SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
ACCREDITED WITH GRADE "A++" BY NAAC
CATEGORY - 1 UNIVERSITY BY UGC

Proceedings of the International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD - 2026)

6th – 7th February 2026

Jointly Organized by

Centre for Drug Discovery and Development,
Centre for Modern Organic Agriculture Research &
School of Bio & Chemical Engineering
Sathyabama Institute of Science and Technology
Chennai – 600 119. Tamil Nadu. India

ISBN: 978-93-48577-14-6

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
ACCREDITED WITH GRADE "A++" BY NAAC
CATEGORY - 1 UNIVERSITY BY UGC

Proceedings of the International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD-2026)

6th – 7th February 2026

Jointly Organized by

Centre for Drug Discovery and Development
Centre for Modern Organic Agriculture Research
&
School of Bio & Chemical Engineering
Sathyabama Institute of Science and Technology
Chennai – 600 119. Tamil Nadu. India

In association with

Association of Agriculture Technology in Southeast Asia, Thailand

AATSEA

&

IITM PRAVARTAK
CATALYSING INNOVATION

ISBN: 978-93-48577-14-6

Chief Patron

Dr. Mariazeena Johnson

Honourable Chancellor

Sathyabama Institute of Science and Technology

Patron

Dr. Bharathi. B.

Director (Innovation)

ICMBSD - 2026 - Organizing Team

Convenor
Dr. M. Radhakrishnan
Professor (Research)

Organizing Secretary
Dr. V. Gopikrishnan
Assistant Professor (Research)

Centre for Drug Discovery and Development
Sathyabama Institute of Science and Technology, Chennai, India.

Co-Organizing Secretaries

Dr. S. Bharathi
Assistant Professor (Research)
Centre for Modern Organic Agriculture Research

Dr. B. Ramesh Kumar
Head
Department of Biotechnology
School of Bio &Chemical Engineering

Sathyabama Institute of Science and Technology

About Sathyabama Institute of Science and Technology:

Sathyabama is a prestigious institution which excels in the fields of Engineering, Science and Technology for more than three successful decades. It offers multi-disciplinary academic programmes in various fields of Engineering, Science, Technology, law, Dental Science, Pharmacy, Nursing, Management, Arts and Science and Allied Health Sciences. It is established under Sec.3 of UGC Act, 1956 and is been Accredited with 'A++' Grade by the National Accreditation and Assessment Council. The Institution has been graded as Category I University by UGC under the UGC (Categorization of Universities (only) for Grant of Graded Autonomy) Regulations, 2018. The Institution persistently seeks and adopts innovative methods to improve the quality of higher education and is responsive to the changes taking place in the field of education on a global scale. The Institution has a team of dynamic and outstanding faculty, innovative pedagogical practices, state of the art infrastructure and world class Research Facilities.

Sathyabama has a good presence in rankings and ratings at National and International level. The Institution has been ranked in 51st position by the National Institutional Ranking Framework (NIRF), Government of India among the Universities in India for the year 2023 and ranked one among the top 100 Universities for eight consecutive years. Sathyabama is ranked among the Top 5 Institutions in the Country for Innovation by ATAL ranking of Institution for Innovation Achievements, Govt. of India. Times Higher Education and QS has ranked Sathyabama among the top Institutions worldwide. Sathyabama Institute of Science & Technology has alliances with leading Universities and research establishments at National and International Level. It is a research intensive University with world class laboratories and research facilities and is involved in research in the emerging areas of Science and Technology. Sathyabama has undertaken various sponsored and collaborative R&D projects funded by National and International Organizations. Sathyabama has written a special page in the history of space research on 22nd June 2016 with the launch of "SATHYABAMASAT" in association with ISRO.

About Centre for Drug Discovery and Development &
Centre for Modern Organic Agriculture Research, Sathyabama:

The Centre for Drug Discovery and Development (CDDD) was established in 2013 at the university in Col Dr. Jeppiaar Research Park with the goal to discover novel drugs to fight against life-threatening infectious diseases. The centre revolves around microbial bioprospecting, Natural product drug discovery, research on Tuberculosis and Virology, Biofilm biology, Genomics and Proteomics, Translational immunology and vaccine research, marine bioprospecting, Bio-nanomolecular research, Vector-borne disease laboratory and CMOAR lab. The centre has received research grants from esteemed organizations including DST, DBT, NCPOR, ICMR, SERB, MHRD-SPARC, and MoES.

The Centre for Modern Organic Agriculture Research (CMOAR) was established in February 2024 at Sathyabama in association with the King Monkut's Institute of Technology, Ladkrabang, Thailand and Association of Agriculture Technology in Southeast Asia (AATSEA), Thailand. The main moto of CMOAR is to explore microbial resources for developing biofertilizers, biocontrol agent, and nano elicitors for sustainable agriculture. The centre is also organizing internships, workshops and expert lecture series on modern organic agriculture

About Conference – ICMBSD - 2026:

The UN Sustainable Development Goals (SDGs) are supported by microbial biotechnology, which uses microorganisms (bacteria, actinobacteria, fungi, and algae) to develop sustainable solutions for global problems. It does this by providing environmentally friendly methods to manage waste (biodegradable plastics), clean pollution (bioremediation, wastewater

treatment), improve agriculture (biofertilizers), produce clean energy (biofuels), manage waste (biodegradable plastics), improve health (therapeutics), and create bio-based materials. This ICMBSD – 2026 establishes a platform for accelerating microbial biotechnology research among the academicians, scientist and industrialists.

Conference Themes:

- Microbial Bioprospecting
- Microbial Bioremediation
- Microbial Biocontrol and Biofertilizers
- Nano-based natural products and its applications
- Polar Microbiology
- Plant–Microbe–Nano Interactions
- Gut Microbiome and Probiotics
- Sensor-based Precision Agriculture
- Integrated Smart and Sustainable Farming Systems

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
CATEGORY - 1 UNIVERSITY BY UGC

MESSAGE FROM THE CHANCELLOR

Dr. Mariazeena Johnson

I am glad and happy that the Centre for Drug Discovery and Development & the Centre for Modern Organic Agriculture Research and the School of Bio & Chemical Engineering at Sathyabama Institute of Science and Technology is organizing an "International Conference on Microbial Biotechnology for Sustainable Environment and Agriculture (ICMBSD – 2026)" on 6-7, February 2026. The conference will serve as an excellent platform to address some of the most pressing challenges in the field of environmental and agriculture research.

At Sathyabama, we believe in the power of interdisciplinary research to create a meaningful impact. Translational research is the need of the hour, bridging the gap between laboratory discoveries and real-world applications**.** ICMBSD - 2026 is designed to bring together academicians, scientists, clinicians, industry experts, and students to share insights, exchange ideas, and forge collaborations that drive advancements in sustainability. At this juncture, I would like to express my appreciation and thanks to the Association of Agriculture Technology in Southeast Asia (AATSEA), Thailand, for their active collaboration

We remain deeply committed to research excellence and fostering an ecosystem that nurtures innovation. The participation of esteemed experts and enthusiastic young researchers in this conference is a testament to our mission of contributing to scientific advancements that benefit society.

Sathyabama Institute of Science and Technology has always been at the forefront of innovation. With our NAAC 'A++' accreditation, Category I University status, and consistent top rankings in India and globally, we are dedicated to fostering a culture of discovery. Our Centre for Drug Discovery and Development, established in 2013, continues to be instrumental in harnessing microbial resources for sustainable development in health, the environment, and agriculture. To all the participants, I encourage you to engage actively, share your insights, and forge meaningful connections. Together, let us harness the power of translational research to create a healthier, more sustainable, and equitable world.

Wishing you all a productive, inspiring, and memorable conference!

Warm regards,

Dr. Mariazeena Johnson M.B.A., M.Phil., Ph.D.,
Chancellor
Sathyabama Institute of Science and Technology

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
CATEGORY - 1 UNIVERSITY BY UGC

MESSAGE FROM THE DIRECTOR INNOVATION

Dr. Bharathi. B

It gives me immense pleasure to invite you all to be a part of the International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD – 2026), hosted by Sathyabama Institute of Science and Technology.

Scientific progress thrives on collaboration, innovation, and the relentless pursuit of knowledge. ICMBSD – 2026 serves as an exceptional platform where eminent researchers and academicians from across the globe come together to deliberate on the latest advancements in environmental and agricultural sustainability through microbial biotechnology.

This conference features an impressive line-up of eminent national and international speakers from Thailand, Italy, Chile, France, USA, Egypt, and India, fostering a truly global exchange of scientific knowledge. Around 200 participants from across the country have registered for this conference, and we have received a total of 120 abstracts for oral and poster presentations.

The conference themes, ranging from microbial bioprospecting, bioremediation, sustainable agriculture, polar microbiology, and plant–microbe interactions, are thoughtfully curated to address the most pressing challenges and emerging opportunities in the biomedical and environmental sciences.

I extend my heartfelt gratitude to our esteemed partners, KMITL, Thailand, and AATSEA, Thailand, as well as all the sponsors and speakers for their invaluable contributions. Your expertise and dedication are instrumental in making ICMBSD – 2026 a resounding success.

I also express my sincere appreciation to all our plenary speakers, session chairs, researchers, and students participating in this conference. Special thanks to the organizing committee for their tireless efforts in bringing together such a remarkable assembly of scientific minds.

I am confident that this conference will catalyze new ideas, collaborations, and discoveries that will shape the future of microbial interventions for sustainable environment and agriculture.

Wishing you all an insightful, engaging, and productive experience at ICMBSD – 2026!

Dr. Bharathi. B.
Director (Innovation)
Sathyabama Institute of Science and Technology

Technical Committee – ICMBSD - 2026

Registration, reception, & Stage arrangement
Dr. V. Gopikrishnan
Dr. T. Rajasekar
Ms. Sudhanarayani Rao
Ms. T. Thangam
Ms. S. Ranjani
Mrs. K. Revathy
Mrs. A. Aruna
Ms. K. Akila
Mr. R. Ashwin
Mr. A. Kishore Kumar
Mrs. A. Anandhi
Ms. Sowmiya. G
Ms. Blessy Cleatus
Ms. Subhaprakashini

Scientific Committee
Technical session
Dr. P. Krupakar
Dr. M. Radhakrishnan
Dr V. Gopikrishnan
Dr. V. Gopikrishnan
Ms. Sudhanarayani Rao
Mrs. A. Ananandhi

Oral/Poster Presentation
Dr. R. Sam Ebenezer
Dr. S. Vignesh
Dr. Bharathi S
Dr. Mangalalakshmi
Dr. V. Gopikrishnan
Mrs. K. Revathy
Ms. T. Vaishnavi
Ms. Sowmiya.G
Mr. S. Tamil Selvan

Abstract Book /Souvenir
Dr. M. Radhakrishnan
Dr. P. Krupakar
Dr. V. Gopikrishnan
Dr. S. Bharathi

Finance and Purchase Committee
Dr. V. Gopikrishnan
Dr. M. Radhakrishnan
Dr. S. Bharathi
Ms. S. Ranjani
Mr. A. Kishore Kumar
Mr. Karthick Prakash MP
Mr. R. Ashwin
Mr. S. Tamil Selvam

Accommodation and Transport
Dr. V. Gopikrishnan
Dr. S. Vignesh
Mr. A. Kishore Kumar
Mr. Karthick Prakash MP
Mr. S. Sai Mahesh Kumar
Mr. Naveen

Food and refreshments
Dr. T. Rajasekar
Dr. V. Gopikrishnan
Dr. Mangalalashmi
Mr. A. Kishore Kumar
Mr. Karthick Prakash MP
Ms. S. Ranjani
Ms. Vaishnavi
Ms. K. Akila
Mr. R. Ashwin
Mr. D. Sakthi
Mr. Sai Mahesh
Ms. Espin Sneta
Mr. Eshwarnath

Certificate and OD Form distribution
Dr. T. Rajasekar
Dr. V. Gopikrishnan
Dr. S. Bharathi
Dr. R. Sam Ebenezer
Mrs. A. Anandhi
Ms. T. Vaishnavi
Mr. R. Ashwin
Ms. Sowmiya .G
Ms. Blessy Cleatus

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD-2026)

Jointly Organized by

Centre for Drug Discovery and Development (CDDD),
Centre for Modern Organic Agriculture Research (CMOAR) &
School of Bio & Chemical Engineering
Sathyabama Institute of Science and Technology

