جامعة الحسن الثاني بالدار البيضاء
UNIVERSITÉ HASSAN II DE CASABLANCA

جامعة الحسن الأول
UNIVERSITÉ HASSAN 1er

ROYAUME DU MAROC
Ministère de l'enseignement supérieur
de la recherche scientifique
et de la Formation des Cadres

جامعة محمد الخامس
Université Mohammed V

كلية العلوم
Faculté des Sciences et Techniques Mohammedia

ReNSA
Centre de Recherche
Ressources Naturelles Santé et Agroalimentaire

IRD
Institut de recherche
pour le développement

LBM-FST
FES

3rd International Congress

"MICROBIAL BIOTECHNOLOGY FOR DEVELOPMENT"

«MICROBIOD3»

Mohammedia, Morocco, October 24-26th, 2016

Abstract Book

Congress Theme :
"Contribution of Biotechnologies in Bio-Economy:
Health, Environment and Clean Energy"

CONGRESS CHAIRMAN AND EDITOR

Prof.Dr. Moulay Mustapha Ennaji

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- All particpants and scientific contributors
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- The Scientfic Committe
- The Organazing committe
- The Local Support Committe
- The book abstract Edition Committe.

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- Fédération Marocaine des Droits du Consommateur
- Forum hispano-marocain

A friendly thought to all of colleagues who didn't get their visa on time or who didn't have sufficient funds to attend to the MICROBIOD3 congress.

We wish to meet you again in future in the next MICROBIOD4 congress.

Thank you for coming for all of you who make the journey to Mohammedia City!

Have a great conference!

Pr. Dr. Moulay Mustapha ENNAJI , *M.Sc.,Ph.D,RSM (CCM)*
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Contributors:

All the over 350 accepted and published abstract's authors have contributed to this book abstract.
Each contributor is responsible for the content and the results reported in his abstract.

International and National Abstract Review Committee

The 3rd International Conference of Microbioal Biotechnology for Development MICROBIOD3 received over than 480 abstract submissions which were put through a blind, peer-reviewed process carried out by an international and national panel of reviewers who play a critical role, in designing a strong scientific programme.
More than 100 specialists from around the world, which we extend our special thanks for the time they dedicated to the success of the conference and their expertise to serve as peer reviewers, helping to ensure that the abstracts presented were selected, on the basis of rigorous review and were of the highest scientific quality.

Abstract Mentors

The Abstract Mentor Programme provides an opportunity for early-career abstract submitters to receive feedback from experienced abstract submitters on their draft abstracts. The programme links participants to mentors within the same track to maximize the use of the mentors'expertise.

This edition, 40 mentors reviewed 400 draft abstracts for more 200 researchers, offering them an opportunity to improve their submissions. Thus, 315 mentees finally submitted an abstract for The International Conference Microbiod 3, in edition of 2016.

We would like to extend a special thank you to the volunteer abstract mentors, listed in Scientific committe, whose mentoring helped early career Microbiogical and Biotechnologies researchers improve the quality of their abstracts.

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Prof. Dr. Moulay Mustapha Ennaji
FST-Mohammadia, UH2C

Prof. Dr. Moulay Mustapha ENNAJI is a Moroccan citizen native of Marrakesh (Morocco). He is a scientist specialized in the fields of Virology, Hygiene and Microbiology. He got a Master of Science, in 1986, and a PhD in Virology, in 1993, at Armand Frappier Institute, University of Quebec (Canada). Between 1991 and 1993, he completed a post doctorate at the Canadian Red Cross. From 1993 to 1995, he was Research Associate (RA) and from 1995 to 1996 a Research Officer (RO) at the National Council of research of Canada (CNRC). He was also a visiting researcher at the University of California, Irvine, in the US and abroad Lecturer at the Histochemistry Institutes of Paris (France). He was a guest researcher of the Franklin Foundation, in USA, NIH Bethesda. Between 2005 and 2010, he was appointed Director of Virology, Hygiene and Microbiology and coordinator of the consortium of Biomedical and Environmental Sciences Laboratories, at UH2C-FSTM. Since 2010 to present, he is Director of the Laboratory of Virology, Microbiology, Quality and Biotechnology / Eco-toxicology and Biodiversity, Leader of Virology Oncology and Medical Biotechnology Team and deputy director of the Research Centre of Natural Resources and Food (rensa) of UH2C. From 2010 to 2015, he was national expert at CNRST and member of the National Commission for scholarships. Previously, from 2012 to 2014, he was also a UNESCO expert on governance reform of university systems. Throughout his career, he was rewarded with 24 awards. He has organized numerous national and international meetings in the fields of virology, microbiology and hygiene. To date, he is Vice President of the Moroccan Association of Biosafety and Microbiology.

Welcome

Microbiona President's word

President of the Moroccan Association of Biotechnologies and Protection of Natural Resources MICROBIONA
The Third International Congress : Microbial Biotechnologies for Development
MICROBIOD 3
24- 26th October 2016, Mohammedia, Great Casablanca, Morocco

Ladies and Gentlemen:

It is such a great pleasure to welcome all of you to Mohammedia, the beautiful city of roses, that hosts the 3rd international congress of Microbial Biotechnology for Development MICROBIOD taking place from 24th to 26th October, 2016.

On behalf of the Steering, the Organization , the Scientific Committees, and the Local Committees, we would like to express our gratefulness to **Pr. Dr. Moulay Mustapha Ennaji**, the President of this congress and the director of the laboratory of Virology, Microbiology, Quality & Biotechnologies / Ecotoxicology and Biodiversity, who has not only put his energy and personal resources on the congress, but also has been the driving force behind us all. Furthermore, we would like to thank all the members of the Moroccan Association of Biotechnologies and Protection of Natural Resources (MICROBIONA), and **Mr. Pr. Khalid Oufdou** the past president of MICROBIONA whom have always manifested awareness with regards to scientific research in general and microbial biotechnologies in particular. Our thanks are also extended to our key speakers who came from: Germany, Turkey, France, Spain, Tunisia, Slovenia, Jordan, USA, Canada and Morocco.

As president of MICROBIONA, I am pleased to welcome each one of you to the third international congress that is essentially covering five themes; namely: 1- Microbial Biotechnology and Human Health, 2- Microbial Biotechnology and Animal Health, 3- Microbial Biotechnology and Environment, 4- Microbial Biotechnology in Agriculture, 5- Recent Advances in Microbial Biotechnology.

This congress will be organized around 12 plenary conferences and 14 thematic conferences, a round table, tackling the aforementioned themes. Besides, an international symposium and four workshops will be integrated as essential components of the congress. There will also be 80 oral presentations, 300 poster in five poster sessions, and more than 400 abstracts that will be assembled in two books of abstracts and selected proceedings that will be published in due time. We are very confident that the congress will be a great opportunity for all of us interested in Microbial Biotechnologies to keep up-to-date with the latest research findings. We are hopeful that the congress will be both a fruitful and insightful experience for all attendees, participants, and organizers.

We look forward to meeting you all in Mohammedia,Great Casablanca,Morocco

Pr. Nour-eddine MEZRIOUI
President of MICROBIONA

Welcome

MICROBIOD3 Congress Chairman's word

Message from the President of MICROBIOD 3 Congress
Message from the Steering, Organizing and Scientific Board
The Third International Congress: Microbial Biotechnology for Development
MICROBIOD 3
24-26th October 2016, Mohammedia, Great Casablanca, Morocco

On behalf of the Steering, Organizing , Scientific and local Committees, it is a great pleasure for me to welcome all of you to the third International congress "Microbial Biotechnology for development" MICROBIOD 3, in our beautiful city Mohammedia , Morocco.

Building on the previous success of the previous 1st and 2nd international congresses of MICROBIOD1 and 2 that took place at the Faculty of Sciences-Semlalia / Marrakech in 2009 and 2012, this 3rd international congress brings to the forth the latest scientific advances from multiple disciplines in Microbiology and Biotechnologies fields.

We are thankful to the honorable national and international speakers and experts who will shed light on both the body of research conducted recently, as well as the advances that have been made so far in microbial biotechnologies.

This congress has been designed to provide a comprehensive and innovative overview of the latest research development in Microbiology and Biotechnologies fields. It also aims to enhancing the scientific level and the quality of knowledge of our distinguished participants and to encourage the young researchers mainly in Microbiology and Biotechnologies fields.

While preparing the scientific program of this congress, we tried to strike a balance as we organized a round table, various workshops and conferences where experts and specialists from numerous fields get the chance to interact with colleagues, students and young scientists. This will absolutely bring about an exchange of ideas, experiences and up-to-date knowledge in the field of microbial biotechnologies.

We look forward to meeting you in Mohammedia, Great Casablanca, Morocco at the third congress of Microbial Biotechnology for development MICROBIOD 3 from 24 to 26th October 2016.

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PROGRAM

Troisième Édition du Congrès International "Biotechnologies Microbiennes au Service du Développement"

The Third Edition of the International Congress "Microbial Biotechnologies for Development"

MICROBIOD 3

24 au 26 Octobre 2016 - Mohammedia – Maroc

Programme Scientifique / Scientific Program

Dimanche 23 Octobre 2016 / Sunday, October 23th 2016

16H00-19H00 : Accueil et Enregistrement des Participants / Welcome and Registration of Participants Affichage des Posters/ Poster Display

Lundi 24 Octobre 2016 / Monday, October 24th 2016

08H00-09H00 : Accueil et Enregistrement des Participants / Welcome and Registration of Participants Affichage des Posters/ Poster Display

Salle 1 : 09H00-09H30
Cérémonie Officielle d'Ouverture / Official Opening Ceremony

Mot du Président de l'université Hassan II de Casablanca
Mot du Doyen de la Faculté des Sciences et Techniques de Mohammedia
Mot du Président de l'Association Microbiona
Mot du Président du Congrès Microbiod 3

Hommages / Tributes

Hommage Posthume / Posthumous tribute :

- Pr Mohamed Kouam, Ex Doyen de la FSTM et FSTS et Ex Président de l'UCD-El Jadida
- Dr Nouzha Cohen, Microbiologiste, Institut Pasteur du Maroc

Cérémonie d'Hommage / Tribute Ceremony :

- Pr Abdelaziz Benjouad, Immuno-Virologiste, Vice Président à l'UI de Rabat
- Dr Samira Senouci, Microbiologiste Virologiste, Ex Chef de Département de Microbiologie Institut National d'Hygiène-DELM – Rabat

Salle 1 : 09H30-10H30
Conférence Inaugurale / Opening Conference

Modérateurs : Pr. Lkhider M., Doyen de FSTM et **Pr. Mezrioui N.,** Président de Microbiona
Rapporteurs : Pr. Benchekroun M.N., ENCG, Casablanca **et Pr. Azedoug H.**, ENES, Casablanca

09H30-09H50 : Pertinence de la gouvernance équitable du dossier énergétique
Pr. Iraqi Moulay Ahmed, Professeur de Médecine, Ex Ministre de l'Environnement du Maroc et Co-président du COP7 2001 Maroc

09H50-10H15 : **Impact des Énergies Renouvelables à l'Horizon 2030**
Dr. Benkhadra Amina, Ex Ministre de l'énergie et des mines et Président Directeur Général de L'ONHYM, Rabat, Maroc

10H15-10H30 : Discussion Générale

10H30 - 10H45 : Pause Café et Session Poster / Coffee Break and Poster Session

Salle 1 : 10H45-12H30
Table Ronde / Round Table

"Spécificité de la Biotechnologie en Bio Économie comme Levier du Développement Durable : État des Lieux et Perspectives"

Modérateurs : Pr. Amzazi Said, Pr. Lkhider Mustapha, Pr. Benjouad Abdelaziz
Rapporteurs : Pr. Benchekroun Mohamed Nabil, Pr. Hassani Lahcen, Pr. Saile Rachid

Intervenants Invités :

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Pr. Barakate M., FSS, Marrakech
Pr. Amine Az. FST-Mohammedia

Salle 1 : 12H30-14H00

Thème I : Biotechnologies Microbiennes et Santé Humaine
Topic I : Microbial Biotechnologies for Human Health

Modérateurs : Pr. Sehouli Jalid, Pr. Hassani Lahcen, Pr Ennaji My Mustapha
Rapporteurs : Dr. Timinouni Mohammed, Dr. Bennani Abdelouaheb, Pr. Barakate Mustapha

12H30-12H50 : **Conférence Plénière (CP 1)**-Discussion / **Plenary Conference (CP 1)**-Discussion

New aspects in Diagnostic, therapy and follow up care in ovarian cancer
Pr. Sehouli Jalid, University of Berlin, Germany

12H50-14H00 : Session I-1 : Communications Orales et Discussion / Oral Presentation and discussion

12H50-13H00	**COI-1 :** Identification of Bio-Markers using Real Time PCR for Early Diagnosis of Gynecological and Breast Cancers Viral Etiology in Morocco **Ait Hammou Rahma** Faculty of Sciences and Techniques, Mohammedia, Maroc /CHU.
13H00-13H10	**COI-2 :** Sequence Variations in E6 and E7 Oncogenes of Human *Papillomavirus* Type 16 from Gabonese Cervical Cancer Isolates **Assoumou Samira Zoa** University of Health Sciences, Libreville, Gabon
13H10-13H20	**COI-3 :** E6 and E7 Oncogenes of Human *Papillomavirus* Type 16 : Genetic Variability in Congolese Cervical Cancer Isolates **Boumba Luc Magloire Anicet** Faculty of Health Sciences, Brazzaville, Congo
13H20-13H30	**COI-4 :** Can *Helicobacter pylori* vacA genotypes and cagA Status Be Used as Predictor of Gastric Diseases Development in a Moroccan Population ? **El Khadir Mounia** Faculty of Medicine and Pharmacy of Fez, Morocco
13H30-13H40	**COI-5 :** Clinico Pathological Review of 89 Patients with Bile Duct Cancer and Association with *Helicobacter pylori* **Cherif Soumia** FST-Mohammedia /CHU Mohammed VI Morocco
13H40-13H50	**COI-6 :** HIV-1 Drug Resistance Mutations Reported in People Living with HIV in Libreville, Gabon between 2002 and 2009 **Ndjoyi-Mbiguino Angélique** Faculty of Medicine and Health Sciences, Gabon
13H50-14H00	**Discussion**

Salle 2 - 12H50-14H00

Atelier I
Les Énergies Propres et Le Développement Durable : Quel Avenir pour Le Développement Social au Maroc ?

Modérateurs : Pr. Belamine majid, Pr. Iraqi Moulay Ahmed, Pr. Benkhedra Amina
Rapporteurs : Pr. Bessi Halima, Pr. Bahlaoui Abdellah, Pr. Kerak Ebrahim, Pr. Jamil Said
Animateurs : Pr. Bellamine Majid, Pr. Zorkani Izedine Pr. Benchrifa Rachid, Pr. Iraqi Moulay Ahmed, Pr. Mouline Said, Pr. Skali MA, Pr. Zejli Driss, Pr. Bennouna Aziz

L'Efficacité Énergétique et le Développement des Énergies Renouvelables au Maroc
Pr. Said Mouline, Directeur Général de l'ADEREE, Président du Cluster des Énergies Renouvelables et Président de la Fédération de l'Énergie à la CGEM

La Vision Stratégique de la SMI dans le Développement des Énergies Renouvelables au Maroc
Pr. Ahmed Baroudi, Directeur Général de la Société Marocaine d'Investissement

La Coopération entre le Maroc et l'Union Européenne dans le Cadre du Développement des Énergies Renouvelables
Pr. Abdelali Dakkina, Directeur Adjoint et Chef de Projets à l'ADEREE

L'Économie Énergétique, le Maroc et DESERTEC
Pr. **Aziz Bennouna**, Professeur Universitaire Émérite, ex. Secrétaire Général du CNRST

Introduction aux Nanomatériaux et Opportunité d'Application pour le Photovoltaïque
Pr. Azzedine Zorkani, Faculté des Sciences, Fès, Maroc

Le Rôle des Technologies de Stockage dans la Transition Énergétique
Pr. Rachid Benchrifa, Faculté des Sciences, Université Mohamed V, Rabat

Transfert de la Technologie et Coopération Internationale dans le Domaine des Énergies Renouvelables
Pr. Driss Zejli, Université Ibn Toufail de Kénitra, ex. Directeur de la Cellule de l'Économie de l'Énergie de Université Mohamed V de Rabat

14H00-15H00 : Déjeuner et Session Poster / Lunch and Poster Session

Salle 1 : 15H00-18H30

Thème I : Biotechnologies Microbiennes et Santé Humaine
Topic I : Microbial Biotechnologies for Human Health
Modérateurs : Pr. Konuk Muhsin, Pr. Nejjari Chakib, Pr. Zyad Abdelmajid
Rapporteurs : Dr. Senouci Samira, Pr. Hafid Jamal, Dr. El Mzibri Mohammed

15H00-15H30 : **Conférence Plénière (CP2)** - Discussion / **Plenary Conference (CP2)** - Discussion
Pharmacogenomics Applications in Neurophyschyatric Diseases
Pr. Konuk Muhsin, Üsküdar University, İstanbul- Turkey

15H30-15H50 : **Conférence Thématique (CT1)**-Discussion / **Thematic Conference(CT1)**-Discussion
Epidemiology and Clinical Trials in Public Health
Pr. Nejjari Chakib, Université Mohammd VI des Sciences de la Santé, Casablanca, Maroc

15H50-16H10 : **Conférence Thématique (CT2)**-Discussion **/ Thematic Conference (CT2)**-Discussion
Viral Carcinogenesis : Etiopathology of Human Gynecologic Cancer Breast, Cervical and Ovarian
Pr. Ennaji Moulay Mustapha, FST, Mohammedia, Maroc

16H15 - 16H30 : Pause Café et Session Poster / Coffee Break and Poster Session

16H30-18H30 : Session I-2 : Communications Orales et Discussion / Oral Presentation and discussion

16H30-16H40	**COI-7 :** Molecular Characterization of Multi and Extremely Drug Resistant *Mycobacterium tuberculosis* Isolates from Morocco **Oudghiri Amal** FST- Tanger/CNESTEN- Rabat, Morocco
16H40-16H50	**COI-8 :** Detection of *Helicobacter pylori* and its CagA Virulence Gene : Association with Gastric Diseases **Nadifiyine Saloua** Pasteur Institut, Casablanca, Morocco
16H50-17H00	**COI-9 :** Aspects Épidémiologiques et Cliniques de l'infection à *Helicobacter pylori* à travers une Étude Marocaine **Bounder Ghizlane** Faculty of Sciences Ben Msik, Casablanca /Pasteur Institute of Morocco.
17H00-17H10	**COI-10 :** Prevalence of Panton-Valentine Leukocidin in *Staphylococcus aureus* Strains in Tangier Morocco **Mourabit Nadira** Faculty of Sciences and Techniques, Tangier, Morocco
17H10-17H20	**COI-11 :** Phenotypic Characteristics of Methicillin Resistant *Staphylococcus aureus* Isolated from Pediatric in the Mother Child Hospital in Morocco **Serray Bahija** Faculty of Sciences and Techniques, Beni Mellal, Morocco
17H20-17H30	**COI-12 :** Rotavirus VP7 and VP 4 Genotyping in Stool Samples from Children with Acute Diarrhea in Williamsville Area (Abidjan, Côte d'Ivoire) **Karamoko Yahaya** Université Nangui Abrogoua, Côte d'Ivoire
17H30-17H40	**COI-13 :** Évaluation de l'Activité Antifongique de la Pierre d'Alun Comparée avec l'Activité Antifongique du Bicarbonate de Soude et de l'Héxétidine sur les Levures de *Candida* **Dahmane Ouiam** Faculty of Medicine and Pharmacy, Rabat, Morocco
17H40-17H50	**COI-14 :** Putting Viruses to Work for Cancer Diagnostics **Alana Olagata** University of California, Irvine, USA
17H50-18H00	**COI-15 :** Pre Administration of Curcumin Prevents Hyperhomocysteinemia in Ethanol Induced Gastric Ulcer **Hussein Jiha** Faculty of Sciences Cairo University Giza
18H00-18H10	**COI-16 :** COI-16 : In vitro anticancer activity of Euphorbia echinus extract **Sbayou Houda** FST-Settat/ENS Rabat
18H10-18H20	**Discussion**

Salle 1 - 18H30-20H00

Symposium International / International Symposium

"Virus et Cancers : Aspects Génétiques, Thérapies Géniques et Cellulaires, Nouveaux Oncogènes et Signalisation Cellulaire"
/
"Viruses and Cancer: Genetic Aspects, gene and cell therapies, New Oncogenes and Cell Signaling"

Modérateurs : Pr. Sehouli Jalid, Pr. Ennaji Moulay Mustapha
Rapporteurs : Pr. Bennani Bahia, Dr. El Mzibri Mohammed, Dr. Bennani Abdelouahab
Animateurs : Pr. Sehouli Jalid, Dr. Kaufmann Andreas, Pr. Benider A., Dr. Bennani Abdelouaheb, Pr. Bennani Bahia, Pr. Bessi Halima, Dr. El Mzibri Mohammed, Pr. Benhessou Mustapha, Pr. Benchkroune Mohamed Nabil, Pr. Ennaji Moulay Mustapha

Lundi 24 Octobre 2016 / Monday, October 24th 2016

Salle 2 : 15H00-18H15

Thème II: Biotechnologies microbiennes et Santé Animale
Topic II : Microbial Biotechnologies and Animal Health

Modérateurs : Pr. Bennani Bahia, Pr. Bencharki Bouchaib, Pr. Ibn Souda Koraichi Saad
Rapporteurs : Pr. Barrijal Said, Pr. Kichou Faouzi, Pr. Boughribil Said

15H00-15H20 : Conférence Thématique (CT1)-Discussion / Thematic Conference (CT1)-Discussion
Avian Adenoviral Infections and an Update on Their Re-Emergence in Morocco
Pr. Kichou Faouzi, IAV, Rabat, Maroc

15H20-15H40 : Conférence Thématique (CT2)-Discussion **/ Thematic Conference(CT2)**-Discussion
Antitumor potential of Natural Substances and Their Role in the Boosting of Immune System: Cellular and Molecular Analysis
Pr. Zyad Abdelmajid, FST, Beni Mellal, Maroc

15h40-18h15 : Session II-1 : Communications Orales et Discussion / Oral Presentation and discussion

15h40-15H50	**COII-1 :** Pathogenesis and Tissue Distribution of Moroccan Avian Infectious Bronchitis Virus Strains (Italy02 genotype) in Experimentally Infected Broiler Chickens **Khataby Khadija** Faculty of Sciences and Techniques, Mohammedia, Maroc/ BIOPHARMA
15H50-16H00	**COII-2 :** Evaluation of the Safety and Efficacy of a Live Attenuated Thermostable Rift Valley Fever Vaccine in Sheep, Goats, Cattle and Camels **Daouam Samira** Faculty of Sciences and Techniques, Mohammedia, Maroc/ MCI-Mohammedia

16H00-16H10	**COII-3 :** Control of Peste des Petits Ruminants **Fakri Fatima Zohra** Institut Agronomique et Vétérinaire Hassan II, Rabat, Maroc/ MCI-Mohammedia
16H10-16h15	Discussion

16H15 - 16H30 : Pause Café et Session Poster / Coffee Break and Poster Session

Timing	**Titre de Communication / Title of Communication**
16H30-16H40	**COII-4 :** Tuberculosis in Eurasian wild boar (*Sus scrofa*) from Morocco **El Mrini Meryem** Institut Agronomique et Vétérinaire Hassan II, Rabat, Morocco
16H40-16H50	**COII-5 :** Development and Validation of One Step Taq Man MGB Real Time RT-PCR Assay for Rapid Detection and Discrimination of Infectious Bursal Disease Cirus **Cheggag Maryame** Agronomic and Veterinary Institute Hassan II, Rabat/ BIOPHARMA, Morocco
16H50-17H00	**COII-6 :** Comparative Innocuity and Efficacy of Live and Inactivated Sheep pox Vaccines **Hamdi Jihane** Multi Chemical Industry, Mohammedia, Morocco
17H00-17H10	**COII-7 :** Étude Comparative de la Pathogénécité des Souches Marocaines du Virus de la Clavelée **Hajjou Saida** Faculty of Sciences and Techniques, Settat / BIOPHARMA, Morocco
17H10-17H20	**COII-8 :** Comparison of Virological and Serological Findings on Moroccan Bluetongue Virus 1 and 4 Infected Sheep **Drif Kamar** Institut Agronomique et Vétérinaire Hassan II, Rabat, Morocco
17H20-17H30	**COII-9 :** Isolation and Identification of Pasteurella Respiratory Infected Ruminants in Morocco **Sebbar Ghizlane** Faculty of Sciences, Rabat, Morocco/ BIOAPHARMA, Morocco
17H30-17H40	**COII-10 :** Thermal Stability Study of Five Newcastle Disease Attenuated Vaccine Strains **Boumart Zineb** Multi Chemical Industry, Mohammedia, Morocco
17H40-17H50	**COII-11 :** Culture, Identification et Profil de Sensibilité des *Escherichia Coli* en Pathologie Aviaire : Étude rétrospective 2013-2014-2015 **Boughribil Said** Faculté des Sciences and Techniques, Mohammedia, Maroc
17H50-18H00	**COII-12 :** Study of the Effectiveness of Ovipox Vaccine Against a Wild Strain of Sheep pox in Morocco **Lafar Sara** Faculty of Sciences and Techniques, Mohammedia / BIOPHARMA, Morocco
18H00- 18h15	**Discussion**

Mardi 25 Octobre 2016/ Tuesday, October 25th 2016

Salle 1 : 09H00-14H00

Thème III : Biotechnologies Microbiennes et Environnement
Topic III : Microbial Biotechnologies and Environment

Modérateurs : Pr. Göttfert Michael, Pr Jofre Joan, Pr. Gantzer Christophe
Rapporteurs : Pr. Bessi Halima, Pr. Bahlaoui My Abdellah, Pr. Hafidi Mohamed

09H00-09H30 : Conférence Plénière (CP1)-Discussion / **Plenary Conference (CP 1)**-Discussion
Biotechnologies et Énergies Renouvelables
Pr. Bellamine Majid, Max Planck Institutfür Physik, Hambourg, Germany

09H30-09H50 : Conférence Thématique (CT1) - Discussion / **Plenary Thematic (CT1)**-Discussion
Streptomycetes as Drivers of Nutrient Turnover and Organismic Interactions
Pr. Mika Tarkka, UFZ, Halle Salle, Germany

09H50-10H10 : Conférence Thématique (CT2)-Discussion / Thematic Conference (CT2)-Discussion
Stable Isotope Probing of Carbon Flow in the Plant Holobiont
Pr. Achouak Wafa, CNRS-CEA-Aix Marseille II, France

10H10-10H20 : Conférence Thématique (CT 3)-Discussion / Thematic conference (CT 3)-Discussion
Outils Moléculaire de Dernière Génération en Biotechnologies
Pr. Ibrahimi Azedine, Faculté de Médecine, Rabat, Maroc

10H20-10H45 : Session III-1 : Communications Orales et Discussion / Oral Presentation and discussion

10H00-10H10	**COIII-1** : Microbe Assisted Phytoremediation of Metal Polluted Salt Marshes using Halophytes and Plant Growth Promoting *Rhizobacteria* **Paredes Paliz Karina** Facultad de Farmacia, Universidad de Sevilla, Spain
10H10-10H20	**COIII-2 :** Isolement et Identification des Bactéries Tolérantes aux Métaux : Rôle Possible pour la Bio Remédiation **Nouri Mohamed** Faculty of Sciences and Techniques, Beni Mellal, Morocco
10H20-10H30	**COIII-3 :** Dépollution des Solutions Aqueuses Riches en Chrome par le Biofilm de la Souche *Wickerhamomyces anomalus* formé sur les Déchets du Bois **Asri Meryem** Faculty of Sciences and Techniques, Fez, Maroc
10H30-10H45	**Discussion**

10H45-11H00 : Pause Café et Session Poster / Coffee Break and Poster Session

11H00-11H10	**COIII-4 :** Performances Zootechniques d'un Régime Alimentaire à base de Déchets d'Algues Bio Transformés sur la Croissance des Ovins **Ennouali Mohammed** Faculty of Sciences, Kenitra, Morocco

11H10-11H20	**COIII-5 :** Validation of Miniscale Algal Toxicity Bio Assay for Toxicity Screening **Berrebaan Imane** Faculty of Sciences and Techniques, Mohammedia, Morocco
11H20-11H30	**COIII-6 :** Biodegradation of Antibiotics during the Co-Composting of Sludge and Assessment of Their Genotoxicity **Khadra Ahmed** Faculty of Sciences, Marrakech, Morocco
11H30-11H45	**COIII-7 :** Genetic Diversity Characterization of Environmental and Clinical *P. aeruginosa* Isolates from Meknes Region (Morocco) **Maroui Itto** Faculty of Sciences, Moulay Ismail University, Meknes
11H45-11H55	**COIII-8 :** Isolation of Actinobacteria from Arid Sand in Merzouga : Taxonomic Diversity and Biological Activity **Ouchari Lahcen** Faculty of Sciences, Marrakech, Morocco/ CNRST, Rabat
11H55-12H05	**COIII-9 :** Production d'un aliment piscicole équilibre par bio-tranformation optimale de mélanges ternaires de déchets et sous produits organiques des industries agroalimentaires **Lakhal Dounia** Faculty of Sciences and Techniques, Mohammedia, Morocco
12H05-12H15	**COIII-10 :** Etude de l'effet antibactérien de quelques huiles essentielles sur l'agent phytopathogène *Pseudomonas syringae* Pv. Tomato DC3000 **Sabir Asmaa** Faculty of Sciences Ben M'Sik, Casablanca, Morocco
12H15-12H30	**Discussion**

13H00-14H00 : Déjeuner et Session Poster / Lunch and Poster Session

Salle 1 : 14H00-16H00

Thème III : Biotechnologies Microbiennes et Environnement
Topic III : Microbial Biotechnologies and Environment

Modérateurs :Pr. Göttfert Michael, Dr Senouci Samira, Pr. Imziln Boujemaa
Rapporteurs : Pr. Mika Tarkka, Pr. Achouak Wafa, Pr. Karamoko Yahaya

14H00-14H35 : Conférence Plénière (CP1)-Discussion **/ Plenary Conference (CP 1)**-Discussion
Évaluation du Danger Viral dans l'Environnement et les Aliments /
The Public Health Hazard of Food Borne Viruses
Pr. Gantzer Christophe, Université Henri Poincaré, Faculté de Pharmacie, Nancy, France

14H35-15H15 : Conférence Plénière (CP2) - Discussion **/ Plenary Conference (CP2) -** Discussion
Bacteriophages as Indicators of Pathogenic Viruses in the Water Environment
Pr. Jofre Joan, University of Barcelona, Barcelona, Spain

15H15-16H00 : Session III-1 : Communications Orales et Discussion / Oral Presentation and discussion

15H15-15H25	**COIII-11 :** Les Bactériophages dans les Eaux Usées : Outils d'Évaluation de Performance des Traitements d'Épuration pour l'Élimination des Virus Entériques

	Hmaied Fatma CNSTN, Technological Pole, Sidi Thabet, Tunisia
15H25-15H35	**COIII-12 :** Détection des Entérovirus par PCR en Temps Réel dans les Eaux Usées et Étude de Corrélation entre Contamination Virale et Bactérienne **Amri Islem** CNSTN, Technological pole, Sidi Thabet, Tunisia.
15H35-15H45	**COIII-13 :** Characterization of Microbial Diversity in Moroccan Rivers Using a Metagenomics Approach **Ettamimi Sara** Faculty Polydisciplinary of Taza / Faculty of Sciences, Oujda, Morocco
15H45-16H00	**COIII-14 :** Détection des Virus Entériques Pathogènes dans les Milieux Hydriques au Maroc **Attar Aicha** Faculty of Sciences and Techniques, Mohammedia, Morocco

16H00-16H15 : Pause Café et Session Poster / Coffee Break and Poster Session

Salle 1 - 16H15-19H00

Atelier I - Virus à Transport Hydrique : Virus et Environnement

Thème III : Biotechnologies Microbiennes et Environnement
Topic III : Microbial Biotechnologies and Environment

Modérateurs : Pr. Gantzer Christophe, Pr. Hmaied Fatma, Pr Jofre Joan
Rapporteurs : Pr. Mezrioui Noureddine, Pr. Karamoko Yahaya, Pr. Ennaji My Mustapha

Animateurs : Pr Jofre Joan, Pr. Gantzer Christophe, Dr. Senouci Samira, Pr. Hartard Cédric, Pr. Bertrand Isabelle, Pr. Hmaied Fatma, Pr. Hafid Jamal, Pr Amri Islem, Dr. Idrissi Azzouzi Lalla Meryem , Melle Tarek Fatima, Pr. Ennaji My Mustapha

Méthodes de Détection des Virus Pathogènes dans l'Eau et les Aliments
Pr. Christophe Gantzer, Laboratoire de Chimie Physique et Microbiologie pour l'Environnement, UMR 7564,CNRS, Université de Lorraine, Nancy, France

Recherche et Détection des Virus Entériques dans les Bivalves au Maroc
Dr. Idrissi Azzouzi Lalla Meryem, Laboratoire National de Référence de la Poliomyélite, Institut National d'Hygiène, Rabat, Maroc

Detection of Norovirus, Hepatits A virus and Other Human Enteric Viruses in Molluscan Shellfish by Taqman Real Time Reverse Transcription Polymerase Chain Reaction Assay
Tarek Fatima et MM Ennaji, Faculté des Sciences et Techniques, Mohammedia, Maroc

Intérêt des Bactériophages en tant qu'Indicateur de Pollution Virale dans l'Environnement
Pr. Hartard Cédric, Institut Jean Barriol, Université de Lorraine, Faculté des Sciences et Technologies, Vandœuvre-lès-Nancy, France

Bactériophages dans les Eaux Usées : Outils d'Évaluation de Performance des Traitements d'Épuration pour l'Élimination des Virus Entériques

Pr. Hmaied Fatma, Laboratoire de Biotechnologies et Technologie nucléaire, CNSTN, Pôle technologiques Sidi Thabet, Sidi Thabet, Tunisie

Méthodes de Concentration des Virus Pathogènes dans l'Eau
Dr. Isabelle Bertrand, Laboratoire de Chimie Physique et Microbiologie pour l'Environnement, UMR 7564,CNRS, Université de Lorraine, Nancy, France

Difficultés d'Interprétation de la Présence de Génome Viral dans l'Eau et les Aliments
Pr. Gantzer Christophe, Laboratoire de Chimie Physique et Microbiologie pour l'Environnement, UMR 7564,CNRS, Université de Lorraine, Nancy, France

20H30 : Dîner de Gala / Gala Diner (To be confirmed)

Mardi 25 Octobre 2016/ Tuesday, October 25th 2016

Salle 2 : 08H30-13H00

Thème IV : Biotechnologies en Agriculture, Agro Alimentaire et Bioindustrie
Topic IV : Microbial Biotechnologies in Agriculture, Agri-Food and Bioindustry

Modérateurs : Pr. Andrivon Didier, Pr. Oufdou Khalid, Pr. Latrache Hassan
Rapporteurs : Pr. Asehraou Abdeslam, Pr. El Mousadik Abdelhamid, Pr. Bouizgaren Brahim

08H30-09H00 : Conférence Pléniere (CP1)-Discussion / **Plenary Conference (CP1)**-Discussion
From Symbiosis to Biotechnology : The Metal Ion Inducible Autocleavage Domain
Pr. Göttfert Michael, Institut für Genetik, Technische Universität, Dresden, Germany

09H00-09h20 : Conférence Thematique (CT1)-Discussion / **Thematic Conference (CT1)**-Discussion
Optimiser les Processus de Facilitation et de Plant - Soil Feedback par une Gestion Raisonnée du Potentiel Mycorhizogène des Sols dans les Agro Systèmes Méditerranéens
Pr. Duponnois Robin, IRD, Montpellier, France

09H20-13H00 : Session IV-1 : Communications Orales et Discussion / Oral Presentation and discussion

09H20-09H30	**COIV-1 :** Towards the Control of Date Palm Fusariosis (Bayoud Diseases) by Antagonistic *Pseudomonas* to *Fusarium oxysporum* albedinis L. **Bouizgarne Brahim** Faculty of Sciences, Agadir, Morocco
09H30-09H40	**COIV-2 :** Immature Embryo Derived of Two Bread Wheat (*Triticuma estivum* L.) Varieties Transformation using Particle Bombardment Method with Plasmid pBY520

	Tinak Ekom Danielle Christelle Institute of Agricultural Research for Development, Cameroon
09H40-09H50	**COIV-3 :** Serological Detection and Genetic Characterization of *Pepino mosaic Virus* in Moroccan Tomatoes **Souiri Amal** Faculty of Sciences, Rabat / FST Mohammedia, Morocco
09H50-10H00	**COIV-4 :** Genotypic Characterization of Quinolone Resistant *Escherichia coli* Isolates from Retail Food in Morocco **Nayme Kaotar** Faculty of Medicine and Pharmacy /Pasteur Institut, Casablanca, Morocco
10H00-10H10	**Discussion**
10H10-10H20	**COIV-5 :** Moroccan Bioactive *Actinobacteria* Isolates Producing Efflux Pumps Inhibitors of Resistant Bacteria **Azmani Asma** Faculty of Sciences, Marrakech, Morocco
10H20-10H30	**CO IV-6 :** Effect of Dual Inoculation of Chickpea and Lentil with Stress Tolerant Rhizobia and Plant Growth Promoting Bacteria in Morocco **Benjelloun Imane** Faculty of Sciences, Kenitra / INRA, Rabat Morocco
10H30-10H45	**Discussion**

10H45-11H00 : Pause Café et Session Poster / Coffee Break and Poster Session

11H00-11H10	**CO IV-7 :** Biotechnological Properties and Yeasts Biodiversity Habitats Associated to Moroccan Picholine Olive Variety **Boudallaa Yassine** Faculty of Sciences and Techniques, Settat, Morocco
11H10-11H20	**CO IV-8 :** Atténuation du Stress Salin par les Souches de Pseudomonas *fluorescens* Ms-01 et *Azosprillum brasilense* DSM1690 chez les Plantes de Blé **Azaroual Salah Eddine** Faculty of Sciences, Agadir, Morocco
11H20-11H30	**CO IV-9 :** Plant Cyanobacteria Interactions : Cyanotoxins Water Contamination and Impact on Agricultural Crops **El Khalloufi Fatima** Polydisciplinary Faculty of Khouribga, Morocco
11H30-11H40	**CO IV-10 :** Role of Plant and Aphid Partners in Poleroviruses Transmission by Aphids **Boissinot Sylvaine** Faculty of Sciences and Techniques, Settat, Morocco
11H40-11H55	**Discussion**
11H55-12H05	**CO IV-11 :** Ecology of Pantoea Agglomerans 2066-7 Strain : a Biological Control of Bacteria Onion Diseases **Sadik Soumia** Faculty of Sciences, Meknes, / INRA, Meknes, Morocco
12H05-12H15	**CO IV-12 :** The effect of *Myrtus communis* Extract on Cedar Wood Surface Energy : Theoretical and Experimental of Fungal Adhesion **Sadiki Moulay** Faculty of Sciences and Techniques, Fez, Morocco
12H15-12H25	**CO IV-13 :** Isolation and Identification of Potential Mycotoxin Producing Fungi on Pasta in Morocco **Bouafifssa Y.** Faculty of Sciences, El Jadida, Morocco

12h25-12h35	**CO IV-14 :** *In-vitro* Evaluation of the Antagonistic Activity of *Bacillus amyloliquefaciens* and *Trichoderma harzianum* against *Colletotrichum acutatum* **Es-Soufi Rababe** Faculty of Sciences, Tetouan, Morocco.
12h35-12h45	**Discussion**

13H00-14H00 : Déjeuner et Session Poster / Lunch and Poster Session

Salle 2 : 14H00-17H30

Thème IV : Biotechnologies en Agriculture, Agro Alimentaire et Bioindustrie
Topic IV : Microbial Biotechnologies in Agriculture, Agri-Food and Bioindustry

Modérateurs : Pr. Benchekroun Moncef, Dr. Achbani El Hassan, Pr. Ouhdouch Yedir
Rapporteurs: Pr. Mazouz Hamid, Pr. Oudra Brahim, Pr. Faghir M

14H00-14H30 : Conférence Plénière (CP2)-Discussion / **Plenary Conference (CP2)** - Discussion
Epidemiovigilance for Improved Control of Plant Diseases : the Case of Potato Late Blight
Pr. Andrivon Didier, INRA, Rennes, France

14H30-14H50 : **Conférence Thématique (CT2)** - Discussion / **Thematic Conference (CT2)**-Discussion
The Rhizobia Legumes Relationship under Salinity Stress
Pr. Oufdou Khalid, Faculty of Sciences, Marrakech, Maroc

14H50-19H10 : Session IV-2 : Communications Orales et Discussion / Oral Presentation and discussion

14H50-15H00	**CO IV-15 :** Can Moroccan Rock Phosphate Be Useful after Bio Solubilization for Sustainable Agriculture ? **Hassimi Moussa** University of Tillabéri, Niger / Faculty of Sciences Marrakech, Morocco
15H00-15H10	**CO IV-16 :** Prevalence, Molecular and Antimicrobial Resistance of *Salmonella* Isolated from Sausages in Meknes, Morocco **Ed-Dra Abdelaziz** Faculty of Sciences, Meknes, Morocco
15H10-15H20	**CO IV-17 :** The Potential Effects of Herbicides on Soil Bacterial Communities **Mhamdi Ridha** Centre of Biotechnology of Borj-Cedria, Tunisia
15H20-15H30	**CO IV-18 :** Characterization of the Bacteriological and Physicochemical Quality of Raw Milk Cow : Influence of Production Conditions **Cherqaoui Sidi Yassine** Faculty of Sciences, Kenitra, Morocco
15H30-15H40	**CO IV-19 :** Antibacterial, Antioxidant and Cytotoxic, Effects of Old and Freshly Harvested Propolis Extracts **El Mouftari Moulouda** Faculty of Sciences and Techniques, Beni Mellal, Morocco
15H40-15H50	**CO IV-20 :** Chemical Composition, Cytotoxic and Antibacterial Activities of the Essential Oil of *Lippia citriodora* Grown in Different Moroccan Regions

	Oukerrou Moulay Ali Faculty of Sciences and Techniques, Beni Mellal, Morocco
15H50-16H00	Discussion

16H00-16H15 : Pause Café et Session Poster / Coffee Break and Poster Session

16H15-16H25	**CO IV-21 :** Effect of Chitosan and Mycorrhizal Fungi on Stomatal Conductance and Leaf Area of the Tomato Crop Submitted to Two Water Treatments **El Amerany Fatima** Faculty of Sciences, Marrakech, Morocco
16H25-16H35	**CO IV-22 :** Chemical Composition and Antimicrobial Activity of *Periplocalae vigata* Essential Oil and Its Synergistic Potential with Conventional Antibiotics **Ait Dra Loubna** Faculty of Sciences, Marrakech, Morocco
16H35-16H45	**CO IV-23 :** Theoretical Effect of Coating Cobalt and Nickel Based Dental Alloys with a *Bacillus* sp. Extract on the Adherence of *Candida albicans* **Balouiri Mounyr** Faculty of Sciences and Techniques, Fez, Morocco
16H35-16H45	**CO IV-24 :** Potential of *Rhizobium* Strains Isolated from Root Nodules of *Hedysarum flexuosum* for Promotion of Plant Growth **Ezzakkioui Fatima** Faculty of Sciences and Techniques, Tangier, Morocco
16H45-16H55	**CO IV-25 :** Ectomycorrhization of Carob (*Ceratonia siliqua* L.) **Zouari Najat** Faculty of Sciences, Tetouan, Morocco
16H55-17H05	**COIV-26 :** Isolement du Jus de Presse de Canne à Sucre d'une Souche de *Candida* sp. Thermophile et Productrice de Fructofuranose **Ennouali Mohammed** Faculty of Sciences, Kenitra, Morocco
17H05-17H20	**Discussion**

20H30 : Dîner de Gala / Gala Diner

Mercredi 26 Octobre 2016/ Wednesday, October 26th 2016

Salle 1 : 08H30-14H00

Thème V : Avancées et Progrés Récents en Biotechnologies Microbiennes
Theme V : Recent Advances and Progress in Microbial Biotechnologies

Modérateurs : Pr. Crtomir Podlipnik, Pr.Konuk Muhsin, Dr. Loutfi Chafiqa
Rapporteurs : Pr. Ouhssine Mohamed, Dr. El Mzibri Mohammed, Pr. Larini Khalid

08H30-09H05 : Conférence Plénière (CP1)-Discussion / Plenary Conference (CP1)-Discussion

Selection of Targets for Rational Drug Design of Inhibitors for Viral Diseases

Pr Crtomir Podinik, University of Ljubljana, Faculty for Chemistry and Chemical Technology, Ljubljana, Slovenia

09H05-09H25 : Conférence Thématique (CT1)-Discussion/Thematic Conference(CT1)-Discussion
New Technologiesand HPV Genotyping : What's Implication in Developing Countries ?
Pr. Bennani Bahia, Faculté de Médecine, Fes, **Maroc**

09H25-09H45 : Conférence Thématique (CT2)-Discussion / Thematic Conference(CT2)-Discussion
Génotypage Moléculaire des Souches Résistantes de *Mycobacterium tuberculosis* isolées au Maroc
Dr. El Mzibri Mohamed, CNSTEN, Rabat, Maroc

09h45-10H05 : Conférence Thématique (CT3)-Discussion / Thematic Conference (CT3)-Discussion
Molecular Epidemiology of Hepatites B and C in Morocco
Dr. Bennani Abdelouahab, IPM Casablanca

10H05-10H25 : Conférence Thématique (CT4)-Discussion / Thematic Conference (CT4)-Discussion
Nouvelles Générations de Vaccins en Santé Animale : Les Vaccins Recombinants
Dr. Loutfi Chafiqa, Biopharma, Rabat, Maroc

10H25-10H45 (CT5)-Discussion / Thematic Conference (TC5)-Discussion
Les Nano Biocapteurs dans le Diagnostic en Microbiologie
Pr. Amine Aziz et Pr. Ennaji Moulay Mustapha, Faculté des Sciences et Techniques, Mohammedia, Maroc

10H45-11H00 : Pause Café et Session Poster / Coffee Break and Poster Session

11H00-13H45 : Session V-1 : Communications Orales et Discussion / Oral Presentation and discussion

11H00 -11H10	**CO V-1 :** Molecular Epidemiology of Phlebovirus in Four Provinces in Morocco **El Kacem Sofia** FST-Mohammedia/Pasteur Institut, Casablanca, Morocco
11H10-11H20	**CO V-2 :** Neutral Serine Protease from *Trichoderma harzianum*. Purification, Biochemical Characterization and Use in Antibacterial Peptides Preparation from *Scorpaena notata* muscle **Abidi Ferid** Institute of Applied Sciences and Technology, Tunis, Tunisia
11H20-11H30	**CO V-3 :** Modélisation Mathématique de l'Activité Autolytique de *Lc. lactis* en fonction de Deux Variables Physicochimiques par l'Usage des Surfaces de Réponses **Hassaine Omar** Faculty of Natural Sciences and Life, Oran, Algérie

11H30-11H40	**CO V-4 :** Molecular Determinants of Aggressively of Barley yellow dwarf virus BYDV-PAV Groups CPII Isolates **Bencharki Bouchaib** Faculty of Sciences and Techniques, Settat, Morocco
11H40-11H50	**CO V-5 :** Inhibitors effects of Oleuropein, Kaempferol and Quercetinon the Spike protein of MERS *Coronavirus* InSlico **Kasmi Yassine** Faculty of Sciences and Techniques, Mohammedia, Morocco
11H50-12H00	**CO V-6 :** QSAR Modelling and Molecular Docking Studies of Three Models of delta Opioid Receptor **Sapundzhi Fatima** Bulgarian Academy of Sciences, Bulgaria
12H00-12H15	**Discussion**
12H15-12H25	**CO V-7 :** Competitive Electrochemical Immunosensor for Hepatitis A Detection based on Horseradish peroxidase as a Signal Amplification Label **Mandli Jihane** Faculty of Sciences and Techniques, Mohammedia, Morocco
12H25-12H35	**CO V-8 :** Application of the Experimental Design for the Development of a Reverse Hybridization Technique on Strips for Oncogenic HPV Detection and Typing **El Aliani Aissam** Faculty of Sciences and Techniques, Mohammedia / CNESTEN, Morocco
12H35-12H45	**CO V-9 :** Statistical Approach for Optimization of Lipase Production by *Bacillus subtilis* **Misbah Asmae** Faculty of Sciences and Techniques, Fez, Morocco
12H45-12H55	**CO V-10 :** Bionomics of *Anopheles sergentii* and first Molecular Detection of its Insecticide Resistant Genes Kdr and Ace-1 in Morocco **Benabdelkrim Filali Oumama** FST Mohammedia/Pasteur Institute, Casablanca, Morocco
12H55-13H05	**CO V-11 :** Novonestmycins A and B, Two Non Polyenic Antifungal Derivatives Newly Produced by *Streptomyces* sp. Z26 : Purification and Structural Elucidation **Nafis Ahmed** Faculty of Sciences, Marrakech, Morocco/ IMIT, University Tübingen, Germany
13H05-13H15	**CO V-12 :** Can the Available Vaccine (Mass-type H120) of Avian Infectious Bronchitis Able to Protect Against a New Emerging Italy02 Genotype in Moroccan Broiler Chickens ? **Khataby Khadija** Faculty of Sciences and Techniques, Mohammedia /BIOPHARMA, Morocco
13H15-13H25	**CO V-13:** A simple, rapid and efficient method of Pepino mosaic virus RNA isolation from tomato fruit **Souiri Amal** Faculty of Sciences Rabat / FST Mohammedia, Morocco
13H25-13H35	**CO V-14 :** Assessment of Genetic Diversity Among 16 *Sorghum* Accessions in Morocco using SSRs Markers **Alloudane Rajae** Faculty of Sciences and Techniques, Tangier, Morocco
13H35-13H45	**Discussion**

13H45-14H45 : Déjeuner et Session Poster / Lunch and Poster Session

Salle 1 - 14H45-17H00

Atelier III
Double Usage en Sciences du Vivant : Aspect Biosécurité et Biosûreté

Modérateurs : Pr. Temsamani Khalid, Dr Senouci Samira, Pr. Ennaji Moulay Mustapha
Rapporteurs : Pr. Serrar Driss, Pr. Fares Khalid
Animateurs : Pr. Temsamani Khalid, Dr Senouci Samira, Pr. Serrar Driss, Pr. Fares Khalid, Pr. Ennaji Moulay Mustapha

Salle 2 - 14H45-17H00

Atelier IV
La pomme de Terre : Aspect Sanitaire, Lutte contre les Ennemis, Efficacité et Durabilité dans la Sécurité Alimentaire Mondiale"

Modérateurs : Pr. Andrivon Didier et Pr. Ennaji Moulay Mustapha
Rapporteurs : Pr. Barakate Mustapha, Pr. Achbani El Hassan, Pr. Boughribil Said
Animateurs : Pr. Andrivon Didier, Pr. Barakate Mustapha, Dr Achbani El Hassan, Pr. Ennaji M.M.

MICROBIOD 3 Award of Best Oral Communication
MICROBIOD 3 Award of Best Oral Communication

17H00-17H30 : Pause Café / Coffee Break

Mot des Associations
American Society for Microbiology, Pr. Ghazal Hassan
Moroccan Association of Microbiology, Dr El Mzibri Mohammed
MICROBIONA Association, Pr. Mezrioui Noureddine
The Moroccan Biosafety Association (MOBSA/AMABIOS), Pr. Temsamani Khalid

Salle 1 : 17H30-18H00
Synthèse du Congrès / Synthesis of The Congress
Cérémonie de Clôture du Congrès / Closing Ceremony of Congress

Modérateurs : Pr. Mezrioui N, Président de Microbiona, **Pr. Ennaji M.M**, Président MICROBIOD3
Rapporteurs : Pr. Oufdou K., Pr. Barakate M., Pr. Bouizgaren B.

Annonce de la 4ème édition de Microbiod

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OC1 : Pertinence de la Gouvernance Équitable du Dossier Énergétique

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Biography

MoulayAhmed Iraqi est Ex Ministre de l'Environnement, Président / membre actif de Sociétés Savantes

Vice Président du comité d'éthique de la Faculté de Médecine de Casablanca(FMC) ; Animateur de séminaires de Pédagogie ; Animateur de conférences et de débats scientifiques et publiques ; Consultant d'organismes étatiques et institutionnels (Santé-environnement enseignement) ; Membre de comités de lecture de revues scientifiques ; Secrétaire Général adjoint du parti socialiste ; Éditorialiste du Journal « Al Manbar Il Ichtiraki »

Ayant une Carrière hospitalo-universitaire de recherche, ordinale, associative, politique et syndicale bien remplie, Pr. Iraqi est également

Auteur d'articles et de manuscrits scientifiques ; Auteur d'essais sur la vie publique ; Participant au débât public écrit et radio diffusé ; Président honoraire de la SMSM depuis1998 ; Titulaire du Wissam Alaouite, depuis1991 ; Vice Président honoraire de la FMPC, depuis 1989. Moulay Ahmed Iraqi est Docteur en Médecine (UPS, Toulouse, 1977), Titulaire du C.E.S d'Anatomie Pathologique, France, 1979) et Expert en pédagogie (Université Paris V, 1988).

Outre sa formation académique, il est à souligner que Pr. Moulay Ahmed Iraqi est titulaire de Titres honorifiques de « National Arab Medical Association », « Association Catalyse et Environnement», Sociétés Maghrébines et Marocaines de Sciences Médicales, Facultés et Universités Marocaines.

Abstract

La gouvernance des énergies répond éternellement et universellement à la raison de l'homme (RDH). Les variations spatio-temporelles qui l'accompagnent relèvent de la sorte de la perception individuelle des défis qui lui sont inhérents. Elle est, par conséquent, synonyme d'un consentement implicite, certes, nuancé, mais, effectif. Ni les déficits globaux de la planète ni la majoration croissante des disparités d'accès spatial et social des ressources même vitale n'en affecte l'immunité, au contraire, c'est en somme le moteur d'une histoire marquée par des alliances, des conflits et de compromis à la fois consensuels et conflictuels.

Par sa pensée, la gouvernance en fait de l'ensemble des ressources vitales transcende les époques et les lieux. Par la mondialisation culturellement consentie d'une manière ou d'une autre, elle débouche sur une institutionnalisationuniversellement commune. Le spectre du réchauffement climatique domine par des retombées angoissantes l'ordre du jour de la communauté internationale. Du fait de la prééminence de la RDH, l'investissement humain et financier, malgré le dépassement de son seuil de tolérance devient aussi insupportable qu'inefficient. Car rien n'empêche la raison de la nature (RDN) de répondre sévèrement mais normalement à la sollicitation anormale des ressources et des réceptacles de vie. Les progrès spectaculaires notamment mais non exclusivement des sciences de la vie et de la terre conjugué avec les leçons du passé ouvrent cependant la voie du meilleur mais sous réserve d'une lucidité authentique. L'argumentaire de celle-ci repose sur deux grandes vérités, l'une portant sur les ressources vitales et l'autre sur la gouvernance adéquate. La première tient à la réalité de la diversité globale et intégrée de la dynamique de l'environnement, et la seconde au dictat de l'adaptation aux évolutions spatiotemporelle des changements qui s'en suivent. Les deux convergent en la qualification de la gestion équitable des ressources naturelles de conditions incontournables de la survie d'abord et du mieux être ensuite. C'est tout juste une question de volonté, l'obstacle à franchir étant plus idéologique que scientifique.

Quoiqu'il en soit, l'autonomie énergétique revêt le caractère d'une vue de l'esprit aussi dangereuse qu'erronée et dangereuse. La vertu de la gouvernance équitable des ressources disponibles et mobilisables spatialement et socialement fait en revanche la pertinence des précisions apportées à ses termes de référence.

OC2 : Impact des Énergies Renouvelables à l'Horizon 2030

Dr. Benkhadra A.
Président Directeur Général l'ONHYM, Rabat, Maroc et Ex-Ministre de l'Énergie et des Mines

Dr. Amina Benkhadra

Executive Director of National Office of Hydrocarbons and Mining

Biography

Amina Benkhadra is a Moroccan engineer and politician. She was Minister of Energy, Mines, Water and Environment of Morocco, in the El Fassi government, between 2007 and 2012. She is executive director of the National Office of Hydrocarbons and Mining (ONHYM).

Amina Benkhadra gets a degree in Civil Engineering, Specialty Mining, of the National School of Mines of Nancy, in 1978, a doctorate in Mining Engineering Science and Technology at Mines ParisTech, in 1981, and a certificate in Management Training at Columbia University, in 1991.

His career began, in 1982, at the Office of Research and Mining Participation (BRPM). It first began as a department head of mining studies, at the Studies and Valuation Division BRPM. She became head of the department of Mining Studies and Head of the Investments Division. In 1994, she is

Director of Mines in the Ministry of Energy and Mines. Meanwhile, she is a director in the boards of several mining companies, subsidiaries or partners ONHYM.
She became director of BRPM, in 1998, after putting up a new strategy for development of the mining sector, while she held the office of Secretary of State for Development of the mining sector.

She is executive director of the National Research Agency and Oil Operations (ONAREP), since 20 August 2000. She is also the president of the Federation of the Mineral Industry (FDIM).

In 2013, it is one of "25 Most Powerful Women in Business in Africa" the Newspaper Jeune Afrique.

PCI-1 : New Aspects in Diagnostic, Therapy and Follow Up Care in Ovarian Cancer

Pr. Sehouli Jalid
University of Berlin, Germany

Pr. Jalid Sehouli

Biography

Name Professor Jalid Sehouli, M.D.
Birthday/ -place 1968, April 19th / Berlin
Nationality German, Moroccan
CurrentPositions Director of the Clinic of Gynecology, Charité Campus Virchow Clinic, Berlin
Director of the Clinic of Gynecology, Charité Campus Benjamin Franklin, Berlin
Head of the European Competence Center for Ovarian Cancer (EKZE), Charité Campus Virchow Clinic, Berlin,
Head of the Interdisciplinary Center of Gynecolgical Cancer of the Charité

AcademicCareer

10/2014 Acceptance of Professorship for Gynecology for life at Charité
06/2013 Invitation for professorship of gynecology (ordinaries)to University of
11/2013 Hamburg/Eppendorf/ Germany University Medicine Berlin
10/2007 Professorship for Gynecology at Charité UniversityMedicine Berlin
01/2005 Habilitation (postdoctoral lecturer qualification) at theHumboldt-University with the theme: "MultimodalManagement in Malignant Ovarian Tumors"
01/2005 Certification for student teaching: Gynecology and Obstetrics
09/1998 Doctoral thesis: Postoperative use unconventional cancer therapies in gynaecologic oncology

Academic Education

04/1989 Study of human medicine at the Humboldt-UniversityBerlin
03/1991 Preliminary medical examination
03/1992 1. State examination
04/1994 2. State examination
05/1995 3. State examination

Professional Education

04/1988-04/1989 Apprenticeship to nursery / University of Berlin, Charité,Campus Virchow-Klinikum
07/1995-01/1996 Medical doctor in practice
07/1995-09/1996 Hospital: Ernst von Bergmann-Klinikum Gynecology and ObstetricsDirector: Prof. Dr. H. Hagen
10/1996-01/1997 University of Berlin, Charité Campus Virchow-Klinikum Gynecology and Obstetrics Director: Prof. Dr. W. Lichtenegger

02/1997-09/1999 Medical doctor, scientific assistant, study coordinator ofdifferent phase-I, -II- and phase-III trials on the field ofgynaecologic oncology
Since 10/1999 University of Berlin, Charité Campus Virchow-Klinikum
07/2002 Consultant for Gynecology and Obstetrics
02/2003 Attending, Department of Gynecology and Obstetrics,Charité Campus Virchow-Klinikum
01/2004 Leading Attending, Department of Gynecology and Obstetrics, Charité Campus Virchow-Klinikum
09/2006 Certification of special training on GynecologicalOncology
07/2007 Professorship for Gynecology and position as
Deputy Director of the Department of GynecologyCharité, Campus Virchow-Klinikum
11/2007 Head of the European Competence Centre for OvarianCancer, Charité Campus Virchow-Klinikum, Berlin
Since 04/2011 Director of the Department of Gynecology, CharitéCampus Virchow-Klinikum
10/2013 Official Offer of a professorship at University Eppendorf,Hamburg
Since 12/2013 Director of the Department of Gynecology, Charité Campus Benjamin Franklin
10/2014 Acceptance of a lifetime professorship, Charité –University Medicine Berlin
Reproductive Medicine Research Trials:
Director of studies of different phase I, II and II trials concerning targeted therapies
Publications:
More than 350 international publications in professional journals
Editor and author of more than 50 book or book chaprters

PCI-2 : Pharmacogenomics Applications in Neurophyschyatric Diseases

Pr. Konuk Muhsin

Institute of Science and Technology, University of Yardmcılığı, İstanbul, Turkey

Pr. Muhsin Konuk

Biography

He was born, in 1964, in Emirdag. Primary and secondary education completed at Ataturk primary school and in Vaishali Vaishali. He graduated from Selcuk University, in 1984, and worked for a year as a biology teacher in a private educational institution.

In 1985, he became a research assistant in the Department of Biology of the Faculty of education at Selcuk University. In 1998, he completed his Master. State Scholarships, in the UK (University of Wales, Swansea), was commissioned to do a PhD. He received his Ph.D. in Molecular Biochemistry field, in 1994, by completing Selçuk University, in GATA Research Center. Among 1995-1996, he completed his military service, as a reserve officer in the same year and received the title of Professor.

In 2002, at Afyon Kocatepe University, Faculty of Arts and Sciences, Department of biology, he was appointed Professor of the Department of molecular biology. In the same year, he was BATTERY vocational high Schools's Coordinator.

Biology Department Chairman and Dean of the Faculty of Arts and Sciences, he was appointed. In the meantime, with a short period of time the BATTERY has performed the Coordinator of international relations. At the University was established by the Commission and the Assembly tasks a lot.

He is currently Director of the Institute of Science and Technology, at the University of Yardmcılığı, Rector of Üsküdar, Deputy Director of the Institute of Social Sciences, Faculty of Engineering and Natural Sciences Molecular Biology Department.

CTI-1 : Epidemiology and Clinical Trials in Public Health

Pr. Nejjari C.
Université Mohammd VI des Sciences de la Santé, Casablanca, Maroc
Faculté de Médecine et de Pharmacie, Fès, Maroc

Pr. Chakib Nejjari

Biography

Professeur de l'enseignement supérieur, Département d'Epidémiologie et Santé Publique, Faculté de Médecine et de Pharmacie de Fès. Titulaire d'un doctorat en Médecine et d'un doctorat en sciences d'épidémiologie et de santé publique, à l'Université Bordeaux Segalen, Bordeaux, France. Ancien chercheur, dans une unité INSERM, à Bordeaux, en France, puis, enseignant chercheur à la Faculté de Médecine et de Pharmacie de Casablanca, il a lancé à la jeune Faculté de Médecine et de Pharmacie de Fès le Département d'Epidémiologie et Santé Publique, réunissant une équipe dynamique et formée à cette discipline. Pr. Nejjari s'est toujours intéressé à l'interaction entre l'environnement et la santé, dans leurs aspects globaux et les stratégies de lutte contre les nuisances environnementales. Directeur du laboratoire d'Epidémiologie et de Recherche Clinique, il est chef du département des Sciences fondamentales et médecin chef du centre de diagnostic, au sein du centre hospitalier Hassan II à Fès. Il a été membre du Conseil de l'Université Sidi Mohamed Ben Abdellah et des conseils académique et scientifique de cette Université.

Il est membre de plusieurs sociétés savantes nationales et internationales. Il est expert de plusieurs organisations gouvernementales ou non gouvernementales, nationales ou internationales, notamment, le ministère de la santé, l'organisation mondiale de la santé et l'union internationale de lutte contre la tuberculose et les maladies respiratoires. Il a organisé ou contribué à l'organisation de plusieurs rencontres ayant trait à l'environnement et à la santé.

Il a contribué à de nombreux travaux de recherche en Epidémiologie et Santé Publique, tant au niveau national qu'international. Il est actuellement associé à des programmes de recherche internationaux. Il a reçu un certain nombre de distinctions, notamment, la Médaille d'Honneur du "Comité National

contre les Maladies Respiratoires et la Tuberculose" (Paris, 1995), le Prix « COLUMBUS Prévention Médicale » (Paris, 1997) et le Prix Emile-Aubertin de l'Association Bordelaise et Régionale pour l'Avancement et la Diffusion des Sciences Médicales" (Bordeaux, 1994). Il a été aussi membre de l'équipe ayant reçu le prix Hassan II, pour l'étude Casa Airpol dirigée par le Pr. M. Bartal.

PCI-2 : Viral Carcinogenesis : Etiopathology of Human Gynecologic Cancers Breast, Cervical and Ovarian

Pr. Ennaji M.M.
Laboratory of Virology, Microbiology, Quality and Biotechnologies and Eco-toxicology and Biodiversity, Faculty of Sciences and Techniques, Mohammedia, Maroc
Team of Virology, Cancerology, Quality and Medical Biotechnologies, Faculty of Sciences and Techniques, Mohammedia, Maroc

Pr. Moulay Mustapha Ennaji

Biography

Pr. Moulay Mustapha Ennaji is a Moroccan citizen native of Marrakesh (Morocco). He is a scientist specialized in the fields of Virology, Hygiene and Microbiology. He got a Master of Science, in 1986, and, a PhD, in Virology, in 1993, at Armand Frappier institute, University of Quebec (Canada). Between 1991 and 1993, he completed a post doctorate, at the Canadian Red Cross. From 1993 to 1995, he was Research Associate (RA) and, from 1995 to 1996, a Research Officer (RO), at the National Council of Research of Canada (CNRC). He was also a visiting researcher, at the University of California, Irvine, in the US and abroad Lecturer, at the Histochemistry Institutes of Paris (France). He was a guest researcher of the Franklin Foundation, in USA, NIH Bethesda.

He was recruited, in 1996, to the Faculty of Sciences and Techniques Mohammedia (FSTM), falling under Hassan II University of Casablanca (UH2C), as a lecturer and enabled Professor where he was the head of the biology department, from 1997 to 2000. He is currently Professor of Higher Education (PES), in the same Faculty. As he is a scientist who is concerned by the research development, he gives numerous conferences and lectures, in Virology, Cancerology, Hygiene and Microbiology, since 1986, at many Moroccan, Canadian and American universities.

Between 2005 and 2010, he was appointed Director of Virology, Hygiene and Microbiology, and coordonator of the consortium of Biomedical and Environmental Sciences laboratories, at UH2C-FSTM. Since 2010 to present, he is Director of the Laboratory of Virology, Microbiology, Quality and Biotechnology, Eco-toxicology and Biodiversity, Leader of Virology Oncology and Medical Biotechnology Team and deputy director of the Research Centre of Natural Resources and Food (rensa) of UH2C. He was also responsible for the Master programs in Biotechnology and Biomedical Technologies (2000-2003), DESA of Microbiology and Bioengineering (2005 to 2010) and Master of Science and Technology (MST Microbiology, Applied Virology and Bio-industry Engineering and

MST of Livings (Immuno-Virology and Applied Microbiology), from 2010 to 2015. He is a member of the Council of the Center of Doctoral Studies (CEDoc), at FSTM-UH2C, since 2008. Between 2005 and 2010, he was deputy head of the UFR DESA Biomedical Sciences and from 2000 to 2005 deputy leaders of the UFR PhD, in Health and Environment. Since 2005 to present, he is Deputy Head of Life and Environment Sciences Doctoral UFR. From 2010 to 2015, he was national expert at CNRST and member of the National Commission for scholarships. Previously, from 2012 to 2014, he was also a UNESCO expert on governance reform of university systems.

Throughout his career, he was rewarded with 24 awards. He has organized numerous national and international meetings in the fields of virology, microbiology and hygiene. To date, he is Vice President of the Moroccan Association of Biosafety and Microbiology To date, he is Vice President of the Moroccan Association of Biosafety and Microbiology.

Abstract

Cancer is a leading cause of death worldwide and about 70% of all cancer deaths are reported and occurred in low and middle income countries. Gynecological cancers account for 19 % of cancers worldwide. In Africa, the most common cancers, in women, are breast and cervical cancer. The cancer mortality pattern is quite different, in Africa, compared to other parts of the world. This may be explained by the difference in the climate, diet, genetic factors and so on. Cancers causing viral infections such as HBV/HCV, EBV and HPV are responsible for up to 20% of cancer deaths in low and middle income countries.

In Morocco, breast and gynecological cancers are a real national public health problem. Annually, Morocco recorded nearly 30,000 new cases of cancer. However, gynecological cancers (breast, cervical and ovarian) represent 60 % of all women's cancers, in Morocco, and 50% of women treated, in 2011, at the National Institute of Oncology, in Rabat, Morocco.

The development of new technologies, including molecular tools allow the biology, to ensure an important role in cancer research. Today, the knowledge produced by basic research, in Molecular Biology, bioinformatics sequencing and phylogeny contribute greatly, in diagnostics, therapeutics and prognostics of these cancers. Whether molecular signatures allowing typing of cancers, cellular or extracellular biomarkers for the diagnosis and monitoring or targeted molecules characterization of viral etiology, transfers between biology and clinic, are currently the most studied.

Consequently, researches attempting to identify the real causes or origins of breast and gynecological cancers are manifold including viral etiology which involve principally the HPV (Human Papilloma Virus), EBV, MMTV, HBV. Etiology as viral risk factor is often reported in these cancers. Furthermore, the study of the p53 protein which is a tumor suppressor factor, acting as a negative regulator of cell growth by inducing cell cycle arrest or apoptosis and can be regarded as a marker for predicting evolution in tumors.

It is in this context that our team conducted several studies based on molecular identification of these cancers, using specific techniques (conventional PCR, real time PCR, genome sequencing and phylogeny) and studied of epigenetic and epidemiology of breast and gynecological cancers, among the African population (the case of Gabon, Mali and Congo) and, in particular, the Moroccan population. Besides, most of these studies focused on the determination of phylogeny, strains in circulation in these countries and viral etiology using specific primers for each virus which demonstrated an involvement, in these cancers.

The diagnosis is often made in the later stages and, consequently, poor prognosis, prevention of breast and gynecological cancers should be strengthened in Africa and Morocco. Thus allowing further developing preventive strategies, establishing a better prognosis and appropriate therapeutic monitoring for patients.

Finally, breast and gynecological cancers, in Africa and Morocco, are a scourge whose characteristics remain unclear.

Keywords : Africa, breast and gynecological cancers, molecular characterization, diagnosis, prevention

TCII-1 : Avian Adenoviral Infections and an Update on Their Re-Emergence in Morocco

Pr. Kichou F.
Department of Veterinary Pathology and Public Health, Hassan 2nd Institute of Agronomy and Veterinary Medicine, Rabat, Morocco

Pr.Kichou Faouzi

Biography

Nom : Kichou - **Prénom** : Faouzi
Date et lieu de naissance : 16 Fevrier 1959 à Oujda.
Nationalité : marocaine - *Statut marital* : marié & 3 enfants.
Adresse professionnelle : Dépt. Pathologie & Santé Publique Vétérinaire, IAV Hassan II BP 6202, Rabat. *E-Mail* : f.kichou@iav.ac.ma –
- *Tél* (GSM) 212 661372357;

DIPLOMES UNIVERSITAIRES
Doctorat en Médecine Vétérinaire, 1984 Institut Agronomique et Vétérinaire Hassan II
Doctorat d'Etat Es Sciences Vétérinaires, - Institut Agronomique et Vétérinaire Hassan II/ College of Veterinary Medicine, Université du Minnesota, USA (Veterinary pathology), 1992.

ACTIVITES ACADEMIQUES
Professeur de l'Enseignement Supérieur (PES C) à l'Unité d'Histologie et Anatomie Pathologique, Département de Pathologie et de Santé Publique Vétérinaires à l'Institut Agronomique et Vétérinaire Hassan II. Date de recrutement: 01/1985 - 1985-1992 : maître assistant - 1992-1996 : maître de conférence - 1996-2001 : Professeur de l'enseignement supérieur (PES) A - PES B 2001-2007- PES C depuis 2007.

Enseignement théorique et pratique :
Anatomie pathologique spéciale pour les étudiants de 5ème année vétérinaire
Cancérologie Générale pour les étudiants de 3ème année vétérinaire
Travaux pratiques : Cliniques d'anatomie pathologique 5ème & 6ème années vétérinaire

Encadrement de travaux de thèse (DMV) et de recherche

ACTIVITES PROFESSIONNELLES
1. Autopsies et diagnostic nécropsique chez les animaux domestiques et sauvages.
2. Diagnostic histopathologique, hématologique et cytologique des maladies animales.
3. Participation à de nombreuses commissions d'expertise en cas d'émergence de problèmes de santé animale à l'échelle nationale.

RESPONSABILITES ACADEMIQUES ET PROFESSIONNELLES

Membre de l'Association Nationale des vétérinaires du Maroc & de l'Association Nationale des Productions Animales depuis 1986.
Membre du bureau de l'Association Nationale de Pathologie Aviaire depuis 2003.
Secrétaire Général du Conseil National de l'Ordre National des Vétérinaires du Maroc 2001-2005.
Président de l'Association des Vétérinaires Enseignants-Chercheurs du Maroc depuis 2006.
Chef de département de Pathologie et Santé Publique Vétérinaire, IAV Hassan II, 2007-2010.
Directeur de la Formation en Médecine Vétérinaire, IAV Hassan II 2010–2014.
Membre, Trésorier et Vice-président du comité exécutif du Réseau des Etablissements d'enseignement Vétérinaire en Méditerranée (REEV-Med) 2012-2016.

PUBLICATIONS, RAPPORTS ET PRESENTATIONS

- Publications dans revues nationales et internationales : 50
- Rapports & manuels : 11
- Présentations dans des manifestations scientifiques et techniques nationales et internationales: 59

Abstract

Adenoviruses are non enveloped, icosahedral, double-stranded DNA viruses belonging to the family of Adenoviridae. Their size is approximately 65 nm and they make up five genera namely Mastadenovirus, Ichtadenovirus, Atadenovirus, Siadenovirus, and Aviadenovirus. Within the genus Siadenovirus are hemorrhagic enteritis virus of turkeys and marble spleen disease virus of pheasants and egg drop syndrome virus of chickens represents Atadenovirus genus. These 2 genera constitute the best known adenoviruses affecting poultry. The genus Aviadenovirus is subdivided into five species (A–E) with 12 serotypes named fowl adenoviruses (FAdV) FAdV 1 to FAdV 8a and FAdV 8b to FAdV 11. The major structural proteins of fowl adenoviruses are the hexon and two fibres linked to a penton base which bear type-, group and subgroup-specific determinants. FAdVs can be transmitted either horizontally or vertically and are the cause of inclusion body hepatitis and hepatitis-hydropericardium syndrome as well as gizzard erosions (FAdVs 1, and 8) of chickens and hepatitis in pigeons (PiFAdV1) and ducks (DAdV 1 & 2). In Morocco, the most known adenoviral infection occurring in poultry is hemorrhagic enteritis virus of turkeys. It has been identified for the first time in the country during the epizootic of 2009-2010 and was associated with heavy losses among turkeys and since then vaccination has been implemented in controlling the disease. In chickens, IBH was diagnosed for the first time in the eighties of the last century among broilers. An epidemio-pathologiccal study conducted in 1994-1995 showed no prevalence of the disease during that period in the country. Since that time no cases were reported until December 2012, when severe and unusual outbreaks of inclusion body hepatitis (IBH) occurred among chicken flocks. After that re-emergence, several other cases associated with high mortality occurred among broilers and breeders. A retrospective and prospective study showed that among a total set of 26 case assessions suspected of IBH and submitted for histopathological examination from 2012-2015, 18 were confirmed positive with 7 cases during the only year of 2015. However, the extent of the disease and its pathological factors involved are unknown. In addition, viruses involved in occurring cases are not fully identified nor characterized, and it is not known whether the disease appears as a primary or secondary process to infections or immune-suppressed state. Moreover, several cases of proventriculus and gizzard erosion syndrome were diagnosed among young chickens and turkeys from 2010-2012 but could not be linked to adenovirus infection according to the solely gross and microscopic investigation results.

TCII-2 : Antitumor Potential of Natural Substances and Their Role in the Boosting of Immune System : Cellular and Molecular Analysis

Pr. Zyad A.

Laboratory of Biological Engineering, Team of Natural Substances, Cellular and Molecular Immuno-pharmacology, Immunobiology of Cancer Cells, Sultan Moulay Slimane University, Faculty of Sciences and Technology, Béni-Mellal, Morocco

Biography

Pr. Abdelmajid Zyad

Abdelmajid Zyad is a professor of higher education and former Vice Dean of the Faculty of Sciences and Techniques Beni Mellal (Morocco), in charge of scientific research, cooperation and continuous training. He got the PhD degree from the University of Paris XI (1994) and the Gustave Roussy Institute in Villejuif-France (Immunology and biology of tumors & Molecular Biology). He got a post-doc position, in allergy-immunology and infectious diseases department at the Children's Hospital of Philadelphia (CHOP) University of Pennsylvania, Philadelphia (USA) (1994-1996). He also held a Doctorate from the Cadi Ayyad University Marrakech (1998) (Immunology and Molecular Biology). He is a head of the immunobiology of tumor cells, molecular and cellular immuno-pharmacology team (FST Beni Mellal) (1999-present). In addition, he is responsible for doctoral formation "Natural Resources, Environment and Health", within the Graduate Studies Center "Science and Technology" (2008-present). He is also responsible of the master “health and environment” since its accreditation, in 2014. Supervisor of many national doctoral theses, masters and graduation projects of undergraduates. Author of numerous international and national publications. Furthermore, he is also responsible for teaching immunology and molecular biology, at the FST Beni Mellal (1996-present) and Molecular Biology at the Faculty of Medicine and Pharmacy Marrakech (2002-2009). Member of numerous scientific associations at national and international level and president of the Association “La Source” to fight cancer in the Beni Mellal-Khénifra region.

Abstract

Interest, in medicinal plants, has burgeoned due to increased efficiency of new plant-derived drugs and the growing interest, in natural products. Because of the side effects of conventional medicine, the use of natural products, in the treatment of various diseases, has been on the rise, in the last few decades. A large number of these products have shown beneficial therapeutic effects, including anti-cancer, anti-inflammatory, anti-oxidant, anti-microbial and immunomodulatory effects.

Our laboratory is interested, in the research of new natural molecules, with anti-cancer and/or immunomodulatory properties. In this work, different natural sources have been used : *Nigella sativa* species (Ranunculaceae), *Thymus broussonnettii* species (Lamiaceae), *Artemisia herba alba*, *Artemisia annua* and propolis. Different extracts were obtained from these sources. The essential oil, obtained by hydrodistillation and the various extracts, obtained by different methods including Soxhlet extraction, using solvents of varying polarity, were analysed by gas chromatography coupled to mass spectrometry (GC-MS) and by HPLC-MS. These extracts include biological active molecules belonging essentially to polyphenols, terpenoids, flavonoids and alkaloids. We tested the cytotoxic activity of these extracts as well as some purified molecules against a panel of animal and human tumor cell lines, including the murine mastocytoma (P815), kidney adenocarcinoma of hamster (BSR), human breast adenocarcinoma (MCF7), human laryngeal carcinoma (Hep), human ovarian adenocarcinoma (IGR-OV1) and its chemo resistant counterparts OV1/adriamycin (OV1/ADR), OV1/vincristine (OV1/VCR) and OV1/cisplatin (OV1/CDDP).

Our results show differential effects of these extracts and purified components against each target cell line. Some of these products induce apoptosis as revealed by DNA degradation and flux cytometry

assays. Furthermore, while some molecules were able to induce a cell cycle arrest, in GO/G1 phase, others induced the arrest at the S phase. Interestingly, when these products were tested against normal human PBMC, number of them induce a very small cytotoxic activity and in some cases, a proliferative effect was observed.

Using the DBA-2/P815 (H_2^d) mouse model, tumors were developed by subcutaneous grafting of tumor fragments of similar size obtained from P815 (murinmastocytoma cell line) injected in donor mouse. Interestingly, intratumoralinjection or oral administration of some products significantly reduced solid tumor development, inhibited the incidence of livermetastasis development and improved mouse survival. On the other hand, some extracts and purified molecules have been tested for their effect on the innate immunity (PBMC proliferation and nitric oxide production by macrophages) alone or in association with mitogens (PHA, CONA). We show that only the essential oil of *Thymus broussonettii* and carvacrol were able to induce a significant proliferation. In addition, the antigenotoxicity of these extracts was studied using the micronucleus test on mouse bone marrow cells. We demonstrate here that the oral administration of the ethanolic extract of propolis significantly inhibited the genotoxic effect of vinristine injected to DBA2 mice and enhance the lymphocyte account in these mice.

Other results will be presented regarding the effect of these extracts or purified molecules on apoptosis, angiogenesis, adhesion to vascular endothelium, metastasis.

Keywords : *Thyme, Nigella sativa, propolis,* chemical composition, extracts, purified molecules, antitumor activity, apoptosis, cell cycle, genotoxicity, PBMC, immunomodulation, metastasis, angiogenesis

PCIII-1 : Biotechnologies et Énergies Renouvelables

Dr. Bellamine Majid
Max Planck Institut für Physik, Hambourg, Germany

TCIII-1 : Streptomycetes as Drivers of Nutrient Turnover and Organismic Interactions

Dr. Mika Tarkka
Helmholtz Centre for Environmental Research, Department of Soil Ecology, UFZ, Halle, Germany

Biography

Pr. Mika Tarkka, Senior Scientist

M. Tarkka is a senior scientist, in the Department of Soil Ecology, at the Helmholtz Center for Environmental Research-UFZ, in Halle, Germany. He completed his M.Sc. in plant physiology, at the University of Helsinki, Helsinki, Finland and pursued his Ph.D. with Marjatta Raudaskoski, at the University of Helsinki, with the topic plant and fungal development in mycorrhizal symbiosis. As a postdoctoral fellow and research associate with Ruediger Hampp, at the University of Tuebingen, Germany, he investigated how streptomycetes impact mycorrhizal symbiosis formation and affect plant disease resistance. Dr. Tarkka assumed his current position, at the UFZ Halle, in 2007, and his research focuses on plant-microbe and fungus-bacterium interactions, in particular, on the molecular mechanisms by which streptomycetes, plants and fungi interact with each other and on the functional properties of streptomycetes communities related to disease suppression and carbon turnover.

Abstract

Streptomycetes are ubiquitous soil dwelling microorganisms which confer the characteristic earthy smell of the soil. They have a mycelial lifestyle and undergo complex morphological differentiation. More than 500 species of the genus *Streptomyces* have been described and strains have been isolated from very different environments, with numerous isolates from dry soils. The success of these filamentous bacteria, in terrestrial environments, is attributed to their ability to produce extracellular hydrolytic enzymes, to gain nutrition from organic matter. Apart from this, the *Streptomyces* species may also play an important role, in mineral weathering. These bacteria also produce mixtures of antimicrobial compounds, allowing them so to defend their substrates. Of the scores of soil-borne microorganisms, streptomycetes have been reported to be most prolific producers of a variety of clinically important biochemicals.

Recently, a new picture has begun to emerge in which the role of some of *Streptomyces* secondary metabolites has been associated to interactions with eukaryotes. These studies suggest that part of the the metabolites are generated to achieve symbiotic relationships with plants, fungi and animals.

Parasitic interactions, in plants, are expressed by scab-causing streptomycetes and actinomycetoma causing strains cause severe and debilitating deep tissue and bone infections in humans. In most cases the interactions with streptomycetes are, however, beneficial and growth promoting, as is the case with many insects, plants and marine animals that use streptomycete-produced antibiotics to protect themselves against infections. But some interactions are more complex.

For instance, the plant beneficial bacterium *Streptomyces* sp. AcH 505 stimulates the formation of mycorrhizal symbiosis, between beneficial fungi and forest trees, but reduces damage by phytopathogens including pathogenic fungi and nematodes. The impact of streptomycetes on fungi is related to their secondary metabolite production and AcH 505 can modulate microbial communities, by producing both antibiotics and fungus growth promoting substances. It also affects plant gene expression. Plant disease resistance genes are induced upon AcH 505 inoculation, but this response is attenuated when a mycorrhizal fungus is co-inoculated. In contrast, plant defense gene expression is further enhanced upon the challenge with powdery mildew infection which is the central element, in systemic protection of plants, by all root associated bacteria.

In conclusion, *Streptomyces* research is an exciting and emerging field that will become increasingly important, as the search for new antibiotics switches to unusual and under-explored environments and novel biologically active microorganisms are searched for medicinal and agricultural purposes.

TCIII-2 : Stable Isotope Probing of Carbon Flow in the lant holobiont

Haichar F.Z., Bressan M., Berge O., Heulin T., Achouak W.
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Biography

Dr. Wafa Achouak

2004 – present Lab Leader, Laboratory of Microbial Ecology of the Rhizosphere and Extreme environmnets.
2012 – present research director at CNRS.
2002 : HDR University of Luminy Marseille, France(Life science)
1994 : Senior Research Scientist, CNRS.
1994 : Postdoctoral Scientist, USDA Beltsville US.
1993 : PhD University Nancy I France
1985 : Master University HassanII Casablanca Morocco

We study the molecular basis of plant-bacteria interaction in the rhizosphere and aim to decipher how plant select microbiota from soil and what make certain bacterial populations more adapted to the rhizosphere of certain plant species.
Author of 82 publications, 3 patents and 16 book chapters. Hindex 27

- Associate Editor for Microbiology 2009-2015

- Senior Editor for Microbiology 2015-
- Member of the Scientific committee of the French National program "Coastal and Continental Ecosphere (EC2CO)" sub-program: Hydro-biochemical cycle, transfer and ecotoxicological impact (CYTRIX) since 2006
- Memberof the Scientific committee "French National program Coastal and Continental Ecosphere (EC2CO)" sub-program: Environmental Microbiology (µBien) 2006-2014
- Memberof the Steering committee and Scientific committee "Fédération de recherche" ECCOREV
- Memberof the Scientific committee "Colloque Rencontres Plantes-bactéries", Aussois, since 2006
- Membre de l'instance scientifique ou administrative de CSS BIHASC INRA. since 2012
- Member of the evaluation committee ANR SVSE7 2010-2012
- Vice president of the evaluation committee ANR SVSE7 2013
- Member of recruitment selection board of Lecturer (University Lyon I, 2012)

Expert for the evaluation of research grant from FRB, Ministère de l'enseignement sup et de la Recherche, Région Bretagne, Fondation Internationale pour la Science (FIS), Technology Foundation STW OTP research proposals (NL), Programme Génome Québec Canada, Cefipra (Indo-French Centre for the Promotion of Advanced Research)

Abstract

In natural conditions, healthy plants host a remarkable assemblage of structurally and functionally diverse microbiota, which has recently emerged as a novel trait participating in the ability of plants to adapt to their environment. The structure and function of active microbial communities that assimilate root exudates can be tracked by using stable isotope probing (SIP) approaches.

To determine the role of plant species and genotype in shaping microbial communities structure, we performed DNA-based SIP approach (DNA-SIP) by growing different plant species and different plant genotypes separately in the same soil, under $^{13}CO_2$ continuous-labelling. We also developed mRNA-SIP approach to determine the impact of plant *via* root exudates on the expression of certain phytobeneficial genes.

The application of continuous $^{13}CO_2$-labelling of plants revealed the indirect role of root exudates in the activation of bacterial communities implicated in soil organic matter (SOM) degradation highlighting the importance of the priming effect and the identification of root exudates assimilating bacteria. This allows us to formulate hypotheses on the relative contributions of different groups of microbes to rhizosphere functioning. Additionally, using mRNA-SIP technique to investigate gene expression shows great promise for understanding the impact of the plant via roots exudation in controlling bacterial gene expression. While, the non-coding RNAs *rsmZ, acdS* gene encoding ACC deaminase *and nosZ* gene encoding nitrous oxide reductase were expressed by bacteria inhabiting roots and by those that derive nutrients from the breakdown of organic matter in soils or from root exudates, the expression of *phlD* gene involved in 2,4-diacetylphloroglucinol (DAPG) production was completely shut down in the root compartment, probably to preclude the deleterious effect of DAPG.

