CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
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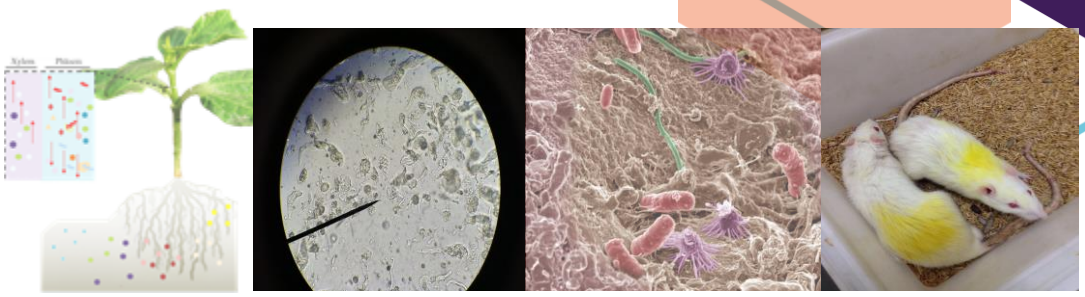
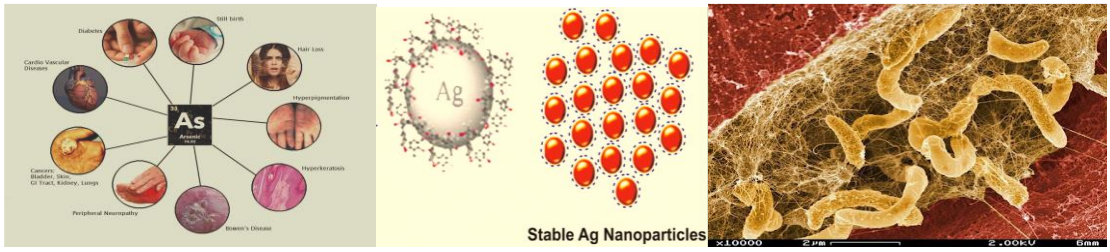
CENTER OF EXCELLENCE
GOVT. OF GUJARAT

RANKED 22nd nirf 2021 COLLEGE
P. D. PATEL INSTITUTE OF APPLIED SCIENCES
Gujarat, India





International conference on

"Emerging Trends in Biological Sciences"

Organized by
Department of Biological Sciences
P. D. Patel Institute of Applied Sciences
January 09–11, 2022

।। जीवो ब्रह्मैव नापरः ।।
GSBTM
TRANSCRIPTING BRIGHTER BIO FUTURE

DST
Department of Science & Technology
Government of Gujarat

PROGRAM AND ABSTRACT BOOK

DEPARTMENT OF BIOLOGICAL SCIENCES
P. D. PATEL INSTITUTE OF APPLIED SCIENCES
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

Presents

International Conference on

"Emerging Trends in Biological Sciences"

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Sponsored by

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CHIEF PATRON	*PATRON*
Shri Surendrabhai Patel **President, CHARUSAT**	**Prof. R. V. Upadhyay**

ADVISORY COMMITTEE

Dr. Devang Joshi
Registrar, CHARUSAT

Prof. Pankaj Joshi
Advisor, CHARUSAT

Prof. Datta Madamwar
Advisor, CHARUSAT

Prof. R. M. Patel
Advisor, CHARUSAT

Dr. C. K. Sumesh
Dean, Faculty of Science, PDPIAS, CHARUSAT

Prof. Palash Mandal
Principal, PDPIAS, CHARUSAT

Dr. Aditi Buch
Head, Department of Biological Sciences, PDPIAS, CHARUSAT

CONVENOR	*ORGANIZING SECRETARIES*
Dr. Chirayu Desai	**Dr. Bhavtosh kikani** **Dr. Anoop Markande**

ORGANIZING COMMITTEE

Dr. Gayatri Dave
Dr. Janki Thakker
Dr. Neeraj Jain
Dr. Ruchi Chaturvedi
Dr. Janki Patel
Dr. Mandar Kulkarni
Dr. Bragdish Iyer
Dr. Seema Amin
Dr. Anamika Jha
Dr. Murali Sharaff
Dr. Tapan Patel

THEME OF THE CONFERENCE

This conference is intended for deliberations, discussions and interactions on emerging trends in biological research including understanding of disease biology and therapeutic interventions, environmental sustainability, waste management and resource recovery, systemic signalling in plants, applied microbiology and biotechnology.

Invited talks on basic and translational research will be delivered by eminent experts working in various interdisciplinary domains of biological sciences. Contributory flash talks and poster presentations will be made by young researchers.

FOCUS AREAS

- Biomedical Research
- Environmental Research
- Biomolecular Research
- Agricultural Research

TABLE OF CONTENTS

***Abstracts of shortlisted presentations submitted by participants as per the ICETBS-2022 format have only been included in this abstract book compilation.**

Message from Chief Patron

CHARUSAT has hosted various national and international level events. I am proud that P D Patel Institute of Applied Sciences is starting off the year 2022 by organizing International Conference on 'Emerging Trends in Biological Sciences.' I am happy to know that this conference will be focusing on the key topics of Biomedical, Biomolecular, Environmental and Agricultural research. Thus, it would be a unique amalgamation of basic and translational biological science research to be found in one conference.

I congratulate all the faculty members, students, scientist collaborators, eminent speakers, and the conference sponsor Gujarat State Biotechnology Mission (GSBTM) for successfully launching this conference despite the paramount accumulation of work that the pandemic has forced upon everyone. This conference is a statement of strength, dedication, and commitment of PDPIAS towards disseminating scientific education and research boundless.

I am sure this conference will serve as an excellent platform for scientists and students of biological sciences to share their experiences, collaborate, educate, and grow their knowledge exponentially.

I wish everyone attending this conference a fruitful and enlightening experience and team ICETBS-2022 a grandeur success in conducting the event!

Shri Surendrabhai Patel
President
CHARUSAT

Message from Patron

It is a moment of pride for me that P. D. Patel Institute of Applied Sciences is organising such a mega event by bringing various eminent speakers to share their expertise with developing minds. I welcome all of the delegates, invited speakers, advisory committee members, colleagues, and participants on behalf of Charotar University of Science and Technology (CHARUSAT) and the entire organising committee. The purpose of this conference is to stimulate and inspire young minds to take a focused scientific approach and thus promote the importance of such seminars and provide quality higher education.

It is believed that technological development has progressed to the point that facts about biological processes can be understood. Today's society is facing challenges in improvising human health care and environment. Recognizing the urgency of the moment, it is critical that fresh minds collaborate with experienced minds to focus on insights and advancements in the field of sciences.

Investing in scientific initiatives that focus on environmental restoration, increase in crop production, developing new diagnostic and therapeutic approaches will help to develop a sustainable future. I am confident that this symposium will provide a scientific environment for the intellectuals and scholars to deliberate and share their ideas, experimental designs, discoveries and technical expertise, which will pave the way to solve wide range of biological research problems across the globe and to address it.

I wish this conference a great success.

Prof R. V. Upadhyay
Provost,
CHARUSAT

Message from Registrar

I am delighted to welcome all to the International Conference on 'Emerging Trends in Biological Sciences' ICETBS-2022. In the past, P. D. Patel Institute of Applied sciences (PDPIAS) has organized national and international conferences, bringing scientists and experts from multiple fields together. Despite the COVID-19 pandemic affecting the academic calendar of coursework and examination, PDPIAS stood by its belief to collaborate and encourage knowledge-sharing of advances in biological science research by organizing this conference.

The vast list of esteemed speakers for this ICETBS 2022 showcases the invaluable knowledge exchange going to happen through this conference. I'm sure that this will be a constructive, comprehensive, and enlightening conference for all the biological sciences scientists, scholars, and students.

I wholeheartedly thank Gujarat State Biotechnology Mission (GSBTM) for supporting and making this conference possible. Let us join in this amazing journey churning innovative ideas, and advancements in biological sciences.

I wish ICETBS 2022 to be a grand success!

Dr. Devang Joshi
Registrar
CHARUSAT

Message from Scientific Advisor

Greetings!

It gives me immense pleasure to welcome you to the International Conference on Emerging Trends in Biological Sciences, ICETBS-2022 hosted by Department of Biological Sciences, P. D. Patel Institute of Applied Sciences, Charotar University of Science and Technology, Changa. As a Scientific Advisor of CHARUSAT, I wish to express a deep appreciation for the efforts put up in by the organizers in conducting this event and bringing together expertise across the globe with diverse backgrounds on a common platform.

I welcome all the invited eminent speakers and participants to this great academic event and hope that the deliberations and proceedings of the conference will help the budding researchers to get an in-depth insight and inspire them to pursue quality research in their respective fields.

As we all know the pandemic caused by COVID-19 has changed the world order, impacting everyone. The ICETBS-2022 will foster discussions and hopes to inspire participants to initiate collaborations within and across disciplines for the development of Biological Sciences under virtual mode. The recent global hygiene crisis has reminded us that most health and environmental issues need to be addressed globally and that technological and scientific advances are the result of strong and intensive international cooperation. The International Conference on Emerging Trends in Biological Sciences (ICEBTS-2022) is part of this framework.

Research will deepen our understanding of biological systems and their molecular mechanisms. At the same time, scientists are using this knowledge to improve quality and longevity. This event underscores the importance of such ongoing research focusing on Disease biology and therapeutic intervention, understanding of ecological sustainability, Waste management and resource recovery, systemic signaling in plants, applied microbiology and biotechnology. We also encourage participation in discussion through utilization of the digital platforms during the conference.

I take this opportunity to wish you all great success of the ICETBS-2022.

Dr. Datta Madamwar
Scientific Advisor
CHARUSAT

Message from Dean

On behalf of our whole PDPIAS family, I welcome you all to the P D Patel Institute of Applied Sciences, Charotar University of Science and Technology. As Dean of the Faculty of Science, I am proud of the fact that we take a holistic approach to student development by involving students in all parts of education and research. The present conference aims to provide a platform to the researchers from various fields of Biology for knowledge-sharing and brainstorming. A major aim is to facilitate ignition of new ideas among the participants towards development of future.

In the present scenario, science and technology can be looked upon as a golden opportunity do deal efficiently with some of the major challenges threatening the world. The conference will cover presentations from multiple fields including biomedical, environmental, biomolecular and agricultural research. Several renowned and note-worthy speakers across the globe will share their research insights. I believe that this union will develop strong connection among researchers that shall strengthen community of biosciences which may lead to remarkable discoveries in near future. By attending this conference, the participants would gain insights into the latest developments that could be applied in their individual research problems. It is expected that the various technical sessions, including key note lectures, flash talks and poster presentations will be beneficial to all.

Further I am also sure that the conference will prove to be a milestone on its charted road map with overwhelming response of the attendees. I wish ICETBS-2022 a great success.

Dr. C. K. Sumesh
Dean, Faculty of Science
CHARUSAT

Message from Principal

On behalf of the P. D. Patel Institute of Applied Sciences, I heartily welcome all attendees to the International Conference on Emerging Trends in Biological Sciences ICETBS-2022 supported by Gujarat State Biotechnology Mission (GSBTM).

In the present period, bioscience and biotechnology are becoming increasingly important fields in both developed and developing countries. Advancements and researches in this subject are already having a good impact on society, and we may expect further innovations to contribute to human sustainability in the twenty-first century. The conference tracks are disease biology and therapeutic interventions, environmental sustainability, waste management and resource recovery, systemic signaling in plants, applied microbiology and biotechnology. I wish for the students and speakers to exchange and share their knowledge. This conference, will help to foster breakthroughs and innovations in the field of biosciences in this country and around the world.

I wish the conference every success and hope that the knowledge and expertise acquired from it to go a long way, enriching the fields of biosciences and thereby contributing to the developmental activities across the globe.

Prof. Palash Mandal
Principal PDPIAS
CHARUSAT

Message from Organizing Committee



With an aim to bring together eminent scientists working in the emerging areas of biological research and to inculcate scientific passion amongst young researchers the Department of Biological Sciences, P. D. Patel Institute of Applied Sciences is organizing a GSBTM sponsored International Conference on "*Emerging Trends in Biological Sciences*" (ICETBS-2022). It is our privilege and honour on behalf of the entire organizing committee to welcome all the delegates, invited speakers, panel experts, judges, colleagues, and research scholars to this conference. The conference intends to be focused on themes of biomedical research, environmental research, biomolecular research and agricultural research. The aim is to provide an ideal platform for the biological science researchers for knowledge-sharing, brainstorming and networking, thereby facilitating the ignition of new research ideas amongst the participants.

Considering the strong requirement of research-academia interface, this conference shall provide a platform for the convergence of various interdisciplinary research innovations and recent advancements in biological sciences to enhance the domain knowledge of participants. This will empower and inspire the young minds to develop a focused scientific approach in their own research endeavours. We are grateful to the international experts for accepting our invitation to share their expertise and interact with the participants of this conference.

With great pleasure, we would like to thank Charotar University of Science and Technology for providing us the opportunity to conduct this event. We are extremely thankful to Gujarat State Biotechnology Mission (GSBTM) for sponsoring this event. We are grateful to the research scholar volunteers and our colleagues without their tireless efforts this task of organizing ICETBS-2022 would not have been accomplished.

We extend a warm welcome to all the delegates and hope that you will have a scientifically enriching and rewarding experience in this conference.

Dr. Chirayu Desai
(Convener)

Dr. Bhavtosh Kikani and Dr. Anoop Markande
(Organizing Secretaries)

SCIENTIFIC PROGRAM

<table>
<tr><td colspan="3"><u>Day 1 (09/01/2022)</u>
Zoom Meeting Link for 9th January 2022 (Day: Sunday, Time: 10 AM to 4 PM IST)
https://us06web.zoom.us/j/83954001115?pwd=QkdPdnl1amNiRUIrdmw2Yk9nbWRLdz09 Passcode: 212163</td></tr>
<tr><td colspan="2">Inaugural session</td><td>10:00 am – 11:15 am (IST)</td></tr>
<tr><td colspan="2">Welcome and brief about activities during the day</td><td>11:15 am – 11:30 am (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session - 1</td><td>11:30 am – 12:15 pm (IST)</td></tr>
<tr><td colspan="2">Poster Presentation - 1</td><td>12:15 pm – 12:45 pm (IST)</td></tr>
<tr><td colspan="2">Technical break</td><td>12:45 pm – 01:15 pm (IST)</td></tr>
<tr><td colspan="3">Technical sessions
Chairperson: Dr. Bragadish Iyer</td></tr>
<tr><td> 
Prof. Harishkumar Madhyastha</td><td>Affiliation:
University of Miyazaki, Miyazaki, Japan

Invited Lecture 1:
Unearthing the Events of Late Arsenicosis, Metabolism, Pathogenesisand Clinical Manifestation</td><td>1:15 pm – 2:00 pm (IST)

4:45 pm – 5:30 pm (Miyazaki, JST)</td></tr>
<tr><td> 
Prof. Absar Ahmad</td><td>Affiliation:
Aligarh Muslim University, Aligarh, India

Invited Lecture 2:
Eco-conscious Synthesis of Stable, Protein Capped, Water Dispersible Nanoparticles Using Biological Routes Along With Their Applications in HealthCare</td><td>2:00 pm – 2:45 pm (IST)</td></tr>
<tr><td colspan="2">Poster Presentation-2</td><td>2:45 pm – 3:45 pm (IST)</td></tr>
<tr><td colspan="2">Concluding session</td><td>3:45 pm – 4:00 pm (IST)</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Day 2 (10/01/2022)</u>
Zoom Meeting Link for 10th and 11th January 2022 (Day: Monday & Tuesday, Time: 3 PM to 9 PM IST)
https://us06web.zoom.us/j/83055474330?pwd=WjRGRGR1c1h4U2lSS1lSZ1RKSjBiZz09 Passcode: 297382</td></tr>
<tr><td colspan="2">Welcome and brief about activities during the day</td><td>3:00 pm – 3:15 pm (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session - 2</td><td>3:15 pm – 4:00 pm (IST)</td></tr>
<tr><td colspan="2">Technical break</td><td>4:00 pm – 4:15 pm (IST)</td></tr>
<tr><td colspan="2">Poster Presentation - 3</td><td>4:15 pm – 4:45 pm (IST)</td></tr>
<tr><td colspan="2">Technical break</td><td>4:45 pm – 5:00 pm (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session - 3</td><td>5:00 pm – 5:45 pm (IST)</td></tr>
<tr><td colspan="3">Technical sessions
Chairperson: Dr. Aditi Buch</td></tr>
<tr><td> 
Prof. Eric D. Van Hullebusch</td><td>Affiliation:
University of Paris, Paris, France

Invited Lecture 3:
Biotechnologies for Circular ssEconomy: SelectiveCritical Elements Recovery from Secondary Resources</td><td>5:45 pm – 6:30 pm (IST)

1:15 pm – 2:00 pm
(Paris, CET)</td></tr>
<tr><td> 
Prof. Pradeep Kachroo</td><td>Affiliation:
University of Kentucky, Lexington, USA

Invited Lecture 4:
Mobile Regulators of Systemic Signalling in Plants</td><td>6:30 pm – 7:15 pm (IST)

8:00 am – 8:45 am
(Lexington, EST)</td></tr>
<tr><td> 
Prof. Ramaraj Boopathy</td><td>Affiliation:
Nicholls State University, Thibodaux, USA

Invited Lecture 5:
Microbial Mining of Termite Gut Microbiome for Biodegradation of Phenolic Compounds</td><td>7:15 pm – 8:00 pm (IST)

7:45 am – 8:30 am
(Thibodaux, CST)</td></tr>
<tr><td> 
Prof. Rajesh Sani</td><td>Affiliation:
South Dakota School of Mines and Technology,South Dakota, USA
Invited Lecture 6:
OMICS Analyses of Planktonic Cells and Biofilms of Sulfate-reducing Bacteria: Filling the Knowledge Gaps in Microbial Metal Stress</td><td>8:00 pm – 8:45 pm (IST)

7:30 am – 8:15 am
(South Dakota MST)</td></tr>
<tr><td colspan="2">Concluding session</td><td>8:45 pm – 9:00 pm (IST)</td></tr>
</table>

<table>
<tr><td colspan="3">Day 3 (11/01/2022)
Zoom Meeting Link for 10th and 11th January 2022 (Day: Monday & Tuesday, Time: 3 PM to 9 PM IST)
https://us06web.zoom.us/j/83055474330?pwd=WjRGRGR1c1h4U2lSS1lSZ1RKSjBiZz09
Passcode: 297382</td></tr>
<tr><td colspan="2">Welcome and brief about activities during the day</td><td>3:00 pm – 3:15 am (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session – 4</td><td>3:15 pm – 4:00 pm (IST)</td></tr>
<tr><td colspan="2">Technical break</td><td>4:00 pm – 4:15 pm (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session – 5</td><td>4:15 pm – 5:00 pm (IST)</td></tr>
<tr><td colspan="2">Technical break</td><td>5:00 pm – 5:15 pm (IST)</td></tr>
<tr><td colspan="2">Flash Talk Session – 6</td><td>5:15 pm – 5:45 pm (IST)</td></tr>
<tr><td colspan="3">Technical sessions
Chairperson: Prof. Palash Mandal</td></tr>
<tr><td> 
Prof. Gyaneshwar Chaubey</td><td>Affiliation:
Banaras Hindu University, [BHU], Varanasi,India

Invited Lecture 7:
The Host Susceptibility against SARS-CoV-2 inSouth Asia</td><td>5:45 pm – 6:30 pm (IST)

5:45 pm – 6:30 pm (Varanasi, IST)</td></tr>
<tr><td> 
Prof. Vishal Shah</td><td>Affiliation:
Community College of Philadelphia, Philadelphia, USA

Invited Lecture 8:
Soil Microbial Community – Good and the Bad</td><td>6:30 pm – 7:15 pm (IST)

8:00 am – 8:45 am (Philadelphia, EST)</td></tr>
<tr><td> 
Dr. Reben Raeman</td><td>Affiliation:
University of Pittsburgh, Pittsburgh, USA

Invited Lecture 9:
Exploring Mechanisms Driving Gut Permeability in Non-Alcoholic Fatty Liver disease (NAFLD)</td><td>7:15 pm – 8:00 pm (IST)

8:45 am – 9:30 am (Pittsburgh, EST)</td></tr>
<tr><td colspan="2">Concluding session</td><td>8:00 pm – 8:10 pm (IST)</td></tr>
<tr><td colspan="2">Online Poll and Feedback</td><td>8:10 pm – 8:15 pm (IST)</td></tr>
<tr><td colspan="2">Valedictory session</td><td>8:15 pm – 9:00 pm (IST)</td></tr>
</table>

INVITED SPEAKERS

 **Prof. Harishkumar Madhyastha,** *Associate professor, Department of Applied Physiology, University of Miyazaki, Japan*	Dr. Harishkumar started his career as a scientist in Murugappa Chettiar Research center, Chennai, India. He worked on spirulina cultivation technology under the leadership of Prof. C.V. Sheshadri (Retd. Prof. of IIT-Kanpur) which was subsequently expanded to Spirulina producing industries like Parry Spirulina, Chennai. Later on, he pursued postdoctoral research at Miyazaki University that culminated in a faculty position in the Department of Applied Physiology at the University of Miyazaki. His current research interests include generation of novel platforms for delivery of nano-sized biomaterial payloads into specific cell types and the utilization of this smart model as new drug delivery system for wound healing. As a nutraceutical biomaterial for wound healing, he formulated nano-sized C-Phycocyanin, Curcumin, Vinofelon, Emodin, Quercetin as selective cell migration regulating agents, and other biomedical applications. As a member of transdisciplinary projects, he is involved in understanding the role of nano-cargo, exosomes in late keratosis of arsenic toxicity in human. His academic credentials are credited with h-value of 23, 1322 citations, with >90 publications and 6 international patents (Google Scholar). He is actively involved in many international projects including ongoing Indo-Japan scientific and academic collaborations. As an officially recognized Indo-Japan academic spokesperson of University of Miyazaki, he is engaged in outreach programs to further strengthen the cohesive relationship with Indian academicians.
 **Prof. Absar Ahmad,** *Professor and Director, Interdisciplinary Nanotechnology Centre (INC), Aligarh Muslim University, Aligarh, India*	Prof. Absar Ahmad has made pioneering and key contributions to the fields of bio-nano-science and technology which have received high international acclaim amongst peers. Most notably, his entire volume of work has been developed and done in India. His work has an underlying theme of imaginative implementation of environmentally friendly, green chemistry, room temperature biological and bioinspired methods to emerging areas of modern science with multidisciplinary applicability. In particular, his works on bioinspired synthesis of metal, semiconductor and oxide nanosystems using fungal and plant extract media and related studies on elucidation and control of the biomolecular processes and mechanisms are highly cited. His recent works on anticancerous drug extraction from endophytic fungi, and their immobilization on nanosystems for drug delivery applications are expected to have significant impact on emerging field of nanomedicine. After 7 years at CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR- CIMAP), Lucknow, and 23 years of service at the CSIR-National Chemical Laboratory (CSIR-NCL), Pune, he was a Senior Principal Scientist at the Biochemical Sciences Division when he was offered the post of Professor and Director at the newly created Interdisciplinary Nanotechnology Centre (INC), at Aligarh Muslim University (AMU), Aligarh. He has been conferred with several prestigious awards which include the DBT-Tata Innovation fellowship, Govt. of India, VASVIK Industrial Award, Materials Research Society of India (MRSI) Medal, CSIR-National Chemical Laboratory: Scientist of the Year, etc. He has recently received a prestigious Rs. 4 crore grants from the Department of Biotechnology (DBT), Government of India, New Delhi, for a multi-institutional project to access the potential of Nanomaterials in Diabetes, Malaria, Theragnostic and translation of the findings into marketable products, processes and patents.