Inauguration Agenda

Venue: Tmt. Soundrabai Auditorium, Sathyabama Centre for Advanced Studies (III Floor)
Sathyabama Institute of Science and Technology, India

Date: 6th Feb 2026

Time: 10.00 – 10.45 AM

9.00 – 10.00 AM	Registration & Guest Arrival
10.00 AM	Welcoming of Guests
10.15 – 11.15 AM	Thamizh Thai Vaazhthu Lighting of Lamp
Welcome address:	**Dr. Bharathi B** Director (Innovation), Sathyabama
About ICMBSD – 26	**Prof. M. Radhakrishnan** Convenor – ICMBSD 2026 Centre for Drug Discovery - Sathyabama
Presidential Address: & **Honouring of Guests**	**Dr. Mariazeena Johnson** Honourable Chancellor, Sathyabama Institute of Science and Technology
Special address:	**Ms. Maria Catherine Johnson** Vice President Sathyabama Institute of Science and Technology
Release of Conference Proceedings	**Dr. Mariazeena Johnson** Hon. Chancellor, Sathyabama
Received by & Felicitation	**Prof. Kasem Soytong** Director, RIMOA – King Monkuts Institute of Technology Ladkrabang, **Thailand**
MoU Signing:	1. **Universidad Austral de Chile, Valdevia, Chile** 2. **OFERR Nallayan Research Centre for Sustainable Development, Chennai, Tamil Nadu** 3. **Freezeceutics, Chennai, Tamil Nadu**
Release of Books	1. **Marine Microbiome and Microbial Bioprospecting (Elsevier)** Edited By Dr. M. Radhakrishnan, B.Abirami, Dr. K. Manigundan & Dr PV Bhaskar 2. **Harnessing Microbial Resources for Sustainable Agriculture (Springer)** Edited by: Dr. Gopikrishnan, Dr. Radhakrishnan, Dr. Kasem Soytong and Dr Wafaa Haggag
Vote of Thanks	Dr. V. Gopikrishnan, Organizing Secretary, ICMBSD – 2026 Assistant Professor (Research), CDDD - Sathyabama

International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD-2026)

6-7, February 2026

Venue: Tmt. Soundrabai Auditorium, Sathyabama Centre for Advanced Studies (III Floor)
Sathyabama Institute of Science and Technology, India

List of Plenary Speakers

Plenary Talk (PT) – 1	**Prof. Kasem Soytong,** Director, Research Institute of Modern Organic Agriculture King Monkut's Institute of Technology Ladkrabang, (KMITL), Bangkok, Thailand
PT – 2	**Dr. Valeria Bianciotto,** Senior Scientist, Institute for Sustainable Plant protection(IPSP), National Research Council (CNR), Turin University, Italy
PT – 3	**Dr. KG. Sabarinadhan,** Associate Professor and Head, Department of Agricultural Microbiology Agricultural College and Research Institute, Madurai, TN, India
PT – 4	**Dr. M. Gomathy,** Associate Professor, Department of Soil Science and Agricultural Chemistry, VOC Agricultural College and Research Institute (TNAU), Killikulam, TN, India
PT – 5	**Dr. Sergio Leiva Poveda,** Associate Professor, Institute of Biochemistry and Microbiology Universidad Austral de Chile, Valdivia – Chile, Chile
PT – 6	**Dr. Julien Jean Malard-Adam** G-EAU (Gestion de l'eau, acteurs, usages) IRD (Institut de recherche pour le dévelopment) , Université de Montpellier, Montpellier, France
PT – 7	**Dr. Jiaojiao Song,** Lecturer & Head, Research and International Relations, RIMOA - King Monkut's Institute of Technology Ladkrabang, (KMITL), Bangkok, Thailand
PT – 8	**Dr. John Cassius Moreki,** Associate Professor, Department of Animal Science, Faculty of Animal and Veterinary Science, Botswana University of Agriculture and Natural Resources, Botswana
PT -9	**Dr. Govindaraj Dev Kumar,** Associate Professor, Department of Food Science and Technology College of Agricultural and Environmental Sciences, Griffin, GA 30223
PT – 10	**Dr. Wafaa Haggag** Professor, Department of Plant Pathology, National Research Center, Egypt

International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture

(ICMBSD-2026)

6-7, February 2026

Venue: Tmt. Soundrabai Auditorium, Sathyabama Centre for Advanced Studies (III Floor)
Sathyabama Institute of Science and Technology, India

Plenary Session – Chairpersons

Session I:	**Dr. P. Krupakar,**
PL 1	Associate Professor (Research)
PL 2	Centre for Drug Discovery and Development, Sathyabama
	Dr. V. Hari Balaji,
	Founder & CEO
	Vivagen Dx Labs, Chennai
Session II	**Dr. V. Gopikrishnan**
PL 3	Assistant Professor (Research)
PL 4	Centre for Drug Discovery and Development, Sathyabama
	Dr. S. Lalitha
	Assistant Professor
	Dept of Botany, Periyar University, Salem
Session III	**Dr. PM. Ayyasamy**
PL 5	Associate professor, Dept of Microbiology
PL 6	Periyar University, Salem
	Dr. M. Radhakrishnan,
	Professor (Research)
	Centre for Drug Discovery and Development, Sathyabama
Session IV	**Dr. T. Rajasekar,**
PL 7	Assistant Professor (Research)
PL 8	Centre for Drug Discovery and Development, Sathyabama
PL 9	**Dr. S. Kumaran**
PL 10	IITM Pravartak, Chennai

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

Venue: Tmt. Soundrabai Auditorium, Sathyabama Centre for Advanced Studies (III Floor)
Sathyabama Institute of Science and Technology, India

Scientific Sessions – Chairpersons

Sessions	Date & Time	Venue	Chair Persons
Oral Presentation			
Session I **(Online)**	**06.02.2026** 15.15 – 17.00	Tmt Soundrabai Auditorium Sathyabama Centre for Advanced Studies (III Floor)	**Dr. Amit Kumar,** Associate Professor (Research), Centre for Climate Change Studies, Sathyabama **Dr. A. Suresh,** Scientist Central Research Laboratory, Meenakshi Medical College Hospital & Research Institute,
OP – Session II **(Offline)**	**06.02.2026** 11.30 – 17.00	Senate Hall, Sathyabama Centre for Advanced Studies (I Floor)	**Dr Senthilkumar,** Assistant Professor Central University of Tamil Nadu, Thiruvarur **Dr. S. Bharathi,** Assistant Professor (Research) Centre for Modern Organic Agriculture Research, Sathyabama
OP - Session III **(Online)**	**07.02.2026** 9.30 – 13.00	Room No 319 – Sathyabama Centre for Advanced Studies (II Floor)	**Dr. S. Vignesh,** Assistant Professor (Research) Centre for Drug Discovery and Development, Sathyabama **Dr. Mangalalakshmi** S-PDF Centre for Drug Discovery and Development, Sathyabama
OP - Session IV **(Offline)**	**07.02.2026** 9.30 – 13.00	Senate Hall, Sathyabama Centre for Advanced Studies (I Floor)	**Dr V. Ramesh Kumar** Head, Dept of Biotechnology, Sathyabama **Dr. Sam Ebenezer,** Assistant Professor (Research) Centre for Drug Discovery and Development, Sathyabama
Poster Presentation			
Session I **(Offline)**	**07.02.2026** 9.30 – 13.00	Seminar Hall, Centre for Drug Discovery and Development, Sathyabama Research Park (III Floor)	**Dr. D. Saravanan,** Assistant Professor (Research) Centre for Laboratory Animal Technology & Research, Sathyabama **Dr. D. Kavitha,** Assistant Professor PG & Research Dept of Zoology, Guru Nanak College, Chennai - 42

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
ACCREDITED WITH GRADE "A++" BY NAAC
CATEGORY - 1 UNIVERSITY BY UGC

International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD-2026)

6-7, February 2026

Jointly Organized by

Centre for Drug Discovery and Development (CDDD),
Centre for Modern Organic Agriculture Research (CMOAR) &
School of Bio & Chemical Engineering

Venue: Tmt. Soundrabai Auditorium, Sathyabama Centre for Advanced Studies (III Floor)
Sathyabama Institute of Science and Technology, India

Programme Agenda

Time	Sessions	Speakers
Day I: Friday, February 6, 2026		
10.00 – 10.45	**Inauguration**	
10.45 – 11.00	Tea Break	
Session I:		Chairpersons: Dr. P. Krupakar, CDDD, Sathyabama Dr. V. Hari Balaji, Vivagen Dx Labs, Chennai
11.00 – 11.45	Plenary Talk (PT) - 1	**Prof. Kasem SoyTong** RIMOA - King Monkut's Institute of Technology Ladkrabang, (KMITL), Bangkok, Thailand
11.45 – 12.30	PT – 2	**Dr. Valeria Bianciotto** National Research Council (CNR), Turin University, Italy
Session II		Chairpersons: Dr. V. Gopikrishnan, CDDD, Sathyabama Dr. S. Lalitha, Periyar University, Salem
12.30 – 13.15	PT – 3	**Dr. KG. Sabarinadhan** Agricultural College and Research Institute, Madurai, Tamil Nadu, India
13.15 – 14.15	**Lunch Break**	
14.15 – 15.00	PT – 4	**Dr. M. Gomathy** VOC Agricultural College and Research Institute (TNAU), Killikulam, TN, India
15.00 – 15.15	Tea Break	
15.15 – 17.00	Oral Presentation – Session 1 (Online)	Chair Persons: Dr. Amit Kumar, CCCS, Sathyabama Dr. A. Suresh, Meenakshi Medical College & Hospital
11.30 – 17.00	Oral Presentation – Session 2 (Offline)	Chair Persons: Dr. Senthil Kumar, CUTN, Thiruvarur Dr. S. Bharathi, CMOAR-Sathyabama

Day 2: Saturday, February 7, 2026		
Session III		Chair Persons: Dr. PM. Ayyasamy, Periyar University Dr. M. Radhakrishnan, CDDD - Sathyabama
9.30 – 10.15	PT – 5	**Dr. Sergio Leiva Poveda** Universidad Austral de Chile, Valdivia – Chile, Chile
10.15 – 11.00	PT – 6	**Dr. Julien Jean Malard-Adam** IRD, Université de Montpellier, Montpellier, France
11.00 – 11.15	Tea Break	
Session IV		Chair Persons: Dr. T. Rajasekar, CDDD, Sathyabama Dr. S. Kumaran, IITM Pravartak, Chennai
11.15 - 12.00	PT – 7	**Dr. Jiaojiao Song** RIMOA - King Monkut's Institute of Technology Ladkrabang, (KMITL), Thailand
12.00 – 12.45	PT – 8	**Dr. John Cassius Moreki** Botswana University of Agriculture and Natural Resources, Botswana
	PT – 9	**Dr. Govindaraj Dev Kumar** Department of Food Science and Technology College of Agricultural and Environmental Sciences, Griffin, GA
	PT – 10	**Dr. Wafaa Haggag** Department of Plant Pathology, National Research Center, Egypt
9.30 – 13.00	Oral Presentation – Session 3 (Online)	Chair Persons: Dr. S. Vignesh, CDDD, Sathyabama Dr. Mangalalakshmi, CDDD, Sathaybama
9.30 – 13.00	Oral Presentation – Session 4 (Offline)	Chair Persons: Dr. V. Ramesh Kumar, Sathyabama Dr. Sam Ebenezer, CDDD Sathyabama
9.30 – 13.00	Poster Presentation Session I	Chair Persons: Dr. D. Saravanan, CLATR, Sathyabama Dr. D. Kavitha, Guru Nanak College
14.00 – 15.00	**Valedictory Function**	

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

Oral Presentation – Session I (Online)

Venue : **Tmt. Soundrabai Auditorium**
Sathyabama Centre for Advanced Studies (III Floor)
Date : **06.02.2026**
Time : **15.00 – 17.00 Hrs**
Chair persons:

Dr. Amit Kumar,
Associate Professor (Research)
Centre for Climate Change Studies, Sathyabama

Dr. A. Suresh,
Scientist
Meenakshi Medical College Hospiral & Research Institute, Kanchipuram