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Haichar F.Z., Marol C., Berge O., Rangel-Castro J.I., Prosser J.I., Balesdent J., Heulin T., Achouak W. (2008) Plant host habitat and root exudates shape soil bacterial community structure. ISME J. 2:1221-30.

TCIII.3 : Outils Moléculaire de Dernière Génération en Biotechnologies

Pr. Ibrahimi A.
Faculté de Médecine de Rabat, Maroc

Biography

Prof.Dr. Azeddine Ibrahimi

Pr. Ibrahimi completed his PhD in Molecular Biology from the Nice-Sophia Antipolis University (France) in 1992. He then joined the Stony Brook Medical School (Stony Brook University, NY, USA) as a Research Associate and promoted to Assistant Professor in 1999. In 2003, he was appointed to the University Sidi Mohammed Ben Abdellah (Fès, Morocco) and as an as adjunct professor to Al Akhawayn University (Ifrane, Morocco). In 2010, he joined the Rabat Medical & Pharmacy School where he founded and headed the First Moroccan Medical Biotechnology laboratory at the University Mohammed the Vth in Rabat.
Pr Ibrahimi has been very active in teaching medical biotechnology & genomics in recent years and coordinating the Master program of Medical Biotechnology & Bioinformatics. He has been, also, very active as a researcher as he authored and co-authored several peer reviewed articles and book chapters in different international journals.

PCIII-2 : Evaluation du Danger Viral dans l'Environnement et les Aliments - The Public Health Hazard of Foodborneviruses

Dr. Gantzer Christophe
Laboratoire de Chimie Physique et Microbiologie pour l'Environnement, UMR 7564, CNRS, Université de Lorraine, Nancy, France

Biography

Pr. Gantzer Christophe

Christophe Gantzer a fait des études de Biochimie à Strasbourg (France). Dès 1991, il s'intéresse à la virologie du milieu hydrique, lors de son Diplôme Études Approfondies et de sa thèse d'Université, à Nancy. Il obtient son doctorat, en 1996, avec le Prix de la meilleure thèse d'Université de la Faculté de Pharmacie. Après plusieurs expériences post-doctorales, en France, et, en Israël, dans le domaine de la microbiologie environnementale, il est recruté, à l'Université de Lorraine, en 1999, comme Maître de Conférences, puis, il est nommé Professeur, en 2007, avec comme objectif de recherche principale les virus pathogènes du milieu hydrique. C'est, en 2008, qu'il devient responsable d'une équipe de Microbiologie Environnementale, et, il est, actuellement, directeur adjoint du Laboratoire de Chimie Physique et Microbiologie pour l'Environnement (LCPME). Ce laboratoire est une unité mixte de recherche entre l'Université de Lorraine et le CNRS qui regroupe environ 70 personnes (UMR 7564). La thématique du laboratoire concerne les réactions aux interfaces dont celles des microorganismes. C'est ainsi qu'il s'intéresse aux mécanismes d'adhésion-agrégation, aux mécanismes d'inactivation et aux méthodes de détection des virus entériques dans l'environnement.

Professeur Gantzer a dirigé 10 étudiants en thèse d'Université. Il a produit près de 70 publications internationales, dans le domaine de la virologie de l'environnement, a participé à la rédaction de 5 ouvrages de virologie, a réalisé plus de 50 communications et a été invité à faire 35 conférences, dans le monde entier (Brésil, Japon, nombreux pays européens). Il a participé à plus d'une dizaine de contrats de recherche publics (Contrats Européens, Agence Nationale de Recherche Française ou Luxembourgeoise) ou privés (industriels du domaine de l'eau). Entre 2006 et 2010, il a coordonné un groupe de travail concernant l'inactivation des virus dans l'environnement et au cours des traitements regroupant 17 pays européens, dans le cadre d'un contrat européen de coopération scientifique et technologique (COST 929 : Environmental and Food Virology). Plus récemment, Pr Gantzer a créé une Unité Mixte Technologique (UMT ViroControl), en collaboration avec un industriel (Actalia). Cette UMT vise à mieux appréhender le risque virologique dans les matrices environnementales et alimentaires.

Il enseigne la microbiologie à la Faculté de Pharmacie de Nancy et dans d'autres Facultés de l'Université de Lorraine. Il a participé à la création d'un nouveau Master de Microbiologie à l'Université de Lorraine, en 2009. Il est membre élu de nombreuses instances de l'Université (Pôle de Recherche, Collegium Santé pour l'enseignement) et de la Faculté de Pharmacie (Conseil de Faculté, Président de la Commission recherche 2010-2015, Président de la Commission en charge des postes, depuis 2016).

Abstract

Depuis la démonstration d'une transmission féco-orale du *Poliovirus*, au début du siècle dernier, les scientifiques n'ont eu de cesse de tenter de limiter le danger viral lié à l'eau et aux aliments. Aujourd'hui, les virus ciblés, les méthodes de détection disponibles et les traitements appliqués ont beaucoup évolués, mais, l'objectif est toujours de maîtriser la pollution virale.

Les premiers virus ciblés étaient donc les *Enterovirus* dont le *Poliovirus*, mais, aujourd'hui ce sont, plus particulièrement, les *Norovirus* et le virus de l'hépatite A qui sont les plus impliqués dans des épidémies virales d'origine hydrique ou alimentaire. Ils sont responsables, respectivement, de gastro-entérites et d'hépatites virales. D'autres virus entériques doivent rester sous surveillance, car ils ont le même mode de transmission (*e.g. Rotavirus, Adenovirus, Astrovirus*) ou sont considérés comme émergents (*e.g.* virus de l'hépatite E). Mis à part les *Rotavirus* et les *Adenovirus*, leur structure est très similaire, avec un génome constitué d'ARN et une capside de nature protéique de 20-30 nm. L'objectif constite donc à évaluer le comportement et la survie de ces particules dans l'environnement, mais, aussi à les détecter dans des matrices complexes.

Les indicateurs bactériens de pollution fécale ont été utilisés, depuis plus d'un siècle, pour évaluer le danger viral. Ils ont permis de limiter très largement la transmission des virus entériques *via* l'environnement et les aliments. Mais, force est de constater qu'ils ont des limites en tant qu'indicateur de pollution virale. Il convient donc de mieux préciser ce type de pollution, soit par la recherche directe des virus pathogènes, grâce aux techniques moléculaires, soit par l'utilisation d'autres indicateurs de pollution fécale de nature virale (*i.e.* bactériophages fécaux).

L'approche universelle n'existe pas, c'est, uniquement, par une bonne connaissance des avantages et des inconvénients de chacune que le danger viral pourra, à l'avenir, être encore mieux maîtrisé.

PCIII-3 : Bacteriophages as Indicators of Pathogenic Viruses in the Water Environment

Pr. Jofre Torroella Juan

Department of Microbiology, School of Biology, University of Barcelona, Barcelona, Spain

Pr. Juan Jofre

Biography

Born in Girona (Spain), 1947. Married and father of two

Education : B.Sc., 1971 (University of Barcelona); Ph.D., 1974 (University of Barcelona). Postdoctoral fellow (Fulbright grant) at Baylor College of Medicine in Houston, Texas (1975-1977).

Appointments : Assistant professor at the UB (1977-1978) ; Associate Professor at the Universidad Complutense de Madrid (1978-1979) ; Associate Professor (1979-1981) and Full Professor (1981-1982), at the Universitat de les Illes Balears. Full professor, at the University of Barcelona (since 1982 ; now Professor Emeritus).

Vice-Dean at the School of Biology of the UB (1983-1986).

Vice-rector of Research at the University of Barcelona (1986-1990).

Chairman of WG11 (bacteriophages) of the Technical Committee SC4 (water) of the International Standardization Organization.

Chairman of the Health Related Water Microbiology Group of the International Water Association (2000-2004).

Main fields of research. Health related water microbiology, mainly aspects related to viruses and viral indicators. Significance of bacteriophages, in the horizontal transmission of virulence factors and genes of resistance to antibiotics in the environment.

Publications : More than 200 peer-reviewed articles ; 195 of them appear in the Citation Index (ISI-Web of Knowledge), with a total of 5360 citations and an**h** index of 44.

Awards and honors : Narcís Monturiol Medal to the Scientific Excellence (1998, Generalitat de Catalunya); Fellow of the American Academy of Microbiology (2001) ; Fellow of the Institut d'Estudis Catalans (2007) ; Fellow (at present General Secretary) of the Royal Academy of Sciences and Arts of Barcelona.

Abstract

Bacteriophages infecting enteric bacteria have been extensively studied as potential indicators of fecal as well as viral indicators, in water environments. As viruses, in terms of composition, structure, morphology and capsid size, they share many properties with human viruses. Once outside the gut they mimic viruses much better than the present bacterial fecal indicators do.

Bacteriophages viewed as indicators are grouped and named according to the host strain used to detect them. Among the more studied, we found coliphages and bacteriophages infecting *Bacteroides*. Bacteriophages infecting some strains of *Bacteroides*have value, because they are able to directly discern the source of the fecal contamination. But, the need of anaerobiosis usually discourage people using them as indicators and their use is now restricted to microbial source tracking. Coliphages or phages infecting *Escherichia coli* are nowadays more widely used. Two types of coliphages have been studied. Somatic coliphages that infect *E. coli* through the cell wall, and F-specific coliphages that infect through the sex pili.

Methods standardized by ISO and USEPA are available for infectious viruses. These standardized methods are easy, fast and cost effective and recent developments indicate that they are easily adaptable to friendly use commercial kits. Molecular methods are available for some F-specific coliphages. Both somatic coliphages and F-specific coliphages are excreted by humans and animals. The probabilities that they reproduce in the environment are extremely low. They are found in great numbers in sewage, sewage sludge, septic tanks content, wastewater from abattoirs, slurries and manures. No seasonal variation is observed and similar concentrations are reported around the world. Their resistance to water and biosolid treatments and persistence in the water environment resemble those of viruses. Numbers in receiving waters, surface and groundwater are higher than numbers of human viruses. The possible relationship between presence and levels of indicator phages and human viruses in waters has been studied, though with disparate results.

However, an even inferior percentages of co-occurrence or absence of correlation among different human viruses has been reported. A number of epidemiological studies conducted to evaluate the relationships between the presence of coliphages in surface waters and swimming illnesses have been carried on with disparate outcomes, but, again human viruses were studied in some of these studies and failed, evenmore than phages, to show any association with infections related to bathing. Coliphages are increasingly being included, in guidelines related to water and biosolid management and quality.

PCIV-1 : From Symbiosis to Biotechnology : The Metal Ion Inducible Autocleavage Domain

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1. Institut für Genetik, TU Dresden, Dresden, Germany
2. Institut für Ressourcenökologie, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

Pr Mihael Gottfert

Biography

Surname, first name	Göttfert, Michael
Date of birth	03 September 1953
Nationality	German
Qualification	Dipl.-Ing. agr., Dr. rer. nat., Professor of Molecular Genetics
University Address	Institute of Genetics, Technische Universität Dresden, Helmholtzstrasse 10, 01069 Dresden, Germany
E-Mail	michael.goettfert@tu-dresden.de
University studies	1975-1980, Study of Agricultural Sciences at the TU München-Weihenstephan, degree: Dipl.-Ing. agr.
Doctoral thesis	1980-1984, Dissertation at the Institute of Genetics at the University of Bayreuth
Postdoc	1984-1985, Postdoc at the Biological Research Center of the Hungarian Academy of Sciences in Szeged
	1986-1996 Postdoc at the Institute of Microbiology at the ETH in Zürich
Current position	since 1996, Professor of Molecular Genetics, Department of Biology, TU Dresden, Germany
Past or present academic activities at the TUD	Member of the study commission of the department (Past: Head of department, vice dean of faculty, board member of the department)
Membership in professional societies	- Saxonian Academy of Sciences in Leipzig (Head of the Mathematical-Natural Sciences Class
	- Association for General and Applied Microbiology (VAAM) - International Society for Molecular Plant-Microbe Interactions

- American Society for Microbiology

Research area: Signal exchange in the rhizobia-legume interaction, analysis of type III-secreted proteins, characterisation of efflux systems, stress response of *Bradyrhizobiumjaponicum* (salt, heat, pH), proteome and transcriptome analyses of *Bradyrhizobiumjaponicum*

Abstract

In *Bradyrhizobium japonicum*, the plant signal genistein leads to the activation of more than 100 genes. One induced gene cluster encodes a type III secretion system. The nodulation outer protein NopE1 was proven to be a secreted effector protein [1,2]. Bioinformatics analyses revealed that it contains two domains of unknown function (DUF1521), each encompassing about 170 amino acids. NopE1 was expressed in *Escherichia coli* and purified. The protein is cleaved in the presence of calcium. The cleavage site is within the DUF1521 domain, for which we now use the term "metal ion-inducible autocleavage" (MIIA) domain [3,4]. Blast searches unveiled that the MIIA domain is conserved not only in proteins from *B. japonicum* strains but also in proteins of various α-, β-, γ- and δ-Proteobacteria.

Based on the properties of the MIIA domain, we developed a self-cleaving protein linker. In biotechnology, proteins are often expressed and purified as fusion proteins which are later cleaved by a costly protease. In contrast, the MIIA domain is an easy low cost tool to release the protein from the fusion partner. Initial tests indicate that cleavage within the MIIA domain is not influenced by the fusion partner. Cleavage is accomplished within minutes on ice and at moderate temperatures. Cleavage is also tolerant towards a pH range from about 5 to 9 [5].

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[2] Wenzel, M. et al. (2010). 23, 124-129.
[3] Schirrmeister, J. et al. (2011). J. Bacteriol., 193, 3733-3739.
[4] Schirrmeister, J., et al.(2013). FEMS Microbiol. Lett., 343, 177-182.
[5] Ibe S, et al. (2015). J. Biotechnol., 208, 22-27.

Keywords : *Bradyrhizobiumjaponicum*, type III secretion, nodulation outer protein, NopE1, autocleavage

TCIV-1 : Optimiser les Processus de Facilitation et de « Plant-Soil Feedback » par une Gestion Raisonnée du Potentiel Mycorhizogène des Sols dans les Agrosystèmes Méditerranéens

Pr. Duponnois Robin
IRD, UMR LSTM, F-34398 Montpellier, France

Biography

Prof. Dr. Robin Duponnois

Nom : DUPONNOIS
Prénom : Robin
Né le : 10 Août 1963 à Chaumont, France
Situation familiale : Marié, 3 enfants
Nationalité : Française
Profession : Directeur de Recherche 1ère Classe à l'IRD
Directeur du Laboratoire des Symbioses Tropicales & Méditerranéennes (UMR LSTM)
Spécialité : Ecologie de la symbiose mycorhizienne en milieu tropical et méditerranéen

1. PARCOURS PROFESSIONNEL

1988 : DEA Université de Nancy 1
1988 : Formation doctorale au laboratoire de microbiologie forestière INRA-Nancy
1989 : Ingénieur de Recherche. Société BIOCEM. Groupe Limagrain
1992 : Doctorat de l'Université Nancy. Spécialité Biologie végétale et forestière
1992 : Recrutement à l'IRD (Chargé de Recherche 2ème classe)
1993 : Affectation à l'IRD de Dakar (Sénégal). Laboratoire de Nématologie
1995 : Habilitation à Diriger des Recherches (HDR) de l'Université de Bourgogne (Dijon. France)
1996 : Chargé de Recherche 1ère classe
1999 : Membre élu de la CSS3
2000 : Responsable du laboratoire de Nématologie de Dakar
2001 : Affectation à l'IRD Burkina Faso au Centre de Ouagadougou
2001 : Responsable de l'implantation secondaire de l'UR « IBIS » au Burkina Faso
2002 : Directeur de Recherche 2ème classe
2003 : Représentant adjoint de l'IRD au Burkina Faso
2005 : Affectation à l'IRD Sénégal au Laboratoire Commun de Microbiologie IRD/ISRA/UCAD
2005 : Responsable de l'implantation secondaire de l'UR « LSTM » au Sénégal
2007 : Représentant adjoint de l'IRD au Sénégal avec extension de compétences au Cap vert, à la Gambie, la Guinée, la Guinée Bissau et la Mauritanie
2009 : Responsable de l'équipe « Symbiose et Résilience ECosystémique» (SREC) du LSTM
2010 : Directeur de Recherche 1ère classe
2011 : Chargé de mission pour l'AIRD « Grande Muraille Verte ». Accord cadre AIRD/APGMV
2012 : Chef du consortium « Lutte contre la Désertification ». AIRD/DPF
2013 : Chargé de mission « Lutte contre la désertification ». DGDA/IRD
2015 : Professeur Associé. SupAgro Montpellier

2. RESUME DE CARRIERE

• Responsable du volet lutte biologique contre les nématodes phytoparasites au Sénégal (IRD. Laboratoire de Nématologie) (Janvier 1993 à décembre 1997).
• Affectation au Laboratoire de Biopédologie (IRD. Dakar) (Janvier 1998 à Septembre 2001
• Responsable de l'implantation secondaire de l'UR « IBIS » au Burkina Faso (Octobre 2001 à décembre 2004)

• Responsable de l'implantation secondaire de l'UR « LSTM » au Sénégal. Laboratoire Commun de Microbiologie IRD/ISRA/UCAD (Octobre 2005 à juillet 2010)
• Affectation au Laboratoire Ecologie & Environnement (L2E). Faculté Semlalia. Université Cadi Ayyad de Marrakech. Maroc (Septembre 2010 à Aout 2012).
• Affectation au Laboratoire des Symbioses Tropicales et Méditerranéennes UMR CIRAD / IRD / SupAgro / UM2 / USC INRA
 01 janvier 2015. Directeur de l'UMR « Laboratoire des Symbioses Tropicales & Méditerranéennes (LSTM)». UMR 113 IRD/CIRAD/INRA/SupAgro Montpellier/UM

3. PRODUCTION SCIENTIFIQUE
588 références scientifiques dont **126** articles de rang A, **42** articles non indexés, **56** chapitres d'ouvrage, **6** ouvrages, **316** communications orales ou affichées et **12** brevets. **H Index : 24**.
Lauréat du 2ème prix de l'innovation attribué par l'IRD (Septembre 2011)

4. ACTIVITES DANS LE DOMAINE DE L'EVALUATION DE LA RECHERCHE
• Membre élu de la Commission Scientifique Sectorielle n°3 de l'IRD (1999-2003).
• Relecteur pour les revues scientifiques: Nematology, Plant & Soil, Annals of Forest Sciences, FEMS Microbiology Ecology, Microbial Ecology, Soil Biology & Biochemistry, Agroforestry system, Forest Ecology & Management, Letters in Applied Microbiology, New Phytologist, Australian Ecology, New Forest Research, Journal of Applied Microbiology, chemosphere, Acta Oecologica, ISME Journal, etc
• Expert pour la Fondation Internationale pour la Science (FIS) (Depuis 2006).
• Expert pour la National Science Foundation (NSF) (Depuis 2006).
• Expert pour la « Austrian Science Fund » (FWF) (Depuis 2007)
• Expert pour le Ministère des Affaires Etrangères et du Développement International (MAEDI) (Depuis 2007)
• Membre du comité scientifique du Fond de Soutien Prioritaire (MAE) « Sud-Expert » Afrique de l'Ouest (2007-2009).
• Membre du comité des experts Programme Aires-Sud (MAEE) (2008-2011).
• Membre du comité ANR SEV 7 (2010-12)
• Membre du comité ANR International SEV7 (2010-12)
• Expert pour la mission d'expertise internationale (MEI) du Ministère de l'Enseignement Supérieur et de la Recherche (MESR. France) (Depuis 2010)
• Membre du conseil scientifique du Centre National d'études et de recherches sur la Sahara (CNERS) (Marrakech. Maroc) (Depuis 2011)
• Vice-Président de la Commission Scientifique Sectorielle n°3 (CSS3) IRD (2002-2006)
• Membre du Comité Scientifique Français de la Désertification (CSFD) (Depuis 06 2014)
• Expert pour l'Agence Internationale de l'Energie Atomique (AIEA) (Depuis 2014)
• Expert pour l'IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). Groupe « Evaluations régionales » (Afrique) & Groupe « dégradation/restauration » (Depuis 2015)
• Membre du comité d'experts spécialisés "Produits phytopharmaceutiques: substances et preparations chimiques" de l'Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et travail (ANSES) (Depuis 2016).

Abstract

La surexploitation des ressources naturelles, en milieu méditerranéen, au cours de ces dernières décennies, a entrainé une fragilisation des sols aggravant les phénomènes d'érosion hydrique et éolienne qui aboutissent à un appauvrissement des ressources telluriques minérales et organiques, mais, aussi de la microflore, tant au niveau de sa structure que de sa diversité fonctionnelle. Parmi les composantes microbiennes, particulièrement sensibles à cette pression anthropique, figurent les champignons mycorhiziens. Ces symbiotes fongiques sont des microorganismes indispensables à la croissance de la majorité des plantes terrestres. Outre leur rôle dans la nutrition minérale de la plante hôte, ils améliorent aussi la résistance de la plante vis à vis de stress biotiques (attaques parasitaires) et abiotiques (métaux lourds, stress salin ou hydrique). Dans les sols dégradés, le potentiel mycorhizien

des sols atteint, généralement, un seuil, en termes d'abondance et de diversité de propagules fongiques, qui ne permet plus à la communauté de champignons mycorhiziens d'assurer leur rôle vis à vis de la couverture végétale. En effet, il est maintenant parfaitement admis que ces microorganismes symbiotiques jouent un rôle majeur, dans des processus biologiques fondamentaux, processus de facilitation et processus de « Plant-Soil Feedback » qui régissent l'évolution spatio-temporelle des écosystèmes végétaux terrestres et assurent la productivité et la stabilité du couvert végétal.

De nombreux travaux ont suggéré que des pratiques culturales imitant ces processus naturels pouvaient répondre aux impératifs d'une agriculture durable, dans le contexte de la Révolution Doublement Verte. En conséquence, et, afin d'optimiser ces processus biologiques, il est alors nécessaire de promouvoir le développement de ces symbiotes microbiens *via* un apport en masse de champignon (approche « réductioniste » ou mycorhization contrôlée) ou *via* une gestion du peuplement résiduel, par l'utilisation de vecteurs biologiques particulièrement adaptés aux conditions drastiques rencontrées dans ces régions (carences minérales, sécheresse) (Approche « holistique »).

Les principaux résultats obtenus dans des agrosystèmes, au Maroc, visant à tester ces stratégies d'amélioration du potentiel mycorhizogène des sols, seront présentés, en soulignant l'impact de ces symbioses mycorhiziennes sur la productivité du périmètre cultivé, mais, également, sur la structure et la diversité fonctionnelle de la microflore tellurique.

Mots Clés : légumineuses, symbiose mycorhizienne, microflore, diversité fonctionnelle, agroécosystème

PCIV-2 : Epidemiovigilance for Improved Control of Plant Diseases : The Case of Potato Late Blight

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Biography

Dr. Didier Andrivon

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Education

- 1985: Ingénieur Agronome, Ecole Nationale Supérieure Agronomique de Rennes
- 1991: Ph.D Agronomic Sciences, Institut National Agronomique Paris ('cum laude')
- 1998: Habilitation à Diriger les Recherches (Sciences de la Vie), University Rennes I

Foreign languages (read, written and spoken): English, German, Spanish

Research Carrier

Scientific papers

- Papers in international refereed journals (Web of Science; 1987-2016) ; As of 31.05.2016: 81 papers, 1349 citations ; h=23
- 9 book chapters; 10 invited conferences in national or international congresses or symposia.

National and international projects

➢ Europe & international

- Participant in 8 EU projects since 1992, and one F-GB bilateral project -INRA-BBSRC 'Invasion and persistence of plant pathogens' (2007-2011); WP leader in EU Projects EUCABLIGHT and CO-FREE
- French coordinator of two bilateral Franco-Moroccan projects PRAD (1999-2001 & 2003-2005)
- Coordinator, ARIMNET PoH-MED (2013-2016)
- Coordinator, C-IPM IPM Blight 2.0 (2016- 2019)

➢ National

- Leader of 6 research contracts funded by the French Ministry of Agriculture
- Participant /WP leader in numerous projects, including ACC Sciences du Vivant (MRE), 1996-1997; Action Biodiversité MRE, 1997-1999; Contrats de branche 1998, 2003 ; ANR-ADD CEDRE, 2005-2009 ; ANR EMERFUNDIS, 2007-2011; ANR SYSTERRA ARCHIDEMIO 2009-2012.
- WP leader in INRA-ACCAF project CLIF (2012-2016)

➢ Research administration

- Leader, team 'Characterisation and durable management of plant resistance to diseases', UMR BiO3P (2000-2011)
- Head, UMR BiO3P (2005-2007)
- Deputy-head, INRA Plant Health and Environment Division (2007-2014) http://www.inra.fr/sante_plantes_environnement/

➢ Expertise

- Associate editor, Plant Pathology (since 1996); Phytopathology (1999-2001).
- Referee (Oecologia, New Phytologist, Journal of Evolutionary Biology, Phytopathology, Plant Disease, Mycological Research, European Journal of Plant Pathology, Journal of Phytopathology…): 8 - 10 papers a yr since 1995.
- External referee for research projects – FR, UK, Norway, Israël.

Abstract

Integrated control strategies of plant diseases requests an intimate knowledge of the pathogens themselves, their distribution in time and space, but, also, their genetic characteristics (which condition their evolutionary potential) and their pathological and ecological features (which determine

largely their epidemic potential and survival). This paper shows how these features can be monitored and exploited, with the example of potato late blight (caused by *Phytophthora infestans*), in Europe.

We will briefly describe the sampling and observation procedures, as well as the methods used for fast genotyping (SSR profiles on samples collected on FTA cards) and precise phenotyping of pathogenicity and ecological traits.

Population monitoring of *P. infestans* in Europe is ongoing, since the early 1980s, with variable intensity according to countries and periods. It generated an extensive data set about over 10.000 isolates, operable as a joint database, under the collaborative network Euroblight (www.euroblight.org). This information showed two very distinct groups of populations, in Europe, clonal populations, in western and southern countries, with fast emergence and repeated invasions by new lineages, and highly diverse, sexual populations, in northern and northeastern Europe.

These structures explain the earlier epidemics observed, in many European countries, and also account for the breakdown of some major resistance genes. IPMBlight 2.0, an ongoing project recently started, now aims to check the predictive ability of genetic profiles relative to phenotypes and to exploit pathogen population information to design more efficient Decision Support Systems against late blight.

Keywords : epidemiovigilance, pathogen monitoring, *Phytophthora infestans*, phenotyping, genotyping

TCIV-2 : The Rhizobia-Legumes Relationship under Salinity Stress

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Biography

Pr. Khalid Oufdou

Khalid Oufdou is a full professor, at the Cadi Ayyad University. He had his 3rd cycle Doctorate, in Microbiology, on 1994 and his State Doctorate Es-Sciences in Microbiology and Biotechnology, on 2000. He supervised more than 10 PhD theses and published more than 40 publications with high impact factor. He developed several research projects, with Spain, France, Germany, Tunisia, Portugal and Sweden (3 IFS grants). He was awarded by the Alexander von Humboldt foundation (AvH Germany 8 months fellowship) and by the Deutscher Akademischer Austauschdienst (DAAD Germany 3 months fellowship). He was the chairman of the first edition (02-05 November 2009 MICROBIOD 1) and the second edition (02-04 October 2012 MICROBIOD 2) of the International

congress "Microbial Biotechnology for Development" www.ucam.ac.ma/microbiona. He was the President of the Moroccan Association of Microbial Biotechnology and Protection of Natural Resources (MICROBIONA), from 2009 to 2013.

Abstract

Legume symbiotic interactions with nitrogen-fixing bacteria could be used, in agricultural and forest soils, under severe conditions and for soil restoration. The rhizobia-legumes relationship is subjected to many environmental stresses such as salinity, phosphorus deficiency, water and nutrient availability and soil contamination by toxic compounds. The inoculation with indigenous N_2-fixing rhizobia can increase soil fertility and quality, especially in poor soils, and can contribute to the tolerance of legume plants to abiotic and biotic environmental stresses. Salinity is one of the major factors responsible for deterioration of soil and limiting crop production, particularly, in arid and semi-arid regions. The salt tolerance of rhizobial strains nodulating Moroccan faba bean cultures was determined on yeast extract mannitol (YEM) medium containing salt (0 to 428 mM NaCl). The rhizobial strains were identified at the species and symbiovar levels, by analysing 16SrDNA, *nodA* and *recA.*

In this work, we looked for osmoadaptive mechanisms, by screening for the genes *otsA* and *kup* known to be involved in osmotic stress tolerance. These genes are encoding trehalose-6-phosphate synthase and an inner membrane protein representing a low-affinity K^+ uptake system, respectively. Rhizobial strains varied in their tolerance against NaCl. Three strains were highly tolerant to a salt concentration of up to 428 mM NaCl. Phylogenetic characterization of the strains nodulating *V. faba* showed that most of them belong to *R. leguminosarum* (102 strains) whereas 4 strains were identified as *Ensifer meliloti* (formerly called *Sinorhizobium meliloti*).

In this work, we showed the presence of *otsA* and *kup* genes within the genome of all studied strains. However, the accumulation of trehalose and potassium, in response to NaCl stress, differed between the salt sensitive and tolerant strains. We found a direct correlation between the trehalose and potassium contents of the rhizobial strains and their osmotolerance. We evaluated the effect of salt stress (0, 60 and 120 mM of NaCl) on growth, nodulation process, nitrogen uptake and mineral nutrition content of *V. faba* L. plants inoculated with native Moroccan rhizobia isolated from root nodules of faba bean plants grown in the Marrakech-Haouz region. Three *R. leguminosarum* strains, which had a different tolerance to salinity, were used to inoculate faba bean plants. Shoot biomasses were reduced under salinity stress, especially, in the plants inoculated with the salt sensitive strain. The nodulation of faba bean roots was strongly decreased, under 120 mM salt treatment, particularly, for the sensitive strain. The total nitrogen content decreased with increase of salinity, except for the plants inoculated with the tolerant strain. Sodium and calcium increased sharply, in plant tissues, with increasing salt stress, while the potassium concentration decreased. Inoculation with tolerant strain led to reduced Na^+, Ca^{2+} and K^+ absorption by faba bean plants.

The application of the salt tolerant rhizobia strains resulted in increased plant biomass, nodulation and nitrogen content and reduced the contents of the analyzed ions and then protect faba bean plants against the toxic effects of salinity.

Keywords : *Vicia faba*, *Rhizobium leguminosarum*, *Ensifer meliloti*, salinity, nitrogen, osmotolerance, 16SrDNA, *nodA*, *recA*, *otsA*, *kup*, trehalose, potassium, mineral nutrition

Acknowledgements
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PCV-1 : Selection of Targets for Rational Drug Design of Inhibitors for Viral Diseases

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Pr. Črtomir Podlipnik

Biography

Dr Črtomir Podlipnik acquired his PhD, in the field of theoretical chemistry, at the University of Ljubljana, Slovenia, under the supervision of Pr. Jože Koller. Afterwards, he joined the group of Pr. Anna Bernardi (University of Milano, Italy), where he was involved in designing of Cholera Toxin inhibitors. Currently, he is working as an Assistant Professor, at the Faculty of Chemistry and Chemical Technology, University of Ljubljana, Slovenia. He has great scientific interest, in research of relevant bio-molecular systems and with his valuable comprehensive knowledge in this field, he actively participates, in many projects, including research of Ebola.

Abstract

Rational drug design (RDD) is a method to find new drugs based on the knowledge of a biological target, which is commonly a protein or nucleic acid. The drug, which is usually a small organic molecule, may alter the function of certain biomolecules.

The main goal of RDD is to design molecules that are complementary (shape, MESP) to its target. Nowadays, computational (*in silico*) methods, which include databases, QSAR, homology modeling, docking, represent an important issue in almost each drug development project.

In this presentation, we will critically review some of the recent methods and protocols that are currently used for RDD. As an example, the structure based design of small molecule inhibitors against Ebola viral infection will be presented. The Ebola virus, which is a member of the *Filoviridae* family, causes one of the most lethal diseases nowadays. The genome of this virus, which encodes only eight proteins (NP, VP35, VP40, GP/sGP, VP30, VP24, and RNA polymerase), is written on a single-stranded, negative sense RNA (19 k nucleotides in length). Even though the Ebola virus is genetically simple it has a very complex lifestyle, which is depicted in figure 1.

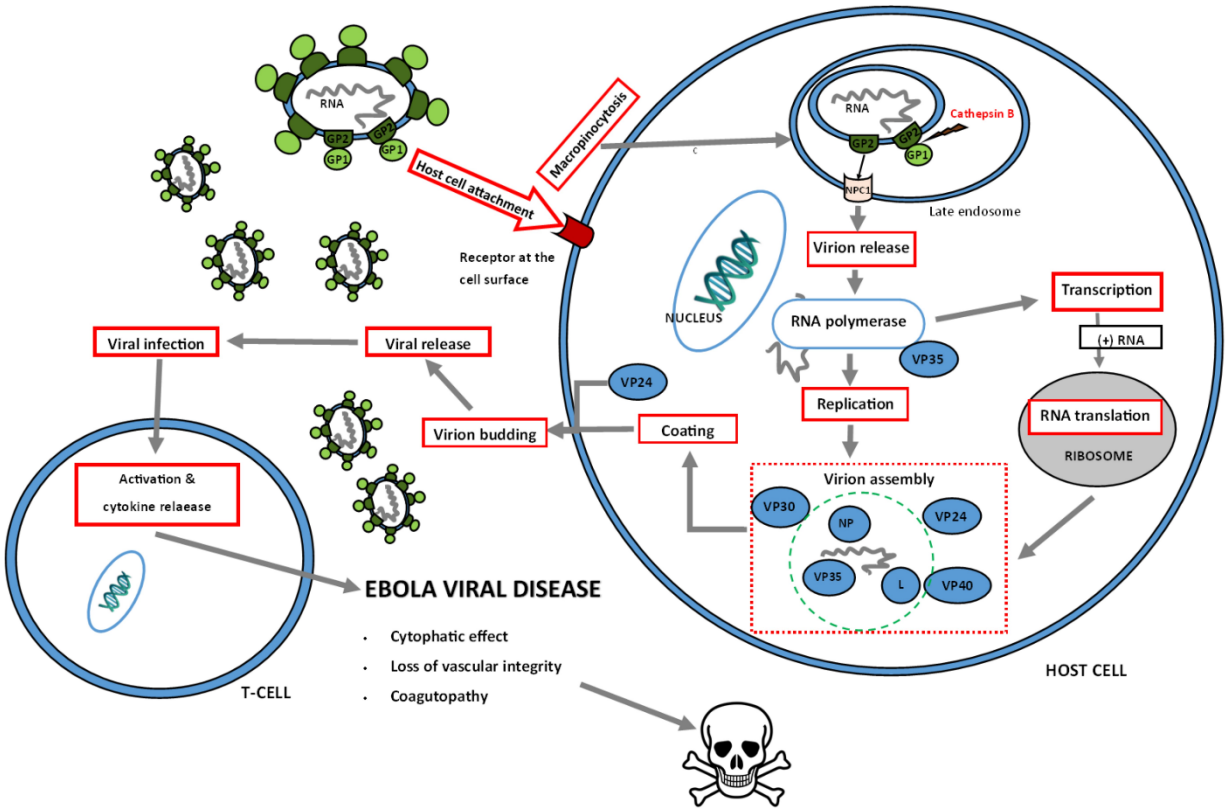

Figure 1: Ideogram of Ebola virus live cycle

The strategy for the design of small molecule inhibitors against the Ebola virus include different targets, some of them are EBOV proteins (VP24, VP35, VP40, etc.) and others are host proteins involved in the life cycle of the Ebola virus (Cathepsin B, DC-SIGN, NPC1, ATP1A1, …)[1]. Knowing the live cycle of the Ebola virus, several strategies to fight against Ebola viral disease are proposed in literature (a) production of monoclonal antibodies that target EBOV glycoprotein, (b) inhibition of endosomal escape, (c) enhancing intracellular innate immunity, (d) silencing of the expression of EBOV genes by synthetic RNA analogues, (e) inhibition of viral RNA processing, (f) disruption of the assembly of viral nucleocapsid and virion budding, (g) fight against infection by Ebola Virus Like Particle (VLP) delivery. The recent discoveries about the Ebola virus, its life cycle and targets allow us to initiate a proteochemometric modeling PCM. This is a computational method to model the bioactivity of multiple ligands against multiple protein targets[2].

In our work we targeted different proteins related to Ebola viral disease, according to the strategies described above. Molecular docking, mainly performed with Schrodinger's Suite 2105[3], has been the key method for searching medicaments for Ebola viral disease. We will show recent attempts to find a medicament against Ebola where different proteins (VP24, VP30, VP35 and VP40) that have different roles in Ebola viral disease pathology were used as targets for virtual screening of the NuBBE database. The NuBBE database is a virtual database of natural products and derivatives from the Brazilian biodiversity[4]. The analysis of virtual screening results has shown that compound NuBBE.283 (6-hydroxy-rutin) isolated from plant *Rubiaceae Chimarrhis turbinata* is the promising candidate for a medicament against the Ebola viral disease.

The NuBBE database were used to find the natural product which may protect us against the infection with Zika, which is a mosquito-borne flavivirus and is currently a global public health concern[5]. In case of Zika, the target was a Zika envelope protein of which the structure was resolved recently[6].

We will conclude our presentation with the structure based design of novel Neuroaminidase Inhibitors for Influenza[7], which is also a disease with a huge pandemic potential.

Keywords : structure based drug design, Ebola viral disease, Zika, Avian Flu

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CTV-1. New technologies and HPV genotyping: what's implication in developing countries ?

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Research Center "Health, biomedical research, biomolecules and quality of life" created in the University Sidi Mohammed Ben Abdellah of Fez, Morocco

Biography

Pr. Bennani Bahia got the PhD degree from the University Hassan II of Casablanca in 2002. In 2003, she was recruited as assistant professor in the Faculty of Medicine and Pharmacy of Fez, University Sidi Mohammed Ben Abdellah (Fez, Morocco), where she is responsible for teaching virology and founded the microbiology and molecular biology laboratory. In 2007, she founded and headed the team "Microorganisms, genomics and oncogenes factors". In 2010, she got the habilitation degree from the same University. She is the head of "Human pathology, Biomedicine and environment" Laboratory since it's accreditation. In 2015, she was appointed as coordinator of the research center "Health, biomedical research, biomolecules and quality of life" created in the University Sidi Mohammed Ben Abdellah of Fez. Pr. Bennani is supervisor of many national doctoral theses and masters and author of numerous international publications.

Abstract

Cervical cancer is the third most prevalent cancer in women around the world and molecular evidence indicates that HPV is the main etiologic factor of this cancer. Of the almost 200 different HPV types identified to date, 40 have been commonly found in anogenital lesions and, on the basis of their oncogenic potential, they were classified on high-risk and low-risk types. In effect, persistent infection by high-risk HPV genotypes is responsible for cellular lesions that can evolve to invasive cervical cancer. Hence, the importance of HPV detection test as a screening tool was emphasized and was introduced with cytology in several screening programs. Also, the introduction of the genotyping techniques, in spite of their limitations, in such programs has lead to reduction of this cancer burden and mortality. Firstly, it allows identifying women at high risk and secondly, it helped to determine the most prevalent genotypes, that was utile for the development of preventive vaccine. In fact, several tests using several sampling technics and many PCR-based genotyping methods have been developed and each of them has some advantages and disadvantages that will be highlighted. Generally, those technics require many steps or specialized equipment increasing the assay duration and cost. Thereby, some questions remain: what's the place of those tests in countries with limited resources? Can they be useful in screening programs in those countries? If not, is their any alternative and what are the consequences that result?

CTV-2 : Génotypage Moléculaire des Souches Résistantes de *Mycobacterium tuberculosis* isolées au Maroc

Dr El Mzibri, M., Chaoui I. et al.
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Dr El Mzibri Mohammed

Biography

Dr. Mohammed EL MZIBRI, titulaire d'un doctorat d'université en 1996 à l'université de la Méditerranée, Marseille - France. J'ai intégré le CNESTEN en 1999 en tant que chercheur scientifique en charge de développer l'axe recherche médicale. En 2002, j'ai été nommé responsable de l'unité Biologie et Recherche Médicale dans laquelle j'ai eu l'opportunité de développer différents axes de recherche en cancérologie, tuberculose, pharmacologie et valorisation des plantes médicinales marocaines.

En 2006, j'ai été à l'initiative de la mise en place de l'Unité Mixte de Recherche en Nutrition avec l'Université Ibn Tofail, et j'assure jusqu'à maintenant la coordination.
A partir de Juin 2015, j'ai pris la responsabilité de la Division Sciences du Vivant au CNESTEN dont la mission est de développer des programmes de recherche dans le domaine de la radiobiologie, pharmacologie, nutrition et biotechnologies, et de promouvoir l'utilisation des techniques nucléaires et isotopiques pour répondre à des problématiques d'intérêt national.

Aussi, et à travers ces années, j'ai eu l'occasion de coordonner des projets nationaux et internationaux et participer dans plusieurs autres projets de recherche, dans le domaine de la cancérologie, la tuberculose, la pharmacologie et la valorisation des ressources naturelles. Les travaux réalisés ont été publiés dans des revues internationales et présentés dans des manifestations nationales et internationales. Au cours de ces années, j'ai eu le plaisir et la responsabilité de co-encadrer plusieurs travaux de doctorat, master, DESA et PFE…

Entre 2012 et 2015, j'ai été nommé expert évaluateur Auprès du CNRST afin d'évaluer les projets soumis dans le cadre des appels d'offre nationaux et des collaborations internationales, leurs états d'avancement ainsi que les rapports finaux. J(ai également réalisé des évaluations pour le compte de l'Agence Universitaire de la Francophonie et la Fondation Lalla Salma de Prévention et Traitement des Cancers.

Abstract

À travers le monde, l'émergence et la dissémination des souches de *Mycobacterium tuberculosis* (MTB) résistantes aux antibiotiques antituberculeux, en particulier, les souches multi-résistantes (MDR) et ultrarésistantes (XDR), menacent le succès des différents programmes de la lutte contre la tuberculose (TB). La connaissance des bases moléculaires de l'acquisition de la résistance de MTB aux antibacillaires principalement les mutations génomiques a permis le développement de tests

moléculaires présentant l'avantage de fournir des résultats rapides et fiable sur le statut de la résistance des souches mycobacteriennes.

Différents tests moléculaires ont été utilisés, pour identifier les principales mutations associées à la résistance aux antibacillaires de première ligne (la rifampicine (RIF), l'isoniazide (INH), la streptomycine (SM) et l'ethambutol (EMB)) et ceux de deuxième ligne (fluoroquinolones (FQs) et médicaments injectables) chez des souches de MTB isolées à l'Institut National d'Hygiène ou à l'Institut Pasteur de Casablanca ou de Tanger.

L'analyse moléculaire a montré une relative bonne concordance entre les résultats phénotypiques et génotypiques avec une prédominance des mutations au niveau des codons 531, 526 et 516 du gène *rpoB*. Les isolats INH^R avaient principalement des mutations au niveau des codons katG315 and inhp-15. Aussi, sur 58 isolats phénotypiquement SM^R, seulement 17.2% (10 cas) portaient des mutations géniques, les mutations nucléotidiques au niveau des codons 43 et 88 du gène *rpsL* et au niveau du codon 512 du gène *rrs* ont été retrouvées respectivement chez 12.1% (7/58); 1.7% (1/58) et 3.4% (2/58) des isolats. Enfin, les mutations au niveau du codon 306 du gène *embB*ont été identifiées chez 42.3% (11/26) des isolats de MTB phénotypiquement EMB^R.

Aussi, et, sur l'ensemble des isolats étudiés, 84 souches MDR ont été retenus pour l'étude du statut XDR. L'analyse moléculaire de ces souches MDR a montré que 17.85% sont des pré-XDR. Seules des mutations dans le gène *gyrA* ont été retrouvées, touchant principalement els codons 91 et 94.

Parallèlement, toutes les souches sensibles, MDR et pré-XDR ont fait l'objet d'une caractérisation plus fine du génotype à travers le spoligotyping et le MRU-VNTR typing format 12 et/ou format 15. Nos résultats montrent que pratiquement toutes les souches circulantes au Maroc ont été caractérisées (absence de patterns orphelins) avec une prédominance de trois familles : Harleem, LAM et T, le SIT42/LAM9 a été identifié comme étant le spoligotype dominant dans les isolats cliniques de MTB au Maroc, ceci reflète une bonne adaptation de cette famille à notre population à travers le temps.

Globalement, les résultats obtenus montrant que (i) la population de MTB est hautement homogène ;(ii) la TB au Maroc est presque exclusivement transmise par des souches MTBC modernes appartenant aux groupes génétiques principaux 2/3 (Haarlem, LAM et T), avec un haut niveau de biodiversité décelé par MIRU-VNTR.

L'ensemble de ces travaux montre clairement l'intérêt d'introduire ces outils moléculaires dans le programme de prise en charge de la tuberculose au Maroc, aussi bien pour détection rapide de la TB-MDR et XDR, en vue d'ajuster rapidement le traitement et d'interrompre la propagation des formes sévères de la tuberculose pharmacorésistante, que dans le cadre de la surveillance épidémiologique pour une gestion efficace et efficiente de cette maladie dans notre pays.

Mots Clés : Tuberculose, *Mycobacterium tuberculosis*, génotypage, résistance

CTV-3 : Molecular epidemiology of Hepatites B and C in Morocco

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Biography

Abdelouaheb Benani is a Head of Molecular Biology Laboratory at Pasteur Institute of Morocco which is a national reference Molecular Biology Laboratory for Hepatitis C RAMED Program (Moroccan Ministry of Health). Dr Benani is also the Elect-President of Arab Society for Virology, 2nd Vice-President of Moroccan Society for Virology and also an Active member on the "Advisory Board, Consultative Meeting on Regional Strategy for Prevention and Control of Viral Hepatitis and Other Epidemics-Prone Blood-Borne Diseases, in 2008" (WHO/EMRO, Cairo, Egypt).

In 1993 : He got his Master of Molecular Biology and Biotechnology at Université Libre of Bruxelles (ULB, Belgium) in "*Anti-Tumoral Action of Parvoviruses*".

In 2002 : He got his PhD in molecular microbiology in Fes University (Morocco) on the "*Molecular Epidemiology of Hepatitis C in Morocco*". He participates in several international and national workshops and congresses. He published in many international journals including *Journal of Medical Virology, BMC public health, Virology Journal...* He is an active researcher in molecular epidemiology of HBV and HCV in general population and high Risk groups in Morocco. He organized the 1st International Symposium for Virology in Morocco in 2003 (Marrakech, Morocco), the First PCR Forum and Molecular Typing at Pasteur Institute of Morocco and the Hepatitis C Workshop at the 5th World Congress on Virology (Atlanta, USA 2015). He is implicated in student's research for their training, master, and PhD.

He serves as a reviewer as well as editorial board member of many international journals. Currently, he is a reviewer of some Grant agencies.

Abstract

Hepatitis B and hepatitis C are serious public health problems worldwide and leading causes of chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma.
HCV infects 170 million people worldwide. Its genome RNA sequence is highly variable. Six major genotypes and approximately 80 subtypes have been recognized since it was first identified. HCV Genotyping is well recognized as an essential tool for prognosis and prediction of treatment duration. Pegylated interferon- (Peg-IFN) and ribavirin combined therapy results in a sustained viral response (SVR) in approximately 50% of patients infected with HCV of genotype 1 and 80% of those with HCV genotypes 2 or 3. While specific genotypes dominate in certain regions of the world (genotype 4 in the Middle East, 5 in south Africa, and 6 in south east Asia). Many regions have multiple genotypes circulating including Europe and the United States.

Despite the availability of efficient vaccine, hepatitis B remains one of the major causes of liver disease. There are approximately 400 million people chronically infected worldwide. Eight HBV

genotypes (A-H) were identified. The various HBV genotypes have distinct geographical distribution and may be related to severity of liver disease and treatment response.

According to the latest data from a large screening program in the general population, prevalence of HBsAg and HCVab was 1.79% and 1.5% respectively. HBV and HCV viral loads were measured by the CAP/CTM real-time PCR (Roche Diagnostics). HCV genotyping was tested by Versant LIPA HCV II (Siemens). We have found that HCV genotypes 1 and 2 are the most prevalent in Morocco while genotypes 3, 4 and 5 are less common. Sequencing of HCV NS5B region of genotype 2 has shown that HCV subtype 2i is predominant. This finding suggests that subtype 2i is not only found in French patients as published, but also in Morocco with high prevalence.

In the other hand, HBV genotype D is predominant in Morocco, as this is the major HBV genotype in Mediterranean countries. HBV genotypes A and F are quite rare; and might be possibly acquired from other countries. High circulation of precore and basal core promoter mutants is common in chronic hepatitis B infection in Morocco.

Intermediate prevalence of HBV and HCV infections in Morocco is found; HVC is transmitted by Parenteral and nosocomial modes whereas HBV is parenterally and also sexually transmitted in our country. Nosocomial transmission of HCV is important, especially in high risk groups (hemodialyzed and hemophiliac patients). The introduction of HBV vaccination in the national schedule of new-born vaccination will be the leading strategy to resolve HBV infection.

TCV-4 : La Biotechnologie au service de la Santé Animale Production des Vaccins à usage Vétérinaires

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Biography

Dr. LOUTFI Chafiqa

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Dr Chafiqa LOUTFI, is a Microbiologist and Virologist. She got her DEA on Microbiology-Biochemistry and DES on Microbiology, University of Med V, Rabat, Morocco, in 1987-1991. Since 2002, she is acting as a Head of Virology Laboratory at Society of Biological and Pharmaceutical Productions Veterinarians (BIOPHARMA) in Rabat, Morocco, which a first National Society of animal Vaccines production against infectious diseases in Morocco and Africa. She is also the Responsible of active principles production and conventional Virological diagnosis - Department of Virology - BIOPHARMA. She participates and organized as well in several International and National , Seminars, Workshops and Congresses. She published several scientific works in indexed International Journals in the field of Virology and Veterinary Research. She is an active researcher in the development of control strategies against veterinary viruses. She is implicated in student's

research training, bachelors, master, and PhD. She serves as a reviewer as well as editorial board member of some international journals. She is also a member of several professional National and International Associations.

Abstract

Le secteur vétérinaire fait un appel croissant aux biotechnologies, pour découvrir, tester et produire de nouveaux traitements (ex: vaccins, protéines recombinantes et anticorps monoclonaux etc...) mais aussi pour diagnostiquer et comprendre les causes des maladies.

Un approvisionnement fiable des vaccins purs, sûrs, puissants et efficaces est essentiel pour le santé d'un animale. l'immunisation des animaux avec des vaccins de haute qualité est le principal moyen de contrôle de nombreuses maladies animales. Dans d'autres cas, les vaccins sont utilisés en conjonction avec le control d'une maladie nationale ou les programmes d'éradication. Comme la pathogenèse et l'épidémiologie de chaque maladie varie, le rôle et l'efficacité de la vaccination comme un moyen de contrôle varie également d'une maladie à l'autre. Certains vaccins peuvent être très efficaces, ce qui induit une immunité qui empêche non seulement les signes cliniques de la maladie, mais peuvent aussi prévenir l'infection et à réduire la multiplication et l'excrétion de l'agent pathogène.

La vaccination dans la plupart des pays est basée principalement sur l'utilisation des vaccins vivants atténués et/ou inactivés, tandis qu'avec le développement biotechnologique, y'a la multiplication des approches nouvelles dérivées de la fusion cellulaire et de la recombinaison d'ADN/ARN a entraîné toute une série d'innovations dans les vaccins vétérinaires au niveau de leur conception, de leur préparation et de leur utilisation.

Les modalités de production diffèrent selon les vaccins (vaccin vivant ou inactivé). Dans le cas des vaccins tués, l'étape suivante est l'inactivation de l'agent pathogène, suivie de l'étape de purification des antigènes. Ces antigènes purifiés ainsi obtenus vont être concentrés avant d'y apporter, dans certains cas, un ou plusieurs adjuvants. Dans le cas des vaccins vivants, le vaccin est préparé à partir d'une souche virale particulière, rendue non pathogène sans être tuée. La norme de l'OIE pour la gestion et les techniques exigeantes pour la réalisation d'essais pour les maladies infectieuses (Organisation Mondiale de la Santé Animale) précise que les méthodes d'essai et les procédures doivent être appropriées pour des applications de diagnostic spécifiques pour que les résultats des tests peuvent avoir de pertinence. En d'autres termes, l'essai doit être « apte à l'usage ». L'évaluation qualitative et quantitative de la capacité d'un résultat de test positif ou négatif pour prédire avec précision d'infection ou l'état d'exposition de l'animal ou d'une population d'animaux est la considération ultime de la validation du test. Tout vaccin nécessite avant sa commercialisation, une Autorisation de mise sur le marché (AMM) qui garantit son efficacité et son innocuité, et qui apporte une information complète sur ses conditions d'utilisation.

***Mots clés**: Biotechnologie, Vaccins, Technologie, OIE, ADN/ARN, AMM*

CTV-5 : Les Nano Biocapteurs dans le Diagnostic en Microbiologie

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Biography

Prof. Dr. Aziz Amine

Prof. Aziz Amine, has been Head of Department of Chemical Engineering and Environment of the University Hassan II-Mohammedia during the period 1999-2003. Professor Amine's research over the last 25 years has focused on sensors and biosensors and their use in Analytical Chemistry. He is author of more than 100 papers and has served as coordinator of several national and international research projects. He is a reviewer for several scientific international journals. He is one of the Editors of the International Journal "Biosensors and Bioelectronics" Impact Factor 7.47. Chairman of the International Workshop "Biosensors for Food Safety and Environmental Monitoring" organized every two years in Morocco.

WoI-1 : Le rôle des Technologies de Stockage dans la Transition Énergétique

Pr Benchrifa Rachid
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Biography

Prof. Rachid Benchrifa

Rachid BENCHRIFA, Docteurs de Sciences physiques, soutenue en France 1990. Chercheur au Centre National pour la Recherche Scientifique et Technique (CNRST) de 1991 à 2013, cofondateur de l'unité de recherche : *Technologies et Économie des Énergies Renouvelables*(TEER) en 1995 au CNRST, coauteur du livre «مدخل إلى الطاقة», le livre a eu le *Prix Hassan II pour l'environnement* au titre de l'année 2008. Professeur à l'Université Mohammed V, Faculté des Sciences Rabat (FSR) depuis 2014. Au centre de mon travail, se trouve deux thématiques spécifiques, le stockage d'énergie et particulièrement les technologies de l'hydrogène, et l'intégration de l'énergie éolienne dans le système de production d'énergie. Le deuxième intérêt est la sensibilisation au rôle moteur de l'énergie propre dans tout développement durable.

Abstract

Tout le monde est convaincu que les énergies renouvelables composeront une part importante du bouquet énergétique futur. Domestiquer ces sources d'énergie pour la production de l'électricité, dépend en premier lieu du coût et de l'efficacité des technologies de production. L'injection de l'électricité produite à partir de ces sources renouvelables intermittentes dans le réseau, génère un certain nombre de complications, l'insertion d'une interface de stockage réduirait considérablement ces complications. Ainsi, le développement de ces sources renouvelables dépendra des percés technologiques que connaîtront les technologies de stockage. En effet le stockage de l'énergie composant principal du système énergétique actuel est appelé à se développer davantage dans l'avenir. Et pour avoir une meilleure adéquation entre la demande en énergie dans le temps et dans l'espace et son offre, des capacités importantes de stockage sont nécessaires.

Les technologies de stockage rendent le système de production énergétique plus stable et plus flexible dans son fonctionnement et améliorent l'efficacité et la qualité de la production. Ainsi les producteurs utilisent le stockage de l'électricité et la chaleur pour pallier les micros coupures, stabiliser le réseau (fréquence et tension), permettre une meilleure utilisation des installations de production de base pendant des heures creuses, et assurer une fourniture plus économique de l'électricité pendant les heures de pointe. En effet le système de stockage n'est économique que si l'ensemble des coûts, d'investissement, de maintenance et de fonctionnement du système de stockage est inférieur à la différence entre le coût de production pour le stockage (production supplémentaire des installations de base pendant les heures creuses) et de la production normale des installations de pointe.

Le stockage en général implique un certain nombre de technologies, anciennes et modernes, qui sont basées sur un cycle de stockage - déstockage quotidien et qui peut s'étendre à un stockage saisonnier

d'énergie. Ces technologies couvrent un large spectre d'applications, des applications améliorant la rentabilité du système de production aux applications améliorant la qualité du courant telles que le volant d'inertie, les supercondensateurs, les supraconducteurs et le stockage dans les batteries électrochimiques.

WoI-2 : Introduction aux Nanomatériaux et Opportunité d'Application pour le Photovoltaïque

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Biography

Dr. Izeddine Zorkani

Dr I. Zorkaniwas born in Fes Morocco; he did all his high school studies in Fes. Fes contains the Quaraouine University, one of the oldest Universities in the world. He holds a 3d Cycle Thesis in Solid State Physics from Poincaré University in Nancy-France. He holds a PhD in Semiconductor Physics from the ULG University in Liège-Belgium. He has about 30 years of experience in Nanosciences with a focus on solar energy applications. Previous interests include Low Dimensional Systems and Nano-materials. Dr Zorkani has produced numerous formal scientific publications & scientific reports. He has co-initiated the the Moroccan Association of Nanotechnology" (AMANAT), the North Africa of the Nanoscience African Network (NANOAFNET), the African Network of Solar Energy (ANSOLE), the Moroccan Society of Renewable energies andthe Renewable Energy University Network (REUNET). He is Member of the African Laser Centre and Responsible of a Federation Scheme with the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste – Italy). He is Responsible of a Research Group"Nanomaterials and Renewable Energies" and Director of the Solid State Laboratory, Physics Department, FSDM, Fes-Morocco. Dr. Zorkani is the President of the Moroccan NGO Sebou Association for a Healthy Environment (ASES)

He is involved in numerous international co-operation programs in nanosciences with a focus on novel optical materials and solar energy applications. Being involved in numerous international & national committees and advisory boards, he is a regular associate of the International Centre for Theoretical Physics-Trieste (ICTP).

Dr. Zorkani has and is involved in co-supervision of numerous postgraduate students from the Africa. His main interests are related to both fundamental investigations & technological applications in the field of nanomaterials and solar energy.

Abstract

This presentation reviews the uses of solar energy, and examines its impact on society and the environment. The Photovoltaic conversion is discussed; we will give a detailed description of different Photovoltaic technologies with a focus on Nanomaterials. The objective of RDI is to reduce the cost of solar cells with very high efficiency (> 30%). We will give a brief introduction to nanotechnology and describe the national conditions and realities for nanoscience and nanotechnology (N&N).
Recommendations on increasing the use of solar energy in sunbelt countries are discussed; special studies for the case of Morocco will be presented.The Moroccan Project of Solar Energy (PSM) aims the establishment in 2020 with a capacity of electricity production from solar energy with a total capacity of 2000 MW; the PSM will be presented.

WoIII-1 : Méthodes de Détection des Virus Pathogènes dans l'Eau et les Aliments

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Abstract

La plupart des virus entériques pathogènes ne sont pas ou difficilement cultivables. C'est pourquoi la détection directe de ces virus dans des matrices complexes ne peut s'effectuer que par des techniques moléculaires. Le Comité européen de normalisation devrait proposer pour fin 2016 la version définitivede la norme ISO 15216 (XP CEN ISO/TS 15216-(1-2)) permettant de rechercher du génome des norovirus et du virus de l'hépatite A dans les aliments à risque (i.e.. fruits de mer, salades, fruits rouges, eaux, surfaces). L'approche s'effectue en deux étapes, une étape de concentration-extraction des virus à partir de la matrice et une étape de détection du génome viral par RT-PCR. Cette méthode est, aujourd'hui, incontournable et parfaitement adaptée, pour des études rétrospectives de recherche de l'origine alimentaire d'une épidémie virale. Sur des approches plus prospectives de gestion du danger viral, son utilisation reste encore limitée, car la présence du génome ne permet pas de témoigner du caractère infectieux des virus. De plus le faible volume analysé et la présence potentielle d'inhibiteurs restent encore une source réelle de faux positifs et de faux négatifs.

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WoIII-2 : Recherche et Détection des Virus Entériques dans les Bivalves au Maroc

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Dr. Senouci Samira, Département de Microbiologie, Institut National d'Hygiène, Rabat, Maroc

Abstract

Les Enterovirus sont des virus entériques humains pouvant provoquer des maladies graves chez les enfants. Ils sont éliminés dans les selles et contaminent de cette manière le milieu hydrique et les mollusques bivalves. Les maladies dues aux Enterovirus et aux Hépatovirus constituent un important problème de santé publique. Pour lutter contre ces maladies, il est donc nécessaire de disposer d'une méthodologie permettant le contrôle et la surveillance virologique des milieux hydriques.

L'objectif de notre étude est de déceler les Enterovirus et le virus de l'hépatite A dans les moules (*Mytilus galloprovincialis*) et les huîtres (*Crassostrea gigas)*, dans le but d'avoir un aperçu sur la contamination virale du milieu hydrique, évaluer la contamination virale des mollusques bivalves et le risque de transmission vers l'Homme via leur consommation.

Un total de 432 individus (48 échantillons) dont 288 individus (24 échantillons) de moules (*Mytilus galloprovincialis*) et 144 individus (24 échantillons) d'huîtres (*Crassostrea gigas*) provenant de 3 sites naturels (Harhoura, embouchure de BouRegreg et Yaacoub el Mansour) pour les moules et à partir d'une station d'aquaculture (la lagune de l'Oualidia) pour les huîtres ont été analysés par culture cellulaire et par PCR en temps réel.

L'analyse des moules collectés a permis de détecter des Enterovirus à un taux de 75% sur l'ensemble des échantillons testés dont 70.8% sont des Enterovirus Non Poliomyélitique (EVNP) et 4.2% sont des Poliovirus de type 1 souche vaccinale, alors que chez les huîtres est de 0%. L'analyse statistique, à l'aide du test du Khi2 pour les proportions, a révélé que les différences observées dans les trois sites naturels ne sont pas significatives ($p>0,05$). Concernant le pourcentage de positivité en virus de l'hépatite A chez les huîtres et les moules par PCR en temps réel est de 0%.

Les différents résultats obtenus dans cette étude ont clairement montrés le risque de contamination par les Enterovirus à travers la consommation de mollusques bivalves provenant des gisements naturels. Ces résultats soulignent l'importance de renforcer la qualité virologique des mollusques bivalves avant leurs commercialisations.

Cette étude effectuée au Maroc a permis de montrer le risque infectieux de la consommation de mollusques bivalves des gisements naturels contaminés par les eaux usées. D'où le danger sur la santé public et sur la richesse maritime.

Une meilleure connaissance de la contamination des mollusques bivalves nous aide à comprendre les niveaux de virus dans l'environnement et améliorer la sécurité alimentaire, protégeant ainsi les consommateurs.

WoIII-3 : Detection of Norovirus, Hepatits A virus and Other Human Enteric Viruses in Molluscan Shellfish by Taqman Real Time Reverse Transcription Polymerase Chain Reaction Assay

Tarek Fatima, Faculté des Sciences et Techniques, Mohammedia, Maroc

Abstract

Enteric viruses are considered as a major cause of non bacterial human gastroenteritis diseases in the world, they can be transmitted directly from person to person or indirectly (fecal-oral route) via virus contaminated water, air, sol, surfaces, or foods. Therefore consumption of raw or under cocked contaminated molluscan shellfish is the most frequent cause of foodborne gastroenteritis, due to their filter feeding system. Indeed, these animals concentrate viral particles in their digestive gland; thus representing an important host for enteric virus transmission to human. Viruses that can be transmitted to human include the human Noroviruses (NoV), Hepatitis A virus (HAV), Hepatitis E virus (HEV), Rotavirus (RV), Astroviruses, Sapoviruses, Adenoviruses, Aichivruses, and other enteroviruses and picornaviruses. (Greninger et al., 2010; Sair et al., 2002; D'Souza et al., 2007). Among the most significant foodborne enteric viruses are hepatitis A virus and noroviruses, which contribute to the vast majority of illnesses. The exceedingly small size of most enteric viruses and the inability to grow them in cell cultures make their detection difficult. Therefore, molecular methods, particularly reverse transcription-polymerase chain reaction (RT-PCR), has become the most common assay procedure.

The aim of this study is to detect and characterize enteric viruses present in Moroccan cost via analysis of molluscan bivalve, these latter are a sedentary species so they would be a good indicator of viral pollution. To achieve this, sampling concerned four species (Oysters, cockles, mussels, and clams) of Moroccan wild and harvested shellfish was made from areas classified from A to C. Before proceeding to the PCR assay, the viruses were extracted from shellfish tissues, clarified and concentrated.

Bivalve molluscan shellfish has been collected, from several points and harvesting area from north and south of Morocco, and transferred in refrigerate box to the laboratory for analysis (Laboratory of Virology, Microbiology, Quality and Biotechnology/ Ecotoxicology and biodiversity). After shelling the shellfish in sterilized conditions, the digestive gland were removed, pooled in order of 1.5 g for each sample and homogenizate with glycine buffer for concentration of viral particles by Adsorption-Elution-precipitation method according to the method previously described by Kittigul et al. (2008). Viral nucleic acids were extracted from shellfish concentrate using Trizol method (Invitrogen) for extraction of RNA according to the manufacturer's instructions, and with phenol chloroform for extraction of DNA, and then analyzed by TaqMan real time RT-PCR and/or PCR using specific primers and probes.

WoIII-4 : Intérêt des Bactériophages en tant qu'Indicateur de Pollution Virale dans l'Environnement

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Abstract

La recherche de certains bactériophages dans l'environnement comme indicateurs de pollution fécale est justifiée par leur capacité à se répliquer au niveau des bactéries présentes dans le microbiote intestinal des animaux à sang chaud.Ils sont ainsi excrétés dans les selles de l'Homme et des animaux et sont retrouvés en grandes quantités dans les eaux usées brutes.

Si parmi ces bactériophages, la plupart présentent une structure « tête queue » (*i.e.* coliphages somatiques, phages de *Bacteroides fragilis*), les bactériophages ARNF-spécifiques présentent des similitudes structurales avec de nombreux virus entériques pathogènes (capside protéique icosaédrique, génome à ARN simple brin). Ils pourraient ainsi constituer des indicateurs de pollution fécale de nature virale, capables de mieux représenter le comportement des virus pathogènes humains (*i.e.* norovirus, virus des hépatites A ou E) dans l'environnement ou au cours des traitements inactivants.

Les bactériophages sont en effet parfois retrouvés dans des situations où les indicateurs bactériens de pollution fécale classiques (*E. coli*, entérocoques) sont absents. Ces situations soulignent donc un risque viral qui pourrait perdurer malgré l'absence des indicateurs conventionnels, moins résistants.Les bactériophages semblent donc plus adaptés à évaluer le risque viral, d'autant plus que certains d'entre eux résistent mieux que les virus pathogènes aux traitements inactivants (le phage MS2 est par exemple l'un des virus les plus résistants aux traitements UV). Par ailleurs, le caractère infectieux des bactériophages fécaux est facile à vérifier, en opposition aux virus pathogènes non cultivables pour lesquels la détection de leur génome par des techniques moléculaires n'est pas toujours synonyme deprésence de virus infectieux. Enfin, certains bactériophages pourraient aussi permettre de discriminer l'origine humaine ou animale de la pollution fécale, avec plus ou moins de succès(*i.e* phages de *B. fragilis*, génotypage des bactériophages ARN F-spécifiques).

Parmi ces indicateurs, ce travail s'est particulièrement intéresséaux bactériophages ARN F-spécifiques, afin d'évaluer leur potentiel pour discriminer l'origine d'une pollution fécale ainsi quepour apprécier le risque viral dans des fruits de mer et des eaux environnementales provenant d'un site situé dans le nord-ouest de la France.

Concernant leur utilisation pour discriminer l'origine de la pollution, l'analyse de différents types d'échantillons d'origine connu (eaux usées urbaines, selles d'animaux, eaux usées d'abattoir) a par exemple démontré que le simple génotypage des bactériophages ARN F-spécifiques présentait parfois quelques limites pour distinguer les échantillons humains des échantillons animaux. Le séquençage des phages a cependant permis de mettre au point des outils moléculaires plus spécifiques d'une pollution humaine, notamment par la détection spécifique de certaines souches du génogroupe II et du génogroupe III.
Lors de la recherche des bactériophages ARN F-spécifiques dans les matrices environnementales,les contraintes imposées par les limites de détection ont été illustrées par la détection de phages infectieux dans certains échantillons en l'absence de génome correspondant. La situation inverse a également été observée, vraisemblablement expliquée par la meilleure stabilité des génomes par rapport aux particules infectieuses.Ces données soulignent donc combien il est difficile de conclure quant au risque infectieux lié à un virus pathogène lorsque celui-ci est recherché par des techniques moléculaires dans des matrices environnementales.

Concernant l'utilisation des bactériophages ARN F-spécifiques pour estimer la pollution fécale, leur recherche dans les eaux superficielles du site d'étude (vraisemblablement soumit à une pollution fécale récente) n'est pas apparue très informative puisque leurs concentrations étaient en moyenne 100 fois inférieures à celles d'*E.coli*, qui était présent dans tous les échantillons. A l'inverse les concentrations détectées dans les fruits de mer étaient 3,6 fois supérieures à celles d'*E. coli*, suggérantdonc une meilleure bioaccumulation des phages ARN F-spécifiques. La recherche des phages a ainsi permis d'identifier une pollution fécale en l'absence d'*E. coli*dans plusieurs lotsde fruits de mer analysés.

Enfin, si l'on s'intéresse particulièrement à la pollution virale, une corrélation a été observée entre la présence de génome de phages ARN F-spécifiques du génogroupe II (phages d'origine humaine) et celle du génome de norovirus dans les fruits de mer, qu'ils soient impactés par une pollution fécale massive ou plus modérée.

Les bactériophages fécaux apparaissent donc comme des outils intéressants pour mieux gérer le danger viral lié aux aliments ou à l'environnement. La difficulté réside cependant dans le choix des indicateurs à utiliser, puisqu'ils présentent chacun des avantages etdes limites. En effet, si le potentiel des bactériophages ARN F-spécifiques à discriminer l'origine d'une pollution a pu être ici augmenté, et que plusieurs arguments justifient leur recherche dans les fruits de mer, leur détection dans les eaux n'a pas montré de réel intérêt comparé à *E. coli*. Dans ce type de situation, la recherche des coliphages somatiques est généralement plus sensible, ces derniers étant excrétés en plus grande quantité dans l'environnement. De la même manière, l'intérêt des bactériophages ARN F-spécifiques semble limité dans les eaux relativement chaudes (> 25°C), ces derniers étant plus fragiles que les phages somatiques dans ces conditions.

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WoIII-5 : Bactériophages dans les Eaux Usées : Outils d'Évaluation de Performance des Traitements d'Épuration pour l'Élimination des Virus Entériques

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Abstract

Les eaux usées épurées sont comme une véritable ressource en eau supplémentaire, pouvant contribuer à la diminution du déficit hydrique et constituer une solution durable, sur le plan écologique et sur le plan économique. Se pose alors la question de la qualité microbiologique de ces eaux ? Aucun critère n'est fixé pour les virus entériques, bien que ceux-ci constituent la cause majeure de gastroentérites d'origine hydrique. L'utilisation des eaux et la consommation des produits contaminées par les virus entériques favorisent le développement de gastro-entérites, d'hépatites aigües et de certaines zoonoses. La recherche des virus infectieux, dans les matrices de l'environnement, est complexe. D'où l'intérêt de l'investigation des indicateurs de contamination virale, dans les eaux usées traitées. Les bactériophages constituent des candidats d'indicateurs de contamination virale.

En Tunisie, la recherche simultanée des virus entériques, des coliphages somatiques, des phages d'ARN F-spécifiques et des phages de *Bacteroides* GA17 et RYC2056, dans les eaux des stations d'épurations, est, respectivement, effectuée, par RT-PCR en temps réel, par la technique de la gélose en double couche, et, selon les normes ISO 10705-2 (2000), ISO 10705-1 (1995) et ISO 10705-4 (2001).

De fortes concentrations de *Rotavirus* ($5.2x10^5$ à $1.3x10^7$ $cg.L^{-1}$) et des phages ($2.1x10^5$ à $1.1x10^7$ $UFP.L^{-1}$), sont trouvées, à la sortie des stations d'épuration des eaux traitées par boues activées. Ce qui témoigne de la résistance similaire de Rotavirus et des coliphages totaux au traitement secondaire. Les coliphages somatiques ont été les plus abondants dans les eaux usées. Les coliphages somatiques, les phages d'ARN F- spécifiques et les phages *infectant Bacteroides Fragilis* RYC2056 et *Bacteroides thetaiotaomicron* GA17 ont manifesté une résistance importante aux traitements par boues activées et par le chlore, en terme d'efficacité de traitement (Hmaied et *al*., 2015 ; Yahya et *al*., 2015 ; Jebri et *al*., 2012). L'absence des *Rotavirus* dans les eaux usées d'abattoir traitées par le procédé de la membranaire MBR (concentration à l'entrée du MBR est de $6.25\ 10^6$ $cg.L^{-1}$) témoigne de son efficacité au regard de l'élimination virale. Le taux de réduction des bactériophages est de 4 log (traitement efficace, si abattement supérieur ou égal à 2 log). Les coliphages somatiques peuvent être des

indicateurs appropriés, pour estimer l'inactivation des virus par les rayons gamma (Jebri et *al.*, 2013). Ils constituent donc de bons outils, pour évaluer la performance du traitement des eaux usées, pour l'élimination virale.

WoIII-6 : Méthodes de Concentration des Virus Pathogènes dans l'Eau

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Abstract

Les concentrations habituelles en virus entériques pathogènes dans le milieu hydrique, ainsi que les faibles volumes imposés lors del'étape de détection par les méthodes moléculaires ou la culture cellulairenécessitent la mise en œuvre de méthodes de concentration des particules virales. Ces méthodes utilisent fréquemment la charge électrostatique des particules virales à un pH donné, mais elles sont aussi de plus en plus souvent basées sur la taille ou le coefficient de sédimentation des particules. Pour les eaux de surface (rivière, eau de mer…) des volumes de l'ordre de 10 à 50 L sont généralement analysés avec un protocole d'adsorption-élution utilisant une filtration sur membrane chargée positivement ou négativement (Cashdollar and Wymer, 2013) ou sur laine de verre (Wyn-Jones *et al.*, 2011). Suite à l'étape d'élution, une deuxième concentration des particules virales s'avère alors nécessaire. Pour les échantillons environnementaux tels que des eaux usées autorisant l'analyse d'un volume plus faible, de l'ordre de 100 mL, l'ultrafiltration qui concentre les particules virales en fonction de leur taille avec un seuil de coupure de 30 à 100 kDa est de plus en plus utilisée (Qiu *et al.*, 2016).

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WoIII-7 : Difficultés d'Interprétation de la Présence de Génome Viral dans l'Eau et les Aliments

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Abstract

Le niveau de connaissance actuel ne permet pas de proposer une interprétation scientifiquement rigoureuse de la présence de génome de virus pathogènes dans des matrices environnementales ou alimentaires. Dans le cas d'une réponse positive, en l'absence d'information sur le caractère infectieux de ces virus,il est impossible de conclure sur le réel danger viral pour l'Homme. Il a en effet été

largement démontré que le génome d'un virus présente une persistance très supérieure à son caractère infectieux. Néanmoins l'absence d'information sur ce point conduit à l'application d'un principe de précaution qui entraîne le retrait potentiellement injustifié des lots du marché. Cette surestimation est réelle car de fortes prévalences dans certaines matrices sont rapportées dans la littérature. Dans le cas d'une réponse négative, le faible volume analysé, le rendement d'extraction des acides nucléiques parfois de l'ordre de 1% et la présence d'inhibiteurs conduisent souvent à une sécurité très relative concernant l'absence de danger viral.

Pour l'heure, il semble donc encore très important d'utiliser des indicateurs de pollution dont le caractère infectieux puisse réellement être validé (*i.e.E. coli*, enterocoques, phages).

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Oral Communication

COI-1 : Identification of Bio-Markers Using Real Time PCR for Early Diagnosis of Gynecological and Breast Cancers Viral Etiology in Morocco

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Abstract

Breast and gynecological cancers (cervical cancer, ovarian cancer ...) represent a real public health problem, in Morocco. In 2011, these cancers accounted for 60% of all cancers, among women and 50% of cancer among women treated at the National Institute of Oncology. In spite of significant advances in research on these cancers, with the new tools of molecular biology, viral etiology of these cancers is often associated and reported to oncogenic DNA and RNA viruses, mainly HPV (human Papilloma virus), EBV, MMTV, HBV and the most affected virus is often the HPV. Therefore, their diagnosis is frequently performed late to the metastatic stage. Currently, more research is directed towards the molecular signatures of different cancers, including research on newly discovered biomarkers and highlighted called miRNAs that allow early diagnosis of these cancers. Among these, the identification of MicroRNAs (miRNAs) which are epigenetic biomarker able to regulate promoters of genes of cancer cells and which are released early, in the general circulation, thus providing potential targets for diagnosis.

The aim of this study is to determinate the expression profile of microRNAs and establish the relation between viral etiology of these cancers and MicroRNAs. Our research project proposes to establish the viral etiology of these cancers, using specific primers for each type of viruses and identify some MiRNAs specific to each type of breast and gynecological cancers, among the Moroccan population. These MiRNAs were extracted and purified with specific methods from fresh biopsies collected from obstetrics gynecology service of CHU Ibn Rochd of Casablanca and amplified using RT-PCR.

These newly discovered molecular signature of cancer can contribute to an early and selective cancer diagnosis, if the molecular profile is well established and can provide a new way of prevention to ensure a better prognosis and improving therapeutic monitoring for patients, in Morocco, for breast and gynecological cancer or another type of cancers (vulva, endometrial…).

Keywords **:** bio-markers, breast cancer, gynecological cancers (cervical and ovarian), MiRNAs, Real Time PCR,viral etiolog

COI-2 : Sequence Variations in E6 and E7 Oncogenes of Human Papillomavirus Type 16 from Gabonese Cervical Cancer Isolates

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Abstract

HPV-16 variants distribution is reported to differ geographically and in their oncogenic potential for progression to cervical cancer. In this study, we investigated the HPV-16 variants distribution among women from Gabon.

Amplification of E6 and E7 genes of 29 HPV-16 isolates of Gabonese women with cervical cancer (collected in the Pathology Laboratory of the Faculty of Medicine and Health Sciences of Libreville, Gabon) was performed by using type-specific primers PCR and then directly sequenced. The sequences obtained were aligned with the HPV-16 GenBank reference sequences.

Out of the 29 samples investigated, 25 were successfully amplified. In the 25 samples analyzed 9 and 3 nucleotide changes in E6 and E7 gene respectively were found. In the E6 gene, the most frequently observed mutation were C143G, G145T, T286A, A289G, C335T which led Q14D and H78Y non-synonymous amino acid variations. The others mutations found C109T, G132C, G132T, A403G were detected in 24% (6 of 25), 68% (17 of 25), 32% (8 of 25), 32% (8 of 25), respectively. The E7 gene appears to be better conserved than the E6 gene. Only 3 mutations were detected of which two were silent T789C and T795G and the third A647G was missense mutation with substitution of Asparagine to Serine (N29S). This mutation was present in 32% (8 of 25) samples. All the variants detected in this study belonged to the Af1 (68%; 17 of 25) and Af2 (32%; 8 of 25) lineages.
This study reported for the first time the distribution of HPV-16 E6 and E7 genetic variants in cervical cancer cases in Gabon. Our results highlight the predominance of African lineage in Gabonese population.

Keywords : HPV-16 variants, E6 gene, E7 gene, cervical cancer, Gabon

COI-3 : E6 and E7 Oncogenes of Human Papillomavirus Type 16 : Genetic Variability in Congolese Cervical Cancer Isolates

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Abstract

The molecular epidemiological studies showed that some variants of HPV-16, distributed geographically, would present a higher risk of causing cervical cancer. This study aimed to analyze nucleotide changes of HPV-16 E6 and E7 genomic regions, from infected Southwestern Congolese women.

DNA of twenty HPV-16 isolates was analyzed by amplifying the E6 and E7 genes using type-specific primers PCR and direct sequencing. The sequences obtained were aligned with the HPV-16 GenBank reference sequences.

Thirteen (65,0%) out of 20 DNA-samples were successfully amplified. Genetic analysis revealed 18 and 4 nucleotide changes in E6 and E7 genomic regions, respectively. The most frequently observed nucleotide variations were the missense C143G, G145T and C335T in E6 (100%), leading to the non-synonymous amino acid variation Q14D and H78Y. E7 genomic region was found to be highly conserved with two most common T789C and T795G (100%) silent variations. All HPV-16 variants identified belonged to the African lineage, 7 (53,8%) belonged to Af-1 lineage and 6 (46,1%) to Af-2 lineage. The missense mutation G622A (D21N), in the E7 region, seems to be described for the first time in this study.

This study reported for the first time the distribution of HPV-16 E6 and E7 genetic variants in infected women from southwest Congo. The findings confirmed almost ascendancy of the African lineage in our study population.

Keywords : human papillomavirus type 16, E6 and E7 genetic variants, Southwest Congo

COI-4 : Can *Helicobacter pylori* vacA Genotypes and cagA Status Be Used As Predictor of Gastric Diseases Development in a Moroccan Population ?

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Abstract

Helicobacter pylori (*H. pylori*) infection induces inflammation of the gastric mucosa which may progress to precancerous lesions leading to gastric cancer (GC). Pathological determinism is associated to some virulence genes of the bacterium, notably the vacuolating-cytotoxin-gene (vacA) and cytotoxin-associated-gene-A (cagA). The present study aimed to find the association of the vacA genotypes and cagA status with sex, age and gastric diseases.

Gastric biopsy was taken from 1074 consenting moroccan patients with gastriti peptic ulcer or GC and who had undergone upper gastrointestinal endoscopy. The specimens were processed by PCR to identify *H. pylori*, cagA status and to characterize vacAs, vacAm and vacAi regions directly from biopsies *H. pylori* positives. The use of these samples was approved by the Ethics Committee of CHU-Fez. SPSS-software was used to correlate genotypes with different gastric diseases.

VacA genotyping revealed the predominance of vacAs2i2m2 (49.7%). The correlation between vacA genotypes and cagA status with age reveals that the most virulent vacA alleles (s1, i1 and m1) are more predominant in men than in women (p=0.004, p=0.009 and p=0.019 respectively). *H. pylori* vacAi1 genotypes is strongly associated with the risk of GC, the OR (95% CI) was 10.45 [2.15-50.75], while vacAs1/cagA+ can be considered a protective factor for GC, the OR was 0.13 [0.02-0.75].

This first study conducted in our country demonstrates a large genetic diversity of *H. pylori* with a predominance of vacAs2m2i2 and shows that vacAi1 may be of a clinical usefulness in identifying patients at a high risk of GC development.

Keywords : *H. pylori*, gastric diseases, vacA, cagA

COI-5 : Clinico Pathological Review of 89 Patients with Bile Duct Cancer and Association with *Helicobacter pylori*

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Abstract

The aim of this study is to asses clinico-pathological aspects of histological confirmed bile duct cancers and to determine whether the presence of *H. pylori* in bile duct biopsies is associated with an increased risk of biliary tract carcinoma.

A retrospective study was performed at Mohammed VI University Hospital, over 14 years (2001-2015). Eighty nine cases of histological confirmed bile duct cancer were enrolled in this study. Demographic data, clinical and histopathological characteristics were collected. Bile duct specimens were investigated for *H. pylori* by several techniques.

The patients average age was 60±12,04 years old. The highest frequency was seen between 61 and 70 years, 76% of cases were female and

24%were male. The histological study shows that adenocarcinoma is the most common histological type. After examination for *H. pylori*, 54% of the patients were positive.

The data obtained suggests the necessity of early diagnosis. The definition of risk factors is the challenge that could improve the prognosis of this cancer.

Keywords : bile duct cancer, clinico-pathological aspects, *H. pylori*, Morocco

COI-6 : HIV-1 Drug Resistance Mutations Reported in People Living with HIV in Libreville, Gabon between 2002 and 2009

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Abstract

Antiretroviral therapy (ART) has reduced morbidity and mortality related to human immunodeficiency virus (HIV) infection but in spite of this advance, one of the major potential challenges is the risk of emergence of ARV drug-resistant HIV strains contributing to treatment failure in patients. Thus, the aim of this study is to evaluate the genotypic profile of HIV-1 isolates from treated patients in Libreville, Gabon.

A total of 109 patients in therapeutic failure between January 2002 and December 2009 were included in this study. Genotypic analyses of the reverse transcriptase and protease genes were performed by PCR and sequencing with TRUGENE HIV-1 Genotyping system. The last update (2015) of the International Aids Society (IAS-USA) list of mutations was used to determine the mutations recorded which might be related to drug resistance.

Among the 109 patients, analysis was done for 44 patients. All patients had an infection with the subtype non-B. Nucleoside reverse transcriptase inhibitor (NRTI), Non-Nucleoside reverse transcriptase inhibitor (NNRTI) and protease inhibitor (PI) mutations were found in 38.6% (17/44), 25% (11/44) and 90.9% (40/44) cases, respectively. Mutations involvement in NRTI cross resistance called Thymidine analogue mutations (TAMs) were the most commonly NRTI found mainly represented by T215 F/Y (27.3% ; 12/44) and M41L (20.5% ; 9/44) and K70R (13.6% ; 6/44). Multiple NRTI resistance mutation was found in 12 cases (27.3%). New NRTI mutations was found : T 215/A in one case. In the NNRTI mutations, G190A/S/V (11.2% ; 5/44) was mainly found. Major mutations associated with resistance to protease inhibitors were found in 15.9% (7/44) cases for M46I/L, 13.6% (n = 6/44) cases for I54V, 13.6% (6/44) cases to L90M and 11.4% (5/44).

This study on the prevalence of resistance mutations show the existence of several resistances to key antiretroviral drugs used in patients with HIV to Gabon.

These mutations can affect the efficacy of treatment, by reducing the sensitivity to one or more antiretroviral.

The surveillance for HIV-1 drug resistance transmission, in Gabon, should be strengthened.

Keywords : HIV-1 drug, resistance mutations, reverse transcriptase gene, protease gene, Libreville, Gabon

COI-7 : Molecular Characterization of Multi and Extremely Drug Resistant *Mycobacterium tuberculosis* Isolates from Morocco

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The emergence of multidrug-resistant (MDR) and extensively drug-resistant tuberculosis (XDR TB) threatens disease control efforts throughout the world. Drug-resistant TB may be acquired, if bacteria harboring spontaneously emerging drug resistance mutation are positively selected due inadequate treatment regimens, poor drug quality or patient non-compliance. Alternatively, drug-resistant TB may also occur through the transmission of already resistant strains, termed primary resistance. Unlikely, disease caused by XDR *Mycobacterium tuberculosis* (MTB) isolates is associated with very poor treatment outcomes. Thus, the rapid detection of microbial resistance to second line drugs (SLDs), prior to and during treatment, is therefore of essential importance for the implementation of increased infection control measures that may well limit the spread of XDR-TB to other patients.

The present study aimed to characterize these mutations within MDR isolates, in order to have a global picture on the occurrence of XDR-TB in this setting and select specific SNPs that could be used for the rapid, specific and sensitive detection of resistance to SLDs.