 **Prof. Eric D. Van Hullebusch,** *Professor, Institut de Physique du Globe de Paris , Université de Paris, France*	Eric van Hullebusch is currently full Professor in Biogeochemistry of Engineered Ecosystems at Université de Paris and Institut de Physique du Globe de Paris (Paris, France). He has a BSc in Biochemistry, and a Master degree in Aquatic Chemistry and Microbiology from the University of Poitiers (France), and a Ph.D in Aquatic Chemistry and Microcrobiology from the University of Limoges (France). Prof van Hullebusch has worked in the Netherlands as Postdoctoral Researcher at Wageningen University & Research and in France as Associate Professor in Biogeochemistry of Engineered Ecosystems at Université Paris-Est. He also spent 2 years at IHE Delft Institute for Water Education in the Netherlands where he was full professor of Environmental Science and Technology and head of the Pollution Prevention and Resource Recovery chair group in the Environmental Engineering and Water Technology department. His main research interests are in the area of environmental biotechnologies and biogeochemistry, with special focus on: i) Study of metals and metalloids biogeochemistry in engineered ecosystems, ii) Biohydrometallurgy of secondary resource waste streams, and iii) Treatment of waste and soils contaminated with organic pollutants. Within these research areas, he published more than 260 papers in scientific journals with peer review, has co-edited 6 books and is co-author of more than 25 book chapters. For instance, he is very much interested in the application of biotechnologies for the selective recovery of technology critical metals from primary and secondary resources. For more information see http://www.ipgp.fr/fr/van-hullebusch-eric
 **Prof. Pradeep Kachroo, Professor,** *Department of Plant Pathology, University of Kentucky, USA*	Dr. Pradeep Kachroo is currently working as a Professor at University of Kentucky, USA. He has received many prestigious awards: Thomas Poe Cooper Research Award, University of Kentucky, 2019, Noel Keen Award for Research Excellence in Molecular Plant Pathology, American Phytopathological Society, 2014, Prestigious Paper Awards, University of Kentucky, 2007, 2010, 2014, Faculty Futures Award, University of Kentucky, 2004. He has published 88 peer-reviewed publications in high-impact factor journals and books. He has edited the book "*Systemic signaling in plants*" Wiley-Blackwell Publishing. He is the section editor for BMC Plant Biology since 2009 and co-editor for Journal of Integrative Plant Biology since 2014. His research is to help understand how specific signaling pathways are induced during host-pathogen interaction, how these pathways communicate with each other and the molecular, genetic and biochemical mechanisms underlying such regulations. His research group is using Arabidopsis as a model plant system and is studying its interaction with bacterial pathogen Pseudomonas syringae, viral pathogen turnip crinkle virus (TCV) and fungal pathogens Colletotrichum higginsianum and Botrytis cinerea. With regards to signaling mechanisms his research group's main interest is to decipher the role of fatty acid, lipid and cuticular pathways in local and systemic acquired resistance, to characterize resistance (R) protein-mediated signaling and to understand interaction between light and defense signaling.

Prof. Ramaraj Boopathy, *Alcee Fortier Distinguished Service Professor, Biological sciences, Nicholls State University, USA*

Dr. Raj Boopathy is an Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA. He received the Jerry Ledet Foundation Endowed Professorship in Environmental Biology in 2002 and John Brady Endowed Professorship in 2012. In 2008, Dr. Raj Boopathy received the Nicholls State University's Presidential Award for Teaching Excellence. He has more than 30 years of research experience in the area of bioremediation and bio-processing. His research involves bioremediation of hazardous chemicals including oil spills and explosives, biological treatment of wastewater, antibiotic resistance genes in the environment, and bio-ethanol production. He has published more than 200 research papers in peer- reviewed journals and 20 book chapters. He edited two books. His research work has been cited more than 9,600 times with h-index of 54. Dr. Raj Boopathy reviewed research grants for National Science Foundation, Department of Defense, US Environmental Protection Agency, Department of Energy, and numerous private agencies and foreign governments including South Africa, Switzerland, Indonesia, Hong Kong, UK, and Israel. He is the editor of the journal, Environmental Quality Management, Current Pollution Reports, Bioengineered, and Applied Sciences (Section, Environmental and Sustainable Science and Technology). He also serves as a senior editor of the Journal, Renewable Bioresources and is on the Editorial Boards of various International journals including International Biodeterioration & Biodegradation, Bioresource Technology, and the International Journal of Soil and Sediment Contamination. Dr. Raj Boopathy received Fulbright scholarship and spent six months teaching and conducting research at the Institute of Technology (ITB) in Bandung, Indonesia in 2007. He also received European Union-US biotechnology Fellowship and Leverhulme commonwealth fellowship. He has been elected as a Fellow of various societies including International Union of Pure and Applied Chemistry (IUPAC), Society for Industrial Microbiology and Biotechnology (SIMB) and the International Forum on Bioprocessing (IFBioP). Dr. Raj Boopathy was selected as a Fulbright Senior Scholar Specialist to visit various countries for next five years by the US State Department and he recently visited Malaysia and Indonesia as a Fulbright Specialist. Dr. Boopathy received Dr. Waksman Award from SIMB for his contribution in Microbiology Education in 2017. Dr. Boopathy is the recipient of the World Class Professor (WCP) award from the Government of Indonesia. Dr. Boopathy currently serves as a visiting professor at the Institute of Technology Bandung (ITB), Indonesia.

 **Prof. Rajesh Sani,** *Professor, Department of Chemical and Biological Engineering, South Dakota School of Mines and Technology, USA*	Dr. Sani is a Professor in the Departments of Chemical and Biological Engineering and Applied Biological Sciences at South Dakota School of Mines and Technology, South Dakota, USA. His research expertise includes Biocatalysis, Rules of Life in Biofilms, Extremophilic Bioprocessing, Biomaterials, Gas to Liquid Fuels, Genome Editing of Extremophiles and Space Biology. Over the past 15 years, he has been the PI or co-PI on over $50.45 million in funded research. He has one patent, nine invention disclosures, and published over 103 peer-reviewed articles in high impact factor journals and have contributed to over 32 book chapters. In addition, he has edited eleven books and one Proceedings for Springer International Publishing AG, Wiley, and ACS publications. Dr Sani has been leading a research consortium funded by the NSF with the aid of 84 scientists and engineers. The focus of the consortium on “Methane regulation in deep and extreme environments".
 **Prof. Gyaneshwar Chaubey,** *Professor, Department of Zoology, Banaras Hindu University, Varanasi, India*	Dr. Chaubey is a Professor in the Department of Zoology, Banaras Hindu University, Varanasi. He has published >101 peer reviewed research papers and 6 book chapters, with an h index- 28; i10 index- 53; number of citations 4324 ResearchGate: RG score 42.15 (June 2021). He is known for in-depth work on several ethnic groups of South Asia, including Himalayan, Andaman, Austroasiatic, Dravidian, Indian Jews, Siddi, Roma and Parsis. He was selected as top young researcher to meet the Nobel Laureates in 61st Lindau Nobel Laureates Meeting 2011, Germany. He is among top 2.5% Scientists of the World (Source: ResearchGate Germany); top 1% highly cited Scientist in the area of Heredity and Genetics (Web of Science, USA); and top 5 Evolutionary Biologists of India (Source: IndianHumanEvolution). He is an academic editor of Journal PLOS ONE (The world’s first multidisciplinary Open Access journal) Public library of Sciences, USA from August 2013 and was featured on their webpage on 10th Anniversary of the journal. Based on his team's research on Roma (European Gypsy), Late Smt. Sushma Swaraj (Minister of External Affairs) has called them the ‘children of India’ in year 2016. He wrote a column with Dr K Thangaraj on the issue of ‘Aryan Invasion’ in a leading newspaper ‘The Hindu’. He is awarded by Gencove USA for free sequencing of 300 Zoroastrian samples. He was invited by National Geographic USA for presentations and panel discussion (Who we are?) in National Geographic Symposium- June 2018. He is among ‘10 Indians To Watch Out For In 2019’ by Swarajya Magazine. In October 2019, he was felicitated by Honourable Home Minister Govt of India for outstanding work in Indian prehistory. He is writing regular editorial columns in largest Hindi daily ‘Dainik Jagran’ on COVID-19 and India. He has won the Top researcher award (2020) in Institute of Science, BHU.

 **Prof. Vishal Shah,** *Professor and Dean, Math, Science and Health Care Division, Community College of Philadelphia, USA*	Dr. Vishal Shah is the Dean of the Math, Science and Health Care Division at the Community College of Philadelphia. Prior to this, Dr. Shah has served West Chester University as the Associate Dean for the College of the Sciences and Mathematics, where he was responsible for improving parameters of student success; academic policies, procedures and systems; program development and implementation; and external partnership development. Dr. Shah has co-authored over 80 publications in international peer-reviewed journals, received 18 research grants and six patents, and presented over 75 presentations in scientific conferences. He is on the editorial board for the Environmental Monitoring and Assessment and Frontiers for Young Minds. Dr. Shah earned his bachelor's, master's and doctorate degrees in Microbiology from Sardar Patel University in India. He received the prestigious UNESCO-ROSTE fellowship to carry out research in Prague, Czech Republic. He completed his post-doctoral research at New York University's Tandon School of Engineering.
 **Dr. Reben Raeman,** *Assistant Professor, Department of Pathology, University of Philadelphia, USA*	Dr. Reben Raeman is an Assistant Professor at Department of Pathology, University of Pittsburgh, USA. He is the recipient of many prestigious awards such as AASLD Liver meeting Poster Presentation: Presidential Award (2016) and Broadus E. Browne Award for Outstanding Ph.D. Candidate (2011). He is the project investigator on various research grants supported by NIH, NIDDK, Michael J. Fox Foundation (MJFF), Pittsburgh Liver Research Center (PLRC) Pilot and Feasibility Award. He has published several high quality research papers and has a patent to his credit. He has been a grant reviewer for various funding agencies and has reviewed publications for several reputed international journals. His primary research focus is to elucidate host and environmental factors driving hepatic inflammation and fibrosis in non-alcoholic steatohepatitis (NASH). His research has established that gut microbial antigens are among the primary drivers of hepatic inflammation and fibrosis in NASH. His findings also underscore the importance of diet-induced gut dysbiosis, mucosal inflammation, and subsequent disruption of the intestinal epithelial barrier in NASH. The mouse model of compromised intestinal epithelial barrier used for his research turned out to be an excellent dietary model of NASH. When fed a Western diet, these mice not only develop key features of MetS, but also develop hepatic inflammation and fibrosis. Using this novel preclinical model, his team is performing further studies to gain mechanistic insights into the etiology of NASH progression. His goal is to dissect the complex interplay between intestinal epithelial barrier, microbiota, bile acids and immune cells in NASH.

INVITED LECTURES

IL 01

Unearthing the events of Late Arsenicosis, Metabolism, Pathogenesis and Clinical manifestation

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Arsenic contamination has been reported as biggest challenge and catastrophe in the world especially south Asia. The syndrome of endemic arsenic poisoning occurs during the concurrent exposer of As metalloids, dust, The synergistic and antagonist effect of arsenic toxicity in the human body thought to be depends on the dose and duration of exposure. High levels of arsenic in groundwater have been found to be associated with various health-related problems including skin lesions, cardiovascular diseases, reproductive problems, psychological, neurological, immunotoxic, and carcinogenesis. Among the arsenic related cancers, liver, lung, skin, bladder and kidney cancers are reported to be prevalent in the patients who exposes to arsenic. The mechanism of arsenic toxicity consists in its transformation in metaarsenite, which acylates protein sulfhydryl groups, effect on mitochondria by inhibiting succinic dehydrogenase activity and can uncouple oxidative phosphorylation with production of active oxygen species by tissues. The arsenic stimulated cellular signaling pathways which help in proliferation and neoplastic transformation ultimately resulted in cancer manifestation whereas apoptotic pathways inhibited carcinogenesis. Here we discuss the Therapeutic strategies against arsenic should be designed taking into account all these factors.

IL 02

Eco-conscious synthesis of stable, protein capped, water dispersible nanoparticles using biological routes along with their applications in health care

Prof. Absar Ahmad

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In this talk, we describe our research into the use of plants and plant microorganisms in the synthesis of bio-compatible, water soluble, fluorescent and protein capped metal, metal sulfide, quantum dots and metal oxide, biominerals, carbon nanoparticles of different sizes and shapes. In a significant departure from bacteria-based methods for nanomaterial synthesis that have been investigated in some detail, we have shown that plant microorganisms such as fungi and actinomycetes when challenged with aqueous metal ions are capable of reducing the ions both intra and extra-cellularly resulting in the formation of stable metal nanoparticles. The formation of metal nanoparticles occurs by an enzymatic process and thus, the fungus-based synthesis process is not limited to reduction reactions alone. The versatility of this approach is underlined by our findings that enzymes such as sulphite reductase, nitrate reductase and hydrolyzing proteins are secreted by the fungi in response to metal stress thereby leading to the possibility of economical room-temperature synthesis of quantum dots, metal nanoparticles and nanooxides. In the course of evolution, fungi have enjoyed an intimate symbiotic relationship with plants and hence, it is quite likely that plant extracts may also possess useful biomolecules which not only carry out the above listed range of biotransformations but also control the shape of nanoparticles. In this regard, we have studied a number of plant extracts for realizing metal nanoparticles and have observed that Geranium and Lemongrass extracts result in shape modulated gold nanoparticles. In particular, the reaction of aqueous gold ions with Lemongrass extract resulted in the large-scale synthesis of gold nanotriangles with interesting near infrared absorption. Potential application of the gold nanotriangles, magnetite and other inorganic nanoparticles in diagnosis, imaging, therapeutic and hyperthermia of cancer cells are being investigated.

IL 03

Biotechnologies for Circular Economy: Selective Critical Elements Recovery from Secondary Resources

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Technology critical elements (TCEs) (i.e., platinum group elements (PGEs), rare earth elements (REEs), Nb, Ta, Ga, Ge, In, Tl, Te) as well as some base and precious metals are essential in the development of novel high-tech applications and the supply of these elements became one of the main economic and technological challenges for the European Union (EU). They are essential in green technologies, including renewable energy, emission free electric vehicles and energy-efficient lighting. However, the sustainable supply of TCEs and some other elements is a major concern as highlighted by 29 critical mineral raw materials (CRMs) 2020 EU list. Waste electrical and electronic equipment (WEEE) is recognized as an important secondary source of TCEs. Also, solid metalliferous wastes (sludges, dusts, residues, slags, red mud and tailing wastes) originating from ferrous and non-ferrous metallurgical industries have reported to be promising resources of TCEs. There are several options to recover TCEs and precious metals from these waste streams, and biotechnologies have been seen as a promising alternative to the current industrial best available technologies (i.e., pyrometallurgy). These technologies encompass biologically induced leaching (bioleaching) from various matrices, biomass-induced selective biorecovery. The current frontiers in CRMs recovery from WEEE and solid metalliferous wastes using biotechnology, the biochemical fundamentals of these bio-based technologies and the recent research and development activities will be presented.

IL 04

Mobile Regulators of Systemic Signalling in Plants

Prof. Pradeep Kachroo

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Systemic acquired resistance (SAR) is a form of broad-spectrum resistance induced in response to local infections that protects uninfected parts against subsequent secondary infections by related or unrelated pathogens. Thus, SAR is more desirable than the "acquired immunity" of vertebrates, which only generates antigen-specific immunological memory. SAR signaling requires two parallel branches, one regulated by salicylic acid (SA), and the other by pipecolic acid (Pip), azelaic acid (AzA) and glycerol-3-phosphate (G3P). AzA and G3P function downstream of the free radicals nitric oxide (NO) and reactive oxygen species (ROS) and Pip functions by increasing NO/ROS levels. The plant galactolipids monogalactosyldiacylglycerol (MGDG) and digalactosyldiacylglycerol (DGDG) are also required for SAR and alpha-galactose-β-galactose sugars on DGDG are required for normal biosynthesis of NO. During SAR, SA, Pip, AzA, and G3P accumulate in the infected leaves, but only a small portion of these is transported to distal uninfected leaves. SA is preferentially transported via the apoplast, whereas phloem loading of AzA and G3P occurs via the symplast. Many of these chemical are associated with human disorders, although their underlying molecular mechanisms in such disorders are largely unknown. The evolutionary conservation of select signals and their precise role in SAR will be discussed.

IL 05

Microbial Mining of Termite Gut Microbiome for Biodegradation of Phenolic Compounds

Prof. Ramaraj Boopathy

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The subterranean Formosan termite (Coptotermes formosanus) is an insect pest in Louisiana, USA causing billions of dollars annually in damage. There has been research about the microbiome of this termite, but more research is needed about factors affecting the termite microbial ecosystem. Information on nitrogen fixation, carbon utilization, and degradation of various chemicals is available, but to date, the effect of termite diet has not been investigated. In this study, termites were collected from dead pieces of red maple, tupelo, nuttal oak, and live oak. This study had three main objectives: to determine the effect of termite diet on the bacterial community in the gut of termites and the number of bacteria capable of utilizing phenol, acetate, and cellobiose, three common carbon sources in the termite gut, and to determine the ability of two Acinetobacter species and a termite gut bacterial consortium isolated from termite guts to utilize phenol. This study showed there are significantly more bacteria capable of utilizing cellobiose in the guts of termites from oak species compared to bacteria utilizing phenol in other tree species. Additionally, one isolate, Acinetobacter tandoii was more capable of utilizing phenol than A. berenziniae or the consortium. This study supports the idea that the termite microbiome is a stable and intricate ecosystem with little effect from the termite's environment.

IL 06

OMICS Analyses of Planktonic Cells and Biofilms of Sulfate-reducing Bacteria: Filling the Knowledge Gaps in Microbial Metal Stress

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The molecular response mechanisms of sulfate-reducing bacteria (SRB), which corrodes various metal surfaces, are not well understood. Here, we combine physiological, spectroscopic, microscopy, and omics (transcriptomics, epigenomics, and metabolomics) analyses to provide a comprehensive view on the pathways activated in a model SRB, Desulfovibrio alaskensis G20 (DA G20), in response to Cu. Detailed analysis of the differently expressed genes (transcriptomics) suggests involvement of putative molecular mechanisms (e.g., metal-ion binding, transporter activity, ATP binding, and hydrolase activity) and biological processes (e.g., transcription, translation, and phosphorelay signal transduction) in DA G20 response to Cu. In-terms of cellular component, integral components of membrane were highly differentially expressed in response to Cu. Radical S-adenosyl-L-methionine (SAM)-domain containing protein, which is responsible for metal ion binding, was upregulated, while the flagellar basal body protein, which helps in motility, was downregulated in the presence of Cu. Results also indicated that transcription factor families associated with stress responses were differentially expressed with Cu. Epigenetics analysis of DA G20 under Cu stress mapped the differentially methylated (m5C methylation) genes distributed across CHH, CHG and CPG genomic islands. The result revealed 37 genes with de-novo methylation that includes methyltransferase genes involved in the transfer of methyl group from SAM to other carbon atoms of differentially methylated genes and the genes involved in sensing extracellular change in environment. Increase in the methylation of chemotaxis and flagellar proteins, transcription regulation, metal ion binding, lipid metabolism, and energy metabolism could suggest their roles to overcome Cu stress. Our omics data has allowed us to identify several possible molecular mechanisms adopted by DA G20 to cope with Cu toxicity. These results are currently being used as a baseline for gene expression profiles of DA G20 biofilms grown on bare copper and copper coated with 2D materials' surfaces.

IL 07

The Host Susceptibility against SARS-CoV-2 in South Asia

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Infection born by Coronavirus SARS-CoV-2 has swept the world within a time of a few months. It has created a devastating effect on humanity with social and economic depression. Europe and America were the hardest hit continents. India has also lost lives, making the country fourth most deadly worldwide. However, the infection and death rate per million and the case fatality ratio in India were substantially lower than in many developed nations. Several factors have been proposed including genetics. In a series of analysis involving genomics and surveillance, we have reported several novel findings. We found out a protective haplotype in ACE2 gene among Indian populations. We have also reported that a large chunk of Indian population was asymptomatic to the SARS-CoV-2 infection. Thus, the real infection in India was severalfold higher than the reported number of cases.

IL 08

Soil Microbial Community – Good and the Bad

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Microorganisms play a critical role in the structure and functioning of soil ecosystems. Within acidic soil across the northeastern United States and Canada, we have little understanding of the microbial diversity present and its relationship to the biochemical cycles. Understanding the taxonomical and functional diversities in the acidic soil allows us to understand key organisms that could be responsible for maintaining key ecosystem processes. The soil microbiota is sensitive to changes in soil conditions and results suggest that microbial consortium could be used as an environmentally friendly alternative to the use of chemicals to maintain soil fertility and ecosystem functioning. In particular, for agriculturally important crops cultivated on acidic soil, organic cropping through use of microbial addition in the soil is possible. Similarly, certain species of soil microorganisms could also be involved in release of carcinogens in the air. Overall, the results indicate that careful monitoring of soil microbiota is critical for increasing the health and wellbeing of human and soil health.