S. No	Abstract Number	Title of the Abstract	Authors and Affiliation
1.	S1-OP1	Sustainable Applications of Natural Dyes on Textile Fibers Pretreated with Nano based Natural Products and its Bacterial Characteristic for Production of Smart Textiles	Ali N. F. Dyeing and printing Department, National Research Centre, 12421-Dokki, Cairo, Egypt
2.	S1-OP2	Biophotonic Properties of Honey-Derived Water: An Indigenous Discovery Rooted in Prophetic Medicine	Dr. Dushyanthan Prophetic Medicine, Board of Prophetic Medical Science,
3.	S1-OP3	Potential Influence of Fruit-Associated Bacteria on *Lactobacillus casei*: An In-Vitro Study	Prayukta Padelkar [1], Dr. Rinkal Patel [2], Dr. Anirudh Gupta [1*] [1]NIMS Institute of Allied Medical Science and Technology (NIAMST), NIMS University, Rajasthan, Jaipur-303121 [2] Rapture Biotech International Pvt Ltd., Mumbai, Maharashtra-400064
4.	S1-OP4	Optimisation of plant growth regulator mediated in-vitro shoot culture of *Solanum nigrum* by managing endophytic bacterial infection	Hadavani Rishita Anilkumar Dept of Biochemistry, NIMS, Jaipur
5.	S1-OP5	Exploring The Biomedical Potentials of Mangrove Associated Actinobacteria Isolated from Mangroves in Ernakulam District	Greeshma James[1], Sajeevan T P[2], Rejish Kumar V.J.[1,3] [1]Faculty of Ocean Science and Technology, Kerala University of Fisheries

			and Ocean Studies, Panangad, Kochi, India [2]Department of Marine Biology, Microbiology and Biochemistry, Cochin University of Science and Technology, Kochi, Kerala 682016, India [3]Faculty of Fisheries Science, Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
6.	S1-OP6	Evaluation of the antibacterial potential of solvent-mediated leaf extract fractions of *Streblus asper* Lour. against selected Gram-positive and Gram-negative bacteria	Mouli Pal Molecular Biology and Genetics Unit, Department of Zoology, The University of Burdwan, Golapbag, Purba Bardhaman-713104, West Bengal, India
7.	S1-OP7	Actinomycetes from Cochin Estuary as a promising source of antibiofilm agents for aquaculture	Amritha T, Sumitha, Gopalakrishnan, Sajeevan T P, S Venu Department of Marine Biology, Microbiology and Biochemistry, School of Marine Science, Cochin University of Science and Technology (CUSAT), Kerala
8.	S1-OP8	Characterization of *Streptomyces fradiae* from Mangrove Sediment as a Potential Probiotic and Its Effects on Growth, Antioxidant Activity, Immunohematology and Resistance to *Aeromonas Hydrophila* in Nile Tilapia *Oreochromis niloticus*	Mary Juliet S[1], Greeshma James[2], Abinsha Alex[3], Rejish Kumar V J1'[4] [1]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India [2]Faculty of Ocean Science and Technology, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India [3]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India [4]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
9.	S1-OP9	Production, Extraction and Characterization of Biosurfactant from a Substrate by Using Oil Contaminated Soil Microbe	Shanmugapriya M, and Nagajothi Kasilingam* PG & Research Department of Microbiology, KR. College of Arts & Science, KR Nagar, Kovilpatti, Tamilnadu, India.
10.	S1-OP10	Antimicrobial and Phytocemical Analysis in *Cassia auriculata*	Akash R, Angel M, Gopika P.S, Insamam A, Julie Varsha R.S, Vaishnavi M.S, Antony S

			Department of Microbiology, Malankara Catholic College, Mariagiri, Kaliakkavilai, Kanyakumari Dist 629 153. Tamil Nadu
11.	S1-OP11	Study of Potential Microbial Enzyme Complex for Degradation of Plastic from Marine Environment	K.R.Beula Rani, Fathima shihana.A, Saliha Thasneem.A ,Lijina Raj.L., Jeba sherin.R, Arothini Harishmatha.A., Aravind.R.S Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, Tamil Nadu, India-629 153,
12.	S1-OP12	Sustainable Bioplastic Production from Agro-Waste using Soil-Derived Microbes	T. Reena., S. Sana Fathima., S.V. Abhisha., P.D. Nandhana., M. Abishek.,A.K. Deebika.,Abirami.S.V Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153 .
13.	S1-OP13	Prevalence of Antibiotics Resistance Bacteria in Mosquito Breeding Stagnant Water	K. Sukesh, Sooryajith.S S, Bhoomika. S, Sreeshma. S S Harisree. V B, Aparana. AV, T Muhammed naseeb Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153.,
14.	S1-OP14	Production of bio-ethanol and biogas From sugarcane bagasse using *Saccharomyces cerevisiae*	Vijila Helen, Mary, Sreeja, Noufiya, Alfiya, Jersha, Reeba, Athira Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153,
15	S1-OP15	Evaluation of the antibacterial properties of *Musa Acuminata* peel extracts on microorganisms isolated from deteriorated cake samples	Andrewslin jani., S. Shamna Begam.,R.H. Nijieshma., S.R. Ariya Sree., J.B. Athilah., P.D.Gowri Krishna., A. Sujith Issac Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153
16	S1-OP16	Proteomics Insights into the anticancer activity of bacteriocins against MDA – MB 231 Breast Cancer Cells	Mrs. Andrewslin Jani V[1], Dr. Hema T.A.[2] [1]Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu [2]Dept. of Microbiology, Malankara Catholic College, Mariagiri, Kaliakkavilai.
17	S1-OP17	Phytochemical Analysis and Antimicrobial Evaluation of *Beta vulgaris* Extract Against Dandruff-Causing Microorganisms	Divya T Raj., Ajin R., Annie Bennet S., Dhanya T., Fathima Ramshiya M., Nithisha V., Sreejith D. B. Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India - 629 153,
18	S1-OP18	Therapeutic activity of *Psidium Guajava* against Clinical Pathogens	T.A Hema., Arshina Fathima A., Deepika P.V., Jagadeesh J , Jency U, Lemisha R S., Nitheesh S M., Solairamamoorthi J

			Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153
19	S1-OP19	Bioprospecting of Fish Gut Microbes for Industrial Applications	Boomika Venkatesan[1], Karthik Prakash[1], Gopikrishnan Venugopal[1], Radhakrishnan Manikkam[1], Kasem Soytong[2], Jiaojiao Song[2]. [1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600 119., Tamil Nadu, India [2]Reserch Institute of Modern Organic Agriculture (RIMOA), King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, Thailand

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

Oral Presentation – Session II (Offline)

Venue : Senate Hall, Sathyabama Centre for Advanced Studies (I Floor)
Date : 06.02.2026
Time : 14.00 – 17.00 Hrs
Chair persons:

Dr Senthilkumar,
Assistant Professor
Central University of Tamil Nadu,
Thiruvarur

Dr. S. Bharathi,
Assistant Professor (Research)
Centre for Modern Organic Agriculture
Research, Sathyabama

S. No	Abstract Number	Title of the Abstract	Authors and Affiliation
1	S2-OP1	From a Single Cow to a Conservation Movement: Community-Driven Preservation of Indigenous Cattle Breeds in India	Nethravathi M. Founder, Kannukkuties | Indigenous Cattle Conservation Initiative, India
2	S2-OP2	Evaluation of Immunomodulatory Potential of *Terminalia chebula* Leaves	Evelyn Maria Sinoj Department of Biotechnology, Hindustan Institute of Technology and Science, Padur, Kelambakkam, Chennai - 603103, Tamil Nadu, India
3	S2-OP3	Production of Bacterial Cellulose Collagen, Silver Nitrate and PVA Cross-Linked Nanofiber by Electrospinning Method	Akila Kesavan, Dr. M. Radhakrishnan Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.
4	S2-OP4	Nanoliposomes Mediated Essential Oil Core-Shell Formation	S. Gunaselvi, Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai
5	S2-OP5	Comparative Evaluation of Spirulina Extract and Magnesium Chloride Nanoparticles on The Growth Of *Amaranthus* Species	S.Janani, Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai.
6	S2-OP6	Gut Microbiome And Probiotics : Role In Human Health And Disease Prevention	Karen Lawrence Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai.

7	S2-OP7	Bioshield Patch Wearable Nanobased Patch For Chemical Warfare Defense	Madhumita N Department of Biotechnology Hindustan institute of Technology and Science, Tamil Nadu
8	S2-OP8	Exploring Bacteria From Different Rice Varieties For Probiotic Development	Sivaranjani G[1], Bavanilatha M[1], Kishore Kumar A[2], Radhakrishnan M[2]* [1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
9	S2-OP9	Bioprospecting of Actinobacteria from Understudied Sources for Anti-Infective Metabolites.	Arul Hancy Evitaa K I[1]., Ramesh Kumar V[1]., Kishore Kumar A[2]., Radhakrishnan M[2]* [1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
10	S2-OP10	Single Cell Oil From Yeast	Remya J[1] , Bavanilatha M[1], Kishore Kumar A[2] , Radhakrishnan M[2]* [1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
11	S2-OP11	Effective Adsorptive Potential Of Metal Doped Nanoparticles And Concerning Its Effect On Heavy Metal (Cadmium) From Industrial Wastewater-A Review	Nisha U Dept of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.
12	S2-OP12	Earthworm Cast Microbiome as a Source of Next-Generation Bio-inoculants for Sustainable Agricultures	Nathiya M, MS[1]. Jesisa Persis Preethi[1], R. Ashwin[2], MP[2]. Karthick Prakash, Aruna Arunachalam[2], V. Gopikrishnan[2] [1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of

			Science and Technology, Chennai, Tamil Nadu, India
13	S2-OP13	Review of metal doped carbon quantum dots for heavy metal (Lead) removal: Emergence, Preparation, Optimization and mechanism	D. Prabu, Shalini K, Jayasurya R Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu
14	S2-OP14	Analyzing and Predicting the Agronomic Effectiveness of Biodegradable Beads Derived from Banana Pseudostem Using Data-Driven Models	Harini P[1], Pavithra K[1], D Venkatesan[1] [1]Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119
15	S2-OP15	Exploration of Novel Antifouling Agents from Fish Gut–Associated Bacteria	Aashniya[1], V. Gopi Krishnan[1], Sumathi[2], Ramesh Kumar Ashwin[1], Karthik Prakash[1], Aruna Arunachalam[1] [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India [2] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India
16	S2-OP16	Development of a Low-Fat, Probiotic Frozen Dessert Using a Synergistic Rare Sugar and Functional Fiber System for Enhanced Gut Health	Nithya Sri P, Kishoth Kumar M Dhanalakshmi Srinivasan College of Engineering & Technology, Mamallapuram, Chennai, India
17	S2-OP17	Efficient Prebiotics to Enhance the Growth of Probiotics	Mangala Lakshmi Ragavan[1], Sathish Rengaraj[2], Buvaneswari[2], Rajalakshmi[2], Krupakar Parthasarathy[1]* [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2] Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamil Nadu, India
18	S2-OP18	Actinomycetes from Cochin Estuary as a Promising Source of Antibiofilm Agents for Aquaculture	Amritha T, Sumitha Gopalakrishnan, Sajeevan T. P., S. Venu Department of Marine Biology, Microbiology and Biochemistry, School

			of Marine Science, Cochin University of Science and Technology (CUSAT)
19	S2-OP19	Characterisation and Stability of Natural Pigments Extracted from Agricultural and Food Processing Wastes	Prabhavathi R[1], Jerina Begam B[1], Karthik Prakash M. P[2], Ashwin R[2], Selvaraj R[1], Gopikrishnan V[2]* [1] Department of Biotechnology, Arunai Engineering College, Thiruvannamalai, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India
20	S2-OP20	Natural Bioactive-Loaded Hydrogels for Wound Healing: From Plant-Derived Therapeutics to Clinical Translation - A Review	Kiruthika A R.* Jancy Mary E.* Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600119, INDIA
21	S2-OP21	Current Status on Drug Delivery for Bone Tissue Engineering	Anushka Singh[1]#, Ashrita Srivalli Padmasolala[1]#, Prakash P[1]*, V. Ramesh Kumar[1]*, Manjunath Kamath[2] [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, India [2] Centre for Nanoscience and Nanotechnology, International Research Centre, Sathyabama Institute of Science and Technology, Chennai – 600119, India
22	S2-OP22	Development of Biodegradable and Antimicrobial Bio-Plastic Film	Nafeesa S and Kavipraba A Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India
23	S2-OP23	Smart Digital Applications–Based Decision Support System for Integrated and Sustainable Pineapple Farming	Afiya Rajan Selin Ph.D. Scholar, Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, India
24	S2-OP24	Hydrocarbonoclastic Bacteria	Abdul Rashid Khan Product Development, Saveetha School of Engineering, SIMATS, Chennai, India
25	S2-OP25	Influence of Stocking Density and Pond Type on Productivity, Health Management, and Revenue in *Litopenaeus vannamei* Aquaculture	Libin Vijayan[1], Sam Ebenezer Rajadass[2], Vignesh Sounderrajan[2], Krupakar Parthasarathy[2], Krishna Kumar Babulakshamanan[1], Rithik William[1], Samuel Gnana Prakash Vincent[1]#