A collection of 603 *Mycobacterium tuberculosis* strains isolated, at the Pasteur Institute, in Casablanca, were enrolled in this retrospective study. First molecular characterization of MDR strains was performed by examining hot regions of *rpoB, katG,* and the *inhA* promoter genes which are known to harbor the majority of Rifampicin and Isoniazid, resistance-associated mutations, respectively, by PCR, DOT Blot hybridization strategy, using radiolabelled probes. The mutation profiles associated with resistance to SLDs, FQs and injectable drugs were assessed by DNA sequencing. Target sequences for five genes were examined : *gyrA, gyrB*(FQs), *rrs*(KAN,AMK,CAP), *tlyA* (CAP) and *eis* promoter (KAN).

Molecular analysis showed that 26.7% of MDR strains are pre-XDR harboring mutations in the *gyrA* gene, with a prevalent mutation in Asp94Gly (66.6%), followed by Ala90Val (17.6%) and Ser91Pro (17.6%). No point mutation was detected, neither in *gyrB* nor in *rrs*genes. The *eis* promoter and *tlyA* gene sequencing are underway. The sensitivity for the detection of FQs resistance by DNA sequencing could not be evaluated, because of the lack of the information regarding DST for SLDs (DST is in progress for Fluoroquinolones and injectable drugs).

The results of this study demonstrate the utility of detection of mutations associated with drug resistance to SLDs, especially, to FQs which is crucial for optimizing the treatment of TB and preventing transmission of drug resistant MTB strains. Implementation of molecular tests for further drug resistance identification would facilitate DST for SLDs, particularly, in developing countries, were the majority of MDR and XDR TB occur.

Keywords : Morocco, *Mycobacterium tuberculosis*, MDR-TB, XDR-TB, pre-XDR-TB, sequencing, *gyrA, gyrB, rrs, tlyA, eis* promoter

COI-8 : Detection of *Helicobacter pylori* and its CagA virulence gene : Association with Gastric Diseases

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Helicobacter pylori (Hp) infection is a public health problem, affecting silently 50% of the world population and 68% of the Moroccan population [1]. Hp is the only bacterial agent classified by WHO as carcinogen type I. It has many virulence factors, giving it the power to colonize the human stomach (pH=2) Urease, to fluctuate the inflammatory response and to alter the integrity of the gastric mucosa "CagA" protein. Hence, the appearance of many gastric disorders such as ulcers, gastritis, MALT and gastric cancer.

This study aims to identify Hp with PCR, by revealing the presence of its specific gene "UreA", identify CagA strains on the infected

population (Hp^+) and study the association between these strains and the different gastric pathologies.

The 84 gastric biopsies obtained by endoscopy have been subjected to an histopathological examination, in order to determine gastric pathologies and a DNA extraction and PCR to reveal the presence of UreA and CagA genes. The average age of our population is 47±14.5 years.

Among the 84 studied patients, 27 (32.1%) were positives for the UreA gene, among which 63% are suffering from gastritis. A total of 10 patients (37%) were found to be positive for CagA and suffered from gastritis. These cases may present a high risk to develop more severe diseases that can lead to gastric cancer [2,3].

Keywords : *Helicobacter pylori*, UreA, CagA virulence gene, gastric diseases

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COI-9 : Aspects Épidémiologiques et Cliniques de l'Infection à *Helicobacter pylori* à travers une Étude Marocaine

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Abstract

Helicobacter pylori (H.pylori) colonise l'estomac d'environ la moitié de la population humaine dans le monde. L'infection par cette bactérie est chronique et peut évoluer de la gastrite à des pathologies graves telles que les ulcères gastro duodénaux et le cancer gastrique. Dans les pays en développement, l'infection à *H. pylori* constitue un problème de santé publique.

Le but de cette étude est de déterminer la prévalence de l'infection à *H. pylori* et d'étudier l'impact des différents facteurs épidémiologiques ainsi que les principales maladies gastriques associées à cette infection, chez une population marocaine.

L'étude épidémiologique a été faite sur 837 patients, les renseignements cliniques et socioéconomiques sont collectés sur des dossiers archivés (1998-2011), à l'Institut Pasteur du Maroc et dans un centre médical de gastroentérologie à Casablanca. L'examen histologique, réalisé sur des biopsies, visait à rechercher des anomalies de la muqueuse gastrique, une inflammation ou un processus cancéreux, et, à révéler, en second lieu, la présence de *H. pylori*.

La prévalence de l'infection à *H. pylori*, chez la population étudiée, est de 69,2%, avec une prédominance (80,2%) chez le groupe de [31-40 ans]. Le sexe ne présentait aucun effet significatif sur la prévalence. Une corrélation significative a été observée, entre la prévalence de l'infection à *H. pylori* et le développement des gastrites chroniques (91,8%) dont 35,5% appartient au groupe de [31-40 ans].

Les résultats de cette étude indiquent que le groupe d'âge [31-40 ans] présente la plus forte prévalence de l'infection à *H. pylori* et le taux le plus élevé de gastrites. Il constituerait ainsi un terrain de risque pour la survenue d'un cancer gastrique.

COI-10 : Prevalence of Panton-Valentine Leukocidin in *Staphylococcus aureus* Strains in Tangier Morocco

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Abstract

In the present study, we determined the prevalence and evaluated risk factors for PVL-positive *S. aureus* as a cause of infections among patients, in Tangier, Morocco.

Between January 2012 and December 2014, we studied 212 *S. aureus* recovered from clinical specimens from 983 patients hospitalized at Mohamed V Hospital, during the prospective study. Data for risk factor analysis were collected. Isolates were identified as *S.aureus* by Gram stain tube coagulase and deoxyribonuclease reactions. PVL Toxin and *mec*A were detected by PCR for all isolates. PVL-positive strains were further analyzed by antimicrobial susceptibility testing by disk diffusion by EUCAST methods. Statistical analyses were performed using SPSS V 20.

PCR testing revealed that (42:19.81%) of isolates from this study harbored the lukSF-PVgenes. The mean age of PVL positive patients was 19±14,19 years compared to 20±14,19 years of PVL-negative patients. Most isolates (201:94.81%) were MSSA and (11:5.1%) were MRSA. Thirty (30:71.42%) of the PVL-positive strains were classified as community-associated SA (CA-SA) and 12 (28.57%) as hospital-associated (HA-SA). Only (2) two MRSA infected patients were PVL-positive. These two strains were isolated from children with respiratory infections and considered to belong to community acquired CA-MRSA. All PVL-positive isolates including MRSA showed a high-grade antimicrobial susceptibility.
Our results suggest the presence of MSSA PVL-positive strains spreading across the community and were associated to skin and bone infections. Antimicrobial resistance could not represent the only elements highlighting the importance of an infection, the need of PVL screening should be taken into account, specially, in pediatric patients.

Keywords : PVL, *S. aureus*, MRSA

COI-11 : Phenotypic Characteristics of Methicillin Resistant *Staphylococcus aureus* Isolated from Pediatric in the Mother Child Hospital in Morocco

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Infections involving methicillin resistant *Staphylococcus aureus* MRSA remain a serious threat to hospitalized patients worldwide. It's characterized by recalcitrance to antimicrobial therapy which is a function not only of widespread antimicrobial resistance but also the capacity to form biofilms. The present study evaluated the presence of genes encoding adhesion factors and biofilm forming capacity in MRSA.

In this study 53 isolates of MRSA, recovered from December 2010 to Mai 2014 in a Mother Child Hospital CHU Mohamed VI Marrakech in Morocco, were screened for the presence of *bap, ica* genes associated with biofilm formation and for bbp, *cna, ebpS, eno, fib, fnbA, fnbB, clfA and clfB* genes that encode microbial surface components recognizing adhesive matrix molecules MSCRAMMs. The biofilm formation assay was performed in 96-well microtiter polystyrene plates. The presence of genes was determined by polymerase chain reaction PCR.

In the present study, an association was found between *icaD* gene detection and biofilm formation. Thus, 100% of the strains harbouring *icaD* and producing biofilm suggests that in these species biofilm formation is an important mechanism for the persistence of the infection. None of the isolates harboured *bap* or *bbp*. Furthermore, 96.23% isolates were positive for *fnbA*, 60.37 % isolates were positive for *eno*,

43.39% isolates were positive for *clfA* and *clfB* and 11.32% isolates were positive for *cna*, 9.34% isolates carried *ebps*, 5.66% isolates were positive for *fib* and 1.89 % isolates carried *fnbA*. The presence of the combination of these genes means that they may have a good genetic capacity for adherence.

Our findings showed that the SARM carrier, in Marrakech, children was high, from this data. The genetic variations of adhesion genes need further investigation.

COI-12 : *Rotavirus* VP7 and VP 4 Genotyping in Stool Samples from Children with Acute Diarrhea in Williamsville Area (Abidjan, Côte d'Ivoire)

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Abstract

Childhood diarrheas lead to considerable morbidity worldwide. Moreover, the related mortality occurs, mainly in developing countries. One of the major diarrhea infectious agents in children under five years is *Rotavirus*. It's an enteric virus that is transmitted by the faecal-oral route. High genetic variations of *Rotavirus* have been documented. The molecular epidemiology of this virus is mostly based on molecular typing of VP7 and VP4 genes. Recently vaccines (Rotarix® and RotaTeq®) have been approved, based on the believed most frequent genotypes. However, the genotypic diversity varies quickly in African countries. This substantiates the interest of monitoring routinely the genetic pattern of the infectious agent.

Our goal, in this work, was to evaluate the proportion of Rotavirus, in the etiology of childhood diarrheas, in Williamsville neighborhood in Abidjan city and assess the genotypic pattern found in the positive samples.

To do this, we collected 103 stool specimens from children consulting Williamsville area Public Health Center for acute diarrhea. Out of the 103 analyzed samples by RT-PCR, 37 were positive. The G1, G2, G3 and G4 genotypes were detected in the VP 7 gene. The genotyping of the VP4 gene showed only P [8] and P [4]. The combination of the two kinds of genotypes gave P [8] G1, P [8] G3, P [8] G4 and P [4] G2.

Finally, we conclude that the genotype pattern is usual enough to permit the efficiency of the new vaccines.

COI-13 : Évaluation de l'Activité Antifongique de la Pierre d'Alun Comparée avec l'Activité Antifongique du Bicarbonate de Soude et de l'Héxetidine sur les Levures de *Candida*

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Abstract

Les champignons sont parmi les causes les plus importantes d'infections aigües ou chroniques profondes, chez l'Homme, en particulier, sur les muqueuses buccales, qui peuvent être graves, chez les individus affaiblies ou immunodéprimées. Le traitement de ces candidoses fait appel à plusieurs médicaments antifongiques, et, en complément, à des bains de bouche. Les soins les plus long et le manque de disponibilité des médicaments pour leur traitement encouragent en permanence la recherche alternative et nous ont amenés à les trouver parmi les thérapies traditionnelles, avec un faible coût et une faible toxicité. La pierre d'alun est parmi les produits naturels utilisés, depuis l'antiquité, en médecine traditionnelle marocaine, pour réduire la plaque dentaire, soigner les inflammations gingivales ou les caries dentaires.

L'objectif de ce travail est d'étudier la composition chimique de la pierre d'alun et évaluer *in vitro* son efficacité contre les levures de *Candida*.

Ainsi, à partir des prélèvements buccales, les souches de *Candida* sp. isolées chez les patients externes ou hospitalisés, au niveau de LCPM CHIS, à Rabat, sont mises mises en culture et identifiées. On a réalisé des dilutions de l'alun, en milieu gélosé de Sabouraud additionné de Chloramphénicol (250, 500,1000, 5000, 10000 PPM), afin de déterminer la concentration inhibitrice des candidoses. On a évalué l'activité antifongique de l'alun, par comparaison avec celle du bicarbonate de soude et de l'Héxétidine utilisé en médecine dentaire.

L'activité antifongique de l'alun est observée à une concentration de 5000 PPM, par rapport à la concentration inhibitrice du bicarbonate de soude (9000 PPM) et à la concentration inhibitrice de l'Héxétidine (10000 PPM).

La pierre d'alun a un effet antifongique sur des différentes levures de *Candida*, ce qui révèle qu'elle pourrait être utilisée comme un antifongique naturel, pour le traitement des maladies parodontales et autres pathologies induites par cette levure.

Keywords : alun, activité antifongique, *Candida* spp, bicarbonate de soude, Héxétidine

COI-14 : Putting Viruses to Work for Cancer Diagnostics

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Abstract

Testing patient samples for disease diagnosis could be more rapid, routine and robust, if bacteriophage could replace antibodies for the recognition of disease biomarkers.

Towards this goal, we directly wire bacteriophage (phage) tailored to recognize cancer biomarkers into electronic circuits. Phage-displayed protein libraries provide vast diversity for the recognition of biomarkers of disease. Thus, from a vast library of peptides displayed on the phage surface, phage with high affinity and specificity for target biomarkers were selected.

Further optimization of phage binding applied homolog shotgun scanning libraries, an approach analogous to medicinal chemistry. Then, synthetic chemistry was used to alter the viral surface, improving its affinity through incorporation of additional ligands and engineering of the geometries of scaffolds used for peptide presentation on the phage surface. We demonstrated sensitive detection of prostate cancer biomarkers in artificial and natural urine.

In addition, further engineering of the display scaffold and chemically synthesized wrappers allowed suppression of non-specific binding to prostate cancer cells, a daunting challenge for the very sticky phage surfaces.

In summary, phage offer an excellent platform for the recognition of cancer biomarkers in biological samples. In addition, the robustness and ease of their production make phage attractive replacements for conventional antibodies.

COI-15 : Pre Administration of Curcumin Prevents Hyper Homo Cysteinemia In Ethanol Induced Gastric Ulcer

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Abstract

Curcumin is a protype natural product that has been widely recognized as an antioxidant and anti-inflammatory agent.

In this study, we aimed to evaluate the potential role of curcumin supplementation in attenuating the aggressive effect of alcohol in experimental induced gastric ulcer.

Forty male albino rats weighing 150-180 g were classified into four groups including control, curcumin, ethanol and treated groups. Oxidant and antioxidant parameters were estimated, liver and kidney function were measured, tumor necrosis factor-a (TNF-a) was determined by ELISA and homocysteine was estimated by HPLC, using reversed phase column and UV detector at 260 nm.
Stomach malondialdehyde (MDA) and nitric oxide (NO) levels were significantly increased by ethanol consumption compared to control group, beside the reduction of reduced glutathione (GSH) and the elevation of homocysteine and TNF-a.

Whereas, pretreatment of curcumin prevented the hypercysteinemia and the elevation of TNFa resulting in a depletion of gastric ulcer.

We concluded that curcumin is considered a promising supplement in attenuating gastric ulcer through its important role in depletion of oxidative stress as well as inflammatory action.

Keywords : Gastric ulcer, curcumin, hyperhomocysteinemia, HPLC, ethanol

COI-16 : *In vitro* anticancer activity of *Euphorbia echinus* extract

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Abstract

Cancer is one of the major causes of death worldwide. Therefore, the search for novel anticancer drugs with new mechanisms of action is essential for future chemotherapeutic treatment.

Natural products have historically played an important role in the development of anticancer drugs. *Euphorbia echinus* is a native plant from south Morocco, popularly called "Daghmous", and widely used to dissolve cysts. It is also a hypoglycemic, anti-inflammatory, laxative, as well as curing for many others remedies. However, up to now, no anticancer study of *Euphorbia echinus* has ever been performed.

In this context, the aim of this work was to study cytotoxic effects of *Euphorbia echinus* extract against HL60 (human promyelocytic leukemia cell line), K562 (human chronic myeloid leukemia cell line), Ishikawa (human endometrial adenocarcinoma cell line) and SH-SY5Y (human neuroblastoma cell line) by MTT test. This assay is based on the metabolic reduction of soluble MTT by mitochondrial enzyme activity of viable tumor cells, into an insoluble colored formazon product, which can be measured spectrophotometrically after dissolving in dimethylsulfoxide (DMSO) [1]. ECV304 (human umbilical vein endothelia cell line) was used as non cancerous cellular control.

The *Euphorbia echinus* extract was found to be highly cytotoxic against HL60 and K562 (approximately 80% cytotoxicity). Moreover, *Euphorbia echinus* extract has proliferative effect on ECV304 human endothelial cells. Our results suggest that *Euphorbia echinus* may have anticancer potential against human leukemia cells.

Keywords: Anticancer activity - *Euphorbia echinus* - Cytotoxicity – MTT test

[1]: Carmichael J, DeGraff WG, Gazdar AF, Minna JD, Mitchell JB.Evaluation of a tetrazolium-based semiautomated colorimetric assay: assessment of radiosensitivity.Cancer Res. 1987;47(4):943-6.

COII-1 : Pathogenesis and Tissue Distribution of Moroccan Avian Infectious Bronchitis Virus Strains (Italy02 genotype) in Experimentally Infected Broiler Chickens

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Abstract

Avian infectious bronchitis (IB) is one of the most important viral diseases of poultry, affecting chickens of all ages and causing major economic losses in poultry flocks. Mass vaccination is conducted, in Morocco, using a vaccine against Massachusetts which is the most dominant serotype. However no information about the pathogenesis and tissue distribution of the Moroccan Italy02 genotype was reported.

Thus, 40 one-day-old specific pathogen free chickens were divided randomly into four groups. Group1, 2 and 3 were inoculated intra-oculo nasally, with 103.5 EID50 of Italy02 viruses and group 4 was kept as control. Chickens, in each group, were monitored for 14 days post-infection (pi).

Chickens, in all infected groups, showed severe respiratory signs which most of them have been reproduced on 2dpi, with varying times of appearance and disappearance. The infected birds appeared lethargic, reluctant to move, with specific respiratory clinical signs and macroscopic lesions. However, no nephritis lesions or mortality were recorded in all groups.

The specific histological lesions, finding in all infected birds, exhibited tracheal lesions, with mucosal thickening, hyperplasia of the surface epithelium and mononuclear inflammatory cell infiltrate of lamina propria. Primary and secondary bronchi, epithelial hyperplasia and mononuclear inflammatory cell infiltrate of the lamina propria were also observed. Tracheal lesions, developed in all infected birds, confirm the ability of the three tested strains to induce respiratory disease.

The results at 14 dpi also revealed that all strains were able to induce serological response. Virus re-isolation from infected organs and amplification of the viral RNA by real-time PCR proved the presence of the virus in lung and trachea of infected chicks. Neither re-isolation nor significant viral RNA detection were detected in the kidney.

The results demonstrated that the three strains Italy02 genotype emerging in Moroccan poultry farms have a wide distribution for respiratory system, without kidney damage and without causing mortality.

Keywords : infectious bronchitis virus (IBV), Italy 02, clinical scoring, pathogenecity

COII-2 : Evaluation of the Safety and Efficacy of a Live Attenuated Thermostable Rift Valley Fever Vaccine in Sheep, Goats, Cattle and Camels

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Rift valley fever (RVF) is a vector-borne zoonotic disease causing huge economic loses in livestock (ruminants and camels) and human fatalities. The disease is endemic in most Sub-Saharan African countries, including West Africa, and has been present in the Middle East since 2010. Vaccination is considered to be the

most effective way to prevent and control the expansion of the disease. The available attenuated vaccines for RVF cause abortions and teratogenic effects (Smithburn strain vaccine) or are thermolabile (CL13 strain vaccine). This study therefore set out to develop a safe and effective thermostable live attenuated RVF vaccine.

The existing CL13 vaccine, which is a naturally attenuated strain, was made thermostable through three cycles of heating (+56°C) and selection. The resulting candidate vaccine (CL13T) was stable at +4°C, for 20 months, and shows significantly improved levels of thermostability over the existing CL13 vaccine. A pilot batch of the CL13T vaccine was produced and tested for safety and efficacy in cattle, sheep, goats and camels.

The vaccine was found to be safe, with no clinical signs or side effects observed in vaccinated animals, and there was no evidence for circulation of the virus in the blood of animals after vaccination. Immunogenicity was tested by neutralizing antibodies detection and good levels of antibodies were detected for a minimum of one year, in all animal species.

This new thermostable vaccine could represent an efficient tool for the control of Rift Valley Fever in endemic countries. The vaccine also has the potential to be used, along with an appropriate diagnostic test, to differentiate vaccinated from infected animals (DIVA).

Keywords : Rift Valley Fever, thermostable Clone 13 vaccine, sheep, goats, cattle, camels

COII-3 : Control of Peste des Petits Ruminants

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Abstract

Peste des Petits Ruminants (PPR) and sheep/goat pox (SGP) are the most contagious diseases of small ruminants throughout Africa and Asia. Different types of vaccine could be proposed depending to the epidemiological situation : live attenuated, inactivated or recombinant vaccine. Dual vaccination against both diseases in one shot is possible using a combined live attenuated vaccine or a Poxvirus recombinant PPR vaccine.

A combined (Nigeria 75PPR and sheeppox Romania strains) live vaccine was developed and tested together with a recombinant vaccine (goatpox virus expressing H and F proteins of PPRV) and an inactivated vaccine. Safety and efficacy were evaluated on goats and sheep, goats were challenged by PPR and sheep by SP virulent strains.

The combined and recombinant vaccine confers a good protection against both PPR and SGP infections. The combined vaccine was used in the field in Morocco and in some African countries with good safety and precocious immunogenicity against both diseases.

The combined and recombinant vaccine could be used for vaccination campaigns to protect small ruminants in one shot against two major diseases. The live combined vaccine is cheap and efficient, the recombinant vaccine has a potential to be used, along with an appropriate diagnostic test, to differentiate vaccinated from infected animals (DIVA), but vaccination may request a double injection. The inactivated vaccine is also an option for countries or zones free from PPR.

Keywords : peste des petits ruminants, sheep pox, combined vaccine, recombinant vaccine

COII-4 : Tuberculosis in Eurasian wild boar (Sus scrofa) from Morocco

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Abstract

Wild boars (*Sus scrofa*) are widespread in the northern third of Morocco. We aimed to investigate the presence of tuberculosis in wild boars and to generate information on the possible host status in this region.

Mycobacterium bovis was isolated in mycobacteriological cultures from six of 43 wild boars. Culture-positive samples yielded spoligotype number SB1627. A 60% of lung tissue specimens or tracheobronchial lymph node samples yielded positive culture. Two thirds (64%) of the wild boar submitted for histopathology revealed tuberculosis-compatible lesions. These lesions were particularly frequent in lymph nodes (63%) and in lung tissue samples (43%). Ziehl-Neelsen staining did not identify acid-fast bacilli, indicating paucibacillary infections.

Our results confirm the presence of *Mycobacterium tuberculosis* Complex (MTC) infection in Moroccan wild boar. However, our information was limited to only 43 wild boars from one specific region. Thus, further research is needed to assess the host status of wild boar, in Morocco.

Keywords : Tuberculosis, *Sus scrofa*, Morocco

COII-5 : Development of One Step TaqMan-MGB Real Time RT-PCR Assay for Rapid Detection and Discrimination of Infectious Bursal Disease Virus

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Abstract

Infectious bursal disease (IBD) is an important contagious viral infection of the immune system of poultry. It is caused by a member of the *Avibirnavirus*genus within the family of *Birnaviridae*. This infection constitutes a permanent threat to the profitability of the Moroccan poultry sector despite the use of various types of commercially available vaccines. PCR is an important and rapid tool for the diagnosis of IBD. TaqMan-Minor Groove-Binding (MGB) real-time RT-PCR two step assay developed by Gonzalo et *al*., (2012) is a practical tool for differentiating between very virulent (vv) and non-vv (classic and variant) IBDV strains infection in poultry.

The aim of this work was to modify and develop TaqMan-MGB real-time RT-PCR in one step using a TaqMan labeled probe (two fluorogenic) for the detection of infectious bursal disease virus.

In order to perform the test, D78 vaccine strains of IBDV *versus* a local Moroccan vv strain of IBDV ($T=10^{5.5}$ $DICT_{50}.mL^{-1}$) were used. The primers and probe used for real time RT-PCR amplification of IBDV were carried out with the VP5/VP2 overlapping region of segment A developed 5Gonzalo Tomás et al, 2012). The amplification reaction was run in two stages. In the first stage, reverse transcription (RT) was performed on RNA producing complementary DNA (cDNA) by the activity of reverse transcriptase and in the second one, the cDNA obtained was amplified by PCR under the activity of the DNA polymerase. Both enzymatic reactions were carried out successively in a single tube at a real-time machine instead of the RT in a tube and recovered cDNA and subsequently moved to its amplification. The resulting run allowed to reduce the temperature cycle time from 6 hours to 47 min. The specificity of the IBDV assay was tested with RNA from infectious bronchitis virus, Newcastle disease virus and avian influenza virus. The sensitivity

was determined using dilutions of the D78 RNA genome. The assay demonstrated a wide dynamic range, between$10^{-4,0}$ PFU to $10^{-1.0}$ RNA copies.

The method developed here was validated for specificity, linearity, repeatability, sensitivity, reproducibility and limit of detection. It allowed greatly reducing the test running time by 6 folds. The validation results satisfied the predetermined acceptance criteria and suggest that the assay developed here is a useful tool for the very rapid diagnosis of IBDV and to detect and discriminate in one step very virulent (vv) from non-vv (classic and variant) IBDV strains infection in poultry.

Keywords : infectious bursal disease virus, chickens, rapid diagnosis tests, RT-PCR

COII-6 : Comparative Innocuity and Efficacy of Live and Inactivated Sheep pox Vaccines

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Abstract

Sheep pox (SPP) is one of the priorities, high-impact animal diseases in many developing countries, where live attenuated vaccines are routinely used against sheeppox virus (SPPV). In an event of an SPP outbreak, historically disease-free countries would hesitate to use of live vaccines against SPPV, due to the safety and trade reasons. Currently no killed SPPV vaccines are commercially available.

In this study, we developed an inactivated Romanian SPPV vaccine and assessed its efficacy and potency in comparison with a live attenuated Romanian SPPV vaccine.

Four naïve sheep were vaccinated once with the Romanian SPPV live attenuated vaccine and16 sheep were vaccinated twice with the inactivated vaccine. All sheep in the live vaccine group were included in the challenge trial which was conducted using a highly virulent Moroccan SPPV field strain. Eight sheep of the inactivated vaccine group were challenged and the remaining sheep were monitored for seroconversion. Experimental animals were closely monitored for the appearance of clinical signs, body temperature and inflammation at the injection site. Two naïve sheep were used as unvaccinated controls.

The inactivated Romanian SPPV vaccine was found to be safe and confer a good protection, similar to the live vaccine. Specific antibodies appeared from seven days post vaccination and remained up to nine months.

This study showed that the developed inactivated Romanian SPPV vaccine has a potential to replace attenuated vaccine to control and prevent sheep pox in disease-free or endemic countries.

Keywords : Sheep pox, Romanian strain, inactivated vaccine, efficacy, potency

COII-7 : Étude Comparative de la Pathogénécité des Souches Marocaines du Virus de la Clavelée

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Abstract

L'objectif de l'étude est de déterminer et de choisir une souche d'épreuve pour le contrôle des vaccins produits contre la clavelée. Toutes les souches testées, pour réaliser cette étude, étaient d'origine marocaine (n=5) : deux souches d'Oujda, une de Berkane, une de Taounate et une souche d'Azilal. Afin d'étudier le pouvoir pathogène de ces souches, plusieurs tests ont été réalisés : passage et titrage sur culture cellulaire de coeur d'agneau, inoculation expérimentale sur les moutons suivie du titrage *in vivo* et titrage par PCR en temps réel, et, enfin, une séro-neutralisation.

Parmi les 5 souches marocaines étudiées, c'est la souche de Berkane qui a présenté le pouvoir pathogène le plus élevé. Les souches d'Oujda et de Berkane ont montré les mêmes signes cliniques résultants de l'infection expérimentale des mêmes souches, avec des titres infectieux élevés, surtout pour la souche de Berkane. La séro-neutralisation a montré la présence d'anticorps anti clavelée le 7ème jour qui suit l'infection. Dès le 10 ème jour, l'ensemble des animaux inoculés ont montré une séroconversion, avec des titres représentatifs, pour la souche de Berkane. La souche de Berkane semble être la plus pathogène parmi les souches testées. Elle peut représenter une excellente souche d'épreuve pour le contrôle des vaccins destinés contre la clavelée.

Keywords : clavelée, souches (isolats), PCR, titrage, séro-neutralisation

COII-8 : Comparison of Virological and Serological Findings on Moroccan Bluetongue Virus 1 and 4 Infected Sheep

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Abstract

The bluetongue (BT) virus has been reported, in Morocco, since 2004. To investigate the involvement of BTV 1 and BTV4 infections, on immunity of sheep, and to provide a basis for interpretation of serological and virological data, experimental infections were conducted with BTV-1 and BTV-4 strains.

Antibody responses to BTV infections were evaluated using two enzyme-linked immunosorbent assays and microtiter serum neutralization tests (mSNTs), in addition, to virological monitoring based on RT-PCR.

Large variation was observed between the three groups, in clinical signs, showed variation in immune responses between animals.

Viremia for BT virus was readily detected, in sheep, following BTV-1 infection, but, was not detected following exposure to BTV-4, in group B and group C.

The high manifestation of clinical signs caused by BTV1 serotype compared to those caused by BTV4 could likely be due to BTV strains antigenicity and could probably be responsible in suppressing or manifesting BT symptoms and viremia for this serotype.

Keywords : bluetongue virus, immunity, sheep, clinical signs, RT-PCR, viremia

COII-9 : Isolation and Identification of *Pasteurella* Respiratory Infected Ruminants in Morocco

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Abstract

Pasteurellossis species (*Pasteurella trehalosi* and *Mannheimia haemolytica*) are regarded as the main pathogens responsible for the acute respiratory tract infection, in ruminant livestock, by causing an economic loss in ruminant around the world. In Morocco, very little data is available regarding the inference of these species in such infections. Therefore, our objective is to check whether these species are implicated in respiratory infections and if so, to determine the serotypes incriminated in their clinical expression.

Thus, 25 samples were collected from infected bovines and screened with a highly sensitive real time PCR technique. All positive samples were subjected to culture on Petri plate containing agar base supplemented with 5% sheep blood and identified using biochemical AIP20E, biological (Mac Conkey selective medium) and microscopic (gram's staining) investigations.

The preliminary results demonstrated that a percentage of 20 positive samples were found for *Pasteurella trehalosi.* The mean Ct value of 32

was determined by molecular analyses. *Haemolytica* species were not detected in any sample. These data, while limited on a very slight number of samples, are encouraging and we need to extend the study and confirm the outcome.

Keywords : Morocco, ruminants, respiratory infections, *P. trehalosi, M. haemolytica*

COII-10 : Thermal Stability Study of Five Newcastle Disease Attenuated Vaccine Strains

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Abstract

Newcastle Disease (ND) is of big concern, throughout the world, because of the devastating losses that can occur on commercial and backyard poultry. The major problem, in many countries, is the loss of the vaccines effectiveness due to inadequate use or storage conditions, mainly in hot climates.

In the present study, the stability of 5 most used NDV vaccine strains (I-2, La Sota, B1, Clone 30 and VG-GA) was tested, comparatively for stability, at different storage temperatures. The vaccine stability was evaluated by the cumulative infectious titer drop and the theoretical shelf life at +4°C and +37°C, for freeze-dried form and +4°C, +24°C, +37°C and +45°C, for the vaccine reconstituted, in the diluents.

Results showed that I-2 and La Sota are the most stable vaccine strains, compared to B1, C30 and VG-GA. They registered the lowest titer drops and the longest shelf life whether at cool, high or room temperatures, for both freeze-dried and reconstituted vaccines.

Our study showed that I-2 and La Sota strains are the most robust vaccines, the ones that could resist to high temperatures and could be advantageously, used in the rural areas and tropical or subtropical countries.

Keywords : poultry, vaccine, Newcastle, temperature, stability, infectious titer

COI-11 : Culture, Identification et Profil de Sensibilité des *Escherichia Coli* en Pathologie Aviaire : Étude Rétrospective 2013-2014-2015

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Abstract

La colibacillose aviaire a toujours représenté une pathologie importante, dans les élevages avicoles, causée par *E. Coli* qui est un agent de surinfection et un hôte commensal du tractus digestif et respiratoire de la volaille par excellence. Elle est la principale cause de grosses pertes économiques, dans le secteur avicole.

Ce travail a porté sur la réalisation d'une étude rétrospective, sur un total de 648 échantillons isolés, durant les années de 2013, 2014 et 2015, pour détecter et comparer les taux d'infections à *E. Coli*. Les souches isolées sur la gélose au sang et sur le milieu Drygalski ont subi des identifications morphologiques, la coloration de Gram, des tests biochimiques, antigéniques et un antibiogramme.

Les résultats ont montré qu'il y a une une pré-dominance des infections causées par *E.Coli*, par rapport aux autres infections bactériennes. Le taux des infections causées par *E.coli* a subi une réduction en passant de 87% en 2013 à 60% en 2015. Par contre, le taux des autres infections bactériennes a enregistré une augmentation de 13%, en 2013, à 40%, en 2015. La prévalence du sérotype non typable (NT) a enregistré un taux supérieur (60%) par rapport aux autres sérotypes $O_{78}K_{80}$ (35%), O_2K_1 (8%) et O_1K_1 (3%). Les fluctuations des taux de chaque sérotype, au cours des trois années d'études, sont très faibles.

Nos résultats montrent que la souche étudiée d'*Escherichia coli* est sensible à la colistine (99%) par rapport à la florfénicol (67%) et aux triméthoprimes (60%). Mais, elle a montré une résistance à la fluméquine (80%) et à la tétracycline (71%).

Enfin, il serait intéressant de faire des études pour stopper la prolifération de ces nouvelles infections bactériennes qui peuvent menacer, avec le temps, toute la culture aviaire.

Mots Clés : colibacillose, *Escherichia coli*, autres infections bactériennes, aviculture et antibiotiques

COII-12 : Study of the Effectiveness of Ovipox Vaccine Against a Wild Strain of Sheep pox in Morocco

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Abstract

Sheep pox is an infectious viral disease, highly contagious, caused by the Sheep pox virus which belongs to *Capripoxvirus*genus of *Poxviridae*family that specifically affects sheep. The disease is characterized by the appearance of nodules or vesicles on the skin and lungs that can cause death, especially to young animals. In Morocco, despite prophylactic actions based on mass vaccination, Sheep pox was declared in all regions of the kingdom, thus affecting the development of sheep sector in our country.

The objective of this work is to evaluate the protection conferred by the Ovipox vaccine as a live attenuated vaccine, used in prophylactic campaigns, against a local strain isolated, in 2010, responsible for the nodular form described for the first time, in Morocco.

Thus, the experimental approach is based on the calculation of protection index described by the OIE, as the logarithmic difference of 2 viral titers of controlled and vaccinated animals that should be positively correlated with protection. Secondarily, the realization of a clinical monitoring based on recording the body temperature and the clinical signs observed on tested animals after the inoculation of the challenge strain.

Keywords : Sheep pox, *Capripoxvirus*, vaccine, protection, sheep, Morocco

COIII-1 : Microbe Assisted Phytoremediation of Metal Polluted Salt Marshes Using Halophytes and Plant Growth Promoting Rhizobacteria

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Abstract

Metal contamination of estuarine systems is a severe environmental problem. In the last decade, phytoremediation with halophyte plants and metal resistant rhizobacteria is gaining momentum. The aim of our work was the isolation and characterization of bacteria from the rhizosphere of *Spartina maritima* in the polluted Odiel estuary (Huelva, SW Spain) with potential in phytoremediation.

Metal resistance, metal biosorption, plant growth promoting properties and biofilms formation were analyzed in the bacterial collection. Selected strains were identified and proposed as an inoculant for halophyte plants. The effect of inoculation on seed germination, plant growth and physiology, oxidative stress and metal accumulation has been addressed.

P. agglomerans RSO6 and RSO7, together with *Bacillus aryabhattai* RSO25, were selected among 25 initial isolates on the basis of resistance towards metals, bioaccumulation, PGPR properties and the capacity to form biofilms. Inoculation of *Spartina densiflora* seeds with RSO6 and RSO7 enhanced germination by 300% in polluted sediments, whereas RSO25 increased germination by 200% with regard to non-inoculated controls. The *consortium* of the three bacteria did not achieve further improvements on seed germination. Both *Pantoea agglomerans* RSO6 and RSO7 and also *Bacillus aryabhattai* RSO25 promoted plant growth under metal stress. However, whereas the formers did not significantly affected metal accumulation in plant tissues, the latest increased metal accumulation only in roots, thus preventing metal the transfer into the food chain. The three bacterial strains diminished the oxidative stress caused by metals, as revealed from determination of antioxidant enzymatic activities and the level of expression of genes related to stress.

Our results represent a novel contribution to the design of phytoremediation strategies for polluted salt marshes, aimed to phytostabilize metals and to prevent the risk of metal mobilization to the food chain and the environment.

Keywords : halophytes, *Spartina maritima*, *Spartina densiflora*, heavy metal pollution, PGPR, phytoremediation

COIII-2 : Isolement et Identification des Bactéries Tolérantes aux Métaux : Rôle Possible pour la Bioremédiation

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Abstract

Aujourd'hui, la pollution par les métaux lourds utilisés dans de nombreuses applications telles que l'industrialisation a des impacts très néfastes sur l'environnement et la santé de la population. De nombreux pays, partout dans le monde, recherchent des moyens, pour sauver l'environnement qui ne cesse de se détériorer.

Nous avons étudié la diversité génétique et taxonomique des bactéries cultivables, par des techniques d'empreintes génétique PCR et un séquençage du gène ARNr 16S. Dans cette étude, nous avons effectué l'analyse phylogénétique des bactéries cultivables du sol contaminé de la mine de fer d'Ait Ammar (région d'Oued Zem), en utilisant des séquences partielles de l'ARNr 16S (ADNr 16S). Un total de 73 souches de bactéries endophytes et rhizoplanes ont été caractérisées génotypiquement (BOX-PCR, ERIC-PCR et séquençage de l'ADNr 16S).

Les échantillons du sol contienent de fortes concentrations variant de 14620 à 435490 mg Fe kg^{-1}, de 270 à 9200 mg P kg^{-1}, de 50,96 à 222,16 mg Cr kg^{-1}, de 22,25 à 153,3 mg Zn kg^{-1}, de 14,35 à 99,60 mg Cu kg^{-1}, de 0,62 à 34,56 mg Pb kg^{-1} et de 0,37 à 20,4 mg Cd kg^{-1}, respectivement.

La comparaison de nos séquences de clones avec ceux de la base de données GenBank, seulement 23 clones affichent grande similitude avec des bactéries connues.

Mots Clés : séquençage, bioremédiation, mine de fer, ADNr 16S, Ait Ammar

COIII-3 : Dépollution des Solutions Aqueuses Riches en Chrome par le Biofilm de la Souche *Wickerhamomyces anomalus* Formé sur les Déchets du Bois

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Abstract

Afin de développer un nouveau bioprocédé basé sur des microorganismes en biofilm, pour le traitement des eaux usées riches en chrome, ce travail a pour but l'optimisation du pouvoir dépolluant du biofilm formé par la souche de levure *Wickerhamomyces anomalus* sur les déchets du bois. Cette souche a été préalablement isolée à partir d'un site contaminé de la ville de Fès et a montré un grand pouvoir dépolluant du Cr (VI). L'optimisation a été réalisée en culture batch par « central composite design" (CCD). Les paramètres étudiés sont le pH du milieu (2-8), la concentration initiale de chrome (10-100 $mg.L^{-1}$), la dose en support (0.5 $g.L^{-1}$-10$g.L^{-1}$), la concentration en biomasse (1-5 $g.L^{-1}$). Les réponses du plan d'expériences sont la réduction du chrome (VI) et la dépollution du chrome total.

Les résultats indique que le modèle est adéquat, avec une valeur très satisfaisante R^2 (0,925) pour la réduction du chrome (VI) et (0,913) pour la dépollution du chrome total.En système ouvert, le temps de saturation « breakthrough » du biofilm de *W. anomalus* a été déterminé à l'échelle des colonnes (L=33 cm, ø interne = 4 cm) remplies au 1/3 par les déchets du bois, à une concentration initiale de chrome de 10 $mg.L^{-1}$ à un débit de 5 $mL.min^{-1}$.

De tels résultats contribueraient à mieux contrôler la dépollution des eaux usées par ce biofilm, dans le but de développer un système performant qui serait utilisé dans un nouveau bioprocédé pour le traitement des eaux usées riches en chrome.

Mots Clés : *Wickerhamomyces anomalus*, biofilm, chrome, plan d'expériences, culture en batch, système ouvert

COIII-4 : Performances Zootechniques d'une Régime Alimentaire à Base de Déchets d'Algues Bio Transformés sur la Croissance des Ovins

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Abstract

À la fin de la biotransformation des déchets d'une algue rouge *Gelidium sesquipedale* après extraction d'agar-agar, nous avons obtenu un produit fini dépourvu de bactéries pathogènes et riches en protéines 26%, lipides 0,40%, glucides 38% et d'éléments minéraux 11%.

Trois rations contenant, respectivement, 20%, 25%, 30% de déchets d'algues sont comparées à une ration commerciale, pour établir la meilleure croissance sur les ovins.

Nous avons suivi le gain de poids et le gain moyen quotidien durant les 90 jours. Quatre lots de dix ovins chacun ont été soumis au test d'engraissement. Le lot 1 recevant l'aliment (F1) a atteint un gain moyen de poids obtenu de 14,5 Kg, soit un gain moyen quotidien (GMQ) de 161 $g.J^{-1}$. Le lot 2 recevant l'aliment F2 a enregistré un gain de poids moyen de 16,3Kg, c'est l'équivalent d'un GMQ 181 $g.J^{-1}$. Quant au lot3, nourri par l'aliment F3, il a marqué le plus grand gain de poids moyen de 19,35 Kg, soit un GMQ de 215 $g.J^{-1}$. Le lot témoin, quant à lui, a montré un gain de poids moyen intéressant proche du celui du lot1, soit 13,3 Kg, ce qui correspond à un GMQ de 147 $g.J^{-1}$.

En outre, les analyses microbiologiques réalisées sur les carcasses et les viscères ovins ont montré que la flore mésophile anaérobie totale varie entre 10^2 et 10^3 $UFC.g^{-1}$ et les coliformes fécaux varient entre 1 et 3 $UFC.g^{-1}$. *Salmonella* sp. et *Clostridium* sont totalement absents.

Ces résultats confirment la possibilité de résoudre les problèmes dus aux carences protéiques et minérales, chez les animaux par l'addition de ces déchets fermentés et obtenir une viande saine et propre à la consommation.

Mots Clés : *Gelidium sesquipedale*, agar-agar, levain, ration alimentaire, croissance, gain de poids, gain moyen quotidien, engraissement

COIII-5 : Validation of Miniscale Algal Toxicity Bioassaiy for Toxicity Screening

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Abstract

Since the industrial revolution, in 19th century, water quality deterioration is fast becoming a major threat, around the world and more dramatically with anthropogenic industrialization, hence the birth of analytical monitoring methods. Historically the physicochemical methods, using abiotic parameters have been proven as valuable tool for screening, such as technique have some lacks informations about the biological effects of all compounds present and other factors such as bioavailability, toxicants interaction. For this reason, many international standards and group researchers denoted biological assessments, using standard ecotoxicological bioassays, from different trophic levels as complementary and supplementary approach to evaluate the whole toxicity of complex mixture. Algal growth inhibition test is one of the most wedpreased assay used, in toxicological studies, for many attributes : (i) ease of culture, (ii) ecological relevance, (iii) and its board sensitivity of contaminants. Nevertheless, the batch-type algal toxicity tests usually adopted by many international standard organizations are time-consuming and require a large areas of benchspace and volume sampling. However, the classical algal growth inhibition test require professional equipment and expertise.

The aim of this study was to validate a miniaturized algal growth inhibition version bioassay, using ELISA microplate as a fast, low cost and automation toxicity test for potential pollutants. For this turn, a comparative study were carried with the standard flask assay, as well as to compare the sensitivity of tested algae to selected compounds.

The result shown the good concordance and correlation with tow procedures , that making our technique an appropriate chose for high sample, throughput toxicity screening.

Keywords : microalgae, standard bioassay, microplate assay, toxicity, screening

COIII-6 : Biodegradation of Antibiotics During the Cocomposting of Sludge and Assessment of Their Genotoxicity

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Abstract

Les rejets des substances pharmaceutiques et médicamenteuses, dans les eaux usées, peuvent présenter des risques de contamination des terres agricoles, lors de la réutilisation des eaux usées épurées et/ou lors de l'épandage des boues de STEP.

Dans ce sens, cette étude se fixe comme objectif l'évaluation des risques liés à la présence des antibiotiques, dans les boues, et leur devenir, lors du co-compostage boues-déchets palmier.

L'étude de la toxicité et de la génotoxicité des boues résiduaires de STEP a été réalisée, avant et après traitement, par compostage, sur les plants de *Vicia faba* à l'aide du test des micronoyaux. Les résultats du test des micronoyaux montrent que les boues non traitées sont génotoxiques à une concentration de 30%. Cette génotoxicité est liée à la présence, à la fois des éléments traces métalliques et des contaminants organiques comme certains antibiotiques (Fluoroquinolones). Après traitement par compostage, la génotoxicité de ces boues a diminué de 50%. Le suivi des polluants organiques émergents a montré que la Ciproflxacine et l'Ofloxacine sont les plus abondants, dans les boues. Ces deux composés appartenant à la famille des Fluoroquinolones montrent une résistance à la biodégradation aérobie par compostage, dans nos conditions expérimentales.

Dans le but d'évaluer l'impact des Fluorquinolones apportées par épandage des boues de STEP sur le sol, trois antibiotiques (Acide Nalidixique, Ciproflxacine et Enrofloxacine) ont été choisis, pour le test de micronoyaux sur *Vicia faba*. Quatre concentrations de chaque molécule (0.01, 0.1, 1, et 10 $mg.kg^{-1}$) sont testées seules et en mélange.

Les résultats du test des micronoyaux ont montré, pour les deux concentrations les plus élevées, que chaque antibiotique induit une augmentation significative de la fréquence des micronoyaux. Le mélange des trois antibiotiques induit une augmentation significative de la fréquence des micronoyaux, par rapport au témoin négatif pour toutes les concentrations.

Mots Clés : compostage, boues primaires, antibiotiques, génotoxicité

COIII-7 : Genetic Diversity Characterization of Environmental and Clinical *P. aeruginosa* Isolates from Meknes Region (Morocco)

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Abstract

Pseudomonas aeruginosa is an opportunist pathogen causing serious infections with higher morbidity and mortality rates. This study aimed to investigate *P. aeruginosa* diversity and the occurrence of clones within two hospitals and different environmental sites in Meknes region (Morocco).

From a batch of 123 clinical and environmental *P. aeruginosa* isolates, 24 closely related strains were selected, according to their antimicrobial resistance and virulence profiles. Genetic diversity of this strains sample was assessed by pulsed-field gel electrophoresis (PFGE), using the restriction enzyme DraI.

Examined strains sample showed a remarkable diversity, regardless of the strains origin. 19 genetic profiles including five clones with two strains each were obtained. PFGE didn't support a close relatedness between clinical and environmental isolates nor between the two hospitals strains. Among 10 clinical strains genotypes 3 clones were detected : one clone transmission of VIM-2 metallo-β-lactamases producer strains within burn ward and another of carbapenem resistant strains within cardiology service as well as one clone dissemination of carbapenem resistant strains from intensive care unit to burn ward. In environmental strains 9 genotypes with 2 clones were identified, one from the same habitat at distant period and the other from two geographically linked habitats.

This study is the first molecular characterization of environmental and clinical *P. aeruginosa* isolates, in Morocco. It constitutes a good tool for further monitoring of the circulating drug-resistant and virulent *P. aeruginosa* isolates not only, in Meknes region, but, also, throughout Moroccan territory and indicates the need for stricter application of *P. aeruginosa* infection control measures in hospitals.

Keywords : clones, diversity, PFGE, *Pseudomonas aeruginosa*

COIII-8 : Isolation of *Actinobacteria* from Arid Sand in Merzouga : Taxonomic Diversity and Biological Activity

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Abstract

A total of 164 *Actinobacterial* isolates from rhizospheric sand of Merzouga were screened for their antimicrobial activities on Tryptone Soy Agar and then on Bennett Agar, using spot agar method against four pathogens *Staphylococcus aureus*, *Listeria monocytogenes*, *Salmonella enterica* and *Candida albicans*. Electrophoretic profiles obtained by repetitive element PCR fingerprinting (rep-PCR), using BOXA1R primer, were compared using Bio-Numerics 7.1 software for clustring.

Among the 164 isolates, 58,5% and 55% were active, respectively, on TSA and on Bennett, against one or more of tested Gram positive and negative pathogens. However, some active strains on TSA become inactive on Bennett and *vice versa* highliting the importance of culture media for activity expression. A comparative analysis of antimicrobial activity, using the statistical software Minitab V.17, divided the isolates into fifteen groups. The comparison of the average diameters of the inhibition zones, using Minitab V.17, allowed to subdivide the isolates into 25 groups. Dendogram derived from BOXA1R-PCR fingerprints showed that 32 isolates were grouped in 18 clusters containing from two to four isolates while 132 isolates were not grouped.

The Antimicrobial activity showed a low biological diversity, but the Rep-PCR revealed a high taxonomic diversity of isolates. The combination of antimicrobial activity and rep-PCR results revealed a relatively high diversity patterns of this extreme ecosystem, with potential activities against pathogens.

We conclude that such ecosystem could be an interesting source of new *Actinobacteria* that could produce new bioactives compounds. Works aiming to identify the isolates and to characterize produced molecules are in progress.

Keywords : *Actinobacteria*, antimicrobial activity, Rep-PCR, biological diversity, taxonomic diversity

COIII-9 : Production d'Un Aliment Piscicole Equilibré Par Bio Transformation Optimale de Mélanges Ternaires de Déchets et Sous Produits Organiques des Industries Agroalimentaires

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L'industrie agroalimentaire génère de nombreux déchets organiques. Mal gérés, leur impact peut être significatif et pose des problèmes d'ordre économique et écologique.

Dans l'actuel projet, on tente de résoudre le problème posé aux producteurs de l'industrie agroalimentaire *via* une valorisation des déchets organiques, par une biotransformation, en vue de produire un aliment piscicole. Celle-ci met en jeu des microorganismes spécifiques qui réalisent la bioconversion naturelle du mélange des déchets industriels ainsi préparés de par leur métabolisme biologique.

La théorie de la biotransformation technologique indique qu'il faut, pour obtenir un produit intéressant, équilibrer la composition élémentaire des mélanges de départ (source de carbone, azote, phosphore), optimiser quant à l'humidité, et, assurer une bonne aération. Ces conditions restent nécessaires, pour la croissance et l'activité microbienne. Il est donc essentiel de distinguer quelle configuration optimale il faudrait assurer pour que cette biotransformation soit orientée vers la génération d'un produit à grande valeur ajoutée.

Partant du principe que les résidus organiques ont une composition connue et fixée par la caractérisation initiale (ordre de grandeur souvent communiqué dans la littérature), le déficit reste à optimiser dans l'opération de couplage des déchets et les conditions physico-chimiques à assurer. Tout paraît comme une simple optimisation de la biotransformation des déchets de l'industrie agroalimentaire. Les variables à étudier sont la durée de la biotransformation, la composition du mélange (3 composantes) et la nature de l'agent de bioconversion (souche microbienne).

Nos études préliminaires déjà établies montrent qu'il faut environ 15 jours, pour obtenir un produit stable. Une optimisation meilleure par rapport au temps reste à trouver. Mais, dans l'immédiat, on se focalisera sur l'étude de l'évolution de la qualité du mélange de biotransformation, en fonction de la formulation initiale.

À l'issue de ce projet, un modèle mathématique prédictif est communiqué, un diagramme ternaire et les courbes d'iso-réponse sont établis et les zones intéressantes dans le diagramme sont déterminées. Au final, des tests de validation biologiques, sur des espèces de poissons vivants, est en cours. Les résultats préliminaires sont prometteurs.

Mots Clés : biotransformation, valorisation, déchets organiques, industries agroalimentaires, aliment piscicole

COIII-10 : Étude de l'Effet Antibactérien de Quelques Huiles Essentielles sur l'Agent Phytopathogène *Pseudomonas syringae* pv. tomato Dc3000

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Abstract

On note de nombreuses vertus thérapeutiques dans les huiles essentielles. Elles sont exploitées dans divers domaines, notamment, en phytothérapie, où elles peuvent présenter un sérieux candidat, pour remplacer les différents pesticides chimiques utilisés communément contre les maladies infectieuses d'origine fongique et bactérienne.

L'objectif de ce travail est de faire un screening de l'activité antimicrobienne de six huiles essentielles sur la souche *Pseudomonas syringae* pv. tomato DC3000, responsable de la moucheture bactérienne (maladie très commune des tomates de champs au Maroc) et résistante à la Rifampicine, dans le but de développer un moyen de lutte biologique.

Quatre huiles essentielles de *Thymus vulgaris*, *Citrus limonum*, *Mintha puligium* et *Eucalyptus*

globulus ont inhibé la croissance de *Pseudomonas syringae* pv. tomato DC3000. Le meilleur effet bactériostatique et bactéricide reste celui de *Eucalyptus globulus*. En revanche, la souche s'est révélée être moyennement résistante au *Rosmarinus officinalis,* et, particulièrement, résistante au *Cedrus atlantica*.

Ces résultats ont été obtenus en employant les méthodes de la diffusion en puits, de la micro atmosphère, de la détermination de la CMI et CMB. En parallèle, les mêmes techniques ont été appliquées sur les souches *Escherichia coli*, *Listeria monocytogenes*, *Staphylococcus aureus*, afin d'identifier les éventuelles huiles essentielles opérant à large spectre.

Mots Clés : huiles essentielles, activité antimicrobienne, moucheture bactérienne, *Pseudomonas syringae* pv. tomato DC3000, résistance bactérienne, rifampicine, lutte biologique

COIII-11 : Les Bactériophages dans les Eaux Usées : Outils d'Évaluation de Performance des Traitements d'Épuration pour l'Élimination des Virus Entériques

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Abstract

Les eaux usées épurées sont comme une véritable ressource en eau supplémentaire, pouvant contribuer à la diminution du déficit hydrique et constituer une solution durable, sur le plan écologique et sur le plan économique. Se pose alors la question de la qualité microbiologique de ces eaux ? Aucun critère n'est fixé pour les virus entériques, bien que ceux-ci constituent la cause majeure de gastroentérites d'origine hydrique. L'utilisation des eaux et la consommation des produits contaminées par les virus entériques favorisent le développement de gastro-entérites, d'hépatites aigües et de certaines zoonoses. La recherche des virus infectieux, dans les matrices de l'environnement, est complexe. D'où l'intérêt de l'investigation des indicateurs de contamination virale, dans les eaux usées traitées. Les bactériophages constituent des candidats d'indicateurs de contamination virale.

En Tunisie, la recherche simultanée des virus entériques, des coliphages somatiques, des phages d'ARN F-spécifiques et des phages de *Bacteroides* GA17 et RYC2056, dans les eaux des stations d'épurations, est, respectivement, effectuée, par RT-PCR en temps réel, par la technique de la gélose en double couche, et, selon les normes ISO 10705-2 (2000), ISO 10705-1 (1995) et ISO 10705-4 (2001).

De fortes concentrations de *Rotavirus* ($5.2x10^5$ à $1.3x10^7$ $cg.L^{-1}$) et des phages ($2.1x10^5$ à $1.1x10^7$ $UFP.L^{-1}$), sont trouvées, à la sortie des stations d'épuration des eaux traitées par boues activées. Ce qui témoigne de la résistance similaire de Rotavirus et des coliphages totaux au traitement secondaire. Les coliphages somatiques ont été les plus abondants dans les eaux usées. Les coliphages somatiques, les phages d'ARN F-spécifiques et les phages *infectant Bacteroides Fragilis* RYC2056 et *Bacteroides thetaiotaomicron* GA17 ont manifesté une résistance importante aux traitements par boues activées et par le chlore, en terme d'efficacité de traitement (Hmaied et *al*., 2015 ; Yahya et *al*., 2015 ; Jebri et *al*., 2012). L'absence des *Rotavirus* dans les eaux usées d'abattoir traitées par le procédé de la membranaire MBR (concentration à l'entrée du MBR est de $6.25\ 10^6$ $cg.L^{-1}$) témoigne de son efficacité au regard de l'élimination virale. Le taux de réduction des bactériophages est de 4 log (traitement efficace, si abattement supérieur ou égal à 2 log). Les coliphages somatiques peuvent être des indicateurs appropriés, pour estimer l'inactivation des virus par les rayons gamma (Jebri et *al.*, 2013). Ils constituent donc de bons outils, pour évaluer la performance du traitement des eaux usées, pour l'élimination virale.

Mots Clés : eaux usées traitées, virus entériques, procédés de traitement, coliphages somatiques, phages d'ARN F-spécifiques, phages de *Bacteroides*

COIII-12 : Détection des Entérovirus par PCR en Temps Réel dans les Eaux Usées et Étude de Corrélation entre Contamination Virale et Bactérienne

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Abstract

Les risques sanitaires d'origine hydrique, notamment infectieux, ont considérablement diminué, grâce au développement de différents types de traitement. Cependant, la survenue de pollutions accidentelles, la persistance de risques, la méfiance des consommateurs vis-à-vis de la qualité de l'eau distribuée appellent à une vigilance accrue et à l'instauration de pratiques inspirées du concept de sécurité sanitaire. Les virus entériques sont abondants, dans les rejets urbains, notamment, les entérovirus qui sont excrétés dans les selles et peuvent contaminer les eaux usées et les coquillages. La capacité des entérovirus à se multiplier en culture cellulaire et le développement de techniques de biologie moléculaire appliquées à leur diagnostic rendent ces virus utilisables comme indicateurs de la contamination virale.

Notre étude s'est développée sur deux principaux axes qui sont la recherche des entérovirus, indicateurs de contamination virale et la détection d'indicateurs de contamination fécale (*Escherichia coli*), dans les résidus de trois STEP de la Tunisie. La détection des entérovirus a été effectuée par la technique PCR en temps réel.

En effet, les entérovirus (n=68) ont été détectés dans tous les échantillons avec un pourcentage de contamination, dans les eaux usées traitées, de 26% fortement positif, 53% moyennement positif et 21% faiblement positif. En outre, tous les échantillons étaient contaminés par *E. Coli*, avec une baisse de la concentration, dans les eaux de sortie par rapport aux eaux usées brutes. Les résultats obtenus ont montré qu'*E. Coli* est sensible au traitement biologique, dans la station Charguia. Notre étude n'a pas montré une corrélation entre la contamination virale et la contamination bactérienne.

Mots Clés : *Escherichia coli*, Entérovirus, PCR en temps réel, STEP, eau usée

COIII-13 : Characterization of Microbial Diversity in Moroccan Rivers Using A Metagenomics Approach

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Abstract

The microbial communities, in fresh water such as rivers, has an important role in the biogeochemical cycling of nutriments and the clean-up of pollution, but only 10% of these microbes can be studied by classical culture. Metagenomics analysis gives the opportunity to study better the functioning of these natural ecosystems. Morocco is characterized by the presence of an extensive network of rivers spread over the whole territory.

The aim of the project is to exploit the metagenomics approach, for the exploration of microbial diversity of three Moroccan rivers (Sebou, Moulouya and Oum Errabiaa). We characterize and compare microbial community compositions and structures in these populations, using bioinformatics and computational tools, to identify taxonomic groups and genes (biomarkers), to suggest which environmental factors influence the selection of microorganisms.
This work is done as part of the international project 'River sampling day'. Metagenomics data generated by this work will be used to make comparison with other ecosystems to suggest the environmental factors that can play a selective role of microorganisms.

Keywords : Metagenomics, moroccan rivers, bioinformatics, biomarkers

COIII-14 : Détection des Virus Entériques Pathogènes dans Le Milieu Hydrique au Maroc

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Abstract

Les virus entériques sont rejetés en grande quantité dans l'environnement où ils sont capables de persister très longtemps. Ils sont infectieux, à très faibles doses, pour l'Homme, et, sont à l'origine d'un nombre important de toxi-infections alimentaires, chaque année, dans le monde.

Leur transmission féco-orale se fait, principalement, par la consommation des eaux et d'aliments contaminés, consommés frais ou n'ayant pas subi de traitement industriel ou domestique suffisant, ainsi que par les contacts interhumains.

L'épidémiologie moléculaire a clairement impliqué des virus dans des épidémies, les *Norovirus*, les *Rotavirus* responsables de gastro-entérites et le virus de l'hépatite A, étant les virus les plus souvent incriminés.
Nous nous proposons, dans cette étude, d'évaluer la contamination par le virus de l'hépatite A (VHA), les *Rotavirus* et les *Enterovirus* des eaux collectées, à partir de cinq sources différentes.

L'objectif de cette étude est de déterminer la prévalence de ces virus dans des eaux de mer, usées et d'estuaires, et d'en préciser les sérotypes circulants.

Pour ceci 450 échantillons ont été récoltés et ont subi des concentrations primaires et secondaires. Les acides nucléiques (ADN et ARN) des particules virales ont été extraits par des amorces spécifiques afin de procéder au séquençage et évaluer les phylogénies de leurs gènes.

Mots Clés : eau usée, eau d'estuaire, eau de robinet, eau de mer, *Enterovirus*, *Norovirus*, *Rotavirus*, virus entériques, concentration primaire, concentration secondaire, RT-PCR

COIV-1 : Towards The Control of Date Palm (Bayoud Diseases) by Antagonistic Pseudomonas to Fusarium oxysporum f. sp. albedinis L.

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Abstract

The purpose of our investigation was to screen *Pseudomona*s from rhizospherical soil of a suppressive soil for antagonism against *Fusarium oxysporum* f.sp. *albedinis* L. (*Foa*), the causal agent of date palm *(Phoenix dactylifera*) fusariosis (bayoud disease).
One hundred isolates were selected by using King B medium. The antagonism against *Foa* was carried out by various methods (confrontation in growth medium and in sterilized soil, measure of spore formation and germ tube growth, production of chitinase and siderophores). The most effective isolates were then chosen, as candidate for biocontrol experiments, under green house by using a susceptible cultivar (Jihel).

In vitro direct confrontation led to the isolation of 100 *Pseudomonas* isolates. Among them, 46 showed strong inhibition of the mycelial growth of *Foa* as evidenced by the reduction of *Foa* colony diameter and 44 only induced a reduction of sporulation at the margin of *Foa* colony which was confirmed by microscopic observations (effects on microconida and on germ tube growth). In addition, isolates showed different extents in the production of siderophores and chitinases. Thereafter, biocontrol assays in greenhouse by using the susceptible date palm cultivar Jihel were performed by using 9 isolates with the highest antagonistic abilities.

This experiment, performed during six months, showed that some isolates protect Jihel plantlets from the adverse effects of the pathogen (no mortality, normal development of the root system), in comparison with infected controls which showed symptoms of severe wilt disease. In addition, the protection from the disease was concomitant to a dramatic decrease of *Foa* in the soil cultivation mixture as observed.

These results indicate that the *Pseudomonas* isolates from suppressive soil are of interesting potential as biocontrol agents for the control of date palm fusariosis, in field conditions.

Keywords : date palm, *Fusarium oxysporum* f.sp. *albedinisPseudomonas*, biocontrol, suppressive soil

COIV-2 : Immature Embryo Derived of Two Bread Wheat (*Triticum aestivum* L.) Varieties Transformation Using Particle Bombardment Method With Plasmid pBY520

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Abstract

Wheat cultivation is still difficult to control, because it faces several biotic and abiotic stresses. The transfer of resistance, in wheat plants, to these stresses, through traditional approaches, remains limited. However, genetic transformation allows the acquisition of this tolerance while overcoming the difficulties of classical improvement.

In this context, immature embryos of two Moroccan bread wheat varieties (‘Massira’ and ‘Arréhane’) and the pBY520 plasmid (carried by

E. coli strain construct) containing the HVA1 gene for drought tolerance as well as the gene bar selection marker for resistance to the herbicide phosphinothricin were used, in this study, for bombardment protocol.

The percentage of calli bombarded with regenerated plantlets was 23.92% for the variety 'Massira' and 5.26% for the variety 'Arréhane'. The selection was carried out on ½ MS rooting medium lacking hormones and supplemented, with phosphinothricin (3 mg). Thus, 4.36% and 6% of plantlets of varieties 'Massira' and 'Arréhane', respectively, survived. The resistant plantlets were transferred to the greenhouse and the evaluation of the expression of the bar gene in leaves was positive about 60%. The confirmation by molecular analysis revealed only a transformation efficiency of 0.52% for the variety 'Arréhane'.

We have been able to successfully introduce plasmid pBY520 *via* particle bombardment into bread wheat. Further analysis for tolerance to water stress tolerance, in subsequent generations, will be performed.

Moreover, we were able to highlight some key points involved, in the successful transformation of wheat, by particle bombardment. Firstly, the damage caused by the penetration of gold particles into the targeted cells depended on the variety. Secondly, transformation efficiency was highly genotype dependent. Thirdly, there was no significant link between regeneration capacity and the rate of transformation.

Keywords : bar gene, genetic transformation, bread wheat, plasmid pBY520

COIV-3 : Serological Detection and Genetic Characterization of Pepino mosaic Virus in Moroccan Tomatoes

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Abstract

Pepino mosaic virus (PepMV) has become an emerging pathogen that causes significant losses, in tomato crops worldwide.

Several interception reports of PepMV, on Moroccan tomato fruit, have been stated, but the current situation of the disease is unlikely and the molecular characterization of PepMV population, in Morocco, has not been determined yet.

A primary aim of this work was to develop a monoclonal antibody based double antibody sandwich ELISA (DAS-ELISA) with sufficient sensitivity and specificity to detect PepMV in tomato. Another aim was to determine the genetic composition of Moroccon PepMV population. For this purpose, first we generated Hybridoma cell lines secreting PepMV-specific Mab. Besides, the genomic nucleotide sequences of a part of RNA-dependant RNA polymerase (RdRp), triple gene block (TGB) and coat protein (CP) were determined.

As results, the developed DAS-ELISA test was able to detect PepMV with a suitable sensisivity. Furthermore, the phylogenic relationship among isolates and the known genotypes showed that the Moroccan population shares a very high sequence identity with PepMV CH2 strains. As well, Moroccan isolates reveal some specific single nucleotide polymorphisms that lead to distinct variants.

Thus, this study will contribute to a timely and rapid detection of PepMV and the genotype determination would be a prerequisite, for prevention and deploying effective strategies in disease management.

Keywords : Pepino mosaic virus, tomato, monoclonal antibody, DAS-ELISA, genetic characterization, phylogenetic analysis

COIV-4 : Genotypic Characterization of Quinolone Resistant Escherichia coli Isolates from Retail Food in Morocco

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Abstract

Retail food can transmit several diseases, as well asmultidrug-resistant isolates, from person to person.

In this study, the prevalence and characteristics of nalidixic acid-resistant *Escherichia coli* isolates were investigated in retail food samples from Morocco.

The isolates were screened for their antimicrobial activity and phylogenetic group typing. These isolates were also screened for quinolone-resistance determinants (PMQR, DRQR), class 1 integron-resistance gene cassettes and virulence genes using PCR, followed by DNA sequence analysis. Fifteen PMQR positive isolates were further characterized, using pulsed-field gel electrophoresis to determine the genetic relatedness.
Seventy Nal-resistant *E. coli* isolates with diverse genetic origins were recovered in 28% (70/250) of retail food samples. *E. coli* isolates of phylogenetic group A were dominant (64%, 45/70) and all isolates showed multidrug-resistant profiles.

In addition, three different gene cassettes were identified (*aadA1*, *aadA*, *aac(3)-Id*) in 18%. Resistance was most commonly observed to tetracycline (90%), followed by amoxicillin (88.5%), amoxicillin/clavulanic acid (68%), ciprofloxacin (59%) and levofloxacin (43%). PMQR were identified in 32 isolates, including *aac(6')-Ib-cr* (n=16), *qnrS1* (n=11) and *qnrB19* (n=7). Mutations in gyrA and parC genes were detected among 80%, and the isolates showed substitution Ser83-Leu and Asp87-Asn, in gyrA, and Ser80-Ile, in parC. Virulence-associated genes *stx1, eae, sfa*, *hlyA*and *stx2* were found in six (8%), three (4%), two (3%), three (4%) and three (4%) isolates, respectively.

The current study demonstrates that retail food could be a significant reservoir forquinolone-resistant *E. coli* which should be evaluated in the community.

Keywords : retail food, *E. coli*, quinolone-resistance, virulence genes, PFGE, Morocco

COIV-5 : Moroccan Bioactive *Actinobacteria* Isolates Producing Efflux Pumps Inhibitors of Resistant Bacteria

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Abstract

Traditional antimicrobials antibiotics are increasingly suffering from the emergence of multidrug resistance among pathogenic microorganisms. Among the antibiotic resistance mechanisms, efflux pumps have recently received a particular attention. Hence, there is an acute need for new active agents.

Reducing the rate of emergence of antibiotic-resistant is our objective, by studying the ability of Moroccan *Actinobacteria* isolates to produce natural efflux pumps inhibitors (EPI) of medical interest.

Thus, 210 *Actinobacteria* isolates were screened, for their ability to produce efflux pumps inhibitors, using agar diffusion method. As test strains we have used in this study the wild type

strain *Escherichia coli* AG100 and its mutant AG100A with non- functional pump efflux system and the two clinical strains of *Staphylococcus aureus*, the sensitive one SA-1199 and its mutant SA1199B. Phe-Arg-β-naphtylamide (PAβN) which inhibits the efflux system of many bacteria was used as control. Finally, the biological and chemical characterizations of active compounds were conducted from four liters fermentation culture of selected bioactive.

Our screening program showed that among the 210 screened *Actinobacteria* isolates, 9% were able to produce EPI. From the most promising ones, we have purified five different bioactive compounds and their structure elucidations were under investigation. Isolates of interest were subjected of taxonomic study to determine the genus and species levels based on the morphological studies, physiological studies and chemotaxonomic studies. The taxonomic study is finalized by the sequencing of the 16S rDNA gene of the selected strains.

Screening only a subsection of our natural product library led to purify five molecules as EPI capable of sensitizing Gram-negative and Gram positive bacteria to antibiotics to which they are ordinarily intrinsically resistant.
This result demonstrates the great potential of this approach in expanding antibiotic effectiveness in the face of the growing challenge of resistance.

COIV-6 : Effect of Dual Inoculation of Chickpea and Lentil With Stress Tolerant Rhizobia and Plant Growth Promoting Bacteria in Morocco

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Abstract

Chickpea and lentil are important pulse crop grown, mainly in arid and semi-arid regions where numerous environmental factors may affect nodulation, nitrogen fixation and biomass production. To enhance the productivity of those two crops and limit the use of chemical fertilizers, it is necessary to support the use of biofertilizers based on stress tolerant microorganisms, for an economic and ecological sustainable agriculture.

The aim of this study is to test the effect of dual inoculation of chickpea and lentil with rhizobia and PGPR on the growth and the yield of those two legumes, in Morocco.

Thus, 207 and 206 strains were isolated from chickpea and lentil. They were examined for their tolerance to environmental stresses and characterized, using rep PCR and sequencing of 16S rDNA. Two highly efficient and tolerant rhizobia were selected, for each culture, for a field experiment inoculation test, in combination with plant growth promoting bacteria. The experiment was carried out in two sites in complete random bloc, 16 treatments were applied.

Results showed a better performance of the host, inoculation with selected rhizobia increased significantly grain and straw yield for chickpea and lentil, in both sites. Nodules number, shoot dry weight and nitrogen content were also enhanced compared to control. Dual inoculation with rhizobia and PGPR enhanced more yield and nodules number for both cultures which shows that used strains were more competitive and effective than native ones. Dual inoculation with rhizobia and PGPR of chickpea and lentil was efficient, in both sites.

This suggests that nodulation, nitrogen fixation, phosphate solubilization and yield of those two cultures can be improved by inoculation, using competitive stress tolerant microorganisms as a cheap way to increase the productivity of those crops, in Morocco, limiting like this the use of

chemical fertilizers and preserving a sustainable agriculture.

Keywords : chickpea, lentil, stress tolerance, rhizobia, PGPR, inoculation

COIV-7 : Biotechnological Properties and Yeasts Biodiversity Habitats Associated to Moroccan Picholine Olive Variety

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Abstract

Yeasts are a heterogeneous group of fungi distributed in different genera belonging to Ascomycetes and Basidiomycetes and are widely spread in Morocco. They are most frequently isolated from sugar-rich substrates and several species have been able to adapt to different environments or ecological niches.

The aim of this study was to know the yeast biodiversity, from habitats associated with Moroccan Picholine olive tree. Yeasts were isolated from samples of soil rhizosphere, olive fruits and leaves.

Samples were collected in sterile flasks from various olive fields, in the region of Marrakech and Safi. Morphology and physiology identification use included yeasts morphology, assimilation of carbon and nitrogen compounds, fermentation tests and urea's hydrolysis. Some biotechnological properties of these isolates were studied. For this purpose, the activity of various enzymes (β-glucosidase, protease, peroxidase and lipase) was evaluated.

The Barnett Pc program identified many species potentially candidate in biotechnology, belonging essentially to *Debaryomyces, Saccharomyces, Candida, Cryptococcus, Rhodotorula and Pichia*.

Keywords *:* yeasts, olive tree, field, biodiversity, biotechnology, Morocco

CO IV-8 : Atténuation du Stress Salin par les Souches *Pseudomonas fluorescens* Ms-01 et *Azosprillum brasilense* DSM1690 chez les Plantes de Blé

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Abstract

La présente étude vise à démontrer l'effet des bactéries bénéfiques, pour la croissance des plantes (PGPM), dans l'atténuation de l'effet de la salinité du sol sur les cultures. Ainsi, l'utilisation de deux souches bactériennes qui expriment des activités de promotion de la croissance des plantes, dans les conditions salines, est investiguée.

Les deux souches étudiées sont *Pseudomonas fluorescens* Ms-01 (souche nouvellement isolée) et *Azosprillum brasilense* DSM1690 obtenue auprès de la collection Allemande des microorganismes.

Les expériences d'inoculation ont été menées sur les plantes de blé (*T. aestivum)* variété Amal. Les graines ont été stérilisées en surface et immergées dans des solutions bactériennes à10^9 CFU.mL^{-1}. Les plantes non inoculées ont servi de témoin. L'ensemble des plantes est mis dans des pots normaux et des pots salinisés contenant 5 g de NaCl.Kg^{-1} du sol. Les plantes sont placées en phytotron, leurs poids racinaire et aérien ont été comparés. Les analyses biochimiques des plantes ont porté sur leur contenu en proline et les mesures des activités des enzymes antioxydantes (POD et APX), selon des protocoles standardisés basés sur des essais spectrophotométriques.

Les résultats obtenus ont montré que l'inoculation des plantes de blé par les deux bactéries résulte en une augmentation significative de la taille et des poids (plus de 50%), dans les conditions salines. Les analyses biochimiques ont démontré une accumulation

significative de la proline, en condition de stress salin, avec des concentrations de 0,021 µmol.gFW^{-1} et 0,009 µmol.gFW^{-1}, pour les plantes inoculées et les plantes témoins, respectivement. Par ailleurs, la concentration des enzymes POD et APX augmente significativement (environ 21% et 84%), dans les plantes inoculées.

En conclusion, la corrélation entre l'accumulation de la proline et les activités des enzymes antioxydantes, sous les conditions salines, indique que l'inoculation des bactéries PGPM a stimulé la voie de défense des plantes de blé contre le stress salin, améliorant ainsi leur croissance. L'application de rhizobactéries, favorisant la croissance des plantes (PGPR) comme bio-inoculants, est donc devenue une approche respectueuse de l'environnement, efficace et économiquement viable, pour contrebalancer la salinisation des terres agricoles.

Mots Clés : PGPR, salinité, *P. fluorescens* Ms-01, *A. brasilense* souches DSM1690, blé (*T. aestivum* L. var. Amal), Proline, POD, APX

CO IV-9 : Plant-Cyanobacteria Interactions : Cyanotoxins Water Contamination and Impact on Agricultural Crops

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Abstract

The pronounced eutrophication of aquatic ecosystems is causing frequent appearances of toxic cyanobacteria blooms. Those are responsible for several substantial ecological disruptions, related to the production and release of cyanotoxins. The negative impact of cyanobacterial toxins, on different organisms, has largely been lifted. However, phytotoxic effects of those toxins, on terrestrial plants, have recently attracted great interest, due to contamination of irrigation water. This route has several allelopathic effects over crop quality and production.

The studies conducted within our team focused on the evaluation of effects related to the contamination of water intended for irrigation by cyanotoxins, on terrestrial plants having significant economic interest. Thus, exposure of *Medicago sativa*, *Solanum lycopersicum*, to cyanotoxins extracts, has identified both biological and physiological negative effects. A reduction in seed germination and plant growth, in addition to induction of oxidative stress, are major disturbances generated by cyanotoxins contained in the irrigation water. In addition, these bioactive substances have also shown negative effects on agricultural soils and their biological components.

Thus, our studies have shown that cyanotoxins are causing several changes on soil bacterial communities. All these effects raises the need for standards related to irrigation water like those used for drinking water.

Keywords : blooms, Cyanotoxins, terrestrial plants, biological and physiological disturbances, agricultural production

CO IV-10 : Role of Plant and Aphid Partners in Poleroviruses Transmission by Aphids

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Abstract

Polerovirus are phloem limited viruses strictly transmitted by aphids, in a circulative and non propagative manner. Virions are acquired by aphids, when ingesting sap from infected plants. Virus particles cross the gut epithelium to be

transported into the hemolymph and then to the accessory salivary glands cells, before being released, together with saliva, into the plant during a subsequent feed. Although viral determinants involved in the transmission process have been identified, data are lacking on (i) the role of post-translational modifications of the structural proteins in virus transmission, (ii) on the involvement of plant proteins in the transmission process, (iii) on the deregulation of aphid genes during virus acquisition and inoculation and (iv) on the nature of polerovirus receptors in aphids.

We have developed different approaches to decipher some of these transmission steps. We have observed that acquisition of virions, in aphid intestinal cells, did not induce a strong gene deregulation, suggesting that the virus hijacks a well-conserved endocytosis mechanism. We have identified several phloem proteins able to bind purified virions *in vitro* and have shown that these proteins can stimulate virus transmission by aphids when added to the aphid diet together with purified virus. Identification of virus partners in phloem cells are pursued by screening Arabidopsis cDNA libraries using the yeast double hybrid system. We have also demonstrated that poleroviruses particles are not phosphorylated, nor glycosylated and that glycosylation does not play a role in the transmission process, as suggested before.

Finally, experiments are in progress to identify virus partners in aphid vector by developing yeast screening of aphid cDNA libraries.

COIV-11 : Ecology of Pantoea agglomerans 2066-7 Strain : a Biological Control of Bacteria Onion Diseases

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Abstract

The control of diseases in fruits and vegetables is still mainly based on the use of synthetic pesticides, although the demand for produce free from chemical residues and the emergence of pesticides -resistant pathogen strains is constantly increasing. Biological control, using microbial antagonists, has attracted much interest as an alternative to chemical products.

The main objective of this work is to study the improvement of water activity (aw), temperature and pH tolerance observed in *Pantoea agglomerans* 2066-7.

The growth response of the biocontrol agent *Pantoea agglomerans* 2066-7 to change, in water activity (a_w), temperature and pH was determined *in vitro* in basic medium. The minimum temperature at which 2066-7 was able to grow was +7°C and the growth of 2066-7 did not change at varying pH levels (4-10.34). Moreover, the growth of *P. agglomerans* 2066-7 strain was very effective inside onion bulb wounds at +7°C and +25°C.

P. agglomerans growth was higher than on unmodified medium when polyethylene glycol was used to modify a_w. In the presence of the glucose, the growth was very limited, under the three tested temperatures (+7, +25 and +30°C). Also the results show that, on basic medium supplemented or not with various solutes, *P. agglomerans* grows best at temperature of +25°C and at an a_w ranging from 0.96 to 9.98. At low temperature (+7°C), *P. agglomerans* can grow at a low a_w (0.95), depending on the solute used to reach this a_w. Our study likewise show that polyethylene glycol, glycerol and NaCl have a lesser effect on the growth rate of *P. agglomerans* than glucose and it was higher on the presence of polyethylene glycol than unmodified medium. This study has defined the range of environmental conditions (a_w, pH, and temperature) over which the bacteria may be developed for biological control of plant diseases.

This study showed an excellent adaptation of *Pantoea agglomerans* (2066-7) to cold storage and +25°C temperature which is an important feature, for biocontrol agents of plant diseases.

Keywords : *Pantoea agglomerans*, biocontrol agent, ecology, water activity and plant diseases

COIV-12 : The effect of Myrtus communis Extract on Cedar Wood Surface Energy : Theoretical and Experimental of Fungal Adhesion

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Abstract

Biofilms are serious problems and a major defy, in different areas, such as ship fouling, historical books, cultural heritage and biodegradation of monumental wood. The microbial adhesion to the substrate is a significant and important step, in the biofilms formation.
Thus, the aim of the study was to investigate the effect of three fractions of *Myrtus communis* extract on wood physicochemical properties, and thereafter, to evaluate the theoretical and the experimental adhesion of *Theilavia hyalocarpa* on untreated and treated wood.

The impact of *M. communis* extractives on the hydrophobicity, electron donor (γ^-) electron acceptor (γ^+) parameters and surface tension components (ΔGiwi) of untreated and treated wood were assessed, using contact angle measurement. The anti-adhesive activity of the fraction tested was analyzed by environmental scanning electron microscopy analysis.

The results indicated that all extractives tested have decreased the hydrophobic parameter and made the cedar wood surface more donor electron. According to the values of total free energy of interaction (ΔG^{Tot}), the theoretical adhesion of *T. hyalocarpa* on wood was found favorable. However, the treatments were made the adhesion conditions unfavorable. Moreover, the scanning electronic microscopy analysis has proved the decrease of the cell adhesion percentage with treatment, indicating the high anti-adherence activity of all fractions tested. Therefore, the positive relationship between the theoretical prediction and experiments adhesion has been obtained.

These findings suggest that these extractives could be considered as an alternative source of bioactive molecules for a new preservative of wood against destroying fungi.

Keywords : adhesion, wood, contact angles, microscopy, physicochemical properties

COIV-13 : Isolation and Identification of Potential Mycotoxin Producing Fungi on Pasta In Morocco

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Abstract

Cereals and cereal products are significant and important human food resources, in Morocco. These foodstuffs can be contaminated with fungi in the field, during drying, processing, transportation and manufacturing steps which may lead to the biosynthesis of mycotoxins, under favorable conditions. In a previous investigation, pasta samples were found to be contaminated with mycotoxins and some levels were found above maximum limits set by international regulation.

In this survey, one hundred and six (106) samples of pasta samples, purchased from different cities, in Morocco, were investigated to isolate and identify potential mycotoxinogenic fungi. Each sample was disinfected with sodium hypochlorite at 3% and washed with sterile water. Samples were cultured on MEA, PDA and CZ at +25°C, for 7 days.

Results reveal the presence of four genera : *Penicillium, Aspergillus, Fusarium* and *Cladospurum*. More than ten (10) species were identified. Several species are known to produce mycotoxins. *Aspergillus flavus* is known to produce aflatoxins, *Aspergillus niger* and *Penicillium chrysogenum* are known to produce ochratoxin A and *Fusarium* species are known to

produce fumonisins, zearalenone and trichothecenes (DON, DAS, NIV, T2 and HT2 toxins, …).

The presence of mycotoxinogenic fungi, in pasta samples, could be due to a lack of good agriculture and or food manufacturing practices and should spur authorities and industries to give more importance to the final quality and safety of these products to protect consumers'health.

Keywords : fungi, pasta, mycotoxins, contamination

COIV-14 : *in vitro* Evaluation of the Antagonistic Activity of *Bacillus amyloliquefaciens* and *Trichoderma harzianum* Against *Colletotrichum acutatum*

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Abstract

Biological control is an alternative to chemical pesticides, for agricultural use, with the benefits of greater acceptance by consumers and a reduced environmental impact. The selection of antagonists planned for biological control of plant diseases usually implies to gather and examine a large number of microbial isolates and to increase the probability of discovering strain strongly effective on the surfaces of the host.

The antagonist ability of *Bacillus amyloliquefaciens* strains (I1, I2, I3, I18, RA9, RA12, B3, B12 and B24) and *Trichoderma harzianum* was evaluated against the mycelial growth, sporulation and germination of seven strains of *Colletotrichum acutatum* (1, 2, 3, 4, 5, 6 and 7), the causal agent of strawberry anthracnose.

The results showed various levels of antagonist capacity against *Colletotrichum acutatum*. *T. harzianum* had a great inhibiting effect (around 80%). Some of the selected bacteria exhibited promising antagonistic activity against tested fungi. Out of nine bacterial strains, I2 and RA12 revealed effective biocontrol potential against all tested fungi.

These results suggest interesting application possibilities, on the biological control of strawberry anthracnose.

Keywords : antagonism, phytopathogenic fungi, biocontrol, *Bacillus*, *Trichoderma*, *Colletotrichum*

COIV-15 : Can Moroccan Rock Phosphate Be Useful After Biosolubilization For Sustainable Agriculture ?

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Abstract

Cellulose and hemi-cellulose are the most abundant plant cell wall components, in the biosphere and the most voluminous waste produced by human society. Fortunately, they are non-toxic and biodegradable materials. In parallel, rock phosphate is the largest reservoir of phosphorus, but is inaccessible for direct use by plants due to its insolubility. Apatite rock phosphate is known to be acid soluble.

This study presents two objectives i) a solution of cellulosic waste, like grassland, biodegradation ii) and a new way of rock phosphate biosolubilization.

The aim of this work was to investigate the process of biological dissolution of rock phosphate, using cellulose and hemi-cellulose

substrate (grassland), under anaerobic thermophilic condition.

After 90 days incubation of water and the cellulosic substrate mixture at +45°C, the pH decreased from 6.5 to 4.8, dissolving from 23.4% to 27.6% of the phosphorus from the rock phosphate. Certain organic acids were identified qualitatively and quantitatively, in the bioreactors, acetic, lactic, butyric, propionic acids. This biological dissolution of rock phosphate is due to the presence of a single heat-tolerant strain of bacteria (*Bacillus subtilis)* isolated by the NBRIP test from the reactors. Tests show that this strain is able to grow anaerobically and break down a cellulose substrate.

The dissolution of the rock phosphate, during the thermon anaerobic cellulose biodegradation process, is a consequence of proton release from organic acids, in the aqueous phase of the anaerobic digester.

Keywords : rock phosphate, dissolution, anaerobic, thermophilic condition, bacteria, cellulose, organic acid, pH

COIV-16 : Prevalence, Molecular and Antimicrobial Resistance of *Salmonella* Isolated from Sausages in Meknes, Morocco

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Abstract

Salmonella is among the most important food borne pathogens worldwide, contaminating a wide range of animal products including meat products.

The aims of this study go through two steps. The first step is to estimate the proportion of sausages products contaminated by *Salmonella*, in Meknes city (Morocco), which were collected from various shopping sites : butchery, street vendors, supermarket and souk (Weekly market combines the population of the small villages around Meknes city). The second one is to identify serovars, to determine the antimicrobials resistance patterns of isolates and to detect the *invA* and *spvC* genes.

Thus, 34 (21.79%) *Salmonella* were isolated, recovered 4 serogroups and 12 serotypes. The most prevalent serotypes were *Salmonella* Corvallis (23.53%) and *Salmonella* Kentucky (17.65%). All *Salmonella* isolates were tested for their susceptibility to 18 selected antimicrobials agents, of which 100% were resistant to at least one antimicrobial, 85.30% (29/34) were resistant to two or more antimicrobials and 44.12% (15/34) were resistant to at least three antimicrobials. All *Salmonella* are resistant to ampicillin, 76.47% to streptomycin, 20.59% to sulphonamides, 17.65% to Tetracycline and 11.77% to Ofloxacin. The "ACSSuT" penta-resistance pattern was observed in tow of the *Salmonella* Typhimurium strains. In addition, our study showed that all *Salmonella* strains (34) were positive for invasion gene *invA* and negative for the virulence gene *spvC.*

Keywords : *Salmonella*, antimicrobials resistance, sausage, invA

COIV-17 : The Potential Effects of Herbicides on Soil Bacterial Communities

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Abstract

Inoculation of legumes has been widely used to improve legume productivity in fields. However,

its potential ecological risk on microbial diversity was usually neglected.