IL 09

Exploring Mechanisms Driving Gut Permeability in Non-Alcoholic Fatty Liver disease (NAFLD)

Prof. Reben Raeman

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Nonalcoholic fatty liver disease (NAFLD) describes a spectrum of progressive liver diseases ranging from simple steatosis to steatohepatitis and fibrosis. Globally, NAFLD is the leading cause of morbidity and mortality associated with chronic liver disease, and patients are at a higher risk of developing cirrhosis and hepatocellular carcinoma. While there is a consensus that inflammation plays a key role in promoting NAFLD progression, the mechanisms inciting the inflammatory process are still not fully understood. We recently demonstrated gut microbial antigens as among the primary drivers of hepatic inflammation in NAFLD. Our studies in a mouse model of compromised intestinal epithelial barrier substantiated clinical evidence linking intestinal epithelial permeability and NAFLD progression. Specifically, a Western diet (WD) of high fat, high fructose and high cholesterol significantly increased gut permeability resulting in severe steatohepatitis and fibrosis in mice with a compromised intestinal epithelial barrier. These pathological changes in the intestinal epithelial barrier were triggered by gut dysbiosis and mucosal inflammation, facilitating translocation of gut microbial antigens. We also demonstrated that humans with NAFLD but with no known inflammatory bowel disease (IBD) have increased colonic inflammation and defects in intestinal epithelial barrier. Together, these studies underscore the importance of diet-induced gut dysbiosis, mucosal inflammation, and subsequent disruption of intestinal epithelial barrier in NAFLD progression. In this talk, I will cover our recent efforts to build upon these findings to uncover the cellular and molecular mechanisms underlying intestinal barrier dysfunction in NAFLD.

THEME 1

BIOMEDICAL RESEARCH

FT 15

Antiproliferative activity of biosynthesized zinc oxide nanoparticles

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Cervical cancer is caused by sexually acquired infection and is one of the most common cancers occurring in women worldwide. Many strains of human papilloma virus (HPV) play a major role in causing cervical cancer. There are 15 types of high-risk HPV, among all, type 16 and 18 are responsible for 70% of cervical cancer cases.

In this study, the antiproliferative activity of ZnO-NPs biosynthesized from grapes skin extract was evaluated. ZnO-NPs were synthesized from skin of *Vitis Vinifera* as it contains resvetrol which is known for its miraculous property of inhibiting the formation of free radicals that causes cancer. ZnO nanoparticles were confirmed by its colour change to white aqueous solution which is due to Surface Plasma Vibration of reduced zinc oxide. The cytotoxicity of ZnO-NPs was checked on cancer cell line HeLa. Also, when they were tested on normal VERO cells. The exact mechanism remains unclear at molecular level and further studies can be done on its selective cytotoxicity to understand the mechanism of action.

FT 16

5-Fluorouracil promotes Colorectal Cancer stemness via upregulating specific surface markers and cytokines

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Colorectal cancer (CRC) is deadliest malignancy across the world. The first line chemotherapy used for CRC is 5-fluorouracil (5-FU). The 5-FU completely eradicate rapidly proliferating and terminally differentiated tumor cells but failed to target Cancer Stem cells (CSC). The tumor may get shrunk temporary but remnant CSC multiply and form tumor again more aggressively. The recurrence and resistance lead to metastasis. Here, we demonstrated the role of interleukin-6 (IL-6) and Tumor necrosis factor-alpha (TNF-α) along with certain CSC markers (CD44, ALDH1) in tumorigenesis and metastasis of CRC. We induced CRC in total 12 Sprague dawley rats by 1,2 dimethyl hydrazine. Later animals were treated with 5-FU for 7 weeks at the dose of 10 mg/kg by subcutaneous route. At the end of treatment, half population sacrificed (6), while remaining half (6) left without treatment of 5-FU for 5 weeks and then after sacrificed. IL-6 and TNF-α level were estimated by ELISA while colon fixed in formalin and sent to histology lab for hematoxylin eosin staining and immunohistochemistry at both intervals. Other parameters like colon length, liver index, tumor multiplicity also measured. The results indicated 5-FU up regulate inflammatory cytokines and cell surface markers that promote CRC stemness via Wnt/β-catenin pathway.

Keywords: Cancer stem cells, cytokines, 5-Fluorouracil, β-catenin, metastasis

FT 17

Molecular docking study of Antiproliferative Benzyloxyphenyl substituted Dihydropyrimidinones

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We synthesised twenty Benzyloxyphenyl substituted dihydropyrimidinones (DHPMs). They are evaluated for antiproliferative activity against six solid human tumour cell lines. Among them, two DHPMs, namely **4p** and **4q** found to be most potent (with GI_{50} below 3 μM). Here, we report a molecular docking study of potent **4p** and **4q**. Since **4p** and **4q** are analogues of monastrol, a well-known Eg5 inhibitor, we carried out molecular docking of **4p** and **4q** with Eg5 kinase. Results show that both **4p** and **4q** effectively bind with Eg5 and inhibit the functioning of Eg5 in the cell cycle. So, they possess potent antiproliferative activity against six solid human tumour cell lines. R stereoisomer of **4q** shows the highest binding affinity with -8.8 Kcal/mol. Whereas S stereoisomer of **4q** docked with Eg2 with the highest three hydrogen bonds. Thus, **4q** bind more effectively into the active site of Eg5 than **4p**. So, **4q** is more antiproliferative than **4p**.

FT 18

Immuno-therapy: using body's immune system to fight cancer

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Allison and Honjo's discovery of checkpoint proteins has given a new light of hope for cancer patients and spark to the field of Immuno-therapy.Immunotherapy is a type of cancer treatment that boosts the body's natural defenses to fight cancer. It uses substances made by the body or in a laboratory to improve how our immune system works to find and destroy cancer cells. Cancer relies on a bag of tricks that can render it virtually invisible to the body's diseasefighting apparatus. Tumors even co-opt "checkpoint" proteins found on the immune system's T cells. These proteins normally prevent the immune system from running amok. When activated, these checkpoints can turn a T cell from a bristling warrior ready for a fight into a dozing sentinel — and cancer takes full advantage. Two best-understood checkpoint proteins are called PD-1 and CTLA-4. These T cell proteins are known as receptors. Other proteins called ligands fit precisely into receptors to activate them, instructing the T cell to nod off. It's no accident that this happens at a tumor's doorstep: Cancer can produce such ligands and induces immune cells to do the same. Stopping this ligand-receptor interaction, the drugs like Nivolumab,Pembrolizumab and Ipilimumab sabotage the checkpoint and awaken the killer T cells, which then identify cancerous cells and attack them. The veil is lifted.The new approach "releases the parking brake" on T cells that have reached a tumor only to turn quiescent.

FT 19

"In vitro and In silico Approach to reduce the teratogenic effect of Propylthiouracil"

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Thyroid hormones triidothyrenine and thyroxin are essential for the growth and development of the brain for the fetus and neonate. Hyperthyroidism is the clinical syndrome caused by an excess of circulating free thyroxine, free thyriodothyronine or both. Anti-thyroid drugs (ATDs) like propylthiouracil (PTU) is used for the treatment of hyperthyroidism.In pregnancy, hyperthyroidism must be treated to avoid maternal and fetal complications and ATDs are its treatment. PTU has adverse teratogenic effect and so we modified PTU by both in silico and in vitro approach to reduce its teratogenic effect, which was done by incorporating copper and then checking its effect on chick embryo. Structurally PTU you was modified by dissolving it into copper sulphate solution that is Cu-PTU. Using in vitro study, binding of modified and standard PTU to serum albumin were tested using UV spectroscopy. In in silico study CU PTU showed higher binding affinity than standard PTU with enzyme thyroid peroxidase and serum albumins.For the teratogenic study, as drugs were taken in higher concentration the growth of embryo was not established. Thus we proved that modification of drugs is useful way to reduce the teratogenic effect.

FT 20

In vitro cytotoxic analysis of *Adhatoda vasica* using *Artemia salina* and *Saccharomyces cerevisiae*

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The ancient civilizations have made use of plants for medicinal and therapeutic benefits, as described by the manuscripts of the Ancient Unani, Egyptian papyrus, and the Chinese. Multiple cultures across the world have carried out healing rituals using these medicinal plants. A plant that produces compounds (phytochemicals) that induces a therapeutic response or can be used as the precursory substance to produce drugs for medical treatment in known as a medicinal herb. *Adhatoda vasica* (also known as the Malabar-nut leaf) from the Acanthaceae family, belongs to the class of evergreen shrubs and is endemic to several regions of India and some select parts of the world. It is a well-known medicinal shrub among the Unani and Ayurvedic traditional practices of medicine. Several parts of the plant such as the leaves, bark, root, and flowers for treating respiratory distress, tuberculosis, arthritis, high blood pressure, increasing the cell count, and also several microbial infections. This study is a compilation of the phytochemical analysis of *Adhatoda vasica*, along with a cytotoxicity study using the brine shrimp assays and yeast assays (*Saccharomyces cerevisiae*). Cytotoxic studies help to identify if a sample has any potent toxic compounds. The brine shrimp lethal assay revealed that the toxicity decreased in the sequence of methanol extract of the sample, petroleum extract of the sample, and the chloroform extract of the sample. In contrast yeast assays revealed the methanol extract to have the most toxicity, while the chloroform and petroleum extracts were most and least toxic respectively.

Keywords: *Adhatoda vasica*, Phytochemicals, Cytotoxic studies, Brine shrimp lethal assay, yeast cytotoxic assay

FT 21

Dynamics of Vaginal Microbiota during Estrous Cycle in Cows through Metagenomic Approach

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The study aims to check vaginal microbiota diversity throughout stages of the estrous cycle, with a focus on hormonal changes and in order to identify lactic acid bacteria. This study will aid in the identification of probiotic-capable microorganisms that could be utilized to treat nonspecific uterine infections in cattle, as well as provide a broader perspective on how to reduce antibiotics in milk for human consumption. Total sixteen cows were synchronized with a double PG regime. Vaginal samples for metagenomics and blood samples for hormonal analysis were collected during four different phases (estrus, metestrus, diestrus, and diestrus) of the estrous cycle. Using 16s rRNA sequencing of the V3-V4 hypervariable region metabiota of the eight cows were evaluated. The study's findings revealed that the diestrus phase has a different diversity than the other three estrous cycle phases, implying that hormones affect bacterial diversity. Proteobacteria and Firmicutes are the most abundant phyla at the phylum level, accounting for 94 % of bacterial diversity. All statistically significant genera are high at diestrus stages. The luteal phase had higher levels of Micrococcus, Stenotrophomonas, UGC010, Massilia, and Methylobacillus than the follicular phase, but, no substantial difference between the two phases. Interestingly, the luteal stage was found to have more lactic acid bacteria than the follicular stage. This study represents an important step towards the understanding of microbial diversity within different stages of the estrous cycle of cow and revealed a high diversity of microbiota during diestrus the phase of the estrous cycle.

Keywords: Vaginal Microbiota, Estrous Cycle, Cows, Metagenomic, Probiotics.

FT 22

Whole Genome Analysis of *Lactobacillus plantarum* GBRC and *Pediococcus pentosaceus GBRC* Strains Isolated from cattle's uterus and Determination of Probiotic Properties to Treat Uterine infection in bovines

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Lactiplantibacillus plantarum GBRC and *Pediococcus pentosaceus GBRC* Probiotic strains isolated from bovine's uterine swab samples has putative probiotic properties. To determine the molecular basis underlying the probiotic potentials of these two bacteria and gene involved in the same complete genome sequence analysis were performed. *Lactiplantibacillus plantarum GBRC* and *Pediococcus pentosaceus GBRC* found to contain single circular chromosome of 3204217 bp and 1797848 bp respectively, From these two bacteria genes known to confer probiotic characteristics identified including genes related to stress adaption, biosynthesis, metabolism, transport of amino acids, secretion, biosynthesis of secondary metabolites, defence machinery, and percentage of genome involved in the horizontal gene transfer studied. Where *Lactiplantibacillus plantarum GBRC* showed 9% and *Pediococcus pentosaceus GBRC* showed 3% of total genome involved in the horizontal gene transfer, where truncated Beta lactamase gene found to be present in the *Lactiplantibacillus plantarum GBRC* , however no antimicrobial resistance gene found in the *Pediococcus pentosaceus GBRC*. The optimum growth was observed at 37 ± 2 ˚C for both probiotic candidates. There are no virulence factors found for these bacteria except for enolase which is found to be present in the both bacteria. Based on the phenotypic and genetic differences with phylogenetic relatives, both strains GBRC is proposed to represent a new probiotic bacteria having name as *Lactiplantibacillus plantarum GBRC* and *Pediococcus pentosaceus GBRC* , can be a potential probiotic for treating metritis and endometritis in bovine health, Antimicrobial genes in infections in bovines can be stopped using this approach, which is indeed antibiotic-free. In the present study the whole genome sequence analysis of the two probiotic serve as key reference point for investigation for of potential probiotic to treat uterine infections in bovines.

Keywords: Uterine infections, Probiotic, Antimicrobial resistance, Endometritis and Metritis.

FT 24

Polymorphic Gene Study on Gut- Liver Axis and Therapeutic Effects of Aged Garlic Extract On It

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Inadequate diet such as high fat diet and ethanol consumption in excess are leading cause of morbidity and mortality worldwide. Alarmingly it is associated to more than 60 different medical conditions. Environmental factors along with genetic makeup changes liver condition from fatty liver, hepatitis, fibrosis, cirrhosis and then to hepatocellular carcinoma. Genetic factors have prominent role in liver diseases. The complexity of disease's trait depends on host susceptibility to polygenetic background and on different organs involved. PNPLA3, a polymorphic gene is responsible for excessive triglyceride production. Along with liver PNPLA3 is also expressed by organs such brain, gut and adipose tissue. Thus studying the role of PNPLA3 activity along with gut-liver-adipose axis may contribute to understand and limit its systemic effects. In absence of FDA approved drug for liver diseases, in present study we will be focusing on preventive effects of prebiotic and mediated modification on molecular signaling pathways involved in both *in vitro* and *in vivo* model using HepG2, and CaCo2 cell lines and on Wistar rat model respectively.

FT 26

Structural charcaterization of phycoerythrin from marine cyanobacterium *Halomicronema*

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Phycoerythrin (PE) is green light absorbing photosynthetic pigment, assists in efficient light harvesting in cyanobacteria and red-algae. PE structures from cyanobacteria are not well explored. In the present study, PE from marine cyanobacteria *Halomicronema* sp. R31DM is explored for structural charcaterization by x-ray crystallography. The crystal data is resolved with atomic resolution of 2.21 Å with reasonable R-factor of 0.16% (0.21%). The five chromophores of PE, phycoerythrobilin (PEB) are studied for their relative position in hexamer structure and their interaction with the surrounding microenvironment. The energy transfer mechanism in hexamer structure has been predicted based on the deviation angle and the position of the chromophores. Further, the amino acid sequences of present PE analysed with the other reported PEs. The present structure would provide the role model to understand the structural organization of PE enabling the light harvesting in cyanobacteria.

PS 27

Melatonin and Vitamin C Protects 2,4-Dichlorophenoxyacetic Acid Induced Alteration of Vital Energy, Lipid and Phosphorus Metabolites in Kidney of Mice

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The chlorophenoxy herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) is registered for a range of agricultural and residential uses focused on control of post-emergent broadleaf weeds. Melatonin is a synthetic product of the vertebrate pineal gland, whereas vitamin C (Ascorbic acid) is a naturally occurring organic compound, and both work as antioxidants via direct free radical scavenging activity. Protective effects of melatonin (10 mg/kg body weight) and vitamin C (500 mg/kg body weight) against 2,4-D (low, mid and high dose-16.5, 33.0 and 66.0 mg/kg body weight) induced alteration of vital energy, lipid and phosphorus metabolites in kidney of adult albino male mice of Swiss strain were evaluated in the present study. Mice were assigned into eleven groups with six mice in each group. The parameters evaluated in the present study were succinate dehydrogenase (SDH), glycogen, adenosine triphosphatase (ATPase), total thiol (-SH) groups, total lipid, cholesterol, phosphorylase, acid phosphatase (ACP), alkaline phosphatase (ALP), DNA and RNA. Dose-dependent alterations were noticed due to the herbicide treatment in all parameters. The values of altered biochemical parameters were comparable to control when melatonin and vitamin C were given alone and in combination with 2,4-D. The study demonstrated mitigative potential of melatonin and vitamin C against 2,4-D induced biochemical impairment in the kidney of mice. Combined treatment of these two antidotes showed more significant mitigation as compared to alone administration.

Keywords: 2,4-Dichlorophenoxyacetic acid, kidney, melatonin, mice, mitigation, vitamin C

PS 28

Designing multi-epitope vaccine against enteric pathogen *Salmonella typhimurium*

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Enteric pathogens are a major cause of mortality in developing countries. Development of vaccines can be a huge help against pathogens like *shigella* and *salmonella.* There are some major drawbacks to the use of traditional vaccines like requirement of cold storage, use of needles and requirement of trained professionals for the administration of vaccines. These can be avoided by developing live oral vaccines. Outer Membrane Proteins (Omps) are reported to be immunogenic and can be good potential candidates for vaccine development. They are also highly conserved among different strains and species and thus might be able to show cross protectivity when used in vaccines. Here we have shown a computational approach for designing a multi epitope vaccine against *S. typhimurium* by using epitopes from 5 different Omp; OmpA, OmpC, OmpF, OmpW and OmpS. We have constructed 4 different multi epitope vaccine models using different B cell and T cell epitopes. These models will be verified in future by in vitro experiments.

PS 29

Endocrine disruptor and Polycystic Ovary Syndrome (PCOS): Assessment of serum Bisphenol A (BPA) level in PCOS Women

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Polycystic ovary syndrome (PCOS) is the most common endocrinopathy in women of reproductive age. Yet, due to the numerous different phenotypes, its aetiology remains unclear. Endocrine disruptors, which could interfere with hormone-sensitivity systems, have been hypothesised as a cause of polycystic ovarian syndrome (PCOS). The purpose of this research was to consider at the levels of bisphenol A (BPA) in women with PCOS. 15 women with PCOS and 10 healthy controls, age 14-40 years were enrolled in the study. The modified Rotterdam criteria were used to diagnose PCOS. Serum BPA levels were measured using highperformance liquid chromatography. Women with PCOS had markedly increased BPA levels (0.67 ng/ml ± 0.60) when compared with the control group (0.25 ng/ml ± 0.20) (p = .016). In women with PCOS, BPA was significantly correlated with polycystic morphology on ultrasound but not with obesity androgen levels, or other metabolic parameters. Specific endocrine disruptors, such as BPA, may alter neuroendocrine, reproductive, and metabolic control in women, favouring PCOS development.

Keywords: Polycystic ovary syndrome, Endocrine disruptors, Bisphenol A, High performance liquid chromatography

PS 30

Influence of - 21A/T Catalase Promoter Polymorphism On Type 2 Diabetic Population with Retinopathy In The Western India

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Type 2 diabetes mellitus (T2DM) is the greatest burden globally because of rapid increase in number of diabetic population. T2DM is associated with several other anomalies including diabetes retinopathy (DR). In present study we have evaluated SNP in catalase gene promoter region in West Indian population and its effect on expression of catalase.100 subjects each of non-diabetic, T2DM and T2DM + DR were included in the study. Blood catalase activity was determined by spectrophotometric assay. -21 A/T SNP was determined by PCR followed by RFLP. Determination of transcription factor (TFs) binding sites done by Transfec software and promoter activity by mutagenesis analysis. Out of 100 subjects with T2DM, -21 A/T SNP detected in 9 subjects while 18 subjects in T2DM + DR. Catalase activity in T2DM subjects was 61%, 33% in T2DM + DR and 75% in control. Transfec analysis suggested alteration in binding of TFs due to polymorphism. Mutagenesis studies revealed that SNP leads to 25% decrease in activity of promoter. Catalase activity is reduced in subjects of T2DM and T2DM + DR. Alteration in catalase activity in T2DM and T2DM + DR subjects may be due to SNP -21A/T.

PS 31

Prevalence of *Mycobacterium bovis* in Tertiary Care Hospital, Anand District

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Tuberculosis is a contagious and infectious disease of which is caused by mycobacteria and one third of the world's population is infected. *M.tuberculosis* and *M.bovis* infect both animals and humans. *M.bovis* is the causative agent of Bovine tuberculosis that causes zoonotic tuberculosis in humans, which is acquired from domestic animals and their products, in which cattle are the major reservoir. Therefore, identification of this species is important for epidemiological and management purpose. The present study is to identify mycobacteria isolated from sputum of known TB patients by conventional methods and further by PCR to detect prevalence of *M.bovis*. Sputum samples were collected from a total of 1000 clinically suspected TB patients enrolled in Shree Krishna hospital. All samples were subjected to ZN staining and 100 sputum samples were found AFB positive. These isolates were subjected to PCR by using specific primer targeted hupB gene (histone like protein) to differentiate *M.tuberculosis* and *M.bovis*. The present study shows 4% prevalence of*M.bovis* and 6% to be positive for *M.tuberculosis* and *M.bovis*.

Keywords: ZN staining, PCR, M. bovis, M. tuberculosis, hupB gene

PS 32

Detection of chromosomal abnormalities in recurrent pregnancy loss (RPL) with fetal congenital heart disease (CHD)

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Fetal congenital heart disease (CHD) affects 0.8% to 1.2% of live births. Several studies have found an association between chromosomal abnormalities with CHD cause to fetal loss. Chromosomal abnormalities is reported approximately 18-20% in CDH, most being T21 (52.8%), T18 (12.8%) and 22q11 deletion (12.2%). The rate of chromosomal abnormalities in miscarriages account of 50-60% in RPL. The objective was to detect chromosomal abnormalities by FISH and aCGH in RPL with CHD. We investigated 125 samples of POC with CHD diagnosed by ultrasound. According to ultrasound, 50 samples were detected with single, 30 with multiple, and 45 with complex cardiac defects. Normal results were found in 104 (83%) and abnormalities in 21 samples (17%). The prevalence of chromosomal abnormalities significantly higher in POC with complex cardiac defects (26%). We conclude that association of chromosomal abnormalities with complex cardiac defects are frequent in fetuses as they often lead to RPL.

PS 33

In-depth analysis of *Paraclostridium bifermentans* GBRC isolated from uterine deep tissues of *Bubalus bubalis*

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Chronic non-specific contamination of reproductive tract is a major issue during early postpartum, natural coitus or artificial insemination. Uterine infection is one of the major concerns reducing fertility, production loss and early culling of the animals. Therefore, the aim of this study was to identify any novel bacterium, if present in deep tissue of the uterine environment of *Bubalus bubalis* causing infections. A strictly anaerobic bacterial strain designated as GBRC was isolated from deep tissue of the *Bubalus bubalis'*s uterus. Bacterial strain was found to be Gram positive motile rod. The optimum growth was observed at 40 ± 2 ˚C. The G+C content of the DNA was 28.1%. Pathogenic features like hemolysis, gelatin hydrolysis and production of volatile sulfur compounds exhibited by strain GBRC were analogous to those observed in the epithelial layer invading pathogenic strains. Furthermore, the whole genome sequence analysis confirmed the presence of genes encoding virulence factors and provided genomic insights on adaptation of the strain in uterine environment. Based on the phenotypic and genetic differences with phylogenetic relatives, strain GBRC is proposed to represent a new species of the genus *Paraclostridium* with potential pathogenic character, for which the name *Paraclostridium bifermentans* sp. is suggested. In the present study the whole genome sequence analysis of the strain GBRC serve as key reference point for investigation ~~for~~ of potential pathogenic strain that causes endometritis in bovine.