			[1] Centre for Marine Science and Technology, Manonmaniam Sundarnar University, Tirunelveli – 627012, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India
26	S2-OP26	Real-Time Soil Monitoring Using Internet of Things for Agriculture	Nishaank S. K., Madhumithaa J., T. Bernatin, V. Gopikrishnan School of Electrical and Electronics Engineering, Sathyabama Institute of Science and Technology, Chennai, India
27	S2-OP27	Bioprospecting of Fish Gut–Associated *Pseudomonas* sp. as a Probiotic Candidate for Sustainable Aquaculture	Gokul Praveen[1], Safrina Power Singh[1], Karthik Prakash M. P[2], Gopikrishnan Venugopal[2]*, Radhakrishnan Manikkam[2] [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India
28	S2-OP28	Bioprospecting of Fish Gut–Associated *Pseudomonas stutzeri* (GM30) as a Probiotic Candidate for Sustainable Aquaculture	Safrina Power Singh[1], Gokul Praveen[1], Karthik Prakash M. P[2], Gopikrishnan Venugopal[2]*, Radhakrishnan Manikkam[2] [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
29	S2-OP29	Network Pharmacology–Based Investigation of *Bacopa monnieri* for Neural Therapeutics	Aadharshini A. S[1], Arsha A. S[1], Priya Dharisini Anbalagan[2], Sri Samyuktha Yadav Palanikumar[2], Grace Lydia Phoebe[1]*, Devi B[1]* [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Analytics Avenue for Research and Development, Analytics Avenue LLP, Technology Business Incubator, Sathyabama Institute of Science and

			Technology, Chennai – 600119, Tamil Nadu, India
30	S2-OP30	Development of a Novel Brine Fermentation Method for High-Value Probiotic Tomato-Based Systems Targeting Gut Microbiome Modulation	Ananya Iqbal, Meher Fathima, Catherine Oviya, Meera Josephine Linda Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
31	S2-OP31	Role of Gut Microorganisms in Plastic Degradation by Plastic-Eating Insect Larvae (*Tenebrio molitor*)	Ramesh R, P. R. Meganathan* CSIR–National Environmental Engineering Research Institute, Hyderabad Regional Centre, IICT Campus, Tarnaka, Hyderabad – 500007, Telangana, India
32	S2-OP32	Thiol-Functionalized *Citrus limetta* Biochar for Efficient Heavy Metal Removal from Wastewater	Vinitha Lakshmanan, Vindhiya P, D. Venkatesan Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
33	S2-OP33	Biotransformation of Organic Waste Through Enzymatic Hydrolysis: A Review on Bioactive Peptides and Simulation of Hydrolysis Kinetics	Akshaya G, Tejhashwini L. K, Ramesh Kumar V, Thyagarajan R* Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
34	S2-OP34	Comparative Phytochemical Analysis of Aqueous Extracts of *Azadirachta indica* and *Cuminum cyminum*	P. Sumithira[1], Kavipriya J., Rajabhavani P. Department of Microbiology, St. Anne's Arts and Science College, Chennai
35	S2-OP35	Development of a Chitin-Based Biofertilizer from Crab Shell Waste Enriched with Vermicompost-Derived Microbial Consortia	Yaswanth Narendran M., Rajalakshmi G. Department of Biotechnology, Hindusthan College of Arts & Science (Autonomous), Coimbatore – 641028, Tamil Nadu, India
36	S2-OP36	Enhanced Production of Lipase from Oil Contaminated Soil Associated Bacterium	Deepika S[1], Gayathri Kannan[1], Dayanandan Anandan[2], J. Theborel[1], M. Bavanilatha[1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, India. [2]Centre for Molecular and Nano Medical Sciences, International Research Centre, Sathyabama

			Institute of Science and Technology, Chennai-600 119, India.
37	S2-OP37	Production of biodegradable straw and cup embedded with *Trigonella foenum – graecum*	Maghasri. T[1], Dr. Jayshree Nellore[1], P. Atchuthan[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India [2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India.
38	S2-OP38	Marine Algae Based Green Synthesis of TiO_2 Photocatalysts for Microplastic Degradation: A Comprehensive Review	Keerthana Reddy S[1], Lohitha Kranti D[1], Aswini R[1], Saqib Hassan[1], Ramesh Kumar V[1], Ganesh Kumar[2]* [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India [2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India.

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

==========

Oral Presentation – Session III (Online)

Venue : Room No 319,
Sathyabama Centre for Advanced Studies (II Floor)
Date : 07.02.2026
Time : 9.30 – 13.00 Hrs
Chair persons:

Dr. S. Vignesh,
Assistant Professor (Research)
Centre for Drug Discovery and Development, Sathyabama

Dr. Mangalalakshmi
S-PDF
Centre for Drug Discovery and Development
Sathyabama

S. No	Abstract Number	Title of the Abstract	Authors and Affiliation
1	S3-OP1	Biological suppression of Honeydew - associated *Aspergillus flavus* in mango by Guava Epiphytic Bacteria	S. Renga Sushma, C. Mariappan PG & Research Department of Microbiology, Sri Paramakalyani College, Alwarkurichi-627412.
2	S3-OP2	Potential Antifouling Compound From Marine Actinobacteria	B. Madhumitha Department of Biotechnology, Arunai Engineering College, Tiruvannamalai, Tamilnadu
3	S3-OP3	Development of Biopolymer from Degradable plant waste leaves	R. Thyagarajan, S. Aasiya BSc Biotechnology
4	S3-OP4	. Flame Lily Tuber Extract Mediated Biosynthesis Of Ilver Nanoparticles And Its Antioxidant, Antimicrbial Activities	Thirumal Sivakumar* Department of Botany, Annamalai University, Annamalai Nagar-608 002, Tamil Nadu, India. Department of Botany, Thiru A. Govindasamy Govt. Arts College, Tindivanam-604 001, Tamil Nadu, India
5	S3-OP5	Green Synthesis And Characterization Of Zinc Oxide Nanoparticles From *Vitex Negundo* Leaf Extract And Its Biological Activities	Abishek Alagesan and Sanjivkumar Muthuswamy PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India
6	S3-OP6	Isolation and Characterization of phosphate solubilizing Bacteria from Agricultural Soil and their Applications	Anusuya. A and Sanjivkumar Muthuswamy Department of Microbiology, K.R College of Arts & Science, Kovilpatti, Tamilnadu, India

7	S3-OP7	Development of Pumpkin-Based Phosphate Solubilizing Liquid Biofertilizer for Horticultural Crops	Gowri Murugan, Kannan Duraisamy, Department of Microbiology, K.R College of Arts & Science, K.R. Nagar, Kovilpatti Tamilnadu, India-628503.
8	S3-OP8	Alkaloid extraction and GC-MS characterization study of *Thespesia populnea*	Gurumari muniyasamy. M, Parameswari. A Department of Microbiology, K. R College of Arts & Science, Kovilpatti, Tamil Nadu, India
9	S3-OP9	Comparative Fermentative Efficiency of *Saccharomyces boulardii* and *Saccharomyces cerevisiae* in Bioethanol Production from Wheat and Corn Stalks	Indhumathi S & Kannan Duraisamy, Department of Microbiology, K.R College of Arts & Science, K.R Nagar, Kovilpatti, Tamil Nadu, India.
10	S3-OP10	Exploration of Sardine Gut Microbes for Sustainable Protease Production	Kaviya.M & Sayen Merlin Sophia.S Department of Microbiology, K.R College of Arts & Science, K.R Nagar, Kovilpatti, Tamil Nadu, India.
11	S3-OP11	Characterization study of mucilage from Bael leaf (*Aegle marmelos*) and Anti wound healing activity of *Aegle marmelos*	Lathiksha Shankar.R & Parameswari. A Department of Microbiology, K.R College of Arts & Science, K.R Nagar, Kovilpatti, Tamil Nadu, India.
12	S3-OP12	Marine-Derived Prodigiosin: Isolation, Characterization, and Application Potential	Mariya Joans.M & Sayen Merlin Sophia.S Department of Microbiology, K.R College of Arts & Science, K.R Nagar, Kovilpatti, Tamil Nadu, India.
13	S3-OP13	Production And Characterization Of Copper Oxide Nanoparticles From An Aqueous Leaves Extract Of *Acalypha Indica* (Kuppaimeni) And Its Applications	Nivedha Sekar and Sanjivkumar Muthusamy* PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India.
14	S3-OP14	Microbial Production of Acetic Acid from Banana Peel Waste Utilizing Yeast	Hari Priyadharshini P & Nagajothi Kasilingam* PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India.
15	S3-OP15	Evaluation Of Crude Fungal Cellulase Produced By *Aspergillus, Penicillium* And *Trichoderma* From Corn Cob	Raja Archana . A & Muthukumar.A PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India.

		And It's Eco-Friendly Detergent Application	
16	S3-OP16	Comparative Phytochemical Profiling and In vitro Antimicrobial Evaluation of Methanolic and Aqueous Extracts of *Cocos nucifera* Sprouts	Kannan Duraisamy, P.Jeya veni, S.K.Jeyashri, M.Karthika, R.Karthika, K.Kavitha. PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India.
17	S3-OP17	Production of Single Cell Protein from Papaya fruit peel waste	Shalini Murugiah[1] and Nagajothi Kasilinigam[2]* PG & Research Department of Microbiology, K.R.College of Arts & Science, K.R. Nagar, Kovilpatti - 628503, Tamil Nadu, India.
18	S3-OP18	Natural Pigments from the Endophyte *Aspergillus westerdijkiae* and Evaluation of Their Bioactivities	Abirami Baskaran[1], El-Sayed R. El-Sayed[1,2], Filip Boratynski[1] [1] Department of Food Chemistry and Biocatalysis, Wrocław University of Environmental and Life Sciences, Norwida 25, 50-375 Wrocław, Poland [2] Plant Research Department, Nuclear Research Center, Egyptian Atomic Energy Authority, Cairo, Egypt
19	S3-OP19	Microbe-Mediated Synthesis of Nano-Biofertilizers for Sustainable Tropical Fruit Cultivation	Sakshi Singh*, Anil Buriya, Afiya Rajan Selin Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
20	S3-OP20	Microbial Fertilizers: An Ecofriendly Approach for Sustainable Agriculture	Gaurav Meena*, Abinaya Karunakaran, Pratyasha Acharya, Afiya Rajan Selin Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
21	S3-OP21	Exploiting Plant Growth–Promoting Rhizobacteria in Sustainable Horticulture Crop Production	Kashwin Ilangovan*, Nandhakumar Seenuvasan, Afiya Rajan Selin Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
22	S3-OP22	Sensor-Based Precision Horticulture for Sustainable Management of Perennial Fruit Crops	Abinaya Karunakaran*, Gaurav Meena, Prtyasha Acharya, Afiya Rajan Selin Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
23	S3-OP23	Smart IOT- air based flower harvester	Dr.C.Mabel Joshaline[1], Ms.J.Annie Jennifer J. Chellapandi[2], M. Kesavakumar[3] and V. Mithun[2]

			[1]Department of Rural Development Science 2. Assistant Professor, [2]Department of Computer Science Arul Anandar College, Madurai
24	S3-OP24	A Study on Qualitative Phytochemical Analysis of Aqueous Extracts of *Allium sativum* l. And *Ocimum sanctum*	Vaidehi K, Susan Mary Ceyril, Yashika Sharma Department of Microbiology, St. Anne's Arts and Science College, Chennai, Tamil Nadu, India
25	S3-OP25	Optimization of Production Media for Tannase and Gallic acid Production Using Banana Flower Stalk as Substrate.	Rohini Tamilanban [1*], Rajalakshmi Arumugam [2] [1*]Department of Microbiology, NMSSVN College, Madurai- 625019, Tamil Nadu, India. [2]Department of Biotechnology, Sri Kaliswari College, Sivakasi-626130, Tamilnadu, India,
26	S3-OP26	Bacteriophages as Next-Generation Biocontrol Agents in Agriculture: Prospects and Future Directions	Sivaranjani Gopalakrishnan [I], Suresh Dhanaraj [I*] Department of Microbiology Vels Institute of Science, Technology and Advanced Studies (VISTAS), Chennai