In this study, the impact of inoculation of *Phaseolus vulgaris* with two indigenous rhizobialstrains towards plant growth promotion, richness and structure of the *Rhizobiaceae* and total bacterial communities, in the bulk soil, was assessed.

On-field inoculation experiments of common bean were conducted, using two selected rhizobial strains. The agronomic benefits of inoculation were assessed, on common bean and on the next rotation crop. The effect on soil bacterial communities was assessed using the T-RFLP technique.

Both strains used induced a significant increase in nodulation and grain yield. T-RFLP profiling demonstrated that inoculation significantly increased the phylotype richness of the bacterial communities. No significant difference in richness between both strains used and no additive effect of co-inoculation were observed. However, differences between both inoculants and a clear additive effect of co-inoculation on heterogeneity were found. Both α and γ proteobacteria, together with *Firmicutes* and *Actinobacteria*, were enhanced by inoculation, while no evidence of TRF inhibition was found. The effect of this inoculation was also significant on the next year crop-rotation of potatoes. Biological control of the wireworms was also enhanced (infection decreased by 56%). Inoculation induced significant effects on the first crop, on the second crop, on wireworm biocontrol and on soil bacterial communities. However, these effects varied according to inoculants.

Keywords : biocontrol, common bean, inoculation, potatoes, Rhizobia, soil communities

COIV-18 : Charcterization of The Bacteriological and Physicochemical Quality of Raw Milk Cow : Influence of Production Conditions

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Abstract

The milk of cows is often hampered by the quality management problem that penalizes both producers and processors.
This study focused on the nutritional and hygienic characterization of raw milk from 350 farms and cooperatives in the region of Chaouia-Ouardigha region, in central Morocco. In total, 412 raw milk samples were subjected to physicochemical analysis and microbiological, respectively.

Sample collection tanks directly through bottles of 50 mL. They are transported to the laboratory, by using a cooler (+4 to +6°C). The physicochemical analyses were obtained, using an infrared chemometrics instrument (MILKOSCAN, model FT2) whereas microbiological analyzes were obtained by counting the microbiological load on agar media, according to standardized methods (NF EN ISO 4833, May 2003).

The physicochemical analyzes distributing the milk quality of the area studied into four classes, with distinct variations, between 28 and 42 $g.L^{-1}$ fat between 29 and 35 $g.L^{-1}$ protein, 89 and 95 $g.L^{-1}$ for solids not fat. Microbiological analysis included a microbial group health indicator, total germs which highlighted the strong contamination of samples taken at the cooperatives and moderately high for private producers, with respective averages of $5{,}1.10^{6}$ $UFC.mL^{-1}$ and $3{,}2.10^{5}$ $UFC.mL^{-1}$.

This study allowed to characterize the physicochemical and bacteriological quality, in a grain oriented area. The levels of total coliforms demonstrate hygienic conditions deteriorated, during milking or during transport. Milks have a variable and natural wealth.

Keywords : raw milk, hygiene, microbiology, analyzes, sample

COIV-19 : Antibacterial, Antioxidant and Cytotoxic Effects of Old and Freshly Harvested Propolis Extracts

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Abstract

Propolis is a resinous substance produced by bees from leafs, buds, tree barks and exudates from various plant sources. It has different therapeutic properties related to its phenolic and flavonoid compounds. Cytotoxic, antibacterial and antioxidant effects are among these important properties.

This study aims to compare the effect of ethanolic extracts of old propolis and those of the recently harvested one. For antibacterial effects, we assayed antibiogramme, MIC (Minimum Inhibitory Concentration), and MBC (Minimal Bactericidal Concentration) on *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* ATCC strains.

The average MBC values were 120 µg.mL^{-1}. For cytotoxic study, we assayed the ethanolic extracts against P815 and MCF7 tumor cell lines. The average IC50 was 42 and 74µg.mL^{-1}. For antioxidant activity, the extracts were assayed for DPPH free radical scavenging activity. At 50 µg.mL^{-1} concentration, the extracts exhibited a free radical scavenging activity ranging from 67% to 80%.

The ethanolic extracts of propolis are differentially and dose dependently active according to the bacterial strain and cell line.

Keywords : propolis extracts, antibacterial, cytotoxicity

COIV-20 : Chemical Composition, Cytotoxic and Antibacterial Activities of The Essential Oil of *Lippia citriodora* Grown in Different Moroccan Regions

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Abstract

The aim of this work is to investigate the *in vitro* cytotoxic activity of the essential oil obtained by hydrodistillation of dried leaves of *Lippia citriodora* HBK, harvested in different regions of Morocco.

The chemical profile was analyzed by gas chromatography coupled with mass spectrometry (GC/MS). The cytotoxic activities was evaluated on P815, MCF7 and VERO cell lines using MTT assay.

The results showed an antiproliferative activity dose-dependent. However, no cytotoxic effects were observed on human peripheral blood mononuclear cells (PBMC) by performing the same test.

Meanwhile, this essential oil showed an antibacterial activity in *Escherichia coli* ATCC 25922 and *Staphylococcus aureus* ATCC 25923. Nevertheless, it was not active against *Pseudomonas aeruginosa* ATCC 27853.

Keywords : antibacterial activity, cytotoxicity, essential oil, GC/MS, *Lippia citriodora*

COIV-21 : Effect of Chitosan and Mycorrhizal Fungi on Stomatal Conductance and Leaf Area of the Tomato Crop Submitted to Two Water Treatments

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Abstract

The objective of this study was to evaluate the effect of the combination of a complex of mycorrhizal autochthon fungus and a natural polymer chitosan (CH) on growth and development of tomato (*Solanum lycopersicum* L.) submitted two water treatments (WTTT½% and WTTT%). Two physiological parameters were measured at the tomato crop including stomatal conductance (Gs) and leaf area.

The results showed a significant difference between the values of Gs. The WTTT½% has resulted a reduction of the Gs, compared to plants under WTTT%. Also, the Gs was decreased, in plants treated with CH150 and increased in plants treated with CH50 and so in mycorrhizal plants. However, no significant difference in the Gs was found between CH50 WTTT½%, traited with mycorrizal fungi (33,93±4,13 mmol/m^2s), and Ch0 WTTT%, without mycorhizal fungi (39,65±4,80 mmol/m^2s). Moreover, the leaf area is higher, in mycorrhizal plants, and processed by CH150 (219,78±18,52 cm^2) and low in non-mycorrhizal plants and processed, by CH50 WTTT½% (131,42±4,25 cm^2) compared to control plants (150,08±15,76 cm^2).

Keywords : chitosan, mycorrhizal fungi, water treatment, tomato

COIV-22 : Chemical Composition and Antimicrobial Activity of *Periploca laevigata* Essential Oil and Its Synergistic Potential With Conventional Antibiotics

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Abstract

In recent years, resistance of many micro-organisms to antibiotics is one of the most problems that lead to emergency of new infection diseases. Therefore, the combined use of essential oils and antimicrobial agents is one of the promising strategies, to enhance the efficacy of classical drugs and to overcome the resistance mechanisms.

The present study was firstly undertaken to determine the chemical composition of *Periploca laevigata* (*Asclepiadaceae*) essential oil obtained by hydrodistillation and its antimicrobial effect and to evaluate the synergistic potential of the studied essential oil with some conventional antibiotics.

The chemical composition was analyzed by a GC/MS system and a total of 22 compounds were identified representing about 98.8% of the total essential oil. The antimicrobial activity of *P. laevigata* essential oil against bacteria and *Candida* species was qualitatively and quantitatively assessed by the presence or absence of inhibition zones diameters and MIC values.

The essential oil showed an inhibitory effect against the majority of tested bacteria and also against *Candida* strains. Gram-positive bacteria (*S. aureus*, *M. luteus*, *B. cereus*, *B. subtilis*) were generally found to be more sensitive than Gram negative ones (*E.coli*, *K. pneumonia* and *P. aeruginosa)*.The association between essential oil and some synthetic antibiotics (Cefexime, Ciprofloxacin, Gentamycin and Fluconazole) showed that from 25 combinations, 17 (68%) had total synergism, 5 (20%) showed a partial synergistic interaction and 3 (12%) had no effect. Furthermore, the best synergistic effect was obtained with the combination of essential oil and Gentamycin against both Gram positive and Gram negative bacteria, with FICi values ranging 0.28 to 0.50, followed by the combination essential oil-Ciprofloxacin, especially, against

Gram positive bacteria. Interestingly, the association essential oil-Fluconazole showed a total synergistic effect against the majority of studied yeasts.

The obtained results demonstrated that the studied essential oil exhibited a good synergistic effect, in association with antibiotics. These findings are very promising and reveal that the essential oil isolated from *Periploca laevigata* leaves could be a novel source of new bioactive substances.

Keywords : *Periploca laevigata*, essential oil, chemical composition, antimicrobial activity, synergistic effect

COIV-23 : Theoretical Effect of Coating Cobalt and Nickel based Dental Alloys with a *Bacillus* sp. Extract on the Adherence of *Candida albicans*

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Abstract

Biofilm formation on dental biomaterials is implicated in a various oral health problems. Thus, the challenge is to prevent the formation of this consortium of microorganisms using safe approach such as antimicrobial and anti-adhesive natural products.

In the present investigation, the effects of an antifungal extract produced by *Bacillus* sp., isolated from plant rhizosphere, on the surface physicochemical properties of cobalt and nickel based dental alloys, were studied using the contact angle measurements. Furthermore, in order to predict the theoretical adhesion of *Candida albicans* to the coated and uncoated dental alloys, the total free energy of adhesion of this yeast to both metal alloys was calculated based on the thermodynamic approach.

The results showed hydrophobic and weak electron-donor and electron-acceptor characteristics of both uncoated dental alloys. After treatment with the antifungal extract, the surface free energy of both dental alloys were influenced significantly, mostly for cobalt based alloy. In fact, treated cobalt based alloy became hydrophilic and predominantly electron donating. Those effects were time-dependent. Consequently, the theoretical adhesion of *C. albicans* to this alloy became unfavorable, after coating with the investigated microbial extract.

A linear relationship between the electron-donor property and the total free energy of interaction has been found for both dental alloys. Also, a linear relationship has been found between this latter and the hydrophobicity for the cobalt based alloy. However, the exposure of nickel based alloy to the antifungal extract failed to produce the same effect.

Keywords : anti-adhesive, physicochemical property, dental alloy, *Candida albicans*, theoretical adhesion, *Bacillus* extract

COIV-24 : Potential of Rhizobium Strains Isolated from Root Nodules of *Hedysarum flexuosum* for Promotion of Plant Growth

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Abstract

Extensive use of chemical fertilizers create serious environmental problems, biological fertilizers can be as an alternative way of

reducing the use of chemicals in agriculture and contamination of the environment.

Contributing in these goals, 17 strains of *Rhizobium sullae IS123^T* were isolated from the nodules of *Hedysarum flexuosum* and were examined for their plant growth-promoting potential. The tests performed are indole acetic acid (IAA) production, siderophores production, hydrogen cyanide (HCN) production, phosphate solubilization and nitrogen fixation.

The results show that all strains produce indole acetic acid, 13 strains were able to produce siderophores, while five strains were positive for hydrogen cyanide synthesis and two strains were able to solubilize inorganic phosphorus. All strains identified in this study produced effective symbiosis with their original host plant, while the relative effectiveness has not shown a great variation between strains. The combination of the nitrogen fixation and production of different phytohormones showed that the strains HFT38, HFT33, HFT41, HFA54, HFT63 and HFT64 are the best strains selected to be used as biofertilizers.

COIV-25 : Ectomycorrhization of Carob (Ceratonia siliqua L.)

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Abstract

Pisolithus tinctorius is an ectomycorrhizal fungus can be an important element of inoculation in controlled mycorrhization programs for sustainable agriculture.

The present study demonstrate the possibility of inducing artificial symbiose between carob and the *Pisolithus tinctorius.*

The main objective of this study has been to develop procedures to improve the quality of plants produced in micropropagation.

Microplants of *Ceratonia siliqua* were estabilished *via* aseptic seed germination in agar medium, all germinated seeds were transferred in plastic pots containing a sterilized peat, 5 mL of mycelial inoculum were injected around the root system of each carob seedling. All cultures were maintained in the greenhouse. Six months after inoculation, carob roots were colored before being examined in microscopic studies.

Microplants, mycorrhized in vitro or *in vivo* outperformed non-mycorrhized plants in fresh and dry weight gain after acclimatization, whereas microplants mycorrhized in vitro outperformed those mycorrhized *in vivo*
The positively presence of *Pisolithus tinctorius* fungi in the soil, for the growth and development of carob, demonstrate the ability of *Pisolithus tinctorius* to form ectomycorrhizae with wide host range makes it a very interesting organism for artificial inoculation of nursery plants.

Keywords : *Ceratonia siliqua*, *Pisolithus tinctorius*, ectomycorrhization, culture *in vitro*

COIV-26 : Isolement du Jus de Presse de Canne à Sucre d'Une Souche de Candida Sp Thermophile et Productrice de Fructofurabose

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Abstract

Trente souches de levures à forte activité saccharolytique et acidifiantes ont été isolées à partir du jus de presse de canne à sucre et de la mélasse d'une usine sucrière.

La souche LES16 a été retenue, pour sa tolérance à la température qui augmente considérablement au cours de la fermentation.

Il s'agit d'un *Candida* sp qui présente, en conditions optimales, (pH 5,3 $g.L^{-1}$, saccharose 1 $g.L^{-1}$ $(NH_4)_2SO_4$ et +40°C), une activité enzymatique de 4228 UI/l.

Mots Clés : activité enzymatique, *Candida sp*, ß-fructofuranosidase

CO V-1 : Molecular Epidemiology of *Phlebovirus* in Four Provinces in Morocco

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Abstract

Sandflies are vectors of protozoa, viruses and bacteria. To investigate the transmission of *Phlebovirus*, a total of 8753 sandflies were collected, in four foci of leishmaniasis. A total of 16 distinct species were morphologically identified. Cell culture and Nested-PCR screening for phleboviruses, using an assay targeting the polymerase gene, showed positive results, for 19 pools of sandflies belonging to different species originated from four different foci and different from those commonly reported in the literature.

Sequencing of the corresponding products confirmed the results and allowed identification of Toscana virus, exclusively. The sequence analysis shows that Moroccan Toscana virus belong to genotype B and appear close to Toscana virus isolated, in France and Spain.

This study reported the existence of the virus in the north, center and the south of the country. The abundance and diversity of sandflies in Morocco, Mediterranean climate, would support the continuous circulation of Toscana virus, in our country, posing a potential risk of emergence of these arboviruses.

Keywords : sandfly, *Phlebovirus*, *Toscana virus*, Morocco

CO V-2 : Neutral Serine Protease from *Trichoderma harzianum*, Purification, Biochemical Characterization and Use in Antibacterial Peptides Preparation from *Scorpaena notate* muscle

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Abstract

In the present study, purification and properties of an extracellular neutral serine protease from the fungus *Penicillium italicum*and and its potential application as an antioxidant peptides producer are reported. The protease was purified to homogeneity using ammonium sulfate precipitation, Sephacryl S-200 gel filtration, DEAE-Sepharose ion exchange chromatography and TSK-HPLC gel filtration with a 10.2-fold increase in specific activity and 25.8% recovery. The purified enzyme appeared as single protein-band with a molecular mass of 24 kDa in SDS-PAGE.

The optimum pH and temperature for the proteolytic activity were pH 7.0 and +50°C, respectively. The enzyme was stable in the pH range of 6.0-8.0. The protease was activated by divalent cations such as Ca^{2+} and Mg^{2+}. Complete inhibition of the purified enzyme by phenylmethylsulfonyl fluoride confirmed that the protease was of serine-type. The purified enzyme revealed high stability and relatively broad specificity. *Scorpaena notata*muscle protein hydrolysates prepared using purified serine protease (Prot-Pen) showed good *in vitro* antioxidative activities. The antioxidant activities of SMPH-PP were evaluated using various *in vitro* antioxidant assays 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical-scavenging activity, reducing power, ferrous chelating activity and DNA nicking assay. SMPH-PP showed varying degrees of antioxidant activity

and almost the same strongest protection against hydroxyl radical induced DNA breakage. However, the addition of variable amount of SMPH-PP to the reaction mixture helped keeping DNA into his supercoiled form.Hydrolysates prepared by *P. italicum* purified protease can be used in food systems as a natural additive possessing antioxidative properties.

Further works should be done to purify and identify antioxidant peptides from SMPH-PP and determine their biological activities *in vivo*.

Mots Clès : serine protease, purification, *Penicillium italicum*, antioxidative activity, DNA protective effect

CO V-3 : Modélisation Mathématique de l'Activité Autolytique de *Lactococcus lactis*en fonction de Deux variables Physico-chimiques par l'Usage des Surfaces de Réponses

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Abstract

Chez les bactéries lactiques, l'une des propriétés les plus recherchées est l'activité autolytique. Car ces bactéries en s'autolysant, elles libèrent dans la matrice tout leur arsenal enzymatique et un ensemble d'acides aminés, contribuant ainsi à l'apparition de nombreuses molécules riches en saveur qui sont à la base du succès gastronomique des produits transformés. L'environnement industriel où ces bactéries sont conviées à jouer pleinement le rôle pour lequel elles ont été sélectionnées est composé d'un nombre important de paramètres physico-chimiques interagissant ensemble dont certains sont contrôlés ou ajustés, afin de prédire un résultat souhaité.

C'est dans cette ordre d'idée que nous avons développé une approche méthodologique nous permettant d'étudier l'interaction combinée de deux variables (Température et NaCl), selon un plan d'expérience composite centré et réduit (CCD) sur la réponse de notre intérêt (l'activité autolytique) chez une souche de *Lactococcus lactis* - LCL. L'impact de ces deux facteurs sur cette activité a été étudiée, en tampon phosphate (50mM, pH=6,5), à différentes température et concentrations de NaCl, selon un CCD à 12 essais (2 facteurs, 5 niveaux).

Les résultats obtenus montrent que l'action de la température conjuguée à un effet de sel à des concentrations faibles exerce un impact positif sur l'activité autolytique. Une Température au voisinage de +21°C et des concentrations très faibles du NaCl semblent avoir un rôle essentiel, pour une meilleur autolyse de la souche (LCL)**.**

Ceci nous a permis de proposer un modèle mathématique qui semble être robuste affichant un coefficient de corrélation élevée (R^2=0,93).

Mots Clés : bactéries lactiques, autolyse, modélisation, température, NaCl

CO V-4 : Molecular Determinants of Aggressively of Barley Yellow Dwarf Virus BYDV-PAV Groups CPII Isolates

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Abstract

One the most common field cereal viruses, in Morocco, is the barley yellow dwarf virus (BYDV), a *Luteoviridae* with a wide host-range, particularly affecting gramineacous plants. BYDV is persistently transmitted by various aphid species of which *Rhopalosiphum padi* and *Sitobion avenae* appear to be the most important natural vectors. The BYD disease is caused by a complex of at least five viruses of which BYDV-PAV has a large geographical distribution and occurs at high incidence. The observation of plant-pathogen interactions revealed a high level of variation within BYDV-PAV.

Barley yellow dwarf virus-PAV isolates have been splited in two distinct groups named CPI and CPII based on capsid amino acid variation (Bencharki et al., 1999). We have sequenced the

complete 3' half of the genomes of two severe and two mild CPII isolates and compared them with those of several known BYDV-PAV CPII isolates to assess variability and locate potential determinants of severity. Open reading frames (ORFs) 3, 4, 5, 6 and the untranslated regions had different percent homologies between isolates ORF5 (92-97%), ORF3 (88-98%), 3' translational enhancer (87-100%) ORF4 (85-99%), 3' untranslated region (72-97%) and ORF6 (61-99%). In contrast to the mild isolates, the field severe isolates (MA2005-10 and MA2005-12) fell into the same cluster, regardless of the genomic region analyzed. The isolates MA2005-10 and MA2005-12 differed from the mild isolates by eight amino acid substitutions in ORF 3 and 4 and insertions in ORF5. Four amino acid substitutions in the 17 kDa protein encoded by ORF4 caused a change in local net charge in the field severe isolates. Two insertions of four amino acids were identified in the C-terminal half of ORF5 of the severe isolates, but were not present systematically in all severe isolates analyzed.

The potential relationship of these differences in predicted amino acid sequences to disease severity are discussed.

CO V-5 : Inhibitors Effects of Oleuropein, Kaempferol and Quercetinon the Spike Protein of MERS *Coronavirus* In Slico

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Abstract

The Middle East Respiratory Syndrome caused by the MERS *Coronavirus* is considered as one of the several syndrome respiratory in public health, in worldwide, particularly, during the pilgrimage season which represent a real danger on the public health. It was isolated for the first time in Saudi Arabia, in 2012, and, since then, the epidemic extends and covers several countries of region including Qatar, UEA and elsewhere as China, Korea and USA. Camels are considered the natural reservoirs of the virus. Recently, it was reported, in Saudi Arabia, China and Nigeria that the reservoir extends to other animals such as bats and likely to horses and pets.

The aim's study is developing new Spike MERS CoV inhibitors, in adopting the drug design and molecular modeling path using bioinformatics tools. Crystal structures of MERS CoV's Spikes glycoproteins have been received from the database "Research Collaboratory for Structural Bioinformatics" (RSCB).

Three hundred (300) ligands have undergone a virtual screening by the iGEM Dock software to select the best candidate inhibitors. Furthermore, the affinity and interactions ligand-receptor "MERS-CoV complexed with human DPP4" were studied by the Docking using AutoDock software.

The results shows that the flavonoid compounds (FPS1) and pazoles were linked with active site « MERS-CoVcomplexed with human DPP4» and « the receptor binding domain RBD« the receptor binding domain RBD of MERS CoV. The ligands form a non-covalent bonds with the amino acids of active site in position 426, 453, 472, 477, 513, 538, 540 and 542 whose score between -8Kcal /mol and -10Kcal /mol. However, the average distance bond is about 2.3 Angström.

In conclusion, the phenolic component "FPS1" may be an effective therapeutic component for MERS Co-V. Docking score and pharmacological properties make it as an effective candidate for the inhibition of spicules links between regions and DPP4.

Keywords : MERS *Coronavirus*, Spike, Docking, DPP4, inhbitor

CO V-6 : QSAR Modelling and Molecular Docking Studies of Three Models of Delta Opioid Receptor

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Abstract

Delta opioid receptor (DOR) takes part in the control of chronic pain and emotional responses therefore it is an interesting object for QSAR modelling and molecular docking studies with delta-opioid selective enkephalin analogues. The purpose of this study is to find the structure-activity relationship of a series of delta-opioid selective enkephalin analogues, basing on the quantitative parameters of *in vitro* bioassay (efficacy, affinity and potency) [1,2] and the results of the molecular docking with three models of DOR : (1) DOR with crystal structure (PDBid:4ej4) [3] ; (2) a theoretical model of DOR (PDBe:1ozc) [4] ; (3) a model of DOR obtained by homology modelling (named Model B) [5]. The relationship of the quantitative parameters of *in vitro* bioassay with the results from the molecular docking was modelled with first to third degree polynomials and surface fitted method.

We suggest that the polynomial surface fitting of the third order has the best fit, assessed by least squares method for model of DOR obtained by homology modelling. Hence, the third order of polynomial could be used for determination the relationship structure-biological activity between the three models of DOR and a series of delta-opioid selective enkephalin analogues.

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CO V-7 : Competitive Electrochemical Immunosensor for Hepatitis A Detection Based on Horseradish Peroxidase as a Signal Amplification Label

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Abstract

A novel sensitive immunosensor for Hepatitis A virus (HAV) detection has been proposed. The immunosensor configuration involves an indirect competitive immunoassay, implying immobilization by physical adsorption of HAV on carbon nanopowder paste electrode (CNPE).

After reaction between the target analyte and anti-HAV antibodies in solution, the remaining non-conjugated antibody is attached on the HAV-CNPE. The HAV monitoring was performed by means of a secondary antibody labeled with peroxidase (HRP-anti-IgG). To quantify the amount of bound HAV-anti-HAV-anti-HRP, hydroquinone (HQ) and hydrogen peroxide were used. HRP catalyzes the oxidation of HQ to benzoquinone thus, the oxidation product was subsequently determined by chronoamperometry

with an applied potential of -0.3 V *versus* Ag/AgCl reference electrode. The various factors influencing the response characteristic of the immunosensor (BSA, anti-HAV, HAV, IgG labeled HRP) were evaluated. Under the optimized experimental conditions, the resulting immunosensor could detect HAV with a detection limit of 1.6 $IU.mL^{-1}$.

The developed immunosensor may be successfully used for the determination of HAV, at various concentration levels owing to its analytical characteristics. Indeed, this immunoassay method showed a good selectivity, high sensitivity and a good repeatability and could be used for the detection of HAV with consistent results, in comparison with those obtained by the indirect ELISA method.

Keywords : Hepatitis A virus, immunosensor, indirect ELISA, carbon nanopowder paste electrode

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CO V-8 : Application of the Experimental Design for the Development of a Reverse Hybridization Technique on Strips for Oncogenic HPV Detection and Typing

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Abstract

Cervical cancer is the second most common cancer amongst women worldwide, accounting for more than 273,000 deaths a year. It's one of very few types of cancer that have experienced remarkable progress, in scientific, clinical and socioeconomic areas. The clinical and epidemiological studies have shown that the human papillomavirus (HPV) are the major infectious etiologic agents of genital precancerous lesions and cancers. Cytological screening and HPV detection and genotyping, in women, have become a routine testing in many countries. Although this screening has decreased the incidence of cervical cancer, cytological techniques lack sensitivity and HPV-related cervical disease, including premalignant and malignant lesions, continues to be a major burden on health-care systems. The current trend in cervical cancer screening is to improve the sensitivity of screening with new methods and to propose new algorithms for diagnostic and early therapeutic decisions.

Basically, HPV screening and typing are based on molecular techniques, PCR, hybridization and sequencing. In this study, we have planned to develop a molecular approach based on the reverse hybridization on strips, for detection and genotyping of oncogenic HPV 16, 18, 31, 33, 35, 45 and 58. To do that, the reverse hybridization conditions as salinity, pH, concentration of monovalent cations, temperature of hybridization, incubation time were optimized, using a chemo-metric approach called experimental design. The assay was optimized using a PCR product produced from a DNA extracted from a cell line carrying HPV, 18, 31, 33, 35, 45 and 58. In the first step of this work, we focused on developing this technique, using one type (HPV16). Thereafter, the test was validated by confirmed HPV samples.

The results showed adequate hybridization, indicating 100% specificity and 86% sensitivity of genotyping.

Further work will be devoted to the development of the strip carrying the probes of several oncogenic genotypes (16, 18, 31, 33, 35, 45 and 58). Development of such technique will be useful for HPV genotyping and will be of a great interest in cervical cancer management in Morocco.

COV-9 : A statistical Approach for Optimization of Lipase Production by *Bacillus subtilis*

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Abstract

Lipases are serine hydrolases defined as triacylglycerol acylhydrolases (EC 3.1.1.3), wich catalyse a partial or complete hydrolysis of triglycerides to glycerol and free fatty acids over the oil-water interface. However, in non-aqueous conditions, they catalyse the reverse reactions such as esterification, interesterification and transesterification. The recent interest, in the production of lipases, is associated with their applications as additives in food, fine chemicals, detergent, waste water treatment, cosmetics and pharmaceuticals.

Considering the importance of microorganisms as miniature factories for lipase enzyme production, the present study deals with the preliminary isolation of several strains, qualitative screening of lipase producing strains, simultaneous selection of best lipase producing strain based on quantitative lipase assay in liquid medium and optimization of various critical medium components, in order to maximize the lipase production by the selected bacterial.

Lipases producing microorganisms were isolated from the traditional tannery of Fez city in Morocco. These colonies were screened qualitatively on selective agar medium containing 1% of Rhodamine-B and 1% of olive oil. The thirteen positive isolates were further screened for maximal secretion of extracellular lipase by assaying the lipase activity in liquid culture using 4-Nitophenyl acetate as a substrate at +37°C. The *Bacillus Subitils* strain, which showed the highest activity, was selected then used in the optimization experiments. Different parameters viz. carbon and nitrogen sources, surfactants, metal ions, incubation temperature and pH of the production medium were evaluated using one-variable-at-time optimization strategy to select variables having the most significant impact on lipase production. After preliminary studies olive oil, Tween 80, MgCl2 and inoculum size were selected as the crucial components of the production medium which affected the lipase production.

The concentration of the selected critical medium parameters was further optimized employing response surface methodology for enhancing lipase production.

Keywords : lipase, *Bacillus subtilis*, optimization, response surface methodology

COV-10 : Bionomics of Anopheles sergentii and First Molecular Detection of Its Insecticide Resistant Genes Kdr and Ace-1 in Morocco

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An. sergentii is considered as the main vectors of the malaria in the south of Morocco. The disease was eliminated, in 2008, and only imported cases are reported nowadays, but Morocco remains vulnerable because of the intensive circulation of gametocytes carriers, the lack of protective immunity of resident population and the presence of potential vectors, in formerly malarious areas. This risk of reemergence of malaria in this region may change with climatic and environmental modifications as well as with increasing of imported malaria from sub-Saharian Africa.

This study will provide baselines information on *An. sergentii* bionomics and for the first time its resistance to insecticides in Morocco by investigating the presence of *Kdr* L1014F and *Ace-1* (G119S) mutations.

Adult population densitie were estimated during mosquito activity from April to September. Mosquitoes resting fauna inside randomly selected houses were collected in the morning in human habitation and animal shelters by

pyrethroid spray using standard procedures. The investigated sites were negative for *Anopheles sergentii* during April to juin 2015 and were only found and collected since July to September 2015. In total, 123 adults of *Anopheles sergentii* were collected. Preimaginal stages were collected and density estimated in each breeding site by the dipping method. Only 7 *Anopheles sergentii* larvaes were collected in two habitats. And it was highly associated with rural habitat, clear water, and sunlight areas. Larvae of *Anopheles cinereus, Anopheles labranchiae* and *Culexpipiens* existed together with *Anopheles sergentii*. Environmental parameters of the breeding sites were recorded.

All the collected mosquitos were identified by using taxonomic keys and are currently tested for the presence of *Kdr* mutation, by using PCR assay and sequencing the amplified fragments of *vgsc*, and the *G119S* mutation by using PCR-RFLP assay. And they are expected to be ready by the time of the conference.

Keywords : *Anopheles sergentii*, bionomics, resistance, *Kdr, Ace-1*, Morocco

CO V-11 : Novonestmycins A and B, Two Non Polyenic Antifungal Derivatives Newly Produced by *Streptomyces* sp. Z26 : Purification and Structural Elucidation

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Abstract

Les mycoses ont augmenté de manière élevée, durant la dernière décennie, et, se classent au quatrième rang des infections nosocomiales, à cause des insuffisances encore perceptibles constatées, lors des traitements des mycoses, de la recrudescence des maladies microbiennes et de la résistance de plus en plus rapide des microorganismes aux antibiotiques. Par ailleurs, les molécules antifongiques polyéniques disponibles, à l'heure actuelle, en thérapeutique, ne réunissent pas les critères définissant l'antibiotique idéal : toxicité spécifique *vis-à-vis* de l'agent pathogène, bonne diffusion dans l'organisme, large spectre d'activité *in vivo*, …etc.

C'est pourquoi de nouveaux antifongiques non toxiques (non polyéniques) doivent être recherchés. Les actinomycètes, bactéries mycéliennes à Gram positif, sont particulièrement très intéressants, par leur grande capacité à produire des métabolites secondaires avec des structures chimiques diversifiées. Le présent travail a ainsi pour objectif la recherche des antifongiques non polyéniques produites par la souche *Streptomyces* sp. Z26 d'origine marocaine.

Durant le programme du screening des actinomycètes doués d'activité antifongique non polyénique, nous avons utilisé en 1er lieu 480 isolats de différents écosystèmes marocains rares contre 16 champignons filamenteux et levures, plus particulièrement quelques espèces de *Candida* et d'*Aspergillus*. Après l'étude de certaines propriétés biologiques et la comparaison des spectres UV-visible avec les antifongiques polyéniques connus, la souche *Streptomyces* sp. Z26 sélectionnée a subit une fermentation de 2 semaines dans le milieu NL 300 et les substances bioactives produites ont été extraites à partir de la phase aqueuse et purifier par HPLC.

Le schéma d'extraction et de purification des substances bioactives a montré que *Streptomyces* sp. Z26 produit plusieurs molécules à activité antifongique non polyénique, et, ceci, en comparaison avec la banque des bases des données des substances naturelles bioactives. Les analyses spectroscopiques (RMN du proton et du carbone 13, spectrométrie de masse, COSY…etc.) ont permis d'aboutir à la détermination des structures chimiques de deux molécules et de démontrer que ce sont des dérivés de Novonestmycins spécialement A ($C_{62}H_{100}O_{24}$) et B ($C_{68}H_{110}O_{26}$).

Mots Clés : mycose, Actinomycète, écosystèmes marocains rares, Novonestmycin, antifongique non polyénique

COV-12 : Can The Available Vaccine (Mass-type H120) of Avian Infectious Bronchitis Able To Protect Against A New Emerging Italy02 Genotype in Moroccan Broiler Chickens ?

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Emergence of a novel strain of Italy02-genotype from vaccinated and unvaccinated chicken flocks in Morocco, remains a problem for the poultry industry and vaccine manufacturers. Therefore, this study aims to evaluate the protection conferred by a most commonly conventional-vaccine (Mass-typeH120) used against Italy02strain recently isolated from Moroccan Broiler Chickens.

180one-day-old specific pathogen free chickens were divided randomly into six groups. Two groups were immunized intra-ocularly with 10^3EID50, the first group vaccinated at one-day-old, the second group vaccinated at one-day-old and boosted at 14 days-old. Whereas, two others groups were kept as no-immunized controls. 3weeks after vaccination, all birds were challenged intraoculo-nasally with $10^{3.5}$EID50 of Italy02 virus. Chickens in each group were monitored for 14days post-challenge.

Vaccinated birds appeared healthy with no clinical signs attributable to virus challenge except a very mild conjunctivitis affecting a limited number of birds vaccinated once. Vaccination fully protected specific pathogen free birds, since no histopathological lesions were observed in the trachea of the birds vaccinated twice with a high significant difference ($P<0.05$). Replication of the challenge virus was prevented in the birds vaccinated twice, however not prevented in those vaccinated once where it was significantly reduced. Moreover, the challenge virus was re-isolated from 50% of birds vaccinated once, while for chicks vaccinated twice; viral RNA was detected in 10% of birds. Vaccination twice has provided a better immunological boost and gave a higher antibody response.

Results demonstrated that the conventional-vaccine (H120) is capable to protect against this new genotype(Italy02) emerging in Moroccan poultry farms, especially when the vaccination program fully respected.

Keywords : avian infectious bronchitis, Italy02, vaccination, Massachusetts serotype, Broiler Chickens, protection

COV-13 : A Simple, Rapid and Efficient Method of *Pepino mosaic* virus RNA Isolation from Tomato Fruit

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Abstract

The main concern in molecular detection of RNA viral pathogens, in plants, is the achievement of good quality of the extracted RNA. Various methods of isolating RNAs from both polysaccharide-rich and poor tissues and other recalcitrant plants are available. However, the use of time and reagent consuming methods and those involving hazardous chemicals is somewhat cumbersome and problematic, especially when it is not necessary for specific purposes like isolating viral RNA from tomato fruit, hence the objective of this paper.

We describe an alternative, simple and rapid method for preparing viral RNA from tomato

fruit without RNA extraction and purification steps, case of *Pepino mosaic virus* (PepMV).
The method employs mechanical treatment and suspension in water. The quality of RNA obtained was judged by spectrometric readings and validated in RT-PCR assays. The used protocol was compared with the usual TRIzol method.

The results showed that the yield and the quality of RNA obtained using the proposed method are efficient and highly yielded in comparison with TRIzol method. Moreover, the developed method successfully allowed a sensitive and reproductible detection of PepMV predicted bands in RT-PCR.

Thus, molecular detection of PepMV from tomato fruit can be performed routinely without fastidious RNA isolation. As well, this will make the diagnosis of other RNA viruses infecting tomato crops easier and less time-consuming, in comparison with the other methods performed with expensive commercial kits and those involving toxic chemicals.

Finally, the described established method will contribute effectively in strategies of phytosanitary and certification programs of tomato crops worldwide.

Keywords : tomato, RNA isolation, *Pepino mosaic virus*, molecular diagnosis

COV-14 : Assessment of Genetic Diversity among 16 Sorghum accessions in Morocco using SSRs Markers

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Abstract

The understanding of genetic diversity within local crop varieties constitutes an important step, in the preservation of their genetic potential.

The aim of this study was to assess the genetic diversity of Sorghum (*sorghum bicolor* L. Moench) cultivated in the Northwest of Morocco.

A total of 16 accessions of sorghum were estimated, using 11 microsatellites markers (SSRs). The alleles were called and sized using Gel Analyzer software version 3. The molecular data analysis software's Cervus version 3.0.7 was used to calculate the different diversity indices within and between populations and NTSYS 2.0.1 software was used to calculate Jaccard distance and to establish a dendrogram.
Our results showed that for all loci analyzed 306 polymorphic alleles were detected with a mean value of 5,36 per locus and the polymorphic information content (PIC) was in the range 0.19-0.80 showing the good discriminatory power of the SSR loci used. Average observed of heterozygoty across all accessions ranged 0.21-0.82, suggesting an important genetic diversity within sorghum landraces.

Cluster analysis using unweighted pair group method arithmetic average (UPGMA) based on Jaccard distance revealed four major groups.

In conclusion, this study demonstrated the utility of SSR markers, in detecting polymorphisms, estimating genetic diversity and establishment of genetic clusters.

Keywords : *Sorghum bicolor* L. Moench, SSRs markers, PIC, genetic diversity, Morocco

Poster

PI-1 : Detection of Carbapenemases and Metallo-β-Lactamases Production in *Acinetobacter baumannii* by Phenotypic Tests

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Abstract

Acinetobacter baumannii is an emerging multi-drug resistant opportunistic pathogen that causes a diversity of nosocomial infections. The most dominant mechanism of carbapenem resistance, in *A. baumannii*, is enzymatic degradation by carbapenemases.

The aim of this work was to study the resistance profile and to detect carbapenemases and Metallo-β-Lactamase producing in *A. baumannii* isolates.

This study was done to detect carbapenemases and Metallo-β-lactamase producing in *A. baumannii* isolates in three hospitals in Morocco from March 2015 to December 2015. The identification tests were firstly colonial morphology, Gram stain, oxidase test and catalase production. The identification was confirmed by API 20NE. During this period, a total of 37 strains of *A. baumannii* were collected and were subjected to Modified Hodge Test (MHT) and Imipenem-EDTA double disc synergy test (DDST).

Susceptibility testing of *A. baumannii* isolates revealed broad resistance profiles especially to Amikacin (51.35%). Among 37 *A.baumannii* isolates, 33 (89.18%) were carbapenem resistant and 12 isolates were suspected carbapenemase producing (36.36%) by Modified Hodge test (MHT), 8 of them found to be MBL producers by DDST.

This study reveals an outbreak of nosocomial infection caused by carbapenemase producing *Acinetobacter baumannii* isolates. Furthermore, Modified Hodge Test seems a simple test which can be performed, in the routine laboratory, for carbapenemases detection, in isolates presenting intermediate or sensitive zone diameter on disc diffusion.

Keywords : *A.baumannii*, carbapenemase, metallo-β-lactamase, Modified Hodge test

PI-2 : Prevalence and Molecular Characterization of Epstein Barr Virus Associated to Nasopharyngeal Diseases in Adult Moroccan Population : Preliminary Study

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Abstract

Epstein Barr Virus (EBV) is involved in nasopharyngeal diseases and especially nasopharyngeal carcinoma. The aim of this study is to determine the prevalence of EBV infection and its genotypes, in our region, and, to establish the association between variants and pathologies, in patients with nasopharyngeal diseases.

Patients attending the Oto Rhino Laryngology department of Hassan II university hospital of Fez, and, for whom nasopharyngeal biopsy was prescribed, were asked to enroll this study. Biopsies taken from nasopharyngeal area of consenting patients were examined by PCR to detect EBV. The molecular characterization consisted on the determination of EBV type (A/B) and *LMP1*, Xho, BamH and BamW genotyping. EBV and pathology correlations were done using SPSS software.

During the period of this study, 139 patients were recruited with a mean age of 40 years [3-78]. About half of them (50.5%) were with carcinoma, 5.4% were with lymphoma and 44.1% were with non-malignant pathology. EBV have been detected in 57.6% of cases with predominance of

type A (91.3%). 30pb deletion of *LMP1* (72.5%), BamH"F" (98.4%) and BamW"i" (66.7%) were the most prevalent variants. XhoI restriction site was detected in 71.4% of cases. A significant association has been detected between EBV infection and carcinoma, in fact 83.9% of patients with carcinoma were EBV positives ($p<0.01$).

The preliminary results show that the prevalence of *EBV* infection is 57.6% with Type A predominance (91.3%). The highest rates of infection have been determined in carcinoma and lymphoma patients.

Keywords : EBV,PCR, genotype, nasopharyngeal carcinoma

PI-3 : Bacterial Sexually Transmitted Infections in Fez Region

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Abstract

Sexually transmitted infections (STIs) such as *Chlamydia trachomatis (C. trachomatis), Neisseria gonorrhoeae (N. gonorrhoeae) and Mycoplasma* are major public health problems worldwide. If not treated, they cause severe diseases that include pelvic inflammatory disease, ectopic pregnancies and infertility. STIs prevalence is higher, in developing countries, where detection and treatment are less accessible compared to developed countries.

The aim of this study was to determine the prevalence of *C. trachomatis, N. gonorrhoeae, Mycoplasma hominis (M. hominis) and Ureaplasma urealyticum (U. urealyticum),* in women attending some department of Hassan II University Hospital of Fez, Morocco. This study was approved by the ethics committee of Medicine faculty of Fez.

Endocervical samples were collected from consenting women attending the gynecology department or the laboratory of Anatomo Pathology of CHU-Fez. The DNA from those samples was extracted and tested by PCR to detect *C. trachomatis, N.gonorrhoeae, M.hominis and U.urealyticum*,using specific primers for each infectious agent.

A total of 1054 cervical samples were collected in this study. Enrolled women from urban and rural areas were aged 16-85 years old, with a mean age of 42.8 (±12) years. The prevalence of *U.urealyticum, N.gonorrhoeae, M.hominis and C.trachomatis* was 18.4%, 14.1%, 5.8% and 1.6%, respectively, and, the overall STIs prevalence, in the studied population, was 32.7%.

The prevalence of detected species is relatively different from that determined, in European countries. So, it's marked by the relatively high rates of *U. urealuticum, N. gonorrhoeae, M. hominis and* low rate of *C. trachomatis.* Our study highlights the need to reinforce the genital infections screening.

Keywords : prevalence, *C. trachomatis, N. gonorrhoeae, U. urealyticum, M. hominis*

PI-4 : Development of Multiplex of PCR and Fragments Analysis for High Risk Papillomavirus Genotyping

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Abstract

Human Papillomavirus (HPV) genotyping is determinant element, in cervical cancer prevention. It allows the establishment of epidemiologic profiles and help to identify women at cervical cancer risk. Existing PCR-based genotyping methods require many steps or specialized equipment, long assay duration and high cost. This affects their routine use, especially, in developing countries. Therefore, the aim of this study was to develop a new, low cost, HPV genotyping method that can be easily used in routine.
A multiple alignment of forty HPV L1 gene sequences was performed, in order to choose specific primers for each HR-HPV. Chosen primers were labeled with different fluorophores and used as reverse primers, in multiplex PCR with MY11 as a common forward primer. The amplified fragments lengths were detected by fluorescence, with capillary electrophoresis. This technique was optimized on plasmids of viral genomes and evaluated on 70 HPV positive clinical specimens (MY11/MY09), by comparing obtained results with sequencing results. Fifteen designed HR-HPV types specific reverse primers and fluorescently labeled were used on two multiplex PCR with MY11 as forward primer. The PCR products lengths were determined by capillary electrophoresis.

Amplification results shows that all the sixteen targeted genotypes (types 16, 18, 31, 33, 35, 39, 45, 51, 52, 53, 56, 58, 59, 68,73 and 82) were identified, specifically and repeatedly, in simple and multiple infections in both artificial and clinical samples.

The developed technique is sensitive, specific, easy to perform and appropriate, for routine laboratory use and high throughput screening programs.

Keywords : human Papillomavirus, High risk genotypes, multiplex PCR, fragment electrophoresis, genotyping

PI-5 : High Risk Genotypes Distribution in Fez Region

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Abstract

High-risk Human Papillomavirus (HR-HPV) genotypes are responsible for cellular lesions that can evolve to invasive cervical cancer. In Morocco, there is a lack of epidemiological data on HR-HPV genotypes distribution that's limits the implementation of cervical cancer prevention programs. In this study we aim to determine the prevalence of each HR-HPV genotype among women, in Fez region.

A prospective study was conducted from March 2013 to February 2015 and was approved by the ethics committee of Faculty of Medicine of Fez. Cervical samples were collected from consenting women attending two department of Hassan II University Hospital. DNA was extracted and subjected to PCR to detect HPV. Positive samples were genotyped using a newly developed method based on multiplex PCR and fragment analysis to identify specifically sixteen HPV genotypes (HPV16, HPV18, HPV31, HPV33, HPV35, HPV39, HPV45, HPV51, HPV52, HPV53, HPV56, HPV58, HPV59, HPV68, HPV73 and HPV82).

A total of 1054 cervical samples were collected from women aged 16 to 85 years old with a mean age of 42, 3 ± 12 years. HPV DNA detection was

performed for all samples and reveals an infection rate of 39,8%. A quarter of infections were linked to HR-HPV types with a predominance of HPV53, 16, 35, 51 and 56.

HPV is an important public health concern in this region, with a particular HR types distribution. The results of this preliminary study already show that future cervical cancer prevention programs in Morocco should pay more attention to genotypes HPV35, HPV53 and HPV51.

Keywords : human Papillomavirus, high-risk genotypes distribution, Fez region, PCR multiplex, fragment analysis

PI-6 : *Helicobacter pylori* Inflammation et Cancer Gastrique

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Abstract

Helicobacter pylori (*H. pylori)* est une bactérie pathogène colonisant l'estomac de la moitié de la population mondiale, reconnue par l'OMS, comme la seule bactérie carcinogène de classe I et considérée comme la principale cause de cancer gastrique (CG) hors cardia. La prévalence de l'infection à *H. pylori* chez les sujets atteints d'un CG hors cardia est de plus de 93% et l'éradication de *H. pylori* peut diminuer l'incidence du CG jusqu'à 25 %. Au Maroc, la prévalence de l'infection à *H.pylori* est de 69,2% dont 3,2% souffrait de CG. À l'échelle mondiale, le CG occupe le 4ème rang des cancers les plus fréquents (1 million cas par an) et le 2ème rang comme cause de mortalité par cancer (700 000 décès par an). Au Maroc, le CG est le second cancer digestif, après les cancers colorectaux et la 5ème cause de décès par cancer.
L'évolution vers le cancer gastrique peut être liée à des facteurs bactériens, des facteurs environnementaux et des facteurs génétiques de l'hôte tel que le polymorphisme des gènes de certaines cytokines inflammatoires. Chez la population marocaine la mutation TNFα-238 A > G est associée à une augmentation de risque de CG. Il est donc nécessaire d'éradiquer ce pathogène quand il est détecté, pour éviter tout risque d'apparition de cancer gastrique.

Mots Clés : *Helicobacter pylori*, inflammation, cancer gastrique

PI-7 : Aspects Épidémiologiques et Cliniques de l'Infection à *Helicobacter pylori* à travers une Étude Marocaine

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Abstract

Helicobacter pylori (H.pylori) colonise l'estomac d'environ la moitié de la population humaine dans le monde. L'infection par cette bactérie est chronique et peut évoluer de la gastrite à des pathologies graves telles que les ulcères gastro duodénaux et le cancer gastrique. Dans les pays en développement, l'infection à *H. pylori* constitue un problème de santé publique. Le but de cette étude est de déterminer la prévalence de l'infection à *H. pylori* et d'étudier l'impact des différents facteurs épidémiologiques ainsi que les principales maladies gastriques associées à cette infection chez une population marocaine.

L'étude épidémiologique a été faite sur 837 patients, les renseignements cliniques et socioéconomiques sont collectés sur des dossiers archivés (1998 – 2011), à l'Institut Pasteur du

Maroc et dans un centre médical de gastroentérologie à Casablanca. L'examen histologique, réalisé sur des biopsies, visait à rechercher des anomalies de la muqueuse gastrique, une inflammation ou un processus cancéreux, et, à révéler, en second lieu, la présence de *H. pylori*.

La prévalence de l'infection à *H. pylori*, chez la population étudiée, est de 69,2%, avec une prédominance (80,2%) chez le groupe de [31- 40 ans]. Le sexe ne présentait aucun effet significatif sur la prévalence. Une corrélation significative a été observée entre la prévalence de l'infection à *H. pylori* et le développement des gastrites chroniques (91,8%), dont 35,5% appartient au groupe de [31- 40 ans].

Les résultats de cette étude indiquent que le groupe d'âge [31-40 ans] présente la plus forte prévalence de l'infection à *H. pylori* et le taux le plus élevé de gastrites. Il constituerait ainsi un terrain de risque pour la survenue d'un cancer gastrique.

PI-8 : Intestinal Carriage of Vancomycin Resistant Enterococcus in Community Setting in Casablanca

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Abstract

This study aimed to determine the rate of intestinal carriage of vancomycin resistant Enterococci (VRE) and to perform a phenotypic and genotypic characterisation of VRE isolates in the community in Casablanca, Morocco.

During 6 months in 2014, 113 faecal samples were examined for the presence of Enterococci. Antibiotic susceptibility of the isolates was determined by the disk diffusion method. Phenotypic and genotypic species identification was performed and the *vanA*, *vanB* and *vanC* genes were detected by PCR. All bacterial isolate were subjected to amplification and sequencing of the 16S rRNA gene.

In total, 100 strains were collected from a community population of 80 persons. So, 55% of the isolates were identified as *Enterococcus faecium and* 45% as *Enterococcus faecalis*. The resistance profile showed that 88% of the strains were multiresistant. The rate of faecal carriage of VRE was 21% (n = 21), among which 8 strains were *E.faecalis* (17.8% of all *E. faecalis*) and 13 strains were *E. faecium* (23.6% of all *E.faecium*). PCR analysis revealed that all of the strains were resistant to vancomycin owing to possession of the *vanA* gene.

The emergence of VRE and the high rate of colonisation by multiresistant Enterococci are alarming. Strict measures are required to control the further spread of these strains in the Moroccan community.

Keywords : intestinal carriage, *Enterococcus,* resistance, vancomycin, moroccan community

PI-9 : Evaluation of The in vitro Anticancer Activity of Berberine Alone and In Combination With A Nitric Oxide Donor On Tumor Cells

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Abstract

As it is well believed that plants are the big reservoir of drugs, we investigated the antitumor and the antioxidant effects of two extracts from the bark of the roots of *Berberis vulgaris*, ethanolic and ethyl acetate extracts.

The study on antitumor activity of these extracts was evaluated by the MTT test on epithelial MCF-7 cell line (human breast adenocarcinoma) which revealed the differential effects of the two extracts where the ethanolic extract is the most cytotoxic one unlike the ethyl acetate extract.

The most fascinating thing is that we found that these two extracts had no cytotoxic effect on normal human cells PBMC (peripheral blood mononuclear cells), when the not targeting the tumor cells by anticancer drugs is what causing the systemic toxicity. The qualitative phytochemical examination performed on the ethanolic extract showed the presence of several molecules including berberine as its principal content. It has been well demonstrated that oxidative and nitrosative stress (reactive oxygen species (ROS) and reactive nitrogen species (RNS) production cause cell damage that plays an important role in cancer development. But, in the other hand, too many findings suggest that excessive concentrations of nitric oxide (NO) show cytotoxic effects against tumor cell lines. These multifaceted findings of NO effects on human health lead us to examine its potential effect on the MCF-7 cell line using the Crystal Violet cytotoxicity test.

Finally, as it is well demonstrated, in this paper, that berberine shows its cytotoxic effect against the MCF-7cell line, we evaluated the combination effect of both berberine and NO against MCF-7 by using the Talalay and Chou synergy test.

Keywords : antioxidant activity, antitumor activity, berberine, *Berberis vulgaris*, ethanolic extract, nitric oxide

PI-10 : Study of Signaling Pathways in HPV Related Cervical Cancer

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Abstract

Signaling pathway is the mechanisms by which a cell communicates with other cells and also with her environment. The activation of the protein cascades is the result of ligand binding to cell receptors. This process affects gene transcription levels. By this process, a cell is able to transform external stimuli into a biochemical signal which controls any biological effects (proliferation, differentiation, apoptosis …).

Cancer is a disease that is characterized by the dysregulation of many signaling pathways. Consequently, numerous elements targeting these pathways have been proposed as therapeutic targets. The alterations of some crucial pathways controlling cell proliferation and apoptosis, such as ERK/MAPK, PI3K/Akt, Wnt/β-catenin and Notch, have been identified in different types of cancer. Cervical cancer specifically is the fourth most common cancer in women worldwide. Persistent infection with Human Papillomavirus HPV is an essential factor for cervical cancer development. Types of HPV that are related to cancer are those classified as high-risk HPV HR-HP (HPV-16 and HPV18).

The aim of our study is to investigate the HPV involvement, in the dysregulation of the different signaling pathways that has shown their implication in the carcinogenic process. For that purpose techniques as reel time PCR and flow cytometry will be used.

Deciphering the precise mechanisms by which HPV oncogenes contribute, in the different signaling pathways modulation, will definitely help to elucidate HPV-related carcinogenesis. This information could eventually aid in identifying biomarkers of prognosis and consequently contribute to the design of more effective targeted therapeutics.

Keywords : Cancer, cervical cancer, flow cytometry, HPV, HR-HPV, signaling pathways

PI-11 : Prevalence of Methicillin Resistant *Staphylococcus aureus* and *Streptococcus* sp. Strains in The Oral Cavity of Moroccan Patients with Chronic Peridontitis

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Abstract

Chronic periodontitis is an infectious disease caused by oral bacteria, mainly characterized by inflammation, attachment los and bone destruction. Some studies suggest that the chronic periodontitis may influence oral microorganisms and lead to the development of pathogenic bacteria in this ecosystem.

The present cross-sectional study included a group of 15 of patients with chronic periodontitis chosen from the Consultation and Dental Treatment Center (CCDT) in the Universitary Center Hospital of Rabat. The main objective of this study was to assess the presence of Methicillin-Resistant *Staphylococcus aureus* strains (MRSA) and *Streptococcus* sp. strains in the oral cavity of Moroccan patients with chronic periodontitis and also identifying the risk factors associated to the presence of these micro-organisms, in the studied population.

Results revealed the presence of commensally bacteria in patients with chronic periodontitis and the absence of pathogenic oral bacteria like *S. aureus* strains. This absence of pathogenic oral bacteria is probably related to the small size of patient's sample.

Keywords : oral cavity, chronic periodontitis, methicillin-resistant *Staphylococcus aureus*, MRSA, *Streptococcus* sp

PI-12 : Profil Bactériologique des Infections Urinaires Diagnostiquées à la Ville d'Ouazzane

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Abstract

L'objectif de notre étude est d'analyser la distribution des bactéries responsables des infections urinaires, dans la ville d'Ouazzane, et, d'étudier la sensibilité de *Escherichia coli* aux antibiotiques.

L'étude est effectuée sur un total de 215 échantillons, 122 du sexe féminin et 93 du sexe masculin. Tous les échantillons ont subi un examen cytobactériologique des urines (ECBU). Cet examen permet de diagnostiquer, avec précision l'infection urinaire, en isolant le microorganisme responsable (bactérie ou levure) et de déterminer sa sensibilité aux antibiotiques.

Les résultats des analyses ont montré que 40% des échantillons testés sont positifs. Indépendamment du sexe, la tranche d'âge la plus touchée est comprise entre 15 et 65 ans, avec une prédominance féminine nette de 62%. Dans cette pathologie, les entérobactéries sont les plus impliquées. La distribution globale des bactéries montre une prédominance plus marquée de *E. coli* (50%) au détriment des autres espèces bactériennes, quel que soit l'âge et le sexe. Sur un total de 12 antibiotiques testés, la sensibilité d*'E.coli* est de 100 % aux Ceftriaxones. Par contre, elle a montré une résistance aux Amoxicillines (100%).

Donc, il serait intéressant de faire des études plus élargies, à l'échelle de la ville d'Ouazzane, pour déterminer la ou (les) source (s) des infections urinaires observées chez les femmes, d'une part, et, l'origine de l'émergence des souches d*'E. coli* de plus en plus résistantes, d'autre part. Cette dernière information est très importante, pour sensibiliser les autorités compétentes, quant à l'évolution des résistances observées qui compliquent davantage le traitement de cette maladie par les antibiotiques.

Mots Clés : infection urinaire, examen cytobactériologique des urines, *E. coli*, antibiogramme

PI-13 : Étude des Connaissances, Attitudes et Acceptabilité du Frottis Cervico Vaginal chez une Population Féminine à Settat

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Abstract

Le cancer du col utérin constitue un problème de santé publique au monde avec environ de 527 624 nouveau cas et 265 672 décès annuellement dont plus de 86% dans les pays en développement. Au Maroc, le cancer du col utérin est le deuxième cancer féminin après celui du sein avec une estimation de 2258 nouveau cas et 1076 décès annuellement. Le dépistage par Frottis Cervico Vaginal (FCV) a prouvé une efficacité dans la lutte contre ce cancer. Cependant, la pratique de ce moyen de diagnostic est tributaire de son acceptabilité par la population cible.

Ainsi, dans ce travail nous nous sommes intéressés par l'évaluation des connaissances et d'attitudes d'une population féminine de la province de Settat envers le cancer du col utérin et la pratique du FCV et relever le taux de son acceptabilité. Pour ce faire, nous avons conduit une enquête auprès de 200 femmes au niveau des structures sanitaires, certaines structures de formation et des lieux publics de la ville de Settat.

Les résultats montrent que 56.6% des participantes sont sensibilisées envers le FCV (entendu parler du FCV). Parmi celles-ci, 67.3% l'ont réalisé, mais, seulement 21.6% d'entre elles l'ont effectué 3 fois et plus. Un pourcentage de 70.3% des participantes ayant effectué le FCV l'ont réalisé, suite à la recommandation du médecin. La peur de découvrir une maladie et le manque de la prescription médicale ont été révélés comme principales barrières à la réalisation de FCV déclarées par 55.2% des participantes ayant entendu parler par le FCV et qui ne l'ont pas réalisé. La majorité des participantes (61.1%) ont déclaré que l'intérêt de FCV est le dépistage de cancer du col de l'utérus. Le taux d'acceptabilité du FCV, au sein de notre population d'étude, a été de 68%. Les principales barrières signalées par les participantes ayant exprimé leur refus à la pratique de FCV sont le manque des moyens (25%), le fait que ça touche à l'intimité (23.4%), la peur de découvrir une maladie (12.5%), le déplacement (9.3%), le manque du temps (7.8%), le manque de prescription médical (7.8%). La recherche de facteurs associés à la pratique antérieure du FCV a montré que l'âge, la conscience du risque d'attraper le cancer du col de l'utérus et la connaissance des symptômes du cancer du col de l'utérus sont des facteurs favorisants. Quant aux facteurs associés à l'acceptabilité du FCV, les résultats ont révélé que le niveau scolaire, le revenu familial, ainsi que l'habitat sont des facteurs positifs. Il apparaît donc que les connaissances de la population étudiée sur l'étiologie du cancer du col et sur le test FCV sont insuffisantes. De plus, le taux de la pratique du dépistage par FCV est très insatisfaisant. Face à cette situation, des efforts de tous les acteurs concernés sont nécessaires, afin d'améliorer la sensibilisation de la population sur le cancer du col utérin, le HPV et les moyens de dépistage disponibles, en particulier le FCV et favoriser ainsi la généralisation du dépistage de ce cancer et l'accès de la population démunie aux services de dépistage.

Mots Clés : cancer du col de l'utérus, HPV, FCV, dépistage, connaissances, attitude, acceptabilité

PI-14 : Importance du Dosage Immunologique par Chimiluminescence dans le Diagnostic des Complications Osseuses de Carence en Vitamine D

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Abstract

La carence en vitamine D apparaît comme un facteur de risque de développement de toute une série de maladies majeures comme le cancer, les maladies immunitaires, cardiovasculaires et métaboliques. L'hypovitaminose D est une maladie qui touche principalement les personnes âgées. Plusieurs facteurs contribuent directement ou indirectement à l'installation de cette maladie.

Le présent travail a traité 100 échantillons provenant de Casablanca. La majorité de la population étudiée est constituée du sexe féminin (73%). Le dosage de la vitamine D, sous la forme

25 hydroxy-vitamine D totale, dans le sérum et le plasma humain, a été réalisé, par l'automate VIDAS® .

Les résultats des teneurs mesurées de cette vitamine ont permis de classer notre population en quatre groupes :
1er groupe : 36 % des échantillons ayant une teneur inférieur à 10 ng.mL^{-1} en vitamine D ;
2ème groupe: 40% des échantillons ayant une teneur comprise entre 10 et 20 ng.mL^{-1} en vitamine D ;
3ème groupe : 12 % des échantillons ayant une teneur comprise entre 20 et 30 ng.mL^{-1} en vitamine D ;
4ème groupe : 12 % des échantillons ayant une teneur supérieur à 30 ng.mL^{-1} en vitamine D.

D'après nos résultats, les personnes âgées sont les plus exposées à cette maladie. Indépendamment de l'ampleur de cette carence, le sexe féminin est le plus touché par l'hypovitaminose D. Une corrélation négative entre le taux de la glycémie et la concentration de 25 (OH) D_3 est notée. La même corrélation est observée avec le taux de cholestérol LDL et la concentration de 25(OH) D_3.

L'implication de l'hypovitaminose D comme facteur de risque, dans l'installation et la complication d'autres maladies graves mérite une étude plus approfondie et plus élargie.

Mots Clés : hypovitaminose D, âges, sexe, glycémie, taux de cholestérol LDL

PI-15 : Contrôle de la Qualité Microbiologique des Produits Pharmaceutiques Non Obligatoirement Stériles

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Abstract

Le contrôle de la qualité microbiologique réalisé à la suite de la fabrication des produits pharmaceutiques est régi par les spécifications des pharmacopées américaines, européennes ou japonaises, depuis plus d'une trentaine d'années. Ce contrôle consiste, particulièrement, en l'essai du dénombrement microbien (bactéries mésophiles, moisissures et levures capables de croître en aérobiose).

Ces essais sont déterminés en utilisant les méthodes de dénombrement classiques. L'identification des germes permet de contrôler l'absence ou la présence limitée, de microorganismes spécifiés comme les Entérobactéries, *Escherichia coli*, *Salmonella*, *Pseudomonas*, *Staphylococcus* pouvant être décelés dans le produit en question.

Durant le présent travail, le contrôle microbiologique a porté sur un ensemble de 28 échantillons issus des lots hétérogènes de produits pharmaceutiques non obligatoirement stériles. Les échantillons sont transportés au laboratoire pour des analyses bactériologiques. Les produits analysés comporte les eaux (déminéralisées, osmosées, distillées), les comprimés, les sirops, les suspensions, les matières premières, ampoules et dentifrices.

Les résultats des contrôles microbiologiques obtenus ont montré que l'eau déminéralisée et l'eau osmosée sont contaminées par la flore totale alors que l'eau distillée est conforme aux critères de la pharmacopée européenne.

Tous les autres produits contrôlés comme les comprimés, sirops, suspensions, matières premières et ampoules sont conformes (absence des germes aérobies totaux et moisissures et levures totales), malgré que ces produits sont non obligatoirement stériles selon la pharmacopée européenne.

La recherche des germes spécifiés (entérobactéries, *Escherichia coli*, *Salmonella*, *Pseudomonas* et *Staphylococcus*) est toujours négative. Cela est dû à la rigueur et aux précautions aseptiques selon lesquelles sont fabriqués ces produits.

L'analyse microbiologique des dentifrices a, par contre, révélé que la charge totale en microorganismes viables dépasse la norme européenne en vigueur (10^3 UFC.g^{-1}), ce qui devrait pousser les autorités sanitaires et les industriels à donner une importance particulière à

ces produits utilisés fréquemment, pour assurer une bonne hygiène de la cavité buccale.

Mots Clés : produits pharmaceutiques, qualité microbiologique, germes pathogènes, contamination

PI-16 : Prevalence of qnr, Aac(6') and qepA in *Escherichia coli* and *Klebsiella pneumoniae* Isolated from North West of Morocco

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Abstract

Qnr-mediated quinolone resistance is increasingly detected worldwide, but few studies have been carried out in Morocco.

The aim of this study was to investigate the mechanisms of Quinolone resistance and the association with other resistance markers among *Esherichia coli (E.coli)* and *Klebsiella pneumonia (Klebsiella spp*) isolated from North west of morocco.

The prevalence of the plasmid-mediated quinolone resistance genes *qnr* and *aac(6')-Ib-cr* was investigated among 398 *E.coli* and 118 *Klebsiella spp* isolates, in private laboratories of medical analysis, between 2012 and 2015, in North west of Morocco. Antimicrobial susceptibility was determined by disc diffusion assay and minimal inhibitory concentrations (MIC) of quinolone were determined by microdilution. The screening of PMQR genes (*qnrA,B,C and S, Aac(6') and qepA*) were done by PCR, DNA sequencing and RFLP.

We selected 203 of *E. coli and* 73 of *Klebsiella spp* multidrug resistant (MDR) strains. Among them13.95% were ESLB producing. For the *E.coli* group, *qnrB, qnrS*, and *aac(6')-Ib-cr* genes were detected in 10.34%, 02.95%, and 26.60%, respectively. These determinants were more prevalent in *Klebsiella spp* group, hence they represented 24.65%, 09.58% and 31.50%, respectively. *QnrA, qnrC and qepA* were absent in this study. For *aac(6')Ib* determinant, 84.41% were belong to the *Aac(6') Ib-cr* variant while for *qnrB* and *qnrS*. The most determined variants were *qnrB1, B6, B16, B42, B66* and *qnrS1, S4, S7*. Different plasmid sizes were detected in a group of PMQR strains.

This is the first study conducted in North-West of Morocco and shows important dissemination of MDR, ESBL and PMQR among *Enterobacteriaceae*.

Keywords : Enterobacteriaceae, PMQR, *qnr*, *aac* (6′), *qepA*, ESBL

PI-17 : A Study of Structural Properties of the D-Mannose in the Natural Treatment of Urinary Infections caused by *Escherichia Coli*

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Abstract

The study of Protein-protein interactions have an important role to understand the process of pathogenesis of bacterial and viral infections. Bioinformatics brings also its contribution to the study of protein-protein interactions by methods and software as molecular dynamics and protein - protein docking.

The aim of this work is to study the interaction between D-Mannose and the Fimh protein, by the use of molecular dynamics method. Initially, several structural calculations and optimizations by Hyperchem8 software were conducted on D-Mannose, to understand how this natural sugar attack the Escherichia coli bacterium. Then Docking calculations were performed by Hex6.3.

Interpretation of results is based on the energy of interaction formed by ligands Alpha-D-mannose and Beta-D-mannose. The lowest energy of interaction of complex probably present a greater inhibition of Fimh protein.

Keywords : molecular modeling, molecular docking, *E. coli* uropathogenics trains, urinary tract infection, α-D-Mannose, β-D- Mannose

PI-18 : Antibiotic Susceptibility of *Staphylococcus aureus* and *Staphylococcus epidermidis* Isolated from Eye Infections in Tlemcen (Algeria)

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Abstract

Eye infections can cause damage to import antfunctional structures and lead topermanent vision loss or blindness. The use of broad-spectrum antibiotics should be given to the appropriate site of infection as soon as the diagnosis is made. However, the resistanceof bacteria to antibiotics made Certain antibiotics ineffective.

To study the sensitivity to antibiotics of the main agents responsible for eye infections in the region of Tlemcen Algeria, the swabs performed on patients, in hospital Tlemcen, centre conjunctivitis, keratitis, endophthalmitis and one case of blepharitis. Antibiotic resistance by the disk diffusion method to 12antibiotics and the minimal inhibitory concentration for oxacillin were performed for all strains.

From 28 Sixty samples, *S. aureus* and 9 S. epidermidis were isolated. The *S. aureus* have a total resistance to Penicillin (100%), 90% for Oxacillin, 93% resistance to Ampicillin, 50% Erythromycin, 60% Streptomycin, 61% for Vancomycin and finally, 32% for Gentamicin.

The *S. epidermidis* also shows a strong resistance rates, 100% resistance to Penicillin and Ampicillin, 90% to Oxacillin, 70% to Erythromycin, 60% for Vancomycin and 22% for Gentamicin. The MIC for Oxacillin resistance confirms all strains with a concentration $\geq 16 \mu g.mL^{-1}$.

Keywords : conjunctivitis, keratitis, endophthalmitis, sensitivity to antibiotics

P-19 : The Human Microbiome and Cancer : Epidemiological Studies ?

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Human microbiome research has garnered substantial attention, both by scientists and by the media. The human microbiome refers to the collective genome of all bacteria, archaea, fungi, protists, and viruses residing in and on the human body. Made feasible by high throughput, next-generation deep sequencing of DNA, as well as expanding computational and bioinformatics support, the microbiome is a conceptual quantum leap from detection and identification of individual microbes to characterisation of entire microbial communities, including both pathogenic and commensal microbes that have not yet been cultured or otherwise detected.

Differences among individuals in our co-dependent relationship with the microbiota is postulated to modulate susceptibility to many malignancies *via* several pathways, including nutrition, detoxification, metabolism, hormonal homeostasis, immune tolerance, and especially inflammation. Previously detected associations of individual bacteria (*e.g.*, *Helicobacter pylori*), periodontal disease and inflammation with specific cancers have motivated studies considering the association between the human microbiome and cancer risk.

This short review summarises microbiome research, focusing on published epidemiological associations with gastric, oesophageal, hepatobiliary, pancreatic, lung, colorectal and other cancers. Large, prospective studies of the microbiome that employ multidisciplinary laboratory and analysis methods, as well as rigorous validation of case status, are likely to yield translational opportunities to reduce cancer morbidity and mortality by improving prevention, screening, and treatment.

PI-20 : CORRELATIONS ENTRE LA VITAMINE D ET LES CANCERS GYNECO-MAMMAIRES VIRO-INDUITS

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Ces dernières années et particulièrement au Maroc, la vitamine D et son étude présente un grand engouement et intérêt pour la santé publique. Devant la recrudescence des cancers gynéco-mammaires , nous sommes en droit de nous poser la question quant à la relation possible entre cette carence en vitamine D et la prévalence des cancers gynéco-mammaires viro-induits .

L'objectif de notre travail est de mettre en évidence les corrélations entre la vitamine D et les cancers gynéco-mammaires viro-induits au Maroc.

La méthodologie de notre travail prospectif consistera à faire des prélèvements sanguins chez trois groupes de patientes (saines , porteuses de tumeur maligne gynéco-mammaire , porteuses de tumeur maligne gynéco-mammaires viro-induite) pour doser la vitamine D dans le sérum à l'aide de dosage de la 25 (OH) D3 chez 3 groupes de patients , la mise en évidence de récepteurs à la vitamine D sur les pièces tumorales , la mise en évidence des co-facteurs incriminés dans la génèse tumorale. Puis , après recueil de quelques biopsies gynéco-mammaires non tumorales chez des patientes saines et des pièces tumorales des cancers gynéco-mammaires , on recherchera la présence ou l'absence de récepteurs à la vitamine D (VDR) par immunocytochimie .La mise en évidence des co-facteurs incriminés dans la génèse tumorale consistera à mesurer , suite à un prélèvement sanguin , les cytokines médiateurs de l'inflammation TNF alpha et IL4 par la méthode ELISA chez 2 groupes de patientes (saines et porteuses de tumeurs gynéco-mammaires) .

Les résultats escomptés de cette étude tendent à préciser la corrélation entre la vitamine D et les cancers gynéco-mammaires viro-induits .

La mise en évidence de cette corrélation pourrait être bénéfique en clinique dans la prévention et la thérapeutique de ces types de cancers .

Mots Clés: Cancer gynecomamaires, Vitamine D, Corrélation.

PI-21Corrélation entre l'expression des récepteurs du facteur de croissance oncogène, Epidermal Growth Factor et le développement des cancers gynéco-mammaires viro-induits chez la population marocaine.

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Les cancers gynéco-mammaires constituent un problème majeur de santé publique au Maroc et partout dans le monde, de par leur incidence et taux de mortalité qui ne cessent d'augmenter. Plusieurs études ont démontré une corrélation entre la surexpression de certains récepteurs de facteurs de croissance et le développement de ce type de cancers, d'où le but de notre sujet de recherche à fin d'étudier cette corrélation au sein de la population marocaine.

Après consentement des patientes et accord du comité d'éthique de la recherche biomédicale, une étude prospective multicentrique sera menée sur une période de 3ans, de Janvier 2017 à janvier 2019, portant sur des biopsies et des pièces opératoires prélevés sur des femmes atteintes de cancers gynéco-mammaires, une analyse statistique sera réalisée.

Concernant le cancer de l'endomètre, une étude publiée en 2013, incluant 10 patientes avec un diagnostic histologique confirmé de cancer de l'endomètre type II a objectivé une surexpression des EGFR, ErbB2, ErbB3, ErbB4. Dès 1987, il fut montré que la surexpression d'ErbB2 dans le cancer du sein constitue un facteur de mauvais pronostic. Concernant le cancer de l'ovaire, connu par la survenue fréquente des rechutes et résistance thérapeutique, une connaissance basée sur le profil histologique et moléculaire de la tumeur pourrait améliorer l'espérance de vie chez les patientes atteintes de ce type de cancers.

L'objectif de cette étude est l'évaluation de la corrélation entre l'expression des récepteurs du facteur de croissance oncogène, EGF et le développement des cancers gynéco-mammaires viro-induits chez la population marocaine, établir le profil moléculaire des récepteurs de l'EGF dans les cancers gynéco-mammaires viro-induits chez la population marocaine et rechercher la corrélation de l'expression des récepteurs de l'EGF et l'éventuel pronostic des cancers gynéco-mammaires viro-induits liés.

Des biopsies sont en cours de récolte pour la caractérisation moléculaire, sérologique et virologique de l'étiologie virale et les réceptions de croissance. Les résultats escomptés de cette étude tendent à préciser la relation entre l'expression des récepteurs de croissance et l'étiologie viral associés aux cancers gynéco-mammaires.

Cette étude sera d'un grand intérêt pour la santé publique et la thérapeutique des cancers gynéco-mammaires.

Mots-clés : cancer gynéco-mammaire,viro-induit , facteur de croissance EGF, récepteur ErbB/EGFR

PII-1 : Élaboration d'une Collection de Souches de Lactobacilles Isolées à partir du Tractus Digestif de Volaille et Mise en Évidence de leur Pouvoir Anti Pathogène

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Abstract

Les souches bactériennes à Gram négatif sont répertoriées comme étant celles qui causent le plus de toxi-infections alimentaires. Parmi les aliments incrimines, la viande de volailles est le plus connu des véhicules de transmission de ces pathogènes. L'idée d'utilisation de la microflore digestive des volailles, en alimentation avicole, pourrait avoir un effet bénéfique sur l'inhibition des microorganismes responsables des différentes maladies qui peuvent toucher les volailles.

L'objectif de ce travail est d'isoler et de caractériser, à partir du microbiote digestif du coq de cheptel naturel, des souches ayant un fort potentiel antagoniste contre les bactéries pathogènes telles que *Staphylococcus aureus, Escherichia coli, Enterococcus faecalis* Jh2-2, et, l'identification des isolats intéressants par PCR, en utilisant des amorces ADNr 16S.

Ainsi, 11 souches de Lactobacilles ont été isolées, en conditions d'anaérobiose à +45°C, à partir des différentes parties du tube digestif (jabot, gésier, jéjunum, duodénum et le *caecum*). L'amplification par les amorces ADNr 16S universelles et la révélation des fragments d'ADN amplifiée par électrophorèse sur gel d'agarose ont permis d'identifier les isolats apparentes au genre *Lactobacillus*, en utilisant la souche de référence *Lactobacillus delbrukii*.

Les tests d'interaction bactérienne de 5 souches sélectionnées ont présenté une activité antimicrobienne, lors des protocoles d'inhibition contre les pathogènes, par l'apparition d'un halot clair sur un milieu solide, montrant l'effet bactéricide de substance secrétée par les probiotiques.

Une meilleure caractérisation, par les méthodes de biologie moléculaire, permettrait d'élaborer une gamme de souches probiotiques, pour l'alimentation animale, en générale, et, avicole, en particulier.

Mots Clés : tractus digestif, lactobacilles, pathogènes, ADNr16S, antagonisme

PII-2 : Do We Need to Invoke β-Lactam Antibiotics Engineering to Determine the Effective Therapeutic Dose to *Pseudomonas* Biofilms ?

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Abstract

The development of novel antimicrobial agents, to combat *Pseudomonas* biofilms that are intrinsically resistant to conventional antibiotics, is an urgent issue. Futhermore, treatments with the highest deliverable doses of conventional antibiotics cannot eradicate colonizing and biofilm forming *P. aeruginosa* and *P. fluorescens*. We have turned our attention to the need to invoke β-lactam antibiotics engineering.

In this study, we present several lines of evidences, suggesting the implication of swimming-swarming and biofilm in antibiotics resistance. The morphological and microscopic analysis of biofilm formation, in these isolates, revealed a very complex, dynamic and biologically exciting view about the architecture.

The results indicate that biofilm formation, swarming and swimming motility exhibited a significant effect of resistance toward the β-lactam antibiotics and there is an induced swarming tendril tip bacteria phenotype with the presence of some β-lactam antibiotics.

There is a dire need both to preserve the effectiveness of existing β-lactam antibiotics and to rapidly develop new ones.

Keywords : *Pseudomonas*, biofilm, resistant β-lactam antibiotics, engineering

PII-3 : Étude Comparative de la Qualité Microbiologique de la Viande Rouge (bovine) dans la Ville de Meknès au Maroc

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Abstract

La viande rouge est un aliment très susceptible à être contaminé par des germes qui menacent sa qualité hygiénique (car richesse en eau et en nutriments), chose qui retentit sur la santé du consommateur, en causant une intoxication alimentaire.

L'objectif de ce travail est l'évaluation et la comparaison de la qualité hygiénique de la viande rouge (bovine) prélevée à partir de différents points de vente, dans la ville de Meknès au Maroc.

Cette étude a porté sur 43 échantillons qui ont été prélevés dans les grandes surfaces, boucheries et vendeurs ambulants. 33 échantillons ont été soumis au dénombrement de la flore mésophile aérobie totale (FMAT), coliformes totaux, coliformes fécaux, *Staphylococcus aureus et Salmonella spp.*,10 autres échantillons ont été analysés, pour la présence de *Listeria monocytogenes.*

Les résultats ont montré que les prélèvements des grandes surfaces, des boucheries et des vendeurs ambulants étaient fortement contaminés, pour la FMAT avec, respectivement, $1.30x10^5$ UFC.g^{-1}, $2.3x10^5$ UFC.g^{-1}, $1.6x10^5$ UFC.g^{-1}, pour les coliformes totaux $1.5x10^4$ UFC.g^{-1}, $3.5x10^5$ UFC.g^{-1}, $9.6x10^3$ UFC.g^{-1} et pour les coliformes fécaux $1.1x10^6$ UFC.g^{-1}, $7.3x10^5$ UFC.g^{-1} et $2.4x10^4$ UFC.g^{-1}.

Ces résultats peuvent suggérer de mauvaises conditions d'abattage ou d'étalage. Les ASR, *Staphylococcus aureus* et *Salmonella* sp n'ont pas été détectés, dans les échantillons étudiés. Concernant l'analyse de *Listeria monocytogenes*, les résultats ont montré que 30% des échantillons étudiés contiennent *Listeria monocytogenes* (colonies descriptives), dans les grandes surfaces (10%) et les boucheries (20%), ce qui a été corroboré par leurs catalase positive, oxydase négative et coloration Gram positive.

Ces résultats ont été inattendus. Les échantillons prélevés des vendeurs ambulants ont été moins contaminés que ceux des boucheries et des grandes surfaces, ce qui peut être expliqué par de mauvaises conditions de conservation ; en effet, *Listeria monocytogenes* est un indicateur d'une trop longue conservation au froid.

Mots Clés : viande rouge, qualité hygiénique, contrôle microbiologique, contamination

PII-4 : Collections Coordonnées Marocaines de Microorganismes CCMM

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Abstract

The Moroccan Coordinated Collections of Microorganisms were created in 1998. They are the unique collection, in North Africa, and, the second, in Africa. CCMM are the first and unique Moroccan focal point where microbiological material is preserved, it takes into account the Convention on Biological Diversity.

In 2003, the CCMM published the first printed catalogue containing 447 strains and 127 species (49 bacteria species and 78 fungi and yeast species). In 2007, the CCMM created their website (www.ccmm.ma). In 2013, they became an affiliated member of World Federation of Culture Collections and were the first and unique African collections joining the GCM. In 2014, they published the second printed catalogue containing 1881 strains belonging to 220 species (135 bacteria species, 51 fungi species and 34 yeast species).

The main missions of the CCMM are to :

- Share and exchange the biological material of its holding and its experience and

know-how in the field of fundamental, applied microbiology and biotechnology,

- Provide a link between and within Moroccan Universities, Research Centres and Bioindustries,
- Promote the investigation, preservation and rational exploitation of global microbial biodiversity,
- Insure a quality service to the benefit of its partners and users (scientific and industrial communities).

The main services provided by the CCMM are :

- Isolation and purification of micro-organisms,
- Characterization and identification of strains,
- Storage, preservation and distribution of strains,
- Advice and consultancy,
- Trainings.

Keywords : CCMM, biodiversity, bacteria, preservation

PII-5 : The Study of Some Behavioral and Functional Effects of The Methanol Extract of *Lavandula stoechas* in Rats

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Abstract

Lavandula L. comprises several relevant species for pharmaceutical, cosmetic and perfumery industries.

Considering de traditional medicinal use of lavender, the aim of this study was the evaluation of the effects of a widely used plant in Morocco *Lavandula stoechas*, commonly known as the "l'Halhal". This plant is used in the treatment of memory and sleep disorders or to relieve anxious or depressive person.

Behavioral functions studied were highlighted, using different behavioral tests such as the open field test, the dark/light test, the marble burying test and the forced swimming test. This work was focused on two parts, first, we started by evaluating the effect of the total extract of the plant in normal rats, then, in rats that received a lesion in a part of the hippocampus to highlight a possible compensation of impaired functions.

Taken together, our results provide evidence on the anxiolytic and antidepressant activity of *L. stoechas* total extract.

Keywords : total extract, *Lavandula stoechas*, anxiety, depression

PII-6 : Determination of the Effective Diffusion Coefficient of Phenol in Ca-alginate-Immobilized *Pseudomonas aeruginosa* beads

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Abstract

L'utilisation des cellules bactériennes sous forme de suspension, dans des réacteurs agités, pour le traitement des eaux contaminées par les HC, rencontre plusieurs problèmes tels que la nécessité d'avoir une concentration de biomasse élevée donc des volumes de réacteurs importants ainsi qu'une limitation de la vitesse et du rendement global de conversion, suite à l'inhibition par les concentrations élevées de polluants. La solution est l'immobilisation de ces bactéries sur des supports sous forme de particules poreuses, afin de garantir la réutilisation de la biomasse tant qu'elle garde son activité.

Le présent travail consiste à étudier la biodégradation du phénol par *Pseudomonas aeruginosa*immobilisés dans des billes d'alginate. La détermination du coefficient de diffusion, du facteur d'efficacité et du module de Thiele ont fait l'objet de cette étude.

Les résultats obtenus ont permis de constater que la valeur du facteur d'efficacité (η=0,6), la biodégradation est affectée par la diffusion du

phénol dans la bille d'alginate à une certaine limite. La valeur du module de Thiele (ϕ=3,629) est proche de 5, ce qui indique l'effet combiné entre la diffusion intraparticulaire et la réaction de biodégradation.

La diffusion du phénol dans la particule est relativement lente, ce qui indique que sa biodégradation a lieu à la surface extérieure de la bille près de la périphérie, avant même qu'il ne diffuse plus profondément dans la particule, car la majeure partie de la biomasse est localisée à cet endroit.

Mots Clés : immobilisation, billes d'alginate, biodégradation, phénol, transfert de masse

PII-7 : Isolation of *Salmonella* from Broilers Litter Used as Organic Fertilizer in Agricultural Land in the Province of Rabat-Salé-Kénitra Morocco

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Abstract

The problem of contamination of poultry litter using as an other organic fertilizer in agricultural land by *Salmonella* than the increase of antimicrobial resistance is one of a great importance both in the field of public health as well as in the socio-economic sector of the country, because of the damage it can cause.

This work is aimed at isolating of *Salmonella* spp. from broiler litter used for manure in Morroco. Three thousand samples of broilers litter from ten poultry houses in Salé, Tiflet, Skhirat and Kénitra, were sampled for the presence of *Salmonella* spp. All *Salmonella* isolates were serotyped, confirmed by the presence of virulence gene (invasion) and tested for the resistance to 15 antimicrobial agents by the agar diffusion method.

Detection of *Salmonella* in poultry droppings, in this study, poses health hazards to other uninfected birds, especially those at free range. The high level of antibiotic resistance of *Salmonella* isolates showed the possible significance of broiler as a source of multiple antimicrobial resistant *Salmonella* for human infections.

Keywords : *Salmonella*, broilers litter, organic fertilizer, agricultural land, antimicrobial resistance, Rabat Salé Kénitra

PII-8 : Efficient Protocol for The Synthesis of Pharmaceutical Molecules Using Green Catalysts Based on Fluorapatite

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Abstract

The chemistry of molecules with pharmaceutical and biological activities has generated intensive scientific studies throughout the world. Especially interest has been focused on the synthesis process in the aim to conserve resources, protect the environment and reduce costs.

In the present study, our choice is focused on the synthesis of chalcones [1] and α,α'-(EE)-bis (benzylidene) cycloalkanones [2], because they represent an important class of compounds, as they possess a broad spectrum of biological activity such as anti-inflammatory, anti-cancer, anti-malarial, anti-mitotic, cardiovascular, anti-tuberculosis [3, 4].

The synthesis of molecules above mentioned was carried out by heterogeneous catalysis, using ecofriendly and green solid materials developed in our laboratory, based on fluoroapatite (FAP), Na-FAP and Mg-FAP.

The catalysts were easily prepared, by cheap substrates, and were characterized by various analytical methods, to confirm structure, texture and morphology, XRD, IR, SEM, TEM, BET, EDX, NMR and TGA. The structure of the resulting products was also confirmed by NMR and IR.

We have demonstrated an efficient, green, simple catalyst and method for the synthesis of important

molecules. Simple experimental work up and easy availability of fluoroapatite as catalyst and excellent yields are the advantages of our study.

Keywords : pharmaceutical molecules, biological activities, heterogeneous catalysis, fluoroapatite

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PII-9 : Antibiotic Resistance Profile of *Escherichia coli* of Avian Origin : Broiler Case in The Region of Greater Casablanca

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Abstract

The development of intensive farming, in the poultry industry, has been accompanied by a massive use of antibiotics for the treatment, prevention of infections and for improving animal performance. Antibiotic resistance is a real problem, in veterinary medicine, with a major impact in terms of public health.

The main goal of this study is the surveillance and monitoring of antimicrobial resistance among *E. coli* strains isolated from broilers in the Greater Casablanca region.