Keywords: *Paraclostridium bifermentans* GBRC, uterine infection, endometritis, virulence, *Bubalus bubalis*

PS 34

The Matricellular Protein Mindin Differentially Modulates Fibroblast Subpopulations in Dermal Fibrosis

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Fibroblast activation is a key cellular process in normal physiology such as for proper wound-healing, and in fibrotic conditions besides the tumour stroma. However, "activation" is an umbrella term that includes proliferation, migration, contraction, pro-inflammatory cytokine production and excessive collagen secretion. This raises an interesting question of whether the same fibroblast performs all these or are there subpopulations of fibroblasts performing specific functions. To understand this, we use a Snail transgenic (Snail Tg) mouse model of dermal fibrosis. Using this model, we have identified a protein exclusively secreted in Snail Tg skin, mindin which has multiple effects on different fibroblast subpopulations. Our data indicate that mindin specifically increases inflammatory cytokine expression and migration of the reticular subpopulation of fibroblasts. On the other hand, the papillary fibroblast contract in response to mindin and adopt features of cancer-associated fibroblasts(CAF). Overall this work would lead to a better mechanistic understanding of fibroblast heterogeneity and its role in wound healing and fibrosis. Fibrosis affects nearly every tissue in the body and contributes to 30% of deaths worldwide. Despite this enormous public health burden, there are currently no effective drugs to combat fibrosis, and the discovery of these new pathways offer novel routes for therapeutic intervention.

PS 35

Altered antioxidant status of Hydrogen peroxide induced Human Retinal Pigment Epithelial Cells

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The purpose of the present study is to understand the molecular alteration under oxidative stress conditions on the human retinal pigment epithelial cells (ARPE-19) and further, it is also to determine the antioxidant status of treated ARPE-19 cells. A human retinal cell line, ARPE-19 cells were grown *in vitro* and evaluated the effects of hydrogen peroxide-induced changes at morphological, protein, and mRNA level by using respective methods. Further, we also evaluate the level of antioxidant enzymes to decipher the severity of oxidative stress conditions. In the present study, we obtained results that higher oxidative stress in RPECs leads to its dysfunction. As the concentration of H2O2 increases, cell viability of ARPE-19 cells decreases, and further its effects can also be visible at different levels such as at morphology, antioxidant enzymes, protein, and mRNA expression of ARPE-19 cells. the toxic level of hydrogen peroxide altered the cellular morphology and also the antioxidants levels are highly suppressed however some antioxidants showed a different level of expression.

Keywords: Hydrogen peroxide, oxidative stress, retinal pigment epithelial cells, reactive oxygen species, superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, reduced glutathione, lipid peroxidation

PS 36

Synthesis, characterization and evaluation of curcumin nanoformulation for its in vitro anticancer activity on HCT-116 cell line

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Curcumin has low pharmacokinetics values due to its poor aqueous solubility and absorption but still it is one of the ancient therapeutic agents used for anticancer activity, antimicrobial activity, antioxidant activity, anti-inflammatory activity etc. If we increase its bioavailability and therapeutic efficacy, then this potential natural component can be used as complementary or alternative of current allopathic treatments. So, the aim of this study is to increase the solubility and hence bioavailability by synthesis of curcumin nanoformulation using D-α-tocopheryl polyethylene glycol succinate (TPGS) and evaluated for its anticancer activity. Curcumin nanoformulation was synthesized by solvent-evaporation method and characterized by dynamic light scattering, zeta potential, scanning electron microscopy and X-ray diffraction methods. The water solubility was assessed visibly and *in vitro* release profile by spectroscopic analysis. *In vitro* anticancer activity of nanoformulation was examined using MTT assay. It was found to have smaller particle size, significant stability, water solubility and improved anticancer activity than curcumin.

PS 38

Assessment of biofilm formation and effect of temperature and pH in clinical isolates of *Acinetobacter baumannii* isolated from a tertiary care hospital

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Acinetobacter baumannii, initially thought to be a low grade pathogen, has undeniably emerged as a successful pathogen, posing a serious threat to human health by causing significant morbidity and mortality. According to WHO, *Acinetobacter baumannii* is the number one critical pathogen for which a new antibiotic must be discovered immediately. It is frequently associated to healthcare-associated infections, causing bacteraemia, meningitis, urinary tract infections, wound infections, and lung infections, all of which can lead to serious complications. Objective: The primary objective of our study was to collect clinical samples from various sources in a tertiary care hospital and characterize them using biochemical methods, while the secondary objective was to study the effect of biofilm formation in different media with varying physiological factors like temperature and pH. Ten *Acinetobacter baumannii* isolates from different sources like blood, urine, sputum, endotracheal tube was collected from tertiary care hospital. General morphological characterization like Gram staining, growth on specific media and biochemical characterization was carried out for each sample to confirm the organism. The biofilm studies was carried out by Congo red agar method and Microtitre plate-crystal violet (MTP-CV) assay in different media like Trypticase soya broth (TSB), Luria Bertani broth (LB) and with Minimal media supplemented with glucose and citrate. Results: The biofilm formation profile was higher in TSB media, 60% of the isolates showed strong biofilm activity, while in LB media 30% of the isolates showed strong biofilm forming activity, 40% of the isolates showed strong biofilm activity in minimal media, minimal media with glucose and minimal media with citrate. All the isolates showed favorable growth in pH range from 7-9 and the favorable temperature for growth was in the range 250C -450C. Conclusion: The study inferred that the isolates biofilm formation was more prolific in TSB media and the favorable temperature for growth of the organism is between 250C-450 C in the pH range 7-9.

PS 39

Screening of formulated multicomponent tablets of Indian orchid stem bark aqueous extract in streptozotocin induced diabetic Wistar rats

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Plant materials of many species of medicinal plants are used in the treatment of diabetes. Indigenous people are known to widely use the crude extracts of many plants. The present study was aimed to formulate and evaluate the herbal tablets consisting of aqueous extracts of *Bauhinia variegata* stem bark in streptozotocin induced diabetic Wistar rats. This work was undertaken to formulate aqueous extract of *Bauhinia variegata* into tablets and evaluate its antidiabetic activity. The extract was formulated and antidiabetic effect was observed on streptozotocin induced diabetic rats. HPLC and GC-MS analysis revealed that *Bauhinia variegata* aqueous extract has kaempferol, lupeol and beta sitosterol. Docking study revealed Kaempferol acts on aldose reductase, lupeol on glycogen synthase kinase-3-β-protein and beta sitosterol on dipeptidyl peptidase IV. The aqueous extract was formulated using Avicel PH101, Lactose 200M, Povidone k 30, Mag Stearate and Sodium starch glycolate. Quality testing was done of tablets using standard parameters. Antidiabetic activity of aqueous extract and formulated extract evaluated on diabetic Wistar rats was almost same. *Bauhinia variegata* formulated aqueous extract in tablets form can be explored for its potential as commercial drug for introduction in market after clinical trials on humans. It is a promising antidiabetic drug which can be used as supplementary or alternative drug in holistic diabetes management.

Keywords: Diabetes, *Bauhinia variegata*, kaempferol, lupeol, beta sitosterol

PS 40

Avian chorioallantoic membrane assay: alternative animal model to study ocular malignancies

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The key aim of this research is the use of avian chorioallantoic membrane (CAM) assay to monitor the tumor growth and invasion of patient-derived xenograft (PDX) of Retinoblastoma (RB). RB is the most widespread intraocular tumor among children. Extensive efforts have been made to study the metastatic potential of RB. This is primarily done using matrigel invasion assay. However, it is considerably attributed to variability and does not layout true environment of a basement membrane for tumor development. Moreover, PDX used in this study provides a more authentic representation of tumors compared to cell lines. To carry out research, fertilized chicken eggs were procured, windowed and their CAM layers were dropped. On embryonic development day (EDD) 10, freshly chopped PDX of RB was implanted on CAM layer and the setup was incubated for 7 days. H/E of RB-CAM graft revealed its invasion to CAM mesoderm. Further, its aggressiveness is indicated by synaptophysin and Ki-67 immunopositivity. Significant changes were also observed in the vascularity around tumor indicating angiogenic environment. Moreover, the resemblance of CAM assay to the patient tumor microenvironment, with use of patient-derived tumors, makes it a potential model to develop personalized medicine for the patients suffering from Retinoblastoma.

Keywords- Chicken chorioallantoic membrane, Retinoblastoma, Patient-derived xenograft, tumor development, alternative model

PS 41

TNF-α: Major culprit for Cancer and Cardiovascular Diseases

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TNF (Tumor Necrosis Factor)-α is a protein composed of 185 amino acids. Majorly it is produced by Monocytes, Fibroblasts and Endothelial cells. It acts by binding with two receptors- TNFR-1 and TNFR-2, although it has 5 times higher affinity for TNFR-2 as compared to TNFR-1. It is a crucial regulator of many components of the immune response, promotes macrophage cytokine production, and kills tumour cells. On the one hand, this protein confers resistance to certain types of infections, while on the other side, it causes clinical consequences. TNF-α is involved in both inflammatory and non-inflammatory diseases. It is an acute phase protein that causes a cascade of cytokines to be released and increases vascular permeability, attracting macrophages and neutrophils to an infection site. Disorders that involve TNF-α as a cause for inflammation are Cancer, Rheumatoid Arthritis, Pulmonary disorders and Heart disorders. Based on literature review, ten herbal plants were selected, screened and docked against TNF-α by using Auto Dock vina for evaluating the binding score.

PS 42

Isolation and fabrication of NPCs derived from HUCB for the treatment of Parkinson's disease

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Umbilical cord and placenta, once considered medical waste are emerged to be a valuable source of stem cells. The cord blood stem cells show the potential to treat the fatal disease such as leukemia, cardiac attacks and debilitating disease including Alzheimer's and Parkinson's. Cord blood stem cells are also widely used in therapies such as blood disorders, bone and tissue engineering, dermatology etc. Isolated NPCs are able to proliferate in response to basic fibroblast growth factor and when the culture conditions are altered means addition of BDNF and NT-3, they differentiate into several phenotypes of neurons. Fabricated PCL with 10% sucrose and 10% PEG 4000 scaffold shown good proliferation rate up to 14 days while PCL with 5% sucrose shown to promote good cells attachment and survival rate more than 21 days this may be due to pore size & pore number. Intravenously transplanted NPCs can enter the mice brain with Parkinson disease, survive, migrate and improve functional recovery. Transplantation of human NPCs can be used to restore neurological deficits in experimental Parkinson disease.

Keywords: Stem cells, Parkinson's disease, Neuronal Progenital Cells (NPCs), Polycaprolactone (PCL) scaffold, human umbilical cord blood (HUCB)

PS 44

A PROGNOSTIC SIGNIFICANCE OF P53 OVEREXPRESSION IN ORAL SQUAMOUS CELL CARCINOMA

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Mutation of the p53 gene is one of the most common events in oral carcinogenesis. Immunohistochemical over expression of p53 gene is considered as a marker of poor prognosis in many human cancers. The present study aimed to evaluate a role of p53 overexpression in the prognosis of oral squamous cell carcinoma. It is a prospective cross sectional study that included total 30 oral biopsy samples diagnosed for oral squamous cell carcinoma and processed to analyse p53 over expression by immunohistochemical staining. Out of 30 biopsy samples, 17 cases (56.66%) were found positive for p53 over expression whereas 13 cases (43.33%) found negative. On the basis of intensity of p53 overexpression; 13 cases (43.33%) revealed strong nuclear positivity, 03 cases (10.01%) revealed weak nuclear positivity and 01 case (03.33%) showed moderate nuclear positivity. 23 cases (76.67%) were from well differentiated squamous cell carcinoma whereas 07 cases (23.33%) were from moderately differentiated squamous cell carcinoma. Hence, the results showed significant association of p53 expression with malignant transformation of oral mucosa. The p53 over expression is useful prognostic biomarker in oral squamous cell carcinoma and therefore more large scale studies are needed to evaluate its prognostic significance in the loco-regional population.

PS 45

Development of fluconazole gel containing green synthesized silver nanoparticle for the treatment of recurrence Candidiasis

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The present study includes the green synthesis of Silver Nanoparticles (AgNPs) form Datura matel leaves, which are extensively studied for its potential antimicrobial activity. The synthesized silver nanoparticles where characterized by UV, FTIR, SEM. The particle size was found to be 180 nm with the practical yield of 86%. Method was develop and validated of synthesized silver nanoparticle by UV vis where. To overcome the infection occurs by resistance Candidiasis, the unique combination of Fluconazole and silver nanoparticle is used and formulated into gel. Selection of dose of Fluconazole and silver nanoparticle was by Minimum Inhibitory Concentration (MIC) on resistant Candida albicans. The gel was formulated by using Carbopol 974P in various concentration. The formulated optimized gel was further characterize by drug content, texture analysis, viscosity, pH , stability study, diffusion study and in-vitro antifungal activity. The prepared gel formulation was studied for antifungal activity against resistance Candida albicans and zone of inhibition was found to be 29mm which was higher as compare to marketed formulation contain only Fluconazole and silver nanoparticles (21 mm and 19 mm respectively). Overall research revealed that prepared formulation is eco-friendly and scalable. Furthermore, first time we are reporting UV method for determination of Fluconazole and silver nanoparticles in combination which was found to be simple, lab scale, accurate, precise and sensitive method which has been developed and validated as per ICH guideline.

PS 46

SALIVA BASED NON-INVASIVE SCREENING OF ORAL SUBMUCOUS FIBROSIS USING ATR-FTIR SPECTROSCOPY

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Oral Submucous Fibrosis (OSMF) is a type of precancerous condition of Oral cancer and considered to have the greatest malignant potential. Biopsy is an ultimate option for the conformation of the malignancy. But the invasiveness of the procedure makes it interdict. Therefore, there is an urgent need to identify effective screening and diagnostic methods which would be less invasive, rapid, more accurate and cost effective. Here, we used Attenuated Total Reflection- Fourier transform infrared spectroscopy (ATR-FTIR) with Chemometric analysis coupled with estimation of total salivary protein to discriminate OSMF and Healthy Control (HC). The present study showed the specific Infrared spectrum for OSMF patients, which was specifically differentiated from HC based on the spectral shift of proteins/amide II, carbohydrate and nucleic acid using Principal Component Analysis (PCA) and Hierarchical Clustering Analysis (HCA) with small data sets. ATR-FTIR spectroscopy of saliva coupled with total protein estimation can be used to discriminate between OSMF and HC. However, large sample size should be needed to evaluate the ATR-FTIR for consideration as a screening tool for an early diagnosis OSMF.

PS 47

Mitochondrial dysfunction from a novel mechanism in fungi, affecting drug response

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The limited arsenal of antifungals is rendered ineffective, due to emerging drug resistance in fungal pathogens, including *Candida albicans*. One primary mechanism contributing to drug resistance in *Candida albicans*. is overexpression of plasma membrane pumps (Cdr1p and Mdr1p), which expel the drug out of the cell. It is earlier studied that membrane pumps are sensitive to plasma membrane lipid composition, including sterol and sphingolipids. In this study, an attempt is made to understand the role of phospholipids on Cdr1p (drug exporter)-mediated drug resistance in yeast, the phospholipids biosynthesis genes PSD1, PSD2, CHO2, and OPI3 were deleted in a strain of *Saccharomyces cerevisiae* already overexpressing Cdr1-GFP of *C. albicans* as a heterologous system. The effect of phospholipids biosynthesis gene deletion was analysed on Cdr1p-GFP-mediated drug resistance as well as its localization. The results indicate that phospholipids biosynthesis disruption makes the cell sensitive to several drugs including fluconazole (FLC), with Δpsd1/Cdr1-GFP being worst affected. Interestingly, unlike sterols and sphingolipids, the localization of Cdr1p was unaffected by phospholipid biosynthesis gene disruption. Concomitantly, phospholipids mutants also showed an increase in reactive oxygen species (ROS) generation, as verified by fluorescence probe 2',7'-dichlorodihydrofluorescein diacetate (DCFH-DA) method. In addition, the sensitivity of phospholipid mutants with FLC was found to be synergistic to ROS generation, resulting in further reduction of growth. Thus, this study proposes phospholipid biosynthesis as a novel target for antifungal therapy.

PS 48

Expression of selected biomarker candidate genes to confer in vitro maturation in Indian buffaloes

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In Vitro maturation (IVM) of oocyte is one of the crucial step and it directly relates with better Embryo production in buffaloes. Therefore, the study was planned to study selected gene expression of GDF9, HAS2, SPRY1, ARHGAP22, COL18A1, and GPC4 in IVM and immature Cumulus Oocyte Complexes (COCs). The COCs were recovered from follicles of slaughter origin ovaries of native buffaloes. CoCs were observed under stereo zoom microscope and categorized in four grades according to morphology. Out of four grades, first three grade COCs were considered and randomly allotted in two groups; immature treatment group (n= 263) and IVM treatment group (n= 272). IVM of COCs was carried out under 100 µl drops of BO-IVM media overlaying embryo tested oil in 35 mm petri-dish under 5 % CO2 at 39.0 °C incubator for 24 hours. Cumulus of COCs of both groups were removed by treating with 0.25% trypsin and oocytes were stored in RNALater for future use. The expression of genes was evaluated using qPCR and the relative expression of each gene was calculated using the ΔΔCt method with efficiency correction. The logarithmic transformation of fold change (log2FC) of each candidate genes in the IVM group was computed against the IMT group based on the observed Ct values. Appropriate standard deviation was also depicted based on the observed deviations among the triplicates. The expression obtained for IVM treatment group of earlier reported up-regulated genes (GDF9, HAS2, SPRY1) was higher (upto 10x fold) compared to the immature treatment group (reference group). In present study, relatively lower expression was observed of the rest of the three candidate genes (ARHGAP22 , COL18A1, GPC4) in the bovine transcripts of oocyte which were earlier also reported as down regulated.

PS 49

Prospecting for Potentially Probiotic Lactic Acid Bacteria Isolated from Reproductive Tract of Cows Prospective Partners in Bovine Endometritis Bacteriotherapy

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In Veterinary practice postpartum metritis and endometritis is chronic problem. Many protocol consisting of antibiotics, hormones and NSAIDs were tested. Today's world probiotic gives promising results for gastric problems. Similarly, it is hypothesized that probiotics has potential to resolve non-specific uterine infections like metritis or endometritis. Hence aim of the study was to evaluate in vitro efficiency of probiotics properties against hydrophobicity, **Methods and Results:** Vaginal **s**wab samples were collected from thirty-four cow heifers forthis experiment. collected samples were shipped to the laboratory and MRS and M17 agarmediums were used to isolate LABs. Total 300 isolates were screened on the basis of Colony morphology for LABs. These isolates were sub culture and used for LAB isolation. Using Gram's reaction and catalase test primary screening of LABs. Total two LABs of the Lactobacillaceae family were isolated and tested against standard commercially available proven probiotic strain *Lactobacillus rhamnosus.* In vitro tests for probiotic are – Adhesion to solvent to check hydrophobicity, Antimicrobial activity against pathogenic microorganisms, Cells adhesion assay to reduce pathogen adhesion to surfaces, Antibiotic susceptibility of isolates. The taxonomic identification of the selected strains was carried out by 16s rRNA sequencing. **Conclusions:** Bovine vaginal lactobacilli strains have differential surface properties. The strains selected are capable of inhibiting specific metritis pathogens. **Significance and Impact of the Study:** Our results can be applied for future studies to design a probiotic product to prevent metritis in dairy postpartum cow.

PS 51

"MICROWAVE ASSISTATED SYNTHESIS CHARACTERIZATION AND ANTI-CANCER STUDY OF XANTHENES SUBSTITUTED 1,2,3-TRIAZOLES VIA CLICK CHEMISTRY"

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A new synthetic approach to C-2 triazole-linked bioconjugates of Xanthene based on CuI - catalyzed 1,3-cycloaddition between alkynes and azides is described. The proposed strategy towards the synthesis of Xanthene substituted 1,2,3-triazole derivatives via click chemistry, The desired compounds were prepared using dimidone and aromatic aldehyde in the mild acidic condition to get α,β-unsaturated xanthane derivatives which further nucleophilic attack on propargylic bromide to get propargylic product and then react with aromatic azide to yield crude triazole based xanthane derivatives, which on further purification and characterization will be carried out. All the synthesized compounds were screening for in vitro anticancer activity.

Keywords: Xanthene, Triazole, Dimidone, Propargylic Bromide, Microwave, Click chemistry, Azide.

PS 55

To study the Effect of *Acorus calamus* L. Plant crude extract on the Lung carcinoma cell line (A549) using different assays

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Acorus calamus L. of *Acoraceae* family, commonly known as 'Sweet flag' is a well known drug in the traditional Indian and Chinese medicine system. In Indian aryuvedic system of medicine, the plant is used to treat fever, epilepsy, liver and renal problems. Hydromethanolic extract of *Acorus calamus* L. was prepared by cold maceration method and its phytochemical screening was performed. Extract of *A. calamus* L. showed the presence of phenolics, 275.51 ± 0.001 (mg/ml) Gallic acid equivalence. Antioxidant activities of *A. calamus* L. were close to ascorbic acid standard IC_{50} 16.32 ± 0.31 µg/Ml (DPPH assay) and IC_{50} 27.62 ± 1.53 µg/mL (ABTS assay). It also showed potential cytotoxicity against lung carcinoma cell line with IC_{50} 8.492 ± 2.02 (µg/ml). Different staining methods (DAPI, AO/EtBr, Giemsa) were employed to identify the primary mechanism of cytotoxicity. Hydromethanolic extract of *A. calamus* presents promising anticancerous properties, induction of apoptosis, metastasis inhibition.