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

Oral Presentation – Session IV (Offline)

Venue : Senate Hall, Sathyabama Centre for Advanced Studies (I Floor)
Date : 07.02.2026
Time : 9.30 – 13.00 Hrs
Chair persons:

Dr V. Ramesh Kumar
Head,
Dept of Biotechnology,
Sathyabama

Dr. Sam Ebenezer,
Assistant Professor (Research)
Centre for Drug Discovery and Development,
Sathyabama

S. No	Abstract Number	Title of the Abstract	Authors and Affiliation
1	S4-OP1	An updated review on the recent progress in the toxicological studies of parabens and phthalates on the endocrine system	A. Ruth Angeline Govt College, Nandanam
2	S4-OP2	Carbon Capture Technologies: A Comprehensive Review Of Current Methods And Future Directions	Devi Shri V, Esakkitha K, Michael Rahul Soosai Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil nadu
3	S4-OP3	Biogenic Synthesis of Intracellular Silver Nanoparticle by Endophytic Ascomycetes Fungi From Calotropis gigantea Seeds (L.) R. Br	Ms. A. Kavi Praba*, Raghul Rajah, Aakash Sumesh Kumar, Arthi V. Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India
4	S4-OP4	Antimicrobial effects of guava leaf extract against Streptococcus sp and Candida sp	S.Akshya Priya, R.Kalaivani, D.Susan Caroline, M.Umamaheshwari, J. Jerrina Mariyal CSI Ewart Women's Christian College Metrosapuram, Tamil Nadu
5	S4-OP5	Exploring Cryosphere bacteria for Plant growth promotion and Disease Control	Jayakrishan M[1], P. Prakash[1], Kishore Kumar Annamalai[2], M. Radhakrishnan[2] * [1]Department of Biotechnology, Sathyabama Institute for Science and Technology, Chennai 600 119, Tamil Nadu, India.

			[2]Centre for Drug Discovery and Development, Sathyabama Institute for Science and Technology, Chennai 600 119, Tamil Nadu, India.
6	S4-OP6	Development of Low cost adsorptive material for the treatment of Ground water	Rachel.P [1]*, Sangeetha.P.B[1] ,Annam Renita.A [1] [1]Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai 119. Tamil Nadu
7	S4-OP7	Production of biodegradable straw and cup embedded with trigonella foenum - graecum	Maghasri T Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu
8	S4-OP8	Eggshell-Derived CaO on Rice Husk Biochar: A Novel Heterogeneous Catalyst for Waste Oil Biodiesel	Lakshmi Natarajan, Karthikeyan Department of Chemical Engineering, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu – 600119, India.
9	S4-OP9	Comparing the efficiency of integrated Photo oxidation and Electrooxidation Processes in Pharmaceutical Wastewater Treatment	Sanjana. R*,Sathish. S Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119, India.
10	S4-OP10	Anti-biofilm activity of Streptomyces PRA11 from Kashmir region against carbapenem resistant Gram – Negative bacteria	Thenmozhli. G. S, Radhakrishnan. M* Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.
11	S4-OP11	Studies On Techno-Economic Analysis Of Decentralized Algae Biodiesel Plants Using Agro-Marine Waste	Akshaya R.S., Meenakshy N.S. Dr. M. Karthikeyan Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, India
12	S4-OP12	Cu2+ Doped ZIF-8 As Adsorbent For Ibuprofen Removal From Water	Sathish Sundaram, Yeshwanthika Vijayakumar, Krishnaveni Balakrishnan Department of Chemical Engineering, Sathyabama Institute of Science &Technology, Chennai-119
13	S4-OP13	Biopropecting of mesophilic bacteria from high artic region for protease production	Shalinishree P[1], Theboral J[1], Bharathi S[2], Radhakrishnan M[2*]

			[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
14	S4-OP14	Incorporation of Edible Plant Extracts as Natural Food Preservatives: Green Extraction Methods, Antibacterial Mechanisms and Applications	Jayharini Balakumar [1], Divyadharshini Indrajith[1], Grace Lydia Phoe[1], Prabhakar Singh[1], Bharathi S[2*] [1]Department of biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
15	S4-OP15	Non-Small Cell Lung Cancer (NSCLC): A Comprehensive Review of Risk, Biology, and Therapeutic Innovations	Ramanan K., Kavi Praba A.*, Indumathi S. M.*, Raghul Rajah S. Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India
16	S4-OP16	Formulation and Antibacterial Assessment of a Herbal Ointment Against *Streptococcus* and *Staphylococcus*	Kavi Praba A.*, Risci Kanth K A S, S Nidya Sri, A Nanda Gopaalan Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India.
17	S4-OP17	Plant-Based Nano-Biomanufacturing of SARS-CoV-2 Nucleocapsid Protein for Diagnostic Applications	Sudhanarayani S. Rao, Krupakar Parthasarathy* Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India
18	S4-OP18	Antimicrobial Peptide Designing from *Bacillus licheniformis* Bacteriocin Using *In Silico* and *In Vitro* Analysis: A Promising Therapeutic Agent for Shigellosis	Mangala Lakshmi Ragavan[1], Sushmita Rajan[2], Krupakar Parthasarathy[1], Hemalatha Srinivasan[2*] [1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India [2]B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai, India
19	S4-OP19	The Contribution of Environmental Microbiology to Organic Fertilizer Production (EMO Fertilizer)	T. Bhuvaneshwari, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari, J. Jerrina Mariyal Department of Microbiology, C.S.I. Ewart Women's Christian College (Affiliated to the University of Madras), Melrosapuram – 603204, Tamil Nadu, India

20	S4-OP20	Isolation of Pectin from *Brassica oleracea* (Broccoli Stem) for the Synthesis of Bioplastic Films for Commercial and Food Packaging Purposes	Preetham Sai K[1], M. Bavanilatha[1]*, V. Ganesh Kumar[2] [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
21	S4-OP21	Sensor-Based Precision Horticulture for Sustainable Management of Perennial Fruit Crops	Abinaya Karunakaran[1]*, Gaurav Meena[1], Prtyasha Acharya[1], Afiya Rajan Selin[2] [1] PG Scholar, Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India [2] Ph.D. Scholar, Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
22	S4-OP22	Efficient Prebiotic to Enhance the Growth of Probiotic	Mangala Lakshmi Ragavan[1], Sathish Rengaraj[2], Buvaneswari[2], Rajalakshmi[2], Krupakar Parthasarathy[1]* [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore – 641028, Tamil Nadu, India
23	S4-OP23	Enhancing the Growth of Commensal Gut Bacteria Using Dietary Supplements to Increase Lactase Production: A Statistical Approach	Mangala Lakshmi Ragavan[1], Madhan Muthukumar[2], Janaranjani[2], Rajalakshmi[2], Krupakar Parthasarathy[1]* [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore – 641028, Tamil Nadu, India
24	S4-OP24	Potential Anti-Infective Properties of *Streptomyces* sp. C27 Isolated from the Forest Ecosystem, India	Vijayalakshmi Ganesan, Radhakrishnan Manikkam Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
25	S4-OP25	Combined Effect of Biochar and Beneficial Microorganisms on Soil Health and Plant Growth	J. Blessy, Susan Caroline Department of Microbiology, C.S.I. Ewart Women's Christian College, Melrosapuram – 603204, Tamil Nadu, India

26	S4-OP26	Bioprospecting of Insect Nests: A New Pathway for Antibiotics	A. Aruna, V. Gopikrishnan Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
27	S4-OP27	Titanium Dioxide Nanoparticles by *Bacillus* Species: A Significant Connective Nanoproduct for Antibacterial, Antibiofilm, Antioxidant, Antimicrofouling, and Anticorrosion Properties	Bhuvaneshwari Parthasarathy[1], Radhakrishnan Manikkam[2], Ayyasamy Pudukkadu Munusamy[1]* [1] Department of Microbiology, Periyar University, Salem – 636011, Tamil Nadu, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
28	S4-OP28	Studies on Synthesis and Characterization of Biopigments Produced by an Aerobic Bacterium Isolated from Rhizosphere Soil	S. Sona[1], K. Midhunkumar[1], P. M. Ayyasamy[1]* [1] Department of Microbiology, Periyar University, Salem – 636011, Tamil Nadu, India
29	S4-OP29	Tumor Spheroids and Organoid Models for Mechanistic Evaluation of Nano-Derived Bioactives in Cancer Drug Screening	T. Thangam, Krupakar Parthasarathy*, Subha Prakashini R., Hemamalani A.U. Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
30	S4-OP30	Bioremediation Potential and Mechanistic Response of Indigenous *Chlorella* sp. to Quaternary Heavy Metal Stress Isolated from an Industrially Polluted Site	Anandhi Anandaraj, Rajasekar Thirunavukkarasu* Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
31	S4-OP31	Role of Indigenous Bacteria in Detoxification of Pesticides and Heavy Metal Contaminants	Ramesh Kumar Ashwin[1], V. Gopi Krishnan[1], Radhakrishnan Manikkam[1], Sakthi Dharmalingam[1], Nathiya Murugan[1] [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
32	S4-OP32	The Fish Gut Microbiome and Probiotics in Aquaculture: Mechanisms, Challenges, and Future Perspectives	Karthik Prakash M. P[1], Gopikrishnan Venugopal[1]*, Boomika Venkatesan[2], Safrina Power Singh[2], Sanjivkumar Muthusamy[3], Radhakrishnan Manikkam[1] [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai –

			600119, Tamil Nadu, India [2] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [3] PG & Research Department of Microbiology, K. R. College of Arts and Science, Kovilpatti – 628503, Tamil Nadu, India
33	S4-OP33	Biosurfactant-Assisted Decolorization and Detoxification of Synthetic Dyes	Kishore Kumar Annamalai[1], Radhakrishnan Manikkam[1]*, Manigundan Kaari[2], Eshwarnath Vallipuram Sudhakar[1], Sergio Leiva[3] [1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Dong-A University, Busan, South Korea [3]Institute of Biochemistry and Microbiology, Universidad Austral de Chile, Valdivia, Chile
34	S4-OP34	Exploring Natural Reservoirs of Bioactive Compounds: Solvent-Dependent Antimicrobial and Anti-Tuberculosis Activities of Medicinal Plants	Sakthi Dharmalingam[1], Sanjeevi Prasath Sridhar[2], Radhakrishnan Manikkam[1], Ranjani Singaraj[2] [1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2]Centre for Nanoscience and Nanotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
35	S4-OP35	Bioprospecting of Fish Gut–Associated Actinomycetes	Tamil Selvam Saravanan1,Bharathi Selvaraj1, Radhakrishnan Manikkam2, Gopikrishnan Venugopal[2]* [1]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
36	S4-OP36	Exploration of Arctic Fjord Bacteria for Cold-Active Enzyme Production	Sai Mahesh Kumar S[1], Manigundan K[2], Radhakrishnan M[1]* [1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai –

			600119, Tamil Nadu, India [2] Dong-A University, Busan, South Korea
37	S4-OP37	Production, Optimization, and Toxicity Assessment of a Marine-Derived Amylase from an Epiphytic *Vibrio* Isolate	Vaishnavi Thirukumaran, Gurusakthi Sri M., Rajasekar Thirunavukkarasu* Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
38	S4-OP38	From Biogenesis to Therapeutics: The Expanding Landscape of Selenium Nanoparticles	Blessy Cleatus[1], T. Rajasekar[2], James John[1]* [1] Department of Medical Laboratory Technology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
39	S4-OP39	Biosynthesis and Characterization of Silver Nanoparticles Using *Ficus carica* Leaf Extracts and Production f Nanofertilizers	R.Megala*, Nithish Kumar.R Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore
40	S4-OP40	Comparative Evaluation of Bioactive Properties of *Justicia adhatoda* and *Vitex negundo* with Emphasis on Antimicrobial, Antioxidant, and Mosquito Repellent Potential	Inbaraj Selvaraj, Sumathi Ramanathapuram Karupannan* Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamilnadu, India.