Thus, 42 samples were taken for 200 broilers. Identification of isolated bacteria was carried out with a classic gallery showed the presence of *E. coli* in all samples and underwent antibiogram tests towards the most antibiotic disks used on the (Mueller Hinton) MH agar.

The results showed a very good response towards Colistin (87.41%) and Spectinomycin (52.94%) and Trimethoprim-Sulfamethoxazole (67.56%). As against, the sharpest resistance concern Oxytetracyclines (97.05%), Amoxicillin (88.23%), Enrofloxacin (76.36%), Doxycycline (73.52%) and Cefalotin (60%). A low to medium sensitivity is seen with Nalidixic Acid (50.20%) and Flumequine (48.88%).

The undue and sustainable use of antibiotics has led to the emergence of resistant bacteria (*Escherichia coli*) to these drugs indeed, these resistors have become the rub of farmers and scientists and that lead to the implementation of various strategies to avoid situations of therapeutic impasses.

Keywords : antibiotics, antibiotic resistance, broiler, infection, public health

PII-10 : The Interest of Histopathology In Aquatic Animals Health

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Abstract

Martelia refringens must now be considered particularly important parasites, because of its impact on shellfish production and wide distribution among the bivalve species of Moroccan coast.

This study aims to present the interests of the histopathological study in the detection of *Marteilia refringens*, in mussels, in their digestive diverticula.

Two complementary diagnostic methods can be adopted, the first screening by the technique of coloring stamped tissue, which is based on the

clinical signs of the mussels (dead, chokes, gaping valves, growth arrest), using the Hemacolor stain kit and confirmation by the histopathology technical.

Keywords : *Marteilia refringens*, parasite, shellfish, histopathology

PII-11 : Prophylactic Strategies of Bovine Rotavirus in Intensive Herds in Morocco : Issues and Efficiency

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Abstract

Between January and April 2014, a serious outbreak of calf diarrhea has occurred, in a modern Moroccan dairy herd.

Calves under 90 days of age had all diarrheas and were sampled to control the spread of Rotavirus (RVA) disease in Morocco. Information was collected on animal characteristics and herd-management practices. All cows were immunized against RVA with two different valences (G10P [11] and G6P [5]).

After virus characterization, RVA was detected with a prevalence of 24% and all samples were of G10P [14] serotype. Infection with this virus was found in cases at the 2-3 weeks of age. At this age, active immunity is not yet completed and susceptibility of calves to a field RVA challenge is high unless passive maternal immunization is well managed. Newborn calves fed colostrum promptly after birth (within 1 hour after birth), but only on the two first days of life (during 48h). They were after separated from their dams.

This study revealed that the infection with field RVA, in neonatal calves, might be related first to an inadequate colostrum feeding management especially low colostrum intake and then uncompleted active immunity. And to unvaccinated cows against the appropriate RVA serotype. Indeed, correlation between lactogenic antibody present in the colostrum in immunized cows' and resistance to a field RVA infection of calves have been proven and demonstrated.

Keywords : *Rotavirus* vaccine, colostrum, immunity

PII-12 : Bluetongue Virus : Serotypes and Vaccines Used in Morocco

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Abstract

The *Orbivirus* are divided into serogroups, viruses of the same serogroup having a common antigen localized to the inner capsid.

Bluetongue (BT) is an infectious, non-contagious disease of domestic and wild ruminants caused by Bluetongue Virus (BTV) that is a Orbivirus affecting animals.

The disease is quite prevalent in Morocco where serotypes BTV-1 and BTV-4 were found circulating, since 2006. Despite use of attenuated bivalent vaccine, outbreaks are not uncommon each year along with lack of knowledge, in geographical evolution of each serotype. The disease have a considerable importance, in veterinary medicine, like epizootic hemorrhagic disease (EHD) and African horse sickness virus (AHS), including sheep and equine species for which these diseases are major health risks.

This review describes the epidemiology and ecology of Bluetongue virus, in North Africa, and

the prospects for effective treatments and vaccines.

Keywords : Bluetongue, serotypes, vaccines, Morocco

PIII-1 : Assessing of the Total Microflora Changes during Sewage Sludge and Date Palm Waste Composting by Using Two Culture Approaches

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Abstract

Enumeration for indigenous microflora abundance, during six months of co-composting of sewage sludge and date palm waste, was investigated using two different culture approaches growth standard media (GSM) and Compost Time Extract Agar (CTEA).

On GSM medium shows that the colony-forming unit (CFU) total number was 100 fold higher than on CTEA. The thermophilic phase is determined at 30 days, for both mixtures A and B on GSM. Nevertheless, this stage is limited only at 22 and 30 days, respectively, for mixture A and B on CTEA medium. That indicates a similar temperature profile at *versus* time of co-composting.

The results suggest that the CTEA act as a natural selective medium to enumerate the indigenous functional microflora which contributes to maturation products.

Keywords : microbial succession, sludge, composting time extract agar, standard media, maturity

PIII-2 : Correlation between Physicochemical Properties of Plumbing Materials Surfaces and Biofilm Formation : The case of *Legionella pneumophila* and *Pseudomonas aeruginosa*

Assaidi A.[1,2], Mliji E.[2], Barguigua A.[3], Timinouni M.[3], Zahir H.[1], Nayme K.[3], Elmdaghri N.[2], Ellouali M.[1], Latrache H.[1]

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Abstract

Legionellosis is mainly caused by *Legionella pneumophila (Lpn)*, agent ubiquitous, in natural and anthropogenic water systems, where it is able to form biofilms. There is now evidence that some legionellosis outbreaks are correlated with the presence of biofilms. Although *Lpn* can often be found attached to various surfaces in the environment. The colonization by *Lpn* of existing biofilms and its attachment to abiotic substrates are determined by a wide variety of parameters.

The aim of our study is to determine the correlation between surfaces physicochemical properties and biofilm formation of *Lpn* and *P. aeruginosa* on different surfaces of plumbing materials commonly used in distribution systems of water at three growth temperatures +20, +37 and +44°C.

Contact angles measurements were used to determine the surface physicochemical properties of substratum which are an important factor that govern the adherence and biofilm formation of *Lpn* and *P.aeruginosa* in water systems distribution. The ability of *Lpn* and *P. aeruginosa* to form biofilm on galvanized steel, polypropylene, PVC and copper was also determined.

Lpn serogroup 2-15 and *P. aeruginosa* showed a greater capacity to adhere and form biofilm on the majority of the tested materials at +20, +37 and +44°C than *Lpn* serogroup 1. Only the copper inhibits the growth of biofilm and colonization of water systems by the three stems at all tested temperatures.

Understanding these mechanisms is part of our purpose to select appropriate water conducting materials and preventing biofilm formation which appears as one of the strategies to reduce water systems contamination.

Key Words: *Legionella pneumophila*, *Pseudomonas aeruginosa*, biofilm, surfaces

PIII-3 : The Rehabilitation of a Clay Pit (Orobrique Sarl CR Riah) by Composts Based Sludge

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Abstract

The quarrying and the clay production are a very important sector for the socioeconomic development of the country. In fact, this sector is upstream of the activities linked to the achievement of many projects of development such as brickyard, ceramic and cement. The clay exploitation is accompanied by a stripping unusable levels (the topsoil and sterile) causing the degradation of the top layers of the soil.

This study consists of improving the fertility and productivity of degraded soil, by the addition of organic nutrients from composting of sludge mixed with green waste.

The composting experience was conducted in a bioreactor of 100 liters of capacity for 12 days (stabilization phase), equipped with an air compressor, an automated brewing system and an oxygen analyzer. Monitoring of gases namely CO_2 and temperature evolution were performed each day. Subsequently, the maturation phase will be, in open air for 3 months. The urban sludge of three stations of lagooning system (Settat, Droua, Had Swalm) were tested. Compost mixes are optimized to promote microbial activity, a moisture content of 60% and a C/N ratio to round of 25 were fixed.

The analyzed sludge are characterized by an organic matter content of 57%, 55%, 61% and a C/N ratio around 27.3, 27, 26, total Kjeldahl nitrogen content of 1.16%, 1.13%, 1.28% and available phosphorus percentage of 0.14, 0.16, 0.13, respectively, for sludge from Settat, Droua and Had swalm. Therafter, the study of the evolution and dynamics of the treated soil, by sludge and compost sludge, will be followed by revegetation site by different proportion.

PIII-4 : Efficiency of Co-Composting Process to Remove Toxicity from Sewage Sludge Date Palm Mixture

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Abstract

This investigation focuses mainly on the assessing of the phytotoxicity and genotoxicity, during sewage sludge palm waste composting. Two different concentrations were made, mixture A 1/3 sludge+2/3 palm waste and mixture B ½ sludge+1/2 palm waste.

After six months of co-composting, the genotoxicity assessed by micronucleus induction, in *Vicia faba* roots, decreased significantly by 70.4 and 77.2% for A and B, respectively. This ability of co-composting, in reducing phytotoxicity of numerous seeds of significant plant species such as *lettuce, alfalfa, turnip and*

cress was confirmed by the germination index, which reached over 90%.

These results indicate the efficiency of co-composting process to decrease the sludge toxicity.

Keywords : genotoxicity, phytotoxicity, *Vicia faba*, co-composting

PIII-5 : Determination of the Effective Diffusion Coefficient of Phenol in Ca-alginate Immobilized *Pseudomonas aeruginosa* Beads

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Abstract

L'utilisation des cellules bactériennes, sous forme de suspension dans des réacteurs agités pour le traitement des eaux contaminées par les HC, rencontre plusieurs problèmes tels que la nécessité d'avoir une concentration de biomasse élevée donc des volumes de réacteurs importants ainsi que la limitation de la vitesse et du rendement global de conversion, suite à l'inhibition par les concentrations élevées polluant. La solution est l'immobilisation de ces bactéries sur des supports sous forme de particules poreuses, afin de garantir la réutilisation de la biomasse aussi longtemps qu'elle garde son activité.

Le présent travail consiste à étudier la biodégradation du phénol par *Pseudomonas aeruginosa* immobilisés dans des billes d'alginate. La détermination du coefficient de diffusion, du facteur d'efficacité et du module de Thiele ont fait l'objet de cette étude.

Les résultats obtenus nous ont permis de constater que la valeur du facteur d'efficacité (η=0,6), la biodégradation est affectée par la diffusion du phénol dans la bille d'alginate à une certaine limite. La valeur du module de Thiele (ϕ=3,629) est proche de 5, ce qui indique l'effet combiné entre la diffusion intraparticulaire et la réaction de biodégradation. La diffusion du phénol dans la particule est relativement lente, ce qui indique que sa biodégradation a lieu à la surface extérieure de la bille près de la périphérie, avant même qu'il ne diffuse plus profondément dans la particule, car la majeure partie de la biomasse est localisée à cet endroit.

Mots Clés : immobilisation, billes d'alginate, biodégradation, phénol, transfert de masse

PIII-6 : Treatment of Olive Mill Wastewater by Electrocoagulation : Kinetic Study

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Abstract

Treatment of olive mill wastewater by electrocoagulation (EC) was investigated in a stirred tank reactor (STR), the effect of different influential parameters, namely, contact time, current density and pH was determined. Over 72% of DCO, 93% of polyphenols and 95% of color intensity were removed efficiently, at pH of 5.2, current density of 58.33 mA/cm2 and 45 min reaction time.

A kinetic study of these three parameters was carried out to demonstrate both COD and dark color removal follows first-order model, except for polyphenols reduction which fit the pseudo second-order model with current dependent parameters. Adsorption models were used for mathematical description of the adsorption equilibrium and it was found that experimental data fitted very well to Langmuir-Freundlich adsorption model.

Non-linear method proved a better way to predict the equilibrium isotherm parameters.

Keywords: olive mill wastewater, STR, DCO, polyphenols, non-linear method

PIII-7 : Traitement et Valorisation des Margines par Biométhanisation

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Abstract

Au Maroc, la gestion des margines est devenue une préoccupation, pour tous les producteurs de l'huile d'olive. La charge organique élevée et le caractère acide font des margines un effluent fortement polluant. Leur bio-méthanisation s'avère alors une alternative intéressante. Outre l'aspect épuratoire, elle permet de valoriser la matière organique en énergie renouvelable par la production de biogaz.

Dans cette étude, nous présentons les résultats de prétraitement des margines brutes par électrocoagulation, à l'échelle de laboratoire, pour un volume d'effluent de 2 litres, en utilisant des électrodes de fer sous une densité de courant de 4 A/dm^2.

Pour montrer l'effet de l'électrocoagulation sur la digestion anaérobique des margines, le potentiel méthanogène des margines électrolysées, brutes et diluées (1/1 avec l'eau distillée) a été déterminé en mode batch à +37 °C. Le biogaz produit est mesuré par la méthode du liquide déplacé. L'efficacité du prétraitement a été évaluée en termes d'abattement de la DCO (81 %), des composés phénoliques (75 %) et l'évolution du pH.

Le pouvoir méthanogène des margines digérées a été de l'ordre de 0.74, 0.37, 0.60 $L.g^{-1}$ (de DCO) pour les margines prétraitées, brutes et diluées.

Bien que l'électrolyse (aussi bien que la dilution) des margines a participé à l'augmentation du rendement de la bio-méthanisation (en aval), nous devrions souligner la difficulté de l'application de ce genre de prétraitement à grande échelle.

Ainsi, les efforts ont été orientés vers la proposition d'un model efficace et faisable pour la co-digestion des margines avec d'autres effluents organiques (model en cours de validation).

Mots Clés : margines, électrocoagulation, digestion anaérobique, biogaz

PIII-8 : Valorization Of Station Sewage Sludge By Anaerobic Digestion

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Abstract

Every human activity generates wastewater. It will not be made in the middle in the state and those to be processed. There are currently, at Morocco, 260 treatment plants that produce one hand, a purified water made in the middle and on the other, by-products of .these sanitation by-products are sewage sludge, concentrates suspended solids and dissolved components in the wastewater. For their future use, the sludge can be treated to reduce their water content, fermentability content reduction and the elimination of pathogens. Among the modes of treatment, we find anaerobic digestion seems an attractive option for the degradation of biodegradable waste into useful products such as biogas and high quality compost. The gas rich in methane CH_4 has a high-energy content and can be used in many applications such as heating, cooking, power generation, lighting and as a biofuel that can be injected into the gas network city.

Therefore, we conducted a comparative experimental study between the anaerobic digestion of fermentable only sludge and anaerobic digestion of fermentable sludge agitation. The experiment was conducted in two tanks of 20 liters plastic. Each tank was filled

with 1 kg of sludge from the treatment plant Khouribga (50g.L^{-1}). The sludge are fermented in vats, for a 40-day stays of time. Both trials were conducted in an ambient temperature of +25°C.

The results have shown the PH of the sample, with agitation, between 7 and 7.8 which allowed to have a favorable environment for the development of methanogenic bacteria responsible for the formation of biogas and the reduction of the organic matter and the rate of dryness of 75% and 90%, respectively.

Keywords : sewage sludge wastewater, COD, anaerobic digestion, biogas, physicochemical characterization

PIII-9 : Evaluation of An Aerobic Treatment for Olive Mill Wastewater Detoxification

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Abstract

Olive mill wastewater (OMWW) is a by-product of the olive oil extraction industry. Its dumping creates severe environmental problems, in the Mediterranean countries. The phytoxicity of OMWW is due to the phenolic substances and it is evaluated through a genotoxicity method. An aerobic treatment of OMWW was conducted, during 45 days. Different concentrations of raw and treated OMWW were tested, using the *Vicia faba* micronuclei test.

Results showed that raw OMWW induced significant micronuclei formation at 10% of OMWW dilution. The 45 days aerobic treatment OMWW showed an important decrease, in the genotoxicity and also in the toxicity that was observed at 10% and 20% OMWW dilution. This could be correlated with the biodegradation of 76% of the total phenols. This reduction is related to the strong activity of microorganisms which can use phenols as a source of carbon and energy.

Microorganism's evolution shows an important development of the microbial flora ranging from 10^4 to 3.5×10^5 CFU.g^{-1}. It contains species that degrade not only sugars, proteins and phenols but also species that decompose certain resistant polymers such as tannins.

Qualitative analysis by HPLC shows the disappearance of the majority of phenolic compounds, after the treatment. This study was completed by an agricultural test with *V. faba* plant. Data showed significant growth yield of 36.3% and 29.9% after being irrigated with 5 and 10 t/ha, respectively.

These results supported the positive role of aerobic treatment on OMWW and their capacity to ameliorate the agronomic potential of these effluents.

Keywords : olive mill wastewater, aerobic treatment, phenols, microorganisms, genotoxicity, agronomic potential

PIII-10 : Isolation, Identification and Screening of Ligno Cellulolytic Fungal Strains

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Abstract

In a context of dependence on hydrocarbons, in the coming decades, the white or industrial biotechnologies are a positive solution able to reduce our energy dependence by promoting sustainable raw materials. The lingo-cellulosic complex produced each year by plant activities is

effectively degraded by microorganisms. It plays a key role in the recycling and availability of carbon in plant ecosystems.

The objective of this work is to isolate strains of filamentous fungi from grains of the Meknes region and test their ability to degrade cellulose and lignin.

Several isolates were made from cereals of the region. Isolation and purification were performed on solid Czapek medium. The screening was conducted on selective solid media based on lignin and cellulose as the only carbon sources. The strains have been identified and growth kinetics was studied in a two-week interval.

One hundred and five (105) strains were purified. Genera present are *Penicillium* (55%), *Fusarium* (11%), *Trichoderma* (6%), *Ulocladium* (4%), *Aspergillus* (1%), *Alternaria* (1%), *Rhizopus* (1%), *Epicoccum* (1%), *Botrytis* (1%) and others (19%). Twenty-six percent (26%) of the strains were significantly active on lignin (33%) on cellulose. The distribution of performant isolates brings up genus *Penicillium* (16%) first, then, *Trichoderma* (14%), *Fusarium* and *Ulocladium* (12%).

The diversity of isolated genera and their important biodegradation capability are good bases to oriented and well-controlled valorization. The biological potential of the region can contribute effectively on building up responsible and environmentally friendly activities.

Keywords : ligno-cellulose, grains, Fungi, screening, environment

PIII-11 : Phospholipid Fatty Acid Analysis to Assess the Microbial Variation During The Composting Process of Olive Oil Mill Wastes

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Abstract

The composting process is the seat of microbial activity, whose nature determines the degree of organic matter transformation. Biomass and microbial diversity can be analyzed by the quantitative and qualitative study of membrane phospholipid fatty acids PLFAs. This method is regarded as a very sensitive and reliable tool, to evaluate soil microbial activity and estimate the level of organic matter decomposition.

The co-composting of olive oil mill wastes was followed for 5 months. During the thermophilic phase of composting, the aerobic heterotrophic bacteria (AHB) count showed a significant rise with a slight regression of fungal biomass. In the same way, phospholipid fatty acids PLFAs common in bacteria showed a significant increase of hydroxyl and branched PLFAs. The evaluation of the ratio of octa-decenoic PLFAs to stearic acid (C18:1/C18:0) revealed a significant reduction, while a significant rise in the length of aliphatic chains evaluated by the stearic acid to palmitic acid ratio (C18:0/C16:0) was noted during the stabilization phase.

The follow-up of PLFAs indicates the degree of biodegradation that occurs during composting, it can be regarded an indicator of the stability and maturity of the end product.

Keywords : olive mill wastes, biodegradation, microbial biomass, PLFA

PIII-12 : Étude Physicochimique et Microbiologique et Parasitologique des Eaux Usées Brutes Réutilisées en Irrigation dans la Région de Marrakech

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Abstract

Aujourd'hui, au Maroc, la réutilisation des eaux usées, en agriculture, est devenue une pratique très répandue, dans les régions où les déficits hydriques sont les plus accentués. En effet, les eaux usées peuvent être une alternative qui libère un volume supplémentaire d'eau de bonne qualité, pour des utilisations prioritaires (OMS, 1989).
Cependant, les eaux usées, rejetées directement dans le milieu récepteur sans aucun traitement,

constituent un risque sur les ressources naturelles et aussi sur les populations qui sont en contact permanent ou consommant les produits agricoles irrigués avec ces eaux.

L'objectif de cette étude est d'évaluer l'impact de l'irrigation par les eaux usées brutes et de caractériser sur le plan physico-chimique, microbiologique et parasitologique la qualité des eaux usées rejetées par la station d'épuration de la ville de Marrakech et qui ruissellent dans des séguias jusqu'au zones d'irrigation dans les localités dites Harbil, au nord, et, El Azouzia (Fillala), à l'ouest.

Les résultats préliminaires nous ont permis de recenser un nombre important d'agents infectieux, concluant un risque élevé de maladies diarrhéiques, chez la population locale. Cette pathologie est classée, selon l'OMS, la deuxième cause de mortalité chez les enfants.

Mots Clés : eaux usées, physico-chimie, microbiologie, parasitologie, irrigation, Marrakech

PIII-13 : Immobilization Mobilization of Heavy Metals in Bio Augmented Soil : Soil Column Study

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Abstract

Microorganisms play important roles, in the biogeochemical cycling of metals. Some microbial processes release metals thereby increasing their mobility which may increase bioavailability, whereas, other processes result in immobilization and reduction of bioavailability.

The experiments were carried out in column systems containing artificially contaminated soils to investigate the effect of two yeast strains on mobilization/immobilization of Cr (VI), Cu (II) and Zn. The treatment system was based on the application of leaching.

The results showed that the concentration of Cr (VI) in soils bioaugmented with yeasts was remediated and Cr (VI) concentration in leachate was lower than detectable level after column leaching as compared to control. It was observed that the inoculation of soil complexing zinc by two yeasts causes significant metals remobilization as compared to control. While in the case of Cu an immobilization was detected.

Our results suggested that microbial activity is responsible for both immobilization of Cr (VI) and Cu (II) and mobilization Zn (II) from soil.

Keywords : heavy metals, yeasts, immobilization, mobilization, contaminated soils

PIII-14 : Impact de l'Épandage Direct des Boues de Stations d'Épuration sur la Croissance du Blé

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Abstract

Actuellement, l'épuration des eaux usées, au sein des stations d'épurations (STEP), cause une production non négligeable de boues. Ces dernières sont caractérisées par leur richesse en matière organique (MO) et en éléments fertilisants, et, donc, peuvent être utilisées comme un amendement organique. Néanmoins, la présence dans ces résidus d'éléments traces métalliques (ETM) et des microorganismes pathogènes nécessite une étude préalable de la qualité de ces boues, avant toute usage agricole.

Le but de notre travail est d'étudier l'effet de l'épandage direct des boues de STEP sur la croissance des plantes, pour déterminer sa valeur agronomique et son impact sur le système sol-plante. Dans cette optique, des essais d'apport de doses croissantes (5 t/h, 10t /h, 25 t/h et 50 t/h) de

la boue de STEP de Marrakech sur la culture du blé ont été réalisés.

La caractérisation des substrats utilisés a été effectuée par la mesure des principaux paramètres physicochimiques (pH, humidité, COT, NTK et phosphore assimilable). L'effet de différentes doses de la boue sur la croissance du blé a été effectué par la mesure de différents paramètres de croissances tels que l'allongement aérien et racinaire, matière fraiche aérienne et racinaire et matière sèche aérienne et racinaire.

Après 40 jours de culture, les différents paramètres de croissance étudiés ont montré un développement significatif qui est corrélé avec l'application croissante des doses de la boue. En général, l'apport de la boue a permis une bonne croissance végétale du blé. La mesure de l'allongement aérien et racinaire a montré une augmentation progressive par application des doses croissantes de la boue. La même distinction a été observée pour la matière fraîche aérienne et racinaire ainsi que la matière sèche aérienne et racinaire. Donc l'apport de la boue a permis une amélioration considérable de la croissance du blé par rapport au témoin.

D'après les résultats obtenus, on constate que l'apport de différentes doses de la boue des STEP (doses équivalentes à 5 t/h, 10t /h, 25 t/h et 50 t/h) a permis une bonne amélioration de la croissance végétale du blé. Cette amélioration est proportionnelle à la dose apportée.

Key Words: Boues de stations d'épuration, épandage direct, blé, paramètres de croissance

PIII-15 : Traitement et Valorisation des Déchets Assimilés par Compostage

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Abstract

Depuis quelques décennies, le Maroc connaît une forte croissance de la population urbaine. Avec l'urbanisation rapide, l'évolution des modes de consommation et l'intensification des activités économiques, la production des déchets est en constante augmentation. Ces déchets sont de nature très variées tels que les déchets des ménages, des unités industrielles, des espaces verts, de l'agriculture et les déchets hospitaliers, dont les nuisances deviennent inquiétantes. Le rejet de ces déchets sans aucun traitement préalable engendre des impacts nocifs sur l'environnement, mais, aussi, sur la santé humaine, d'où vient la nécessité de les traiter avant de les rejeter dans la nature.

L'objectif principal de ce travail est d'optimiser le procédé de compostage, en utilisant différents types de déchets (déchets ménagers, déchets vert, …), ainsi leur valorisation en bio-engrais à des fins agricole, en apportant une valeur économique pour la mise en place des conditions favorables du développement durable.

Mots Clés : déchets solides, compostage, traitement biologique, compost

PIII-16 : Biological Properties of the Urban Soils from Marrakech City

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Abstract

The study of urban soils is receiving more intention in the last decades seen their socio-economic importance and their influence on the human health and his wellbeing. Many studies have been conducted around the world to characterize their chemical quality, while their biological properties had been, in general, neglected.

In this work, we studied microbial concentration (bacteria, fungi and actinomycetes) and enzymatic activities (dehydrogenase, urease and phosphatase) in 9 urban soils collected from

different sites in the city of Marrakech, Morocco. The nine sites were chosen following an increasing anthropogenic degree from the peri-urban area of the city toward the historical center (El Khalil *et al*., 2008).

The results showed that the microbial concentration varied between the nine sites, with an increase concentration, following the anthropogenic gradient where the highest concentrations of the three groups were observed, in the most disturbed soils. Enzymatic activities also varied between different sites, but on the opposite of trend observed, in the microbial concentration, the activities decreased when the gradient of the anthropisation increased. The highest activities of the three enzymes (dehydrogenase, phosphatase and urease) were observed, in the least disturbed soils.

The results confirm that anthropisation causes a wide spatial diversity of soils, in urban and peri-urban environments. It introduces technogenic elements in soils which have an impact on the biological functioning of soil.

Keywords : urban soils, microbial concentration, enzyme activities, anthropisation.

PIII-17 : Removal of Crystal Violet Dye from Aqueous Solutions Using a Food Waste as Low Cost Adsorbent

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Abstract

Synthetic dyes are widely used, in various industries such as cosmetic, pharmaceutical, paper, leather tanning, plastic and textile. Wastewater effluents produced, in large volume from these industries, can cause considerable environmental pollution. In recent years, many methods including coagulation and flocculation, reverse osmosis, chemical oxidation, biological treatments and adsorption have been developed, for treating dye containing wastewater. Among all of these methods, adsorption is a highly preferred technique, for treating dye containing wastewater, because of its simplicity and efficiency. Recently, the idea of using various waste materials as adsorbents for the removal of dyes from wastewater has been investigated by number of authors, because of their low cost, low toxicity and easy availability.

In this study, the adsorption of Crystal Violet dye from aqueous solution, on low cost adsorbent, Peanut Shell, was studied using batch experiments. The effect of adsorbent dose, initial dye concentration, contact time, pH and temperature was investigated. The adsorption kinetics was followed by the pseudo-second order models, for all investigated initial dye concentration.

Experimental data showed a good fit with Langmuir isotherm models. The thermodynamic parameters such as enthalpy $\Delta H°$, entropy $\Delta S°$ and free energy $\Delta G°$ have also been evaluated to predict the nature of adsorption.

All results show that Peanut shell is one of the most promising low cost adsorbent for the removal of Cristal violet from aqueous solution.

Keywords : food waste, Crystal Violet, adsorption, isotherms, kinetic

PIII-18 : Approach to study biofilm formation and chlorine disinfection against Legionella pneumophila in water distribution system

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Abstract

Legionella pneumophila is a ubiquitous pathogen responsible for severe pneumonia disease.This bacterium can survive within biofilms and free-living amoebae and also found at high levels in man-made water systems such as air conditioning and cooling towers of hospitals, hotels, cruise ships, industrial facilities and family residences. Many studies have been conducted on the success of different methods that can be used for removal the Legionella bacteria, in water distribution systems.

The aim of our study is tested the response of the planktonic cellules and Legionella biofilm, in the presence of free chlorine with a difference's concentration.

Galvanised steel and polyvinyl chloride (PVC) commonly used for water distribution system were employed as a substratum. The ability of biofilm formation and chlorine disinfection efficiency test were investigated after 10, 20 and 30 days of incubations. First we tested the resistance of planktonic cells at recommended chlorine levels between 0.2 and 0.5 mg/L. Secondly we observed the biofilm ability formation of *L. pneumophila* behaviour (10, 20 and 30 days) towards the hyper-chlorination.

Planktonic cells were able to survive during the study period in the presence of chlorine in broth and sterile tap water. No colony is appear immediately, after the biofilm chlorination at 100, 200 and 300 $mg.L^{-1}$, for 2 hours, but he was able to tolerate this treatment and continue to grow on subsequent days. The coupons were observed by scanning electronics microscope before and after treatment.
Those data indicate the role of biofilm formation in the resistance of *L.pneumophila* to disinfectant treatment and that hyper-chlorination killed planktonic bacteria, in the water distribution system, but it can also change their physicochemical properties.

This mechanism require further study.

Keywords : *Legionella pneumophila*, biofilm, chlorine disinfection, water distribution system

PIII-19 : Sequencing Batch Reactor using Activated Sludge : An Effective and Economic Solution to Cleanse the Brassware Wastewater

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Abstract

Brassware wastewater is classified as the most dangerous effluent, in particular, when it is directly discharged in the receiving environment without any preliminary treatment what generate enormous problems for the receiving medium.

The aim of this work is to study the biological pathway treatment of effluents, at low and medium organic load with sequencing batch reactor (SBR). The effluents characterization have shown a high concentration of metallic load such as silver (3.05 $mg.L^{-1}$), copper (10.64 $mg.L^{-1}$), nickel (150.94 $mg.L^{-1}$) and organic load with the an average COD of 4000 $mg.L^{-1}$. The SBR has been used in a 24 hours cycle for 22 hours of aeration and 2 hours of tailing.

The results have shown a significant reduction in COD and BOD_5 for both low and medium applied organic loads. The COD removal rates present 81% and 74%, while the BOD_5 abatement reaches 86% and 81%, at low and medium organic load, respectively. The abatements observed for heavy metals such as Ag, Cu and Ni with low and medium load were 32.87%, 41.42%, 30.98% and 27.77%, 34.63%, 26.06%, respectively.

The efficiency SBR results have been affected by the presence of both high heavy metals concentrations and increased organic load in real effluent brassware.

Keywords : effluent brassware, sequencing batch reactor, heavy metals, organic load, aeration

PIII-20 : Assessment of Heat Release and Organic Matter Degradation by Using Two Mathematical Models during Sludge Co-Composting in a Bioreactor

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Abstract

Les effluents d'huileries d'olives posent de sérieux problèmes environnementaux. Ces problèmes sont attribués à la richesse des effluents en matière organique et, en particulier, en polyphénols qui sont responsables d'effets phytotoxiques et antimicrobiens.

L'objectif principal de ce travail est d'évaluer la capacité de plusieurs souches de microorganismes à réduire la toxicité de ces effluents, pour une réutilisation agricole éventuelle.

Le screening de souches de microorganismes capables de se développer sur des milieux de cultures solides, à base de cet effluent, à différentes dilutions, a permis de sélectionner une bactérie appartenant au genre *Bacillus* et une levure appartenant au genre *Rhodotorula.* Le test d'antagonisme et de la croissance sur un milieu liquide stérile à base de l'effluent a permis d'orienter, par la suite, les traitements biologiques, afin d'optimiser l'abattement de la charge polluante de cet effluent.

Les essais de traitement biologique de l'effluent d'huilerie d'olive sur lequel aucun traitement préalable n'a été apporté, sans addition de nutriments ni modification du pH, ont été conduits dans un bioréacteur en système batch, inoculé par une suspension des souches sélectionnées.

Les résultats des abattements de la demande chimique en oxygène (DCO) et les polyphénols totaux, pendant un mois de traitement, dépassent 80% et 70%, respectivement.

Mots Clés : effluent d'huilerie d'olive, traitement biologique, *Bacillus*, *Rhodotorula*, polyphénols, demande chimique en oxygène

PIII-21 : Évaluation de l'Écotoxicité d'un Pesticide Organophosphoré sur Deux Espèces de l'Écosystème Aquatique (*Daphnia magna* et *Pseudokirchneriella subcapitata*)

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L'utilisation intensive des pesticides, en vue d'améliorer les rendements et la diversité des cultures, constitue une menace importante, pour les milieux aquatiques, en perturbant les organismes qui y vivent et compromette ainsi le bon fonctionnement de l'écosystème.

Au Maroc, le recours à l'utilisation des pesticides est de plus en plus important, et, parmi ces pesticides, les organophosphorés sont très employés, dans l'agriculture marocaine, d'où la nécessité d'évaluer leur écotoxicité qui repose, en partie, sur la mesure des effets toxiques à court et à long terme, qu'ils provoquent sur les organismes du milieu aquatique, en utilisant des bioessais écotoxicologiques largement adoptés par la communauté scientifique.

Pour cela, nous avons choisi deux espèces représentatives du milieu aquatique un microcrustacé *Daphnia magna* et une microalgue *Pseudokirchneriella subcapitata* communément utilisées dans les bioessais d'écotoxicité aquatique comme modèles biologiques et approuvées par des organisations internationales (ISO, Environnement Canada, OCDE, EPA, US), afin d'évaluer la toxicité d'un pesticide organophosphoré, souvent employé dans l'agriculture marocaine, pour le traitement des parties aériennes.

A la fin de l'essai, nous avons remarqué une toxicité moindre de l'organophosphoré vis-à-vis de l'algue *Pseudokirchneriella subcapitata* contrairement à *Daphnia magna* qui était plus sensible à l'organophosphoré.

Mots Clés : **b**io-essai, pesticide organophosphoré, *Daphnia magna*, *Pseudokirchneriella subcapitata*, écotoxicité

PIII-22 : Algicidal Effects of two Moroccan Medicinal Plants against *Microcystis aeruginosa* Isolated from a Moroccan Eutrophic Lake

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Abstract

The occurrence of Harmful Algal Blooms (HABs), especially the toxic *cyanobacterium Microcystis aeruginosa*, in lakes and reservoirs, can lead to substantial socio-economic losses and adverse damages to water quality and human health. Using a natural algaecide, as an alternative replacing chemical algaecides, will be promessing and ecofriendly solutions.

The aim of this work was to assess the algicidal effects of two Moroccan medicinal plants (*Thymus satureioides* Coss. and *Artemisia herba alba* on the growth of *Microcystis aeruginosa* isolated from Lalla Takerkoust lake reservoir.

An experimental was designed which five different aqueous extract treatments (1%, 0,75%, 0,5%, 0,25% et 0,1%) and a control group were used. Physiological and morphological parameters of *M. aeruginosa* cultures were analyzed.

The obtained results showed that after 8 days of treatment, the highest inhibition rates reached 95,93% and 88,58% in *Thymus satureioides* Coss. and *Artemisia herba alba* aqueous extracts, respectively. The Chlorophyll a and carotenoids concentrations, in cultures, decreased, especially, in the treatment groups 1%. Several morphological changes were notably observed, in the treatment group compared to the controls.
It was concluded that the inhibition of *M. aeruginosa* growth was suppressed by condensed tannins, total polyphenol, flavonoids and probably by others allelochemical substances, in all tested aqueous extracts.

Keywords : *Microcystis aeruginosa, Thymus satureioides Coss, Artemisia herba alba* L., natural algaecide, morphological and physiological changes, growth inhibition, Morocco

PIII-23 : Allelopathic Effects of Two Aquatic Macrophytes Extracts on *Microcystis aeruginosa* Isolated from a Moroccan Lake Reservoir

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Abstract

Aquatic macrophytes are considered to be promising, in the biocontrol of harmful algal blooms (HABs).

In this research, the inhibitory effect of aqueous extracts of *Rananculus aquatilis* and *Nasturtium officinale* on *Microcystis aeruginosa* was assessed.

Five treatments (0.1%, 0.25%, 0.50%, 0.75% and 1%) and a control group were designed to assess their effects on *Microcystis* growth. Physiological and morphological parameters of *M. aeruginosa* cultures were analyzed.

The obtained results showed that *M. aeruginosa* growth was significantly inhibited by the two macrophytes aqueous extracts, in a concentration dependent way. After 8 days of treatment, the highest inhibition rates reached 100% and 74.75%, in *R. aquatil*is and *N. officinale* aqueous extracts, respectively. The Chlorophyll *a* and carotenoids concentrations, in cultures, decreased in the treatment groups. The contents of phycocyanin and allophycocyanine were also reduced, in both the two treatments (1%, 0.75%). Several morphological changes were notably observed, in the treatment groups compared to the controls.

It was concluded that *M. aeruginosa* growth inhibition was specially induced by the total polyphenol, flavonoids, tannins and probably by

others allelochemical substances, in all tested aqueous extracts.

Keywords : *Microcystis aeruginosa* macrophytes, aqueous extract, allelopathy, growth inhibition, morphological changes, Morocco

PIII-24 : *Flavobacterium psychrophilum* Screening with *Actinobacteria* Producer of Bioactive Substances

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Abstract

Rainbow trout (*Oncorhynchus mykiss*) is a salmonid bold, easy to lay and rapid growth. It is a species well adapted to the Moroccan climate and it is high in the cold waters, in the region of Azrou. However, several diseases and pests can affect its intensive farming and cause significant mortality of trout, in the early ages and this even though in some cases and under the permission of the veterinarian, antibiotics and other pharmaceutical products are prescribed and used for treatments.

Furthermore, it was noted that certain microorganisms developing resistance to broad-spectrum antibiotics. Among these microorganisms, we find the species *Flavobacterium psychrophilum* which is a Gram-negative bacterium, filamentous, rod-shaped. This bacterium is part of the bacterial flora of the skin of the fish and the aquatic environment (Bullock and Snieszko, 1981) and because that the flavobacteriosis qualified as cold water disease.

In order to fight against this pathogen, a screening program bioactive substances has been developed which consists of among others the screening of Moroccan ecosystems *Actinobacteria* capable of producing bioactive molecules against *F. psychrophilum*.

Many isolates showed activities vary according to pathogenic strains and testing biological and chemical characterization of these activities are possible.

Keywords : *Actinobacteria*, screening, bioactive substances, Rainbow trout, *Flavobacterium psychrophilum*

P-III-25 : Assessment of Adsorption Kinetics for Removal Potential of Brilliant Green Dye from Aqueuous Solutions Using the Residue of Parsley Extraction

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Abstract

The efficiency of parsley residue as a low-cost adsorbent for removing a cationic dye brilliant green (BG) from aqueous solution has been investigated by using batch mode experiments. The effects of different parameters, namely amount of adsorbent, initial dye concentration, contact time, temperature, pH solution and ionic strength of dye solution have been studied to understand the adsorption behavior of the adsorbent under various conditions. The adsorbent has been characterized by pHzpc measurement, FTIR and SEM coupled by EDAX. The experimental isotherm data were analyzed using Langmuir and Freundlich isotherm equation. The maximum monolayer adsorption capacity was 179 $mg.g^{-1}$ at optimum conditions.

The kinetic results of adsorption obeyed a pseudo-second-order model. Brilliant green adsorption fitted the Langmuir isotherm. Thermodynamic parameters including the Gibbs free energy ΔG°, enthalpy ΔH°, and entropy ΔS° have revealed that the adsorption of BG on the parsley residue is feasible, spontaneous and exothermic.

Keywords : cationic dye, isotherm, kinetic, thermodynamic, adsorption

PIII-26 : Immobilization Mobilization of Heavy Metals in Bioaugmented Soil : Soil Column Study

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Abstract

Microorganisms play important roles in the biogeochemical cycling of metals. Some microbial processes release metals thereby increasing their mobility which may increase bioavailability. Whereas other processes result in immobilization and reduction of bioavailability.

The experiments were carried out in column systems containing artificially contaminated soils to investigate the effet of two yeast strains on mobilization/immobilization of Cr (VI), Cu (II) and Zn. The treatment system was based on the application of leaching.

The results showed that the concentration of Cr (VI) in soils bioaugmented with yeasts was remediated and Cr (VI) concentration in leachate was lower than detectable level after column leaching as compared to control. It was observed that the inoculation of soil complexing zinc by two yeasts causes significant metals remobilization as compared to control. While in the case of Cu an immobilization was detected.

Our results suggested that microbial activity is responsible for both immobilization of Cr (VI) and Cu (II) and mobilization Zn (II) from soil.

Keywords : heavy metals, yeasts, immobilization, mobilization, contaminated soils.

PIII-27 : Accumulation of Heavy Metals by Streptomyces sp. Isolated from Abandoned Mine in Marrakech Region, Morocco

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Abstract

Actinobacteria constitute a morphologically diverse group of Gram-positive bacteria, with high metabolic versatility. Solecka et *al*., (2012) estimated that 75% of secondary metabolites are produced by the genus *Streptomyces*. Their metabolic diversity, particular growth characteristics and mycelial form, make them well-suited for use as agents for bioremediation (Fuentes et *al.*, 2010).

The aim of this work was to investigate metals (lead, cadmium, chromium, copper and zinc) resistance and bioaccumulation potential of *Streptomyces* sp. isolated from some abandoned mining areas, in Morocco.

Twenty four strains were isolated from Sidi Bouatman, Bir Nhas and Goundafa mining residues and were identified, using morphological, biochemical and molecular (16S rRNA) characteristics. Minimum inhibitory concentrations (MIC) were defined and the chemical precipitation assays of metals were performed, by using hydrogen sulfide technic (H_2S). For heavy metal accumulation experiments, living isolates were kept in contact with metal solution (0.5 $mg.mL^{-1}$), during 3 hours, and the quantities of metal removed by isolate's biomass were calculated.

Obtained results of the tested strains showed high resistance to metals and the minimum inhibitory concentrations (MIC, in $mg.mL^{-1}$) recorded as 0,55 for Pb, 0,15 for Cr and 0,10 for both Zn and Cu. The precipitation assay revealed that the

strains BN3 can accumulate Pb at concentrations up to 615 $mg.g^{-1}$ of biomass.

In conclusion, the removal of toxic components from industrial effluents is of a great importance. *Streptomyces* sp. BN3 which was isolated from Bir Nhas mine may be an useful strain, for bioremediation of heavy metals, in contaminated effluents or other polluted environments.

Keywords : heavy metals, resistance, accumulation, *Streptomyces*, mining residues

PIII-28 : Antibiotic Resistance Profiling and Phenotyping of *Aeromonas* species Isolated from Polluted and Unpolluted Aquatic Environments of Marrakech

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Abstract

Aeromonas species are widely distributed, in the aquatic environment and have been frequently isolated from various foods. Motile aeromonads are considered as emerging food-borne pathogens, because it was shown that some *Aeromonas* food isolates can produce different virulence factors. The mesophilic aeromonads have been commonly isolated from patients with gastroenteritis although their role in disease causation remains unclear. They are also associated with sepsis and wounds and with eye, respiratory tract, and other systemic infections. The species principally associated with gastroenteritis are *A. caviae*, *A. hydrophila* and *A. veronii* biovar sobria, *A. caviae* is particularly associated with young children (under 3 years of age).

The present study aimed to investigate antibiotics resistance and phenotyping of *Aeromonas* species isolated from polluted and unpolluted aquatic environments of Marrakech.

A total of 122 *Aeromonas* strains were isolated from three aquatic sources (Tensift river (n=39), raw sewage (n=42) and treated sewage (n=41). *A. caviae*, *A. hydrophila* and *A. veronii* biovar sobria were the three dominant species found, in the prospected sources.

Resistance to 5 antibiotics (Tetracycline (30 µg), Ampicillin (10 µg), Nalixidic Acid (30 µg), Ciproflaxacine (5 µg) and Chloramphenicol (10 µg)) was tested.

The obtained result revealed the resistance of all isolates to Ampicillin. For unpolluted aquatic environments, we recorded that all isolates were completely susceptible to Tetracycline (100%), 94.12% of them were susceptible to Chloramphenicol and 88.24% to Ciproflaxacine where only 64.70% were found to be susceptible to Nalixidic Acid. From the polluted aquatic environments, 84% of the isolates were found to be susceptible to Chloramphenicol, 67% were found to be susceptible to Nalixidic Acid, 78% to Ciproflaxacine and 56% to Tetracycline.

Control of aeromonad numbers and diversity, in aquatic systems, is needed to avoid emerging diseases and public health concerns.

Keywords : *Aeromonas* spp., antibiotic resistance, aquatic environments, Marrakech

PIII-29 : Étude de la Relation entre des Bactéries de *Legionella pneumophila* et des Amibes Isolées à partir d'Écosystèmes Aquatiques à Marrakech

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Abstract

Les bactéries *Legionella pneumophila* sont connues comme des parasites intracellulaires facultatifs de certaines amibes vivant librement dans l'eau douce. Les amibes libres peuvent intervenir dans des relations de type symbiotique ou parasitaire, avec certaines bactéries pathogènes, représentant ainsi un réservoir environnemental très important de germes. Plusieurs bactéries pathogènes sont effectivement connues, pour les relations parasitaires qu'elles

développent avec certaines amibes libres. C'est notamment le cas de *Bacillus subtillis, Serratia marcescens, Pseudomonas, Yersinia, Shigella, Campylobacter* et *Legionella*. À cause de l'implication des bactéries de ce dernier genre, dans de nombreuses infections pulmonaires, entre autres, les légionelloses, de nombreuses études se sont intéressées aux relations existantes entre les amibes et des bactéries de *Legionella pneumophila.*

L'objectif de ce travail est d'étudier le comportement des deux souches amibiennes, isolées à partir de l'eau douce, à Marrakech (SA1, SA2), vis-à-vis d'une souche de *L. pneumophila* sérogroupe 1.

Les résultats obtenus ont permis de mettre en évidence des propriétés originales des amibes vis-à-vis de *Legionella pneumophilla,* avec notamment, une capacité de résistance et une capacité de contrôler la prolifération des bactéries. Nous avons aussi étudié la viabilité des souches de *L. pneumophila,* dans différentes conditions. Les deux souches amibiennes testées ont montré des capacités d'incubation différentes vis-à-vis de la bactérie étudiée. La souche de *Legionella pneumophila* Sérogroupe 1 a montré un pouvoir revivifiant après une co-culture de 72 heurs avec les deux souches amibiennes. Nos résultats complètent les données de la littérature. Nous estimons que les amibes libres méritent une attention particulière, du fait qu'elles jouent le rôle de vecteurs grâce auxquels les légionelles se développent et se propagent dans l'environnement.

Mots Clés : *Legionella pneumophila*, pouvoir incubateur, souches amibiennes, cytotoxicité, Co-culture

PIII-30 : Étude de la Flore Microbienne des Sols Agricoles Contaminés par des Métaux Lourds

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Abstract

La contamination des sols est une préoccupation sociétale majeure. Aujourd'hui, les sols agricoles sont de plus en plus menacés par la pollution par les métaux lourds. Ces métaux lourds proviennent des nombreux activées liés directement à l'Homme, notamment, les activités industrielles, le trafic routier, les exploitations minières, ... Le problème majeur de la contamination des sols réside surtout dans le fait que les métaux lourds sont non biodégradables et persistent donc dans la nature, pendant des longues périodes. Ceci peut se percuter sur la santé des êtres humains et des animaux et à cela s'ajoute le fait que ces contaminants vont affecter directement la flore microbienne qui comprend plusieurs microorganismes d'importance environnementale.

Le but de ce travail est de déterminer la diversité des microorganismes des sols contaminés par des métaux lourds et de les comparer avec des sols témoins non explosés à la pollution par les métaux.

Ainsi pour la réalisation de ce travail, des échantillons de sols non contaminés et d'autres contaminés par des métaux lourds ont été prélevés, dans une région à proximité de la mine de Draa Sfar.

Les analyses physicochimiques et le dosage des métaux lourds présents dans les échantillons ont été réalisés.

Plus de 100 souches bactériennes ont été isolées et purifiées, afin d'évaluer leur résistance aux métaux lourds, par la détermination de leur CMI.

Cinq métaux lourds (Plomb, Cuivre, Zinc, Chrome, Cadmium) ont été testés, avec différentes concentrations (0,05, 0,15, 0,25, 0,375, 0,5 et 1 $mg.mL^{-1}$), sur le milieu Duxbury.

Enfin, l'identification des souches les plus résistantes aux différents métaux a été effectuée.

Mots Clés : métaux lourds, sols, pollution, bactéries, résistance, mines

PIII-31 : Study of Heavy Metals Tolerance and PGPR Potential of Rhizobacteria Isolated from Two Mining Sites in Marrakech Region

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Abstract

Both active and abandoned mines impose a risk of contamination by heavy metals, because particles can be distributed, in the surrounding environment, including groundwater, by wind and rainwater. The mining activities generate a large amount of very unstable toxic waste, in the soils affecting living creatures including microorganisms. Furthermore, continuous exposure to heavy metals leads to a reduction of their abundance in soils.

The objective of this study is to isolate tolerant strains and to evaluate their tolerance towards three different heavy metals (HMs) : cupper (Cu), lead (Pb) and zinc (Zn) being the major toxic elements, in mining sites Draa Sfar and Kettara. Since Kettara soil was extremely acid therefore no microorganism was isolated directly from the soil. So we tried isolating microorganisms, from the rhizosphere of six collected plants.

The results showed low abundances of microorganisms in Draa Sfar soil (4.46×10^6 UFC.g^{-1}), in comparison to a non-contaminated soil (1.25×10^8 UFC.g^{-1}). Also, 35 strains isolated from Draa Sfar soil and plants from the two sites showed tolerance to at least one of the three tested metals. They were selected among others for being able to grow on Duxbury medium supplemented with Cu, Pb or Zn. Their minimal inhibitor concentrations were determined using 96 wells flat bottom plates. The best three strains in term of HMs tolerance FD1, FD2 and RhOF53 were evaluated for their potential to accumulate HMs by making, in contact 1 g of microbial dry biomass, with sterile solutions containing 0.5 $mg \cdot mL^{-1}$ of tested metal. The amount of residual metal present in the supernatant was measured by atomic absorption spectrophotometer (AAS), showing that the studied strains could accumulate HMs at different levels.

All the 35 studied strains were identified by molecular techniques (16S). They belong to the families of *Bacillaceae* (67%), *Enterobacteriaceae* (8%), *Pseudomonadaceae* (6%) and other groups (19%).

In order to investigate their PGPR abilities, these strains were subjected to an antifungal test towards three phytopathogenic fungi : *Fusarium culmorum*, *Fusarium graminearum* and *Microdochium rivalequi* and showed antifungal activities.

The selected strains tolerant to heavy metals may be of great value and a friendly biotechnological pathway, in order to reduce the pollution of mining soils, in symbiotic combinations with plants.

Keywords : mining soil, rhizobacteria, PGPR, heavy metals, antifungal activity

PIII-32 : Traitement et Valorisation des Déchets Assimilés par Compostage

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Abstract

Depuis quelques décennies, le Maroc connaît une forte croissance de la population urbaine. Avec l'urbanisation rapide, l'évolution des modes de consommation et l'intensification des activités économiques, la production des déchets est en constante augmentation. Ces déchets sont de nature très variées tels que les déchets des ménages, des unités industrielles, des espaces verts, de l'agriculture et les déchets hospitaliers dont les nuisances deviennent inquiétantes.

Le rejet de ces déchets, sans aucun traitement préalable, engendre des impacts nocifs sur l'environnement, mais, aussi, sur la santé

humaine, d'où vient la nécessité de les traiter avant de les rejeter dans la nature.

L'objectif principal de ce travail est d'optimiser le procédé de compostage, en utilisant différents types de déchets (déchets ménagers, déchets verts, …), donc, leur valorisation en bio-engrais, à des fins agricoles, en apportant une valeur économique, pour la mise en place des conditions favorables du développement durable.

Mots Clés : déchets solides, compostage, traitement biologique, compost

PIII-33 : Preliminary Evaluation of Greenhouse Tomato Plant Wastes Composting

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Abstract

Tomato corprs production is one of the most important horticultural scope, in Morocco, with more than 5000 hectares of intensive farming. Through, this horticultural activity generate large quantities of organic wastes, especially, in Souss Massa region, were the amount of crop residues available is 955 thousand tons, in 2011, and estimated to be more than 1 million tons, in 2016. Composting may be an effective option for management of these organic wastes for use as a soil amendment and will allow a healthier fertilizing amendment to the soil, free from any germs and weed seeds.

The objective of this study was to investigate the composting process of tomato wastes, sheep manure and sawdust, in a natural aerated static windrow, in order to assess the influence initial C/N ratio on composting parameters.

Results showed that there was a decline in C/N ratio with 20.86%, 11.95% and 19.50%, respectively for initial C/N treatments C/N20, C/N30 and C/N40. A contrasted thermal profiling has been also noticed, with maxima of +72, +65 and +55°C, respectively, for treatments C/N20, C/N30 and C/N40. Oxygen demand was positively correlated with temperature, while a drastic loss of total salt was observed during thermophile phase. Quality test revealed that only treatment C/N30 was statistically equivalent to the control which confirm that the initial C/N ratio equal to 30 is the best ratio for having the optimum composting process.

Keywords : C/N ratio, tomato waste, composting, compost quality, oxygen demand

PIII-34 : Caractérisation Microbiologique des Effluents de Certains Services du Centre Hospitalier Hassan II de Fès

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Abstract

Jusqu'à nos jours, les effluents générés par l'activité des services hospitaliers, quelle que soit leur spécialité, sont évacués, au même titre que les rejets urbains classiques, vers le réseau d'assainissement communal, sans traitement préalable [1]. Ces derniers contiennent des substances spécifiques (résidus médicamenteux, réactifs chimiques, antiseptiques, détergents, désinfectants, des agents pathogènes tels que des bactéries, des virus et des champignons). Ils sont alors une source majeure d'émissions de polluants liquides dans l'environnement et présentent un danger potentiel sur la santé de l'Homme. L'analyse de ces effluents hospitaliers est devenue une préoccupation internationale majeure, en raison des enjeux environnementaux, sanitaires, stratégiques et financiers [2].

Ce travail s'intéresse à l'étude des effluents de certains services du centre hospitalier Hassan II de Fès et a pour objectif la caractérisation microbiologique des rejets liquides, afin d'évaluer leur degré de pollution sur l'environnement et la santé humaine.

Sur un total de 48 échantillons, prélevés sur une période de 6 mois, le dénombrement des germes pathogènes tels que les témoins bactériologiques classiques de pollution fécale, à savoir les coliformes totaux, les coliformes thermotolérants *Escherichia coli*, les Streptocoques fécaux, *Staphylococcus aureus* et les *Clostridium* et la recherche des témoins spécifiques provenant des sujets malades ou des porteurs sains tels que *Staphylococcus*, *Pseudomonas* et *Salmonella* ont été effectués.

Selon la réglementation nationale, 60% des échantillons sont conformes alors que 40% était non conformes.

Des actions d'amélioration sont menées, dans l'objectif de traiter les effluents hospitaliers, afin d'obtenir des eaux de bonne qualité et les réutiliser pour l'irrigation des espaces vertes de Hôpital.

Mots Clés : effluents hospitaliers, analyses microbiologiques, germes pathogènes,danger potentiel

Référence

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PIII-35 : Phosphate Solubilization and Other PGP Activities of *Actinobacteria* Isolated from Phosphate Mine

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Abstract

According to United Nations estimation, the world's human population will reach 8.9 billion, in 2050. This increase is noticed, in developing countries, such as Asia and Africa (Wood, 2001). To meet this challenge, much of the effort focused on improving soil fertility. The most important minerals are nitrogen, phosphorus and potassium which play a key role in the growth, metabolism and plant development (McAfee 2008 ; White and Karley2010). The origin of apatitic phosphate is phosphate mine, the extraction of this mineral that fact by etching, to improve phosphate solubilization and increase the performance of fertilizer biological strategy appears effective and respectful the environment.

The aim of our study is the screening for phosphate solubilizing *Actinobacteria* isolates from the phosphate mine. Several plant growth promotion traits were investigated, under alkaline conditions at +28°C for 5 days. The selected isolates are able to produce phytohormones AIA, tolerate salinity, to show phosphatase and chitinase activities. Among 150 actinomycete isolates, only 3 isolates were selected. Their capabilities to promote *Zea mays* growth under field conditions in phosphorus deficient soil were evaluated.

This study is expected to lead to the formulation of novel bio-phosphate fertilizers. However, its remains to be completed by the assessment of the inoculation of selected isolates impact on microbial biodiversity.

Keywords : phosphate solubilization, actinomycetes, PGPR, *Zea mays*, biofertilizer

PIII-36 : Biological Wasterwater Treatment Using A Gram Positive Bacterium Isolated From Wastewater

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Abstract

The pollution of water with toxic heavy metals is spreading, throughout the world, due to the discharge of large amounts of metal-contaminated wastewater, because of their high solubility in the aquatic environments. Heavy metals can be absorbed by living organisms. Once they enter the food chain, large concentrations of heavy metals may accumulate, in the human body. If the metals are ingested beyond the permitted concentration, they can cause serious health disorders (Babel and Kurniawan, 2004). Therefore, it is necessary to treat metal contaminated wastewater, prior to its discharge to the environment. Heavy metal removal from inorganic effluent can be achieved, by conventional treatment processes such as chemical precipitation, ion exchange and electrochemical removal.

These processes have significant disadvantages which are, for instance, incomplete removal, high-energy requirements and production of toxic sludge. Microorganisms and microbial products can be highly efficient bioaccumulator of soluble and particulate forms of metals, especially, dilute external solutions. Microbe related technologies may provide an alternative or addition to conventional method of metal removal or metal recovery.

The present study aimed to evaluate the bioaccumulation rate of chromium, nickel and cobalt by a Gram positive bacterial strain isolated from wastewater.

Results obtained indicated that the strain 2YB-25 OH was able to accumulate more than 90% of chrome, 80% of cobalt and 70% of nickel, during the active growth cycle. Study of pH effect, on heavy metal removal, shows that the metal ions accumulation increased with increasing pH, for both chrome and cobalt, but decrease for the nickel.

Due to its high metal accumulation capacity, in aerobic conditions, the Gram positive bacteria may be potentially applicable *in situ* bioremediation of heavy metals contaminating aqueous systems.

Keywords : Gram positive bacteria, heavy metals, bioaccumulation

PIII-37 : Caractérisation Physicochimique du Lixiviat de la Décharge de Meknès

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Abstract

The urban wastes, generated in Meknes, are composed of more than 60% of household waste. They were evacuated to the garbage dump of Meknes. This discharge is devoid of a collecting device and treatment of brownish liquid effluents known as leachate. This study aims to make a physicochemical characterization of the leachate.

To do this, we performed a series of sampling, June 2014 to February 2015. During this period, the physicochemical analyzes of these samples revealed low levels of nitrate (NO_3, max=19,30 $mg.L^{-1}$), phosphate ($PO4_3$, max=0.38 $mg.L^{-1}$) and high concentrations of ammonium (NH^{4+}, max=1594.66 $mg.L^{-1}$). This mineral pollution has resulted in a high electrical conductivity, reached a maximum value of 15 970 $S.cm^{-1}$. Organic pollution is low. COD values recorded range from 2.4 to 92 000 $mg.O_2.L^{-1}$ with a mean of 30511.38 $mg.O^{-1}.L^{-1}$. Those of BOD_5 are between 0 and 0.53 $mg.O_2.L^{-1}$ to an average of 0.16 $mg.O_2.L^{-1}$. The values of the ratio of BOD_5/COD range between 0 and 0.22, with an average of 0.02.

This shows that the leachate is considered low biodegradable organic matter. They are in a stabilized condition.

Keywords : caracterisation, leachate pollution, physicochemical parameters, garbage dump, Meknes

PIII-38 : The Effect of Sodium Hypochlorite on Detachment of *Pseudomonas aeruginosa* Biofilms Formed on Stainless Steel

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Abstract

Microorganisms have the ability to adhere to the surfaces and form what we called biofilm. As a result of this, these surfaces became a source of contamination that may lead to a serious health problem. Previous studies proved that biofilms cells can be physically and morphologically different from their planktonic cells, especially, in the response to biocides and sanitizers.

The aim of our study was to evaluate the effectiveness of different concentrations of sodium hypochlorite, with a time contact of 5 minutes on the detachment and viability of *Pseudomonas aeruginosa* biofilm formed on stainless steel 316 and 304 surfaces.

The physicochemical properties of bacterial surface and stainless steel surface were determined using contact angle measurements and the numbers of adhered and detached cells were evaluated, using plat count methods.

The results show that the sodium hypochlorite was effective against biofilms formed, on the stainless steel 304, while the same component was not effective against biofilm formed, on the stainless steel 316, at the concentration of 0,5%, whereas it was effective at the other concentrations (1%, 1,5%, 2%).

Keywords : sodium hypochlorite, biofilms, stainless steel, *Pseudomonas aeruginosa*, detachment, disinfection

PIII-39 : Antibiotics Susceptibility Patterns of *Legionella pneumophila* Strains Isolated from Water Systems in Morocco

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Abstract

In Morocco, antibiotic susceptibility testing of environmental *Legionella* sp. isolates has never been studied. Therefore, the aim of this study is to describe the susceptibility level of environmental *Legionella pneumophila* (*Lpn*) strains, to determine the therapeutic agents preferred and recommended to treat legionella disease.

The minimum inhibitory concentrations (MICs) of twenty-four environmental *Lpn* strains were tested, using broth dilution. Susceptibility test was performed for Macrolide and Fluoroquinolone family antibiotic including Azithromycin, Erythromycin, Levofloxacin Ciprofloxacin and Rifampicin. The used media, for the susceptibility test, was Buffered Yeast Extract broth for *Lpn*. Because no susceptibility-testing breakpoints are available for *L. pneumophila*, we used breakpoints previously described in the literature.

All tested *Lpn* strains were inhibited by low concentrations of fluoroquinolones and macrolides family antibiotics. Rifampicin was the most active antibiotic against the isolates *in vitro*. All *Lpn* isolates were inhibited by antibiotics, in the following order, Rifampicin>Levofloxacin> Ciprofloxacin>Azithromycin> Erythromycin.

The MICs of all antibiotics were significantly lower for *Lpn* serogroup 2-15 than *Lpn* serogroup 1 isolates.

Susceptibility testing of *Lpn* strains to appropriate antibiotics should be performed often to evaluate the possible emergence of resistance. This resistance mechanism is unknown and needs further study.

Keywords : *Legionella pneumophila*, MIC, antibiotics

PIII-40 : Valorisation du Silicium Organique Issu des Plantes ou des Déchets Organique

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Abstract

Le silicium, élément très répandu dans la nature, est généralement connu sous ses formes inorganiques naturelles telles que la silice et les silicates. Ces composés silicés sont très peu ou pas solubles, en milieu aqueux, ce qui explique leur faible incidence au niveau des organismes vivants. Au contraire, le silicium organique présente une forme assimilable par l'organisme et possède plusieurs activités biologiques.

Ainsi, le but de ce travail de recherche est d'étudier l'extraction de composés organiques de silicium, à forte activités biologiques, à partir des plantes et des biotopes marocains (roches) et la synthèse chimique concomitante de ce composé. Une étude comparative de l'effet anti-inflammatoire et antioxydant du silicium naturel et synthétisé sera, par la suite, menée, avant de démontrer son rôle dans la biosynthèse de nombreuses molécules biologiques comme le collagène et la kératine.

Mots Clés : silicium, anti-inflammatoire, antioxydant, collagène, kératine

PIII-41 : Les Actinobactéries Halophiles et Halotolérantes de Deux Écosystèmes Salins Marocains : Isolement, Biodiversité et Screening des Activités Antimicrobiennes à Usage Biomédicale

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Abstract

L'introduction généralisée des antibiotiques a permis de diminuer l'expansion des maladies infectieuses. Cependant, leur utilisation massive et répétée a, non seulement, engendré l'apparition de microorganismes résistants, mais, aussi, l'augmentation de bactéries pathogènes multi-résistantes, d'où la nécessité de chercher de nouvelles molécules à activité antibiotique. Les *Actinobacteria* sont considérées, parmi les microorganismes les plus importants, en biotechnologie. Elles sont responsables de la production d'environ la moitié des métabolites secondaires bioactifs découverts, notamment, des antibiotiques.

L'objectif de ce travail est l'isolement des *Actinobacteria* à partir d'environnements extrêmes salins marocains, l'étude de leur biodiversité et de leur capacité à produire des molécules à activité antimicrobienne. Les différents échantillons collectés (sol, sédiment et eau) ont été prélevés à partir de deux écosystèmes marocains salés (lac Zima et région de Demnate). L'utilisation de six milieux de culture différents a permis l'isolement de 182 isolats d'Actinobactéries halophiles/halotolérants.

L'étude de la diversité des isolats, selon l'International *Streptomyces* Project (ISP), a permis de mettre en évidence une grande diversité bactérienne, avec la dominance de la série blanche (37%) et de la série crémeuse (29%), respectivement, pour les échantillons du lac Zima et de Demnate. Il est à noter, par ailleurs, qu'en se basant sur la tolérance au Na Cl, 10,16% et 89,84% des isolats purifiés était halophiles et halotolérants extrêmes, respectivement. L'étude de l'activité antimicrobienne *vis-à-vis* de 6 bactéries et 4 *Candida*, par la technique des cylindres d'agar, a montré que 52% des isolats ont une activité *vis-à-vis* au moins de l'un des microorganismes tests. Par ailleurs, l'analyse des données a révélé que l'activité antibactérienne dépend aussi bien de l'origine des isolats (écosystème exploité) que de la nature du milieu utilisé pour leurs isolements. Deux isolats ayant montré un large spectre d'action ont fait l'objet d'une caractérisation biologique et chimique de leurs activités. Nous constatons ainsi que l'isolat ZE2316R2 produit mieux les substances bioactives, en milieu liquide qu'en milieu solide, par rapport à l'isolat DS1316M8. De même le choix du système de solvant d'extraction des molécules bioactives a révélé que l'hexane et l'acétate d'éthyle étaient les solvants adéquats, respectivement, pour les isolats DS1316M8 et ZE2316R2. La révélation chimique et biologique de l'isolat ZE2316R2 a permis l'identification

d'une fraction bioactive contre les bactéries à Gram positif.

En conclusion, les écosystèmes salins marocains pourraient être une source potentielle des Actinobactéries productrices de substances bioactives d'intérêt biomédicale.

Mots Clés *:* actinobactéries, écosystèmes salins, isolement, biodiversité, criblage, activités antibiotiques, souches multi-résistantes

PIII-42 : Study of Technological Properties of *Lactobacillus* spp. of Marine Origin

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Abstract

During the last two decades, many interests have been focused on the physiology and genetics of indigenous origin lactic acid bacteria meat and probably of marine origin, especially for their good adaptability. The selection of lactic ferments is based on many criteria to meet both the specifications requested by the user and the constraints imposed by the manufacturer. These criteria may fall within the technological capabilities of the strains, their performance and safety.

The main objective of the present work is to identify native *Lactobacillus* isolated from the gut of a marine fish (*Sardina pilchardus, Boops boops* and Atlantic horse mackerel (*Trachurus trachurus)* caught in the western Algerian coast and technologically characterized by determining their acidifying power, proteolytic, lipolytic and antibacterial activity.

Twenty lactic isolates were isolated and identified by physiological and biochemical tests belonging to *Lb. plantarum, Lb. sakei, Lb. oris, Lb. fermentum, Lb. coryneformis.*

The results of applied technology tests are promising, especially those for antibacterial activity vs 10 pathogenic *S. aureus* ATCC 25923, *E. faecalis* LRSE 26, *E. coli* ATCC25922, *E.faecalis* LRSE 28, *Bacillus cereus, Proteus* sp., *Shigella* sp., *Salmonella infantis, Pseudomonas aeruginosa* and *S. lentus*.

The results of the study of the technological properties of *Lactobacillus* clear that some of these strains can be used in industry saw their enzymatic equipment.

Keywords : *Lactobacillus, Sardina pilchardus*, Boops boops, *Trachurus trachurus*, technolog

PIII-43 : Treatment of Cyanotoxin Contaminated Waters with Macrophytes Best of Advanced Phytoremediation Process

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Abstract

Eutrophication of freshwater bodies may lead to excessive growth of cyanobacterial blooms that are common in many lakes and rivers, all over the world. Many of the cyanobacteria forming blooms are known to produce different types of toxins, including neurotoxins and heapatoxins which can cause a variety of human and animal health, ecological and aesthetic concerns. Actually, numerous research works evoke the problem of cyanobacteria toxicity but are rare those who propose solutions to limit and moderate this toxicity. Eutrophic water systems are not easy to remediate, since the process has to be done upstream by reducing loads of Nitrogen and Phosphorus. Nevertheless, aquatic macrophytes are quite resistant to cyanotoxins and may be used to remediate local areas contaminated with cyanotoxins.

The original aim of this study was to investigate, in laboratory, the possibility of using free-floating aquatic vascular plant *Lemna gibba* (Duckweed, Lemnaceae), in the removal and degradation of cyanotoxins (microcystins, MCs).

Experiments were carried out with a range of microcystins (MC) levels, obtained from toxic *Microcystis* culture extracts (75- 300 µg equivalent MC-LR L-1). During exposure of the plant to MCs, we examined the physiological behavior related to toxin accumulation, possible biodegradation, detoxification and stress oxidative processes of *Lemna gibba*. For the last reason, changes in peroxidase activity and phenol compound content were determined. Following MCs exposure, it was demonstrated that *Lemna gibba* could take up and bio-transform MCs.

The result of this work show that this plant is able to bio-accumulate and partially bio-transform MCs. The system of macrophyte could be recommended as an excellent environmental solution for phytoremediation of cyanotoxin contaminated waters.

Keywords : cyanotoxins, contamination, *Lemna gibba*, biodegradation, phytoremediation

PIII-44 : Denitrification of Drinking Water by Electrodialysis in Continuous Flow Systems

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Abstract

Devant la forte demande en eau potable, il est nécessaire de rechercher des techniques peu coûteuses et peu polluantes qui permettraient d'éliminer les nitrates dans l'eau potable. Différentes procédés de dénitrification sont mis au point : échange d'ions, osmose inverse, électrodialyse et le procédé biologique. Du fait de la simplicité de l'installation de l'électrodialyse, l'application de ce procédé pour la dénitrification est envisagée dans cette étude.

Le but de ce travail consiste à étudier la dénitrification d'une eau potable, par électrodialyse, en régime continu, où certains paramètres ont été déterminés, à savoir le débit d'alimentation et l'influence des ions chlorures et sulfates sur l'élimination des nitrates.

Les résultats obtenus montrent que travailler avec un débit maximal de 4,6 $L.H^{-1}$ permet d'éliminer efficacement 200 $mg.L^{-1}$ de nitrates. De plus, la présence des chlorures freine la migration des nitrates vers le compartiment concentrât, et, cette influence augmente avec l'augmentation de la concentration en ions chlorures. En ce qui concerne les sulfates, leur présence aux concentrations étudiées influence sur l'électro-migration des nitrates, mais, à un degré moins que le cas des chlorures. Cependant, ils ont tendance à concurrencer les nitrates, lors de leur adsorption sur les membranes.

L'électrodialyse permet d'éliminer non seulement les ions nitrates, mais, l'ensemble des espèces ioniques présentes dans la solution (chlorures, sulfates, dureté, …) à un bon taux d'élimination. Donc le traitement des eaux à forte minéralisation par cette technique est intéressant, du point de vue efficacité et économique.

Mots Clés : dénitrification, nitrates, électrodialyse, système continu

P-III45 : Isolement, Production, et Purification de la Lipase Bactérienne Utilisée comme Bio Dépolluant des Eaux Usées

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Abstract

Différents échantillons ont été recueillis des eaux pollués par les matières graisses, dans la région de Mascara, pour l'isolement des souches bactériennes capables de dégrader les matières graisses, afin de les utiliser comme des bio-dépolluants naturels.

L'objectif de ce travail est la recherche des nouvelles lipases bactériennes, en vue d'application biotechniques. Pour cela, nous avons choisi d'isoler, à partir des eaux polluées en déchets graisses issues des abattoirs des bactéries lipolytiques, de caractériser leurs propriétés microbiologiques utilisées dans la production de la lipase extracellulaire, par la méthode de fermentation.

Un total de deux souches a été isolée à +37°C, à partir de l'échantillon des eaux des abattoirs riches en matières graisses. La production de la lipase bactérienne extracellulaire a été étudiée, en fonction de plusieurs inducteurs de natures lipidiques, par la méthode de fermentation. L'activité enzymatique atteignait une valeur maximale, en présence de l'huile d'olive, comme inducteur, et, le glucose, comme source de carbone et énergie à pH=7,2, à +30°C et avec une agitation de 125 tours par minute, *Pseudemonas* sp. (40 µmol.mL^{-1}.72H) *Streptococcus* sp. (47µmol.mL^{-1}.72H). L'enzyme a été purifiée, par précipitation au sulfate d'ammonium, avec un rendement de 63,73% et de 50%, chez *Streptococcus* sp. et *Pseudemonas* sp., respectivement.

La lipase produite par ces deux bactéries est résistante à +65°C et est fortement inhibée en présence de 1 mmol de $Zn^{+}{}_{2}$ et $Mg^{+}{}_{2}$.

Keywords : lipase bactérienne, purification, eaux des abattoirs, bio-dépolluant

P-III-45 : Biological Breakdown During Composting : Case of Sludge from Lagooning Wastewater Purification Station

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Abstract

This study concerns the processing of lagooning sludge, from a wastewater treatment plant (Chichaoua), mixed with green waste, by means of composting. The experiment was conducted as following : mixture 1 (1/2 sludge + 1/2 green waste) ; mixture 2 (2/3 sludge + 1/3 green waste), mixture 3 (1/3 sludge + 2/3 green waste). The three mixtures were composted for four months.

The intense microbial activity, during composting, resulted in a high temperature (between +40 and +50°C), during the first weeks (thermophilic phase) and a level of degradation reaching about 33.6%, 39%, 36%, respectively, for mixture 1, 2 and 3. After the four months of composting, the final composts presented a C/N ratio close to 10, an $NH4^{+}/NO_3$ - ratio <1 and a pH around neutrality, for the three mixtures. The analyzes of element trace metals (ETM) range from 26.3 mg.kg^{-1} ; 27.8 mg.kg^{-1} ; 16.3 mg.kg^{-1} to 21 mg.kg^{-1} ; 13.8 mg.kg^{-1} ;12.5 mg.kg^{-1} for zinc and from 70.04 mg.kg^{-1} ; 100 mg.kg^{-1} ; 65.4 mg.kg^{-1} to 64.9 mg.kg^{-1} ; 42.2 mg.kg^{-1} ; 50 mg.kg^{-1} for lead and from 42 mg.kg^{-1} ; 31.4 mg.kg^{-1} ; 10 mg.kg^{-1} to 67.9 mg.kg^{-1} ; 41.1 mg.kg^{-1} ; 62.2 mg.kg^{-1} for copper, respectively, for mixture 1, 2 and 3, after four months of composting.

These results confirmed the maturity of the final composted product and the low levels of ETM encourage the use of final composting products as fertilzer without any risk.

PIII-46 : Utilisation de la Technique SPME dans l'Analyse des Pesticides Organochlorés dans les Eaux de Surface et de Forage et Comparaison avec la Méthode de Référence LLE

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Abstract

Le Maroc a connu des périodes de retard de pluie, voire des périodes de sécheresse, dans certaines

régions. Confronté aux conséquences du réchauffement climatique, comme l'augmentation de la température moyenne en toutes saisons et le manque d'eau pour la population et l'agriculture, il est nécessaire de trouver des solutions, quant à l'approvisionnement et l'utilisation des eaux de surface, les eaux de barrage et dans certains cas, l'eau de mer. En réponse à ces conséquences, une surveillance continue et rigoureuse de la qualité des eaux est impérative.

Notre travail consiste à mettre en place une technique de substitution plus économique et moins polluante, la SPME (Micro-extraction sur phase solide), puis, de la comparer aux techniques usuelles utilisées en routine LLE (Extraction liquide-liquide), dans le contrôle de la qualité de l'eau potable ou de l'eau utilisé dans l'agriculture.

Notre travail s'est fixé comme objectif de produire des résultats fiables et sûrs, en déterminant un certain nombre de paramètres dont la linéarité, la limite de quantification et de détection, le rendement, la stabilité et la détermination des différents paramètres d'optimisation, afin de rendre cette technique la plus performante que possible, et, enfin réaliser une comparaison entre la technique usuelle d'extraction liquide-liquide utilisée dans les analyses de routine, pour la détection de ces OC, au sien du laboratoire et le rendement de cette nouvelle technique, dans le but de prouver expérimentalement l'intérêt pour le laboratoire d'adopter cette technique, dans la panoplie de ces technique d'analyses.

En définitive, la SPME s'est révélée être une alternative de choix, dans la détection et la quantification des organochlorés étudiés et a répondu à toutes les attentes, en matière de stabilité, répétabilité, reproductibilité et économie, avec un rendement, après optimisation supérieure à celui des techniques déjà utilisées dans ce domaine.

Keywords : SPME, LLE, extraction, quantification, pesticides organochlorés, eau de surface, eau de forage

PIII-47 : Validation of Miniscale Algal Toxicity Bio Assay For Toxicity Screening

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Abstract

Since the industrial revolution, in 19th century, water quality deterioration is fast becoming a major threat around the world and more dramatically with anthropogenic industrialization, hence the birth of analytical monitoring methods. Historically, the physicochemical methods, using abiotic parameters have been proven as valuable tool for screening, such as technique have some lacks informations about the biological effects of all compounds present and other factors, such as bioavailability, toxicants interaction. For this reasons many international standards and group researchers denoted biological assessments, using standard ecotoxicological bioassays, from different trophic levels as complementary and supplementary approach to evaluate the whole toxicity of complex mixture. Algal growth inhibition test is one of the most wedpreased assay used, in toxicological studies for many attributes : (i) ease of culture, (ii) ecological relevance, (iii) and its board sensitivity of contaminants, Nevertheless, the batch-type algal toxicity tests usually adopted by many international standard organizations are time-consuming and require a large areas of benchspace and volume sampling. However, the classical algal growth inhibition test require professional equipment and expertise.

The aim of this study was to validate a miniaturized algal growth inhibition version bioassay using ELISA microplate as a fast, low cost and automation toxicity test for potential pollutants. For this turn, a comparative study were carried with the standard flask assay, as well as to compare the sensitivity of tested algae to selected compounds.
The result shown the good concordance and correlation with tow procedures. That making our technique an appropriate chose for high sample throughput toxicity screening.

Keyworlds : microalgae, standard bioassay, microplate assay, toxicity, screening

PIII-48 : Évaluation de l'Écotoxicité d'un Pesticide Organophosphoré sur Deux Espèces de l'Écosystème Aquatique (*Daphnia magna* et *Pseudokirchneriella subcapitata*)

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Abstract

L'utilisation intensive des pesticides, en vue d'améliorer les rendements et la diversité des cultures, constituent une menace importante, pour les milieux aquatiques, en perturbant les organismes qui y vivent et compromet ainsi le bon fonctionnement de l'écosystème. Au Maroc, le recours à l'utilisation des pesticides est de plus en plus important, et, parmi ces pesticides, les organophosphorés sont très employés, dans l'agriculture marocaine d'où la nécessité d'évaluer leur écotoxicité qui repose, en partie, sur la mesure des effets toxiques à court et à long terme qu'ils provoquent sur les organismes du milieu aquatique, en utilisant des bioessais écotoxicologiques largement adoptés par la communauté scientifique.

Pour cela, nous avons choisi deux espèces représentatives du milieu aquatique un microcrustacé *Daphnia magna* et une microalgue *Pseudokirchneriella subcapitata* communément utilisées dans les bioessais d'écotoxicité aquatique, comme modèles biologiques et approuvés par des organisations internationales (ISO, Environnement Canada, OCDE, EPA, US), afin d'évaluer la toxicité d'un pesticide organophosphoré souvent employé, dans l'agriculture marocaine, pour le traitement des parties aériennes.

A la fin de l'essai, nous avons remarqué une toxicité moindre de l'organophosphoré vis-à-vis de l'algue *Pseudokirchneriella subcapitata* contrairement à *Daphnia magna* qui était plus sensible à l'organophosphoré

Mots Clés : bioessai, pesticide organophosphoré, *Daphnia magna*, *Pseudokirchneriella subcapitata*, écotoxicité

PIII-49 : Impact of Organic and Inorganic Amendments On Biological and Ecotoxicological Properties of Tailing from Kettara Mine

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Abstract

One of the major environmental concerns in abandoned mining sites (*e.g.*, Kettra mine, Morocco) is related to the large volume of dispersed tailings and the hazard of metal pollution of surrounding areas caused by these wastes. The Kettara is an abandoned mine located near Marrakech with more than 3 million tons of mine wastes deposited in tailings impoundments covering approximately 16 Ha without any treatment. In this mine, the waste material is rich in sulfide minerals, mainly pyrrhotite. The physicochemical conditions of soils in Kettara mine caused by high concentrations of metals, acidic pH, low organic matter and low nutrient contents influence negatively the soil microbial communities and consequently restricting plant growth. Those conditions constitute real constraints for the phytoremediation processes that could be used in the Kettara mine. Therefore, an appropriate management of these soils allowing the improvement of physicochemical and biological soil properties is necessary, for minimizing the associated environmental risks and to help plant establishment.

The aim of this study was to evaluate, *in vitro*, the effects of different combinations of organic and inorganic amendments on some soil physicochemical, microbiological and ecotoxicological properties of Kettara mine tailing. To improve soil properties and fertility, tailings samples from the studied mine were mixed with agricultural soil, green waste compost, lime and rock phosphate (RP) at different rate.

A test pattern of eight treatments with three replicates was studied. Unamended tailing was used as control. After 8 months of incubation, under controlled laboratory conditions, the amended tailings were characterized for their biological and physicochemical properties.

The results showed that the control soil present poor biological properties caused by high availability of trace elements (TEs), acidic pH and high salinity. The lime and RP treatments were the most efficient for increasing soil pH and decreasing soluble TEs concentrations. By enhancement of the mineral nutrients, organic amendment was able to improve soil health and fertility leading to the stimulation of microbial community function and structure. Therefore, the use of compost, in combination with lime or RP, seems to be a suitable management strategy, for the remediation of highly acidic metals contaminated soils, because they significantly improve the soil physicochemical properties and decrease soil ecotoxicity leading to improvement of the microbial growth compared with other treatments.

The organic and inorganic amendment of the mining waste could be used as tool to improve soil fertility, thereby creating favorable conditions for revegetation of degraded areas by mining activities.

Key Words : Kettara mine, heavy metals, waste amendments, soil remediation

PIII-50 : Bio Evaluation de la Qualite Bacteriologique des Eaux d'un Ecosysteme Lacustre : Le Cas du Lac du Barrage Boukourdane (Algérie)

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Abstract

La qualité bactériologique du lac du barrage Boukourdane, Tipaza (ALGERIE) indique que, la ville de Menaceur est confrontée à de véritables difficultés d'assainissement de ses eaux usées brutes, et cela pourraient être liées notamment à l'évacuation, sans aucun traitement préalable, des eaux dans l'oued Boukadir et c'est le cas aussi de l'oued Fedjana. Les résultats obtenus, concernant l'évolution mensuelle de la pollution bactériologique de ce lac durant la période janvier 2013 à janvier 2015, ont révélé que les eaux usées rejetées dans les oueds, nuisent fortement à la qualité de ce dernier et que la charge bactérienne est élevée dans les deux stations de prélèvement reliant les oueds au lac. Les résultats sont exprimés par une forte charge en bactéries indicatrices de contamination fécale qui varie entre 4 UFC/100ml et indénombrable pour les coliformes totaux, 3 UFC/100ml et indénombrable pour les coliformes fécaux, 1 et 772 UFC/100ml Entérocoques du groupe D. Nous notons aussi la présence des Clostridium sulfito-réducteurs qui varie entre 1 et 24 UFC/20ml et l'absence totale des salmonelles et *Staphylococcus aureus*. Ces résultats dépassent largement les normes algériennes des eaux destinées à l'irrigation. Ils pourraient être à l'origine d'éventuelles contaminations des cultures irriguées et par conséquent avoir des répercussions sur la santé humaine.

Mots clés : Bioindication, germes fécaux, salmonelle (*Staphylococcus aureus*), lac du barrage, Algérie.

PIII-51 : Olive Oil Mill Effluents Degradation Kinetics in a Batch Bioreactor

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Abstract

The oil mills effluent is a serious environmental problem. This problem is attributed to the organic matter composition of effluents and especially the high amount of polyphenols that are responsible for phytotoxic and antimicrobial effects. The main objective of this work was to evaluate the

ability of several microorganisms strains to reduce the toxicity of these effluents and its possible reuse.

The screening of microorganism isolates able to growth on solid culture media containing the effluent at various dilutions was done. The results showed that the selected bacterium belongs to the *Bacillus* genus and the selected yeast belongs to the genus of *Rhodotorula*. The confrontation and growth tests on a sterile liquid medium based effluent allowed to optimize the biological treatment, which could reduce the pollution load of the effluent.

The tests of biological treatment of olive oil mill effluent, on which no prior treatment were made, without added nutrients or pH change, were conducted in a batch bioreactor system inoculated with a suspension of select strains. The obtained results showed that the removal of the chemical oxygen demand (COD) and total polyphenols during one month of treatment exceeds 80% and 70% respectively.

Keywords: Olive oil mill effluent, Biological treatment, *Bacillus*, *Rhodotorula*, Polyphenols, Chemical oxygen demand.

PIII-52 : Contribution à la Caractérisation Bactériologique et Enzymatique d'un Site Extrême : Le Sol des Bassins d'Evaporation de l'Eau Saline dans la Région de Taza Maroc

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Abstract:

Les microorganismes « extrêmophiles » sont des êtres vivants qui vivent dans des conditions extrêmes ; hautes et basses températures, valeurs extrêmes de pH, hautes concentrations de sel, hautes pressions et radiations ; dans lesquelles d'autres formes de vie ne peuvent pas résister. Les bactéries halophiles sont un groupe de microorganismes qui vivent dans les environnements hypersalins et exigent dans beaucoup de cas la salinité pour survivre. Ces dernières années un intérêt croissant est porté aux microorganismes halophiles, en général sont d'abondantes sources d'enzymes (Cellulase, Pectinase, Amylase, Lipase, …etc.), qui seront sans nul doute d'un grand intérêt pour intervenir dans un futur proche dans les procédés industriels (Environnementale, Alimentaire, Médicale…etc). C'est dans le cadre d'une éventuelle valorisation des ressources microbiennes par utilisation de leurs enzymes que nous avons réalisé ce travail qui s'intéresse à un milieu extrême "le sol des bassins d'évaporation de l'eau salée dans la région de Taza-Maroc".

Au début, nous avons effectué un isolement des bactéries sur milieu LB agar à différentes concentration de NaCl (1% jusqu'à 30%). Les isolats purifiés, ont été caractérisés macroscopiquement (pigmentation, aspect,…etc.) et microscopiquement (forme, coloration de Gram, …etc.). Dans un deuxième temps, nous avons effectué une caractérisation physico-chimique des isolats, (i) la tolérance au NaCl (1% jusqu'à 30%), (ii) la thérmotolérance (37°C jusqu'à 52%) et (iii) l'effet du pH (4 jusqu'à 11). En fin, nous avons pu dévoiler certaines potentialités enzymatiques (Cellulase, Pectinase, Amylase et Lipase) que culminent les isolats microbiens purifiés.

Mots clés: milieu extrême, sol salin, bassins évaporation, bactéries halophiles, activités enzymatiques.