THEME 2

ENVIRONMENTAL RESEARCH

FT 25

Optimization of extraction methods and partial characterization of bacterial carotenoid from the marine environment

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Carotenoids are one of the most diversified and widely distributed natural lipophilic pigments. Carotenoids have drawn a lot of interest due to their biotechnological applications and more significantly because of their potential application in human healthcare, food industries, cosmetics, and pharmaceuticals. Carotenoids have a wide range of applications, so it is important to optimize extraction methods to obtain the highest recovery. Various methods are available for the extraction of bacterial intracellular pigments. The present study emphasizes on optimization of extraction methods followed by partial characterization of the bacterial carotenoid. Various physical and chemical methods like Ultra sonication, Crushing, and solvent extraction were used for the extraction of intracellular carotenoids. Partial characterization of crude carotenoid was carried out by using UV-Visible spectrophotometer and Fourier Transform Infrared Spectroscopy (FTIR). Out of the various methods used, ultrasonication with Lysis buffer was found to be the most effective method for the extraction of intracellular bacterial carotenoids. The extracted carotenoid was dissolved in different solvents like methanol, ethanol, and DMSO and scanned in a Wavelength region of 200-400nm and gives different characteristics spectra in different solvents. The maximum solubility of the carotenoid was obtained in methanol. Methanolic extract of the carotenoid has characteristics spectra at 468, 496, and 528nm.

FT 27

Bioengineered organophosphate hydrolase enhances catalytic activity against the hazardous pesticides/ nerve simulants

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Organophosphates (OPs) are hazardous compounds (irreversibly binds with acetylcholinesterase, a neurotransmitter of the nervous system) widely used as pesticides in agriculture, flame retardant in the electrochemical-industry, and maintained as chemical-warfare agents (Sarin/Soman/Tabun/VX-compounds) by many nations. Extensively used, these compounds pose a severe threat to both human/environmental health. Finding an efficient remediation technique is a challenging task to remove these toxic compounds from the environment. The biocatalyst system emerged as a promising and attractive route for OP-decontamination. The soil-borne microbial enzymes have insufficient catalytic activity and single-substrate specificity; therefore, they cannot degrade multiple pesticides simultaneously. Here we bio-engineered promiscuous organophosphate hydrolase (rOPD) enzyme (*Arthrobacter* sp. HM01) by site-directed mutagenesis (targeting gate-kipper-residues; S265L). Results show a 909-fold improvement in catalytic activity towards malathion. An engineered enzyme (S265L) also improves substrate specificity towards other OP-pesticides like dimethoate/chlorpyrifos/methyl-parathion/glyphosate, with 450-fold, 412-fold, 343-fold, 245-fold, respectively. The mutant S265L efficiently degraded OP-pesticides simultaneously in a limited time course; degraded products were analyzed by TLC/HPLC/GC-MS and proposed pathways. This is the first bio-engineered enzyme from *Arthrobacter* sp. HM01 is capable of degrading multi pesticides, simultaneously. We concluded that the S265 variant of the rOPD enzyme could be promising candidates for in-situ bioremediation of OPs polluted environment (industrial-effluent).

Keywords: Organophosphate compounds, Site-directed mutagenesis, Protein modification, Environmental pollution, Bioremediation, Biodegradation,

FT 28

Evaluation of *Trametes versicolor* laccase in nanoemulsion Based organogel for bioremediation of bisphenol A

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Bisphenol A (BPA) is a chemical produced in large quantities for the production of polycarbonate plastics and epoxy resins. It is a known endocrine disrupting chemical (EDC) that imitate the biological activity of natural hormones, occupy the hormone receptors, or interfere with the body's hormonal system, and therefore causes various health-related issues in animals and humans. Bioremediation of Bisphenol A was attempted by *Trametes versicolor* laccase encapsulated in reverse micelles followed by nanoemulsion preparation and entrapment in calcium alginate using batch and continuous packed bed reactor. Biotransformation potential of the continuous packed bed reactor was maximum (94%) for 100 mg/l BPA concentration with 30 cm bed length at 15 ml/h feeding rate. The sequential decrease in retention time in every treated sample suggested biotransformation of BPA into other products and peaks obtained from HPLC analysis corresponding to transformed product of BPA. Two degradation products named BPA-O-catechol with m/z ratio 244.11 (100%), 245.11 (16.2%), 246.12 (1.2%) and 4,4 (Ethane 2-oxy 2-ol) diphenol with m/z ratio 212.08 (100.0%), 213.09 (15.1%), 214.09 (1.1%) were identified. The reduced log P value of the treated compound suggests higher affinity in an aqueous phase, so it is difficult for this molecule to cross the hydrophobic membrane and penetrate cells and thus their endocrine disrupting activity may reduce.

FT 29

Recovery of energy sources from non-biodegradable solid wastes

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Waste plastics (WP) have become a major environmental threat because of having no suitable disposal pathways. Coal Fly Ash (FA) and Kaolin Clay (KC) samples were modified with H_2SO_4. The mineralogical and microstructural characterization was carried out using XRD, FTIR, SEM, EDS, and BET. Waste low-density polyethylene (LDPE) and high-density polyethylene (HDPE) were degraded using a semi-batch reactor along with modified fly ash catalysts. The liquid products were analyzed using FTIR, nuclear magnetic resonance (^{1}H, ^{13}C, and DEPT-135), and gas chromatography–mass spectrometry (GC–MS). Experimental data showed that the acid treatment increased Si/Al ratios by removing impurities and dealumination. Both WPs were degraded at 400–450 °C., and the highest yield of liquid fuel product (about 87.24 wt%) was achieved for acid-treated KC at a polymer and catalyst ratio of 25 w/w. The NMR results accompanied by GC–MS data ensure that obtained fuels contain both aliphatic (saturated and unsaturated) and aromatic hydrocarbons. As this plastic-to-fuel technology is profitable and eco-friendly, it should be commercialized.

FT 30

A Comparative Assessment of Air Pollution Tolerance Index (APTI) of some plants of Bikaner, Rajasthan, India

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Air pollution is increasing at an alarming rate in the current world. We can mitigate it by implanting tolerant plant species. The present investigation was conducted to assess the air pollution tolerance index (APTI) of some roadside plant species in Bikaner, India. Selected plant species were ample and well distributed in the study area which was Khejri (*Prosopis cineraria*), Neem (*Azadiracta indica*), Babul (*Acacia nilotica*), Ber (*Ziziphus nummularia*), Aak (*Calotropis procera*), Peepal (*Ficus religiosa*), and Datura (*Datura stramonium*). APTI was assessed with the help of ascorbic acid, pH, relative water, and total chlorophyll. It was found that except *Datura stramonium*, all selected plant species were in the range of tolerant due to their high APTI. It was revealed that these plants might be performing some level of air cleaning and they can be grown on national highways to combat air pollution in arid ecosystems. Hence, air pollution can be combated with the help of APTI tool by identifying and selecting tolerant plant species in a particular area.

Keywords: Air quality, Biochemical parameters, Air Pollution Tolerance Index.

PS 79

Implications of religious wastes on prominent water bodies of Bhopal

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The religious activities are deeply rooted in India's religious heritage. During the festive season, thousands of idols of different deities are immersed in water bodies such as lakes and rivers. Idols are constructed by plaster of Paris, clay, cloths, small iron rods, bamboo and decorated with different synthetic dyes and paints such as varnish, water colours, etc. which can lead to a significant decline in the water quality after immersion and worsen the ecology of surrounding areas. The floating materials released through the idol in the river and lake after decomposition result in eutrophication, increase in acidity, and heavy metal concentration. The present study was carried out to assess the impact of religious activities on water quality by collecting and analysing the water samples from different immersion sites of Bhopal. The samplings were done before the immersion, during immersion, and after immersion, and several parameters like pH, Turbidity, TDS, Conductivity, and Dissolved Oxygen, were estimated. Most of the studies found significant changes in the water quality parameters during and after immersions. There are many alternatives available today that are non-polluting and biodegradable. Making a greener choice when selecting idols is one option for constructing alternative tanks for immersion.

Keywords: Health hazard, Heavy metal, TDS, Conductivity.

PS 80

Effect of climate change in Butterfly richness

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The present study was conducted between Jul- 2021 to Dec- 2021 at Baliyavad Dam and their adjacent areas, Junagadh, Gujarat. In this study, we observed that how climate change impacts butterflies' diversity. In the sense of climatic changes, the butterflies were more observed during the summer/dry season and monsoon/ pre-monsoon season, while there were negative impacts on butterflies' diversity during the winter season. The adverse impact of climatic change leads to the local extinction of various butterflies' species, and then it is necessary to conserve this species.

Keywords: climatic change, conservation.

PS 81

Bioremediation of environmental contaminants – A nano-technology-based approach to remove toxic soil and water pollutants

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Increased human activity on energy reserves, dangerous farming methods, and rapid industrialization have all contributed to an increase in environmental contamination over the last few decades. Under the supervision of regulatory authorities, bioremediation is a procedure that uses biological mechanisms to break down, detoxify, mineralize, or modify the concentration of pollutants. However, because the range of contaminants on which it is effective is limited, the time scales involved are quite long, and the residual contamination levels achieved may not always be sufficient, it will not always be suitable. As a result, Nano-remediation is a novel method for removing persistent organic pollutants such as pesticides, chlorinated solvents, brominated or halogenated chemicals, perfluoroalkyl, and polyfluoroalkyl substances (PFAS), and heavy metals in a safe and long-term manner. It is based on the unique qualities of nanoscale particles or nanomaterials, such as high reactivity and surface area, which enable them to remove a wide range of dangerous pollutants from the environment. Nanoscale zeolites, metal oxides, carbon nanotubes, and noble metals are the most commonly used nanoscale materials for nano-remediation. Due to its strong reactivity and outstanding pollutant immobilization capability, nZVI has been a thoroughly investigated metallic nanoparticle for high-efficiency environmental cleanup. Furthermore, because of their unique adsorption properties, CNTs have attracted increased attention for the cleanup of organic and inorganic pollutants. Combining nano-remediation with other soil remediation technologies has been demonstrated to be a helpful soil remediation approach, as the synergetic effects may boost the sustainability of the applied process toward green soil remediation technology.

PS 82

Enhanced bio removal of Lead, Nickel, and Cadmium by *Chrysopogan zizanioides* (*Vetiver*) augmented with *Bacillus xiamenenis*: A pot culture-based phytoremediation and rhizoremediation approach

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Heavy metal contamination is a major environmental concern and also seeking the attention of researchers due to its hazardous effects on plants, humans, and animals. We have come up with a potent plant growth-promoting rhizobacteria (PGPR) having the ability to tolerate the higher concentrations of lead, nickel, and cadmium producing the biofilm and persist cell to cell communication. This bacteria VITMSJ3 *Bacillus xiamenenis* in combination with *C. zizanioides* plant exhibits excellent uptake properties of Pb, Ni, and Cd from the soil with 80 $mgkg^{-1}$, 75 $mgkg^{-1}$, and 65 $mgkg^{-1}$ respectively comparing the one without bacteria. The bacteria also showed remarkable enzymatic activities resulting in no damages to plants. We featured a novel and rapid removal of heavy metals using the biological aspect beneficial for treating the heavy metal contaminated sites. This approach can result in the formulation of a product useful for the large-scale applications.

PS 86

Formulated metallic nanobiochar from plant residues – Batch and Column study evaluation in the removal of lead and zinc ions

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Magnetic nanobiochar fabricated with the induced functional entities enhances the removal efficiency of heavy metal contaminants from the industrial effluents. The present study deals with the synthesis of amino-functionalized magnetic biochar from the plant residues and is used for the removal of lead and zinc metal ions in batch and column. Morphological characteristics of the nanocomposites traits are analyzed through Fourier transform infrared spectroscopy, Field emission scanning electron microscope, and vibrational sample magnetometer. The prepared nanobiochar was affirmed with the presence of silica and amino groups upon it. The magnetic saturation value was about 50 emu/g and the size of the particle is 20 nm. Batch parameters were optimized for various time intervals, pH, temperature, and the sorbent dosage. The rate and mechanism of interaction follow pseudo-second-order kinetics and Langmuir isotherm model with sorption capacity of lead (226.74 mg/g) and zinc (180.5 mg/g) and the reaction system was an exothermic and reversible process. Column studies were demonstrated for the concentration, bed height, and flow rate. The breakthrough point was attained at 1200 min and the removal efficiency of about 67.57 % was obtained for lead ions.

Keywords: Batch, Column, Integrated nanocomposites, lead, removal, zinc.

PS 87

Optimizing aquaculture wastewater supplemented with nano-silica as a growth medium for marine diatoms

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In order to alleviate the health of aquatic animals and reduce as well as improve the water quality index, an economically feasible and environmentally amiable strategy has to be implemented. Since, phytoplankton-like diatoms, are known as the key regulators of nutrient re-cycling and carbon fixation in the oceans, deploying them for recovering and re-establishing the aquatic water quality can substantiate multiple global issues. Besides being ecologically irreplaceable they possess an array of highly valuable metabolites like polyunsaturated fatty acids, chrysolaminarin, and fucoxanthin which find application in pharmaceutical and aquaculture sectors. Thus, reusing the fish aquaculture wastewater, which contains residual antibiotics, trace elements, and micropollutants, as an optimized growth medium for cultivating diatoms can both aid in recycling of nutrients as well as reduce operational costs. This study reveals that utilizing aquaculture spent water as an effective growth medium for diatoms resulted in higher cell numbers in the 50% setup than in the control groups. The species could also reduce the total nitrogen, phosphorous as well as chemical oxygen demand of the aquaculture wastewater used from the aqua pond. Also, the biomass generated had an alleviation in both lipids, carotenoids as well as other cellular metabolite content.

PS 88

Groundwater Quality assessment around Adampur Chhawani Dumpsite Bhopal

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Dumpsite leachate has an adverse impact on water quality as well as on living beings. It contains high levels of organic, inorganic, heavy metals, and xenobiotics which percolates through the subsoil and contaminate the groundwater. Characterization of the leachate originating from the Adampur Chhawani landfill as well as assessment of local aquifer was carried out. A total of one leachate sample and four groundwater samples were collected during pre-monsoon and post-monsoon seasons for monitoring purposes. All the samples were analyzed for physicochemical parameters as per standard procedures (Adoni et al.1985and APHA, 2005). The results indicate that, pH, TDS, EC, TH, CH, Cl levels were found to be alarming. It is evident that the leachate from the municipal dumpsite is polluting the local aquifer to at greater extent making the water unsuitable for drinking purposes. Therefore, immediate methods should be taken to control the leachate contamination in the groundwater.

Keywords: Solid waste, dumpsite, leachate, groundwater contamination

PS 89

Isolation of PHB producing bacteria from Pirana dumping site.

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Bio-based plastic is a biodegradable Green alternative for traditional Synthetic plastic. It is synthesized as intracellular energy reserve granules by certain bacterial species as well as genetically modified plants. The present work is focused on the Isolation and Screening of Poly 3-HydroxyButyric Acid (PHB) producing bacteria from the Pirana dumping site. Production of PHB by two selected bacterial strains, using Luria Bertani broth as seed culture and Minimal media as a fermentative media. Extraction was carried out by the Chloroform extraction method. The product was Quantified taking Crotonic acid as standard by, UV Spectrophotometric method, which determined higher PHB yield by strain I_1.

Keywords: Polyhydroxy butyrate, Dumping site, Crotonic acid, Extraction, and Quantification.

PS 90

Screening and identification of nitrilase producing bacteria and improved nitrilase production by statistical optimization

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We have isolated total 9 nitrilase producing bacteria, amongst which isolate 2 had the highest nitrilase activity and it was identified as *Bacillus subitlis* AGAB-2 after. Initially nitrilase production was improved by one factor at time (OFAT) method involving optimization of culture conditions such as pH, temperature, and time. Mineral medium components were subjected to further optimization study by using Plackett-Burman design (PBD) to find out significant factors that contribute towards nitrilase production. After PBD study, significant factors were carried forward to CCD study by using Response surface methodology to find the optimal concentration of significant factors at which maximum production can be achieved. AGAB-2 culture had broad-spectrum nitrilase activity. PBD study showed that Yeast Extract, Peptone, and KH_2PO_4 were the most significant factors for the production of nitrilase enzyme. RSM-CCD study revealed that maximum nitrilase production of 8872 µ/ml was achieved at 15 g/L, 15 g/L and 0.6 g/L concentration of Yeast extract, Peptone, and KH_2PO_4 respectively.

PS 91

Production of poly-β-hydroxybutyrate (phb) by electro-fermentation

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Synthetic plastics are non-degradable and cause waste disposal problems leading to environmental pollution. Bioplastics are good substitutes for synthetic plastics because of their similar physical and chemical properties and can get degraded completely to CO_2 and water. Poly (3-hydroxybutyrate) (PHB), a biodegradable polymer, synthesized by numerous bacteria as an intracellular reserve granule of carbon and energy storage under limited nutrient conditions and excess carbon source as a substrate. The detection of PHB granules is done by staining with Sudan black B and solubilizing cellular components in sodium hypochlorite and chloroform. Even though useful polymers the raw material cost has been known to contribute significantly to the manufacturing cost of PHB. In the present study, implementation of the integrated system by use of wastes as renewable substrate under optimized media composition followed by sequential conversion into PHB using membrane-less bioreactor by Electro-fermentation represents a better alternative to battle high cost of PHB production. Growth limiting stress at cathode due to microaerophilic microenvironment and its effective utilization by the protons and electrons coming from anode might have diverted the microbial metabolism towards PHB synthesis instead of oxidation. The overall PHB production efficiency was analyzed. There was an increase in the growth and PHB accumulation in the presence of electricity compared to the process without electricity.

Keywords: Bioplastics, Poly (3-hydroxybutyrate) (PHB), Electro-fermentation, Membraneless bioreactor.

PS 92

Green synthesis of bioflocculant mediated iron nanoparticles and its application towards Pb (II) removal from wastewater

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The development in the field of nanotechnology is due to the fascinating properties of nanoparticles. In the present study, plant-based bioflocculant extracted from the fruits of Okra (*Abelmoschus esculentus*) was purified, characterized, and used for the biosynthesis of iron nanoparticles. The biosynthesized Fe nanoparticles were characterized using UV-vis spectroscopy, X-ray diffraction (XRD), Fourier transform infrared (FT-IR), Scanning electron microscopy (SEM), and atomic force microscopy (AFM). TEM analysis was performed and the size of synthesized Fe nanoparticles was found to be 50 nm. Flocculation activity of bioflocculant mediated Fe nanoparticles (BFFeNPs) was tested. The effects of various parameters on Pb(II)removal using BFFeNPs were evaluated using response surface methodology (RSM) based on Box Behnken Design (BBD).The BFFeNPs exhibited high Pb (II) removal efficiency (91.45%) under optimized parameters viz. pH 6, BFFeNPs dosage 0.2 g/L, contact time 30 min and temperature 30º C. A quadratic polynomial model was fitted with the actual data of R^2 0.99 for metal removal. To the best of our knowledge, this is the first report on the potential use of Okra bioflocculant mediated Fe nanoparticles synthesis for the cost-effective and eco-friendly removal of lead from wastewater.

PS 93

Metagenomic analysis of bacterial diversity and antibiotic resistance genes in a polluted tributary of Mahi River, Gujarat

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Metropolitan waste containing antibiotics has been recognized as an emerging environmental pollutant that contributes to the spread of antimicrobial resistance. The release of industrial and municipal waste into the surface waters significantly affects the riverine ecosystem. Urbanized rivers polluted with anthropogenic waste are therefore considered as a reservoir of antibiotic resistance genes (ARGs). In this study the microbiome and antibiotic resistance genes were characterized from the riverine water and sediment samples collected from a Polluted Tributary of the Mahi River (PTMR) near Nandesari-GIDC, Vadodara, Gujarat was investigated in the current research. Whole metagenome sequencing analysis revealed a distinct bacterial community structure and distribution of ARGs in the PTMR samples. The taxonomic distribution of metagenome samples from different sites of PTMR showed the abundance of the *Proteobacteria* phylum. Likewise, an abundance of the genus *Pseudomonas* (4%→21%) was obtained as the river enters the industrially polluted region of Nandesari (M2) as compared to control site (M1). Similarly, the distribution of genus *Limnohabitans* (2%→18%) was obtained in the entire PTMR stream as compared to control site (M1). The antibiotic resistance genes abundance was estimated using the ResFinder 4.0 database and the results show that the industrially polluted region of PTMR has the highest ARGs among all sampling sites of the PTMR. Whereas, antibiotic resistance genes *bla*-TEM-116 of beta-lactam and *Sul1* of sulfonamide families were abundant in the entire stretch of PTMR. The results show changes in the microbial population and the abundance of ARGs in response to industrial pollution at PTMR sites.

THEME 3

BIOMOLECULAR RESEARCH

FT 01

Synthesis, Characterization and Anti-inflammatory activity of Silver Nanoparticles using Pineapple

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The biosynthesis of nanoparticles has been proposed as an economical and environmentally friendly alternative to chemical and physical methods. Plant-mediated synthesis of nanoparticles is a green chemistry approach that combines nanotechnology and plant biotechnology. This study demonstrated the synthesis of silver nanoparticles (AgNP) or (Green Silver) using aqueous silver nitrate extract to reduce Ananas comosus (Pineapple). AgNPs were characterized by ultraviolet spectroscopy (UV-vis) and TEM micrographs show spherical particles with an average size of 12 nm. Different types of methods were followed to investigate the anti-inflammatory activities of the synthesized silver nanoparticles using the heat hemolysis and protein denaturation method. Also, in connection with this paper, there are very rare studies that can confirm that fresh juices are healthier than bottled juices produced using artificial synthetics and colors that can be unhealthy by showing the difference in the inhibition rate between a fresh pineapple juice and a bottled pineapple juice. This study showed the potential of using biomaterials to synthesize silver nanoparticles using green chemistry principles.

Keywords: AgNPs; TEM; green silver; Pineapple; UV-vis

FT 02

Alpha-galactosidase: Production under solid state fermentation and purification

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Alpha-galactosidases (E.C. 3.2.1.22.) are exo-glycosidases which release the terminal α-1,6 linked galactose moieties from galactooligosaccharides like raffinose, melibiose, stachyose, and branched polysaccharides like galactomannans and galacto-glucomannans. This enzyme possesses immense potential in food and feed processing. Hydrolysis of raffinose and stachyose present in leguminous food and feed is beneficial as these oligosaccharides cause intestinal discomfort, flatulence, and low feed utilization in monogastric animals. Alpha-galactosidases can also be used for improving the gelling property of guar gum by partial removal of galactoside units. Moreover, in combination with xylanases and mannanases, α-Galactosidase is also used for biobleaching in the paper and pulp industry. In this study, the production of extracellular α-galactosidase by *Penicillium aculeatum* APS1 was carried out under solid-state fermentation. Influence of various physico-chemical parameters on the production of α-galactosidase was studied. Maximum yield of α-Galactosidase was 515.5U/g using wheat bran and copra cake in a ratio of 4:1 moistened with 5%CSL (pH 5.5) at 50% (w/v) moisture level. Alpha-galactosidase was purified by three-phase partitioning (TPP) technique followed by gel permeation chromatography (GPC) to homogeneity with 209U/mg specific activity, 22.4 fold purification, and 73.8% yield. The optimum temperature and pH were found to be 55°C and 4.5, respectively. Kinetic parameters like Km and Vmax were analyzed for p-nitrophenyl-α-D-galactopyranoside as substrate and the effect of various metal ions, surfactants, additives, and inhibitors was also studied.