International Conference on
Microbial Biotechnology for Sustainable Development in Environment and Agriculture
(ICMBSD-2026)
6-7, February 2026

Oral Presentation – Session V (Offline)

Venue : Seminar Hall, Sathyabama Research Park (III Floor)
Date : 06.02.2026
Time : 14.00 – 17.00 Hrs
Chair persons:

Dr. Sam Ebenezer
Assistant Professor (Research)
Centre for Drug Discovery and Development, Sathyabama

Dr. S. Vignesh
Assistant Professor (Research)
Centre for Drug Discovery and Development, Sathyabama

S. No	Abstract Number	Title of the Abstract	Authors and Affiliation
1.	S5-OP1	Multitarget Therapeutic Insights into Artocarpus heterophyllus and Artocarpus hirsutus for Diabetic Foot Ulcers: A Network Pharmacology Approach	Arrun Al Rashid A[1#], Lisanth S P[1#], Rizwan Ahamed Najimudeen[2], Priya Dharshini Anbalagan[2], S Usha Nandhini[1*], Prabhakar Singh[1*] [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, 600119, India. [2] Analytics Avenue for Research and Development, Analytics Avenue LLP, Sathyabama Institute of Science and Technology – Technology Business Incubator, Chennai, Tamil Nadu, 600119, India.
2.	S5-OP2	Hybrid polymer composite scaffolds for soft tissue engineering	Dheeptha Balaji[1], Devi B[1*] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119
3.	S5-OP3	Impact of per- and polyfluoroalkyl substances (PFAS) on marine microalgae	Hibah Afsheen[1], Inbathamizh, L [1]. Anaswara, A.R [2]. Dinesh, S [3]. Inbakandan, D [2] and Kumar, C [2*] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600 119. [2]National Facility for Coastal & Marine Research (NFCMR) and Centre for Ocean Research (DST-FIST Sponsored centre), MoES – Earth Science &Technology Cell, Sathyabama Institute of Science and Technology, Chennai 600 119, Tamil Nadu, India.

			[3]Spinco Biotech Pvt Ltd, Perungudi Industrial Estate, Chennai – 600 096
4.	S5-OP4	Harnessing Trichoderma-Based Microbial Biocontrol Strategies for Sustainable Pest Management in Warm-Season Vegetables4.	Prtyasha Acharya*[1], Gaurav Meena[1], Abinaya Karunakaran[1] and Afiya Rajan Selin[2] PG Student & Ph.D. Scholar, Department of Horticulture, Central University of Tamil Nadu, Thiruvarur (India) – 610001
5.	S5-OP5	Quercetin as a Bioactive Additive for Sustainable Food Packaging: Extraction Strategies and Performance in Biopolymer Films	Niranjana P.[1], Rakshaiya Yadav G[1]., Sowmiya G[2]., Rajasekar Thirunavukkarasu[2]*., Ramesh Kumar V[1]*., Jesia Persis Preethi[1]* [1]Department of Biotechnology, Sathyabama Institute of Science and TechnologyChennai-600 119,Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600 119,Tamil Nadu,India
6.	S5-OP6	Nanophosphate biofertilizers from phosphate solubilizing bacteria via green synthesis : a review	Shiv Santhose S, Siddharth Kannan, Kavi Praba A, Indumathi S M Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Tamil Nadu, 600119, India
7.	S5-OP7	Network Pharmacology and In Silico Evaluation of Anti-Amyloid Phytochemicals: A Comprehensive Review	M S Sowmya Narayan[1], Rean Vergis Manu[2], S Usha Nandhini[3], L Inbathamizh[4] Department of Biotechnology, Sathyabama Institute of Science and Technology, Tamil Nadu, 600119, India
8.	S5-OP8	Comparative gut microbiome dysbiosis and probiotic signatures in inflammatory and metabolic disorders using IDS and MCI metrics	Varsha.R and Dr.H Jemmy Christy Department of Bioinformatics, Sathyabama Institute of Science and Technology, Chennai – 600 119. Tamil Nadu
9.	S5-OP9	Selenium based nano particle : synthesis , application and advance in PAH removal	Vijayan P R*, Jasper Pearlson Selvakumar D, D Venkatesan Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119
10.	S5-OP10	Smart Wound-Healing Scaffolds Based on Moringa for MRSA-Infected Diabetic Ulcers	Raghul Rajah S and Devi Baskar* Department of Biotechnology, Sathyabama Institute of Science and Technology, Tamil Nadu, 600119, India

11.	S5-OP11	Review on Mango-derived Biomaterials and Biopolymers: Emerging Applications in Biotechnology	Meghna Rathish and Kavipraba A* Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600119. Tamil Nadu
12.	S5-OP12	Exploring bacteria from different rice varieties for probiotic development	Sivaranjani G[1]., Bavanilatha M[1]., Kishore Kumar A[2]., Radhakrishnan M[2*] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
13.	S5-OP13	Synthesis of fish-oil biodiesel using bone meal–ZnO catalyst and its application assessment in IC engines	Palaniselvam. KG ,Praveen Kumar. G, Dr. M. Karthikeyan Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119, India.
14.	S5-OP14	Analyzing and Predicting the Agronomic Effectiveness of Biodegradable Beads Derived from Banana Pseudostem Using Data-Driven Models	Harini P, Pavithra K, D Venkatesan Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119
15.	S5-OP15	Agro-waste to smart biofilm: biodegradable corn husk film enhanced with cinnamon extract	R. Sai Prathiksha Department of Biotechnology, Hindustan Institute of Technology and Science, Padur, Chennai - 603103, Tamil Nadu, India
16.	S5-OP16	Bioextraction of Magnesium as Growth Promoting Plant Nutrient from Magnesite Mine Soil through a Laboratory Bioreactor Approach and Application on Plant Growth	M. Nandhini[1], V. Gopikrishnan[2] and P.M. Ayyasamy[1*] [1]Department of Microbiology, Periyar University, Salem - 636011, Tamil Nadu [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai -600119, Tamil Nadu
17.	S5-OP17	Treatment of dye wastewater by using hydrochar in batch process	Kishore. R, Manikandan.C, Dr.A.Annam Renita Department of Chemical Engineering, Sathyabama institute of Science and Technology.

International Conference on Microbial Biotechnology for Sustainable Development in Environment and Agriculture

(ICMBSD-2026)

6-7, February 2026

Poster Presentation - Session I

Venue: **Seminar Hall, Centre for Drug Discovery and Development Sathyabama Research Park (III Floor)**

Date : **07.02.2026**

Time : **10.00 PM – 1.00 PM**

Chair persons:

Dr. D. Saravanan, Assistant Professor (Research) Centre for Laboratory Animal Technology & Research, Sathyabama

Dr. D. Kavitha, Assistant Professor PG & Research Dept of Zoology, Guru Nanak College, Chennai - 42

S. No	Poster Number	Title of the Abstract	Authors and Affiliation
1.	S1-PP1	Determination of Antimicrobial activity of recombinant chemokine IL-8 (Cxcl8) against MDR *E. coli* and Methicillin Resistant *Staphylococcus aureus*	Raghav T. S[1], Yabes P[1], Dr. M. Bavani Latha[1], Jayshree Nellore[1], D. Saravanan[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Laboratory Animal Technology and Research, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India.
2.	S1-PP2	Screening of extracellular enzymes from actinomycetes with special reference to glutaminase.	Anitha.A Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India.
3.	S1-PP3	Evaluation of cryosphere bacteria for their plant growth promoting traits	EJ. Balasaraswathy[1], A. Atchaya[1], S. Usha Nandhini[1], P. Prakash[2], M. Radhakrishnan[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
4.	S1-PP4		S. Dharani Abirama Sundari

		MICROBES- An effective tool for the biodegradation of plastics	Biotechnology, The IES-GATE Training Academy, Tambaram, Tamil Nadu, India.
5.	S1-PP5	Evaluation of biosurfantant producing bacteria for dye degradation	Monisha T[1], Pavithra M[1], Ushanandhini S[1], Eshwarnath V S[1] and Radhakrishnan M[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
6.	S1-PP6	Isolation and Characterization of bacterial Cellulose producing bacteria from Cryosphere Region	Hemavathi.D[1], Lavanya.R[1], S. Usha Nandhini[1], S. Jayashree[1], M. Radhakrishnan[1], S. Sai Mahesh Kumar [1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
7.	S1-PP7	Sustainable Extraction, Purification and Characterization of Astaxanthin from Shrimp and Crab Shell Waste	SP. Kaviya, R. Anitha Department of B. Tech Biotechnology, Hindustan Institute of Technology and Science, Chennai, India. Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai, India.
8.	S1-PP8	Integrated Climate Smart Agriculture in Tamil Nadu Using Microbial, Indigenous, and Artificial Intelligence-Based Innovations	M Daarathi Department of Biotechnology, Bishop Heber College, Trichy, Tamilnadu, India.
9.	S1-PP9	Exploring Plant and Animal Derived Biopolymers for Wound Healing: A Focus on Moringa Pod Mucilage, Chitosan and Collagen as a Novel Fabrication Agent	Jayharini Balakumar [1], Divyadharshini Indrajith[1], Grace Lydia[1], Phoe Prabhakar Singh[1], Bharathi S[2*] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India [2]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

10.	S1-PP10	Isolation and Characterization of Microbial Protease with Potential Detergent Application	Mareeswari M[1], Kanika k [1], Prakash P[1], Bharathi S[2*], [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India [2]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
11.	S1-PP11	In Silico and Experimental Evaluation of Phytocompounds Targeting Biofilm Formation and Motility in *Pseudomonas syringae*	Sumaiya Begum Thuraputheen, Karthikeyan Ramalingam* School of Life Sciences, B.S. Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai 600048, Tamilnadu, India.
12.	S1-PP12	Retrograde Axonal Transport of α-Synuclein: Evidence Supporting the Enteric Nervous System as an Early Site of Parkinsonian Pathogenesis	Erika Sara Ciby Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
13.	S1-PP13	Isolation of PHB Producing Bacterial Source for Bio Plastic Production	Subhasri. R Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
14.	S1-PP14	Screening of Extracellular Enzymes from Actinomycetes with Special Reference to Glutaminase	Gayathri Devi.P Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
15.	S1-PP15	Screening of Seawater Microorganisms for their Potential in Plastic Degradation	Yuvasri. S, Dr. B. Devi [1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
16.	S1-PP16	Production, Characterization and Biological Evaluation of Siderophore from Cryosphere Bacteria	Siva Lakshmi Priya. N[1], Sai Mahesh Kumar. S[2,] Dr. M. Radhakrishnan [2], Dr. G. Brindha1 [1]Dept of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamil Nadu [2]Centre for Drug Discovery and Development, Sathyabama Institute of

			Science and Technology, Chennai– 600 119, Tamil Nadu, India
17.	S1-PP17	Exploring Enzymes Producing Bacteria from Kalpakkam Ecosystem	Sakthi Shivani.P Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119,Tamil Nadu, India
18.	S1-PP18	Production, Characterization and Biological Activities of EPS from Cryosphere Bacteria	Mahasivanantham[1], Sai Mahesh Kumar S[2], Dr Radhakrishnan M[3], Dr Mohana Priya R[4] [1]Dept of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamil Nadu [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India
19.	S1-PP19	Evaluation Of Antifungal Properties of Actinobacteria	Rejith R.S. Kumar [1+], Parkavi. K. P[1+], Thenmozhi. G.S [2], Radhakrishnan. M [2*], Mahalakshmi. K[3], Usha Nandhini. S[1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology,Chennai – 600 119, Tamil Nadu, India [3]Department of Microbiology, Sree Balaji Dental College, Chennai – 600 100, Tamil Nadu, India
20.	S1-PP20	Bacteriocins as Adjuncts to Antibiotic Therapy Against Multidrug-Resistant *Staphylococcus aureus*	Thasnim Begum Shahjahan[1], Jesia Persis Preethi[1], Revathy Kalyanasundaram[2], Krupakar Parthasarathy[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
21.	S1-PP21	Bacteriocins from *Lactobacillus*: A Natural Alternative to Antibiotic	Anugraha Rajangam[1], Jayshree Nellore[1], Revathy Kalyanasundaram[2], Krupakar Parthasarathy[2] [1]Department of Biotechnology, Sathyabama Institute of Science and