PIII-53 : Detection of Norovirus, Hepatits A virus and Other Human Enteric Viruses in Molluscan Shellfish by Taqman Real Time Reverse Transcription Polymerase Chain Reaction Assay

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Abstract:

Enteric viruses are considered as a major cause of non bacterial human gastroenteritis diseases in the world, they can be transmitted directly from person to person or indirectly (fecal-oral route)

via virus contaminated water, air, sol, surfaces, or foods. Therefore consumption of raw or under cocked contaminated molluscan shellfish is the most frequent cause of foodborne gastroenteritis, due to their filter feeding system. Indeed, these animals concentrate viral particles in their digestive gland; thus representing an important host for enteric virus transmission to human. Viruses that can be transmitted to human include the human Noroviruses (NoV), Hepatitis A virus (HAV), Hepatitis E virus (HEV), Rotavirus (RV), Astroviruses, Sapoviruses, Adenoviruses, Aichivruses, and other enteroviruses and picornaviruses. (Greninger et al., 2010; Sair et al., 2002; D'Souza et al., 2007). Among the most significant foodborne enteric viruses are hepatitis A virus and noroviruses, which contribute to the vast majority of illnesses. The exceedingly small size of most enteric viruses and the inability to grow them in cell cultures make their detection difficult. Therefore, molecular methods, particularly reverse transcription-polymerase chain reaction (RT-PCR), has become the most common assay procedure.

The aim of this study is to detect and characterize enteric viruses present in Moroccan cost via analysis of molluscan bivalve, these latter are a sedentary species so they would be a good indicator of viral pollution. To achieve this, sampling concerned four species (Oysters, cockles, mussels, and clams) of Moroccan wild and harvested shellfish was made from areas classified from A to C. Before proceeding to the PCR assay, the viruses were extracted from shellfish tissues, clarified and concentrated.

Bivalve molluscan shellfish has been collected, from several points and harvesting area from north and south of Morocco, and transferred in refrigerate box to the laboratory for analysis (Laboratory of Virology, Microbiology, Quality and Biotechnology/ Ecotoxicology and biodiversity). After shelling the shellfish in sterilized conditions, the digestive gland were removed, pooled in order of 1.5 g for each sample and homogenizate with glycine buffer for concentration of viral particles by Adsorption-Elution-precipitation method according to the method previously described by Kittigul et al. (2008). Viral nucleic acids were extracted from shellfish concentrate using Trizol method (Invitrogen) for extraction of RNA according to the manufacturer's instructions, and with phenol chloroform for extraction of DNA, and then analyzed by TaqMan real time RT-PCR and/or PCR using specific primers and probes.

PIII.54 : Screening d'Activités Hydrolytiques Extracellulaires chez des Microorganismes Halophiles Aérobies Isolés des Marais Salants des Régions du Centre Ouest et Sud du Maroc

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PIII-55 : Valorisation des Déchets Hélicicoles dans le Traitement Biologique des Effluents des Laiteries

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Le traitement biologique est un moyen d'épuration écologique qui présente une tendance de plus en plus accrue. Les réacteurs à lits mobiles figurent parmi ses conceptions. Ils sont connus efficaces à pouvoir ramener les rejets des laiteries à la réglementation en vigueur, avant qu'ils ne soient déversés dans les égouts ou dans l'environnement.

Étant donné que ces bioréacteurs sont une conception qui nécessite l'utilisation de supports de colonisation, l'objectif de cette étude est de substituer les supports synthétiques classiquement utilisées (généralement en plastique) par d'autres supports naturels.

Le matériau est un déchet hélicicole, choisi parce qu'il présente naturellement une surface spécifique considérable, pour favoriser la formation du biofilm épurateur. Ce travail consiste à étudier son utilisation, en tant qu'un nouveau garnissage d'origine naturel dans le réacteur MBBR.

L'évaluation des coquilles d'escargots comme support d'adhésion de biomasse, dans un procédé de traitement d'épuration biologique à lit mobile, est menée en présence des champignons *Aspergillus niger* et *Penicillium chrysogenum*, leur capacité et leur résistance dans un environnement de stress tel que la présence d'acides ou de produits phénoliques étant démontré dans de nombreuses études. Un suivi de la qualité de la dépollution est réalisé, en mesurant régulièrement la Demande Chimique en Oxygène (DCO), l'azote totale (NKT), le phosphore soluble (P) et la matière en suspension (MES).

Les résultats obtenus sont prometteurs et montrent que les coquilles d'escargot peuvent constituer un support de colonisation des biofilms par excellence.

Mot Clés : effluent laitier, biofilm, biomatériaux, traitement biologique, déchet hélicicole

PIII-56 : Canalisation d'Eau Potable en PVC – Nouvelle Formulation pour des Effets Anti Adhésion

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Abstract

Les biofilms sont des dépôts qui se forment naturellement et spontanément dans les réseaux de distribution d'eau potable. Parfois spectaculaires, ils sont le plus souvent inoffensifs. Ils demandent, cependant, d'être maîtrisés, car ils peuvent abriter des germes pathogènes. À cause de la présence de ces nuisances, la qualité microbiologique de l'eau potable peut fortement se dégrader, au cours de son transport dans les réseaux de distribution, en raison, notamment, d'un éventuel détachement de bactéries, depuis le biofilm.

Notre étude a pour but de concevoir une formule de canalisation d'eau potable, en remplaçant (totalement ou partiellement) certains ingrédients de la formule standard classique par d'autres composantes naturelles connues pour leur effet antibactérien. Leur intégration pourra donc vraisemblablement abaisser la propriété de collage dans le tube.

À l'aide d'une nouvelle formule intégrant un composé naturel, nous avons réussi à élaborer, par le procédé d'extrusion, un tube de canalisation avec de bonnes propriétés mécaniques. Un test d'adhésion a été réalisé, dans les conditions statiques. Les observations, réalisées au moyen de la microscopie électronique à balayage, confirment l'effet d'anti-adhésion.

Mots Clés : Matière plastique, biofilm, adhésion, formulation, canalisation, eau potable

PIII-57 : La conservation biologique des produits agroalimentaires

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Deus souches de bactéries lactiques (SMBL1 et SMBL2 du genre lactobacillus) et une souche de levure (SMLV1) sont utilisées dans la fermentation et la bioconservation de certains aliments. Ils ont assurées une fermentation parfaite et ainsi une durée de vie, une salubrité et une intégrité sans égales.
Des interactions positives entre les levures et les bactéries lactiques ont montrés une synchronisation du métabolisme fermentaire de l'ensemble des souches composant le ferment sélectionné.
En effet après 16 heures d'incubation avec le ferment S6, on apu stabiliser le pH à 3,57 et l'acidité à 1,22% et ce à partir du 30eme jour de fermentation contrôlée.
Le pH obtenu est conforme pour le conditionnement des produits alimentaires.

Mots clés : consommateurs, aliments, légumes, produits biologiques, fermentation lactique, microorganismes, ferment, conservation.

PIII-58 : Fermentation contrôlée d'artichaut par inoculation microbienne

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Il devient très reconnu que certain bactérie lactique rentrent dans l'usage des produits agroalimentaire pour allonger la durée de vie, et améliorer la texture et le gout.
Notre travail a pour objectif de mettre en place un procédé contrôlé et efficace accédant à la fermentation et la conservation d'artichaut, pour remplacer le procédé traditionnel reconnu par ses produits de qualité perceptible
Des souches de bactéries lactiques et une levure ayant montrés un grand pouvoir acidifiant, antibactérien et un haut potentiel fermentatif ayant été isolé, purifier et conservé, sont capables de conserver et fermenter de façon naturelle l'artichaut sans ajout des additifs chimiques industriels.
Parmi deuze souches bactériennes, la bactérie lactique SMBL1, la bactérie lactique SMBL1 et la souche de levure SMLV1 ont été maintenues pour constituer le ferment de fermentation.
La fermentation d'artichaut a été exécutée suivant deux protocoles expérimentaux suivants : une fermentation spontanée et une deuxième contrôlée réalisée par inoculation d'un mélange simultané des trois souches (SMBL1, SMBL2 et SMLV1).
Des analyses des paramètres physicochimiques (température, acidité, pH) et microbiologiques (FMAT, Coliformes fécaux, bactéries lactiques et levures) ont été réalisé au cours de l'évolution de deux fermentations.
Les résultats qui en découlent sont meilleurs en terme du temps de fermentation 30 jours, de réduction du pH 3,57 et de production d'acide 1,22, Ces résultats ne sont pas de même pour la fermentation traditionnelle. Cette fermentation contrôlée a permis l'obtention des artichauts de bonne qualité homogène, de qualité hygiénique finale adéquate et de longue durée de vie.
Mots-clés : artichaut, bactérie lactique, levure, fermentation spontanée, fermentation contrôlée, ferment.

PIII-59 : Screening d'activités hydrolytiques extracellulaires chez des microorganismeshalophiles aérobies isolés des marées salants des régions du centre ouest et sud du Maroc

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Résumé

Les formes de vie sur terre sont innombrables, comme les environnements qui les abritent.Celles se développant dans des environnements hostiles sont globalement qualifiées d'extrêmophiles. Les premiers organismes extrêmophiles isolés font partie des organismeshalophiles, découverts dans un environnement qu'on croyait dépourvu de vie, d'où son nom :la Mer Morte. Leur résistance aux fortes salinités leur confère des caractéristiques étonnantes,ce qui révèle un véritable atout biotechnologique.

Une étude ayant pour objectif, le criblage et la production d'hydrolases de microorganismeshalophiles isolés d'environnements hypersalinsmarocains est réalisée. Pour cela, unecollection de 500 souches de procaryotes halophiles aérobies isolées à partir des échantillonsd'eau, de sel et de sédiments prélevés au niveau de deux marais salants situés sur la côte atlantique du centre ouest et sud du

Maroc (Tarfaya et Oualidia) est constituée puis caractérisée phénotypiquement. Elles sont aussi systématiquement examinées pour détecter la présence qualitative de cinq activités hydrolytiques extracellulaires (amylase, protéase, cellulase, lipase et DNase).

Mots clès: Criblage, Bactéries halophiles, Enzymes hydrolytiques, Marais salants, Côte Atlantique Centre- Sud, Maroc.

PIV-1 : *Listeria* and *Brucella* in Raw Cow's Milk in the Region of Tlemcen

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Abstarct

Algeria is the largest consumer of milk, in North Africa, with nearly 3 billion liters per year. This food occupies a prominent place, in the diet of Algerians, but can be the cause of various diseases.

For this, our choice fell on *Listeria* by culturing, using the method ISO 11290-1, and *Brucella*, by serological method, in raw cow's milk, in the Tlemcen region.

In a total of 60 samples of raw milk analyzed, only two *Listeria* strains were isolated and identified by classical methods of identification, Camp test and API Listeria. A rate of 3.33% and 3 positive tests, for brucellosis, confirmed by the ring test, is equivalent to a proportion of 5%. Furthermore, both Listeria strains were confirmed as *Listeria monocytogenes*.

Keywords : raw milk, cattle, *Listeria*, brucellosis, Tlemcen region

PIV-2 : The Bacterial Diversity of Camel Milk : A Contemporary Update

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Abstract

Camel milk is a valuable source of food, for people living in arid areas of Morocco. As it is usually consumed, in its raw state, the presence of pathogenic bacteria is of public health importance (Adugna et al., 2013 ; Eberlein, 2007 ; Saad and Thabet, 1993; Younan, 2004).

The present study aimed to investigate the overall microbiota of raw camel milk, collected from four different locations, in Morocco. From four different samples, 808 isolates were obtained using ten combinations of growth media and incubation conditions. Subsequent dereplication using MALDI-TOF MS and identification of selected isolates through sequence analysis of 16S rRNA gene and protein encoding genes revealed a considerable species diversity. Thirty-four bacterial species including two novel lactic acid bacteria and belonging to four distinct phyla, i.e. *Firmicutes* (64.7% of the isolates), *Proteobacteria* (30.0%), *Actinobacteria* (4.9%) and *Bacteroidetes* (0.4%) were isolated.

Keywords : microbiota of raw camel milk, culturomics approach, MALDI-TOF MS, sequence analysis, 16SrRNA, protein encoding genes

PIV-3 : Long Term Cryoconservation Toxic Impact on Aromatisation Acidification Profiles of Wild Thermophilic lactic Strains Isolated from Raw Kamel Milk

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Abstract

The study aimed to select thermophilic lactic wild strains, of technological interest, to explore the stability of commercial thermophilic starter, for ten brands of industrial yoghurt, collected in Bordj Bou Arréridj, provence North-eastern of Algeria.

Isolation, characterization of strains, from raw camel milk, on selective media M17 (*Lactococci* at +42°C) and MRS (*Lactobacilli* at +45°C). The cryopreservation impact on the starter stability, during 21 days, directed by check, upstream and downstream, conservation of 05 physico-chemical parameters (pH, viscosity, conductivity, density and lactate). Acidifying profiles, by monitoring the kinetics of acidification of reconstituted skim milk and flavoring by double test : Voges Proskauer and polarography. The *in vitro* antagonisms study of lactic strain's active crude supernatant (SBA), directed against targets strains prokaryotes and eucaryotes.

The results gave thermophilic strains, *Streptococcus thermophilus* on M17 and homofermentary *Lactobacillus* sp, on MRS.

Milk acidification (in Dornic degree ºD allowed the selection of 06 strains *Lactobacillus* sp. (DL4, 51.09, DL1, 49.5, DL2, 47.70, DL3, 47.52, DS3, 42.62 and DL5, 32.23ºD and six isolates *Streptococcus thermophilus* (TL5, 103.18, TL1, 88.09, TS2, 67.15, TL3, 47.52, TS3, 45.76 and TL4, 36.96ºD.

The flavoring, by Voges Proskauer test, revealed two very intense flavoring strains, four strains intensely positive, one strain moderately positive and nine moderately intense strains.

These results were confirmed on polarography against established standard of pure diacetyl. The results of antagonism gave inhibitory zones, varying between 21 and 10 mm, against targets Gram positive strains, between 25 and 09 mm against those Gram negative and between 15mm and 09mm for interactions against eukaryotes.

The study led to development of a wild thermophilic lac.

Keywords : wild strains, selection, acidification, diacetyl, bacteriocin

PIV-4 : Adhesion of *Staphylococcus aureus* Cultured in the UHT Milk in Polystyrene Surface

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Abstract

The development of microbial biofilms on solid surfaces poses many problems in the industrial sector. In the dairy industry, the surface of materials in contact with bacteria could change the physicochemical properties of the substrate surface. These properties may also exert a great influence on the speed and amount of adhesion. The aim of this work is to study the adhesion of S. aureus cultured in milk in the polystyrene support in different ionic strengths The results show that increasing the ionic strength of milk led to an increase in adherence of S. aureus in the polystyrene support in conclusion it is of interest to consider the physicochemical conditions of the milk to estimate the risk of contamination in milk production.

Keywords : Physicochemical properties, Milk, Adhesion, Staphylococcus aureus, polystyrene

P-IV5 : Evaluation of Hygienic and Microbiological Quality of Raw Cow milk from The Area of Tadla Azilal

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Abstract

The main objective of this study was to assess quality of raw milk produced, in Tadla Azilal area, in Morocco. For this, we intend to evaluate, firstly, its bacteriological quality and hygienic characterization.

The milk samples of raw cow milk produced in 43 farms were collected at 5 areas : Béni Mellal (1), Fkih Ben Saleh (2), Souk Bept (3), Zidouh (4) and Khouribga (5).

Cow milk samples were analyzed by a microbiological count of the standard plate count (SPC), total coliforms (TC), Enterobacteria

(ENT), yeasts (L) and molds (M) and some pathogenic bacteria. And to analyze the hygienic of milk with antibiotic, acidity dornic, pH …

Our study of the Tadla Azillal region showed the presence of bacterial contamination with heterogeneity among the analyzed farms. Thus, it appears that the farms are highly contaminated by a wrong application of the cleaning procedures, in general, bad breeding practices and storage requirements as well as carriage, could be the main factors involved in the microbiological contamination of raw milk from this region. While hygienic results showed that the lower pH and higher titratable acidity values have been demonstrated mainly in farms that have unfavorable breeding practices. This could present a serious concern, for human health, stressing in that the organism. Taken together these variations reflect essentially differences, in practical breeding.

When the period effect is investigated, differences between hot periods and cold periods are present for the parameters mentioned above.

Finally, these data add new insights concerning microbiological and hygienic characteristic of raw cow's milk, produced in the Tadla region in Morocco, and, inform on nutritional potential of milk as well as its dangerousness when hygienic conditions are not respected.

Keywords : raw cow milk, farms, microbiology, hygienic, quality, morocco

PIV-6 : Caractérisation de la Qualité Physicochimique et Évaluation des Risques Sanitaires du Lait Cru Commercialisé *via* le Circuit Informel dans Deux Régions : Béni-Mellal-Khénifra et Rabat-Salé-Kénitra (Maroc)

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Abstract

Pour un but d'évaluer les risques de la santé publique liés à la consommation du lait cru vendu, par voie informelle, une étude d'évaluation de la qualité de cette denrée a été menée, entre mars 2014 et juin 2015, sur 489 échantillons de lait prélevés auprès de 71 points de vente, dans deux régions administratives, au Maroc, Béni Mellal-Khénifra (centre du Maroc) et Rabat-Salé-Kénitra (Nord-Ouest).

Les résultats obtenus ont révélé que 22% des échantillons ont été déclarés positifs, en produits alcalins. L'analyse a montré aussi une présence des résidus des antibiotiques (4,1%), pour un test de recherche de la famille des Beta-lactamines et les Tétracyclines.

Les analyses des résultats soulèvent les risques de la santé publique liés à la consommation du lait cru vendu par le circuit informel, en échappant des organismes de contrôle.

Mots Clés : lait cru, physicochimique, risques sanitaires, circuit informel, résidu, fraude, contrôle, Maroc

P-IV7 : Molecular and Proteomic Characterization of *Leuconostoc mesenteroides* Isolated from Algerian Raw Camel Milk

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Abstract

The majority of researches on camels focused principally on their anatomic characteristics and physiological adaptation for desertation. However, information on camel milk is very limited.

For these reasons we suggested, in the present work, a molecular characterization and evaluation of the genetic variability and a proteomic identification of thirteen (13) putative producing bacteriocin *Leuconostoc* strains exhibiting anti-listerial activity, with a view to elucidate their potential application as additives, in raw food destined for human consumption.

DNA sequencing of the 13 selected strains revealed high homology among the 16S rRNA gene for all strains. In addition, 99% homology with *Leuconostoc mesenteroides* was observed when these sequences were analyses by the BLAST tool against other sequences from reference strains deposited in the Genbank. Furthermore, the isolates were characterized by Matrix-Assisted Laser Desorption/Ionization Time of Flight Mass Spectrometry (MALDITOF MS), which allowed for the identification of 2 mass peaks 4442.78 m/z and 5117.81 m/z that resulted to be specific to the species *Leuconostoc mesenteroides*.

Remarkably, the phyloproteomic tree provided more intra-specific information of *L. mesenteroides* than 16S rRNA-based phylogenetic analysis. Thus, phyloproteomic analysis allowed to group *L. mesenteroides* strains into different sub-branches, while all *L. mesenteroides* isolates grouped in the same branch according to phylogenetic analysis.

This study represents to our knowledge, the first report on the use of MALDITOF MS, on the identification of LAB isolated from camel milk.

Keywords : genomic-MALDITOF MS-MS, camel milk, Leuconostoc, probiotique

PIV-8 : Etude de la Diversité Microbienne du Lait et des Urines de Dromadaire

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Résumé

Les urines et le lait du dromadaire sont appréciés traditionnellement par leurs propriétés antidiabétiques, anti infectieuses, anticancéreuses. De nous jours, plusieurs recherches scientifiques ont confirmé les vertus thérapeutiques de ces deux liquides biologiques qui jouent un rôle important dans la guérison des maladies menaçant la santé humaine.

Notre recherche ambitionne l'étude de la diversité microbienne des urines et du lait du dromadaire afin d'expliquer et d'évaluer les capacités thérapeutiques de ces liquides biologiques.

Après avoir effectué un dénombrement de la flore microbienne du lait et des urines de dromadaire, nous avons pu constater que la diversité microbienne est limité aussi bien au niveau du lait que des urines avec une dominance des levures dans le lait notamment les genres *kluyveromyces* et *candida* et une dominance des bactéries dans les urines où les levures sont absentes. Les échantillons du lait est des urines testés sont dépourvus de moisissures. La majorité des levures isolées résistent à des températures élevées, aux fortes concentrations en sucres (50%) et en NaCl (10%). Ces levures n'assimilent pas les sources de carbone non glucidique et sont dépourvu d'enzymes dépolymérisantes de cellulose, de pectine, d'amidon et de protéines. Au contraire les bactéries disposent de deux activités enzymatiques amylolytique et lipolytique.

Mots clés : dromadaire, lait, urines, microbiologie et diversité

PIV-9 : Carbon Dioxide Production by *Leuconostoc mesenteroîdes* Grown in Single and Mixed Culture with *Lactococcus lactis* in Skim Milk

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Abstract

The effect of mixed culture of *Leuconostoc mesenteroides* subsp. dextranicum and *Lactococcus lactis* subsp. *lactis* (prot+) was investigated, to achieve an optimal production of carbon dioxide.

Only the strain of *L. mesenteroides* can produce carbon dioxide, from lactose and citrate, in milk. The influence of the initial concentration ration between the two strains on growth, carbon dioxide, L-lactate, acetic acid production and citrate used was studied.
When the initial inoculum of *L. lactis* was $2.5x10^5$ $CFU.mL^{-1}$, the growth and evolved CO2 by *L. mesenteroîdes* ($3x10^7$ $CFU.mL^{-1}$) increased, whereas high inoculum of *L. lactis* induced a decrease of growth and CO2 production by *L. mesenteroides.* In mixed culture, CO_2 production continued, after growth stopped, a partial uncoupling can be observed between growth and CO_2 production. A shift of acetate production was observed, in mixed culture and 25.6 mM was obtained, whereas 30.18 mM was obtained at the same time, in pure culture of *L. mesenteroides*.

Keywords : *Leuconostoc mesenteroides*, *Lactococcus lactis*, milk, lactic acid, acetic acid, citric acid, growth kinetics, fermented milk

PIV-9 : Selection of Probiotic Bifidobacteria and the Evaluation of Their Viability in Fermented Milk

PIV-10 : Isolement, Identification Phénotypique et Caractérisation Technologiques des Bactéries Lactiques à partir du Lait Fermenté "Lben", Fromage Traditionnel "Jben" de la Région Tanger-Tétoun

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Abstract

La présente étude a pour but d'évaluer le potentiel biotechnologique de souches de BAL, isolées à partir des Olives de tables, en saumure artisanales, du lait fermenté "LBEN" de vache et du fromage traditionnel "JBEN", et de caractériser ces souches.

Pour ce but, on a opté, en premier lieu, à la caractérisation phénotypique et technologique des souches isolées. La méthode suivie consiste à isoler, en milieux sélectives de MRS et M17, d'identifier les souches, par la coloration de Gram et le test de catalase, de déterminer, en deuxième temps, le type fermentaire, la croissance à différentes températures, la croissance en milieu hypersalé, et la caractérisation des bactéries lactiques, par la recherche de l'arginine dihydrolase (ADH). En troisième temps, on a opté pour une caractérisation technologique, par la recherche du pouvoir acidifiant et du pouvoir protéolytique.

Les résultats ont montré, qu'à partir d'un total de 31 échantillons, on a pu isolés 209 souches. Ces isolats sont des Gram positif, catalase négatif, et, dont 17 isolats (8 %) des *Lactobacillus*, 138 souches (65%) des *Lactococcus* et 57 souches (27%) sont des *Streptococcus*. Les *Lactobacillus lactis* ont montré une activité positive, pour l'arginine dihydrolase (ADH), ce qui traduit leur activité hétérofermentaire. Aussi les tests ont pu démontrer une stabilité aux moyennes températures (température optimale de +30°C) et une sensibilité envers la salinité qui est de l'ordre 6,5% et 8%. Concernant les *Lactococcus lactis*, les tests ont montré une sensibilité aux valeurs de salinité de 6,5% et 8%. Une faible stabilité pour les hautes températures (absence de croissance bactérienne à +45°C) et une absence de production de gaz (CO_2) . Nous avons obtenu, à partir de 209 souches isolées, 178 souches protéolytiques, 154 isolées, à partir du milieu MRS et 24 souches isolées, à partir du milieu M17.

Afin d'attribuer des profils acceptables et fiables aux souches sélectionnées, une identification moléculaire s'avère indispensable et obligatoire.

Mots Clés : bactéries lactiques, lait fermenté traditionnel , fromage traditionnel

P-IV11 : Évaluation des Aptitudes Fromagères des Souches Lactiques Autochtones Isolées à

partir des Fromages de Chèvre du Nord du Maroc

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Abstract

Les consommateurs apprécient les fromages artisanaux, pour leurs arôme et saveur typiques, qui sont généralement attribuées à l'activité métabolique de la microflore autochtone présente dans le lait cru.

L'objectif de cette étude est d'évaluer l'efficacité des souches lactiques autochtones, isolées à partir des fromages de chèvre du Nord du Maroc et qui ont été sélectionnées et caractérisées antérieurement. Nous avons évalué les aptitudes fromagères, avec la combinaison de 6 souches autochtones, en effectuant des fabrications des fromages de chèvre à échelle expérimentale (Lot A : *L. lactis* subsp. lactis fortement acidifiante + *L. lactis* subsp. lactis var. diacetylactis faible producteur de diacétyle-acétoine + *L. paracaseï* fortement protéolytique ; Lot B : *L. lactis* subsp. lactis avec une activité acidifiante modérée + *L. lactis* subsp. lactis var. diacetylactis, produteur important de diacétyle-acétoine + *L. paracasei*, avec une activité protéolytique modérée). Les fromages, ainsi obtenus, ont fait l'objet des analyses physicochimiques, microbiologiques et sensorielles.

Les résultats de la composition chimique des fromages (protéines, extrait sec et matière grasse) n'ont montré aucune différence significative, entre les différents ferments lactiques utilisés, alors que les résultats des analyses microbiologiques ont montré que les fromages des lots A et B ont une meilleure qualité microbiologique, par rapport aux lots C et D. Ceci montre l'efficacité des souches lactiques autochtones couplée avec la pasteurisation du lait.

L'évaluation sensorielle des fromages expérimentaux a montré que les fromages élaborés avec les ferments lactiques autochtones avaient une grande intensité d'arôme et une meilleure qualité de goût similaires aux fromages au lait cru.

Mots Clés : bactéries lactiques, fromage de chèvre, *Lactococcus*, *Lactobacillus*, analyses sensorielles

PIV-12 : Recherche de la *Listeria monocytogenes* dans Certains Produits Alimentaires Alger)

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Abstract

***Listeria monocytogenes* est une bactérie de type Gram positif, à l'origine de la listériose.**

Cette maladie infectieuse grave touche à la fois l'Homme et les animaux. Elle est très résistante et peut se multiplier dans des atmosphères dont la température est comprise entre +1°C et +45°C.

L'intérêt de notre recherche est de permettre une détection de *Listeria monocytogenes* dans les denrées alimentaires concernées ou non par la réglementation nationale.

Au cours de notre étude, un total de 174 échantillons de plusieurs types de produits alimentaires (viandes, fromages, poissons, plats cuisiniers) ont été examinés.

La recherche de *Listeria monocytogenes* dans les aliments a été effectuée selon la norme ISO 11290-1et ISO 11290-2.

Ainsi, 45 souches du genre *Listeria* ont été isolées sur un milieu sélectif (gélose chromogénique ou gélose PALCAM), à partir de plusieurs échantillons alimentaires, essentiellement de la viande rouge et des produits dérivés (16 souches), poissons et produits de la pêche (3 souches), fromages et produits laitiers (11 souches) et les plats cuisinés (15 souches). Les souches isolées ont été caractérisées, sur le plan morphologique et cultural, par observation microscopique et observation de l'aspect des colonies, sur le plan biochimique, par des tests d'identification classique et la galerie Api Listeria.

Nos résultats ne font ressortir que quatre espèces, parmi les six, que compte le genre Listeria, avec une prédominance de *Listeria monocytogenes*.

Mot Clés : *Listeria monocytogenes*, santé humaine, produits alimentaires, observation microscopique, galerie Api

PIV-13 : Qualité Microbiologique des Plats Finis Desservis dans un Centre Hospitalier Marocain

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Abstract

L'hygiène, dans le secteur alimentaire, est d'une importance capitale, en milieu hospitalier.

En fait, les microorganismes peuvent proliférer et atteindre un seuil dangereux, dans les cuisines où règnent des conditions de croissance optimale, c'est-à-dire une humidité importante et une température élevée [1]. Ces dernières années, même avec la modernisation des services alimentaires, plusieurs études ont montré que l'alimentation hospitalière fait face à plusieurs problématiques [2]. Les patients hospitalisés dont l'organisme est fragilisé par la maladie, l'intervention chirurgicale ou l'âge sont des sujets sensibles aux toxi-infections alimentaires collectives (TIAC), considérées comme une infection nosocomiale [3].

L'objectif de ce travail est d'évaluer la contamination microbienne des plats finis destinés à être servis aux patients d'un centre hospitalier universitaire marocain. Les règles d'hygiène alimentaire applicables à l'hôpital sont celles définies en restauration collective décrite par la norme marocaine.

Sur un total de 200 échantillons, prélevés sur une période de 8 mois, le dénombrement de la flore mésophile aérobie totale, des coliformes totaux et des coliformes fécaux, des *Staphylococcus aureus* et des anaérobies sulfito-réducteurs, des levures et moisissures ainsi que la recherche des salmonelles ont été réalisés suivant les normes marocaines en vigueur.

Le nombre d'échantillons conformes, selon la réglementation nationale, était de 160, soit un taux de conformité de 80%.

Les germes causant la non-conformité des aliments (retrouvée dans 20% des cas) étaient représentés, essentiellement, par les germes totaux et le *Staphylococcus aureus.*

Bien que le taux de conformité soit important, des actions d'amélioration sont menées, dans l'objectif de bien gérer le risque d'infections nosocomiales d'origine alimentaire.

Mots Clés : qualité microbiologique, denrées alimentaired, milieu hospitalier**,** infections nosocomiales, hygiène alimentaire, sécurité alimentaire

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PIV-14 : Étude de la Qualité Microbiologique de Denrées Alimentaires Issues de la Restauration Collective de la Ville de Fès

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Abstract

La restauration collective, dans les cantines, les « fast foods » et les restaurants, devient un fait incontournable, dans le schéma actuel du développement urbain, dans les pays en développement.

La présente étude consiste en l'évaluation de la qualité hygiénique des denrées alimentaires prélevées, dans le cadre de la restauration collective, à partir de différents points de la ville de Fès.

Sur un total de 90 échantillons reçus, au LRDEHM de Fès, durant le mois de Ramadan, de l'année 2015, nous avons effectué le dénombrement de la flore mésophile aérobie totale, des coliformes totaux, d'*E.coli*, de *S. aureus* et d'anaérobies sulfito-réducteurs (ASR) ainsi que la recherche des Salmonelles.

21 échantillons ont été classés, par rapport à la réglementation nationale, non conformes, soit un taux de non-conformité de 23,33%. Le pourcentage de non-conformité le plus élevé a été remarqué, au sein de la catégorie des végétaux et des crudités (35%), contre 21,05%, pour les plats cuisinés et 7,70%, pour les pâtisseries. La différence entre les catégories était significative ($P<0,05$). Les germes causant la non-conformité étaient représentés par les germes totaux (4,35%), les coliformes totaux (8,7%) et les *E.coli* (86,95%). Les *S.aureus* et les ASR, quoi que présents, au niveau de certains échantillons, ne causent aucune non-conformité. Aucune Salmonelle n'a été retrouvée.

Afin d'assurer une meilleure sécurité pour les consommateurs, la mise en place et le renforcement du respect des bonnes pratiques d'hygiène et des conditions de conservation doivent être réalisés, à tous les niveaux de production, du transport, de la transformation, de la conservation, du dressage et de la mise en service.

Mots Clés : qualité hygiénique, restauration collective, sécurité, consommateur, Fès

PIV-15 : Effet des Huiles Essentielles de *Mentha pulegium* L. et de *Melaleuca alternifolia* sur la Croissance et la Toxinogenèse de Deux espèces de *Penicillium* Isolées des Denrées Alimentaires

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Abstract

Les *Penicillium*, contaminants de stockage de nombreuses denrées alimentaires, secrètent lors de leur métabolisme secondaire des métabolites hautement toxiques. Les espèces toxinogènes constituent un danger réel pour la santé de l'Homme et de l'animal. Cette étude a pour objectif la démonstration du pouvoir antifongique et détoxifiant des huiles essentielles de deux plantes : *Mentha pulegium L.*et de*Melaleuca alternifolia.*

Dans ce travail, les souches de *Penicillium* ont été isolées à partir des échantillons de denrées alimentaires provenant de Tanger, Tétouan, Nador et de Martil. Les souches toxinogènes sont mises en culture, en présence de différentes concentrations des huiles essentielles, après 10 jours d'incubation à +25°C et en obscurité. La mesure du poids frais et du poids sec permet d'apprécier l'effet des huiles essentielles, sur la croissance mycélienne. La mise en évidence des mycotoxines est réalisée, par chromatographie sur couche mince.

L'huile essentielle de *Mentha pulegium L.* a montré un effet sur la croissance de deux espèces toxinogènes *P.griseofulvum* et *P. verrucosum,* aux concentrations de 2.5% et de 0.156%, respectivement. Tandis que la secrétion des mycotoxines par ces deux souches n'était pas sensible à la présence de cette huile essentielle.

Quant à l'huile essentielle de *Melaleuca alternifolia,* une concentration de 1.25% était suffisante, pour ralentir la croissance mycélienne de *P. griseofulvum* et de *P. verrucosum.* En outre, la secrétion des mycotoxines était moins importante par rapport aux témoins.

Les huiles essentielles constituent un très fort potentiel au niveau de la lutte biologique contre les *Penicillium* toxinogènes et la détoxification des mycotoxines.

Mots Clés : *Penicillium,* toxinogenèse, huiles essentielles, effet antifongique, *Mentha pulegium* L., *Melaleuca alternifolia*

PIV-16 : Activité Antifongique en Micro Atmosphère de l'Huile Essentielle de *Origanum compactum*

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Abstract

Cette étude a pour objectif l'étude de l'activité antifongique en micro-atmosphère de l'huile essentielle *d'origanum compactum*, composée majoritairement de 43.97% de carvacrol, de 17.87% de p-Gymene et de de 11.56% de thymol vis-à-vis de six champignons responsables d'importantes pertes, au niveau des denrées alimentaires stockées, à savoir *P. verrucosum, P. expansum, P. chrysogenum, A. niger, A. flavus et A. ochraceu.*

La méthode de micro-atmosphère repose sur l'évaluation de l'activité inhibitrice de la fraction volatile de l'huile essentielle *d'Origanum compactum*, à une température d'incubation de +25±2°C, sur la croissance mycélienne de six espèces fongiques, après 6 jours d'incubation.

Les résultats de cette étude ont mis en évidence une concentration minimale inhibitrice (CMI) de l'huile essentielle *d'Origanum compactum* de l'ordre de 0.0625 µl.mL^{-1} d'air, pour les espèces de *Penicillium* et de l'ordre de 0.125µl.mL^{-1} d'air, pour les espèces d'*Aspergillus*.

Les CMI retrouvées, pour l'huile essentielle d'*Origanum compactum,* montrent que cette huile a une excellente activité antifongique sur les souches testées, ce qui en fait une alternative intéressante, pour lutter contre les champignons, notamment, ceux du stockage en agroalimentaire.

Mots Clés : huile essentielle, CMI, *Origanum compactum, Penicillium, Aspergillus,* micro-atmosphère

PIV-17 : Chemical Composition and Antibacterial Activity of two Essential Oils of Rosmarinus *Rosmarinus officinalis* et *Rosmarinus eriocalyx* Against *Erwinia Amylovora* fire blight agent

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Abstract

Dealing with resistance and toxicity problems caused by the massive use of plant protection products (pesticides), and with the fact that regulation organizations are questioning, the use of antibiotics, in agriculture, it is particularly urgent to find alternatives to provide efficient protection of crops against plant diseases.

The main objective of this paper is to study the antibacterial activity of essential oils (EO) extracted of two species of Rosmary (*Rosmarinus officinalis*, *Rosmarinus eriocalyx*) against *Erwinia Amylovora*.

The extraction was carried out by water distillation Clevenger's type apparatus.The yields of extracted essential oils (EOs) are about 1.6% and 2.1%, respectively, for *Rosmarinus officinalis* and *Rosmarinus eriocalyx*. The chemical compositions of EO were analyzed, using a gas chromatography / mass spectrometry (GC-MS) showed that both species have almost the same profil. Thus, αpinene, β-pinene, camphene, camphor, borneol were found as predominant compounds and 1,8-cineole as chemotype with 40% for *Rosmarinus officinalis* and 45% for *Rosmarinus eriocalyx*. The *in vitro* antibacterial activity against *Erwinia Amylovora* was evaluated, using the method of aromatogram.

The results revealed that EO of *Rosmarinus officinalis* is most active against *Erwinia Amylovora*.

Keywords : fire blight, *Erwinia Amylovora*, antibacterial activity, *Rosmarinus officinalis, Rosmarinus eriocalyx,in vitro*

PIV-18 : Etude Comparative de l'Effet Anti Adhésion de l'Huile Essentielle et des Extraits Aqueux et Ethanolique de Salvia Officinalis sur l'Acier Inoxydable 304 dans une Solution d'Eau de Mer Simulée

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Abstract

La colonisation microbienne de la surface de l'acier inoxydable 304 est considérée comme une source de problèmes industriels austères, dans des secteurs diversifiés tels que l'industrie agroalimentaire, pharmaceutique, pétrolière, électrique, etc. Ce phénomène est ainsi à l'origine d'une diminution des rendements et d'une augmentation des coûts de production, partout dans le monde, notamment, en raison de la corrosion influencée par les microorganismes ou encore appelée biocorrosion. Dans le cadre de cette problématique, la protection de l'acier inoxydable vis à vis la biocorrosion est devenu une nécessité. Les biofilms étant très difficiles à éradiquer, une fois formés, une stratégie préventive, visant à limiter l'adhésion des microorganismes à l'acier inoxydable 304, constitue une approche pertinente.

Dans cette optique, l'objectif de ce travail est de mettre au point un traitement de surface, à efficacité anti-adhésive, sur l'acier inoxydable 304.

Dans cette poursuite, l'effet de l'huile essentielle et des extraits aqueux et éthanolique de *Salvia officinalis* (avec différentes concentrations, sur la physico-chimie de l'acier inoxydable 304 a été étudié par la méthode de l'angle de contact. Ainsi, l'activité antiadhésive de ces différents extraits a été évaluée, par l'utilisation de la microscopie électronique à balayage environnemental.

Les résultats ont montré qu'il y a une influence significative de de l'huile essentielle et les extraits utilisés sur les propriétés physico-chimiques de la surface de l'acier inoxydable 304. Aussi, un changement dans le comportement adhésif des bactéries sur cette surface a été remarqué qui peut contribuer ainsi sur l'inhibition ou le ralentissement du processus de la biocorrosion.

Mots Clés : *Salvia Officinalis*, adhésion, acier inoxydable, énergie de surface, MEB, angle de contact

PIV-19 : Study of Antibacterial Activity of *Thymus capitatus* Essential Oil and Its Use in Orange Juice Preservation

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Abstract

Preserving food and extending its shelf life have always been a central concern of food industry. In

this study, we evaluated the antibacterial activity of *Thymus capitatus* essential oil (TCEO) and its effect against pathogenic strains in orange juice conserved at +5°C.

The antibacterial activity was studied using well diffusion and broth dilution methods against pathogenic strains of *Escherichia coli* O157:H7 CECT 4267, *Listeria monocytogenes* CECT 4032 and *Staphylococcus aureus* CECT 976. The effect of the essential oil was evaluated against the same strains inoculated separately in orange juice treated with different concentrations of TCEO (0.25%, 0.125%, 0.06% and 0.03%) and conserved at +5°C.

Well diffusion assay showed inhibition zone diameters between 31.3 and 35.25 mm. Broth dilution method also revealed the antibacterial activity of TCEO with a Minimum Inhibitory Concentration (MIC) ranging between 0.25 and 0.125%. In orange juice, TCEO showed great effect at all concentrations and against all tested strains.

Thymus capitatus EO showed a great potential as plant based preservative for enhancement of juices shelf life. It can be proposed as an alternative to synthetic preservatives to ensure juices security.

Keywords : *Thymus capitatus;* essential oil; orange juice

PIV-20 : Évaluation de l'Impact des Températures de Stockage sur la Stabilité et l'Activité Biocide des Huiles Essentielles Formulées Cas de *Tribolium castaneum* (Herbst) (Insecta, Tenebrionidae)

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Abstract

Les céréales, comme d'autres denrées stockées, subissent actuellement de graves problèmes sanitaires. Les agents incriminés sont les ravageurs primaires tels que (*Sitophilus oryzae*) et les ravageurs secondaires entre autre (*Tribolium* sp.).

La présente étude a porté sur l'évaluation de l'effet biocide des huiles essentielles formulées du thym et celui d'agrume, contre les adultes de *Tribolium* rouge de la farine (*Tribolium castaneum*), sous différents régimes thermiques.
Les résultats obtunus montrent que les différentes molécules formulées ont un effet tardif (12h-14h-16h-18h), sur les populations de *Tribolium castaneum* à une température de stockage de +20°C. Les mêmes résultats montrent un effet marquant précoce du thymol et carvacrol sur les individus de *Tribolium castaneum* par rapport au limonène. La toxicité du thymol et le carvacrol se distingue du limonène, dès 12h, et, exercent un effet mortel très remarquable alors que le limonène n'exprime sa toxicité qu'à partir de 14h. Sous températures +20°C et +25°C, le thymol a montré un degré d'efficacité plus important suivi par le carvacrol, puis, le limonène qui présente une efficacité faible. En revanche, à +28°C, le carvacrol exprime un effet biocide très appréciable par rapport aux deux autres formulations thymol et Limonène.

Keywords : *Thymus fontanesii*, biopesticide, huiles essentielles, molécules bioactives, *Tribolium castaneum*, hydrodistillation

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PIV-21 : Biological Activities of Essential Oils and Ethanol Extracts of *Teucrium polium* subsp. capitatum (L.) Briq. and *Origanum floribundum* Munby

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Abstract

The present study was conducted to evaluate the *in vitro* anti-inflammatory, antioxidant and antimicrobial activities of the essential oils and crude ethanol extracts of *Teucrium polium* subsp. capitatum and *Origanum floribundum* from Algeria.
A total of 78 and 55 constituents were identified, representing 92 and 98.4% of the total chemical composition of *Teucrium* and *Origanum* essential oils, respectively. Monoterpenes (22%), sesquiterpenes (31.2 %) and oxygenated sesquiterpenes (25.5%) dominated in the oil of *T. polium* with t-cadinol (18.3%), germacrene D (15.3%) and β-pinene (10.5%); as predominant compounds, while monoterpenes (51.3%) and oxygenated monoterpenes (45.2%) were the most prominent groups in *O. floribundum* oil characterized by thymol (33.6%), γ-terpinene (19.9%) and p-cymene (15.5%). The ethanol extracts were analyzed, in terms of the dosage, in total phenolic and flavonoids contents. Gallic acid equivalent representing total phenolic constituents of the extracts of *T. polium* and *O. floribundum* were 175 and 250 mg GAE/g, respectively, and quercetin equivalent representing total flavonoids were 29.5 and 180 mg QE/g, respectively. The antioxidant potential of the samples was evaluated, using two separate methods, inhibition of free radical DPPH and reducing power.

O. floribundum extract was the most able to reduce DPPH (IC50=18.5±0.1 $\mu g.mL^{-1}$). Both plant oils were able to inhibit the 5-lipoxygenase. L'IC50 was 125.7±7.3 $\mu g.mL^{-1}$ for *Origanum* and 482.52±0.73 $\mu g.mL^{-1}$ for *T. polium*. The antimicrobial activity of the oils and *Origanum* extract against four bacteria and one fungus showed *O. floribundum* as being more active.

Keywords : anti-inflammatory, antioxidant, antimicrobial, GC-MS, *Teucrium polium*, *Origanum floribundum*

PIV-22 : Chemical Composition Antioxidant and Genotoxicity of Essential oil of *Origanum compactum*

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Abstract

Essential oils extracted from various herbs and aromatic plants have been a subject of intensive research, due to the continuous discoveries of their multifunctional properties other than their classical roles as food additives and or fragrances. Essential oils are known to possess several biological properties, including antibacterial, antioxidant, antifungal, insecticidal and anticancer activities.

Because of its geographical location, Morocco has favorable conditions, for the development of a rich and varied flora with a significant potential of medicinal and aromatic plants. The exploitation of this potential became an important and promising sector for the country.

In this context, the aim of this work, was to study the chemical composition of essential oil of *Origanum compactum* by GC-MS and its antioxidant activities by three methods : DPPH free radical scavenging, β-carotene linoleic acid and thiobarbituric acid reactive species (TBARS) assay. We also investigated genotoxic effect, on human peripheral blood lymphocytes, using micronucleus assay (MN) and proliferation index (PI).
The GC-MS analysis showed that the major constituents of *Origanum compactum* essential oil were carvacrol (43.97%), p-cymene (17.78%) and thymol (11.56%). In all methods, the tested essential oil showed a strong antioxidant activity. This could be attributed to the phenolic compounds present at high concentration in this oil. The PI value were influenced by the essential oil. Also, the inrease in concentration of essential oil causes the appearance of micronuclei.
Our results suggest the potential use of *Origanum compactum* as an antioxidant agent. However, further studies are necessary to comfirm genotoxic effect.

Keywords : *Origanum compactum*, antioxidant activity, human lymphocytes, proliferation index, micronucleus test

PIV-23 : Phytochemistry of the Essential Oil of *Illicium verum* Preventive Approach Against the Pathogenic Bacteria

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Abstract

To determine the phytochemical characterization and antibacterial activity of *Illicium verum* essential oil against five bacteria responsible for some infections.

The phytochemical characterization of essential oil was evaluated, using gas chromatography-flame ionization detector and gas chromatography-mass spectrometer analysis. Antibacterial activity of the oil was tested against four bacterial strains responsible for infections *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Staphylococcus aureus*, *Escherichia coli* and *Proteus mirabilis*, using disc diffusion method.

The essential oils obtained by hydrodistillation of the fruit of *Illicium verum*, whose main component is trans-Anethole (70-94%), estragole, limonene, (Z)-anethole, pinene, β-phellondrene and α-terpineol. Antibacterial activity of the oil showed the higher activity against all bacterial strains tested.

The results obtained suggest that the essential oils of *Illicium verum* be used in the treatment of diseases caused by the bacteria testes and serve as a biomolecule source for pharmaceutical industries.

Keywords : *Illicium verum*, essential oils, phytochemestry, antibacterial activity, infection

PIV-24 : Antibacterial Activity of Essential Oils Extracts from Cinnamon, Thyme, Clove and Geranium against a Gram Negative and Gram Positive Pathogenic Bacteria

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Abstract

Essential oils and other extracts of plants have evoked have been screened, for their potential uses as alternative remedies, for the treatment of many infectious diseases.

In this context, the aim of this study was to investigate the antibacterial activity of the essential oils, from Cinnamon, Thyme, Clove and Geranium, against four strains of Gram negative bacteria and two Gram positive bacteria.

The *in vitro* antimicrobial effects of these essential oils was determined by the disc diffusion method. The Minimum Inhibitory Concentration (MIC) was evaluated, by using the broth serial dilution method and Minimum Bactericidal Concentration values (MBC) were defined, as the lowest concentration of sample which resulted in ≥99.9% kill of the initial inoculum. The antibacterial effect was deemed bactericidal or bacteriostatic, depending on the ratio MB/CMI.

Cinnamon possesses an important antimicrobial activity against all tested microbes, with the inhibition zones ranging from 26 to 32 mm. The essential oils of thyme and Clove showed the antibacterial activity, with inhibition zones at 16-22 mm and 16-20 mm, respectively. However, the Geranium essential oil failed to inhibit any of the tested strains. Both Gram-positive and Gram-negative bacteria were resistant to this essential oil.

Results according to the MICs and MBCs revealed that the essential oil from Cinnamon showed the most remarkable bactericidal effect.

This essential oil might be exploited as natural antibiotic for the treatment of several infectious diseases caused by the pathogens germs and conservation agents in the food.

Keywords : essential oils, pathogenic bacteria, antibacterial activity, cinnamon, thyme, clove

P-IV-25 : Chemical Composition and Antibacterial Activity of Moroccan *Thymus satureioides* Essential Oil

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Abstract

In order to increase the Moroccan *T. satureioides* value, the chemical composition and antibacterial activity of its essential oil were evaluated. Analysis by gas chromatography-mass spectrometry gave as major compounds, borneol (34.26%), carvacrol (31.21%) and E-caryophyllene (6.32%). The antibacterial activity was carried out against pathogenic bacteria which are frequent and cause problems in the medical and food fields.

The study of antibacterial activity was performed on Gram positive bacteria *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, *Micrococcus luteus* and Gram-negative bacteria *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella thyphimirium* by the microdilution method.

According to the results of the Minimal inhibitory Concentration (MIC) we can conclude that the essential oil has antimicrobial potential vis-à-vis all microorganisms studied. *Bacillus cereus* was the most sensitive strain against the essential oil with an MIC of 0,015% while *Pseudomonas aeruginosa* was the most resistant one with an MIC of 1%.

PIV-26 : Biological Investigations of Antioxidant, Antimicrobial Properties and Chemical Composition of Essential Oil from *Warionia saharae*

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Abstract

Several aromatic plants and their essential oils are known to possess antimicrobial and antioxidant properties. *Warionia saharae* Benth & Coss, an endemic species of North Africa, is traditionally used in the treatment of inflammatory diseases such as rheumatoid arthritis and for gastrointestinal disorders.

The aims of this study were to examine the chemical composition of the essential oil isolated from *W.saharae* and to test the efficacy of the essential oil as a potential antimicrobial and antioxidant.

The essential oil was investigated by gas chromatography-mass spectrometry (GC-MS). Thirty-six compounds, accounting 96.8% of total oil with 1.1% oil yield were identified. The major compents of W. saharae essential oils were β-eudesmol (24.6%), trans-nerolidol (18.2%), linalool (16.8%), 1,8 cineole (6.2%), camphor (4.6%), p-cymene (3.7%) and terpinen-4-ol (3.6%).

In this study, we analyzed biological activities of *Warionia* essential oil from Errachidia region, Morocco. Indeed, we investigated mainly, the antimicrobial activity against four referenced and representative human diseases health bacteria. Also, this essential oil was tested against phytopathogenic fungi.

The results showed that *W. saharae* oil exhibited significant antibacterial and antifungal activities, with minimum inhibitory concentrations (MIC), ranging between 0.039 and 0.156 $mg.mL^{-1}$, for all bacteria and remarkable antifungal effect that exceeds 50% inhibition of mycelial growth for all fungal strains. We also checked whether this oil exhibited an antioxidant property via radical scavenging ability and antioxidant activity, determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay and β-carotene bleaching test.

Our results show an important antioxidant property for *W.saharae* essential oil.

Keywords : antimicrobial activity, antioxidant activity, chemical composition, essential oil, *Warionia saharae*

PIV-27 : Étude de l'Activité Antifongique des Huiles Essentielles de *Thymus saturoides* et *Thymus leptobotrys* sur des Levures du genre *Candida*

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Abstract

Au cours de ces dernières décennies, et, malgré les traitements antifongiques, actuellement disponibles, l'incidence des infections fongiques a augmenté d'une façon alarmante, provoquant ainsi un taux de morbidité et de mortalité assez élevé. De même, l'utilisation abusive et la prescription immodérée de ces antifongiques ont causé une apparition de souches résistantes aux différentes classes d'antibiotiques classiques. La découverte de nouveaux agents antifongiques est devenue donc une nécessité et l'exploration des ressources naturelles apparaît comme une voie de recherche très prometteuse.

Dans ce contexte, nous avons évalué l'effet antifongique de deux huiles essentielles extraites à partir de deux plantes médicinales endémiques marocaines à savoir *Thymus saturoides* et *Thymus leptobotrys*. L'analyse qualitative de l'activité antifongique de ces deux huiles essentielles a été réalisée, par l'utilisation de la méthode de diffusion par disque, sur milieu gélosé et les concentrations minimales inhibitrices (CMI) et fongicides (CMF) on été réalisées, par la méthode de macro-dilution en milieux liquide.

Le test de diffusion par disque a montré que les deux extraits des huiles essentielles exercent une activité antifongique vis-à-vis de 5 souches de levure du genre *Candida* (deux souches de *C. albicans, C. glabrata, C. krusei, C. parapsilosis)*. L'huile essentielle de *T. leptobotrys* est dotée d'une très forte activité inhibitrice *vis-à-vis* de toutes les souches testées, avec un diamètre d'inhibition variant entre 33 et 60 mm, tandis que l'huile essentielle de *T. saturoides* exerçait une forte activité sur seulement deux souches de *C. albicans,* avec un diamètre d'inhibition qui varie entre 30 et 32 mm.

Le test de CMI a révélé que les deux huiles essentielles testées semblent exercer une action fongicide sur les 5 souches du genre *Candida,* avec un rapport CMF/CMI strictement inferieur à 4.

Mots Clés : infections fongiques, antifongiques, huiles essentielles, *Thymus, Candida*

PIV-28 : *in vivo* Antimicrobial Activity of Methanolic Extract of *Zygophyllum album* against *Bacillus subtilis*

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Abstract

The principal objective of our study was to investigate the *in vivo* anti-*Bacillus* activity and the safety of methanolic extract of *Zygophyllum album (Z. album)*, a plant commonly used in Algeria by traditional healers.

The methods use *Bacillus subtilis*-infected rat model was used, for the study. The physiological and histopathological markers of possible side effects of this extract were studied, using standard methods. The extract had a significant effect on the number of viable *Bacillus subtilis* recovered from faeces, and could stop bacillosis, after 8 and 10 days of treatment, for male rats, with non-toxic dose. However, the histopathological analyses revealed that at the same dose (800 $mg.kg^{-1}$) the curatif technique, with methanolic

extract could induce better antibacterial effect than the preventif one.

So all the overall results indicate that the methanolic extract of *Z. album* has the potential to provide an effective treatment for bacillosis. However, it is necessary to extrapolate these results in large animals, in further studies.

Keywords : *Zygophyllum album, Bacillus subtilis,* infection, safety

PIV- 29 : Composition Chimique et Activité Antimicrobienne de l'Huile Essentielle de *Juniperus communis* L. (Genévrier)

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Abstract

Cette étude a pour objectif la recherche, à travers un screening, de la composition chimique et de l'effet antimicrobien de l'huile essentielle de *Juniperus communis* L., utilisée en médecine traditionnelle, afin de pouvoir utiliser de nouvelles molécules et contrer le problème de santé mondial, soit la résistance aux antibiotiques.

La composition chimique de l'huile essentielle est déterminée par les méthodes CPG et CPG/SM. Nous avons étudié 4 espèces bactériennes, sur la base de leur fréquence d'isolement clinique *Escherichia coli, P.mirabilis, Staphylococcus aureus et A. baumanii* et la levure *C. albicans.* La méthode de l'aromatogramme, pour mettre en évidence l'action des huiles essentielles, en parallèle de l'antibiogramme de ces mêmes souches, a été effectuée.
Le calcul de la CMI et de la CMB est aussi effectué, sur milieu solide avec des dilutions décimales des huiles essentielles.

L'huile essentielle de Genévrier récoltée à Médea, en Algérie, donnent 2,51% d'essence par hydrodistillation. Par CPG et CPG/SM, trente six composés ont été identifiés représentant 91,9% de l'essence totale. L'α-pinène (22,60%), le Bicyclol (12,71%), limonene (9,75%), le borneol (4,96%), le β-myrcene (3,70%), le D-limonene (4,06%) et le camphene (2,12%) sont les principaux constituants.

L'huile essentielle est active *in vitro* contre les bactéries *Escherichia coli, Proteus mirabilis, Staphylococcus aureus et A. baumanii* et la levure *C. albicans,* avec des diamètres d'inhibition allant de 15 à 40 mm, selon les souches, avec une inhibition marquée de *C. albicans.*

L'huile essentielle a montré une forte activité contre tous les microorganismes. Chez les bactéries, *Escherichia coli* et *Staphylococcus aureus* ont manifesté une certaine résistance jusqu'à 1/5000 (v/v). *C. albicans* a été complètement inhibée à 1/2000 (v/v).

En comparant les aromatogrammes et les antibiogrammes, on note une activité intéressante de l'huile essentielle sur les souches utilisées, et, surtout, *C.albicans* qui mérite une exploitation plus approfondie et des applications visant à inhiber les infections microbiennes et la formation de biofilm.

Mots Clés : Genévrier, CPG/SM, aromatogramme, CMI, CMB

PIV-30 : Potentiation of the Antibacterial Effect of *Thymus satureioides and Pelargonium asperum* Essential Oils against *Salmonella enterica* subsp. enterica (serovar Typhimurium) by Binary Combination

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Abstract

This study investigates the antibacterial effect of the single and, for the first time, the combined application of *T. satureioides* and *P. asperum* essential oils toward *Salmonella enterica* subsp. enterica (serovar Typhimurium).

Essential oils were obtained from plants harvested in Morocco. The antibacterial activity of each essential oil was assessed *in vitro*, using disk-diffusion and microdilution methods. The antibacterial effect of the combined application of the studied essential oils was assessed by the checkerboard method followed by the fractional inhibitory concentration index calculation.

Both essential oils showed remarkable *in vitro* antibacterial effects against *Salmonella enterica* subsp. enterica (serovar Typhimurium), with the same MIC (0.125% v/v). Moreover, the study of their antibacterial combined effect has generated five combinations and three types of interaction. The most effective showed a partial synergistic interaction, which contains (½ MIC *T. satureioides* + ¼ MIC *P. asperum*) with a FIC index of 0.744. All combinations generated did not show any antagonistic interaction, between both essential oils against the target bacterium.

The results demonstrated the potential of the combined application of the two studied essential oils, in the control of *Salmonella enterica* subsp. enterica (serovar Typhimurium) pathogen.

Keywords : antimicrobial, essential oil, combined application, checkerboard method, interaction

PIV-31 : Effet Protecteur de Deux Huiles Essentielles sur le Protozoaire *Tetrahymena thermophila*

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Abstract

Les plantes médicinales représentent une alternative efficace et une méthode de prévention des maladies, mais, également, restent toujours la source fiable des principes actifs connus par leurs propriétés thérapeutiques. Les huiles essentielles sont un véritable concentré de plantes qui est défini par un produit huileux, volatil et odorant. Ces essences représentent de nombreuses propriétés, notamment, des propriétés antiseptiques, anti-inflammatoires, anti-cicatrisantes, antimicrobiennes et autres …

Dans ce contexte, on s'est intéressé à évaluer une nouvelle propriété des huiles essentielles qui est l'effet protecteur. Pour ce faire, nous avons choisi deux huiles essentielles de *Rosmarinus officinalis* et *Eucalyptus globulus* connues pour leur vertus, afin de tester leur effet protecteur sur la forme et la croissance d'une cellule de type eucaryotique, en utilisant comme modèle le protozoaire *Tetrahymena thermophila* considéré parmi les protozoaires le plus souvent utilisé en recherche, vu que ce sont des cellules qui combinent la complexité biologique des eucaryotes et l'accessibilité expérimentale des organismes unicellulaires.

Le test de l'effet protecteur des deux huiles essentielles sur le protozoaire a montré que ce dernier est capable de se multiplier et croître en présence des huiles essentielles, seulement à des concentrations relativement faibles. Aussi, selon nos objectifs, ces huiles essentielles pourront être utilisées, en tant que protecteur du protozoaire, contre les contaminations microbiennes, comme elles seront utilisées, pour ralentir sa croissance, par conséquent, diminuer le taux des repiquages.

Mots Clés : protozoaire, huiles essentielles, effet protecteur, contamination, dispersion

PIV-32 : Composition and Antibacterial Activity of Hydro-Alcohol and Aqueous Extracts Obtained from Moroccan Plants of the *Lamiaceae* Family against Pathogenic Strains

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Abstract

The aim of this study was to evaluate the *in vitro* antibacterial activity of ethanol and aqueous extracts of Moroccan plants, from the *Lamiaceae* family, against five bacterial strains regularly implicated in toxi-infections.

The antibacterial activity of extracts was evaluated by agar-well diffusion method, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and CI_{50} against six food borne bacteria (*Bacillus cereus*, *Listeria monocytogenes*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella enterica*). Qualitative and quantitative detection of chemical groups were also evaluated.

The qualitative and quantitative detection of chemical compounds showed that the ethanol extracts of the *Lmiaceae* family plants were rich in polyphenols, with middling values of flavonoids, and relatively poor in condensed tannins. In addition, we note the presence of saponins, essential oils, irroides, alkaloids, anthocyanins and aldehydes.

The results revealed a sensitivity of the five germs to all the extracts tested. In liquid medium, the action of the extracts was directly bactericidal for *B. cereus* and *L. monocytogenes*. For the other strains, especially, *P. aeruginosa*, the MBC value was twice that MIC. However, the ethanol extract (EE) of *O. majorana* and *T. satureioides* showed the highest antibacterial activity against the five strains, with a bactericidal effect.

According to these results, the microplate method was more reliable than solid medium method. While, ethanol was the best solvent in the concentration of the plant active compounds. In addition, the antimicrobial activities of these plants extracts could justify their therapeutic use, in traditional medicine, in the treatment of many microbial infections.

Keywords : antibacterial activity, *Lamiaceae* family, phenolic compounds, Flavonoic content, hydro-alcohol extract, aqueous extract

PIV-33 : Caractérisation Chimique par GC/MS de l'Huile Essentielle d'*Origanum compactum* de Région de Meknès

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Abstract

L'origan à fleurs compactes est une espèce endémique du Maroc et de l'Espagne méridionale. C'est une espèce qui pousse dans les forêts, les broussailles et les pâturages rocailleux de la plaine et des basses montagnes. La floraison a lieu en Mai-Juillet. Sur le plan biogéographique *Origanum compactum* pousse dans le Rif, le Tangérois, le Maroc centro-septentrional, le nord du Maroc occidental, l'ouest du Maroc méridional, le Haouz, le Haut atlas et le sud de la péninsule ibérique.

La partie aérienne a été récoltée, au mois de Mai (2010), dans la région de Meknès, située au centre du Maroc. Après sept jours de séchage, à l'air libre et à l'ombre, l'extraction des huiles essentielles a été réalisée, par hydrodistillation, dans un appareil de type Clevenger. La distillation à durée 3 heures.

L'huile essentielle ainsi obtenue est séchée sur sulfate de sodium anhydre, puis, stockée à une température de +4°C. Les huiles essentielles ainsi obtenues ont été fractionnées, par chromatographie sur colonne (CPL). L'analyse chromatographique de l'huile essentielle brute et les fractions ont été effectuées avec un chromatographe en phase gazeuse (Trace GC ULTRA) couplée à la spectrométrie de masse (Polaris Q MS à traque ionique).

L'analyse par chromatographie en phase gazeuse couplée à la spectrométrie de masse (CPG/SM) montre la présence de Thymol (56,41%), le 3-Carène (13,56%) et le Phellandrène (8,64%) comme produits majoritaires, dans l'huile essentielle brute d'*Origanum compactum*, alors que le trans-Caryophyllène (19,42%), le Carvacrol (91,25%) et l'acétate d'ocimenyle (33,66%) sont les composés majoritaires, respectivement, pour les fractions F_1, F_2 et F_3.

Mots Clés : *Origanum compactum*, GC/MS, thymol, phellandrène, trans-caryophyllène, carvacrol, acétate d'ocimenyle

PIV-34 : Effect of Polyphenols extracted from Honey on Methicillin Resistant *Staphylococcus aureus*

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Abstract

Infections of Methicillin Resistant *Staphylococcus aureus* (MRSA) have different problems of nosocomial infectious diseases, in addition to multidrug resistance.

Our work is a contribution to the evaluation of the antimicrobial effect of four (04) polyphenolic extracts of honey harvested from different sites, in the Algerian territory, on the one hand, and, the study of the physicochemical, microbiological, sensory and pollen of other. The results clearly show the impact of polyphenolic extracts of honey, on bacterial susceptibility. This inhibitory effect was found for the four samples tested with varying efficiency of the polyphenolic extract of which the polyphenolic extract of Jijel is the most inhibitor with MIC=0.095µL.

This activity is linked not only to the type of polyphenols, but, also, to the physicochemical, microbiological, sensory and honey botanical origin.

Keywords : antibacterien effect, MRSA, nosocomials infections, honey, polyphenols

PIV-35 : Comparing the Antimicrobial Potential of Sahara Honey from Algeria and Manuka Honey against Urogenital Microorganisms

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Abstract

Various studies have been conducted, to investigate the antimicrobial properties of honey, from different parts of the world. To date, no extensive studies of the antimicrobial properties of Sahara honey (SH) on urogenital microorganisms have been conducted.

The objectives of this study were to conduct such studies and to compare the antimicrobial activity of SH with Manuka honey (MH).

Several unifloral SH and MH were analyzed to determine their total phenolic, color and antimicrobial capacities. The Folin-Ciocalteu assay was used to measure phenol content. Two different assays were performed to evaluate the antimicrobial potential of the honey samples : agar-well and disk diffusion assay. The honey samples were tested without dilution and at 50 and 25% (w/v) dilution.

The means of the total phenolic contents of SH and MH were 82.8±0.23 and 143.5±0.62 mg.100 g^{-1} honey as gallic acid equivalent, respectively. Initial screening with the agar-well and disk diffusion assay demonstrated that undiluted honey had greater antimicrobial activity against all isolates tested. The zones of inhibition values of SH and MH against different strains ranged from 15 to 27.5 mm and 16.5-24mm, respectively. In addition, the honey showed diameter of the upper region of the inhibition of microbes when the two isolates were mixed.

This is the first report on antimicrobial effect of SH against urogenital microorganisms. This work demonstrates the potential of Sahara honey is a very good trend, in the treatment for polymicrobial infections.

Keywords : antimicrobial activity, sahara honey, Manuka honey

PIV-36 : Antibacterial Activity of Crude Plant Extracts of *Crataegus oxyacantha* and *Cistus salviifolus* Against Three *Staphylococcus* Strain

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Abstract

Dermatosis is a major problem of public health, in developing countries and, especially, in rural

areas. Furthermore, today the germs causing these cutaneous infections are becoming increasingly resistant to antimicrobials, hence the need to return to the traditional medicine, recommended by the World Health Organization.
In this context, this study aims to investigate the antibacterial effect of two crude plant extracts from Sefrou, selected on the basis of an ethnobotanical study.

The extract AZ and IMT are respectively obtained from plants *Crataegus oxyancantha* and *Cistus salviifolius*, using methanolic extraction. Then, both plant extracts were subjected to an *in vitro* antibacterial testing, against three strains belonging to *Staphylococcus* genus.

The results have shown that both extracts exercise an inhibitory activity against all the tested bacteria. The determination of minimum inhibitory concentrations (MIC) showed that both *S. aureus* MR strains expressed the same susceptibility behavior against the studied extracts, while *S. epidermidis* was resistant to AZ extract and very susceptible to IMT.

This preliminary report shows that both selected plants could be a promising source of new *anti-Staphylococcus* agents, however, further analysis in depth are requested to contribute to the successful application of these natural products, in order to control dermatosis.

Keywords : dermatosis, *Crataegus oxyacantha*, *Cistus salviifolius*, anti-S*taphylococcus* activity, bacteria, natural products

PIV-37 : Activité Antimicrobienne de *Cladophialophora* et *Trichoderma*, Mycoendophytes Foliaires d'*Urtica dioica* (Ortie Commune)

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Abstract

Urtica dioica est une plante vivace herbacée, appartenant à la famille des Urticacées, considérée, depuis l'antiquité, comme une importante ressource phytogénétique. Les mycoendophytes favorisent la croissance et confèrent au végétal une meilleure résistance à divers pathogènes.

Pour mettre en évidence la contribution des mycoendophytes d'*Urtica dioica*, dans les vertus thérapeutiques de cette plante, nous avons étudié l'activité antifongique de deux genres de mycoendophytes provenant de fragments de feuilles stérilisées et ensemencées sur milieu PDA, à savoir *Cladophialophora* et *Trichoderma* vis-à-vis d'*Aspergillus flavus*, plusieurs espèces de *Fusarium, Penicillium glabrum, P. sp* et *Botrytis cinerea*, en utilisant la technique de la double culture qui consiste à mettre en contacte direct les mycoendophytes et les souches pathogènes. Nous avons aussi recherché l'activité antibactérienne de ces mycoendophytes vis-à-vis des souches *E. coli* ATCC 25922, *Euterococcus feacalis* ATCC 49452 et 0409p), *Pseudomonas aeruginosa* ATCC 27853, *Klebsiella pneumoniae* ATCC 4352, *Citrobacter freundii* ATCC 8090, *Staphylococcus aureus* ATCC 43300 et 25923) et *Bacillus cereus* ATCC 10876.

Cladophialophora a présenté une activité antibactérienne vis-à-vis de toutes les souches testées, à l'exception d'*Enterococcus feacalis* ATCC 0409p et aucune activité antifongique. Par contre, *Trichoderma* a présenté une activité antifongique et n'a montré aucune activité antibactérienne.

L'ortie est une plante très utilisée, en agriculture et en médecine traditionnelle. Ces vertus pourraient s'expliquer par la présence de ces mycoendophytes, au niveau de son appareil végétatif.

Mots Clés : *Urtica dioica*, mycoendophytes foliaires, activité antifongique, *Trichoderma*, *Cladophialophora*, activité antibactérienne

PIV-38 : Antibiotic Resistance and Incidence of Virulence Determinants en *Enterococci*

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Abstract

The aim of our study was to type *enterococci* from artisanal goat cheese by genotypic methods and to determine antibiotic susceptibility and the presence of virulence determinants.

In this study, 250 *Enterococcus* strains, isolated from goat cheese, were investigated, 205 *Enterococcus faecalis* and 38 *Enterococcus faecium*. Their sensitivity to antibiotics (Tetracycline, Penicillin, Chloramphenicol, Ampicillin, Teicoplanin, Vancomycin, Erythromycin, Kanamycin and Clindamycin) was tested by disc diffusion method.

The results indicated that *E. faecium* possess considerably lower antibiotic resistance than *E. faecalis*. No vancomycin resistance was observed, in all *Enterococcus* isolates. The presence of virulence genes (*efaAfs, efaAfm, esp, agg, cylM, cylB, cylA, cylLL, cylLs, fsr, and gelE*) was determined by PCR. The majority of enterococcal isolates showed availability of one or more virulence factors. *efaAfs+ gelE+* and agg+ were the most frequent genotypes (35.5%). *E. faecalis* isolates harboured multiple virulence traits, whereas *E. faecium* isolates were generally free of virulence determinants.

Keywords *: Enterococci*, antibiotic resistance, virulence determinants

PIV-39 : Biodegradation of *Oleuropein* by *Lactobacillus pentosus* S150 Isolated from Spontaneous fermentation of Moroccan Green Olives

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Abstract

Oleuropein is a phenolic glycoside found, in the bark, leaves and fruit of the olive tree, as well as in some other genera of the *Oleaceae*. The most abundant phenolic substance, in the drupe, is oleuropein, a bitter natural compound responsible for the bitterness of olive fruits. It was known by its inhibitory effect on the lactic acid bacteria, highly desired to assure the natural lactic fermentation process. However, isolation of strains with oleuropein biodegradation property is in progress.

Among 250 isolates, we selected 15 strains showing high degradation capacity of oleuropein, including *Lactobacillus pentosus* S150. This strain was studied for its *in vitro* biodegradation capacity, in modified MRS broth containing oleuropein (1%). The parameters including biomass, pH, free acidity, reducing sugars, oleuropein contents and its hydrolysis products were analyzed during the incubation at +30°C.

After 12 days of incubation, the results obtained showed a decrease of pH, oleuropein and reducing sugars, with a simultaneous increase of biomass, free acidity and hydroxytyrosol.

These results confirm the oleuropein biodegradation capacity of *Lactobacillus pentosus* S150 associated with acidification and biomass development which may lead to its use as starter for controlled fermentation of non alkali treated green olives.

Keywords : oleuropein, *Lactobacillus pentosus*, starter, fermentation, olive

PIV-40 : Étude de Certaines Propriétés Probiotiques des Souches de Bactéries Lactiques et de Levures Isolées des Olives en Fermentation

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Abstract

Le Maroc est très connu par sa production en olives de table. Il le 4ème exportateur mondial des olives de table. Pour renforcer la compétitivité de ce secteur, nous avons pensé à jouer sur le facteur qualité, en particulier, les propriétés probiotiques, et, ceci par la mise au point de ferments composées principalement de souches de bactéries lactiques et de levures autochtones aux olives de table marocaines, en fermentation naturelle. Ces souches sélectionnées doivent résister à l'acidité gastrique ainsi qu'aux acides biliaires, afin de parvenir vivantes dans le gros intestin et de pouvoir y exercer une action bénéfique.

Pour cela 224 souches de bactéries lactiques et 180 souches de levures ont été utilisées pour cette étude. Jusqu'à présent, on a effectué plusieurs tests à savoir la résistance aux pH acides (2, 2,5 et 3), la résistance à la bile (0,3%), l'hydrolyse de l'arginine et de l'urée, la dégradation de l'amidon, ainsi que d'autres tests sont cours d'exécution.

Les résultats obtenus jusqu'à présent montrent la capacité d'un grand nombre de ces souches à dominer et à se développer dans les conditions du tube digestif, à savoir le milieu acide, la présence de la bile, ainsi que l'hydrolyse de l'urée et de l'amidon.

Mots Clés : olives vertes, bactéries lactiques, levures, probiotiques

PIV-41 : Diversity of *Nematophagous fungus* Communities in Commercial Olive Nurseries in Morocco

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Abstract

The plant-parasitic nematodes (PPN) are important plant pests, in agriculture. Annual losses caused by PPN are estimated from 8.8 to 14.6% of the world crop production (100-157 billion USD by year). In Morocco, nematode parasitism is enhanced, in intensive cropping systems (tomato, olive, …), especially, with root-knot nematodes (*Meloidogyne* spp.). Because of crop intensification and the adaptation of PPN to chemical pesticides, the search of alternative strategies for nematode control is necessary. Biological control using nematophagous fungi is one option, especially, at the nursery state before planting. However, few studies have been conducted with native strains.

Then, the present study aims at evaluating the nematode population levels and isolating, identifying and assessing the *in vitro* predatory activity of *Nematophagous fungi* that had been isolated in 25 commercial olive nurseries, in contrasting soil substrates across five regions, in Morocco (Souss-Massa, Haouz, Guerouane and Sefiane). Among the 305 soil samples recovered from these nurseries, conidial traps of nematode destroying fungi were recorded, in all the areas surveyed. Seventy-three pure isolates were obtained. Diversity indices showed that the fungal isolates were more numerous, in the Souss region while the fungal communities were more numerically alike, in the Guerouane region. *In vitro* predatory activity of the fungal strains against *M. javanica* juveniles showed that *Talaromyces assiutensis* has been identified as the most efficient nematophagous fungus. The *Arthrobotrys* species, *Drechslerella brochopaga*

and the *Monacrosporium* species were able to trap 50 to 80% of the nematode juveniles. *Paecilomyces* and *Trichoderma* species were able to kill 30 to 50% of the juveniles.

The development of such nematophagous fungi as biocontrol agents can be considered.

Keywords : *Nematophagous fungi*, *Meloidogyne*, olive nurseries, diversity, *in vitro* predation

PIV-42 : Diversité des Mycoendophytes Foliaires chez *Limoniastrum feei* (Girard) Batt. de Oued Aghlal (Béchar, Algérie)

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Abstract

La plupart des plantes étudiées, dans les écosystèmes naturels, sont infestées par des champignons microscopiques, sans pour autant qu'elles ne développent de symptômes pathogènes. Ces microorganismes discrets représentent une trame fongique importante et diversifiée appelés endophytes. Ces symbiotes fongiques, bien qu'ils soient invisibles et peu connus sont importants. Leur fonction écologique apparaît, de plus en plus évidente, puisqu'ils participeraient activement à une meilleure adaptation des plantes à leur environnement et contribuent, par conséquent, au maintien de la biodiversité végétale.

Dans ce travail, notre intérêt s'est porté sur les mycoendophytes foliaires présents chez *Limoniastrum feei* (de Gir.) Batt. de la région de oued Aghlal (Béchar). L'espèce étudiée est endémique du Sahara septentrional marocain et algérien et appréciée pour ses propriétés médicinales.

L'échantillonnage a concerné 23 sujets sains. 10 feuilles sont prélevées sur chaque pied pour être ensemencées sur milieu PDA. L'incubation est faite à température ambiante. Elle est suivie par une identification morphologique (macroscopique et microscopique). Après incubation, nous avons obtenu un total de 444 isolats fongiques. Ces derniers appartiennent à différentes espèces fongiques. Les espèces du genre *Penicillium* suivies de celles du genre *Aspergillus* apparaissent comme les plus dominantes. Ces deux genres sont connus pour leurs activités antimicrobiennes. Ils pourraient donc contribuer par leurs métabolites secondaires aux propriétés médicinales de cette plante. De part cette richesse remarquable de la mycoflore endophyte, les feuilles de *L. feei* peuvent être considérées comme un véritable hotspot de biodiversité microbienne.

Mot Clés : *Limoniastrum feei*, mycoendophytes, diversité foliaire, Béchar Algérie)

PIV-43 : Study of the Adhesion phenomena of the Agent of Fire Blight to the host *Malus spp*. (Apple)

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Abstract

Fire blight, the disease caused by *Erwinia amylovora*, infects most species of the subfamily *Maloideae* of the family *Rosaceae*.

This disease results in enormous economic looses for producers of fruits like apple (*Malus domestica*), pear (*Pyrus communis*) and quince (*Cydonia oblonga*). Since 2006, the symptoms were detected, in Morocco, and the disease has spread, in most production zone of apple, in the country. In order to prevent the infection to occur, it is the must to understand the relation between the bacteria and biofilm formation. As it is now the adhesion of bacteria to substrata conducts to biofilm formation and improves the efficiency of bacteria activity and resistance to different kind of stress.

This study was conducted to investigate the adhesion phenomena. The samples (about 30) were collected after a research of information concerning the parcels infected in the region of Béni Mellal. Medium agar KB was used to isolate

24 bacteria. We determined the physicochemical characteristics and the surface tension with the contact angle technic of different supposed causal agent bacteria collected.

The results showed different profiles.

Keywords : fire blight, adhesion, biofilm, contact angle, surface tension

PIV-44 : Induction of Resistance in Tomato (*Lycopersucum esculentum*) Plants Treated with *Bacillus amyloliquefaciens* and Its Effect on the Advance of Stem Necrosis Caused by *Rhizoctonia solani*

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Abstract

Bacillus amyloliquefaciens has shown great potential, for controlling plant diseases caused by soil fungal pathogens. One of the possible mechanisms responsable for the biocontrol of plant diseases by antagonist microorganisms is induction of systemic reactions.

The possible interaction of this mechanism, in the reduction of disease caused by *Rhizoctonia solani*, in tomato plants led us to study the effect of *B. amyloliquefaciens*. We therefore analysed the induction of systemic resistance, in the leaves of tomato plants infected by decapitation of the stem and inoculated with the antagonist through the root.

We studied the dynamic of necrosis, in the infected stems and the possible role of peroxidases, in the defence mechanism involved, in the plant-pathogen-antagonist interactions in which peroxidases are known to play a fundamental role in cell wall thickening throught lignification, suberisation or the insolubilisation of extensin monomers.

The effect of adding *B. amyloliquefaciens* colonies to the roots diminished necrosis length, implying that pathogenic infection slows down. The antagonist fungus induces peroxidase activity, thereby intensifying resistance. In general, the peroxidase activity of acid proteins is greater than that of basic proteins after inoculation with the antagonist *B. amyloliquefaciens*. The increase in peroxidase activity seems to be directly related with the defensive response of plants (lignification responses), both systemic, in leaves, and direct, in roots, where not only does the activity increase but peroxidases that do not appear in the untreated plants are produced "de novo".

Keywords : Peroxidase, Tomato, *Bacillus amyloliquefaciens*, *Rhizoctonia solani*, Induction of resistance

PIV-45 : Effect of Some Antagonistic Bacterial Strains on the Mycelial Growth and Conidial Germination of *Botrytis cinerea*

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Abstract

Infection of strawberry by *Botrytis cinerea* is an important problem in the world. Biological control represent an alternative to the use of pesticides in crop protection.

A key to progress, in biological control, to protect strawberry against *B. cinerea* is, to select, *in vitro*, the best agent to be applied in the field.

The aim of this work was to compare the effect of some antagonistic bacterial strains on the mycelial growth and conidial germination of *B. cinerea*.

More than 300 isolates of bacteria were obtained by isolations on PCA medium. By using the dual culture method, nine isolates were screened for their effectiveness to produce an inhibition zone and necrosis against *B. cinerea*. A comparative study was made for the nine selected bacteria *in vitro*. Bacterial suspensions were prepared and adjusted to different concentrations. The interaction pathogen antagonist was made in liquid medium, for the germination test and in solid medium, for the mycelium growth test.

The nine bacteria affect mycelial growth and conidial germination at different degree. Their effect on the mycelial growth was more marked than on the conidial germination of the pathogen. Two isolates have a maximum inhibition *in vitro* at the lowest concentration tested on the growth and conidial germination. The antagonists were identified as *Bacillus spp*. based on cultural and morphological characteristics. A molecular technique was used to confirm identification, in CECT (Spain). The antagonistic bacteria were identified as *Bacillusamyloliquefaciens*.

Two isolates of them (B3-Bc5 and B24-Bc7) can be used for the *in vivo* tests.

Keywords : *Bacillus amyloliquefaciens*, *in vitro*, *Botrytis cinerea*, mycelial growth, conidial germination

PIV-46 : Antagonistic Activities of Plant Growth Promoting Fluorescent *Pseudomonads* against Tomato Bacterial Canker Agent *Clavibacter michiganensis* subsp. michiganensis

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Abstract

Bacterial canker of tomato is widespread, in the Souss Massa region (Morocco). This work aims to select fluorescent *Pseudomonads* against tomato bacterial canker agent *Clavibacter michiganensis* subsp. michiganensis (Cmm) and with plant growth promoting abilities

Thirty two antagonistic activities of plant growth promoting fluorescent *Pseudomonas* against tomato bacterial canker agent *Cmm* were isolated from rhizosphere soil of healthy tomato plants located, in tomato plantations highly affected by bacterial canker disease. Among them, eight isolates showed hight inhibitory effects against *Cmm*, the causal agent of bacterial canker disease and were thereafter identified, by using various phenotypic methods (fluorescence on King B medium, API20 NE system and other biochemical tests including levane and pectinase production and lipid and aesculin hydrolysis).

Experiments aimed also to check for their ability to *in vitro* inhibit the growth of *Cmm* and the formation of bacterial biofilm by *Cmm*.

The eight isolates showed *in vitro* plant growth promoting abilities. *In vitro*, quantitative experiments were performed, in order to monitor their ability to produce the phytohormone indol acetic acid (IAA), to solubilize tricalcium phosphate $Ca_3 (PO_4)_2$ most likely by the production of organic acids and to produce siderophores. Results showed inhibition of the growth and the biofilm formation by *Cmm*. Results also showed a production of IAA up to 960 $\mu g.mL^{-1}$ and solubilization of $Ca_3 (PO_4)_2$ ranging from 34,33 to 133,3 $\mu g.mL^{-1}$.

These findings suggest the potential of fluorescent *Pseudomonads* with high antagonistic performances against *Clavibacter michiganensis* subsp michiganensis and PGPR effects. Experiments aiming to use effective isolates to control bacterial canker and to promote the growth tomato plants in greenhouse conditions are in progress.

Keywords : fluorescent Pseudomonads, *Clavibacter michiganensis* subsp michiganensis, PGPR, Tomato, antagonism

PIV-47 : Induction of Hydrogen Peroxide H_2O_2 and Catalase Activities in Date Palm

(*Phoenix dactylifera* L.) Seedling by *Pseudomonads* bacteria

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Abstract

The purpose of our investigation was to screen *Pseudomonad*s as inducers of systemic resistance (ISR) against *Fusarium oxysporum* f.sp. albedinis (Foa), the causal agent of date palm *(Phoenix dactylifer*a L.) fusariosis (Bayoud disease).

Four *Pseudomonas* isolates (Ps 28, Ps 37, Ps 38 and Ps 39) were applied to either the susceptible Jihel (JHL) or resistant Boustahmi noir (BSTN) cultivar. In addition to measurement of *Pseudomonad* growth, in treated parts of the root system and that of *Foa* inside infected parts, the amounts of H_2O_2 and the activity of catalase were measured every 5 days. The experiment was performed during 60 days.

At the end of experiments, results showed an increase of *Pseudomonas* growth, in inoculated parts of the root system and a reduction of *Foa* conidia, in infected parts. Pseudomonad treated roots showed an enhancement of H_2O_2 (up to 1.4 and 2.6 fold increase for BSTN and JHL, respectively). Catalase activity showed an increase of 1-3 fold, in the resistant cultivar BSTN. Interestingly, an increase of 10-11 times, in catalase activity was showed in *Pseudomonad*-treated roots of the susceptible cultivar JHL. Increases were also showed by *Foa* treated roots. Increases in H_2O_2 and catalase activity were concomitant to a reduced mortality in the susceptible cultivar JHL while, controls consisted of *Foa* infected, non bacterized seedlings displayed severe disease symptoms and very low catalase activities.

These results suggest the potential of Pseudomoads, as a defense signal inducers of ISR, in susceptible cultivar JHL and could be used as a powerful tools, in biocontrol of Bayoud disease.

Experiments aiming to study other ISR mechanisms (soluble phenols, peroxydases etc) are in progress.

Keywords : date palm, *Fusarium oxysporum* f. sp. Albedinis, *Pseudomonas*, induced systemic resistance

PIV-48 : Potential antagonism of some Trichoderma strains isolated from Moroccan soil against three phytopathogenic fungi of great economic importance (*Fusarium oxysporum*, *Verticillium dahliae* and *Rhizoctonia solani)*

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Abstract

In this study, 17 *Trichoderma* strains were isolated from different soils (crop fields and Argan forests), in Morocco. Purified single-spore cultures were identified to species-level using molecular methods and tested for their potential antagonism against three phytopathogenic fungi of great importance, in Morocco (*Fusarium oxyxporum*, *Verticillium dahlia* and *Rhizoctonia solani).* After DNA extraction translation elongation factor (*tef1*) was amplified in extracts of 17 strains, sequenced and compared with their ex-types.

As a result, three species were identified among the strains which clustered in two different subclades of *Trichoderma* The species *T. afroharzianum* and *T. Guizhouense* belong to the *Harzianum clade*, while *T. Longibrachiatum* belongs to the *Longibrachiatum* clade.

Investigation of potential antagonistic effects of these strains against the soil-borne phytopathogens *Fusarium oxysporum*, *Rhizoctonia solani* and *Verticilium dahliae* was conducted, in a dual culture plate assay. All

Trichoderma isolates showed effective antagonistic performance by decreasing radial of pathogens' mycelium confronting *Trichoderma* isolates.

Trichoderma afroharzianum showed significant differences, when comparing control radii Rc with the radii confronting antagonist Ra ($P< 0.05$) highest percentage inhibition of radial growth (PIRG%). The highest PIRG (80.64%) was obtained, for isolate T2.1 against *Fusarium*. In the other hands, T9i12 which is a reesei species shows a high radial inhibition of pathogens' mycelium.

Keywords : *Trichoderma* spp., *Fusarium oxysporum*, *Verticillium dahliae*, *Rhizoctonia solani*, antagonistic fungi

PIV-49 : Search, Isolation and Identification of Entomopathogenic Fungi of the Mediterranean Fruit Fly (*Ceratitis capitata*)

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Abstract

This work forms part of biological control against crop pests and has as objectives search, isolation and identification of entomopathogenic fungi and the assessment of their pathogenic power against the Mediterranean fruit fly (*Ceratitiscapitata*).