FT 03

Production, purification and characterization of invertase enzyme from *Aspergillus niger* using fruit peels

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This study is a new approach towards invertase production which is an enzyme that plays important role in food industries for producing jams, candies, and sweets. Invertase is known for its application in the hydrolysis of sucrose into glucose and fructose. Here, in this study sucrose is substituted with fruit peels, which is not only sustainable but also cleans up huge agro wastes. As the usage of sucrose makes the production of invertase expensive, using fruit peels can be innovative and effective. The fungal strain of *Aspergillus niger* is used in this experiment. Solid-state fermentation is carried out during the procedure to extract invertase enzyme and assayed through invertase assay and DNSA assay for reduced sugars. The purification of invertase is carried out through dialysis and other processes. Optimization of invertase is determined for its activity. This study can be a new possibility to produce invertase enzyme commercially on large scale.

Keywords: Invertase, sucrose, solid-state fermentation, enzyme assay, fruit peels, *Aspergillus niger*.

FT 04

Bacillus velezensis CGS1.1: an Antibiotic Growth Promoter substitute

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Probiotics have been a viable and eco-friendly substitute for antibiotic growth promoters in animal farming. This study puts forward the probiotic prospect and application of a chicken isolate CGS1.1 by integrating genotypic and phenotypic attributes. CGS1.1 could effectively tolerate simulated gastrointestinal juices. It showed notable bile salt hydrolase activity, auto-aggregation, cell surface hydrophobicity, and antibacterial activity against a wide range of pathogens. Interestingly, the strain completely inhibited the growth of *E. coli* and *S. enterica* within 24 h in liquid co-culture assay. CGS1.1 effectively hydrolyzed complex polysaccharides and phytate owing to the production of exoenzymes. *In silico* genome studies revealed its taxonomic identity as *Bacillus velezensis.* Genome annotation revealed the presence of genes explaining the aforementioned probiotic and antibacterial properties. Furthermore, CGS1.1 was found to be non-hemolytic and susceptible to antibiotics. No virulent or toxin encoding genes could be identified in the genome of CGS1.1 signifying its safety. Dietary supplementation of CGS1.1 improved the feed conversion ratio and humoral immune response in broiler chicken demonstrating its potential as an antibiotic alternative feed additive to promote chicken growth and control pathogens.

FT 05

Noticeable differences in Photosynthetic genes of Cenchrus ciliaris plastome of Kutch desert compared to other Cenchrus species

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Buffel grass (*Cenchrus ciliaris*) can withstand heavy grazing and therefore it is highly valued as a fodder species in a dry area. Buffel grass is also one of few pastoral species that are apomictic. Because of this capability, it is highly valued in agriculture also. Different grasses have to adapt with their ecological conditions to thrive. This grass we have collected from the Kutch desert which is the unique ecological area where salinity, temperature, and drought stresses are there. This grass surviving and also photosynthesizing successfully there shows unique adaptation capacity. To study this we isolated chloroplast DNA, sequenced and assembled the whole chloroplast genome. We compared our *Cenchrus* species with other available *Cenchrus* plastome of NCBI database. Further distinct photosynthetic gene expression profiling was also performed to represent their unique physiology. Here we found differences in terms of nucleotide as well as in expression level for some important photosynthetic genes.

PS 56

Amendment of process parameters for biosynthesis of alkaline protease from *nesterenkonia* sp. via factorial and response surface methodology

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Proteases are enzymes that catalyze the breakdown of peptide bonds and have a wide range of industrial applications. Five potent protease isolates were obtained from seawater samples from The Gulf of Khambhat. Ours is the first report of alkaline protease production and process optimization using a statistical approach from genera *Nesternkonia* (confirmed via 16S rRNA gene sequencing). In the present study temperature, pH, carbon, nitrogen source, NaCl concentration, and inoculum density were initially optimized by the One Variable At a Time (OVAT) approach using Minitab software. Further, the enzyme production was statistically optimized using Design-Expert software with factorial designing e.g. Plackett-Burman Designs (PBD) and Response Surface Methodology (RSM) e.g. Central Composite Design (CCD). Results were analyzed using ANOVA and found to be statistically significant. The designed experimental models showed increased enzyme production viz. PBD (241.15 U/ml) and CCD (242.32 U/ml), which are both higher than unoptimized medium (197.6U/ml). An overall 1.23 fold increase in yield was observed when a quadratic model of RSM with temp. 37°C, pH 9.0, NaCl 25g/L, inoculum density 3.0% (v/v), gelatin 25g/L, and peptone 10g/L was simulated. Looking into the novelty of isolate and ample production via statistical approach, further scale-up and bioreactor studies may prove significant.

Keywords: Alkaline protease, Central Composite Design (CCD), *Nesterenkonia*, Optimization, Plackett Burman Design (PBD), Response Surface Methodology (RSM)

PS 57

Investigating the effects of antioxidants on yeast cell survival and its antioxidant system under glacial acetate-induced oxidative stress

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S. cerevisiae-'the budding yeast has been used for brewing since ancient times. Being aerobic, yeast cells are exposed to reactive oxygen species (ROS) produced during aerobic metabolism and changing osmolarity as well as high ethanol concentrations. Here, we have investigated and compared the effects of antioxidants such as N-acetyl-L-cysteine (NAC) and Pyrroloquinoline quinone (PQQ) on yeast cell survival and growth under glacial acetic acid (GAA)-induced oxidative stress. Under GAAstress the yeast cell growth decreased by 50%. Exogenous supplementation of NAC as well as PQQ both improved yeast cell survival and growth under GAA stress. The protective effects of these antioxidants on yeast enzymatic and non-enzymatic defense systems were also investigated and it was observed that both NAC, as well as PQQ, significantly reduced ROS accumulation and antioxidant enzyme activities under GAA induced oxidative stress.

PS 58

Effect of bacterial amyloid BE AM1 on microbial growth and interactions

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Amyloid proteins have been considered to be misfolded associated with neurodegenerative diseases. Bacterial functional amyloids have now been identified as impacting cell surface adhesins, amphipathic films, biofilms, the extracellular matrix, and bacterial adhesion. The ability of *Solibacillus silvestris* AM1's bacterial amyloid BE-AM1 to influence the growth of other microorganisms such as bacteria, fungi, and haloarchaea was investigated here. The amyloid BE-AM1 increased the free energy of interaction potential of the tested bacterial surface thermodynamics. It was discovered that the presence of functional amyloids increased bacterial biomolecule release, tolerance to hydrocarbon presence, and growth in the presence of hydrocarbon as the sole carbon source. The amyloid BE-AM1 to form biofilms in other bacteria (which could produce their amyloid proteins) was tested. The current study adds to our understanding of the inter-species interactions of amyloid proteins, which will aid in our understanding of microbially induced human amyloids.

Keywords: *Solibacillus silvestris* AM1, Inter-species interactions, Surface thermodynamics, Adhesion, hydrocarbon tolerance.

PS 59

ISOLATION AND SCREENING OF l-GLUTAMINASE PRODUCING MICROORGANISMS

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L-glutaminase is one of the most important therapeutical and industrial enzymes, it is used as an antitumor agent besides its use as a flavor enhancer in fermented foods. In the present study, microorganisms including fungi and actinomycetes were isolated from soil samples and screened for L-glutaminase production by plate assay method, 37 fungal isolates were screened for Lglutaminase production, 10 isolates were found to be L-glutaminase producers. Out of 10 Lglutaminase producers, two fungal isolates show maximum enzyme production i.e. 401.03 U/gds and 440.34 U/gds which were further identified as *Aspergillus terreus* ZHG-2 and *Fusarium luffae* ZHG-14 respectively based on ITS. Similarly, 9 isolates of actinomycetes were screened for enzyme production, and out of which, 6 actinomycetes isolates were positive. Two isolates show maximum enzyme production i.e. 153.89 U/ml and 128.06 U/ml, which were further identified as *Streptomyces flavoviridis* ZHG-2 and *Streptomyces albogriseolus* ZHG-6 respectively based on 16s rRNA sequencing.

PS 60

Exploring the molecular docking analysis and antidiabetic activity of isolated fraction of Samanea saman leaf extract through in-vitro and in-vivo approach

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The study aims to investigate and identification of bioactive principle for the antidiabetic drug in Samanea saman leaf extracts. Hence to identify active metabolite leaf the extract was further fractioned and separated by analytical techniques to found Alpha-Tocopherol shows the maximum availability and bioactivity. This is the first of its kind to report the presence of α-tocopherol in Samanea saman leaf extracts. Molecular dockings were done to determine the binding modes of α-tocopherol into active sites of key insulin-signaling marker and also leaf extract and α-tocopherol were screened and evaluated the in vitro assays. These results confirm that the extracts have a good antidiabetic property. Isolated α-tocopherol was compared between the crude and standards acarbose in vitro studies. Future, the therapeutic efficacy of extract and compound was examined in two different in vivo model high-fat diet and streptozotocin-induced type 2 diabetic rats, and the results show lowered fasting blood glucose level and increased insulin level and the biochemical parameters to close to the normal levels in the diabetic treated rats. Histology of liver, pancreatic, kidney, and adipose tissues supported the biochemical findings. The gene expression analysis of adipose tissues was evaluated and shows the attenuate insulin resistance and enhanced insulin-dependent glucose uptake through translocation and activation of GLUT4 in adipose of insulin-resistant. The isolated compound from extracts shows better activity than crude extracts. Isolated α-tocopherol shows insulin secretion in GLUT4. Hence, this Samanae saman shows promising for the management of obesity-related type 2 diabetes mellitus and its secondary complications. Further, study to evaluate the clinical trials to formulate the antidiabetic drug as an alternative source of synthetic drugs.

Keywords: Samanea saman, Type 2 Diabetes mellitus, Autodock, Obesity, amylase, glucosidase α-tocopherol, Glucose transporter-4 (GLUT4).

PS 61

Synthesis of high maltose containing syrup by immobilising α-amylase on Fe_3O_4-GO nanoparticles

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Industries are increasingly looking for thermostable amylases that can withstand high temperatures. Furthermore, Ca^{+2} is regarded as a cofactor for alpha-amylase because it indirectly increases thermostability and converts $CaCl_2$ into calcium oxalate, resulting in corrosion in heat exchanger pipes, which raises the cost, so there is an increasing demand for calcium-independent amylases. In addition to this, the current research focuses on the statistical optimization of physicochemical conditions affecting alpha-amylase production. Fe_3O_4 nanoparticles were synthesized and coated with a GO (graphene oxide) matrix immobilized with alpha-amylase. GO fixed enzyme detachment at higher temperatures by forming a covalent bond with alpha-amylase, which increased stability. The stable enzyme's optimal temperature and catalytic pH were 70°C and pH-7.0, respectively. Thermodynamic calculations showed that immobilization on nanoparticles successfully increased strength and that the enzyme alpha-amylase became calcium-independent.

Keywords: Alpha-amylase, Fe_3O_4-GO nanoparticles, Calcium Independency, Thermodynamics

PS 62

Efficient antimicrobial activity of pyrazole, 1,3,4-oxadiazol and dihydropyrimidin-2-one hybrid derivatives

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The increasing demand of novel antimicrobial compounds to defeat Multi Drug Resistance (MDR), the most important goal for chemists is to ensure to develop the next era of synthetic approach and effective potent chemical than the recent generation. In continuation to this, the present work deals with the hybrid synthesis and antimicrobial activity of novel series of 4-(1,3-diphenyl-1*H*-pyrazol-4-yl)-6-methyl-5-(5-(aryl)-1,3,4-oxadiazol-2-yl)-3,4-dihydropyrimidin-2(1*H*)-ones. All the newly synthesized compounds were screened for *in vitro* antibacterial and antifungal activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pyogenes* bacteria, and *Candida albicans*, *Aspergillus niger*, *Aspergillus clavatus* fungi respectively by using serial broth dilution method. The structures of the novel compounds were elucidated by IR, $_{1}$H-NMR, $_{13}$C-NMR, and Mass spectra. From the bio-activity results, electron-withdrawing (EWG's) like Chloro (-Cl) and Nitro (-NO_2) groups on phenyl nucleus at *ortho*, *meta*, and *para* can serve as important gateways for the designing and developing of new antimicrobial agents with potential activity.

Key Words: Pyrazole, Dihydropyrimidin, 1,3,4-Oxadiazol; Antimicrobial evaluation.

PS 63

Isolation, Identification and Biological Screening of Anti-Microbial Peptide Histatin-5

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Histatins are among the antimicrobial peptides (AMPs), which play an important role in the innate and adaptive immunity of nearly all living creatures. Histatins (Hsts) are a family of related cationic histidine-rich polypeptides of variable length. Molecules constitute a primitive immune defense mechanism and are found in a wide range of eukaryotic organisms, from human to plants to insects. This group of molecules is termed 'antimicrobial peptides' (AMPs). Histatin 5 is soluble in water from pH 4 to 9. Zink Precipitates at pH 9 for histatin 5 solublity. Histatin-5 was also analysed for DNA fragmentation to ascertain whether the cytotoxicity results from the apoptosis or by some other mechanisms. The result showed that histain-5 exhibited fragmentation of DNA-like pattern, which confirmed the positive results of apoptosis induced cytotoxicity rather than necrosis.

PS 64

Engineering of thermostable phytase–xylanase for hydrolysis of complex biopolymers

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Industrial processing of enzymes requires higher heating that affects the thermal stability of the enzyme and increases the production cost. In this study, xylanase–phytase (XP) fusion protein was generated via co-expression in a single vector with a cold-shock promoter, leading to improved activity at optimal pH, temperature, and the thermal behavior of the protein. Xylanase–phytase (XP) fusion and phytase proteins were characterized by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). The XP fusion was thermally stable up to 124 °C, higher than phytase which was steady up to 113.5 °C. XP fusion exhibits higher stability at its thermal transition midpoint (Tm) 108 °C, higher than the Tm value of phytase which is 90 °C. Industrially efficient and environment-friendly proteins with low production cost and higher stability can be generated by ‘fusion protein’ technology.

PS 65

Optimizing variables affecting efficient immobilization of a-amylase over magnetite nanoparticles

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α-Amylase (EC 3.2.1.1) is widely known for its industrial applications like the production of maltose, high fructose-containing syrup, and starch liquefaction. As of 2028 market capital of a-amylase would be nearly $377.01 million. Immobilization of such enzymes can be crucially beneficial for industrial purposes. Magnetite nanoparticles have been proven good for immobilization as they can be easily removed from the system using a magnetic field leading to easy removal of the enzyme. Hence the same enzyme can be used more than once. Fe_3O_4 and Fe_3O_4- SiO_2 were the nanoparticles used for immobilization via covalent coupling. The polymer used to attach the enzyme with the nanoparticles were casein, gelatin, and gum acacia including glutaraldehyde as a cross-linking agent for the polymer. RSM studies were carried out using 4 factors, 27 runs; Box Behnken Design. The 4 factors for RSM studies were concentration of nanoparticles, polymer, glutaraldehyde, and enzyme. Based on the results of RSM studies the optimum concentration of all four factors was found which supported maximum immobilization. The pH optima, temperature optima, and operational stability were found by immobilizing the enzyme at concentrations found during RSM studies. Upon comparing the pH optima of the immobilized enzyme with soluble enzyme there was no significant difference, but the immobilized enzyme showed a higher temperature optima and was even more stable at higher temperature then soluble enzyme. The immobilized enzyme was also able to catalyze consecutive reactions.

Keywords: Amylase, Immobilization, RSM, nanoparticles

PS 66

Production and Optimization of L-asparaginase by *Halomonas Pacifica* isolated from Marine Soil

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L-asparaginase (E.C.3.5.1.1) is an enzyme found in a wide range of organisms including plants, microbes, animals, and in the serum of certain rodents. It is an amidohydrolase that catalyzes the hydrolysis of the amide group on the side chain of asparagine to aspartic acid and ammonia. L-asparaginase (L-ASNase) is used in the treatment of Acute Lymphoblastic Leukemia (ALL) and Lymphosarcoma as a pivotal agent for around 30 years. ASNase has a crucial role in the Food Industry as it reduces the levels of Acrylamide generation. The present study comprises of isolation of potent L-ASNase producing bacteria via primary and secondary screening from marine soil along with an identification of the most potent one by 16s rRNA sequencing. It also includes optimization of the growth conditions for an isolate to give the highest L-ASNase activity by the Response Surface Design Methodology (RSM).

Keywords: L-Asparaginase, acrylamide generation, Response Surface Methodology

PS 68

One-Pot Green Synthesis of Luminescent Carbon Dots for pH Responsive Intracellular Drug Delivery of Doxorubicin for Human Breast Cancer Therapy

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Carbon dots (CDs) has been the most versatile carbon-based materials in bioimaging and drug delivery applications. In this study, a simple pH-responsive fluorescent therapeutic drug delivery system of doxorubicin (DOX) loaded carbon dots (TCDs-DOX) for intracellular drug delivery was developed. The CDs were prepared from a traditional Indian Ayurvedic medicinal plant Triphala through one-pot hydrothermal method. The synthesized CDs were characterized by the UV-Visible spectrophotometer, Fluorescence Spectrophotometer, and FT-IR. The DOX was loaded on CD's through electrostatic interaction and was confirmed by decreasing fluorescence intensity, drug loading efficiency was found to be 88%, 96%, 98% for different concentrations. Moreover, the therapeutic activity of the doxorubicin-loaded carbon dots were evaluated using the MCF-7 cell line. The MTT assay shows that the Triphala carbon dots are inert and do not exert any significant effect on the cell viability, while there is a decrease in cell viability when the drug is conjugated on the surface of CDs. Triphala CDs possess potential applications in bio-imaging, bio-labeling, and cancer therapy due to their target- specific drug delivery and fluorescence tracking properties.

Keywords: - Carbon dots, Doxorubicin, Triphala, MCF7 cells, MTT assay, Cancer therapy, bio imaging.

PS 69

Metagenomic Fosmid Library preparation, screening and sub cloning, characterization of lignocellulolytic enzyme from cattle rumen

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The most prevalent kind of hydrolytic enzyme is amylase (EC 3.2.1.1, 1,4--D-glucan-glucanohydrolase) belongs to the GH13 family, which is an extracellular enzyme that catalyzes the hydrolysis of starch and glycogen molecules. Amylases are a type of industrial enzyme that can be found in a wide range of products, from detergents to food and pharmaceuticals. In the present study we have cloned the alpha-amylase gene from the fosmid library of cattle rumen metagenomic DNA and functionally expressed it in Escherichia coli. The ORF encoding alpha-amylase consisted of 1488bp, corresponding to a protein of 496 amino acids. The purified protein has a molecular weight of 56.6-kDa on SDS-PAGE and its expression was confirmed by western blotting. The pH and temperature for maximum enzyme activity were 5.5 and 45 °C respectively. Various metal ions enhanced the enzyme activity and in presence of ca+2 activity was significantly increased. The Km and Vmax values for CMC were found to be 61.98mg/mL and 77.96 µmol/mL/min, respectively. Alpha-may identified in the present study may act as an excellent candidate for industrial applications, and may aid in lignocellulosic biomass conversion because of its potential amylolytic activity, thermostability, and excellent pH stability.

PS 70

Deciphering molecular targets of eugenol and beta-caryophyllene for colorectal cancer: An *in silico* approach

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Major deaths due to colorectal cancer (CRC) arise from the metastatic dissemination of primary tumours and that is related to molecules contributing to metastatic phenotype, the pathways they control, and the genes they regulate. Eugenol (EUG) and Beta-Caryophyllene (BCP) are essential oil that contributes to chemo-preventive properties by combating the side effects of chemotherapy. This study proposes Pharmacokinetic assessment through ADMET analysis showed that both the compounds follow the rule of five with good bioavailability thus, the compounds were found to be in acceptable range by following drug-likeness properties. Network pharmacology-based analysis of compound-disease-target (C-D-T) network showed that EUG and BCP target 65 and 25 proteins of metastatic CRC including SRC, PI3KR1, HSP90AA1, AKT1, MAPK1, MAPK3 which were selected based on their edge count from which SRC had the highest node degree of 14 suggesting that it could be an important target for designing drug for modulation of metastasis in CRC. These proteins were further screened in the molecular docking studies with both the compounds at the active site. Molecular docking results depicted that EUG and BCP inhibited the C-D-T network's core target SRC protein (proto-oncogene tyrosine-protein kinase src) more effectively than any other protein.

PS 71

Identification of mirror repeats in *ced-9* apoptotic gene of *C. elegans*

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Programmed cell death (apoptosis) is an inherent property in *C. elegans* and plays important role in development, metamorphosis, and homeostasis. The *egl-1, ced-9, ced-4* and *ced-3* are most essential genes which play important roles during programmed cell death. The genome of *C. elegans* is 100Mb distributed over six chromosomes and various repeats sequences like direct repeats, tandem repeats, palindromic sequences, and minisatellites sequences have been reported within its genome. One type of repeats which have been rarely studied within genome of *C. elegans* is mirror repeats. Mirror repeats have unique potentialities to form parallel DNA, antiparallel DNA as well as triplex DNA. In the current study, we identified mirror repeats within exons of *ced-9* gene of *C. elegans* for the first time. It was observed that there are twenty-nine mirror repeats within exons of *ced-9* gene by using simple manual bioinformatics approach. The identified mirror repeats are not limited to *ced-9* gene only but are well distributed within genome of *C. elegans, Drosophila melanogastor* and *Xenopus tropicalis.* Future molecular and biophysical studies will explore the function of identified mirror repeats.

Keywords: *Caenorhabditis elegans, ced-9* gene, DNA mirror repeats.

PS 72

Enzymatic Characterization of Cocoonase, a Trypsin protease

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Cocoonase is a serine protease family endopeptidase enzyme produced by the moth from the anterior portion of the cocoon during moth emergence. Characterization of cocoonase can help in standardizing protocols for improving the quality of silk obtained from the cocoons. My aim of the project was to the prediction of the substrate for cocoonase based on structural analysis of trypsin and sequence comparison with cocoonase. In-Silico analysis revealed that cocoonase substrate binding sites and catalytic triad are highly conserved with trypsin. In addition to this, 93% of conservation found around 8Å residues of substrate binding site. Conservation between trypsin and cocoonase suggested the use of trypsin substrate for biochemical characterization.