			Technology, Chennai – 600119, India ²Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India
22.	S1-PP22	Mechanistic Design of a Time-Released Probiotic Capsule Integrating Prebiotic and Postbiotic Payloads for Enhanced Functional Stability	Varsha Maalika G. M¹, Saqib Hassan¹, Revathy Kalyanasundaram², Krupakar Parthasarathy² ¹Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India ²Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
23.	S1-PP23	Microbial synthesis of nanoparticles using fungi and Actinomycetes	A. Kenamma, J. Jerrina Marial , D . Susan Caroline, R. Kalavani, M. Uma Maheshwari, C.S.I Ewart Women's Christian College, Chengalpattu - 603204, Tamil Nadu, Chennai
24.	S1-PP24	Microbial degradation of plastics and synthetic polymers in soil and aquatic systems	L. Dharshini, J. Jerrina marial D . Susan Caroline, R. Kalavani, M. Uma Maheshwari, C.S.I Ewart Women's Christian College, Chengalpattu- 603204, Tamil Nadu, India.
25.	S1-PP25	Biosynthesis of gold nanoparticles using medicinal herbs and characterization studies	K. Ashalata Behara, J. Jerrina Marial ,D. Susan Caroline, R. Kalaivani, M . Uma Maheshwari, C.S.I Ewart Women's Christian College, Chengalpatt - 603204, Tamil Nadu, Chennai
26.	S1-PP26	Screening marine microbes for bioactive compounds with anticancer activity	A. Kavitha, J. Jerrina Marial D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari C.S.I Ewart Women's Christian College, Chengalpatt - 603204, Tamil Nadu, Chennai
27.	S1-PP27	Green synthesis of metal nanoparticles using plant extracts and their biomedical applications	P. Priya, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari. C.S.I Ewart Women's Christian College, Chengalpatt-603204, Tamilnadu, India
28.	S1-PP28	Role of microbiome engineering in enhancing	A. Haripriya, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari.

		both plant growth and disease resistance.	C. S. I Ewart Women's Christian College, Chengalpat - 603204, Tamil Nadu, India
29.	S1-PP29	Bioremediation potential of polar microbes in oil spill cleanup	K. Bemmy Gracy, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari. C. S. I Ewart Women's Christian College, Chengalpat - 603204, Tamil Nadu, India.
30.	S1-PP30	Preliminary Screening and evaluation of probiotic properties of lactic acid bacteria from the arctic region	K. Priyanka[1], G. Sanjana Singh[1], S. Usha Nandhini[1], Prabhakar Singh[1], M. Radhakrishnan[2], Sai Mahesh Kumar[1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai
31.	S1-PP31	Evaluation of Bacteria for PGP Properties from Soil Sample	Balaji M.[1], Ramesh Kumar[1], Grace Lydia Phobe[1], Sai Mahesh Kumar[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai
32.	S1-PP32	Bioprospecting of bacteria for plant growth promotion	Guna Karthic M.[1], Ramesh Kumar[1], Grace Lydia Phobe[1], Ashwin R.[2] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai
33.	S1-PP33	Suspension Culture Approach for Bioactive Metabolite Production from Mint Tulsi (Ocimum sp.) for Therapeutic Applications	Nadiyah Thajudeen, Deepika V., Ramesh Kumar V., Prakash Pandurangan* Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India.
34.	S1-PP34	Engineered Peptide Constructs for Immune Response Modulation against Viral Pathogens	Danya Sri[1], Aaqila Sujautheen[1], Sam Ebenezer Rajadas[2]#, Vignesh Sounderrajan[2], Bavanilatha M.[1], Jesia Persis Preethi[1]

			[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India. [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.
35.	S1-PP35	Non-Tuberculous Mycobacterial Infections: Emerging Threats, Diagnostic Challenges, and Future Directions	Monisha Rao[1], Krithika Saravanan[1], Sam Ebenezer Rajadas[2]#, Vignesh Sounderrajan[2], Jayshree Nellore[1], Jancy Mary[1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India. [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.
36.	S1-PP36	Antigenotoxic effect of paramylon from Euglena gracilis against heavy metal stress cadmium in Allium cepa root tips	Thirushna[1], Devi[1], Srinivasan[2]* [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India [2]Centre for Ocean Research Sathyabama Institute of Science and Technology, Chennai, India.
37.	S1-PP37	Exopolysaccharide-Producing Bacteria from Fish Intestines: Screening, Production, and Characterization	Ramachandiran M[1], Karthik Prakash MP[2], V. Gopikrishnan, K[2]. Kavitha [1]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore- 641028 Tamil Nadu, India; [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600 119, Tamil Nadu, India
38.	S1-PP38	Immunomodulators in Tuberculosis Disease Management	Chennupati Shalini[1], Bachina Naga Siri[1], Vignesh Sounderrajan[2#], Sam Ebenezer Rajadas[2], Inbathamizh L[1], Jayashree S[1] [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India. [2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.
39.	S1-PP39	Bioprospecting of Fish Gut–Associated *Pseudomonas* sp. as a Probiotic Candidate for Sustainable Aquaculture	Gokul Praveen[1], Safrina Power Singh[1], Karthik Prakash M P[2], Gopikrishnan Venugopal[2*], Radhakrishnan Manikkam[2]. [1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai 600119, Tamil Nadu, India

			[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai 600119.
40.	S1-PP40	Marine Algae Based Green Synthesis of TiO_2 Photocatalysts for Microplastic Degradation: A Comprehensive Review	Keerthana Reddy S[1], Lohitha Kranti D[1], Aswini R[2], Saqib Hassan[1], Ramesh Kumar V[1], Ganesh Kumar[2*] [1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600119.,Tamil Nadu, India [2]Centre for Ocean Research and Development, Sathyabama Institute of Science and Technology, Chennai-600119.Tamil Nadu, India
41.	S1-PP41	Natural Antibacterial Scaffold for 3D Fish Muscle Culture	S. Sandhya[1],D.Suganthi[1], Jayshree Nellore[2], Ms.Grace Lydia Phoebe,Dr.V.Karthick[1] [1]Centre for Ocean Research and Development, Sathyabama Institute of Science and Technology, Chennai-600119.Tamil Nadu, India [2]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600119.,Tamil Nadu, India

 ISBN: 978-93-48577-14-6

ABSTRACTS FROM PLENARY SPEAKERS

ISBN: 978-93-48577-14-6

PT - 1

Organic Agricultural Innovation and Organic Certified Standard of AATSEA

Kasem Soytong[1,2,4], Jiaojiao Song[1,3,4]

[1]Research Institute of Modern Organic Agriculture (RIMOA), King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand;

[2]Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand;

[3]King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus, Thailand; [4]Association of Agricultural Technology in Southeast Asia (AATSEA), Bangkok Thailand

[*]**Corresponding Author:** Kasem Soytong; **E-mail:** ajkasem@gmail.com

Abstract

Biological technique is proposed as integrating biotic and abiotic factors including digital agriculture through modern organic agriculture or organic agriculture innovation for food safety/security and sustainability to surrounding environment. This new approach is to change the concept of organic agriculture from traditional or conventional to modern organic agriculture. Modern organic agriculture has been successfully proved which based on understanding scientific basis of natural sciences to produce agricultural inputs for the quality and quantity of crop productivity as compared to chemical agriculture. Biotic factors in rhizosphere soil involve to understanding all living organisms in farm both benefit and non-benefit organisms, microbial community in rhizosphere soil, bioremedation, biological pest management (weed, insect pests, and plant pathogens) etc. Moreover, biotic factors under plant canopy and surrounding cropping production involve in microbial community under plant canopy both benefit and pathogenic microbes and organisms, insects for pollination, predators etc. Abiotic factors in rhizosphere soil involve soil fertility (organic matter, soil pH, E.C., soil structure, soil moisture and temperature, soil aerotion, ratio of oxygen and carbon dioxide in rhizosphere soil, the toxic chemicals residue in soil and water etc. Furthermore, abiotic factors under plant canopy and surrounding cropping areas involve in temperature, wind direction, relative humidity, light intensity for physiological processes of photosynthesis, respiration, translocation of water and nutrients, evapotranspiration (water moving from soil to atmosphere by evaporate from surface of soil and transpiration from crops through stomata), water and weed management, naturally plant protection etc. Digital agriculture helps for precision agriculture using AI, Iots, sensors, weather station, dron technology as organic smart farms. Modern technique for organic crop production is complexity consideration system integrating all factors to know the problems in each modern organic farms which can be recommended to solve the faced problem in farms with appropriated biotechnology for successfully organic crop production. Organic certified standard is needed for farmers and consumers to realize and acceptable level as organic products which AATSEA organic certified standard is one of the representative agent for organic certification.

Keywords: Biotechnique, Rhizosphere soil, Organic Certification, modern organic farms

 ISBN: 978-93-48577-14-6

PT – 2

Beneficial Soil Bacteria and Symbiotic Fungi for Sustainable Crop Production

Bianciotto Valeria[1]

[1]Institute for Sustainable Plant Protection (IPSP), National Research Council of Italy (CNR) at the Department of Life Sciences and Systems Biology, University of Turin
Viale Mattioli 25, 10125 Turin, Italy.
Email: valeria.bianciotto@cnr.it

Soil microbial communities are a cornerstone of sustainable agricultural systems, as they contribute to soil quality, nutrient availability, plant vigor, and crop resistance to environmental stresses. Within this complex microbiota, a wide range of beneficial soil microorganisms—such as rhizosphere-associated bacteria and free-living nitrogen-fixing microbes, commonly referred to as plant growth-promoting rhizobacteria (PGPR)—are increasingly used as biofertilizers. In addition to PGPR, arbuscular mycorrhizal fungi (AMF) play a central role due to their ability to establish symbiotic relationships with the roots of most terrestrial plant species. By forming mycorrhizal associations, AMF improve the uptake of essential nutrients, enhance plant water status, increase tolerance to adverse conditions such as drought and salinity, and support plant defense mechanisms against soil-borne pathogens. These biological components represent sustainable and cost-effective alternatives to chemical fertilizers and pesticides, contributing to reduced environmental impact and the promotion of more resilient agricultural practices.

However, although microbial inoculants have demonstrated significant benefits in laboratory and greenhouse studies, their effectiveness under field conditions is often inconsistent, particularly with regard to AMF applications. Factors such as soil chemical and physical properties, the presence of native microbial communities, plant genotype, climatic variability, and farming practices strongly influence the establishment, survival, and performance of introduced microorganisms. Consequently, many commercial biofertilizers show variable outcomes and limited reliability when applied on a large scale.

Recent studies highlight the importance of interactions among soil microorganisms, particularly the positive synergistic effects between AMF and other beneficial microbes. The use of multi-microbial consortia, combined with diversified and sustainable agronomic management, is emerging as a promising approach to enhance soil biodiversity, ensure functional stability of agroecosystems, and improve crop productivity. Therefore, integrated research approaches that combine microbial community analyses with agronomic evaluations are essential to optimize the design and application of biofertilizers under real farming conditions. This presentation will showcase selected case studies from greenhouse and field trials, illustrating both the opportunities and limitations of biofertilizer-based strategies, with particular emphasis on AMF-driven approaches for sustainable agricultural intensification.

 ISBN: 978-93-48577-14-6

PP – 3

Innovative beneficial microbial delivery systems in agriculture

Sabarinathan KG[1], Gomathy M[2] and Ananthi K[3]

[1]Agricultural College and Research Institute, Madurai

[2]VOC Agricultural College and Research Institute, Killikulam

[3]Tamil Nadu Agricultural University

Corresponding author: sabarinathan@tnau.ac.in

Abstract

The successful application of beneficial microorganisms in agriculture depends largely on the development of efficient delivery systems that maintain microbial viability, stability and functional performance under field conditions. Recent advances in innovative microbial delivery systems, including nano-based formulations, have opened new avenues for enhancing crop productivity, soil health and agricultural sustainability. This study highlights emerging strategies for the delivery of plant growth promoting microorganisms, biocontrol agents and biofertilizers through advanced formulation technologies.

Novel delivery platforms such as liquid and carrier based inoculants, encapsulation techniques, and nano enabled delivery systems are designed to improve microbial protection, targeted release and rhizosphere colonization. Nano based formulations, in particular, offer enhanced surface interactions, controlled release of microbial metabolites and improved stability under environmental stress, thereby increasing field-level efficacy. These delivery approaches facilitate improved nutrient mobilization, phytohormone production, stress tolerance and disease suppression in crops.