Search, isolation and estimation of the abundance of entomopathogenic fungi were carried out on soil samples of *Arganiaspinosa* forests and citrus orchards.

To trap the insect pathogenic soil fungi, we adopted the technique of using larvae of the fruit fly (*Ceratitiscapitata*) as baits. The resulting fungal isolates are identified, based on macroscopic and microscopic criteria. After trapping isolation and identification of fungal strains, pathogenicity tests were used to select several fungal strains that have significant pathogenic powers against the Medfly. The degree of virulence was estimated based on the ability of the fungus to induce the disease and / or death in the insect and also by calculating the lethal time 50 (LT_{50}).

The results obtained clearly demonstrated the sensitivity of medfly of the different treatments tested and particularly to strains of *Aspergillus niger and Epicoccum* sp. that have shownhigh mortality rates (more than 84%) and strains of *Fusarium* sp., *Trichoderma harzianum* of *Scedosporium* sp. and *Ulocladium* sp. with more than 70% of mortality. Furthermore these strains showed short LT_{50} (less than 83 hours).

All these results confirm, firstly, the presence of entomopathogenic fungi of the medfly (*Ceratitis capitata*), in the soil of the Arganeries and citrus orchards and, secondly, the potential of these entomopathogenic fungi in the control of this pest.

Keywords *:* Biological control, *Ceratitis capitata*, entomopathogenic fungi, citrus

PIV-50 : Plant Monocultures support more antagonistic activity among soil *Streptomyces* populations than plant polycultures.

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Abstract

Streptomyces possess strong antagonistic activities and inhibit diverse plant pathogens. However, the effects of plant community characteristics on *Streptomyces* inhibitory activity have received little attention. We evaluated the impact of plant species and plant community richness, on the frequency and intensity of inhibitory activity of rhizosphere *Streptomyces* communities against 2 fungal plant pathogens, *Fusarium oxysporum* f. sp. graminearum and *Fusarium oxyxporum* f. sp. lycopersici, the agents of wheat head blight and tomato wilt, respectively.

Soil samples were taken from the rhizosphere of two plant species, *Andropogan geradii* and *Lespedeza capitata*, each growing, in

communities of 1 (monoculture) or 16 (polyculture) plant species. *Streptomyces* inhibitory activity against the two pathogens was studied using an *in vitro* assay, to reveal inhibition on each target pathogen. For each soil sample, the proportions of *Streptomyces* that exhibit antagonistic activities against each pathogen and the mean size of the inhibition zone were determined.

Plant richness modified the impacts of both plant species on *Streptomyces* antagonistic activity.

Regardless of plant species, monocultures supported higher frequencies and greater intensities of *Streptomyces* inhibition than polycultures.

Streptomyces antagonistic capacity increased with decreasing plant community richness, suggesting that plant diversity modifies selection for antagonistic phenotypes among soil *Streptomyces*. Fostering monoculture conditions, in agricultural settings, may contribute significantly to reducing the impacts of soil pathogens.

PIV-51 : The Phenotypic and Symbiotic Characterization of Rhizobia Nodulating *Lotus creticus* in the North of Morocco

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Abstract

The plants belonging to the genera *Lotus* are increasingly, utilized in pastures, throughout the world because of their high productivity over a wide range of soils. They provide high quality animal fodder, prevent erosion and contribute to soil stabilization and ecosystem restoration .

This research investigated the rhizobia that are associated with *Lotus creticus*. Rhizobia are a diverse group of bacteria that live, in symbiosis, with legumes in root nodules. Rhizobia fix nitrogen from the atmosphere and provide this nutrient to the plant.

This work was conducted to evaluate and characterize the phenotypic diversity (biochemical and physiological tests) that exists in a rhizobial collection isolated from nodules of *Lotus creticus* collected from different sites, in Tangier, in the north of Morocco.

Forty tree bacteria of *Rhizobium* nodulating *Lotus creticus* were isolated and purified on YEM medium supplemented with Congo red or Peptone Glucose or Bromothymol Blue.

Results showed a different behavior of isolates, in the presence of those dyes. A total of 37.14% isolates could acidify the medium, while 62.86% bacteria were alkalinizers. Moreover, all test isolates showed good uptake of sucrose and were urease positive.

Concerning the test of tolerance to salinity (0.5% to 5%), to pH (3, 2 to 10) to temperature (+4°C to +42°C), heavy metals and antibiotics, results revealed widespread physiological diversity within these populations of *Rhizobium* nodulating *Lotus creticus* .

The strains isolated, in this study, can be used for inoculation of plants, in marginal areas.

Keywords : *Lotus creticus*, phenotypic characterization, *Rhizobium*, Tangier, forage

PIV-52 : Effects of Mycorrhization on The Growth of Carob (*Ceratonia siliqua*) Plants and Their Response to Drought Stress

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Abstract

Soil microorganisms play an important role, in the growth and nutrition of numerous plants. They allow greater water absorption, improve the uptake of nutrients, from the soil and contribute

to the plants'protection against pathogens. The symbiotic relationship between trees and mycorrhizae contributes to establishing the forest ecosystem and guaranteeing its longevity.

The carob tree is native to the Mediterranean region and can be found, in numerous areas, in North Africa, Southern Europe and the Middle East. It has great commercial potential and its domestication can have a positive impact, on the local economy throughout the region and, in Morocco, in particular. Additionally, through the use of eco-friendly cultivation methods such as mycorrhization or the use of PGPR (Plant Growth Promoting Rhizobacteria), its domestication can be completed with minimal ecological impact while maintaining a high yield and healthy crops.

In this study, we investigated the impact of mycorrhization and PGPR inoculation, on the growth and physiology of carob plants and their role in the plants' response to drought stress. Various growth parameters were monitored, in order, to assess the impact of the PGPR and mycorrhizal treatment with or without drought stress : dry weight, wet weight, height, mineral content and enzymatic activity.

In terms of growth parameters, the obtained results have shown that mycorrhization and PGPR treatment have a positive impact on the plant's size, nutrition and overall health. Additionally, our results indicate that mycorrhization and PGPR treatment contribute to the minimization of the impact of drought stress on the carob plants.

Keywords : carob, mycorrhizae, PGPR, drought stress, ecology, mediterranean

PIV-53 : Extraction and Characterization of Lignin and Cellulose Nanocrystals from the Moroccan Bagasse

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Abstract

The wide availability of biomass has allowed it to regain a great interest, in recent years, and made it a good candidate for the enhancement and better use through to wealth of biopolymers, cellulose, hemicelluloses and lignin. Several technologies were proposed, for fractionation or separation of cellulose, hemicellulose and lignin from biomass such as hydrothermal treatment, alkali treatment, treatment with solvent, …

In the present study, we exploited the alkali treatment. The Moroccan bagasse was fractionated to cellulose, hemicellulose and lignin by alkali treatment. This process consists in hydrolyzing bagasse by hot water for 120 min to extract hemicelluloses. The residue obtained is treated with sodium hydroxide (NaOH 15%) [1].

The black liquor is acidified by the recovered sulfuric acid to pH 2 to 3. The precipitate is washed, dried, in an oven, and then ground, in a mortar, to obtain a uniform powder. The residue remaining after treatment with sodium hydroxide represents the cellulose. It was then bleached, using sodium hypochlorite for the extraction of cellulose nanocrystals [2].

The extracted lignin was then extensively characterized, using FTIR, RMN, TGA, DSC, GPC and MEB.

Keywords : bagasse, lignin, cellulose, cellulose nanocrystals

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PIV-54 : The Use of Mycorrhizal Fungi and PGPR Bacteria for a Durable Productivity of *Lycopersicum esculentum* Mill

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Abstract

Lycopersicum esculentum Mill (tomatoes) is one of the most cultivated and consumed fruit in the world. It has an excellent nutritional and gustatory value. Morocco is considered to be one of the leading producer and exporter countries of tomatoes (FAO, 2007). So, increasing its production to match the needs of its growing population has become a necessity. However, its yield is affected by many factors which include drought, salt stress, as well as fungal diseases like downy mildew and grey mold. In addition, the use of chemical additives such as fertilizers and pesticides, presents a serious threat to the global environment and human health. Nevertheless, eco-friendly alternatives do exist : mycorrhizal fungi and PGPR bacteria are microbiological components found naturally in soil which can positively affect plant cultures'life. They have a significant influence on the growth, nutrition, resistance to diseases and environmental stresses.

The main objective of this study is optimizing the use of these microbes as biological means to improve the growth and productivity of tomato seedlings in a healthy and sustainable agricultural environment.

The different arbuscular mycorrhizal fungi were evaluated for their ability to improve the overall health and yield of *Lycopersicum esculentum* Mill under greenhouse conditions as well as their role in improving the plant's response to stress. Our results show that mycorrhizal and PGPR treatments do indeed improve the physiological parameters and the enzymatic activity of the inoculated seedlings, compared to non-inoculated control plants, in both the presence and absence of water stress.

Keywords : tomato (*Lycopersicum esculentum* Mill), arbuscular mycorrhizal fungi, PGPR bacteria, drought stress, growth, productivity

PIV-55 : Plant Growth Promoting Rhizobacteria Their Effect on Plant Growth Promotion and Disease Suppression

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Abstract

Injudicious application of agrochemicals can cause major problems, such as soil and water pollution, besides reduction of biodeversity. Currently, the use of plant growth promoting rhizobacteria (PGPR) in agriculture becomes an alternative solution to reduce the harmful effects of chemicals product and to offer an ecologically sustainable approach to increase crop production and health, contributing substantially in making the twenty-first centry the age of biotechnology.

This study aimed to evaluate the ability of Rhizobia isolated from root nodules of leguminous plants growing widely in different regions of FEZ-Morocco to produce plant growth promoting substances such as ammonia (NH3), indole-3-acetic acid (IAA), hydrogen cyanide (HCN), Siderophore and to solubilize phosphates as well as potassium. Rhizobial isolates were tested for antagonism against *Aspergillus niger* and also for acceleration germination of alfalfa seeds.

The result showed that on the 110 tested isolates, 60% showed the ability to produce IAA, whereas 51% were found to solubilize inorganic phosphate. Also in this study, the production of ammonia was detected in 70% of isolates. However, only 5% were cyanid producer. Also some isolates were able to solubilize potassium. It was observed that several isolates produce sedirophore and showed the potential to accelerate seed germination and antifungal activities.

Our selected isolates may be used as biofertilizers for crop improvement and to control plant diseases.

Keywords : plant growth promoting rhizobacteria, indole-3-acetic acid, hydrogen cyanide, phosphate solubilization, antifungal activities, seed germination

PIV-56 : The Use of the Plant Growth-Promoting Rhizobacterium Pseudomonas with Phosphate Solubilizing and ACC-Desaminase Activity as Biofertilizers

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Abstract

The use of bio-fertilizer such as N_2 (nitrogen) fixing and phosphate solubilizing bacteria (PSB) can reduce chemical fertilizer applications and consequently lower roduction cost.

The use of PSB as biofertilizers PGPR, in order, to increase the productivity may be a viable alternative to organic fertilizers and could decrease the environmental problems associated with conventional chemical fertilizers, which also helps, in reducing the pollution and preserving the environment, in the spirit of an ecological agriculture. In addition, to biological nitrogen fixation, phosphate solubilization is very important, in enhancing the soil fertility. Usually, phosphorus (P) is the second element limiting plant growth proceeded by nitrogen, and can be the main growth-limiting nutrient.

The use of phosphate solubilising *Pseudomonas* as inoculants have provided an alternative biotechnological solution, in sustainable agriculture to meet the P demands of plants.

The present study was carried out to isolate the PSB from the rhizosphere, to characterize indoleacetic acid (IAA) productivity and 1-aminocyclopropane-1-carboxylate (ACC) deaminase activity, in some strains of fluorescents *Pseudomonas* for evaluating its enhancement of plant growth.

Keywords **:** bio-fertilizer, PSB, IAA, Pseudomonas

PIV-57 : Effect of Rhizobium and *Arbuscular mycorrhiza* on the Growth and Physiological Parameters in Alfa *(Medicago sativa*) Under Salt Stress

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Abstract

1. Aims of the work:

Salinity is a major stress limiting the productivity of food crops. It constitutes an important constraint to Alfa Alfa (Medicago sativa L.) production in many parts of the world. The synergistic benefits of the dual inoculation of legumes with nodule bacteria and arbuscular mycorrhizae (AM) are well established. The aim of this study was to assess the co-inoculation response of Alfa Alfa (*MedicagoSativa*) to arbuscular mycorrhizal fungi (AMF) and rhizobium strians, under salt stress.

Intact seeds were germinated then inoculated with autochthonous mycorrhizal (AM) and/or rhizobial strain RHOL1 and grown under greenhouse and salt stress (120 mM) at the Faculty of Sciences Semlalai of Marrakesh. At the flowering stage, growth and physiological parameters were assessed.

The results showed that salt stress significantly decreased plant growth, stomatal conductance. However Arbuscular mycorrhizal autochthonous (AM) improve salt tolerance and biomass production of Alfa alfa-Rhizobium symbiosis under salinity. The chlorophyll content was decreased under this constraint but electrolytes leakage was increased.Whereas, plants water parameters didn't show any significant variation under salt stress.

The salt stress affected negatively the growth and physiological parameters in Alfa Alfa-rhizobia symbiosis but this effect can be reduced by the presence of AM.Thus indigenous fungal isolates could be an effective biological means to improve the tolerance of Alfa alfa-Rhizobium symbiosis under salinity

Keywords **:** *Medicago sativa*, rhizobium, salinity, mycorrhiza, tolerance

PIV-58 : Caractérisation Moléculaire de la Symbiose Haricot – Rhizobia Sous Déficience en Phosphore : Expression Différentielle de Genes du Cortex Nodulaire

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Abstract

La déficience des sols en éléments minéraux, particulièrement, le phosphore (P) est une limitation majeure, pour la croissance et le développement des légumineuses fixatrices d'azote. En réponse à la déficience P, les légumineuses nodulées développent un système d'acquisition plus efficace du P, en augmentant la surface d'échange racinaire ou en secrétant des acides organiques et des phosphatases (APases) dont le rôle est de dissoudre le P insoluble du sol.

Ce travail s'intéresse à la caractérisation et localisation de l'expression de gènes responsables de la mobilisation du P organique nodulaire. Le matériel végétal, utilisé dans cette étude, est constitué par six lignées recombinantes contrastantes de haricot commun. Après leur germination, les plantules sont inoculées avec une souche de référence *Rhizobium tropici* CIAT899 et transférées dans des bacs contenant la solution nutritive déficiente ou suffisante en P. Au stade plein floraison, l'expression de gènes phytase et APases est localisée par *in situ* RT-PCR, à l'intérieur des nodules frais de 3 mm de diamètre.

Les résultats obtenus montrent que la déficience en P induit une forte expression de gènes phytases et APases, au niveau des nodules de différents génotypes. En effet, cette expression génétique se diffère en fonction des génotypes et des tissus nodulaires. Elle est plus forte chez la lignée tolérante RIL115, en comparaison avec la lignée sensible RIL147. Ainsi, le gène phytase s'exprime au niveau du cortex nodulaire externe, le gène TPP au niveau de la zone infectée et le gène FBPase au niveau des traces vasculaires et le cortex nodulaire interne. Cette forte expression de gènes, sous déficience en P, s'accompagne avec une augmentation significative des activités APases et une meilleure efficacité d'utilisation du P.

Nous concluons que l'augmentation de l'expression de gènes phytases et APases nodulaires pourrait constituer un mécanisme adaptatif, pour la tolérance des légumineuses fixatrices de N_2 au déficit en P.

Keywords : haricot, nodule, phytase, phosphatase, phosphore, symbiose

PIV-59 : Variations Saisonnieres de Diversité en Champignons Endophytes Folaires du Pistachier de l'Atlas de Dayate Aiat

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Abstract

Le bétoum ou pistachier de l'Atlas est le plus ubiquiste des arbres du Nord de l'Afrique et du Proche Orient. Il présente une amplitude écologique et une plasticité remarquables. Les feuilles de cette essence constituent un véritable hotspot de diversité des champignons endophytes. Elles apparaissent au printemps et sont caduques à la fin de l'automne.

Notre étude a concerné les variations saisonnières de cette diversité fongique, entre le printemps et l'automne. Notre échantillonnage a été fait sur les pistachiers de l'Atlas de Dayate Aïat, wilaya de Laghouat. Les feuilles ont été récoltées, au mois d'avril et au mois d'octobre, sur les mêmes dix individus sains. Pour chaque saison, vingt feuilles par sujet sont choisies pour la mise en culture sur milieu P.D.A. L'incubation est faite à température ambiante, pendant 2 mois. Elle est suivie par une identification morphologique (macroscopique et microscopique). Plusieurs isolats de champignons endophytes ont été prélevés, à partir des 800 échantillons, mis en culture. Les genres dominants pour les isolats du printemps sont *Aspergillus* et *Epicoccum.* Ces derniers montrent une importance dans les interactions hôtes-pathogènes. En effet, ces deux genres sont considérés comme des agents de lutte biologique. Pour l'automne, ce sont les genres *Trichophyton* et *Cladosporium* qui sont dominants. Ces derniers

permettent l'accélération des taux de décomposition des matières organiques et des composés insolubles des feuilles. Le cortège de mycoendophytes foliaires semble conditionner par la plante. Il est fonction de ses besoins, lors des différentes phases phénologiques.

Mots Clés : *Pistacia atlantica* L., Laghouat (Algérie), saison, champignons endophytes, feuille.

PIV-60 : The effects of PGPR on Wheat *(Triticum aestivum*) Growth Parameters

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Abstract

Soil is an excellent niche of growth of many microorganisms protozoa, fungi, viruses and bacteria. Use of microbial inoculants or plant growth promoting rhizobacteria (PGPR) for the enhancement of sustainable agricultural production is becoming a more widely accepted practice, in intensive agriculture, in many parts of the world. PGPR are beneficial bacteria which have the ability to colonize the roots and either promote plant growth through direct action or via biological control of plant diseases. They are associated with many plant species and are commonly present, in various environments.

In this study, we isolated 83 strains from wheat rhizosphere, in the region of Marrakech, Morocco. These bacterial isolates were purified, screened *in vitro* for PGP characteristics and evaluated for their beneficial effects on the germination of wheat.

Seven strains were selected for *in vitro* testing which included the germination test and other *in vitro* tests such as phosphate solubilization, production of indole-3-acetic acid (IAA) and ammonia.

In order to assess the effects of the isolated strains on plant growth, two varieties of wheat tender *Triticum aestivum* (Wafia) V1 and (Amal) V2 were targeted. The inoculation of these two varieties with different strains induced an increase of the growth of the stemand root with rates of 14.82% and 57.85% for V1 and 40.76% and 47.40% for V2. The increase, in fresh weight and dry weight of both shoot and root parts, were 44.44%, 27.5% and 42.51%, 15% for V1 and 31.24%, 29.28% and 51.36%, 37.20% for V2 strains LPB50 and LPB4, respectively.

Keywords : PGPR, growth, environment, wheat, indole-3-acetic acid

PIV-61. Date Palm Water Stress Resistance Improvement by Mycorrhizal fungi and PGPR Bacteria

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Abstract

Arbuscular mycorrhizal fungi (AMF) areobligate symbionts that cannot develop without the presence of a host plant. They are found in the rhizosphere forming a mutualistic symbiosis with the roots of over 80 % terrestrial plant species. Date palm trees have always been the basis of the oasis structure which plays a major economic, social and ecological role.

Morocco has seen a decrease in the total area of palm groves, this regression was mainly due to the Bayoud disease and prolonged droughts. A research program was thus launched for the selection of the most efficient mycorrhizal strains from Zagora palm groves to alleviate the effects of these issues.

Our study highlights the importance of selected mycorrhizal fungi and PGPR bacteria, in improving the tolerance of the date palm to water deficit as well as improving their yield. The physiological parameters and enzymatic activities of the palm date plants infected by the selected mycorrhizae and PGPR bacteria were evaluated for varying degrees of water stress.

Our results have shown that the selected mycorrhizal fungi have the ability to infect the

roots of the palm date and seem to allow the plants to withstand the application of a severe water stress. Furthermore, the presence of mycorrhizae fungi and PGPR seems to also improve the overall health of the plants.

Keywords : Palm date, water stress, mycorrhizal, PGPR bacteria

PIV-62 : Prospection de *Dickeya* Bactérie Macergène Responsable de la Pourriture Molle dans Quatre Régions à Forte Production de la Pomme de Terre au Maroc

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Abstract

Depuis son introduction au Maroc au XIXème siècle, la culture de pomme de terre a connu un élan singulier, au niveau socio-économique. La production de cette plante a remarquablement augmentée, passant d'environ 150 000 tonnes, en 1960, pour arriver à un record de millions de tonnes en 2014. Pourtant, la culture de la pomme de terre est influencée par de multiples graves phytopathologies causées par des ravageurs qui peuvent infecter cette plante aux différents niveaux de sa chaîne de production (champ, transport et stockage) provoquant ainsi des pertes et des dégâts importants et redoutables. Parmi les agents phytopathogènes les plus importants économiquement figurent les bactéries pectinolytiques appartenant aux genres "*Dickeya*" et "*Pectobacterium*" responsables des maladies de la "pourriture molle" et de la "jambe noire".

L'objectif de la présente étude est la recherche et l'isolement de *Dickeya* sp., à partir des principales régions productrices de pomme de terre, au Centre-Nord du Maroc (Meknès, Moulay Bousselham, Larache et Sidi Kassem, El Jadida).

L'isolement est effectué, à partir des tubercules pourris, des tiges atteintes de la Jambe noire et du sol de la rhizosphère, sur milieu minimum contenant de la pectine, comme seule source de carbone et d'énergie. Les isolats purifiés sont testés, pour leur pouvoir de synthétiser les enzymes : pectinase, cellulase et amylase. Les isolats montrant un aspect enzymatique similaire à celui de *Dickeya* sp. (pectinase$^+$, cellulase$^+$, amylase$^-$) sont alors sélectionnés, pour réaliser le test de phytopathogénicité, sur les tranches de tubercules de pomme de terre. Puis, une amplification par PCR, en utilisant le couple d'amorce (ADE1/ADE2) spécifique du gène pectate lyase de *Dickeya* est effectuée. Enfin, l'amplification en chaîne et le séquençage de l'ADNr 16S sont réalisés, pour déterminer l'espèce.

À partir de 658 isolats purifiés, 23 isolats (pectinase$^+$, cellulase$^+$, amylase$^-$) sont considérés comme candidats appartenant au genre *Dickeya*. L'amplification par PCR nous a permis de confirmer l'identité d'un isolat en tant que *Dickeya* sp. Il est à citer que les études biomoléculaires sont en cours de réalisation, pour identifier les isolats appartenant au genre *Pectobacterium*.

Mots Clés : Bactéries phytopathogènes, *Dickeya*, *Pectobacterium*, pourriture molle, jambe noire

PIV-63 : Genotypic and Phenotypic Diversity for Tolerance to Environmental Stresses of *Rhizobia nodulating lens* Culinaris in Morocco

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Abstract

Environmental pollution problems and increased demand for green technologies, in production are forcing farmers to introduce agricultural practices with a lower impact on the environment. During its growth, *Lens culinaris* is usually affected by different environmental stresses such as drought, extreme temperatures, soil pH, salinity and heavy metals which limit its growth and productivity and also affect biological nitrogen fixation ability of rhizobia. Inoculation with appropriate stress tolerant rhizobia is necessary for a safe and sustainable agricultural production.

Part of our research consist on the isolation of rhizobia nodulating, in different soil types, in morocco, in order to examine their molecular and phenotypic diversity for the above mentioned stresses and select the most tolerant ones for inoculation aims.

Thus, 27 sites, in Morocco, were investigated to sample a total of 206 *Lens rhizobia*, these rhizobia were examined for genetic diversity, using REP-PCR method and also for tolerance to harch environmental stresses (high temperature, water deficiency, salinity extreme ph) and resistance to heavy metals and antibiotics.

Results revealed that phenotypic characterization of 206 rhizobia nodulating *Lens culinaris* for tolerance to environmental stresses revealed a wide variability, for tolerance to heavy metals ($HgCl_2$, $MnCl_2$, $CdCl_2$ and $ZnCl_2$) and antibiotics, variable response to high temperature (38% of isolates grow at +40°C), to salinity (4% of isolates grow at 1540 mMol NaCl) and water stress (0MPa-1,25MPa). REP-PCR showed also a large diversity among those bacteria, it would be confirmed by sequencing of nodC, nifH and 16S r DNA genes.

A wide phenotypic and genotypic diversity was revealed in rhizobia of *Lens culinaris*, in Morocco. This variability may be harnessed for enhancing biological nitrogen fixing, using the selected best tolerant strains for inoculation of *Lens culinaris* for adaptation to climate change in Morocco.

Keywords : Rhizobia, *Lens culinaris*, phenotypic diversity, environmental stresses, REP-PCR

PIV-64 : Criblage Phytochimiques et Dosage des Polyphénols et Flavonoïdes des Feuilles de *Ziziphus lotus* L.

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Abstract

Le jujubier (*Ziziphus lotus*) appartient à la famille des rhamnacées pousse sur les rives sud de la méditerranée, jusqu'en Afghanistan. Cette plante est considérée, parmi les plantes aromatiques et médicinales largement utilisée en médicine traditionnelle. Elle présente plusieurs intérêts, aussi bien sur le plan nutritif et cosmétique que médicinal. De même, les extraits naturels de plantes contiennent une variété de composés phénoliques auxquels sont attribuées diverses activités biologiques.

Le présent travail a été réalisé, afin de déterminer les différents groupes chimiques contenus dans les feuilles de *Ziziphus lotus* et de déterminer aussi la teneur totale en polyphénols et en flavonoïdes. Deux extraits bruts ont été préparés, à partir des feuilles de cette plante, l'un méthanolique et l'autre hydroéthanolique.

Les dosages des polyphénols totaux et des flavonoïdes effectués sur ces extraits ont été déterminés, à partir des courbes d'étalonnage d'acide gallique et de la quercétine, respectivement.

Les résultats montrent que l'extrait hydroéthanolique est plus riche en polyphénols et en flavonoïdes que l'extrait méthanolique.

Mots Clés : *Ziziphus lotus*, extraits naturels, criblage phytochimiques, polyphénols, flavonoïdes

PIV-65 : Effect of Pre Incubation of Rhizobia with Hesperetin on *Vicia faba* Growth and Nodulation Under Salt Stress Conditions

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Abstract

Flavonoids are a diverse group of phenolic compounds, ubiquitously found in plants that serve a variety of ecological and physiological functions. Various types of flavonoids were identified in Fabaceae root exudates, however a limited number of them are involved in rhizobia legume symbiosis. Indeed, in this symbiotic interaction, flavonoids act as chemoattractants, inducers of nodulation by activation of the expression of *nod* genes and determinants of host specificity. Naringenin and hesperetin are among the major signal compounds which stimulate *nod* gene activity of *R. leguminosarum* bv. viceae (Begum et al. 2001). It has been shown that inoculation of pea and lentil plants with rhizobia pre-induced by hesperetin leads to an improvement of nodulation and growth of these plants under greenhouse conditions (Mabood et al. 2006).

In this investigation, we tested the effect of inoculation with preinduced rhizobia by hesperetin on *Vicia faba* plant growth and nodulation under salt stress conditions.

Three rhizobia strains (RhOF4, RhOF6 and RhOF53), which have a different tolerance to salinity, were used to inoculate faba bean plants grown under controlle d environmental conditions. Germinated seeds were inoculated with rhizobial strains preinduced with 10 µM hesperetin, at different levels of salt stress (0 and 70 mM). Rhizobia grown without signal molecules were used as control inoculums.

Data collected from this experiment showed that salinity treatment negatively affects plant nodulation and dry matter accumulation. In control plants (0 mM NaCl), plants inoculated with RhOF53, a salt tolerant strain, exhibited the highest root dry weight. Plants inoculated with the non-preinduced RhOF6 strain had the lowest values of root dry weight (RDW). However, inoculation of *V. faba* plants with the salt sensitive strain RhOF6 preinduced by hesperetin significantly increased the root biomass. Addition of 70 mM NaCl to the nutrient solution reduced significantly RDW, in all plants except those inoculated with RhOF53+H (RhOF53 preincubated with Hesperetin). While hesperetin pretreatment of RhOF6 and RhOF4 had no effect on root dry weight, under salt stress compared to plants receiving untreated rhizobia.

The results for shoot dry weight (SDW) showed that pretreatment of RhOF53 with hesperetin improved growth of the host plant, in comparison to plants inoculated, with the untreated strain, in the absence and the presence of salt. The relatively highest values of SDW were obtained in the symbiotic combination faba bean-RhOF53+H, for all culture conditions. Hesperetin treatment did not significantly affect this parameter, in plants inoculated with RhOF6 and RhOF4. However, plants receiving the salt sensitive strain (RhOF6) seem to be most affected by salinity, in comparison with plants infected with salt tolerant rhizobia. *V. faba* plants exhibited almost double the nodule number when inoculated with RhOF53 or RhOF6 compared with plants inoculated with RhOF4. Salinity treatment did not significantly affect this parameter except for the faba bean-RhOF6 combination, which showed a significant reduction of the nodule number (NN).

Furthermore, preincubation of rhizobia with hesperetin had no effect on NN, in all plants, under different salt stress conditions.

Our study showed that saline treatment inhibits plant growth of faba bean. Pretreatment of the bacteria with hesperetin had no stimulatory effect on nodulation. However, it seems to stimulate plant growth by increasing shoot and root biomass in *V. faba* inoculated with the tolerant strain RhOF53.

Keywords : Faba bean, rhizobia, salt stress, flavonoid, hesperetin

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PIV-66 : The Mononuclear NiII Complex bis (azido-κN) bis [2,5-bis pyridin-2-yl)-1,3,4-thiadiazole-κ2N2,N3]nickel(II) Protects Tomato from *Verticillium dahliae* by Inhibiting the Fungal Growth and Activating Plant Defences

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Abstract:

Verticillium wilt is one of the most important vascular disease, caused by the soil-borne fungi *verticillium dahliae,* and considered as a major limiting factor for tomato production of the word. The objectives of our work were to examine the antifungal proprieties of a new mononuclear transition metal nickel complex bis(azido-κN)bis[2,5-bis(pyridin-2-yl)-1,3,4-thiadiazole-κ2N2,N3]nickel(II) (noted NiL2(N3)2) and its parental ligand 2,5-bis(pyridin-2-yl)-1,3,4-thiadiazole (L) and to determine their effect on the in vitro growth of a strain of the pathogen (SH), and their aptitude on controlling verticillium wilt in the green house and activating plant defenses reponses.
In vitro, $NiL_2(N_3)_2$ exhibited a strong antifungal activity against the strain SH (50% to 80%) with a very low concentration (10µg/ml to 30µg/ml). In the green house, $NiL_2(N_3)_2$ induced higher protection against *verticillium dahliae* at 50µg/ml. It reduced leaf alteration index by 85% and vessel browning by 96% . In addition, its protective ability was associated with the accumulation of H_2O_2, and the activation of total phenolic content as well as potentiation of the activity of peroxidase and plyphenol oxidase. These results demonstrated that $NiL_2(N_3)_2$ can be considered as a new activators of plant defense responses.

KEYWORDS :plant defenses, protection, verticillium wilt, tomato, nickel complex, 2,5-bis(pyridin-2-yl)-1,3,4-thiadiazole.

PIV-67 : Diversité en mycoendophytes et épiphytes foliaires de peganum harmala de dayate aiat

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Abstract

Les champignons colonisant les plantes supérieures représentent une composante importante de la biodiversité microbienne. Qu'il soit endophytes ou épiphytes, ces derniers vivent en interaction complexe avec ces plantes où les deux partenaires tirent profit. Notre étude a été réalisée sur une plante spontanée médicinale de la région des dayas : *Peganum harmala*. Notre intérêt dans ce travail s'est porté sur un aperçu de la diversité des mycoendophytes et des épiphytes au niveau des feuilles de cette essence. Dix sujets sains ont été récoltés au mois d'avril 2015 de manière aléatoire. L'échantillonnage a été effectué à dayate Aiat, région de Timzerth, wilaya de Laghouat. Pour les mycoendophytes, une stérilisation superficielle des feuilles a été réalisée selon le protocole de HELANDER *et al.* (1994), afin d'éliminer les organismes épiphytes qui demeurent au niveau du phylloplan. Les fragments sont ensemencés sur milieu PDA et incubés à température ambiante. Quant aux épiphytes, des suspensions de feuilles ont été ensemencées sur PDA suivant le protocole de PUSZ *et al.* (2015) et incubées à température ambiante. Après deux mois d'incubation, nous avons procédé à l'identification microscopique

des différentes souches de champignons. Les résultats obtenus montrent une abondance des genres *Alternaria* et *Cladosporium* pour les mycoendophytes, *Penicillium* et *Rhizopus* pour les épiphytes. Les genres *Mycocladus* et *Mucor* ne sont recensés qu'au niveau des champignons épiphytes. Cette diversité est en relation avec l'environnement et la composition chimique de la plante, d'où la nécessité d'identifier ces molécules bioactives qui ont une origine fongique ou végétale.

Mots clés : mycoendophytes foliaires, champignons épiphytes, interaction, diversité, *Peganum harmala*, Laghouat.

PIV-68 : Isolation of phosphate solubilizing bacteria and fungi and their potential for lead to ericaceous plant growth

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Abstract:

Many soil microorganisms are able to transform insoluble forms of phosphorus to an accessible soluble form, contributing to plant nutrition as plant growth-promoting microorganisms (PGPM). Their mecanisms of growth are through biological control with production of organic acids, siderophore and similar products with very high affinity to ferric iron.

The objective of this work was to isolate, screen and evaluate the phosphate solubilization activity of fungi and actinobacteria from soil and roots of plant belonging to ericaceous familyin order to select potential microbial inoculant. Five fungi strains and seven actinomycetes strains isolates originating from this soil were tested for their ability to grow on a synthetic minimum medium (SMM) containing TCP (tricalcic-phosphate) insoluble phosphate as sole P source.

All isolated were able to grow in SMM medium.The five fungi and two actinomycets showed the most active growth and solubilization capability. These isolates were shown to be able to solubilize P in liquid cultures. The study of mechanisms involved in these weathering processes indicated that all fungi and only one actinomycete strain were able to produce siderophores. Most of the actinomycets were shown to belong to the streptomyces genus and all the fungi belong to the Helotiales order.

Key words : Screening, phosphate solubilization,tricalcic-phosphate, microorganisms, ericaceous shrubs.

PIV-69 : Biodiversity of the Fruit flies (*Diptera: Tephritidae*) and their host plants in Morocco

Younes El Harym& Boutaïna Belqat

Abstract:

Fruit flies (Diptera: Tephritidae) are one of the largest families of acalyptères Diptera, with 4300 species worldwide (Norrbom, 2004) including several species, particularly belonging to the subfamily Tephritinae, grow on plants of Asteraceae (Freidberg & Kugler, 1989).

Few species infest their flower heads; they induce the formation of galls in capitula, stems or roots of Asteraceae (Freidberg, 1984). While other species attack rather fruit (White & Goodger, 2009).

The Tephritidae are of agro-economic importance and form one of the main common pests in all Mediterranean countries; they attack the fruit and cause decrease in productivity. It is very important to know this pest that can destroy more than 80% of a harvest. Fly attacks lead to impairment of the quality of the fruit, causing an increase in acidity.

In order to study the plant-microbe interaction, it is first of all important and necessary to evaluate the Tephritidae biodiversity in our territory, separating the harmful species of those useful or harmless.

Fruit flies of Morocco were sampled at 89 sites along several regions during the last 3 years. 39

nominal species in 25 genera were identified of which 15 species are new for the Moroccan fauna. The objectives of this study are summarized in the elaboration of a catalogue bringing together all the species known from Morocco with the range of their host plants, in the establishment and maintenance of areas of prevalence crowned by the presence of pests, fruit flies.

Keywords: Fruit flies, Checklist, host plants, Morocco.

PIV-70 : Nematophagous fungi as biocontrol agent against root knot nematodes *Melodoigyne.spp*

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Abstract

The Root-knot nematodes (RKN), Meloidogyne spp., Are serious threat to many cultures around the world, particularly greenhouse crops. Nematicides are the most used method against plant parasitic nematodes. However, the majority of them was banned in developed countries because of their negative effects on both the environment and the human health. Hence looking for other ecological and effective management strategies has become a necessity. Biological control is considered the most relevant and least damaging approach as it is ecofriendly, economically viable and offers a sustainable and cost- effective alternative to chemical nematicides.The nematophagous fungi have been studied extensively as agents of biological control. This work aims the isolation and selection of nematophagous fungi from the soils of Souss Massa Draa region (SMD), the strains of fungi that have shown their efficacy against plant parasitic nematodes will be used as a bionematicides. The insolation is made from different types of soils collected in the region, galls and nematode eggs. The apical growth and the production of spores were studied for 62 isolated strains including : *Trichoderma, Paecilomyces, Fusarium, Aspergillus, Penicillium and Arthrobotrys*. Seven strains have not been identified.

Key words : Root-knot nematodes, Biological control, nematophagous fungi, bionematicides

PIV-71 : Stimulation des défenses naturelles de la pomme en post-récolte par le glucuronane et les oligoglucuronanes extraits de l'algue verte *Ulva lactuca*

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Abstract

La stimulation des défenses naturelles des plantes représente (SDN) une approche prometteuse en terme de contrôle phytosanitaire qui répond parfaitement au respect de l'environnement, d'une agriculture durable et de sécurité alimentaire tout en valorisant une ressource naturelle abondante d'algues marines. Notre travail s'inscrit dans ce contexte et a pour objectif de rechercher des polysaccharides d'*Ulvalactuca* élicitant les mécanismes de défense de la pomme en post-récolte.

Ainsi, un polysaccharide d'*Ulvalactuca*, le glucuronane (homopolymère non sulfaté) est isolé et purifié à partir de l'ulve. La production d'oligosaccharides (oligoglucuronane) à partir de ce polymère est obtenue par différents procédés

biotechnologiques faisant intervenir une enzyme spécifique, une glucuronane lyase purifiée à partir d'une souche bactérienne *Ochrobactrum* sp. baptisée PEC2. Les oligoglucuronanes (β-Δ-(4,5)-oligoglucuronanes) présentent des degrés de polymérisation moyens de 3. Le glucuronane et son oligomère sont ensuite évalués à travers la sévérité de la moisissure bleue causée par *Penicillium expansum* et la moisissure grise causée par *Botrytis cinerea* sur la pomme (cv Golden Delicious) en post-récolte et *via* la capacité de ces molécules saccharidiques à induire les mécanismes de défense de la pomme. Le traitement ponctuel de la pomme (5 $mg.ml^{-1}$), par les deux extraits saccharidiques a montré des potentialités élicitrices intéressantes qui se traduisent par un effet protecteur variable des pommes contre les agents de pourriture bleue (*P.expansum*) et de pourriture grise (*B.cinerea*). Cette protection est globalement plus importante suite au traitement par les oligomères de glucuronane. En absence de tout effet fongitoxique direct, l'action protectrice des saccharides pariétaux de l'ulve serait plutôt attribuée à la stimulation des défenses naturelles des pommes en postrécolte, comme en témoignent l'accumulation du peroxyde d'hydrogène, les inductions de la catalase et de la superoxyde dismutase ainsi que l'activation des activités peroxydasiques.Il en est de même de l'implication de la voie des polyphénols dans les réponses de défense de la pomme qui s'est traduite *via* l'induction des activités de la phénylalanine ammonialyase et de l'accumulation des phénols totaux.

Les résultats obtenus débouchent sur une voie prometteuse de développement de moyens de lutte appropriés pour la protection des cultures.

Mots clés : Stimulation des défenses naturelles (SDN), pomme, post-récolte, Glucuronane, Oligoglucuronanes, *Penicillium expansum*, *Botrytis cinerea*, *Ulva lactuca*.

PIV-72 : Evaluation de l'activité antifongique des extraits des fruits de *Ziziphus lotus* sur la croissance mycélienne de Botrytis cinerea et Rhyzoctonia solani

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Abstract:

Les extraits naturels des PAM contiennent une variété de composés phénoliques auxquels sont attribuées diverses activités biologiques. Dans la présente étude on a tenté d'évaluer l'activité antifongique des extraits éthanoliques et méthanoliques préparés à partir des feuilles du *Zizyphus lotus* de la région du Fès, sur la croissance mycélienne de deux champignons responsables de graves dommages chez plusieurs produits de maraîchage à savoir : *Rhyzoctonia solani* et *Botrytis cinerea*. In vitro, nous avons préparé une série de dilutions des extraits méthanoliques et hydro éthanoliques des feuilles de zizyphus qui seront, par la suite, incorporés dans un milieu de culture gélosé stérile. Un fragment de champignon a été prélevé à partir d'un tapis mycélien issu d'une culture jeune des souches étudiées. Les boîtes ont été incubées à 25°C en conditions d'obscurité. Le suivi de la croissance mycélienne a été effectué dès le lendemain de l'inoculation jusqu'à une semaine. Les analyses ont montré que les extraits possèdent un pouvoir antifongique dont l'importance varie selon le type de champignon. L'extrait méthanolique a inhibé *Rhyzoctonia solani* et *Botrytis cinerea* à 60 et 80mg/ml respectivement, tandis que la CMI des deux souches a été observée à 80mg/ml avec l'extrait éthanolique. Ceci peut-être expliqué par l'apport des composés phénoliques présents dans les essences végétales de *zizyphus lotus* ayant une activité biologique très marquée.

Ces données se montrent très prometteuses, surtout que la plante de zizyphus possède des propriétés antioxydants, anti-inflammatoires et antimicrobiennes vis-à-vis de plusieurs microorganismes.

Mots clés: activité antifongique, zizyphus lotus, croissance mycélienne, composés phénoliques, microorganismes.

PIV-73 : Comparison between toxicity of lead and chromium in green beans and cherry tomatoes grown in bioponic environment.

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Abstract

The toxicity of lead and chromium for green beans, and cherry tomatoes was evaluated firstly by the growth, production plants as well as their accumulation in different parts of both plants (roots, stems , leaves and fruits), and secondly, by assessing the concentration in the water and soil culture. Two tests were carried out; consist on planting in bioponics in a BIOTOP device, which the plants of green beans and cherry tomatoes were exposed through their root system at concentrations of 5 ppm, 10 ppm and 20 ppm for each contaminant (lead and chromium) in a nutrient solution. The results show that lead greatly reduces the performance of the plants while essentially accumulating at the roots with a significant amount which also pass at the stem and leaves, and lower as it passes through the fruit. But for chromium no significant differences were found for all growth and production parameters, however its accumulation is also made in the roots with grades increasingly weak from roots to fruit

PIV-74 : Valorisation agroalimentaire du caroubier du maroc : la mise en œuvre d'un nouveau procede de decorticage des graines de caroube .

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Abstract:

Le caroubier ou *Ceratonia siliqua L.*, de la famille des Caesalpiniaceae présente un grand intérêt socioéconomique et offre de nombreuses potentialités économique, sociale et environnementale. Fruits et graines de la caroube disposent de qualités indéniables dans la fabrication de produits alimentaires, pharmaceutiques…etc. En revanche et malgré le développent remarquable de la production marocaine d'année en année, et malgré que le Maroc occupe la deuxième position dans la production mondiale du caroubier le potentiel de sous-exploitation et de sous-valorisation nationale reste important. D'où vient la nécessité d'adopter une approche stratégique de valorisation des sous-produits de cette filière à savoir les graines de caroube qui renferme l'endosperme qui présente la matière basique de la fabrication de la gomme de caroube qui est connue comme additif alimentaire codée E410.

Dans un souci de préservation de l'environnement et dans l'esprit de l'instauration d'une chimie verte, des essais d'extraction de la gomme de caroube en milieu non chimique ont été entrepris.

Après récolte, les graines subissent une décutilation et une dégermination. Les endospermes ainsi nettoyés sont ensuite broyés pour donner la gomme de caroube brute. L'étape de purification consiste en une solubilisation de la farine dans l'eau à température élevée et une précipitation des galactomannanes à l'éthanol, la dernière étape d'extraction consiste à faire un blanchiment afin de préserver à la gomme de caroube ces propriétés irréprochables. Les résultats préliminaires obtenus sont très encourageants. L'étude de la qualité de la gomme obtenue est en cours.

Mots clés : *Ceratonia siliqua, graines de caroube, gomme, décorticage, purification, blanchiment.*

PIV-75 : Fungal endophytes diversity of leaves of *Pistacia atlantica* Desf. of dayate El Gouffa and dayate Aïat (Laghouat, Algérie)

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Abstract

Pistacia atlantica Desf. is a spontaneous tree of semi arid and arid area. This essence reflects a great ecological and economic importance. Our study concerned the subjects of dayate El Gouffa and those of dayate Aïat (Laghouat, Algeria), which are located in the arid climate. The aim of this work consists of an approach of a diversity of foliar endophytic fungi. The leaves were collected in April out of ten healthy trees per daya. Twenty leaves per subject are chosen for the culture on P.D.A. The incubation was carried at ambient temperature for 2 months. This is followed by a morphological identification. At dayate El Gouffa, the most abundant fungal endophytes are *Aspergillus*, *Epicoccum*, *Phoma* and *Trichoderma*. At dayate Aïat, *Aspergillus* and *Epicoccum* genera are the most abundant. Several genera present at dayate El Gouffa are absent in dayate Aïat and vice versa. We can cite at El Gouffa, *Absidia*, *Apophysomyces*, *Arthrinium*, *Bahusakala*, *Circinella*, *Colletotricum*, *Gymnoascus*, *Hypoxylon*, *Penicillium*, *Trichoderma* and *Verticillium*. The fungi recorded only at dayate Aïat belong to the genera *Cordyceps*, *Curvularia*, *Monilia*, *Nigrospora*, *Paraphaerosphaeria*, *Phomopsis*, *Rhizoctonia* and *Xylaria*. Mutualist fungi provide to the Atlas pistachio several benefits. Several factors may be responsible for these changes between the two dayas. Note however that dayate Aïat is more degraded than dayate El Gouffa.

Keywords : *Pistacia atlantica* Desf., foliar fungal endophytes, diversity, aridity, Algeria

PIV-76 : Genetic Diversity and Improvement of Trifolium isthmocarpum Cultivars (*Forage Species*)

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Abstract

Moroccan clover (*Trifolium isthmocarpum Brot. Leguminosae*), occurs in different habitats in Morocco. It grows in saline areas where traditional forage legumes cannot be cultivated. Salt tolerance in Moroccan ecotypes of T. isthmocarpum Brot. were evaluated in greenhouse and compared with Australian cultivar : Trifolium michelianum Savi. Paradana. Plants were submitted to three irrigation treatments using concentrations 0 mM, 80 mM and 200 mM of NaCl, during 3 months. The effects of salinity on growth, dry matter production, shoot and root ion relations, leaf water relation and gas exchange were determined. Under stressed conditions, T. isthmocarpum was more salt tolerant ($p < 0.001$) with a greater survival rate and good dry matter production, than T. michelianum. To tolerate salinity, T. isthmocarpum and T. michelianum developed a Cl- exclusion mechanism. However, the Cl- exclusion was more important in T. isthmocarpum than T. michelianum. On the other hand, T. isthmocarpum accumulated more K^+ in shoots than other species, when exposed to moderate and high levels of salinity. At 200 mM of NaCl, the stress promoted a substantial degree of stomatal regulation; but, in spite of this, T. michelianum showed signs of leaf tissue dehydration, decreases in relative water content and osmotic potential values.

Keywords : Trifolium isthmocarpum, Crop improvement, Leguminosae

PIV-77 : Study of the quality of a derivative of Moroccan dates: Dkess (date paste)

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Abstract

The objective of this work is the study of the quality of a derivative of Moroccan dates: Dkess (date paste). This is the basis for Food Saharan regions. Despite the sensitivity of Dkess to alteration and that poses serious problems to human health found that few studies conducted on this product. The study was performed on 300 samples (100 samples of traditional pasta dates (Dkess), 100 samples of semi industrialized pulp and 100 samples of industrialized dates paste), physico-chemical characteristics (4 criteria), microbiological and hygienic (10 criteria) were

assessed against the standards. The results showed that the quality of pulp is much more developed than that of traditional pulp and semi industrialized and this on all the criteria examined whether physicochemical or microbiological (42% of the samples of traditional pulp and 33% of dough semi industrialized does not conform to international standards). In addition, the poor preservation of places of production causes an alteration of traditional pasta and pasta semi industrialized dates and their susceptibility to contamination by microorganisms, and the damage is even more important as storage conditions and storage are not adequate. The control of manufacturing processes and preparation as well as the entire food chain of these products must be improved to ensure the health and safety of consumers.

Keywords : Morocco**,** dates, Dkess, quality, microbiological study, physicochemical analysis.

PIV-78 : Effects of bioactive molecules extracted from sesame seeds and oil on the stability of different edibles oils

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Abstract

Sesame (*sesamum indicum*) is considered to be one of the first recorded plants; it has been used extensively for thousands of years as a seed of worldwide significance for edible oil, paste, cake, confectionary purposes. The extensive usage of sesame may be due to its highly content of nutritious protein also, sesame seeds were found to possess antioxidant and health promoting activities, which can be highly correlated to their total phenolic and lignans. Many studies were conducted to investigate the health-promoting effects of sesame in the world. In this study, our aim is to evaluate the effects of phenolic contents, lignans and tocopherols extracted from sesame seeds and oil (fresh and roasted sesame seeds and oil) on the stability of edibles oils (sun flower, colza, soy) for 60 days, to promote them as natural antioxidants,and comparing it with synthetics antioxidants (BHA,BHT).

The evolution of the oxidation state was measured by the acidity, peroxide, iodine and specific extinction at 270 nm, and also the determination of phenolic content, total lignans, and assessment of the antioxidant activity.

The results showed that the oils containing natural antioxidants and bioactive molecule from sesame extracts have undergone oxidative damage less pronounced than that of the reference (without phenolic contents of sesame) at various time of analysis.

It appears that the polyphenols, lignans and tocopherols of sesame seeds and oil are effective naturals antioxidants that presents no health risk compared with synthetic ones.

Key words: Sesame, bioactive molecule, edible oil, natural antioxidant, synthetic antioxidant.

PIV-79 : Etude de l'activité antimicrobienne et de la résistance aux antibiotiques des souches de bactéries lactiques isolées des saumures d'olives vertes en fermentation naturelle

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Abstract:

L'objectif de ce travail est d'étudier l'activité antimicrobienne et la résistance aux antibiotiques de souches de bactéries lactiques (LAB) associées au processus de fermentation naturelle des olives vertes marocaines de table. 56 souches isolées et purifiées ont été étudiées. L'activité

antimicrobienne a été évaluée par la méthode de diffusion sur milieu gélosé en testant le surnageant, avec différents traitements (avec et sans neutralisation, filtration sur 0.2µm…). Les souches sensibles utilisées *Micrococcusluteus*, *Listeriainnocua* et *E. coli*. Après incubation à 37°C, l'activité antimicrobienne des souches de LAB a été évaluée par la mesure du diamètre d'inhibition autour des puits. Les résultats ont montré que 89,09% de souches de LAB sont actives sur toutes les souches indicatrices utilisées. 96,42% sont actives contre les *Micrococcus* et *Listeria* (Gram+) et 98,21% actives contre les Gram négatives.

La résistance aux antibiotiques a été étudiée par la méthode des disques sur milieu solide. Les antibiotiques testés sont Oxacilline (1µg), Cephalotine (30µg), Vancomycine (30µg), Amoxycilline (25µg), Erythromycine (15µg), Ampicilline (10µg) et (25µg), chlorampénicol (30µg). Les disques ont été déposés sur MRS solide en boites de pétri préalablement ensemencés par les souches de LAB jeunes. Après 24heures d'incubation à 37°C, les diamètres d'inhibition ont été mesurés. Les résultats ont montré que la majorité des souches de LAB sont résistantes à l'oxacilline, la vancomycine, l'ampicilline (10 et 25 µg) ainsi que le chloramphénicol. Vis-à-vis de l'érythromycine et de la céphalotine, la majorité des souches ont montré une grande sensibilité, alors que vis-à-vis de l'amoxicilline, leur sensibilité est modérée.

Mots Clés : bactéries lactiques, antimicrobien, antibiotiques, fermentation, olives.

PIV-80 : Screening of Antibacterial and Antioxidant Properties of Moroccan Garlic (*Allium sativum*)

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Abstract

Garlic *(Allium sativum)* has been a favorite additive in food for many years in various cultures. It is known that it possesses antimicrobial, antioxydant, anticancer and antidiabetic properties. The bioactive components of garlic are mainly responsible for the healing properties and have a variety of antibacterial activities. Moreover, Garlic is a good source of total polyphenols content.

The aim of our study is to test the antibacterial activity of aqueous extract of garlic against Staphylococcus aureus, Escherichia.coli and Klebsiella pneumonia. and to study and compare an antiradical activity, phenolic, flavonoid and flavonol contents of five areas on Morocco. Those contents were determined using spectrophotometric method. Antioxidant activities were studied using two methods: DPPH and ABTS radical scavenging activity.

The results obtained showed that the aqueous extract of garlic showed increased inhibitory effect. The maximum antibacterial activity was observed against Klebsiella pneumonia (22 mm) and minimum activity against Escherichia.coli and Staphylococcus aureus (12 mm). Moreover, it turned out that total polyphenolic compounds and antioxidant activities varied from one area to another. The results showed, in general, a good correlation could be found between antioxidant activity and polyphenolic compounds.

It is concluded that the aqueous garlic extract can be used to produce new therapeutics so it can be used to develop new antimicrobials and it has been found that the fives cultivar represent a good sources of natural antioxidants and they could be considered as useful sources of materials for human health.

Keyword: Garlic, *Allium Sativum*, antibacterial activity, antioxidant activity, polyphenol contents.

PIV-81 : Studies of Extracellular Enzyme Profiles and citric acid production by Aspergillus niger isolates from undervalued dates

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Abstract

Citric acid is considered as the most important organic acid, used as a natural preservative and conservative. It is also used to add an acidic or sour taste to foods and soft drinks. In addition, extracellular enzymes are used in food, beverages, confectionaries, textiles and leather industries to simplify the processing of raw materials.

In this study, fungal strains; isolated from undervalued dates, were identified by their morphological and microscopic characteristics, and then screened for their citric acid production capacity and extracellular enzymes profile. For the screening of citric acid production, the spores were inoculated in the fermentative liquid medium and incubated for 144 hours at 30±1°C under shaking. After incubation, the citric acid concentration was measured by the method described by (Marrier and Boulet (1958). The highest concentration of citric acid was obtained with *Aspergillus niger* S-7 at pH 6.0, at temperature 30±1° C, using sucrose as carbon source and ammonium sulphate as nitrogen source.

On the other hand, thirty fungal strains (*Aspergillus niger*), were screened for their enzymatic capacities, including amylase, cellulase, lipase, and protease. The results obtained showed positive reaction of 72% of the strains for amylase, 32% for lipase, 35% for cellulase and 28% for protease.

Keywords: *Aspergillus niger*, screening, citric acid, enzymes,date fruits.

PIV-82 : Improvement of the traditional treatments of conservation of dates by the method of planning experience

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Abstract:

The Moroccan population directly consumes great quantities of dry fruits or in the form of ingredients in traditional preparations realized during the festivities and the month of Ramadan, however few information, microbiological and biochemical on the quality of these foodstuffs, are available. Initially, we considered it useful to carry out a socio-economic survey on the consumption of dried fruit in Fès , 120 people were selected in a way random and questioned,treatment results has been doing through the software Sphinx plus2, in order to identify and to evaluate the type of dry fruits the most consumed . The results of this study directed us towards the choice of the dry fruit most consumed to study its hygienic quality, and finally to adopt traditional techniques for its treatment by using the method of planning experience. The application of this treatment, the monitoring of this type of food and the installation of processes of conditionings appropriate to close to the salesmen will be of capital importance to improve hygienic quality of dates and to save the consumers of this type of food of the serious medical risks.

Key words: Dates, hygienic Quality, treatment, Fès, Morocco

PIV-83 : Identification moléculaire (PCR-Delta& PCR-ITS-RFLP) des levures dans les vignobles de la plaine de Ghriss. Cépages : Syrah et Grenache

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Abstract:

Le raisin est un fruit exemplaire de la diversité microbienne. Dans ce cadre, nous avons exploré dans la présente étude, la divergence de la flore levurienne indigène dans les vignobles de la région de Ghriss (Mascara) en collectant des échantillons de raisin de deux cépages (Grenache et Syrah).

Une grande diversité moléculaire de cette flore a été mise en évidence, à l'aide de deux techniques d'identification moléculaire :

PCR - ITS – RFLP (Polymorphisme de la région ITS 1 – ARNr 5,8 S – ITS 2), Alors, 08 espèces de levures différentes sur les 15 étudiées appartenant à 7 genres différents ont été caractérisées de façon approximative selon leur profil moléculaire. Ainsi les souches étudiées ont été caractérisées avec au maximum 02 enzymes de restriction. Ces résultats ont permis d'enrichir les bases de données, moyennement pourvues en séquences ITS caractéristiques de genres ou d'espèces de levure présentes sur les baies de raisin.

PCR Delta qui est une étude supplémentaire qui a permis de trier les levures, en saccharomyces et les non saccharomyces.

Parallèlement, une étude microscopique d'identification classique des levures a pu renforcer ces résultats.

Parmi les espèces de levures identifiées : Rhodotorula acheniorum et Metschnikowia pulcherrima, Bretanomyces intermidius, saccharomycopsie capsularis. Candida mesentirica, Les espèces apiculées (Kloeckera apiculata et Kloeckera apis), et la Zygosaccharomyces bailii.

Keywords: **Levures, Grenache, Syrah, Région de Ghriss, PCR Delta, PCR - ITS - RFLP.**

PIV-84 : Contribution à l'étude quantitative et semi qualitative des composés phénoliques des feuilles et graines de Moringa oleifera (arbre de vie) de la région d'Adrar.

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Abstract:

Le Sahara algérien se caractérise par la diversité de ces ressources végétales, réservoir de substances naturelles à intérêts majeurs pour la santé de l'oasien.

La région d'Adrar dispose un important patrimoine d'essences végétales spontanées et parfois cultivées utilisées en thérapie traditionnelle.

L'étude quantitative des composés phénoliques notamment les flavonoïdes a mis en évidence par spectrophotométrie d'une part la diversité du feuillage et graines de *Moringa oleifera* en anthocyanes et d'autre part en aglycones flavoniques.

L'étude semi-qualitative par chromatographie sur couche mince des flavonoïdes a révélé la richesse des feuilles et graines de cette espèce en aglycones flavoniques.

Mots clés : Sahara algérien, composés phénoliques, anthocyanes, aglycones flavoniques, *Moringa oleifera*

PIV-85 : Comparative Antibacterial Effect Of Synthetic Saffron (*Tartrazine*) and Turmeric (*Curcuma longa*)

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Abstract:

Tartrazine (E102) is a monoazo pyrazolone dye used mainly to color food products, drugs and cosmetics. In addition, this food colorant is largely used in cooking in Morocco and in developing countries. The Current research aims to compare the antibacterial effect of synthetic saffron (The Tartrazine) and Turmeric or indian saffron extracted from *Curcuma longa*. The bacterial ATCC strains used are *Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa*. The Antimicrobial susceptibility tests used were the antibiogramme test, MIC, MBC

and the positive control were Ofloxacin, chloramphenicol and ceftriaxone.

Keywords: Turmeric, Tartrazine, antibacterial tests**.**

PIV- 86: Preictive adhésion of Penicillium digitatum and Penicillium italicumon on oranges

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Abstract:

Microbial adhesion to surface has been recognised as resulting from physicochemical interactions between microorganism and surface. These interactions depend on the physicochemical properties on both the substrate and microbial cell surfaces.

It is well known that the fruit, after harvest, are attacked by mold, which caused their alteration. Rare studies have been reported the effect of physico-chemical properties of the mold surface on microbial adhesion on fruits.

A good understanding of the microbial adhesion phenomenon of *P. digitatum and* P. italicum on one variety of oranges (Navel), cannot be achieved without the determination of physicochemical characters (hydrophobicity and the electron-donor,and electron –acceptor donor) of this molds and the oranges by contact anglesmeasurementsusing the approach proposed by van Oss.

The adhesion of *P. digitatum and* P. italicum on the orange substrata was predicted by the XDLVO approach.Results shows that the adhesion of *P. digitatum and* P.italicum on Navel oranges was thermodynamically unfavorable. Then, adhesion of *Penicillium molds* on Navel oranges will be impossible ($\Delta GTotal > 0$).

The Predictive adhesion informs about the potential of contamination on post-harvest oranges.

Keywords: *P. digitatum*;P. italicum ; Predictive adhesion ; oranges;

PIV-87 : Isolement de souches de bactéries lactiques probiotiques à partir de saumures d'olives vertes en fermentation naturelle

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Abstract:

L'objectif de ce travail est la caractérisation des propriétés probiotiques des souches de bactéries lactiques (LAB) isolées des saumures d'olives vertes en fermentation naturelle. Les échantillons de saumure sont été prélevés en milieu industriel et ensuite analysés pour leurs propriétés physico-chimiques et microbiologiques. L'isolement des souches de LAB probiotiques a été réalisé sur milieu MRS agar, ensuite les souches obtenues ont été étudiées pour leurs propriétés phénotypiques et propriétés probiotiques (résistance à la bile, aux pH acides et au NaCl).

Les résultats obtenus ont montré que les saumures d'olives ont en moyenne un pH de 4,32, une acidité de % 0,61. Ces valeurs rentrent dans la gamme des valeurs tolérables par les LAB. L'étude des propriétés phénotypiques a montré que les souches isolées sont toutes Gram positives, immobiles, catalase négatives, gaz négatives. Elles sont représentées par des bacilles (67,85%), des Coccobacille (19,64%) et des cocci (12,51%). 89.28% de souches sont résistantes à la bile (0.3%). Vis-à-vis du pH, 21,42% de souches résistent à pH2, 30,35 % à pH 2,5, et 100% à pH 3. Ces critères nous ont permis de sélectionner 7 souches pour leur résistance à la

bile et aux pH acides étudiés. La combinaison de la bile (0,3%) avec différents pH (2, 2,5 et 3) a montré des niveaux de résistance des souches étudiées qui sont 0%, 28,57% et 100%, respectivement. Vis-à-vis du NaCl les 7 souches étudiées ont montré une tolérance au NaCl jusqu'à une concentration de 8%, au-delà de 8% aucune souche n'a montré de croissance.

Mots clés : bactéries lactiques, probiotique, fermentation, olives

PIV-88 : Isolation And Identification Of Bacteria Degrading Sucrose Isolated From Sugar Beet Roots

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Abstract:

Sugar beet is one of the two major sugar crops in the world. In Morocco, it is the first important source of white sugar after sugarcane, especially in the region of Gharb. In fact, sucrose losses are caused by physiological and biological processes, such as respiration, germination and the action of specific enzymes in sugar beet (invertase), through the development of microorganisms on the wounds of beet (i.e. edge breaks). The objective of this study is the isolation, identification and determination of the effect of these bacteria on the sucrose content of sugar beet roots, using phenotypic and genotypic identification techniques.This study has allowed the isolation of 123 isolates from sugar beet roots. The results of phenotypic tests shows that of the 123 isolates, 67 are Gram negative and Gram positive 56. The study of the degradation of sucrose *in vitro* isolates allows us to distinguish 2 groups:

Group 1: 93 isolates are able to degrade 15% sucrose.

Group 2: 83 isolates are able to degrade 20% sucrose.

Genotypic study using BOXA1R-PCR, sequencing 16S rRNA and bioinformatic results analysis using databases (BLAST, Ez-Taxon), and bioinformatic softwares (BioNumerics v7.5, DNA baser) allowed to group 123 isolates into 23 clusters and identify 114 isolates grouped into 11 families, 20 genera and 41 species. In this study, the results obtained have allowed us to infer that sugar beet roots are a considerable bacterial diversity (41 species). Indeed, these isolated bacteria have a direct effect on the degradation of sucrose *in vitro*.

Keywords: Isolation – Identification – Sugar beet – Bacteria – 16sRNA – Sucrose

PIV-89 : Screening Of Rhizobacteria For Their Plant Growth Promoting Activities

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Abstract:

In addition to their high cost, the massive use of chemical fertilizers has an adverse effect on the environment and human health. Therefore, alternatives solutions become a major necessity. The use of rhizobacteria as rhizobia known by their nitrogen fixing ability and phosphate solubilization represents a promising approach in this domain.

This study focuses on evaluating the ability of endophytic bacteria isolated from root nodules of *Acacia sp.*, to solubilize inorganic phosphate and produce indole acetic acid (IAA) under laboratory conditions. Furthermore, these isolates were evaluated for more other plant growth promoting traits such as production of ammonia, hydrogen cyanide (HCN), siderophores and their antagonistic activity against some phytopathogenic fungi.

On a collection of 80 tested isolates, we selected ten which showed better inorganic phosphate solubilization activity on National Botanical

Research Institute's phosphate growth agar (NBRIP) supplied with 5% of tricalcium phosphate. Subsequently, these isolates were evaluated colorimetrically to determine the amount of soluble phosphate on NBRIP broth. In addition, the IAA production by synergism of three the best IAA producers rhizobacteria (I22, I69 and I75) was investigated. The selected rhizobacteria could be a promising option for overcoming the deficiency of phosphorus in soils and improve the growth and development of plants.

Keywords: rhizobacteria; phosphate solubilization; indole-acetic acid; siderophore; Synergy.

PIV-90 : Microbiological, biochemical, and molecular identification (PCR-RFLP-ITS) of the yeast from Sultana grape cultivated in Ain Merane (Wilaya of Chlef)

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Abstract:

Grapes defined as the fruit of the vine, the most cultivated in the world. It is considered a major habitat of many spices levuriennes. But the Identification and the isolation of yeasts can be a problematic. This work aims to isolate, purify and characterize levuriennes species from the sultana grape ((*Thompson's seedless).* grown locally by some winegrowers in the region of Ain Merane located in (Chlef, Algeria). Several tests were performed (microbiological, biochemical and molecular), two strains isolated from grape juice obtained by simple grinding.

The microbiological identification gave two different strains marked rough-orange and beige-cream on the middle surface (YPG + Gentamicin). While their types of sexual reproduction was characterized by the presence of two spores per asci for the first, and two to four spores per asci for the second strain. However biochemical identification of the two strains by the API 20 C AUX, based on the fermentation of sugars, confirmed that the two latter may belong to the genera of *Pichia* and probably *Rhodotorula*.

Pichia fermentans and *Metschnikowia pulcherrima* were confirmed by a genetic approach (PCR-RFLP) using two restriction enzymes (Taq I, and HaeIII), ofthe region (ITSI, 5.8S rRNA, IITSI) amplified by PCR, the latter was characterized by a size of 450 bp for *Pichia fermentans* and 380 bp for *Metschnikowia pulcherrima*.

Keywords: Grape, (Thompson's seedless), Taq I, HaeIII, PCR-RFLP.

PIV-91 : CONTRIBUTION A LA BIOCONSERVATION DE LA CREVETTE ROSE « *Parapenaeus longirostris* »

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Abstract:

La crevette rose (Parapenaeus longirostris) est sujette à une altération se traduisant par un noircissement au niveau du céphalothorax et des articulations des pattes après six heures seulement de leur pèche (phénomène de mélanose). Les métabisulfites sont des agents répresseurs de la mélanose les plus utilisées mais qui peuvent malheureusement être à l'origine de crises cardiaques chez cératines personnes. Dans notre travail, nous essayons d'étudier l'effet du jus de citron et du sel pris conjointement sur la qualité de la crevette à deux températures de conservation (0°C et 4°C). Les résultats obtenus montrent que seule la marinade avec 20% de jus de citron et 10%de NaCl semble être la plus efficace pour ralentir le développement de la mélanose des crevettes jusqu'à 6jopurs (avec un temps de trempage de 2heurs, et une température de conservation à 0°c). Cela a été prouvé avec les résultats d'analyses physicochimiques,

organoleptiques et microbiologiques sur la crevette pendant sa durée de conservation.

Mots clés : Bioconservation, crevette rose, mélanose, qualité.

PIV-92 : Evaluation of fish coproducts "*Sardina pilchardus*" serving biotechnology

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Abstract:

Fish processing is a crucial sector for the nutrient needs of humans, but it generates a significant amount of waste estimated with 50%. It follows the problem of dumping of waste in different environments which increases environmental pollution in particular the water environment. Our work aims to exploit the waste of fish products (edges, heads and guts) of the species *Sardina pilchardus* as culture medium for microorganisms such as *Lactobacillus* and *E. coli*. A culture medium was developed for fastidious bacteria such as lactic acid bacteria and for non-fastidious bacteria such as *E. coli*. In this case, a universal medium (MRS TGEA) was prepared as control. The peptone of the modified culture medium was replaced of by isolate obtained from fish waste. Thus, we evaluated the waste of *Sardina pilchardus* as a source of bacteria of industrial interest among other lactic acid bacteria. Through the physicochemical analyzes, the isolate obtained has a high biological value (rich in essential amino acids). The results indicate that the use of this isolate must be accompanied with other essential elements of culture (vitamin compounds, essential amino acids, minerals) as growth factors to optimize the growth of bacteria involved.The physiological and biochemical characterization makes finding 02 different groups of lactic acid bacteria: *Lactobacillus fermentum* and *Lactobacillus spp.* This work allowed us to have a recovery method that reduces the risk of pollution caused by different fish processing industries. So we have contributed to the preservation of our aquatic environment.

Keywords: Fish waste, Isolate, Lactobacillus, *Sardina pilchardus*, Evaluation.

PIV-93 : The impact of co-inoculation with PGPR bacteria on plant mineral nutrition

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Abstract:

Phosphorus is an essential element for plants, its deficiency severely limits crop yields. Considerable part of P is concentrated in the surface portion of soil under mineral or organic configuration. Nevertheless, these forms of P are no longer available because they react with soil components, and only the soluble P in solution may be collected by roots, or less than 0.5% of total P. Certain rhizospheric bacteria have the ability to solubilize the complex forms of P and make them available to grow plants. These bacteria in addition to improve the P nutrition, they can activate the growth by production of phytohormones and chelating substances. The aim of this present work is to make a screening of bacteria solubilizing P from agricultural soil and to test the synergistic or antagonistic effect of inoculation by certain strains on plant growth, phosphorus and nitrogen nutrition. The *in vitro* testing of solubilization capacity by 28 strains was conducted in three culture media namely NBRIY, TCP NH_4Cl and TCPKNO_3, containing three distinct sources of complex P. The results illustrate that NBRIY and TCP NH_4Cl media revealed more active bacteria, with a higher DH/DC ratio especially using tricalcium and monocalcium phosphate as a single-source of insoluble phosphorus. The susceptibility of bacteria to produce siderophores and auxins was also evaluated via tests in solid and liquid media. 22 strains are able to produce a significant quantity of auxins and siderophores in the used media. After selection of some isolates having the PGPR characteristics, we test the confrontation of 4 strains in single and co-inoculation with rhizobia, on legume plant under greenhouse conditions. Some symbiotic combinations are induced an increase in biomass and P content of plants compared with non-inoculated plants. In this study, we prove that phosphate solubilizing

bacteria could be used as potential bio-fertilizers and optimize the P retention capacity by plant in deficient or poor soils.
Keywords: PGPR bacteria, phosphate solubilizing bacteria, rhizospheric soil, siderophores, auxins.

PIV-94 : Study of physicochemical properties of the surface of actinomycetes isolated from soil of Béni amir (Beni Mellal, Morocco)

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Abstract:

Microbial adhesion to surfaces is the result of physico-chemical interactions between the surface of the microorganism. Actinomycetes are filamentous bacteria Gram-positive. They are one of the most versatile bacterial groups and most important in ecology and biotechnology. adhesion of these microorganisms and biofilm formation are used for the selection of new characters taxa physicochemical presenting different biotechnological and environmental interest.

To predict adhesion and biofilm formation of actinomycetes, the aim of this work is to study the hydrophobicity and properties donor-electron acceptor -electron of nine strains, isolated from soil collected from the perimeter of Tadla area Beni Amir, Morocco. Character surface of the bacteria is determined by contact angle measuring (CAM). Strains are grown in the liquid medium Bennet. Measurements of physical and chemical properties were performed in a high ionic strength.

All tested strains express hydrophilic character with values of Δ**Giwii** ranging from 12.72 to 38.12. These bacteria have a strong electron donor character varies from 37.94 to 60.25 and an electron acceptor character low varies from 1.88 to 9.05.

Keywords: Actinomycetes, soil, physicochemical properties, contact angle, Béni Amir.

P-IV-95 .Role of Moroccan actinobacteria isolates as biocontrol agents of root rot in legumes caused by *Aphanomyces euteiches*

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Abstract:

Aphanomyces euteiches is a pathogenic fungus that is responsible for root rot and seedling blight in legumes. At an early attack, there is a reduction of the growth and yellowing of the aerial parts of the plants infested before flowering. Moreover, the roots are completely necrotic, which causes the lack of the functional nodes. The damages caused by this plant pathogen generate socio-economic losses recurring views the importance of legumes as protein crops and as a basis of the human nutrition. At present, there is no product to control this pathogen and several studies have reported that microorganisms could be an efficient solution, respectful to the environment and sustainable for biocontrol against plant pathogens.

Therfore, a screening program of bioactive compounds elaborated by actinobacteria isolated in the Moroccan ecosystems was conducted. After checking the virulence of the strain of *A. euteiches* on pea seeds, 359 actinobacteria isolates were screened for their ability to inhibit *in vitro* the mycelial growth. The results obtained showed that 87 were active and among these only 14 isolates have no effect *in vitro* against 5 strains of rhizobia nodulating legumes.

Selected isolates were thereafter studied for their ability to control seedling of peas in the presence of *A. euteiches* and obtained results showed that 9 actinobacteria isolates inhibited significantly the root rot of peas and could be potential biocontrol agents against *A. euteiches*.

Keywords: Actinobacteria, screening, biocontrol, legume, *Aphanomyces euteiches*

PIV-96 Les actinobactéries des milieux salins Marocains : isolement, biodiversité et screening des isolats bioactifs contre quelques agents phytopathogènes.

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Abstract:

Les environnements salins sont caractérisés par une forte concentration en chlorure de sodium et un pH hautement alcalin. Ces conditions extrêmes sont considérées comme étant hostiles au développement des microorganismes, à l'exception des halophiles/halotolérantes.

La capacité d'adaptation de ces microorganismes extrêmophiles au stress salin offre des perspectives en termes d'application biotechnologiques. Les actinobactéries halophiles/halotolérantes ont acquis une grande importance en tant que nouvelle source prometteuse de composés bioactifs, elles sont ainsi capables de produire une variété de composés bioactifs, y compris des antibactériens, des antifongiques, des antiviraux, des enzymes, des antitumoraux et des immunosuppresseurs.

L'objectif de ce présent travail est l'isolement des actinobactéries à partir d'environnements salins marocains (lac Zima et région de Demnate), ainsi que l'étude de leur diversité et leur capacité à produire des substances bioactives à usage agricole.

Les différents échantillons collectés (sol, sédiment et eau) ont été caractérisés, puis différents prétraitements et six milieux de culture ont été utilisés afin de favoriser d'isolement des actinobactéries. Les résultats obtenus ont montré que les milieux Extrait de sol, *Saline Nutrient Agar* (SNA) et *Chemically Defined Medium* (CDM) sont les plus appropriés pour l'isolement des actinobactéries à partir du sol, sédiment et eau, respectivement.

L'étude de la diversité en se basant sur les séries de couleur du mycélium aérien selon *International Strepromyces Project* des 182 actinobactéries isolées a montré d'abord une grande diversité des isolats des échantillons de la région de Demant par rapport à ceux du lac Zima ainsi qu'une dominance de la série blanche (24%) et crémeuse (23%). Par ailleurs, environ la moitié des isolats purifiés produisent des pigments diffusibles dans le milieu de culture Bennett. En outre, l'étude de la tolérance des isolats purifiés à différentes concentrations de NaCl a montré que le nombre des actinobactéries halotolérantes est plus important (89%) que celui des halophiles (11%). Le screening de la totalité des isolats (182) pour leur capacité à produire des substances antimicrobiennes sur milieu solide *vis-à-vis* de quelques agents phytopathogènes a montré que 22% des isolats présentent une activité antifongique contre au moins l'une des six moisissures phytopathogènes tests et que 40% d'entre eux présentent une activité antagoniste contre au moins l'une des trois bactéries phytobathogènes testées. En outre, le criblage des isolats doués d'activité chitinolytique a montré que 43% des isolats testés sont capable de produire de l'enzyme chitinase.

L'ensemble des résultats obtenus ont montré la grande diversité des actinobactéries halophiles marocaines ainsi que leur capacité à produire des substances antimicrobiennes et d'enzyme, ce qui permet d'envisager leur application en tant qu'agents potentiels de biocontrôle contre les agents phytopathogènes ainsi que les insectes nuisibles.

Mots-clés :*Ecosystème salin, Actinobactéries, Isolement, Diversité, Criblage, Substances bioactives, biocontrôle*.

PIV-97 : Isolement et criblage de bactéries actinomycétales productrices de molécules antimicrobiennes à partir de sol salin dans la région de Taza-Maroc.

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Abstract:

Les bactéries de la famille des *Actinomycètes*, habitants naturel du sol, retiennent particulièrementnotre attention et semblent être d'excellentes candidates productrices desubstances aux propriétés intéressantes. Les actinomycètes en général, et plus particulièrement

les *Streptomyces*sont également d'importance médicale et industrielle parce qu'ilssynthétisent des antibiotiques de structures très diverses et en quantitéabondante. Le contrôle des microorganismes pathogènes par les produits de synthèse a perdu son attraction en raison de l'apparition des souches résistantes et à cause de leurs effets indésirables sur l'environnement, d'où la nécessitée de chercher des microorganismes antagonistes comme moyen de bio-contrôle. L'objectif de notre travail est de chercher des actinomycètes ; connus par la production de métabolites secondaires biologiquement actifs ; pour les utiliser dans la lutte biologique contre les microorganismes.

Au début, cinquante isolats d'actinomycètes sont isolés sur milieu caséine amidon agar (CSA) à partir de sol des bassins d'évaporation de l'eau salée dans la région de Taza-Maroc et purifiés sur le milieu ISP2 (International Streptomyces Project). En suite, l'activité antimicrobienne de 22 isolats d'actinomycètes est testée sur 5 souches bactériennes à Gram-négatif (*Dickeya solani* IP2222, *Pectobacterium brasiliensis* 13471a, *Escerichia coli* K12, *Proteus mirabilis* et *Pseudomonas aeruginosa* CECT118) et 3 souches bactériennes à Gram-positif (*Listeria innocua* CECT4030, *Staphylococcus aureus* CECT976 et *Bacillus subtilis* DSM6633) et une levure : *Candida alibicans.* L'activité antimicrobienne est déterminée en utilisant trois milieux de culture, de composition chimique différente : (i) Milieu Bennett, (ii) Milieu SCA et (iii) Milieu Mueller-Hinton et deux températures d'incubation : 30°C et 37°C.

Mots clés: sol salin, actinomycètes, lutte biologique.

PIV-98 : Screening for rock phosphate solubilizing actinobacteria from a Togolese phosphate mine

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Abstract:

A phosphate mine from Togo, an original biotope rich in insoluble rock phosphate (RP), was explored for the presence of RP solubilizing actinobacteria. One hundred and fifty actinobacteria isolates originating from this mine was tested for their ability to grow on a synthetic minimum medium (SMM) containing insoluble RP as unique phosphate source. Only 29 isolates (19%) were able to weather RP in SMM medium. Five isolates showed the most active growth and solubilization capability. These isolates were shown to be able to solubilize RP in liquid cultures. The study of mechanisms involved in these weathering processes indicated that the isolates produce siderophores but not organic acids. Four of these strains were shown to belong to the genus *Micromonospora and* one, to the genus *Streptomyces.*

Key words: Actinobacteria, isolation, characterization, Togolese phosphate mine, rock phosphate solubilization.

PIV-99 : Isolation and Screening of Actinomycetes from Algerian soil for their Enzymatic and Antimicrobial activities

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Abstract:

The constant evolution of bacterial resistance to antibiotics and the emergence of new infectious diseases is a major public health problem; hence the urgent need for new antimicrobial molecules. Actinomycetes, a slow growing gram positive bacteria, are known as an organism that is useful in the search for bioactive compounds. In this study, 27 isolates of actinomycetes were isolated

from soil samples collected in the area of Tizi ouzou region (northern Algeria). A significant difference in the number of colonies was observed between the different culture media (Bennett, GLM and Sabouraud). After purification, the antibacterial activity of the twenty-seven actinomycetes strains was tested against three bacterial strains from the ATCC collection (*Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, and *Staphylococcus aureus* ATCC 25923) by two agar diffusion methods: the perpendicular streak method and the agar cylinder method. Among 27 isolated strains, 13 showed antibacterial activity toward at least one bacterium in the primary screening. Of the 13 strains showing an antibacterial activity, 5 of them were found to be highly active against *Staphylococcus aureus* with inhibition diameters ranging from 20 to 26 mm. The 27 isolates were then subjected for enzymatic activities. From the test, only 3 strains of isolates have the ability to degrade cellulose; 4 showed amylase and 3 protease activities. The isolatesshowed positive results were then selected for identification.

Keywords: Actinomycetes**;** Antibacterial activity; Enzymatic activity; Bioactive compounds; Multiresistant bacteria.

PIV-100 : Predictive adhesion of Lactic Acid Bacteria to Moroccan Arbiquine olives

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Abstract:

During the fermentation process of table olives, lactic acid bacteria have a strong ability to survive in the brining step. Their adherence to olives is the first step in fermentation process; it is result of interfacial interaction governed by physicochemical proprieties of both surfaces (the surface of the lactic acid bacteria and olives).

To better understand the phenomenon of adhesion, we have studied the physicochemical characteristics of these bacteria and surface of the Moroccan Arbiquine olives. The characterization was carried out with the measurement of contact angle, using three solvents: water, formamide, and diiodomethane. The results were coupled to the equation of Young Van Oss, which allowed us to calculate the energy of the surfaces (γ_s), the component of Vander Waals (γ^{lw}) and the character electron donor (or Lewis base) (γ_s^-) and electron acceptor (or Lewis base) (γ_s^+).

Based on the results of the predictive adhesion and the free energy of adhesion ΔGtot, it was concluded that the adhesion of lactic acid bacteria on the Moroccan Arbiquine olive is very favorable and it varies depending on the stage of maturation of the Moroccan Arbiquine fruit. In fact the surface of the green olives presents an adequate support for the adhesion of lactic acid bacteria followed by the surface of the rotating olives. However, the proportion of adhesion is very low on top of the black olives.

Keywords: fermentation, lactic acid bacteria, Olives, Moroccan Arbiquine, Adhesion, Predictive adhesion.

PIV-101 : Hydrolyse des caséines par les protéases de bactéries lactiques et activité anti bactérienne des hydrolysats

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Abstract:

La protéolyse est réalisée par le système protéolytique des bactéries lactiques, composé de protéases de paroiquiorientent l'hydrolyse des protéines, les transporteurs de peptides et les peptidases.Cette protéolyse peut générer des peptides dont certains ont été identifiés biologiquement actifs.

Deux souches lactiques *Lactobacillus plantarum*BH14 et *Lactococcuslactis*LCL isolées de lait de chamelle et de lait de vache respectivement ont été étudiées pour leur profil d'hydrolyse des protéines du lait et leur aptitude à

sécréter les protéases dans les milieux de culture. Leur caractère protéolytique a été révélé sur gélose au lait.

L'activité des protéases extracellulaires et l'activité d'une enzyme digestive la trypsine examinées sur les caséines en solutionont été évaluéespar dosage au FolinCiocalteu et par la détermination du degré d'hydrolyse (DH).

Par la suite l'activité antibactérienne des hydrolysats obtenus a été évaluée envers une bactérie *Echerichia coli*à l'aide de la méthode de diffusion.

Les résultats obtenus ont montré que*Lactobacillus plantarum*BH14 est plus protéolytique que *Lactococcuslactis*LCL et que les deux souches sont capables de sécréter les protéases dans le milieu de culture lorsqu'elles sont cultivées en présence de lait.

L'activité des protéases extracellulaires de *Lactobacillus plantarum* BH14 sur les caséines en solution est la plus élevée comparativementaux protéases de *Lactococcuslactis* LCL mais les caséines ont montré une sensibilité plus grande à la trypsine. Le degré d'hydrolyse DH exprimé en pourcentage a montré l'efficacité la plus élevée pour la trypsine puis les protéases de la souche BH14.

L'activité antibactérienne révélée par l'apparition de zone d'inhibition a été observée pour les hydrolysats de caséines obtenus par la trypsine et les protéases de *Lactobacillus plantarum*BH14.

Mots clés : Bactéries lactiques, activité protéolytique, protéases, trypsine, hydrolysats de caséines, activité antibactérienne

PIV-102 : Stress acide chez les lactobacilles

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Abstract:

L'adaptation des bactéries à des variations environnementales est un phénomène essentiel à leurs survies ainsi qu'à leurs développements. Cette étude a pour but de comprendre les mécanismes de réponse due à un stress développé par les bactéries lactiques notamment leslactobacilles.

Dans cette étude nous avons testé deux souches BH14 (*Lactobbacillus plantarum)* et CHTD27(*Lactobacillus brevis)* isolées du lait de chamelle.

L'effet du stress acide sur les bactéries montre que le type de stress appliqué sur ces bactéries (stress choc ou prolongé) affectent leurs capacités de se multiplier ainsi que leurs vitesses de croissances de manière différente. La croissance de ces bactéries à différents pH nous a permis de déterminer le pH minimal de croissance.

Une adaptation des cellules montre que celle ci a des effets bénéfiques sur la vitesse de croissance cependant la phase de croissance impliquée (exponentielle ou stationnaire) joue un rôle dans la résistance a ce stress.

La comparaison entre les différentes phases de croissances dans les différents pH des deux souches ainsi que le dénombrement cellulaire nous induit à une conclusion, la BH14 est plus résistante que la CHTD27.

L'application de l'électrophorèse SDS-PAGE a permis de mettre en place un profil protéique qualitatif permettant la mise en évidence de protéines impliquées dans le stress acide.

Le stress acide chez les bactéries lactiques est un sujet intéressant, l'étude approfondie ne peut être que bénéfique, la BH14 a montré une grande résistance à un pH très acide, on peut supposer qu'elle peut résister au pH gastrique ce qui fera d'elle une bonne candidate en tant que probiotique.

Mots clés : *Lactobacillus*-stress acide-adaptation-résistance-SDS page.

PIV-103 : Proteolyse et autolyse de souches de bacteries lactiques d'origine laitiere

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Abstract:

Introduction. Les bactéries lactiques participent à l'affinage des fromages grâce à leurs enzymes protéolytiques. Leur aptitude à s'autolyser et libérer leur contenu enzymatique est une importante caractéristique pour l'élaboration des fromages.

Objectif. Afin de sélectionner des souches performantes, la caractérisation technologique de 24 souches de bactéries lactiques d'origine laitière a porté sur l'étude de leurs activités protéolytique et autolytique. **Matériel et méthodes**. Le criblage de l'activité protéolytique a été effectué sur milieu agar-MRS-lait. La présence de protéases dans le milieu de culture a été recherchée sur gélose au lait. L'hydrolyse des substrats chromogènes (L-leucyl-paranitroanilide ; glycyl-prolyl-paranitroanilide) a été suivie à 410 nm. L'aptitude à l'autolyse a été estimée en mesurant la diminution de la DO. **Résultats.** Toutes les souches expriment une activité protéolytique liée à la paroi bactérienne. Les diamètres de clarification les plus importants pour la protéolyse extracellulaire ont été révélés par les souches CHM16, 18, 19 et 20 (676 à 729mm2). Les activités leucyl-aminopeptidasique (AAP) et glycyl-prolyl-dipeptidylaminopeptidasique (ADAP) sont faiblement exprimées par les isolats CHM et LVK tandis qu'elles sont présentes chez les souches LCL, CHTD27 et 29, BH14 et 21 (AAP : DO de 0.97 à 2.97 ; ADAP : DO de 0.38 à 0.39). Ces dernières ont montré une importante activité autolytique (de 57 à 70%) avec un optimum à des températures proches de leurs températures optimales de croissance, à des pH proches de la neutralité et en présence de 0.5 à 1M de NaCl.