PS 73

In-silico approach for protein-protein interaction of bio-stimulants (harpin)

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Harpins are type III translocators that facilitate pathogens to infect plants. They are types of proteins that are classified according to their function. There are currently 13 harpins identified, which are divided into two types: one domain and two-domain proteins. Despite its role in pathogenicity, there are various positive responses in plants when it is given independently to the plants. It mainly enhances plant growth and induces immunity. The mechanism of how it induces a beneficial response in plants is yet to uncover. One of the possible mechanisms is its interaction with aquaporin, which has been identified by in-vitro analysis of the interaction between Hpa1 and aquaporins. Docking analysis of Hpa1 and aquaporin was also done in a previous work based on the in-vitro study, demonstrating active engagement of the N terminal region. In the present study, this docking analysis results will be used for the comparative analysis of different harpin orthologs and aquaporin interactions. The study findings may assist in elucidating the mechanism of interaction. Moreover, structural-functional relationships can be studied by *in-silico* site-directed mutagenesis.

PS 74

In-silico Approach for targeting Glucose Transporters using Natural Compounds in Leukemia

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Glucose transporters (GLUTs) play a critical role in the glucose uptake of normal as well as cancer/leukemic cells. The nutrient uptake by cells via the GLUTs is crucial for survival, growth, and proliferation, whether it is a normal or cancer/leukemic cell. GLUTs are fundamentally transmembrane proteins that are of 14 types and are distributed among various organs of the body. Out of the 14 GLUTs, GLUT1, GLUT3, and GLUT4 are reported to show upregulation in leukemia and therefore contribute to the leukemic progression. The three GLUTs are also known to develop drug resistance in leukemic cells. Hence, in the present study, we have performed *in-silico* screening of GLUTs with the use of natural compounds library that will be able to modulate their activity in leukemia. Absorption, Distribution, Metabolism, Excretion, and Toxicity (ADMET) analysis of the best-docked compounds were also determined post virtual screening so that a potent natural compound could be further investigated *in-vitro*.

PS 75

Thermal stability of *Antheraea mylitta* cocoonase at various temperature regimes and its evaluation using Circular Dichroism Spectroscopy

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Cocoonase is a proteolytic enzyme exuded by tasar silk moth *Antheraea mylitta* during pupal-adult development. Cocoonase acts upon sericin protein which softens the cocoon shell to allow the exit of the moth from the cocoon. There are various proteolytic enzymes available in nature but cocoonase (28kDa) is unique due to its stability in a wide temperature range. The present study was conducted to observe and evaluate the thermal stability and denaturation of cocoonase in a varying temperature range of 250℃-850℃ using Circular Dichroism Spectroscopy (CD). For this, naturally secreted cocoonase was collected and purified. To observe the structural stability, cocoonase was subjected to varying temperature range of 250-850℃. The CD signals for cocoonase denaturation were recorded between the wavelength ranges of 190-260 nm. It was interesting to note that β- sheet structure of cocoonase retained its structural stability upto 450℃ whereas, beyond 450℃ thermal melting was observed. Thus, through present study, it can be concluded that cocoonase remains stable upto 450℃ and being thermally stable in nature cocoonase in the future can find its possible utility in various biomedical fields and silk processing industry.

PS 76

Genetic Affiliation of A Dravidian Tribe of Bangladesh: Oraon

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Genetic ancestry of South Asia is very complex in the terms of caste, languages, tribal population, and geographical distributions. Oraon is one of the oldest and largest tribes belonging from India, Bangladesh, Bhutan, and Nepal with a population size of over 5 million. They are the second largest tribal community of Bangladesh and are mainly concentrated in the Northwest region of Bangladesh. Linguistically Oraon belongs to the North-Dravidian languages family. There are many hypotheses about their origin and ancestry. Therefore to gain more clarity about their origin and ancestry we performed genetic studies on these people with their neighbouring populations and also want to understand their connection with the Brahui people of Pakistan. All analyses were performed on the genome-wide autosomal data. In our study, we performed allele frequency and haplotype-based analyses and find that Oraon is genetically closer to Austro-Asiatic peoples than Dravidian, While Brahui people are closer with other Pakistani populations. In contrast, with their known linguistic affinity, the Oraon share their more recent common ancestry with the Austroasiatic and Dravidian-speaking populations. All results support isolation by distance model.

PS 78

Statistical optimization, purification and stability kinetics of a thermostable bacterial amylase

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A thermophilic bacterium, *A. rupiensis* was isolated from Tuva Timba, Gujarat. The parameters affecting amylase production were optimized by response surface methodology, using Plackett Burman design, followed by Box Behnken Design. The trends revealed incubation temperature, medium pH, and starch concentration as the most significant variables. The amylase was purified by ion-exchange chromatography, followed by size exclusion chromatography with fold purification and yield of 18 and 35%, respectively. It catalyzed starch over a broader range of temperature and pH. The enzyme was stable at a broad range of temperatures and pH, displaying higher half-life and reduced deactivation rate constant. The feasibility of the starch catalysis reaction mediated by the studied amylase was substantiated by determining the thermodynamic parameters, such as alterations in the enthalpy, entropy, activation energy, and Gibb's free energy. The properties of the amylase such as calcium independence, alkali tolerance, and stability in presence of various chelators and surfactants aid uniqueness, novelty, and commercial promise.

Keywords: Amylase, Response surface methodology, Stability, Thermodynamics, Detergents

PS 83

Novel co-enrichment method for isolation of aerobic magnetotactic bacteria (MTB) producing magnetic nanoparticles (MNPs) with potential application in Microrobotics

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Magnetotactic bacteria (MTB) are a unique ecophysiological group of iron using bacteria that have immense potential applications. These bacteria have predominantly been isolated from oxygen-limited conditions of aquatic niches and rarely from aerobic soils. The Western Ghats biodiversity hotspot has been well studied for its fauna and flora diversity. The enrichment of MTB was carried out to suit aerobic mesophiles from forest soil. The major components included were Ferric quinate and Resazurin. The enrichment and isolates were characterized for their magnetic properties by using magnetotaxis, Vibrating Sampler Magnetometer (VSM), and X-ray diffraction (XRD) analysis. The isolates, namely *Bacillus* sp.S1 (MN212953), *Sphingoaurantiacus* sp. S2_03 (MN212954), *Burkholderia* sp. S2_08 (MN212955) and *Microvirga* sp. S2_09 (MN212956) were isolated and characterized to having magnetosome size of 2.5-8nm. This is the first report for the enrichment and isolation of potential MTB having high magnetic properties.

Keywords: Magnetotactic bacteria, enrichment, Magnetotaxis, Medium optimization, and VSM

THEME 4

AGRICULTURAL RESEARCH

FT-06

A sustainable approach for chromosomal staining with *hibiscus rosa-sinensis* and *opuntia ficus indica*

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Carmine dye, originally obtained from the dried female bodies of insects that prey on Cactus prickly pear, was once a natural product with carminic acid as the active colouring agent. Nowadays, its structure has converted into to a semi-natural product in order to cater to many functions like food colourant, nuclei and chromosomal staining (Dapson, R. W., 2007). Acetocarmine is another form of carmine dye widely used for chromosomal staining. However, if swallowed or absorbed on the skin can be hazardous to health, and most importantly when these synthetic dyes enter the water bodies the chemical overload can pose a serious threat to the aquatic life. In order to resolve the issue, we obtained *Hibiscus rosa- sinensis* flower from temple floral waste and *Opuntia ficus india* (prickly cactus pear) cladode pulp from the a roadside stationed stall preparing fresh seed juice. The of UV Analysis to obtain absorption maxima of 518 nm for Hibiscus dye and two peaks for cactus dye at 484 nm and the other at 535 nm. Thin Layer chromatogram displayed one spot of Hibiscus dye with Rf value of 0.46 and two spots with Rf value of 0.25 and 0.43 for Cactus dye. FTIR analysed C–O peaks at 1059 cm^{-1}, 452.70 cm^{-1}; C–H peaks at 2926 cm^{-1} 465.11 cm^{-1} and O–H peak at 3401 cm^{-1} for Hibiscus dye. While, OH-stretching vibration peak at 3294 cm^{-1} **,** COO^{-} peak at approximately 1600cm^{-1}, C-O peak at 1034 cm^{-1} **and** CO_3^{-2} peak at 875 cm^{-1}. Both, Hibiscus dye and Cactus pear dye were able to stain the chromosome and the meiotic stages were distinguishable.

Dapson, R. W. (2007). The history, chemistry and modes of action of carmine and related dyes. *Biotechnic & Histochemistry*, *82*(4-5), 173-187.

FT-07

The discovery of multifunctional mycorrhizal aid bacteria and their inoculation on bananas with AMF to treat P deficiency

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The present study focused on the screening, identifying, and characterization of mycorrhizal helper bacteria (MHB) from the mycorrhizal inoculated banana plant's rhizosphere. Total 60 MHBs were isolated and screened for their ability to produce biofilm. Thirteen potent biofilm-producing isolates were selected for N-AHL production. MHB4CP was selected for further PGPR and biochemical characterization based on N-AHL production. Molecularly, MHB4CP belongs to *Enterobacter cloacae,* was selected for their ability to germinate mycorrhizal spore in *In Vitro.* AMF colonization was observed through microscopic analysis, and results showed 45-50% higher colonization in the presence of MHB4CP than AMF alone. Further, MHB4CP and AMF were combined and inoculated on Banana plants to alleviate P deficiency as an alternative to chemical fertilizers. In pot experiments, four different level treatments (T-Control, T2, T3, and T4 as MHB4CP, AMF, and MHB4CP with AMF, respectively) were performed. The study reported a significant improvement in all the physiological and biochemical parameters compared to control from the pot experiments. The overall study explains the positive interaction between MHB4CP with AMF to improve the P nutrition and overall growth of the banana plant.

Keywords: Mycorrhizal helper bacteria, AMF, Phosphate, Banana, N-AHL

FT-08

Studies on Isolation of Bacteriophages against Bacterial Blight Pathogen Xanthomonas axonopodis pv. punicae and its Molecular Characterization

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Pomegranate is one of the commercially significant organic fruits of India. It is local to Iran, and which belongs to family Lythraceae. Bacterial blight is threat for pomegranate cultivation which reduces the yield and influences the market cost of table pomegranates. The aim of this study is to recognize bacteriophage from infected leaf, soil, and sewage to deal with the bacterial blight disease. The bacteriophages were isolated from various sources, viz., infected leaf, soil, and sewage. The dual plate culture technique was used in which bacteriophage and Xanthomonas axonopodis pv. punicae were inoculated on same plate, clear zones were appeared after overnight incubation. After In-vitro screening of bacteriophages from infected leaf and soil sample, most Bacteriophages were isolated at 6000 rpm for 10 min and 0.45 µ filter and least bacteriophages were isolated at 6000 rpm for 20 min and 0.22 µ filter. Most Bacteriophages were isolated from sewage sample at 6000 rpm for 20 min and 0.22 µ filter and least bacteriophage was isolated from 6000 rpm for 10 min and 0.45 µ filter. Isolated bacteriophages from various sources demonstrated their adequacy against bacterial blight pathogens.

Keywords: Pomegranate, Xanthomonas, Bacterial blight, Bacteriophage, Molecular characterization

FT-09

Enrichment of fruit juice with different Herbal Extracts and analyzing physico-chemical, sensory and nutritional aspects of the beverage.

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Sapota is tropical evergreen fruit that contains digestible sugar and is virtually treasure of minerals such as iron, carotene, and vitamin C. Herbs are added in the fruits as appetizer that improves the nutritional and healthy aspects of beverage. Herbal based beverages are prepared with the addition of Mentha, Basil, Ginger, Karela and Amla extracts to sapota fruit juice. People suffer from health disorders and Due to their economic problems they can't afford nutrient rich food. This study shows how herbal based beverage can be prepared and can add to its nutritional value. These types of beverages are recommended in normal diet as it will help in relieving stress and contribute as an anti- inflammatory agent. Herbal based beverage has shown potential to serve as a healthy beverage and hence their availability in the market will definitely benefit the health conscious people.

Keywords: Herbal extracts; Anti-inflammatory agent; Sapota; Healthy beverages

FT-10

Green synthesis of silver nanoparticles using Millettia pinnata leaf extract: Effect on seed germination and growth enhancement in black gram

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Farmers are facing problems in harvesting higher-yielding and good quality crops. Here we have focused on this issue and improved the yield and seed quality of black gram. Ecologically synthesized nanoparticles are current trends in various fields of research. Pongam leaves have been used as green manure due to their nitrogen and sulphur content. Thus, our study is to evaluate the effect of green synthesized silver nanoparticles from pongam leaf extract on seed germination and growth enhancement of black gram. Silver nanoparticles have been synthesized from pongam leaf and characterized. Its effect was analysed in black gram seed through a petri-plate study. A further pot study of black gram was done with the same. In a seed germination study, a concentration of biosynthesized silver nanoparticles (1.5mM) was found to have potential activity on black gram seeds. A concentration of 1.5mM has been characterized and confirmed that silver nanoparticles have been synthesized from pongam leaf extract. Moreover, pot study in black gram was conducted, which significantly enhanced the plant growth (root length and shoot length) and its yield by an appropriate 1.5 fold. Based on the results obtained, our nano-fertilizer was proven to increase the grain yield in black gram compared to the control and standard group. N: P: K liquid fertilizer was used as the standard in our study.

Keywords: Ecological; AgNPs; Seed quality; Crop yield; Black gram

FT-11

Denoting Bacterial Secondary Metabolites (B-SMs) as Bio-Syrup for Fungal disease Management in Agriculture.

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Bacterial secondary metabolites (B-SMs) are bioactive, low molecular weight products made-up by bacteria in idio phase of its metabolic cycle. These compounds are not necessary for the growth of bacteria but they are needed to trigger secondary response mechanisms i.e. resistance, survival and/or defence. These metabolites are also known as the specialized metabolites. Rhizo bacteria generates a huge volume of secondary metabolites which have countless diverse physio-chemical and biotic properties. These amalgams mainly cover phospholipids, peptides, polypeptides, quinols, polyketides, alkaloids, polyenes, phenazines, volatiles, amino sugars, macro lactone, aminoglycosides and many more-SMs are well-known for its numerous biocontrol activities i.e., antifungal, antibacterial, antiviral, antitumor and anti-algal assets. This presentation mainly delivers an insights a comprehensive gestalt through significant characteristics of SMs such as SMs classification, their bacterial production and foremost consideration is paid to applications of bacterial SMs as biocontrol agents against phyto-pathogenic fungi for fungal disease management in agriculture.

Keywords: Rhizobacteria, Bacterial secondary metabolites (B-SMs), Bio-control, Antifungal activity, Disease management.

FT-12

Exploring multifaceted potentialities of rhizobacteria isolated from central Gujarat region for the growth promotion of *Arachis hypogaea L.*

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Plant growth promoting rhizobacteria are commonly used as inoculants for improving the growth and yield of agricultural crops. They are rhizospheric organisms that upgrade supplement accessibility and incite biotic and abiotic stress resilience through a wide cluster of systems to improve rural manageability. A Three bacteria were isolated from the rhizospheric soil of different sites of Gujarat. We discuss the three individual hormones produced by bacteria on plant growth and development, their supply with mineral nutrients, water and growth promotion of plant. Auxin biosynthesis play a role in cell enlargement, cell division, vascular tissue differentiation, apical dominance and root initiation. The effects of gibberellins on the plant are stem growth, induction of seed germination, enzyme production, and induction of maleness in dioecious flower. The function of cytokinin in plant growth are morphogenesis, leaf expansion and chloroplast development and out three isolates AB1, AB2, and AB3are gave positive results for auxin, Gibberellin and cytokine. A pot culture experiment was conducted using *Arachis hypogaea L*. The maximum rates of plant height, number of leaves, pod bearing branches and nodules were recorded by applying inoculants of isolates. Further, we sequenced the AB1 isolate, which revealed that it was a *Bacillus rugosus*.

Keywords: PGPR, Phytohormones, Auxin, Gibberellin, Cytokinin, GC-MS, FTIR

FT-13

Beyond Myth: I can't eat carbs if I have diabetes

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Staple cereals are feeding for over half of the world's population and a significant positive association has been found between its consumption & risk towards diabetes in various cohort studies. International Diabetes Federation (IDF) alarmed recently that more than 537 million people have diabetes or pre-diabetes and also endorsed the fact that 58-71% reduction in hyperglycemia induced complexities could be achieved through dietary interventions. Fine tuning the carbohydrate bioavailability thus being the major key, the nutrition scientists have been striving hard through various physical, chemical and molecular strategies; while often found to neglect the scientific role behind certain indigenous methods. The traditional knowledge of oil type and its time of addition during cooking, controlling starch digestibility was recently unraveled where they explained the possibility of lipids to form inclusion compounds with amylose. The amylose–lipid inclusion, when resistant to α-amylase, leads to prolonged enzymatic hydrolysis. The slow or less digestibility of these complexes has been reported to reduce the postprandial serum glucose and insulin response, termed as resistant starch type V. Many more, the extent of complexation and the mechanism behind its reduced digestibility is still not much known. In the light of above- mentioned facts, we believe that this research probing a link between food matrix interaction (starch-lipid) and glycemic potential in staple cereals would deliver valuable insights.

FT-14

Biocontrol of Fusarium wilt disease in *Solanum Lycopersicum L*. by novel saprobe fungi from Charotar region of Gujarat, India

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The presented research aimed to identify potent saprobe having antagonistic activity against *Fusarium oxysporum* and to check the effect of it on tomato plants as a biocontrol agent which decreases disease susceptibility of plants. First, the wilted tomato plants were analyzed for the predominant pathogenic fungal strain identified by rRNA analysis was *Fusarium oxysporum f. sp. lycopersici*. The antagonistic effect of five different saprobes was checked against the isolated *F. oxysporum*. The highest antagonistic effect was reported in the case of *Periconia byssoides*. The *Periconia byssoides* extract-based biocontrol formulations were applied to the healthy plants which showed a significant increment of 1.49 fold in chlorophyll content, 1.32 fold in DPPH scavenging, and 2.05 fold in the total antioxidant potential of leaf extract at 30 days compared to control. *In planta* assay showed that live biomass and *P. byssoids* extract exhibited a respective wilt disease reduction of 56% and 67.7% as compared to chemical fungicidal control which was 49%. Thus, the presented analysis revealed that *Periconia byssoides* has excellent potential as a biocontrol agent for managing Fusarium wilt in tomato plants via inducing systemic plant defense.

PS 01

Antibacterial and antilarvicidal potentials of Silver nanoparticles synthesized from *Bambusa arundinaceae* Leaves

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In the present study, the silver nanoparticles was synthesized from aqueous extract of *Bambusa arundinaceae* leaves. The synthesized (*Bambusa arundinaceae* derived silver nanoparticles) BA-AgNPs were characterized using UV-vis spectroscopy, FTIR, SEM and their antibacterial along with larvicidal potential was evaluated. SEM analysis revealed that BA-AgNPs were predominantly spheroidal shape with particle size in a range of 20 - 80 nm. It present IC50 value (0.71 mg/ml) for DPPH antioxidant activity. In larvicidal bioassay, biologically synthesized AgNPs were more toxic (LC_{90} = 50.8 mg/L) than silver nitrate (LC_{90} = 79.0 mg/L) to fourth instars larvae of *A. aegypti*. BA-AgNPs showed considerably higher antimicrobial activities against *Escherichia Coli (E.Coli)* when compared with both $AgNO_3$ and streptomycin alone. The collective effect of BA-AgNPs with streptomycin was higher as compared to BA-AgNPs alone which indicates the synergistic effect of these components. The results of this experiment suggest that BA-AgNPs are a quite ideal candidate for the development of new antimicrobial drugs.

PS 02

The enriched extraction efficiency of secondary metabolites of cottonseed cake using ultra sonication effectively controlled root-knot disease in Fenugreek, *Trigonella foenum-graecum* L.

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Here, we used the ultrasonic method to enhance the extraction efficiency of secondary metabolites of cottonseed cake. The sonicated extract sample was analysed using liquid chromatography-mass spectrometry (LC-MS) for determining the chemical composition. We were observed that sonicated extract sample produced significant numbers of metabolites compared to the control sample. The different concentrations of cottonseed cake extract were tested to confirm the antagonistic potential against root-knot nematode, *Meloidogyne javanica*. The antagonistic test was performed on infective second-stage juveniles (J2s) of *Meloidogyne javanica in vitro*. A similar approach was extended in pot study against *Meloidogyne javanica* infesting Fenugreek, *Trigonella foenum-graecum* L. The obtained results indicated that sonicated cottonseed cake extract significantly inhibits the J2s movement, and it was also noticeable that root galls were reduced in treated Fenugreek plants. Results showed that this analytical method is simple, robust, environment-friendly, which could be utilized to effectively manage the root-knot disease of crops.

Keywords: Sonication, Cottonseed cake, Root-knot index, Management

PS03

Biocontrol and Plant growth promoting ability of *Planococcus maritimus D47*

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Salinity is a predominant abiotic stress in agricultural soils. The solution is using phytoremediation or bioremediation for reclamation of salt-affected soils on a giant scale. Rhizobacteria living directly or indirectly in the plant rhizosphere are referred to as plant growth which promotes rhizobacteria within the plant growth square *Planococcus maritimus*, gram negative cocci, is psychrotolerant and halotolerat. Firstly isolated from the sea in Korea and crude oil reserves. Series of experiments were carried out in minimal media under different [salt]. Members of *Planococcus spp*. influencing expression of plant growth promoting abilities and pigment production under saline stress was investigated. *P. maritimus* D47 showed efficient siderophore and HCN production. The isolate failed to show any significant P-solubilizing ability as well as antifungal activity against common plant pathogens *Fusarium oxysporum* and *Aspergillus niger*. Moreover, the isolate withstands salinity stress by maintaining the high production of the carotenoid-like pigment. *P. maritimus* D47 can develop as a potent PGPR or bioinoculant, capable of performing even under salinity stress.

PS 05

Evaluation of anticancer and antioxidant potential of millettia pinnata seed extract

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Cancer continues to remain the leading cause of mortality worldwide, in spite of major technological advances. Phytochemicals are gradually emerging as a rich source of effective but safer agents against many different types of cancer. The adverse effect associated with currently available anticancer medications may be overcome by using plant-derived compounds. In this study the hydromethanolic extract (HME) of *Millettia pinnata* seeds was analysed for antioxidant and anticancer activity. Seeds were first defatted and then subjected to extraction by Soxhlet apparatus. The Qualitative Analysis of HME was carried out using preliminary biochemical test, Thin Layer Chromatography (TLC) and Fourier Transform Infrared (FTIR). The quantitative analysis of phenols, flavonoids, tannins in HME was estimated using standard curve of Gallic acid, Quercetin and Tannic acid respectively. The antioxidant activity of the extract was determined by four different free radical scavenging assay. The phytochemical lethality assay and anticancer activity was determined using Brine Shrimp Lethality Assay (BSLA) and MTT assay respectively. The HME seed extract was found to be rich in phenols, flavonoids, alkaloids, with potent antioxidant activity. The sample exhibited cytotoxicity towards MCF-7 breast cancer cell line.

PS 06

Pharmacognostic and anticancer potential of peltophorum pterocarpum flower extract

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Despite major technological advances and cancer therapies, breast cancer is the leading cause of mortality in India. Phytochemicals are gradually emerging as a rich source of effective but safer agents against many different types of cancer. The adverse effects associated with currently available anticancer medications may overcome by using plant-derived compounds. The study of natural compounds and phytochemicals from plants that may inhibit cancer progression is important to make effective drugs for cancer treatment. Antioxidant and anticancer activity of hydro-methanolic extract (HME) of *Peltophorum pterocarpum* flowers, Bergenin (active compound of *Peltophorum pterocarpum*) was investigated. Flowers were dried and pulverized, and the hydro-methanolic extract was prepared using the Soxhlet method. The qualitative analysis of the extract was done using the preliminary biochemical tests, thin-layer chromatography, and FTIR. The quantitative analysis of phenols, flavonoids, tannins in the extract was estimated using a standard curve. The antioxidant activity of the extract was estimated by DPPH, ABTS, Nitric oxide and Superoxide anion scavenging assays. The toxicity and anticancer activity were investigated using Brine shrimp lethality assay and MTT assay respectively. HME was found cytotoxic towards the MCF-7 breast cancer cell line.

PS 07

Do pesticides affect nitrogen fixation by interfering with nitrogenase? - *in silico* insight

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Pesticides are known to affect nitrogen fixation and nitrogen fixing rhizobacteria. However, there has been very little information available about the molecular mechanism of the impact of pesticides on the nitrogen fixation. This study investigated the possibility of interaction between nitrogenase enzyme complex and pesticide molecules which could possibly alter enzyme complex thereby affecting the nitrogen fixation. The study was carried out by molecular docking using the Autodock-Vina tool. The 3D structure of nitrogenase enzyme complex and a total of nine pesticides were downloaded from PDB database and Pubchem database respectively. The docking results indicated that the pesticides can bind with the nitrogenase enzyme either blocking the active site or leading to conformational changes, which may interfere in the nitrogen fixation. Out of nine pesticides two pesticides showed very strong binding with the nitrogenase enzyme complex, five pesticides showed fairly strong binding with the enzyme and only one pesticide showed comparatively weak binding with the enzyme which was apparent from the binding affinities. This study highlights that the pesticides might be interfering with the nitrogenase enzyme complex and thereby affecting the nitrogen fixation as pointed out in the earlier reports on pesticides.

PS08

Characterization and evaluation of antibacterial activity for raw and ripen states of banana peel

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Banana peels, a common household waste and industrial waste, leads to many environmental problems .To overcome and reduce such environmental burden, this study was planned. In this study, we have conducted chemical characterization of raw and ripen states of banana peel and used the agar well diffusion technique to evaluate their antibacterial activity on gram-positive and gram-negative bacteria. Extract concentrations of 100%, 75%, 50%, 25%, 12.5 and 6.25% were used for experiments. We observed that in the ripen-banana peel powder – aliphatic ether, alkane, cyclic alkene and alcohol functional groups were present. In contrast, in the raw-banana peel powder halo compound, 1,2,4-trisubstituted, anhydride, phenol, conjugated alkene, alkane and alcohol functional groups were present. When aqueous extracts and methanolic extracts were compared, aqueous extract concentrations showed no activity. Still, certain methanolic extract concentrations showed antibacterial activity against *Staphylococcus aureus* and *Bacillus subtilis* compared to *Escherichia coli* and *Pseudomonas aeruginosa*. At different solvent concentrations, raw-banana peel showed activity against *Bacillus subtilis* and *Staphylococcus aureus* for 100% and 75%, whereas ripen-banana peel showed activity only for 75%. In conclusion, methanolic banana peel extracts showed prominent activity against gram-positive organisms and can help formulate medicinal products for infections caused by gram-positive organisms.

Keywords: antibacterial activity, characterization, banana peel extract

PS10

Herbal approach to COVID-19

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Ayurveda, the world's oldest yet practiced medical system, originated in India about 5000 years ago. This approach is the essence of herbal medicine, and it has earned a lot of global notoriety under the name "pharmacognosy" during the COVID-19 pandemic. Other herbal medical systems, such as Siddha medicine from ancient India, are also popular. Many plants native to India or South Asia, including turmeric, ginger, and others like guava and ajwain, have been studied for their anti-corona infection properties. Surprisingly, they are described in ancient Sanskrit writings and have long been utilized in India as a treatment for respiratory disorders. These contain antiviral, anti-inflammatory, and immunostimulatory phytochemicals that can aid with coronavirus treatment. The low COVID-19 fatality rate in India was due to the fact that these plants are common ingredients in Indian cuisine and were also consumed in "kadha".Kabasura Kudineer, a combination of medicinal herbs developed by Siddha medicine in India against COVID-19, is also the reason for the low fatality. In the second wave, promising results were seen with a combined herbal and allopathic approach towards COVID-19 prevention and treatment in India. This can ensure a faster pace of success against the virus in the future also.

Keywords: Ayurveda, metabolites, antiviral, anti-inflammatory, immunostimulatory.

PS11

Deciphering the effect of induced mutagenesis in medicinally important plant *Catharanthus roseus*

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Catharanthus roseus, synthesizes bioactive therapeutic metabolites, known as monoterpenoid indole alkaloids (MIAs) including antineoplastic vinblastine, vincristine and antihypertensive ajmalicine, a serpentine. Antineoplastic, vinblastine and vincristine constitute pharmaceutical metabolites of key importance and hence has a high global demand as anticancer agents. However, the *in-planta* biosynthesis and accumulation of these Phyto-pharmaceuticals is very low, attributed to their high cytotoxicity in the plant. The present study was carried out to create abiotic stress through chemical mutagenesis *viz.* sodium azide and ethyl methane sulfonate and physical mutagen X-rays on *C. roseus* seeds and chase its effects over important genes and alkaloids of MIAs pathway *in planta*. The chemical mutagenesis resulted in the development of a pollen-less male-sterile mutant flower bearing *C. roseus* plants with distinct leaves morphology and flower colour. The physiological characteristics of mutated plants were studied in the form of rubisco activity and chlorophyll content, followed by HPLC analysis of antineoplastic vinblastine and its precursor molecules catharanthine and vindoline. The results were compared with the real time analysis of major rate limiting MIAs pathway genes and transcription factors WRKY1 and ORCA2 gene expression analysis. The obtained results demonstrated the capabilities of mutagenesis to enhance antineoplastic vinblastine content in mutated plants.

Keywords: *Catharanthus roseus,* Antineoplastic, Mutagenesis

PS12

Parental polymorphism survey of soybean (*Glycine max*) genotypes with varying levels of phosphatidylcholine, protein, and lipoxygensase-2

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Parental polymorphism survey is the first step in mapping quantitative trait loci (QTLs) linked with a certain trait or introducing desirable traits into a variety from a donor parent using marker-assisted backcross breeding. In the present study, 695 SSR markers covering 20 linkage groups were surveyed for parental polymorphism in 5 parental combinations consisting of seven soybean genotypes, namely NRC151, PS1476, IC275, IC574373, AVKS215, JS20-34, and JS20-98. NRC151 is a high-protein (48%) and high phosphatidylcholine (8.8 mg/g soy flour) soybean genotype. PS1476 is a high phosphatidylcholine (8.4 mg/g soy flour) soybean genotype, while IC275 is a low-protein (35%) and low phosphatidylcholine (2.04 mg/g soy flour) soybean genotype. IC574373 is also a low-protein (37%) soybean genotype. AVKS215 is a lipoxygenase-2 free (Lox-2 -ve) soybean genotype, while JS20-34 and JS20-98 are high-yielding soybean varieties in which lipoxygenase-2 isozyme is present (Lox-2 +ve). Five different parental combinations, namely, NRC151×IC275, PS1476×IC275, NRC151×IC574373, JS20-34×AVKS215 and JS20-98×AVKS215 showed 40.43, 43.02, 36.26, 39.42, and 41.29% parental polymorphism, respectively. Polymorphic markers found in these parental combinations can be used to genotype F_2/RILs for the purpose of identifying QTLs linked to phosphatidylcholine, protein content, and recovering recurrent parent genome content to develop lipoxygenase-2 free high-yielding soybean genotypes.

PS14

FT-IR based Qualitative and Quantitative analysis of α-amylase resistant starch derived from unripe banana flour and bread-making process

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Intracellular Glucose management is a new challenge to a developed world as one-third of the urban population is suffering from Diabetes and other lifestyle disorders. The leading cause is inappropriate diet and a sedentary lifestyle. The starch-rich diet is often the condition's origin because starch digestion rapidly releases glucose into the bloodstream. Eventually, increasing the intracellular level of glucose. Worldwide, food researchers are investigating the diet substitutes that regulate glucose release. In that sense, food containing resistant starch (catalysis-resistant) is a promising alternative. Recently, the unripe banana has garnered much attention as a source of resistant starch. The present study investigates the content of resistant starch during the various stages of the Banana flour bread-making process. For that, we propose the FT-IR spectroscopy-based detection of resistant starch (retrograded starch). Starch and retrograded starch have different signature bond stretching regions, and through FT-IR, the band shift can quickly be recorded. Here in our study, the precise estimation for resistant starch was performed towards the mid-infrared region (1400–800 cm−1) of FT-IR spectroscopy. The results of FT-IR were further ratified with X-ray Diffraction (XRD), TGA-DSC, and Scanning Electron Microscopy analysis. The pure crystals of retrograded starch gave a characteristic peak at 1640 cm^{-1}.

Keywords: FT-IR, Resistant starch, SEM, Unripe banana flour, XRD.

PS15

Study on plant derived magnetic nanoparticles as potent biocontrol agent

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In current scenario where demand in food production is constantly increasing with rise in population, threat of plant pathogens has also increased. Destruction of crops due to diseases caused by plant pathogens has become difficult to control with conventional physical and chemical methods. Here, nanotechnology stands as a new weapon against rising challenges in agriculture. Using magnetic nanoparticles for controlling plant pathogenic fungus can be developed as a potent method for disease management in plant. In present study, effect of plant based Fe_3O_4 magnetic nanoparticles were studied against *Fusarium oxysporum f.sp. ciceris*. Antifungal effect of these nanoparticles and its minimum inhibitory concentration were studied using soft agar assay, plate assay and broth assay. Its vivo effect was checked with pot trails on chickpea. Fe_3O_4 magnetic nanoparticles has showed adequate effect in inhibition of fungus both in vitro and in vivo.

PS17

Antifungal activity of selected botanical extract against plant pathogenic fungi for management of cumin wilt disease and HPTLC fingerprinting

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Fusariumo xysporumf.sp.cumini is a fungus which is responsible for wilt disease in cumin across the world. Chemical fungicides have major ecological consequences and are noxious to non-target creatures. Plant based pesticides and plant metabolites materialize to be among the best choices since they are identified to comprise a lower ecological effect and pose less risk to consumers than synthetic pesticides. In order to establish eco-friendly management, plant extracts of *Moringa oleifera* were used in an in- vitro antifungal test against *Fusariumoxysporum f. sp. cumini*. Different solvent systems were used to extract the selected plant, including methanol, acetone, aqueous methanol, aqueous acetone, dichloromethanol:methanol, and water. Preliminary phytochemical examination of all extracts revealed positive results for major phytoconstitutes such as phenol, flavonoid, alkaloid, tannin, and so on. The poison food technique was used to assess the antifungal activity of extracts at svarious concentrations (4 %, 6%, 8%, 10%, 12% and 14 %) on mycelial development of against *Fusariumoxysporum* and obtained a favourable result in the form of %inhibition. HPTLC fingerprinting was done for each extract and found positive result for flavonoid and alkaloid.This work suggests that botanical extracts might be a useful option in producing powerful plant-based fungicides for the treatment of *Fusariumoxysporum f. sp. cumini* in organic farming.

Keywords: *Fusariumoxysporum f. sp. cumini*, cumin, Plant metabolites, *Moringa oleifera*, poison food technique, HPTLC fingerprinting, organic farming

PS20

Characterization of potassium solubilizing bacteria from corn rhizoplane

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Potassium is one of the most important elements in plant growth. Most of the potassium reserves on The Earth are in insoluble mineral form, which represents a limitation for its absorption by plants. Some microorganisms have the ability to solubilize this mineral. This work aims to isolate and identify potassium solubilizing bacteria resident in the corn rhizoplane. For this, bacteria that formed a solubilization halo around the colony in solid Aleksandrov culture medium were selected. Subsequently, they were characterized taking into account the appearance of the colonies, cell morphology, and were identified by partial 16S rDNA sequencing. It's solubilizing and potassium releasing capacity was determined under different conditions of temperature, pH and salinity, using potassium feldspar and muscovite as insoluble sources of potassium. Eight strains identified with the genera Paenibacillus, Lysinibacillus, Arthrobacter, Bacillus, Pseudomonas and Stenotrophomonas were obtained. The release of potassium from feldspar was favoured at 28 and 30 ºC, pH 7.5 and a saline concentration of 4 g L-1 ; while in the presence of muscovite the best conditions were 30 and 37 ºC, pH 5.5 and 7.5 and 4 g L-1 of NaCl. The most efficient strains were Bacillus sp. INCA-FRc7 and Bacillus sp. INCA-FRc19x with yields up to 2.095 mg L-1. These strains could become economical alternatives to the use of potassium fertilizers and contribute to the ecological sanitation of the agroecosystem.

PS21

Green synthesis of silver nanoparticles using Millettia pinnata leaf extract: Effect on seed germination and growth enhancement in black gram

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Farmers are facing problems in harvesting higher-yielding and good quality crops. Here we have focused on this issue and improved the yield and seed quality of black gram. Ecologically synthesized nanoparticles are current trends in various fields of research. Pongam leaves have been used as green manure due to their nitrogen and sulfur content. Thus, our study is to evaluate the effect of green synthesized silver nanoparticles from pongam leaf extract on seed germination and growth enhancement of black gram. Silver nanoparticles have been synthesized from pongam leaf and characterized. Its effect was analyzed in black gram seed through a petri-plate study. A further pot study of black gram was done with the same. In a seed germination study, a concentration of biosynthesized silver nanoparticles (1.5mM) was found to have potential activity on black gram seeds. A concentration of 1.5mM has been characterized and confirmed that silver nanoparticles have been synthesized from pongam leaf extract. Moreover, pot study in black gram was conducted, which significantly enhanced the plant growth (root length and shoot length) and its yield by an appropriate 1.5 fold. Based on the results obtained, our nano-sfertilizer was proven to increase the grain yield in black gram compared to the control and standard group. N: P: K liquid fertilizer was used as the standard in our study.

Keywords: Ecological; AgNPs; Seed quality; Crop yield; Black gram.

PS 22

Preliminary screening of phytochemical analysis of *Picrorhiza kurroa* root extract

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The plant *Picrorhiza kurroa* is a well-known traditional medicine belongs to the genus *Picrorhiza*, a member of the foxglove family, Scrophulariaceae. It is renowned for its hepatoprotective property and also proved for its various other pharmacological properties such as antioxidant, anti-inflammatory, cardiotonic, brain tonic. It is also used in dyspepsia, fever, purgative, antiperiodic, cholagogue, cathartic, carminative, anthelminthic, asthma, flatulence, cardiac complaints, and chronic hepatitis. The preliminary study was done to analyse the phytochemical screening of the methanolic root extract of *Picrorhiza kurroa* .200gms of the root powder dissolved in 600ml of the methanol (1:3 w/v). Mixture was shaken in orbital shaker at 60rpm for two successive days. The supernatant was filtered through Whatman filter paper (No 2) on a Buchner funnel, while the residues were used for a second (400ml) and third (200lml) extraction. Each day the dissolved parts were filtered and stored in a pre- weighed flask before drying. After the third extraction, the filtrates were decanted and combined. The crude extract was collected in a petri-dish, and used for the phytochemical studies. Total yield obtained 42.179gms (w/v). kutki (*Picrorhiza kurroa)* has become endangered species due to its over exploitation for medicinal purposes. In spite of its geographical distribution, it is available in all the herbal drug stores. The rationale behind this study is to authenticate and standardize the kutki by different parameters to enable its identity, purity and efficacy. Methanolic root extract of *Picrorhiza kurroa* reveal the presence of secondary active constituent's such as glycosides, cardiacglycosides, Tannins, terpenoids, steroids and coumarins. This may strongly supports the further quantitative and animal studies, planned to explore the molecular mechanisms for the cardiovascular disorders.

PS23

Biosynthesis and interpretation of *Tinospora cordifolia* zinc nanoparticles

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Nanoparticles are important features that reflect size, morphology and other properties. The currentstudy focuses on the biosynthesis of zinc nanoparticles using stem extract of *Tinospora cordifolia*.Green synthesis of ZnNPs can terminate chemical pathogens that may have hostile effects, hencemaking nanoparticles more accordant with eco-friendly approach. Therefore, we tried to organisea combination of *Tinospora cordifolia* (Giloy) medicinal properties possibly with nanotechnologywith special emphasis to understand its therapeutic value in the field of medicine for the development of antibacterial agents. It has evidence in traditional Ayurveda for fever, jaundice, chronic diarrhoea, asthma and various skin diseases. The prepared zinc nanoparticles of the stem of *Tinospora cordifolia* have been distinguished by different methods such as UV-Vis spectroscopy, FTIR, EDAX and FESEM. A surface plasma resonance (SPR) of the prepared nanoparticle was observed at 274 nm. The spherical morphological appearance as seen with FESEM analysis showed a size range of 76.8 nm-141 nm and the corresponding zinc content wasfound to be 69.1% as per the EDAX analysis. Using FTIR approach, we observed that the ZnNPsof *Tinospora cordifolia* showed peaks at 3316cm^{-1}, 1571cm^{-1}, 1380cm^{-1}, 1028 cm^{-1} and 523cm-1corresponding to functional groups OH stretching (alcohol group), C=0 stretching (anhydride group), C-H bending aldehyde, C-N stretching amine group respectively. The FTIR spectra and the UV spectra corresponded to the *Cubebin,* the standard secondary metabolite of *Tinospora cordifolia.* The zinc nanoparticles are effective antimicrobial agent against pathogenic microorganisms. The ZnNPs of *Tinospora cordifolia* in our present investigation also showed antimicrobial activity against *Bacillus subtilis, E.coli* and *S. aureus* respectively. This biological synthesis of zinc nanoparticles proved to be clean, non-toxic, bactericidal and environmentally acceptable.

Keywords: *Tinospora cordifolia,* stem extract, nanoparticle, green chemistry.

PS 24

PGPR attribute analysis of Aamla Endophytes

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Of the roughly 300,000 plant species found on earth, each plant is a host to one or more species of endophytic microbes, however only a few of these plants have been completely studied in regard to their endophytic biology. As a result, the opportunity to find novel and unique endophytic microbes amid numerous plants in different ecosystems is considerable. Endophytes are symbiotic microorganism lives inside the different tissue part of plant like nodule, root, bark, leaves and stems without causing any damage to plant or plant part. Recent studies have revealed that endophytes associated with plant in a variety of relationship like mutualistic, commensalism, co-operation or pathogenic. In turn plant provides nutrient and shelter to the endophytes. During mutualistic or symbiotic life cycle in plant endophytes protect plant from drought, increased resistance to disease, protect plant from nematode attack and grazing, provide resistance to heat, and help in plant growth promotion. Bacterial and fungal endophytes are widespread inhabitants inside plant tissues and have been shown to assist plant growth and health. *Phyllathusemblica* L. is the scientific name of Indian Gooseberry commonly known as “Amla” is an angiosperm of the order malpighiales and family Phyllanthaceae. Preliminary research of *Phyllathusemblica* L. has demonstrated that it has antibacterial, antidiarrhoeal, antidysenteric, antioxidative, antiviral, and resistance building properties. Very few endophytes belonging to Amla plant have been reported up till now, so sampling and isolation of endophytes from various parts of plant will help in isolation of novel endophtes.

PS25

Isolation and characterization of PGPR and its potential application as Biocontrol agent

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Major abiotic and biotic factors affect the crop production. Excessive use of pesticide and chemical fertilizers are major threat affecting soil fertility and natural productivity of crop. Hence, to overcome this problem PGPR offers a promising alternative to replace chemical fertilizers and pesticide and supplements. In the present study,62 plant growth promoting rhizobacteria (PGPR) were isolated from different soil samples, And characterized on the basis of colony characteristics, morphology and Gram's reaction. Further, all 62 isolates were checked for multiple traits of plant growth promotion. And isolates showing all multiple traits positive were checked for biocontrol activity. Out of 62 isolates 11 isolates showed multiple traits were checked for Chitinase and Keratinase activity. Isolate No PS 22 showed minimal Chitinase and Keratinase activity compare to other isolates. Hence, it can be concluded that isolate PS 22 showed all multiple traits and biocontrol activity, so it can be used as potential biofertilizers and biocontrol agent.

Keywords: PGP traits, Rhizobacteria, Biocontrol agent

PS 26

Cassia angusifolia Vahl.: An Astonishing herb

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Senna (*Cassia angustifolia* Vahl.) also known as Indian senna or Tirunelveli senna is an under shrub of the family Caesalpiniaceae. The plant has a global acceptance as natural medicine for many ailments, especially constipation. The anthraquinone glycosides like Sennosides (sennoside A, B, and D) and flavonoids present in the plant are responsible for its major biological activities. Senna has set its high value in ethnopharmacology as a treatment for digestive, respiratory, and nervous system problems and weight loss. Apart from its laxative properties, parts of it have also been proven as antibacterial, antifungal, antiviral, anti-parasitic, anti-insecticidal and antioxidant. Some *in-vitro* studies also suggest antidiabetic, hepatoprotective, hypolipidemic and even anti-cancerous activity of Indian senna. Negative acute toxic effect and nearly negligible side effects which is due to overdosing in most of the cases give plausible explanation to the universal acceptance of Indian senna as a safer laxative.

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