Conclusion. Les souches testées ont exprimé des critères de sélection requis pour des applications technologiques.

PIV-104 : L'importance du cactus dans la fermentation lactique et la technologie alimentaire (Meknès, MAROC)

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Abstract

Les dernières décennies sont marquées par l'intérêt particulier porté à la mise en valeur des plantes à intérêt médicinal et alimentaire comme sources de substances bioactives naturelles.

Et aussi afin de tirer profit du potentiel nutritif et médicinal de cactus, leur incorporation sous forme de jus dans les aliments, pourrait constituer une alternative pour leur exploitation surtout dans les industries alimentaires.

Les répercussions des paramètres sur la qualité hygiénique, physico-chimique,nutritionnelle et organoleptique du yaourt ont fait l'objet de nombreux travaux de part le monde qui ont montré la relation très étroite qui existe entre la nature de la matière première ainsi que les procédés technologiques utilisés pour l'obtention d'un produit élaboré répondant aux normes requises et aux exigences de plus en plus aiguisées du consommateur. L'un des moyens de relier les paramètres influençant la fabrication du yaourt et les normes exigées de qualités du produit fini est l'expression mathématique du procédé. Il s'agit d'associer des mesures classiques et des modèles mathématiques afin d'estimer et/ou de prédire les grandeurs clés caractéristiques du produit et des procédés.
Nos travaux s'inscrivent dans cette perspective, en abordant la composition du cactus et les possibilités d'enrichissement des produits laitiers en vitamine C, fibres, polyphénols.

Au niveau de laboratoire les cactus exploités offrent une composition optimale en molécules bioactives et d'intérêt nutritionnel. Ils ont un impact important sur la croissance et le développement des bactéries lactiques.

Le rôle du cactus dans le développement durable des territoires ruraux du Maroc et de Meknès en particulier. Ses fonctions écologiques, médicinales, alimentaires et socio-économiques doivent être.

Mots clé : Cactus, bactérie lactique, yaourt

PIV-105 : Formulation du yaourt à base du cactus (Meknès, MAROC)

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Abstract

L'*Opuntia ficus indica* ou figuier de barbarie, est une plante de type CAM (Crassulacean Acid Metabolism) [1] qui présente des adaptations physiologiques et morphologiques, lui permettant de résister aux conditions difficiles des régions arides et semi arides [2].
En outre, les jeunes cladodes ou "nopalitos" sont consommés comme légume dans certains pays d'Amérique du Sud, dont le Mexique.Ces cladodes qui contiennent différentes molécules bioactives et fonctionnelles dont les flavonoïdes, sont particulièrement riches en fibres et minéraux.
Dans le domaine alimentaire, les jeunes cladodes sont utilisées au Chili et au Mexique, pour préparer la poudre de cladodes, les confitures, marmelade et divers plats. Leurs mucilages qui constituent un apport de fibres alimentaires, améliorent la digestion, ont aussi des propriétés gélifiantes et épaississantes. Ce qui justifie leur introduction comme épaississant à la place des carboxymethylcellulose (CMC) provenant de la modification de la cellulose. Leurs fibres ouvrent ainsi, de nouvelles perspectives dans la préparation et la formulation des aliments.
Au Maroc, comme dans les autres pays du Maghreb, l'utilisation fourragère des cladodes est peu développée si l'on excepte leur utilisation pendant les périodes de sécheresse difficiles[3]. Quand à l'utilisation des jeunes cladodes dans l'alimentation humaine, elle est pratiquement méconnue. Les habitudes alimentaires constituent encore un frein à l'utilisation maraichère des jeunes cladodes, contrairement aux pays d'Amérique du Sud ou la consommation qui ne cesse d'augmenter dépasse 6.36 kg/ an/personne.
Afin de tirer profit du potentiel nutritif et médicinal des cladodes d'*Opuntia*, leur incorporation sous forme d'ingrédient dans les aliments, pourrait constituer une alternative pour leur exploitation.
Nos travaux s'inscrivent dans cette perspective, en abordant la composition des cladodes selon le stade développement et les possibilités d'enrichissement des produits laitiers en vitamine C, fibres, polyphénols. Les cladodes qui on a exploitées sont sélectionnées, en fonction du stade de croissance offrant une composition optimale en molécules bioactives et d'intérêt nutritionnel . Ainsi abordé l'impact lié à l'addition du jus de cladodes pour l'enrichissement des produits laitiers, à travers leur effet surla croissance des bactéries lactiques , d'une part ,et sur le procédé de fabrication notamment : l'acidification, l'évolution des sucres et des mucilages en cours de fermentation, et l'effet sur les caractéristiques sensorielles du yaourt, d'autre part.

Mots clés : *Opuntiaficusindica*, jus de cladodes, composition, mucilage, bactéries lactiques.

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PIV-106 : PGPR traits of Heavy Metals Resistant bacteria: Application in Phytoremediation

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Abstract:

Phytoremediation has been considered as a novel environment friendly technology, which uses plants to remove or immobilize heavy metals, However, most plants that could accumulate high concentrations of heavy metals (i.e., hyperaccumulator) are not suitable for field applications due to their small biomass and slow growth. To avoid these problems, the use of

Metal-resistant plant growth-promoting bacteria can be considered as an important phytoremediation technology for enhancing biomass production as well as tolerance of the plants to heavy metals. In this study we tested bacterial isolates resistant to heavy metals Cr, Zn, Cu, Ni, Pb and Co for PGPR characters (phosphate solubilization, Production On IAA, siderophore and HCN ...). The results showed that 37.14% of bacterial isolates have a capacity of phosphate solubilization, 28.57% are able to produce siderophores and we found that all isolates have the ability to produce IAA. Isolates that satisfy both heavy metal resistance and plant growth promotion characteristics have potential for application in microbially assisted phytoremediation approaches for depollution of heavy metals contaminated soils.

Keywords: Phytoremediation; Heavy metals; Bioaugmentation; plant growth-promoting bacteria

PIV-107 : Bioremediation of landfill leachate using microorganisms

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Abstract:

Landfilling is the most popular way for Municipal Solid Waste (MSW) disposal and has been widely applied in the world. However, the landfill leachate of MSW contains high concentration of organic and inorganic contaminant which may causes significant threat to surface water and groundwater.In Morocco, most landfills are usually open dumps/unlined landfills. Only a few of them which has been constructed within the scope of the National Household Solid Waste Program (NHSWP) launched in 2007, can be regarded as Sanitary landfills, indicating that they were designed and constructed according to engineering specifications. Landfill leachate from the uncontrolled dumping sites, must be managed on a daily basis and for many years after a landfill is closed. This could burden the municipalities with more costs. The bioremediation, which refers to use of microorganism to degrade contaminants, is a suitable solution to tackle this problem and clean up the uncontrolled landfills in Morocco in an effective and economic way

In this context, the key component of our research study is to confirm the role of indigenous microflora in treatment of the leachate of the municipal waste landfill plant in Marrakech and Agadir city. Twelve I1-I12 and J1-J12 strains were isolated from municipal landfill plants in Marrakech and Agadir respectively, and were tested for their ability to grow on various concentration (20%, 40%, 60%, 80%, 100%) of leachate incorporated with agar-agar. The strains, which grow in 100 % leachate, were screened and recorded.

PIV-108 : Bioremediation : microbiology of pesticide degradation, and the use of bio-filters for decontaminationin the field of Agriculture

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Abstract:

Introduction: In Quebec, about 50914 hectares are used for growing vegetables. Several pesticides are used to treat these crops, and these products pose significant risks, to human health and the environment. According to studies done in Quebec in 2001, 49% of private wells close to potato crop fields were found to be contaminated by pesticides.

Hypothesis: The repeated use of pesticides in agriculture leads to the contamination of soil, and stimulates the growth of microorganismes capable of using pesticides as a nutrient source

The objective is to identify microbiological variables responsible for the degradation of pesticides in the process of bioremediation using bio-filters, and specifically:

1. To identify microorganisms capable of growing in soil treated with pesticides

2. Confirm their in vitro ability to degrade pesticicdes
3. use of pesticides in agriculture leads to the contamination of soil, and stimulates the growth of microorganismes capable of using pesticides as a nutrient source

Illumina sequencing results showed that the Proteobacteria and Actinobacteria were the two most prevalent species in soil treated with pesticides. After confirming their ability to degrade pesticides in vitro, these microorganisms will be used to inoculate sterile biofilters in order to assess their potential to degrade pesticides in the field.

The results of this project will help to adopt new strategies to reduce the contamination of water resources, and improve the quality of aquatic ecosystems, and irrigated crops

Keywords: Bioremediation, Microbiology, Pesticides, Biofiltre.

PIV-109 : Enzymatic characterization of yeaststrainsisolated from the gut of a coprophage "Gymnopleurussturmi"

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Abstract:

Nowadays, yeasts are considered asa potential source ofsecondary metabolites with a high added value. The production of thermostable enzymes by yeast increasesthe hydrolysis yield of complex substrates at high temperatures.Thus, they could provide an alternative to chemical hydrolysis for the production of bioenergy and other environmental technologies.

The goal of our present study is tocharacterize enzymes (Cellulase, pectinase, amylase and lipase); secreted by different yeasts isolated from the gut of a coprophage "*Gymnopleurussturmi* ", which are able to degradecomplex substrates to fermentable sugars.

We firsthave determined the physicochemical parameters that influence the ability of ouryeast isolates to produce such enzymes. Isolates with interesting enzymatic activitieswere subjected to biochemical and molecular identification.

From aset of 55 isolates, 50.91% had the ability to produce cellulase and 65.45%to produce pectinase. The lipase activity was shown forall the isolates; on the contrary, no one of them showed any amylase activity. It is important to mention that for some isolates, the production of those enzymes is maintained stable at high temperatures that can reach 48°C.Furthermore, the isolates grew at a wide pH range between 3 and 9. Besides, they have been able to grow at amaximaltemperature of 48°Cand to assimilate several carbon sources including sucrose, xylose, fructose, mannitol, and dextrin.

PIV-110 : First report of resistance genes L1014F kdr and G119S ace-1 mutations among *Culex pipiens* in Morocco

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Abstract:

Culex pipiens complex is a mosquito, and competent vector that transmit Rift Valley Fever virus (RVFV) and West-Nile virus (WNV), this complex is subdivided in two different forms *molestus* and *pipiens*, morphologically identical but genetically different. Vector control is based on the use of pesticides which leads resistance, as *Cx. pipiens* is frequently exposed to insecticides, we aim to investigate the L1014F *kdr* and G119S *Ace-1* mutation frequencies in different forms of

Culex pipiens complex from three regions of Morocco.

Tests were conducted on adults reared from larval and pupal collection from three different regions in Morocco (Tangier, Casablanca and Marrakech). Specimens were identified as belonging to the *Culex pipiens* complex using a multiplex Polymorphism Chain Reaction (PCR) assay prospected for these forms in Morocco by using diagnostic primers designed for the flanking region of microsatellite CQ11, and the characterized mosquitoes were tested for the presence of the L1014F *kdr* and G119S *ace-1* mutations using PCR assay.

Overall 416 specimens were tested for L1014F *kdr* mutation detection, we found that heterozygous resistant form (RS) is more frequent in Tangier and Marrakech than Casablanca: 66%, 60% 17% respectively, while homozygous resistant (RR) genotype is lower in all cities (0-7%). The half of *Cx. pipienspipiens* and hybrid: 53% and 54% respectively, is heterozygous resistant whereas the most of *Cx. pipiens molestus* has the homozygous susceptible (SS) form (90.5%).

About 380 samples were characterized and tested to detect G119S mutation in the three cities. We found that the RS genotype was frequent in urban than rural area: 41.5% vs 27% in Tangier, 61% vs 0% in Casablanca, and 62.5% vs 16% in Marrakech. For the frequency of Ace-1 mutation according to the forms, the RS genotype was frequent in *Cx.pipiens pipiens* (31.5%) and hybrids (26.5%), than *Cx. pipiens molestus* (2%). For the RR form, was very lower in the different forms of *Culex pipiens* (0-2%).

For the first time in Morocco, we determined the frequency of L1014F *kdr and* G119S *ace-1* mutations in different areas of Morocco, and also in different forms of *Cx. pipiens* mosquito.

Key words: *Culex pipiens*, resistance, L1014F *kdr*, G119S *Ace-1* mutation, Morocco.

PIV-111 : Etude de l'adhésion des microorganismes isolés à partir de l'acier inoxydable 304 dans une solution d'eau de mer simulée

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Abstract:

La colonisation microbienne de la surface de l'acier inoxydable 304 est considérée comme une source de problèmes industriels austères, dans des secteurs diversifiés tels que l'industrie agroalimentaire, pharmaceutique, pétrolière, électriques, etc. Ce phénomène est ainsi à l'origine d'une diminution des rendements et d'une augmentation des coûts de production partout dans le monde, notamment en raison de la corrosion influencée par les microorganismes ou encore appelée biocorrosion. Dans le cadre de cette problématique, la protection de l'acier inoxydable vis à vis la biocorrosion est devenu une nécessité.

Les biofilms étant très difficiles à éradiquer une fois formés, une stratégie préventive, visant à limiter l'adhésion des microorganismes à l'acier inoxydable 304, constitue une approche pertinente. Dans cette optique, l'objectif de ce travail est de mettre au point un traitement de surface à efficacité anti-adhésive sur l'acier inoxydable 304.

Dans cette poursuite, l'effet de l'huile essentielle et des extraits aqueux et éthanolique de *Salvia officinalis* (avec différentes concentrations) sur la physico-chimie de l'acier inoxydable 304 a été étudié par la méthode de l'angle de contact. Ainsi, l'activité antiadhésive de ces différents extraits a été évaluée par l'utilisation de la microscopie électronique à balayage environnemental.

Les résultats ont montré qu'il y a une influence significative de de l'huile essentielle et les extraits utilisés sur les propriétés physico-chimiques de la surface de l'acier inoxydable 304. Aussi, un changement dans le comportement adhésif des bactéries sur cette surface a été remarqué qui peut contribuer ainsi sur l'inhibition ou le ralentissement du processus de la biocorrosion.

Mots clés :*Salvia Officinalis,* adhésion, acier inoxydable, énergie de surface, MEB, angle de contact.

PIV-112 : LA BIOREMEDIATION DES SOLS POLLUE AUX HERBICIDES (GLYPHOSATE ET 2,4-D) PAR L'INOCULATION DE LA *PSEUDOMONAS AERUGINOSA* DANS LE PERIMETRE IRRIGABLE DE BOUNAMOUSSA (EXTREME NORD EST ALGERIEN)- EFFETS SUR LA DISPONIBILITE DU PHOSPHORE ASSIMILABLE (P_2O_5).

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Abstract:

La forte utilisation les deux herbicides 2,4-D et du Glyphosate depuis 1968 d'une coté, et d'une autre coté, les besoins en phosphore et en azote (N et P) dans les sols du périmètre irrigable de Bounamoussa Nord Est Algérien, constitue une contrainte majeure de bonne gestion économique, agronomique et environnementale. Grace au phénomène de bioaugmentation, cette étude a été conduite pour évaluer les effets des interactions entre les herbicides Glyphosate et 2,4-D en formulation commerciale et l'inoculum de microorganismesur la production du phosphore assimilable, ainsi que sur l'évolution de l'azote nitrique dans les deux sols agricoles (SI de Beni Ammar et S2 de Maiz el bachir). Les deux herbicides ont été ajoutés à la dose de champ. Au cours de ce travail, nous avons utilisé comme inoculum, *Pseudomonas aeruginosa (*10^9 bactéries/l) une souche microbienne que nous avons isolée d'un sol adapté à la dégradation des herbicides. Le plan expérimental correspond à un système factoriel 6 x 2 (trois traitements et deux types de sols), avec 3 répétitions et 9 dates (1, 3, 7,14, 28, 42, 60 et 90 jrs), en blocs totalement aléatoires. Les effets principaux sont ceux des sols et interaction du sols herbicides et pseudomonas. Après l'isolement du *Pseudomonas aeruginosa*, l'inoculum est injecté avec un mélange d'eau + l'herbicide relevé, leur humidité au 2/3 de la capacité de rétention directement dans le sol.

Les échantillons (12) ont été mis en incubation (étuve) en récipient simple dans l'obscurité (T=28°c) pendant 90 jours. Le phosphore assimilable (méthode Olsen) est extrait avec une solution d'hydrogénocarbonate de sodium à pH = 8,5 et le dosage de l'azote nitrique s'effectue selon méthode de DROUNEAU et GOUNY (in BONNEAU et SOUCHIER, 1979).

Après trois mois d'incubation, les résultats obtenus confirment l'effet variable significatif de l'herbicide de Glyphosate et de l'herbicide 2,4-D vis-à-vis les microflores contrôlant la minéralisation du phosphore organique et de l'azote nitrique dans les deux sols. Ainsi l'étude montré qu'il existe un effet toxique vis-à-vis les activités de la biomasse microbienne responsable de la minéralisation du phosphore et l'azote organique, dépond fortement de la molécule des deux herbicides tester surtout dans les traitements non inoculés S1H1, S2H1, S1H2 et S2H2 par rapports aux témoins S1 et S2. Ces effets se sont traduits en conséquence par des taux d'inhibitions.

Egalement, cette investigation à révélé que l'inoculation du *Pseudomonas aeruginosa* dans les deux sols traités par les herbicides permet une amélioration et une augmentation des quantités du P_2O_5 et NO_3^-. Alors que, utilisés pour la nutrition minérale des céréales. En effet, les taux de stimulation enregistrés permettent de confirmer cet effet positif, ce processus d'intervention bactérienne ce qu'on appelle la bioaugmentation ou biorémédiation des sols.

Pendant une période d'incubation, les quantités de phosphore assimilable et de l'azote nitrique des différents traitements présentaient l'ordre décroissant suivant : S2H2 < S2H1 < S2H2P < S2 < S2P < S2H1P < S1H2 < S1H1 < S1H2P < S1 < S1P < S1H1P.

Mots Clés : inoculation, incubation, minéralisation, nitrification, réorganisation du phosphore, dénitrification, interaction bactérie – herbicides, taux de stimulation, taux d'inhibition, bioaugmentation et biorémédiation

PIV-113 : Caractérisation microbiologique des extraits d'algues marines de la région d'EL JADIDA

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Abstract:

Le Maroc est l'une des pays les plus riches en algues marines connues par leur intérêt biologique et médical.

L'objectif de notre travail est la recherche et l'identification de molécules bioactives à partir des extraits d'algues marines collectées de la région d'EL JADIDA. Ces extraits sont testés in vitro à différentes concentrations pour évaluer leur effet antimicrobien vis-à-vis de plusieurs souches bactériennes comme E.coli.

Les résultats préliminaires ont montré une sensibilité considérable de la majorité des souches bactériennes étudiées vis-à-vis de ces extraits d'algues marines.

De ce fait, d'après cette étude les algues marines peuvent être utilisées comme des antibiotiques naturels efficaces contre ces souches bactériennes et donc présenter un moyen de lutte biologique contre les maladies en question.

Mots Clés : activité antimicrobienne; extrait d'algue marine; molécules bioactives; souches bactériennes ; lutte biologique

PIV-114 : Etude microbiologique de neuf algues récoltées de la côte d'El Jadida

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Abstract

Les biomolécules d'origine marine sont de grande importance pour différents secteurs de l'économie mondiale. Outre leur rôle écologique et naturel, les algues marines regorgent de potentialités pour le développement de différents secteurs économiques (industrie, alimentation, agriculture, médecine, cosmétique…). La demande mondiale croissante en cette ressource dépasse de loin ses capacités de régénération naturelle et exige de plus en plus une gestion rationnelle.

Le présent travail porte sur l'étude microbiologique de neuf algues récoltées de la côte d'El Jadida et plus particulièrement leur pouvoir antifongique. Les premiers résultats obtenus attestent de la variabilité du pouvoir de ces algues contre certains champignons. L'espèce la plus active fera l'objet d'une purification dont le but d'isoler le principe actif.

PIV-115 : Effet du Nitrate sur le Comportement de la Symbiose (Haricot-*Rhizobium phaseoli*), en Condition de la Salinité

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Abstract

L'effet inhibiteur du nitrate sur la symbiose légumineuse * *Rhizobium* a été mis en évidence par plusieurs travaux.
En raison des apports d'engrais azotés aux cultures qui précédent le haricot, les recherches s'orientent vers l'identification de génotypes ayant un bon pouvoir fixateur sur des sols riches en nitrate.

L'objectif du présent travail est de déterminer la concentration optimale de nitrate pour la croissance et la fixation symbiotique de l'azote chez deux variétés de haricot, Dark et Coco blanc en association symbiotique avec la souche *Rhizobium tropici* CIAT 899, cultivées sur milieu dépourvu d'azote et additionné de NaCl 50 mM.

L'expérience est réalisée dans une serre vitrée, sous un éclairement naturel, dans des conditions de température et d'humidité contrôlées. La culture est effectuée en pots d'argile contenant chacun 1 Kg 200 de sable ; tous les deux ont été stérilisés au préalable. Pour chaque variété, les graines de même taille, après désinfection et inoculation, sont semées à raison de 4 par pot. A la levée une seule plantule par pot est maintenue en culture jusqu'à la fin de l'expérience. Les mesures ont porté sur la production de biomasse

de chaque organe, le nombre de feuilles, la surface foliaire, la nutrition hydrique et minérale.

Les résultats montrent que l'apport de NO_3^- à une concentration de 1 mM, améliore l'hydratation des feuilles et leur approvisionnement en éléments minéraux essentiels, notamment N et Pi, et diminue leur contenu en Cl^-. Egalement, l'initiation nodulaire est stimulée, en particulier chez DARK. Cependant, l'effet bénéfique du nitrate sur l'activité fixatrice des nodosités nécessite une étude plus détaillée.

Mots clés : nitrate-symbiose, haricot, *Rhizobium phaseoli*, salinité

PIV-116 : Comparison of qualitative and quantitative hydrophobicity to explain the microbial adhesion behavior

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Abstract:

Bacterial hydrophobicity is generally known as the tendency of a bacterial cell to interact with cells of similar hydrophobicity as opposed to water. Many workers in bioadhesion and biofilm have considered angle contact measure with water an important technique to evaluate hydrophobicity. Despite the recognized importance of the qualitative hydrophobicity expressed as wettability with water (Ow) in many previous studies, it has been reported that it couldn't explain totally the adhesion behavior of many bacteria. Therefore, in 1995, Van Oss proposed a new technique to quantify the absolute degree of hydrophobicity know as (ΔGiwi).

In this work, we have studied the relation between hydrophobicity with two approaches (Ow, ΔGiwi) of twelve different *Escherichia coli* strains and their attachment ability on glass. We have found that there is a no significant relation between qualitative hydrophobicity (Ow) of *Escherichia coli* strains and their adhesion behavior on glass. However, we've revealed that when we pass from extremes values of quantitative hydrophobicity (ΔGiwi) to centric values (close to 0), we can clearly note that their adhesion to glass substrate becomes more pronounced even if the glass were hydrophilic. Moreover, we've observed an important logarithmic correlation between quantitative hydrophobicity ΔGiwi and the surface occupied by adhered cells. The correlation is more significant with the negative value (R^2 = 99,89%) then the positive value (R^2 = 79,14%) of ΔGiwi. However, there is no correlation between qualitative hydrophobicity (Ow) measured directly by contact angle and adhered cells

Key Word: *Escherichia coli*, adhesion, physicochemical properties, foodborne, glass, hydrophobicity.

PIV-117 : Impacts On Soil Of Herbicides Used In Triticum Cultures

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Abstract:

Pollution by pesticides and organic pollutants is mostly perceived through their presence in water and food. However, many pollutants pass through the soil where their conduct will determine the manifestation of their pollutant character. Reducing their environmental impact requires an understanding of the processes they undergo in the soil. Thus, the physico-chemical composition of the soil, temperature and the richness of the microflora are so many and various factors that contribute to the degradation of herbicide residues. Why our study aims to study the soils used for growing wheat in a chemical weeding at stage 3-4 leaves with two herbicides (Sekator and Zoom) of sulfonylurea on some physico-chemical parameters (pH, conductivity, K content, available P content and the rate of organic matter) in semi-arid zone of Algeria. Variance analysis shows no significant effect of pH and conductivity of a soil polluted with both

herbicides compared to the control. As against the soil treated with the herbicide Sekator shows significant decrease in the level of the organic mater ($p \leq 0.05$) and highly significant content of available phosphorus and potassium ($p \leq 0.01$), whereas the soil weeded herbicide Zoom shows a very highly significant increase of the content of available phosphorus ($p \leq 0.001$) and very highly significant decrease in the potassium content.

Keywords: pollution, herbicide, soil, physical parameter, chemical parameter.

PIV-118 : Slow-Release Potassium Sulfate Fertilizer Coated By Starch/Polyacrylamide/Grapheme Oxide Biocomposites

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Abstract:

Given the need to reduce the impact of the use of chemical fertilizers on the environment and the quality of food crop production, it is necessary to develop fertilizer formulations enabling the gradual and controlled release of the active substance [1].
This could be achieved by coating of fertilizers by degradable polymers [2]. In our work, a fertilizer based on K_2SO_4 was coated using a starch/polyacrylamide/graphene oxide film. We prepared enrobed fertilizers with mass ratios K_2SO_4/polymer of 9/1, 8/2 and 7/3.

The release of potassium from coated K_2SO_4 and no-coated K_2SO_4 pellets was realized in water, for different times. The release was monitored by dosage of potassium in elutriant.

After the formation of enrobed fertilizer pellets, the slow-release characteristics of the fertilizer were improved. We believe that this new fertilizers could hold great promise for the development of environmentally-benign controlled-release fertilizer for crop production.

Keywords: Slow release, graphene oxide, starch, polyacrylamide, potassium, fertilizer.

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PIV-119. Development of Nano-Biodegradable Fertilizers from Moroccan phosphate rock.

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Abstract:

Fertilizer is one of the vital input materials for the crop production. However, more than half of the applied amount of common fertilizers cannot reach the plant, but it is washed off by rain and irrigation water. This part of lost fertilizer not only causes large economic losses but also very serious environmental pollution. The overcoming of these shortcomings can be achieved with the use of slow release fertilizers (SRFs). Evaluated as a key nutrient source for food, fiber and biomass production in agriculture, nitrogen is the most important element in fertilizers. However, considering the energy required in its synthesis and the large tonnage required, the nitrogen fertilizer has a high monetary value. Because 50-70% of the nitrogen applied using conventional fertilizers, is lost to the soil due to leaching and to the weakness of nitrogen utilization efficiency (NUE) by plants. Attempts to increase the NUE in conventional fertilizer formulations have thus far resulted in little success.

In our study, hydroxyapatite nanoparticles were synthesized by wet chemical methods and surface modified with urea (Figure). The fertilizer composition was manufactured by encapsulation of urea-modified hydroxyapatite nanoparticles into micro/nano porous cavities under pressure.

These cavities are defined by cellular polymers such as cellulose, hemi-cellulose and lignin. Once this nanofertilizer composition contained in a superabsorbent biopolymeric matrix is incorporated into a soil system, it will absorb moisture, thus initiating slow and sustained release of nitrogen into the soil as a result of diffusion and microbial degradation. N and P contents of the prepared solid nanofertilizer compositions were analyzed using Kjeldhal method and vanadomolybdate method respectively.

The nanofertilizer showed good composition of nitrogen at different pressures. At high pressure, the destruction of cell cavities and cell walls may be the reason for the low loadings.

The urea-modified hydroxyapatite nanoparticles encapsulated into cellulosic biomass displays a slow and sustained release of nitrogen over time at three different pH values. The proposed fertilizer composition may maximize the NUE while minimizing the adverse effects to the environment due to use of large quantities of fertilizer in agriculture

Keywords: Fertilizer, nanocomposite, biomass, macronutrients, slow release.

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PIV-120 : Variability of N_2 Fixation in Cowpea Under Phosphorus Deficiency is Related to Phosphorus Use Efficiency

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Abstract

Low availability of phosphorus (P) is a major constraint to legume production, and efforts are being made to identify legume genotypes with tolerance to low P and greater P use efficiency (PUE). Cowpea (*Vigna unguiculata* L.) genotypes vary in their adaptation to low-P soils. In order to investigate to what extent this variation may be related to PUE for symbiotic nitrogen fixation (SNF), five genotypes (Adrar, El Kala, Djenet, Tizi Ouzou and Bejaia) were grown in semi-hydroponic culture with sufficient *versus* deficient P supply. At the flowering stage, the biomass of plants and nodules and their P contents was determined after measuring the quantity of N_2 fixed. The results showed that nodule and shoot biomass were less when P was deficient. The genotypes which presented the maximum growth during the experiment presented a high efficiency in use of the rhizobial symbiosis calculated as the slope of plant biomass regression as a function of nodulation. Under P-deficiency, efficiency in use of P for SNF was significantly increased in the genotypes El Kala, Djenet and Adrar and accompanied with an increase of the efficiency in use of the rhizobial symbiosis. Hence the large differences show that traits for more P uptake-efficient plants exist in the tested cowpea genotypes. This opens the possibility to breed for more P uptake-efficient varieties as a way to bring more sparingly soluble soil P into cycling in crop production and obtain capitalisation of soil P reserves.

Keywords: cowpea, phosphorus, nodule, rhizobia, N_2 fixation, symbiosis

PIV-121 : Flores autochtones thermophiles : une nouvelle méthode innovatrice pour la sélection de souches thermophiles productrices de diacetyle

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Abstract:

L'objectif de l'étude est de sélectionner des soucheslactiques thermophiles, indigènes, d'intérêt technologique, d'explorer la stabilité des levains thermophiles commerciauxpour dix marques du yaourt industriel,collectes dans la willaya de Bordj Bou Arreridj Nord-Est d'Algerie.L'isolement, caractérisation des souches,réalisé à partir du lait cru camelin, sur milieux sélectifs M17 (Lactocoques à 42°C) et MRS (Lactobacilles à 45°C).

L'impact de cryoconservation, sur la stabilité des levains, pendant 21jours, réalisé par vérification, en amont et aval, de conservation, de 05 paramètres physico- chimiques (pH, viscosité, conductivité, lactate et densité). Profils acidifiant, par le suivi de la cinétique d'acidification du lait écrémé reconstitué, aromatisant par double tests : de Voges Proskauer et polarographie.

Etude des antagonismes In Vitro,du Surnageant brute actif (SBA)des souches lactiques, dirigé contre des souches cibles : Procaryotes etEucaryotes.

Les résultats ont donné des souches thermophiles,Streptococcus thermophilus sur M17, desLactobacillussp,homofermentaires sur MRS.L'acidification du lait en Degré Dornic (°D), a permis la sélection,de 06 souches Lactobacillus sp (DL4; 51.09,DL1; 49.5,DL2; 47.70, DL3; 47.52, DS3; 42.62 et DL5; 32.23) °D, et six isolatsStreptococcus thermophilus(TL5;103.18, TL1; 88.09, TS2; 67.15, TL3; 47.52, TS3; 45.76 et TL4; 36.96)°D.

L'aromatisation, par le test Voges Proskauer, a révélé:02 souches très intensément aromatisantes, 04 souches intensément positif, 01 souche modérément positif et09 souches moyennement intense. Ces résultats, ont été confirmés sur polarographe, contre étalonétablit dediacetylepure.

Les résultatsd'antagonisme, ont donné des zones inhibitrices(ZI : en mm), oscillant entre (21mm-10mm), contre des souches cibles à Gram positif, entre (25- 09) mmcontre celles à Gram négatif et entre (15mm et 09mm) pour les interactions contre les Eucaryotes.

Conclusion : L'étude a permis l'élaboration d'un souchier lactique thermophile, ayant profils acidifiant, aromatisant et bactériocinogène.

Keywords:Mots clés: Souche lactique, Sélection, Acidification, Aromatisation, Diacétyle, Bactériocine

PIV-122 : L'activité anti-microbienne de l'huile essentielle et des extraits aqueux et éthanolique de *Salvia Officinalis*

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Cité de l'Innovation de Fès. Université Sidi Mohamed Ben Abdellah-Fès

Abstract

Les plantes aromatiques sont à l'origine de produits à très forte valeur ajoutée. De ce fait, leur valorisation présente une nécessité qui peut contribuer au développement économique du Maroc. Le but de cette étude est la comparaison de l'effet anti-microbien de l'huile essentielle et des extraits aqueux et éthanolique de *Salvia Officinalis* qui est très répondue au pays.
Ce travail a été procédé par la détermination de la composition chimique de l'huile essentielle et des deux extraits de *Salvia Officinalis* par la GC-MS, ensuite l'activité anti-microbienne a été évaluée par la méthode de diffusion sur disques de cellulose et la méthode de dilution. Les résultats obtenus ont dévoilés que l'activité anti-microbienne de l'extrait éthanolique est significativement plus importante que l'extrait aqueux et l'huile essentielle de *Salvia Officinalis*.

Mots clés :*Salvia Officinalis*, activité anti-microbienne, extrait aqueux, extrait éthanolique, GC-MS, huille essentielle.

PIV-123 : Nutritional variation among ecotypes of sulla *(Hedysarum flexuosumL.)* grown in North of Morocco

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Abstract:

The use of legume forages species as fodder for ruminant is increasingly becoming important in livestock production. In order to evaluate endemic forage species, a prospective study was perform in different regions of Morocco, allowed the determination the area of distribution of *Hedysarum flexuosum* L. known as sulla. The aim of this study was to determine chemical composition, mineral content and in vitro enzymatic digestibility in the whole plant, leaves and stems of five sulla ecotypes collected at late vegetative stage in five locations (Khandak Lihoudi, Ksar Sghir, Melloussa, Boukhalef and Beni Guerfet). Significant differences existed among the ecotypes in their energy value in term of feed unit for milk (UFL) feed unit for meat (UFV) and nitrogen value computed as crude protein digestibility (CPD) depending on genotype and environment. On the basis of this study, *Hedysarum flexuosum* L. have better nutritive potential grazing compared to mostly legume forages used as fodder or grazed pasture that can provide suitable forage for livestock.

Key Words: *Hedysarum flexuosum* L., chemical composition, enzymatic digestibility and nutritive value.

PIV-124. New formula of phosphorus biofertilizers produced from renewable raw materials

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Abstract:

The natural ability of microorganism to produce acids, can be used to release phosphorus, present in the soil in retrogradative form as well as from secondary renewable phosphorus bearing raw materials. Bacteria and fungi that can produce acids are classified as phosphate solubilizing bacteria (PSB) and phosphate solubilizing fungi (PSF), and both as a phosphate solubilizing organism (PSO). Types of acids produced by PSB can be classified as inorganic and organic, for example*Acidithiobacillusferrooxidans*produce sulfuric acid, while in the case of organic acids its spectrum is strongly related with the compounds used in the formulation of growth medium. Presented paper discussed the possibilities of utilization of poultry bones, fish bones, ash from wastes form enhanced biological phosphorus removal (EBPR) system in the production of phosphorus biofertilizers via biosolubilization performed by *Bacillus megaterium*. The effect of solubilization was expressed as the Solubilization Factor (SF, %) defined as the ratio (expressed as percentage) of soluble P_2O_5 present in the solution and phosphorus (expressed as P_2O_5) introduced to solubilization medium in the solid form. By the utilization of mentioned approach, it is possible to obtain three different formulation of phosphorus bioferilizers: liquid, granules as well as substrate with the properties of slow realizing phosphorus biofertilizers. The characterists as well as utilitartian properties ob mentioned products were presented in this paper.

Keywords: Biosolubilization; *Bacillus megterium*; poultry bones; fish bones; renewable raw materials

PIV-125 : Biodegradation assessment of biological oil sludge from a petroleum refinery

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Abstract:

Biological sludge produced by the Waste Water Treatement Plant of a petroleum refinery, in the absence of treatment and recovery sector is stored in internal discharge society. Over time, these wastes decompose and some pollutants (e.g. Hydrocarbons) are dispersed in the environment.

This work focuses on the fate of various organic compounds in sludge from oil refining.

Sludge with high concentration of hydrocarbons 470 mg/g was studied for 14 months of storage. The biodegradation was evaluated during the decomposition time by physicochemical analyzes, hydrocarbons content, humic substances and phytotoxicity test.

The final product show a high degree of biodegradation illustrated by a decrease of C/N and NH_4^+/NO_3^- ratios, from 18.05 to 15.6 and from 26 to 2.25, respectively. Organic matter and total petroleum hydrocarbons exhibited a significant abatement rate of about 50.5% and 62% respectively. Humic substance evolution shows a high degree of polymerization 1.2% which provides information on maturity of final product.

Spectroscopic analysis by FTIR shows a biodegradation of aliphatic compounds and an intense increase in aromatics, which provides information on the proper conduct of the humification process.

The storage process led to reduction of phytotoxicity by the partial removal of toxic compounds such as low molecular-weight hydrocarbons and polycyclic aromatic hydrocarbons, the evolution of all these results is justified by the germination index (GI), which rise from 0.6 % to 50 % for Turnip, and from 1.1% to 124 % for alfalfa.

The physico-chemical, biological properties and the degree of evolution of oil sludge from petroleum refining, opens the way for exploitation of these by-products, for use as substrate for composting as recycling and recovery treatment.

Keywords: Biological sludge, Hydrocarbons, C/N and NH4+/NO3- ratios, Humification/Mineralization, Phytotoxicity.

PIV-126 : Evaluation offishcoproducts *Sardina pilchardus* Serving Biotechnology

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Abstract

Fish processing is a crucial sector for the nutrient needs of humans, but it generates a significant amount of waste estimated with 50%. It follows the problem of dumping of waste in different environments which increases environmental pollution in particular the water environment. Our work aims to exploit the waste of fish products (edges, heads and guts) of the species *Sardina pilchardus* as culture medium for microorganisms such as *Lactobacillus* and *E. coli*. A culture medium was developed for fastidious bacteria such as lactic acid bacteria and for non-fastidious bacteria such as *E. coli.* In this case, a universal medium (MRS TGEA) was prepared as control. The peptone of the modified culture medium was replaced of by isolate obtained from fish waste. Thus, we evaluated the waste of *Sardina pilchardus* as a source of bacteria of industrial interest among other lactic acid bacteria. Through the physicochemical analyzes, the isolate obtained has a high biological value (rich in essential amino acids). The results indicate that the use of this isolate must be accompanied with other essential elements of culture (vitamin compounds, essential amino acids, minerals) as growth factors to optimize the growth of bacteria involved.The physiological and biochemical characterization makes finding 02 different groups of lactic acid bacteria: *Lactobacillus fermentum* and *Lactobacillus spp.* This work allowed us to have a recovery method that reduces the risk of pollution caused by different fish processing industries. So we have contributed to the preservation of our aquatic environment.

Keywords: Fish waste, Isolate, Lactobacillus, *Sardina pilchardus*, Evaluation.

PIV-127 : Extraction et Caracterisation D'huile Essentielle De Plantes Medicinales Et Evaluation De Leurs Activite Anmicrobienne Et Dermocosmetique.

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Abstract:

Tetraclinis articulata est très utilisée en médecine traditionnelle, en Algérie, pour de nombreuses prescriptions notamment le traitement d'affections cutanées, comme anti-inflammatoire et cicatrisant, avec les feuilles. L'étude vise à caractériser les HEs des feuilles de T. articulata ainsi que l'évaluation de leur activité cicatrisante et antimicrobienne sur les microorganismes isolés à partir des brûlures. Des pâtes à base d'HE de T.articulata ont été préparées et appliquées quotidiennement sur des brûlures thermiques de deuxièmes degrés superficille provoqués sur la peau de rats Wistar. L'évolution de la cicatrisation a été appréciée par la détermination de la surface de cicatrisation et le poids corporel chez les rats traité par les pâtes à base d'HE comparé avec le groupe traité par l'excipient seul (placebo) et le groupe témoin (non traité) comme contrôle. Les pâtes à base d'HE ont été plus efficaces que la pâte placebo. Leur activité est intensifiée dans les dernières étapes du processus de cicatrisation et une relation dose-effet est notée au cours de la 3ème semaine.

Keywords Huiles essentielles, Tetraclinis articulata, cicatrisation, formulation galénique, actvivté antimicrobienne.

PIV-128 : Composition chimique et activité antimicrobienne de l'huile essentielle de Juniperus communis L (*Genévrier*)

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Abstract

Cette étude a pour objectif la recherche, à travers un screening la composition chimique et l'effet antimicrobien de l'huiles essentielle de *Juniperus communis* L utilisée en médecine traditionnelle afin de pouvoir utiliser de nouvelles molécules et contrer au problème de santé mondial : la résistance aux antibiotiques

Matériels et méthodes :

La composition chimique de l'huile essentielle des huiles essentielles est déterminée par CPG et CPG/SM

• Souches : Nous avons étudié 4 espèces bactériennes sur la base de la fréquence d'isolement clinique : *Escherichia coli, P.mirabilis, Staphylococcus aureus et A.baumanii* et la levure *C.albicans.*

La méthode de l'aromatogramme pour mettre en évidence l'action des huiles essentielles, en parallèle l'antibiogramme de ces mêmes souches a été effectuée.

Le calcul de la CMI et la CMB est aussi effectué sur milieu solide avec des dilutions décimales des huiles essentielles.

Lecture des résultats :

L'huile essentielle de Genévrier récoltée à Médea en Algérie donnent 2,51 % d'essence par hydrodistillation.

Par CPG et CPG/SM, trente six composés ont été identifiés représentant 91,9 % de l'essence totale. l'α-pinène (22,60 %), Bicyclol(12,71 %), limonene (9,75 %), le borneol (4,96 %), le Beta Myrcene(3,7 %), le D- limonene (4,06 %) et le camphene (2,12 %) sont les principaux constituants.

L'huile essentielle est active in vitro contre les bactéries *Escherichia coli, P.mirabilis, Staphylococcus aureus et A.baumanii* et la levure *C.albicans* avec des diametres d'inhibition allant de 15à 40 mm selon les souches, avec une inhibition marquée de C.albicans .

-L'huile essentielle a montré une forte activité contre tous les micro-organismes. Chez les bactéries, *Escherichia coli* et *Staphylococcus aureus* ont manifesté une certaine résistance jusqu'à 1/5000 (v/v). *C.albicans* a été tous complètement inhibés à 1/2000 (v/v).

En comparant les aromatogrammes et antibiogramme, on note une activité intéressante de l' huile essentielle sur les souches utilisées et surtout *C.albicans* et qui mérite une exploitation plus approfondie et des applications visant à inhiber les infections microbiennes et la formation de biofilm.

Mots clés : Genévrier, CPG/SM, aromatogramme, CMI, CMB

PIV-129 : Optimisation la digestion anaérobie : montage de laboratoire et application sur les fientes de poulet pondeuses issues de élevage de la ville Oujda Maroc

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Abstract

La bio-méthanisation est la transformation par un consortium microbien anaérobie , de la matière organique en un biogaz composé principalement de méthane et de gaz carbonique .cette transformation naturelle est utilisée pour dépolluer les effluents ,éliminer les déchets ,tout en produisant de l'énergie renouvelable tout en conservant le pouvoir fertilisant de la matière .

Le bon fonctionnement du procédé de bio-méthanisation, particulièrement son potentiel énergétique, est conditionné, en grande partie, par les conditions physico-chimiques du substrat à traiter, parmi lesquelles l'inoculum, l'agitation, la température, pH, conductivité électrique et la productivité quantitative gazeuse.

Notre étude se propose d'approfondir l'analyse de ces paramètres de fonctionnement au niveau de Six Batch (Erlenmeyer de 100ml) liés à un gazomètre constitué d'une burette graduée inversée remplis d'une solution de garde (5% acide citrique, 20% Na Cl). Mis en œuvre pour traiter les fientes de poulet pondeuses à l'échelle expérimentale, tout en appréciant surtout leurs effets sur la productivité quantitative gazeuse.

Les Suivis physico-chimique, microbiologique et énergétique de la bio-méthanisation expérimentale des fientes de poulets pondeuses tout le long du cycle de production, dévoilent que la performance d'un digesteur du point de vue production gazeuse dépend principalement de la nature des matières à fermenter, de l'agitation du substrat, la charge microbienne , de la température maintenue au cours de la digestion et aussi du pH et de la quantité de l'inoculum introduit.

Il ressort essentiellement que la production maximale de biogaz est enregistrée dans le digesteur (3) celles-ci ont subi une fermentation méthanique à une température égale à 35°C et sous agitation manuelle deux fois par jour du mélange substrat 2x de l'inoculum

Mots clés : bio-méthanisation, énergie, biogaz, fientes de poulets pondeuses, inoculum

PIV-130 : Effect of Rhizobium and arbuscular mycorrhiza on the growth and physiological parameters in AlfaAlfa (*Medicago sativa*) under salt stress.

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Abstract

Salinity is a major stress limiting the productivity of food crops. It constitutes an important constraint to Alfa Alfa (Medicago sativa L.) production in many parts of the world. The synergistic benefits of the dual inoculation of legumes with nodule bacteria and arbuscular mycorrhizae (AM) are well established. The aim of this study was to assess the co-inoculation response of Alfa Alfa (*MedicagoSativa*) to arbuscular mycorrhizal fungi (AMF) and rhizobium strians, under salt stress.

Intact seeds were germinated then inoculated with autochthonous mycorrhizal (AM) and/or rhizobial strain RHOL1 and grown under greenhouse and salt stress (120 mM) at the Faculty of Sciences Semlalai of Marrakesh. At the flowering stage, growth and physiological parameters were assessed.

The results showed that salt stress significantly decreased plant growth, stomatal conductance. However Arbuscular mycorrhizal autochthonous (AM) improve salt tolerance and biomass production of Alfa alfa-Rhizobium symbiosis under salinity. The chlorophyll content was decreased under this constraint but electrolytes leakage was increased.Whereas, plants water parameters didn't show any significant variation under salt stress.

The salt stress affected negatively the growth and physiological parameters in Alfa Alfa-rhizobia symbiosis but this effect can be reduced by the presence of AM.Thus indigenous fungal isolates could be an effective biological means to improve

the tolerance of Alfa alfa-Rhizobium symbiosis under salinity

Key words: *Medicago sativa*, rhizobium, Salinity, Mycorrhiza, Tolerance.

PIV-131 : Isolation of phsphate solubilizing bacteria and fungi and their potential for lead to ericaceous plant growth

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Abstract

Many soil microorganisms are able to transform insoluble forms of phosphorus to an accessible soluble form, contributing to plant nutrition as plant growth-promoting microorganisms (PGPM). Their mecanisms of growth are through biological control with production of organic acids, siderophore and similar products with very high affinity to ferric iron.

The objective of this work was to isolate, screen and evaluate the phosphate solubilization activity of fungi and actinobacteria from soil and roots of plant belonging to ericaceous familyin order to select potential microbial inoculant. Five fungi strains and seven actinomycetes strains isolates originating from this soil were tested for their ability to grow on a synthetic minimum medium (SMM) containing TCP (tricalcic-phosphate) insoluble phosphate as sole P source.

All isolated were able to grow in SMM medium.The five fungi and two actinomycets showed the most active growth and solubilization capability. These isolates were shown to be able to solubilize P in liquid cultures. The study of mechanisms involved in these weathering processes indicated that all fungi and only one actinomycete strain were able to produce siderophores. Most of the actinomycets were shown to belong to the streptomyces genus and all the fungi belong to the Helotiales order.

Keywords: Screening, phosphate solubilization,tricalcic-phosphate, microorganisms, ericaceous shrubs.

PIV-132 : Carbon Source Effects on The Toxinogenesis of Penicillium aurantiogriseum

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Abstract:

Penicillium aurantiogriseum is a species of Penicillium frequently isolated from olives and other food stuffs. It is recognized a very redoubtable by mycotoxins that it secretes. However, it is very useful in agri-food, pharmaceutical and cosmetics industries by activebiologically substances that produces.
The identification of P. aurantiogriseum is based on morphological and biochemical characteristics given by keys of determination, his metabolic toxinogenic profile is determined by thin layer chromatography TLC. Different concentrations of sucrose were added to the media used to study their effects on the physiological state and toxin production of P. aurantiogriseum.
The analysis of the metabolic profile revealed three mycotoxins in P. aurantiogriseum: the terrestrique acid, the penicillicacid and the aurantiamine. However, the secretion of these mycotoxins depend on the concentration of sucrose added to the media, especially liquid YES.A close relationship was observed, on the one hand, between the physiological conditions of growth and reproduction from the fungal strain, on the other hand, in acid terrestrique secretion. The increasing use of sucrose concentrations has allowed us to observe the signs of aging and

suffering related to the physiological activity of the fungal strain. It results in centrifugal morphological changes of its colonies obtained on the media used. At a certain level of these concentrations, the fungal strain first begins to secrete terrestrique acid then progressively to find its physiological state of departure. This is an escape phenomenon to the action of the increasing concentration of sucrose that we see and whose indicator is terrestrique acid secretion.

Keywords : *Penicillium aurantiogriseu,* Mycotoxins, thin layer chromatography, carbon sources

PIV-133 : Adhesion of staphylococcus aureus cultured in the UHT milk in polystyrene surface

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Abstract:

The development of microbial biofilms on solid surfaces poses many problems in the industrial sector. In the dairy industry, the surface of materials in contact with bacteria could change the physicochemical properties of the substrate surface. These properties may also exert a great influence on the speed and amount of adhesion. The aim of this work is to study the adhesion of S. aureus cultured in milk in the polystyrene support in different ionic strengths The results show that increasing the ionic strength of milk led to an increase in adherence of S. aureus in the polystyrene support in conclusion it is of interest to consider the physicochemical conditions of the milk to estimate the risk of contamination in milk production.

Keywords: Physicochemical properties, Milk, Adhesion, Staphylococcus aureus, polystyrene

PIV-134 : Diversité des Glomeromycota dans les sols rhizosphériques du pistachier de l'Atlas de dayate El Gouffa (Laghouat, Algérie).

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Abstract

Dans cette étude, nous nous sommes intéressés à l'une des plus fascinantes espèces des zones semi arides et arides d'Afrique du Nord : le pistachier de l'Atlas. Cet arbre est à la fois protecteur et productif. Autrefois très abondant, il ne cesse de régresser, suite aux actions anthropiques importantes. Notre travail concerne les pistachiers de l'Atlas de dayate El Gouffa (Laghouat, Algérie), à climat aride. Notre intérêt s'est porté sur la diversité sporale des champignons endomycorhiziens qu'abritent les sols rhizosphériques de cette espèce. Les sols sont prélevés à différentes profondeurs sous six pistachiers de l'Atlas, choisis aléatoirement au sein de la daya concernée. Les sols sont tamisés à 2 mm. L'extraction des spores a été faite par tamisage humide. L'identification des spores sous microscope optique montre une diversité importante des champignons endomycorhizogènes à vésicules et arbuscules. Nos résultats mettent en évidence la présence de plusieurs morphotypes répartis en quatre familles : Acaulosporaceae, Glomeraceae, Gigasporaceae, Ambisporaceae et un nombre importants de morphotypes indéterminés. Le genre *Acaulospora* est le plus abondant parmi tous les genres recensés dans les sols rhizosphériques du pistachier de l'Atlas. Son abondance est de 46%. Il est suivi par le genre *Glomus* avec 18%. Les autres genres de Glomeromycota sont moyennement présents.

Mots clés : Pistachier de l'Atlas, diversité, Glomeromycota, sols, Laghouat (Algérie

PIV-135 : Étude de la Résistance aux Antibiotiques et aux Désinfectants et Typage Moléculaire des Souches de *Pseudomonas aeruginosa* Isolées des Surfaces des Blocs Opératoires d'Établissemnts Hospitaliers Tlemcen Algérie

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Abstract

L'environnement hospitalier est largement contaminé par des microorganismes d'origine environnementale et humaine. En effet, les surfaces, même régulièrement nettoyées et désinfectées, jouent un rôle de vecteur microbien, pour les espèces résistantes comme les *Pseudomonas*.

L'étude vise à détecter la persistance des souches de *P. aeruginosa* sur les surfaces des blocs opératoires, après le bio-nettoyage dans le service EHS de Tlemcen.

Ainsi, 20 souches de *P. aeruginosa* sont isolées et identifiées. L'étude de résistance aux antibiotiques est réalisée par la technique de diffusion sur milieu gélosé. L'efficacité des désinfectants est testée par la méthode de CMI sur microplaque. Les gènes *qacΔE1 et qacE* conférant la résistance aux ammoniums quaternaires sont cherchés par la PCR et le typage moléculaire des souches par ERIC-PCR.

L'antibiogramme a révélé la présence de 9 souches multi-résistances, pour la CMI. Les produits, à base de plusieurs principes actifs, présentent une bonne activité alors que les produits à base d'ammonium quaternaire ne sont pas efficaces sur la totalité des souches même à des concentrations élevées. La PCR permet de confirmer l'absence des gènes *qacΔE1* et *qacE* chez toutes les souches de *P. aeruginosa* et ERIC-PCR a mis en évidence une diversité génétique, une circulation et une dissémination des mêmes clones, au niveau des différents blocs opératoires.

Les résultats obtenus montrent que les désinfectants à base d'ammoniums quaternaires ont une action limitée, ceci implique l'utilisation d'autres désinfectants efficaces, pour réduire au maximum l'émergence des bactéries multi résistantes au sein de service.

Mot Clés : *Pseudomonas aeruginosa*, ammonium quaternaire, *qacΔE1*, *qacE*, ERIC-PCR

PIV-136 : Caractérisation Microbiologique des Extraits d'Algues marines de la Côte d'El Jadida

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Abstract

Le Maroc est l'une des pays les plus riches en algues marines connues pour leur intérêt biologique et médical.

L'objectif de notre travail est la recherche et l'identification de molécules bioactives, à partir des extraits d'algues marines, collectées de la région d'El Jadida. Ces extraits sont testés, in vitro, à différentes concentrations, pour évaluer leur effet antimicrobien, vis-à-vis de plusieurs souches bactériennes comme *E. coli*.

Les résultats préliminaires ont montré une sensibilité considérable de la majorité des souches bactériennes étudiées vis-à-vis de ces extraits d'algues marines.

De ce fait, d'après cette étude, les algues marines peuvent être utilisées comme des antibiotiques naturels efficaces, contre ces souches bactériennes et donc présenter un moyen de lutte biologique contre les maladies en question.

Mots Clés : activité antimicrobienne, extrait d'algue marine, molécules bioactives, souches bactériennes, lutte biologique

PIV-137 : Molecular identification of Trichoderma Moroccan isolates and In vitro screening of their antagonism potential

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Abstract

In this study, 17 Trichoderma strains were isolated from different soils (crop fields and Argan forests) in Morocco. Purified monospore cultures were identified to species-level using molecular methods and tested for their potential antagonism against three phytopathogenic fungi (Fusarium oxyxporum, verticillium dahlia and rhizoctonia solani). After DNA extraction, translation elongation factor (tef1) was amplified in extracts of 17 strains, sequenced and compared with their ex-types. As a result, three species were identified among the strains, which clustered in two different subclades of Trichoderma: the species T. afroharzianum, and T. guizhouense belong to the Harzianum clade, while T. longibrachiatum belongs to the Longibrachiatum clade. Investigation of potential antagonistic effects of these strains against the soil-borne phytopathogens: F.oxysporum, R. solani and V. dahliae was conducted in a dual culture plate assay, using 17 promising Trichoderma strains that have been selected based on a polymerase chain reaction (PCR) screening approach. In vitro, Trichoderma isolates showed effective antagonistic performance by decreasing soil pathogens mycelium radial growth. Trichoderma afroharzianum showed the highest percentage of Radial Inhibition Growth (PRIG %). The highest PRIG% = 98% was for 8A2.3 isolate against R. solani and the lowest PRIG%= 67.21% for T9i10 against F. oxysporum. On the other hand, T9i12 which is reesei species led to a high radial inhibition of pathogens' mycelium.
Keywords
Keywords: Trichoderma spp, Fusarium oxysporum, Verticillium dahlia, Rhizoctonia solani, antagonistic fungi

PIV-138 : Plant monocultures support more antagonistic activity among soil *Streptomyces* populations than plant polycultures.

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Abstract

*Streptomyces*possess strong antagonistic activities and inhibit diverse plant pathogens. However, the effects of plant community characteristics on *Streptomyces* inhibitory activity have received little attention. We evaluated the impact of plant species and plant community richness on the frequency and intensity of inhibitory activity of rhizosphere *Streptomyces* communities against 2 fungal plant pathogens, *Fusarium oxysporum* f. sp. *graminearum* and *Fusariumoxyxporum* f. sp. *lycopersici*, the agents of wheat head blight and tomato wilt, respectively.

Soil samples were taken from the rhizosphere of two plant species, *Andropogan geradii* and *Lespedeza capitata*, each growing in communities of 1 (monoculture) or 16 (polyculture) plant species. *Streptomyces* inhibitory activity against the two pathogens was studied using an *in vitro* assay to reveal inhibition on each target pathogen. For each soil sample, the proportions of *Streptomyces* that exhibit antagonistic activities against each pathogen and the mean size of the inhibition zone were determined.

Plant richness modified the impacts of both plant species on *Streptomyces* antagonistic activity. Regardless of plant species, monocultures supported higher frequencies and greater intensities of *Streptomyces* inhibition than polycultures.

Streptomyces antagonistic capacity increased with decreasing plant community richness, suggesting that plant diversity modifies selection for antagonistic phenotypes among soil *Streptomyces*. Fostering monoculture conditions in agricultural settings may contribute significantly to reducing the impacts of soil pathogens.

Keywords : *Streptomyces*, Inhibition, monoculture, polyculture

PIV-139 : Effect of antimicrobial edible coating on the shelf-life of strawberries

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Abstract

Strawberries are extremely perishable and have unusually demanding postharvest handling requirements. This study aims to develop edible coatings based on gelatin combined with essential oils to improve the quality and shelf-life of the strawberry fruit. Coatings were prepared by dissolving gelatin and thyme essential oil at different concentrations (0.5%, 1% and 1.5%) using glycerol as plasticizer and lecithin soy as emulsifying agent. Fruits were then dipped on the different prepared coatings and stored at 6°C for 15 days for microbiological and physicochemical essays. Results showed that the growth of yeasts and molds, total aerobic flora, and total coliforms were slowed by the application of the coating containing 1.5% of thyme essential oils when the non coated fruits (control) were all covered with the grey mold caused by *Botrytis Cinerea.* Coatings application did not affect physicochemical characteristics (Dry matter, acidity, color, texture …) of the strawberry fruit suggesting that the use of gelatin coating combined with thyme essential oil are useful for extending the shelf-life and maintaining quality of strawberries.

Keywords: strawberry, shelf-life, edible coating, essential oil, thyme.

PIV-140 : Chemical Composition and Antibacterial Activity of two Essential Oils, of rosemary (*Rosmarinus officinalis,Rosmarinus eriocalyx*) Against Erwinia Amylovora fire blight agent

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Abstract

Dealing with resistance and toxicity problems caused by the massive use of plant protection products (pesticides), and with the fact that regulation organizations are questioning the use of antibiotics in agriculture, it is particularly urgent to find alternatives to provide efficient protection of crops against plant diseases.

The main objective of this paper is to study the antibacterial activity of essential oils (EO) extracted of two species of Rosmary (Rosmarinus officinalis, Rosmarinus eriocalyx) against Erwinia Amylovora. The extraction was carried out by water distillation Clevenger's type apparatus.The yields of extracted essential oils (EOs) are about 1.6% and 2.1% respectively for Rosmarinus officinalis and Rosmarinus eriocalyx The chemical compositions of EO were analyzed using a gas chromatography / mass spectrometry (GC-MS) showed that both species have almost the same profil: αpinene, β-pinene, camphene, camphor, borneol were found as predominant compounds and 1,8-cineole as chemotype with 40%% for Rosmarinus officinalis and 45% for Rosmarinus eriocalyx.

The in vitro antibacterial activity against Erwinia Amylovora was evaluated using the method of aromatogram. The results revealed that EO of Rosmarinus officinalis is most active against Erwinia Amylovora.

Keywords : fire blight, *Erwinia Amylovora*, antibacterial activity, *Rosmarinus officinalis, Rosmarinus eriocalyx,in vitro*

PIV-141 : First detection of resistance genes L1014F kdr and G119S ace-1 mutations among *Culex pipiensin* Morocco

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Abstract

Culex pipiens complex is a mosquito, and competent vector that transmit Rift Valley Fever virus (RVFV) and West-Nile virus (WNV), this complex is subdivided in two different forms *molestus* and *pipiens*, morphologically identical but genetically different. Vector control is based on the use of pesticides which leads resistance, as *Cx. pipiens* is frequently exposed to insecticides, we aim to investigate the L1014F *kdr* and G119S *Ace-1* mutation frequencies in different forms of *Culex pipiens* complex from three regions of Morocco.

Tests were conducted on adults reared from larval and pupal collection from three different regions in Morocco (Tangier, Casablanca and Marrakech). Specimens were identified as belonging to the *Culex pipiens* complex using a multiplex Polymorphism Chain Reaction (PCR) assay prospected for these forms in Morocco by using diagnostic primers designed for the flanking region of microsatellite CQ11, and the characterized mosquitoes were tested for the presence of the L1014F *kdr* and G119S *ace-1* mutations using PCR assay.

Overall 416 specimens were tested for L1014F *kdr* mutation detection, we found that heterozygous resistant form (RS) is more frequent in Tangier and Marrakech than Casablanca: 66%, 60% 17% respectively, while homozygous resistant (RR) genotype is lower in all cities (0-7%). The half of *Cx. pipienspipiens* and hybrid: 53% and 54% respectively, is heterozygous resistant whereas the most of *Cx. pipiens molestus* has the homozygous susceptible (SS) form (90.5%).

About 380 samples were characterized and tested to detect G119S mutation in the three cities. We found that the RS genotype was frequent in urban than rural area: 41.5% vs 27% in Tangier, 61% vs 0% in Casablanca, and 62.5% vs 16% in Marrakech. For the frequency of Ace-1 mutation according to the forms, the RS genotype was frequent in *Cx.pipiens pipiens* (31.5%) and hybrids (26.5%), than *Cx. pipiens molestus* (2%). For the RR form, was very lower in the different forms of *Culex pipiens* (0-2%).

For the first time in Morocco, we determined the frequency of L1014F *kdr and* G119S *ace-1* mutations in different areas of Morocco, and also in different forms of *Cx. pipiens* mosquito.

Keywords : *Culex pipiens*, resistance, L1014F *kdr*, G119S *Ace-1* mutation, Morocco

PIV-142 : Formulation du yaourt à base du cactus (Meknès, MAROC)

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Abstract

L'*Opuntia ficus indica* ou figuier de barbarie, est une plante de type CAM (Crassulacean Acid Metabolism) [1] qui présente des adaptations physiologiques et morphologiques, lui permettant de résister aux conditions difficiles des régions arides et semi arides [2].
En outre, les jeunes cladodes ou "nopalitos" sont consommés comme légume dans certains pays d'Amérique du Sud, dont le Mexique.Ces cladodes qui contiennent différentes molécules bioactives et fonctionnelles dont les flavonoïdes, sont particulièrement riches en fibres et minéraux.
Dans le domaine alimentaire, les jeunes cladodes sont utilisées au Chili et au Mexique, pour préparer la poudre de cladodes, les confitures, marmelade et divers plats. Leurs mucilages qui constituent un apport de fibres alimentaires, améliorent la digestion, ont aussi des propriétés gélifiantes et épaississantes. Ce qui justifie leur introduction comme épaississant à la place des carboxymethylcellulose (CMC) provenant de la modification de la cellulose. Leurs fibres ouvrent ainsi, de nouvelles perspectives dans la préparation et la formulation des aliments.

Au Maroc, comme dans les autres pays du Maghreb, l'utilisation fourragère des cladodes est peu développée si l'on excepte leur utilisation pendant les périodes de sécheresse difficiles[3]. Quand à l'utilisation des jeunes cladodes dans l'alimentation humaine, elle est pratiquement méconnue. Les habitudes alimentaires constituent encore un frein à l'utilisation maraichère des jeunes cladodes, contrairement aux pays d'Amérique du Sud ou la consommation qui ne cesse d'augmenter dépasse 6.36 kg/ an/personne.
Afin de tirer profit du potentiel nutritif et médicinal des cladodes d'*Opuntia*, leur incorporation sous forme d'ingrédient dans les aliments, pourrait constituer une alternative pour leur exploitation.
Nos travaux s'inscrivent dans cette perspective, en abordant la composition des cladodes selon le stade développement et les possibilités d'enrichissement des produits laitiers en vitamine C, fibres, polyphénols. Les cladodes qui on a exploitées sont sélectionnées, en fonction du stade de croissance offrant une composition optimale en molécules bioactives et d'intérêt nutritionnel . Ainsi abordé l'impact lié à l'addition du jus de cladodes pour l'enrichissement des produits laitiers, à travers leur effet surla croissance des bactéries lactiques , d'une part ,et sur le procédé de fabrication notamment : l'acidification, l'évolution des sucres et des mucilages en cours de fermentation, et l'effet sur les caractéristiques sensorielles du yaourt, d'autre part.

Mots Clés : *Opuntiaficusindica*, jus de cladodes, composition, mucilage, bactéries lactiques

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PIV-143 : Biomass Exploitation: A New Technological Interest Thermophilic Homofermentative Lactic Levain Assessment

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Abstract

Streptococcus thermophilus a homofermentative thermophilic lactic species; the most widely used in milk process and dairy technology, such as fermented milks, beverages, yoghurts and cheeses. The only urease positive, lactate and flavor compounds (acetaldehyde) production responsible. Acetaldehyde is the main aroma in yoghurts, produced from lactose, glucose, pyruvate converted from threonine and methionine. However, biosynthetic pathways, their regulation are not elucidated. By their resistance to bacteriophages attack, species are used also in cheeses ripening. However, in all milk technological process, species are used only in mixed culture, associated with thermophilic lactic such as Lactobacillus bulgaricus, Lactobacillus helviticus and Bifidobacterium sp, where synergies phenomenon were observed, never in single culture. The study aimed to assess technological behavior of wild Streptococcus thermophilus strains isolated from Algerian raw milk in single culture. Strains belonging to Streptococcus thermophilus species were isolated, selected from Algerian raw milk using MRS and M17 medium, their technological skills of lactate and acetaldehyde production kinetics explored. From all samples, collected, three isolated lactic strains were selected as having unusual technological performance ST1, ST2 and ST3, milk acidification (ºD* Dornic degree) were respectively 70°D and 74°D 69°D, flavoring power of reconstituted skim milk (in ppm: parts per million) was 0.09 ppm for ST1, 0.07 ppm for ST2, and 0.04 ppm for the strain ST3.

Keywords : *Streptococcus thermophilus*, Wild strains, Selection, Acetaldehyd, Lactic acid

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PV-1 : The Role of Ionic Strength and Surfactants Tween 20 and Tween 80 on the Adhesion Phenomenon of *Staphylococcus aureus* on the Glass

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Abstract

The microbial adhesion to surfaces is the result of physicochemical interactions (Van der Waals, Electrostatic and Acid-base) between the two surface involvements, the surface of the microorganism and the substratum. It constitutes the initial step in the colonization and the biofilm formation. The exact role of these physicochemical proprieties is still poorly documented.

To better understand the adhesion process of bacterial cells, we followed the kinetic adhesion of *Staphylococcus aureus* ATCC25923, as a model bacterium, on the glass by varying the experimental conditions as ionic strength (high and low) and adding non-ionic surfactants Tween 20 and Tween 80, polysorbates having a fatty acid ester and a long chain of poly-oxyethylene.

The first obtained results show that the ionic strength, the charge of the surface and the contact time play an important role in the adhesion and the organization of *Staphylococcus aureus* on the surface of the glass. By adding to the culture medium the Tween-20 or the Tween-80, the number of adherent cells decreased. The two surfactants, by their fatty acid chain, have increased the hydrophobic character of the hydrophilic surface of the glass. This has enabled us to deduce that *Staphylococcus aureus* adheres more to the hydrophilic surfaces.

For more information and the understanding of the adhesion process, we believe that it is necessary to perform these experiments, using other surfactants and conduct these experiments with other supports and other bacterial strains.

Keywords : biofilm, adhesion, *Staphylococcus aureus*, glass, surfactants, ionic strength

PV-2 : The Impact of Vegetable Oils on the Physicochemical Properties of Cedar Wood

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Abstract

Cedar wood is one of the oldest structural and decorative material used in the construction of historical monuments of the medina of Fez. Its use dates back to Idrissid's dynasty for building mosques, houses, etc. Despite its many qualities and due to its chemical composition (polysaccharides, lignin), wood is affected by some bacteria and fungi which adhere to the surface and form biofilms thus causing a degradation of the historical monuments of the medina of Fez and therefore a loss of our cultural heritage. Different methods of struggle against biofilm formation are proposed in the literature including vegetable oils. The use of vegetable oils dates back to the second and third century before Jesus Christ by the Greeks and Romans to preserve the wood against fungi.
The aim of this study is to examine how the vegetable oils addition will influence the physicochemical properties of cedar wood, especially hydrophobicity, surface tension and electron donor electron acceptor properties. In addition, a novel approach to assess wood hydrophobicity by contact angle measurements is presented.

An evaluation of the inhibitory potential of these vegetable oils on *Penicillium commune* accession to the surface of the wood has been analyzed by Environmental Scanning Electron Microscopy (MEBE).

Keywords : vegetable oils, wood, contact angle, physicochemical properties, MEBE, adhesion

PV-3 : Surface Hydrophobicity and Acid-Base Properties of Various Wood Species Used in Morocco

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Abstract

The wood has many assets that make it an ideal material for construction. In addition to its aesthetic qualities, it is a lightweight and durable material. It is one of the oldest building materials, in Morocco. It's one of the oldest materials used by man. It marks out our history and has undergone major technological progress, in different areas such as building. Cedar wood, pine wood, beech and other several of wood are the most species used, in Morocco.

However, as a natural material, wood is sensitive to different agent of degradation such as insects and microorganisms, fungi and bacteria. These latter adhere to the wood surface and form biofilms. The microbial adhesion step is considered as critical point, in the biofilm formation process. The physicochemical interactions involved, in this process, are mainly the acid-base, electrostatic and Van Der Waals types. These latter depend on the physicochemical characteristic of material and the microbial surface, especially, hydrophobicity, surface tension and electron donor–electron acceptor properties.

The aim of this study was to evaluate the initial physicochemical characteristics of the wood species mostly used, in Morocco, using angle contact measurement to understand the mechanism involved in the degradation of wood.

Keywords : physicochemical characteristics, contact angle, wood

PV-4 : Biodiversité des Bactéries Halophiles des Marais Salins de la Région de Taza in Maroc

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Abstract

Les bactéries halophiles sont des microorganismes qui tolèrent ou même exigent de très grandes concentrations en sel, pour pouvoir vivre, croître et produire. En fait, afin de peupler et s'adapter aux environnements hypersalins, ces bactéries halophiles développent différentes stratégies biochimiques et physiologiques. Les halophiles constituent un trésor de molécules bioactives à explorer au Maroc et sont rares les travaux de recherche étudiant la biodiversité des biotopes salins.

Dans ce contexte, l'objectif de notre présent travail est d'étudier la biodiversité saline des bactéries halophiles présentes dans les marrais salins de la région de Taza.

Pour ce faire, l'isolement est réalisé à partir du sol et de l'eau des marrais sur milieu LB à différentes concentrations en Na Cl (1%, 5,8%, 10%, 14% et 18%). Les isolats purifiés ont par la suite fait l'objet du test de tolérance en Na Cl sur

milieu LB additionné de différentes concentrations croissantes en NaCl allant de 1% jusqu'à 20%.

Les résultats obtenus ont montré que parmi 108 isolats, 85 (78,70%) sont des halotolérants montrant une croissance à des concentrations en Na Cl entre 0,2 et 0,85M (1 et 5%) et 23 (21,30%) sont des halophiles modérés ayant une croissance à des concentrations de l'ordre de 0,85 et 3,4M (5 à 20%) de NaCl. Alors qu'aucun isolat n'est trouvé halophile extrême, contrairement à d'autres environnements salins (Zalagh (Fès), El Oualidia…) où des halophiles extrêmes ne commençant à croître qu'à partir de 2,5 à 3M en NaCl et pouvant supporter jusqu'à 4M et plus ont pu être isolés.

Ces bactéries halophiles obtenues constituent un véritable trésor dont le potentiel de production de molécules bioactives, et, plus précisément de celles à effets anti-cancer et antioxydant va être évalué.

Mots Clés : bactéries halophiles, milieux salins, marrais salins, biodiversité des milieux salins, halophilie

PV-5 : Optimization of Fermentation Conditions for Extracellular Production of the Antineoplastic Enzyme, L-Asparaginase by Novel *Actinomycete Nocardiopsis* synnemasporogenes sp. *nov. NEAE-85*

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Abstract

The optimization of different fermentation conditions for L-asparaginase production by *Streptomyces brollosae* NEAE-115 and its validation using Plackett-Burman experimental design and response surface methodology. Fifteen nutritional variables (temperature, pH, incubation time, inoculum size, inoculum age, agitation speed, dextrose, starch, L-asparagine, KNO_3, yeast extract, K_2HPO_4, $MgSO_4.7H_2O$, Na Cl and $FeSO_4.7H_2O$) were screened, using Plackett-Burman experimental design. The most positive significant independent variables affecting enzyme production (incubation time, starch and L-asparagine) were further optimized by the central composite design-response surface methodology.

An overall about 3 and a half-fold increase in L-asparaginase production was achieved, in the optimized medium as compared with the unoptimized basal medium. As a result, a medium of the following formula is the optimum for producing an extracellular L-asparaginase in the culture filtrate of *Streptomyces brollosae* NEAE-115 (Dextrose 2g, starch 20g, L-asparagine 10 g, KNO_3 1g, K_2HPO_4 1g, $MgSO_4.7H_2O$ 0.5g, NaCl 0.1g, pH 7, temperature +30°C, agitation speed 150 rpm, inoculum size 4%, v/v, inoculum age 48 h and fermentation period 7 days).

The present work for the first time reported more information on the production of L-asparaginase produced by novel Actinomycete *Streptomyces brollosae* NEAE-115.

Keywords : *Streptomyces brollosae*, L-asparaginase production, optimization, Plackett-Burman design, central composite design

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PV-6 : Contact Angle as New Method to Determine the Corrosion Inhibition Efficiency of Stainless Steel by Plant Extracts

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Abstract

Stainless steel (SS) is a material frequently used for its resistant properties against corrosion. It is covered with a highly protective film of chromium oxyhydroxide and is resistant to corrosion, in many aggressive environments. However, hydrochloric acid solution causes corrosion of stainless steel. Most of the well-known acid inhibitors are plant extracts.

In this study, contact angle was used as new method to determine the corrosion inhibition efficiency of plant extracts which are formed from organic compounds that are found to have higher basicity and electron density. Contact angle method was used to determinate the electron donor electron acceptor and hydrophobicity properties of the non-treated and treated stainless steel surface with different plant extracts.

The results showed that the electron donor propriety of the treated surfaces with plant extracts has increased. This is due to the adsorption of the organic compounds of the plant extracts on the stainless steel surface.

Contact angle is a fast and accurate method to determine the corrosion inhibition efficiency of plant extracts and it can replace the other conventional methods.

Key Words : contact angle, electron donor, corrosion, plant extract

PV-7 : Phylogenetic Analysis of Hypervariable S1 Gene Regions of Avian Coronavirus : Case of Infectious Bronchitis Virus Variants Circulating in Africa

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Abstract

Infectious bronchitis virus (IBV) is a major viral pathogen of commercial poultry, affecting chickens of all ages and causing major economic losses in poultry industry worldwide. Frequent points of mutations and recombination events, in the S1 gene region, result in the emergence of new IBVs variants circulating in the form of several serotypes/genotypes that can be partially or poorly neutralized by current vaccines. IBV is well studied worldwide, nevertheless, in African countries, epidemiological and scientific data are poor and not updated.

This review aims to give a current overview of IBV situation in Africa and to establish phylogenic relation between the African variants.

Three S1 gene hypervariable regions were studied and compared to the reference genotypes/serotypes that found emerging in Africa. This comparison was based on phylogenetic trees, nucleotide and amino-acid sequences analysis.

It clearly appears that IBV variants reported in Africa display a low genetic relationship between them and with the majority of the reference strains emerging in neighboring countries, except the case of variants from Libya and Egypt that show a high relatedness. Also the Massachusetts serotypes were the most prevalent co-circulating with both serotypes, Italy02 type in Morocco and Qx-like genotype in South part of the African continent.

In order to control the IBV variants in Africa, an efficient vaccination strategy program should be implemented.

Keywords : infectious bronchitis virus (IBV), african variants, phylogenetic analysis, S1 gene, hypervariable regions (HVR)

PV-8 : Phylogenic and Phylodynamics Study of EBOLA

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Abstract

Ebola's emergence is due to the evolution of pathogen agent Zaire Ebola virus, responsible for the outbreak of hemorrhagic fever in Africa. Since the beginning of the year 2014, cases of Ebola virus have been reported in four African countries Guinea, Liberia, Sierra Leone and Nigeria.

The aim of this study was pursued on the evolution of virus while the Makona length and to establish a molecular epidemiological model by phylogenetic and phylodynamics analysis.

Thus, 132 sequences were obtained from the NCBI database and they are harvested between 1stJune 2014 and 30th Aguste 2015 from Sierra Leone and Guainía. The collected sequences underwent a global alignment, for determine the conserved amino acid and non-synonymous/synonymous mutations *via* MEGA6. The BEAST software was used to build the phylogenetic tree and the phylodynamics study.

Phylogenetic analysis reveals a high genetic diversity, with the presence of three distinct lineages, first and second rows corresponding to a set of sequences found only in Guinea. A third group of viruses genomes represents part of Guinea and Sierra Leone, demonstrating a migration of virus between the two countries. At the leader region of GP gene of three sequences of Guinea shows no synonymous mutations T => C, where one Asparagine was mutated to Threonine or synonym. These mutations can cause an alteration of virus. The time mutation was increased since March 2015, meaning that virus was in the beginning of latency stage.

In conclusion, the phylodynamics, phylogenetic study and the epidemiological computational SIR model demonstrates that the epidemic is receding from the beginning of March 2015 that allow the estimate at the end of a few months can be a significant decrease in the number of cases and the virus is in a first latency step.

These results do not allow us to say that the danger of the virus has expired. Contrarily, at this point, we need to be warned against a new spread of the epidemic a new faster and more lethal way.

Keywords : Ebola virus, phylogenetic, phylodynamics, mutations non-synonymous

PV-9 : Use of Medicinal Plants in the Treatment of Infection Stones

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Abstract

The chemical composition and ultrastructure of magnesium ammonium phosphate hexahydrate (struvite) obtained from artificial urine is study by using qualitative chemical analysis, scanning electron microscopy and Fourier transform infra-red spectroscopy. The urinary lithiasis associated with a chronic infection of the urinary tract is the term used to describe "stone infection." The stones composed of phosphate ammoniac-magnesien (struvite) and carbapatite, lithiasis called triple phosphates are stones infection more frequent. These stones are sometimes called coralliformes lithiasis, because they can grow quickly and fill the cavities pyelocaliciell. They form when a urinary tract infection with a germ owner of a urease. They can occur complicate a gallstone metabolic secondarily infected by a germ urinary. They represent about 2-3% of all lithiasis analysed.
In this work, we conducted a study inhibition training struvite crystals which gives stones infection, our study inhibition crystallization *in vitro* allows the specification of thermodynamics and kinetics of formation and growth conditions crystalline calcium phosphate. We used inhibitors natural product that prevent, slow or reduce phases of crystallization. We chose the classic model for studying the crystallization of phosphate with and without inhibitor, to assess the ability of any inhibitory inhibitor used.

The precipitation of the solid phase of phosphates from artificial urine is the subject of our investigation.

Keywords : infection, lithiasis, treatment, urinary tract

PV-10 : Molecular Identification with PCR_Delta and PCR_ITS_RFLP of Yeast in the Vineyards of the Plain Ghriss Grape Varieties (Merlot, Cabernet and Carignan)

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Abstract

Identification and isolation of yeasts can often be problematic. We explored, in this study, the diversity of local native flora yeasts, by collecting samples of different varieties of grapes (Merlot, Cabernet and Carignan) which are scattered over the vineyards of the plain of Ghriss (Mascara).

The main purpose of this study is to develop new methods of detection of our yeast isolates, after a realization of macroscopic and microscopic studies that investigate their morphological and cultural characteristics.

A protocol for DNA extraction as well as two methods of molecular detection of fungi has targeted DNAr. A PCR-ITS-RFLP was developed for the region ITS 1-DNAr 5.8 S-ITS 2 and the target PCR-Delta Ty1 retrotransposons (Delta region). They are sensitive enough to detect the biodiversity of different yeast species isolated.

Laboratory studies on isolates have revealed considerable phenotypic divergence accompanying the molecular diversity and show that there's a strain variation.

Despite this diversity, several cases of dominance and survival of strains were observed and ten genera *Pichia, Saccharomyces, Cryptococcus, Rhodotorula, Leucosporidiella, Brettanomyces, Candida, Clockera, Dekkera* and *Diplodia* were identified.

Keywords : yeast, PCR, molecular diversity, Cabernet, Carignan, Merlot

PV-11 : Effet de Certaines Substances Antibactériennes Produites par des Bactéries Halines Extrêmophiles Sur Certaines Bactéries d'Intérêt Sanitaire

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Abstract

Nul n'ignore les divers rôles joués par les microorganismes dans le fonctionnement des différents écosystèmes aquatiques et terrestres, via les cycles biogéochimiques. La grande diversité microbienne est associée à l'existence d'une diversité métabolique importante permettant aux différents microorganismes, surtout les bactéries, de mieux s'adapter aux différentes conditions environnementales rencontrées au niveau de tous les biotopes. Ainsi, les microorganismes extrêmophiles se développent de manière optimale, dans des conditions de milieux très défavorables, et, parfois, mortelles pour la quasi-totalité des autres espèces. Comme exemples de ces microorganismes extrêmophiles, les bactéries halophiles des environnements hypersalins possèdent des capacités d'adaptations moléculaires intéressantes et constituent ainsi une importante source de molécules bioactives.

Ce travail de recherche préliminaire constitue une contribution à l'étude de l'action de certaines substances antibactériennes élaborées à partir d'isolats bactériens halophiles isolés des salines du lac ZIMA (saline d'Echemmaia, Maroc).

Durant cette étude, 274 isolats bactériens sont isolés à partir de deux types d'échantillons eau et sol. Les tests de l'activité antibactérienne des différents isolats sont réalisés, en faisant appel à différents test de bioactivité. Les substances antibactériennes élaborées sont testées sur des bactéries d'intérêt médical (*E.coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Proteus mirabilis, Salmonella* spp, *Staphylococcus aureus…*).

Les résultats ont révélé l'existence d'une activité antibactérienne non négligeable chez 85 isolats. Après les caractérisations morphologique et biochimique, ces isolats appartiennent à 7 groupes bactériens (*Vibrio, Bacillus,* bactéries non fermentaires, *Staphylococcus* …). Les résultats préliminaires obtenus, dans le cadre de ce travail (85 isolats actifs), nous permettent de conclure que 31% des isolats étudiés présentent une activité antibactérienne vis-à-vis des souches cibles testées. Ces substances bioactives, issues

des bactéries extrêmophiles, telles celles étudiées, pourraient constituer un champ scientifique et une voie biotechnologique à étudier et à valoriser pour lutter, entre autres, contre les infections nosocomiales qui ont un impact négatif non négligeable sur la santé publique.

Mots Clés : microorganismes extrêmophiles, microorganismes halophiles, environnements hypersalins, activité antibactérienne, infections nosocomiales

PV-12 : A Risk Assessment of *Enterobacter sakazakii* in Infantile Formula Powder Consumed in Algeria

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Abstract

The *E. sakazakii* is the most pathogenic bacteria assigned with outbreak food poisoning, in the infantile formula powder (IFP). In Algeria, this concern is not researched, in this kind of infantile food. Thus, the microbiological risk assessment of *E. sakazakii* was estimated on IFP consumed in Maghnia city (Ouest of Algeria).

This work aims to (i) research this bacteria in IFP, (ii) to determine it prevalence and concentration at time of consumption and (iii) evaluate the number of baby could consumed this concern must be absent in food.

To achieve these objective, the probabilistic approach was used that based on Monte Carlo simulation. In the first, the data on consumption and preparation mode of infant milk (based on IFP) were collected from Maghnia city. In the second step, the information's on growth and inactivation parameters' of *E. sakazakii* were collected from literature. Then, the consumption chain was divided on four modules : initial contamination (H_0), Mixing (M), inactivation (D) and growth (G).

The *E. sakazakii* was found on IFP with a prevalence of 3% and 0.023 bacteria per gram. The Monte Carlo simulation, of all modules, using @risk software showed that 0,5% of baby could be consumed the milk contaminated by this concern.

Furthermore, the extemporaneously preparation is more recommended for protect the baby health.

Keywords : risk assessment, probabilistic approach, powder infantile milk, *E. sakazakii*

PV-14 : Green Synthesis and Characterization of Silver Nanoparticles Using Red Apple (*Malus domestica*) Fruit Extract at Room Temperature

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Abstract

The present work reports on simple and effective eco-friendly approach for the synthesis of silver nano-particles (AgNPs) from silver nitrate using *Malus domestica* (red apple) fruit. The fruit extract act as both reducing and capping agents.

The synthesized AgNPs were characterized using various instrumental techniques, including ultraviolet-visible spectroscopy (UV-Vis), Fourier transformed infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersive spectroscopy (EDS) and dynamic light scattering (DLS). Surface Plasmon Resonance (SPR) for AgNPs was observed at 422 nm.

The synthesized AgNPs were found to be flower-like in shape, with average diameter of 145 nm. The zeta potential of AgNPs was found to be -65.0 mV. This large negative zeta potential value indicates repulsion among AgNPs and their dispersion stability.

Keywords : red apple, silver nanoparticles, biosynthesis, zeta potential, characterization, green Chemistry

PV-16 : Competitive Electrochemical Immuno Sensor for Hepatitis A Detection Based on Horseradish Peroxidase as A Signal Amplification Label

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Abstract

A novel sensitive immunosensor for hepatitis A virus (HAV) detection has been proposed. The immunosensor configuration involves an indirect competitive immunoassay implying immobilization by physical adsorption of HAV on carbon nanopowder paste electrode (CNPE). After reaction between the target analyte and anti-HAV antibodies in solution, the remaining non-conjugated antibody is attached on the HAV-CNPE. The HAV monitoring was performed by means of a secondary antibody labeled with peroxidase (HRP-anti-IgG).

To quantify the amount of bound HAV-anti-HAV-anti-HRP, hydroquinone (HQ) and hydrogen peroxide were used. HRP catalyzes the oxidation of HQ to benzoquinone, thus, the oxidation product was subsequently determined by chronoamperometry with an applied potential of -0.3 V *versus* Ag/AgCl reference electrode. The various factors influencing the response characteristic of the immunosensor (BSA, anti-HAV, HAV, IgG labeled HRP) were evaluated.

Under the optimized experimental conditions, the resulting immunosensor could detect HAV with a detection limit of 1.6 $IU.mL^{-1}$.

The developed immunosensor may be successfully used for the determination of HAV, at various concentration levels owing to its analytical characteristics. Indeed, this immunoassay method showed a good selectivity, high sensitivity and a good repeatability and could be used for the detection of HAV with consistent results in comparison with those obtained by the indirect ELISA method.

Keywords : Hepatitis A virus, immunosensor, indirect ELISA, carbon nanopowder paste electrode

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