The integration of nano enabled microbial delivery systems with sustainable agricultural practices contributes to improved nutrient use efficiency, enhanced soil biological activity and resilience to biotic and abiotic stresses. Such innovative formulations reduce dependency on chemical fertilizers and pesticides while supporting climate smart and eco-friendly farming systems. Overall, the development of advanced microbial and nano based delivery systems represents a promising strategy for harnessing beneficial microorganisms to achieve sustainable and productive agricultural outcomes.

Keywords: Microbial delivery systems, Nano based formulations, Beneficial microorganisms Biofertilizers and biocontrol

ISBN: 978-93-48577-14-6

PT – 4

Unlocking the power of microbial consortia in enhancing the crop growth

Gomathy M [1], Sabarinathan KG [2] and Ananthi K[3]

[1]VOC Agricultural College and Research Institute, Killikulam

[2]Agricultural College and Research Institute, Madurai

[3]Tamil Nadu Agricultural University

Corresponding author: gomathy.m@tau.ac.in

Abstract

Microbial consortia play a pivotal role in enhancing crop growth, soil health and ecosystem sustainability by offering multifaceted biological functions that surpass the performance of single microbial inoculants. The present study explores the potential of diverse microbial consortia as eco-friendly solutions for improving agricultural productivity and environmental resilience. Emphasis is placed on synergistic interactions among functionally complementary microorganisms capable of promoting plant growth, nutrient acquisition and stress tolerance across different cropping systems.

Yeast based microbial consortia were evaluated for their growth promoting efficiency in rice, demonstrating improved plant vigor through enhanced nutrient mobilization and metabolic activity. In parallel, Arbuscular Mycorrhizal (AM) fungal consortia formulated as a Roor organ culture based liquid inoculum were assessed across multiple crops, highlighting their ability to enhance root colonization, nutrient uptake and soil biological activity. Additionally, microbial consortia with bioremediation potential were examined for their role in mitigating soil contaminants and restoring soil functionality. A seaweed associated microbial consortium was also investigated for its broad spectrum application in crops, contributing to improved growth, stress resilience, and soil fertility.

Overall, the findings underscore the importance of microbial synergy in developing sustainable agricultural inputs that support crop growth while reducing dependency on chemical fertilizers. The integration of microbial consortia for crop enhancement and environmental management presents a promising pathway toward sustainable and climate resilient agriculture

Key words: microbial consortia, sustainable agriculture, yeast consortium, AM fungi, Seaweed

 ISBN: 978-93-48577-14-6

PT – 5

Cold Waters, Hot Prospects: Novel Bacterial Communities Associated with Macroalgae and Sponges from Southern Chile and Antarctica

Sergio Leiva Poveda[1]

[1]Institute of Biochemistry and Microbiology. Faculty of Sciences. Universidad Austral de Chile. Valdivia. Chile.

Microorganisms associated with marine invertebrates and macroalgae are emerging as promising sources of biotechnological innovation. However, many regions and habitats remain poorly explored with respect to the diversity of host-associated marine bacteria, their novelty, ecological roles, and biotechnological or industrial relevance. Here, we bioprospected culturable bacteria associated with marine macroalgae and sponges from southern Chile and King George Island (Antarctica), targeting both Gram-positive (Actinobacteria, Bacillaceae) and Gram-negative taxa. Intertidal Antarctic macroalgae (*Adenocystis utricularis, Iridaea cordata and Monostroma hariotii*) harbored a rich actinobacterial community dominated by Microbacteriaceae and Micrococcaceae, whereas subtidal red macroalgae were enriched in Gammaproteobacteria (mainly *Pseudoalteromonas*) and Flavobacteriia. Antarctic marine macroalgae also yielded several putative novel species, including new members of the genera *Amycolatopsis, Radiobacillus, Winogradskyella* and *Yoonia*. These Antarctic epiphytic bacteria exhibit significant biotechnological potential, particularly due to their hydrolytic enzyme activities. Marine macroalgae and sponges from southern Chile harbored a diverse community of endospore-forming Bacillaceae, mostly from the *Bacillus pumilus* group, with potential as marine probiotics and biosurfactant producers. Overall, our results demonstrate that marine biota from high-latitude regions of the southern hemisphere host diverse and novel bacterial communities with largely untapped biotechnological potential

 ISBN: 978-93-48577-14-6

PT - 6

இயற்கை வேளாண்மையில் விவசாயிகளின் கண்டுப்பிடிப்புகளின் முக்கியத்துவம் - மணிலிருந்து உணவு அமைப்புகள் வரை

Julien Jean Malard-Adam[1]

[1]G-EAU (Gestion de l'eau, acteurs, usages) IRD (Institut de recherche pour le dévelopment) , Université de Montpellier Montpellier, France

உலகத்திலெங்கிலும் வேளாண்மையில் பேண்தகைமை அடைக்கிறதற்கு இரண்டு விதியாசமான துத்துவங்கள் சமீபத்தில் முன்வந்து இருக்கின்றன. இவற்றில் ஒன்று, துலியமான வேளாண்மை என்பது ஒரு கருத்து, உணரிகள், மின்னணு உபகரணங்கள் மற்றும் நுண்ணுயிரி ஊக்கி உட்பொருட்கள் போன்ற வெவ்வேறு புதிய தொழில்நுட்பங்கள் மூலமாக விவசாயத்தின் உற்பத்தி அதிகரிக்க நோக்கத்தில் வருகிறது.

இதற்கு எதிரில், இயற்கை வேளாண்மை என்று தட்டுவம் விவசாயத்தில் இயற்கையாக வரும் நுண்ணுயிரிகள், மண், பூச்சி, பயிர் ரகங்கள் மற்றும விவசாயி அறிவுகள் அனைத்திலும் உள்ள பல்முகத்தன்மையைப் பயன்படுத்து உற்பத்தி அதிகரிக்க முயற்ச்சிகிறது. இந்த நோக்கத்தில், பல வகையான நுண்ணுயிரிகள் கொண்டுள்ள பஞ்சகாவ்யா போன்ற மண் உயிரிகளை ஊக்கும் உட்பொருட்கள் விவசாயிகளாலே உருவாக்கினப்படுகின்றன.

மகசூல் அதிகரிக்கிறதை விட, சத்துள்ள மற்றும் பாதுகாப்பான உணவு எல்லோருக்கும் கிடைக்கவும் என்பது நோக்கத்துக்கு அதிகமான முக்கியத்துவம் கொடுக்க வேண்டியது என்றால், விவசாயிகளால் சொந்தமாக உருவாக்கக்கூடிய தொழில்நுட்பங்களுக்கு முன்னுரிமைக் கொடுத்து, இயற்கையாக வரும் மண் மற்றும் பயிர் உயிரினபன்மையைக் கட்டுப்படுத்த அல்லது குறைக்க மாறாக அவற்றின் முழுமையான திறன்களைப் பயன்படுத்தவும்.

The current need for sustainability in agriculture has led to two main schools of thought on the topic. The first, often called “precision agriculture”, proposes to improve agricultural production through the use of sensors, electronics and new technologies such as microbe-based inputs. On the other hand, natural farming aims to improve production through the use of naturally occurring diversity in soil microbes, crop varieties, and farmer knowledge. This includes such technologies as panchagavya, a soil microbial stimulant that can be produced by farmers themselves. Natural farming, by its more holistic consideration of farming systems, does not only aim to improve yields but rather to create food systems that guarantee access to safe and nutritious food for communities. Upscaling this approach will require, instead of attempting to simplify agricultural systems, the full use of traditional ecological knowledge and associated technologies and biodiversity held by farming communities.

 ISBN: 978-93-48577-14-6

PP – 7

Advanced Nanotechnology for Plant Immunity

Jiaojiao Song[1,2,4*] and Kasem Soytong[1,3,4]

[1]Research Institute of Modern Organic Agriculture (RIMOA), King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand;

[2]King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus, Thailand; [3]Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; [4]Association of Agricultural Technology in Southeast Asia (AATSEA), Bangkok Thailand.

[*]**Corresponding Author:** Jiaojiao Song; **E-mail:** misssongjiaojiao@gmail.com

Abstract

Agricultural biotechnology is targeted to decrease the toxic agrochemical application for crop production towards food safety and sustainable agriculture. Nano-biotechnology has investigated and developed for safety crop production from natural product active metabolites derived from potential microorganism which constructured to be nano-particles or nanofibres for plant disease management. Our research investigatioin has been developed and formulated nano-elicitors constructed from nartural active metabolies from *Chaetomium globosum, Chaetomium lucknoense, Chaetomium brasiliense, Chaetomium cochliodes, Chaetomium cupreum, Chaetomium elsatum, Emrericella nidulns and Trichoderma harziamnum.* It is proved that the specific nano-elicitor such as nano-pure compound rotiorinol of *Ch. cupreum,* nano-pure compound chaetoglobosin-C of *Ch globosum,* nano-pure compound chaetomanone of *Ch. cupreum* can be fastly penetreated into plant cells and tissue for biological activity process to elicit the infected plants to produce phtoalexin capsidiol for disease protection at low concentration of 5 ppm which treated to control chilli and coffee antharcnose caused by *Colletotrichom gloeosporiodes,* nano-pure compound trichotoxin A50 of *T harzianum* which atcs as elicitor to induce capsidiol against antharcnose. Natural nano-pure compound chaetomanone is also expressed antifungal activity against *Fusarium oxysporum* f sp *lycopersici* race 3 and induce the production of alpha tomaline in the infected tomato plants. Moreover, the research findings on nsatural products from microorganism has been further investigated for disease management through plant immunity as plant vaccine. These research approachs can be integated to other control meassures for combining disease management to decrease the application of toxic chemicals in agriculture.

Keywords: Natural products, Nano-elicitor, Plant immunity, Phytoalexin

ISBN: 978-93-48577-14-6

PT - 8

Application of Biotechnology in Poultry Nutrition

John Cassius Moreki[1]

[1]Department of Animal Science, Faculty of Animal and Veterinary Sciences, Botswana University of Agriculture and Natural Resources, P/Bag 0027, Gaborone, Botswana

Corresponding author: jmoreki@buan.ac.bw

Abstract

For a long time, biotechnology has been used in animal production to improve animal performance through better nutrition, enhanced production potential or improved health status. This review focuses on the application of biotechnology in animal production with emphasis on poultry nutrition. It also highlights how biotechnological interventions have been used to address challenges posed by traditional feeding systems, such as nutrient digestibility, anti-nutritional factors (ANFs), and environmental sustainability. Enzymes such as phytase are added to poultry diets to enhance phosphorus utilisation, decreasing environmental pollution. Supplementation with probiotics and prebiotics improves host health and prevents pathogen colonisation by modulating immune functions, altering the intestinal microecology, and enhancing digestion. In addition, prebiotics and probiotics can inhibit pathogenic gut microorganisms or make the animal more resistant. These microorganisms are involved in the genetic manipulation of microbes in the gastrointestinal tracts of monogastric animals, which protect protein, amino acids and fat digestion. Genetically modified grains for nutritional improvements and ANFs could include low-phytate corn, high-oil corn, and low-oligosaccharide soybean. In addition, feed additives such as electrolytes, betaine, amino acids, leaf extracts and trace minerals promote growth in livestock exposed to heat stress. Other additives, including ractopamine, L-carnitine, amino acids, and nucleotides, are used to improve broiler growth and carcass quality. Mycotoxin binders are also included in poultry diets to reduce mycotoxin absorption and bioavailability. This shows that biotechnology has beneficial uses in the poultry industry. It can be concluded that biotechnology has diverse beneficial applications and solutions in animal production, including environmental protection, improved animal production performance, better health, and better animal welfare and well-being.

Keywords: Animal performance, animal welfare, anti-nutritional factors, nutrient digestibility, environmental sustainability, livestock

ISBN: 978-93-48577-14-6

PT – 9

Microbiological evaluations of bioaerosols from peach orchards

Dr. Govindaraj Dev Kumar
Associate Professor – Center for Food Safety
Department of Food Science and Technology
College of Agricultural and Environmental Sciences
1109, Experiment Street, Melton Building
Griffin, GA 30223

Bioaerosols from peach orchards were evaluated for microbial presence and viability, and other potential biomarkers. Correlations among microbial populations (bioaerosols, soil, leaves) and environmental measurements were evaluated to assess the factors for indicator potential. Nine orchards were sampled based on proximity to potentially relevant infrastructure and animal operations. Bile in the air samples showed a potential for use as a biomarker due to its moderate correlation with coliform counts ($r=0.64$). Particulate matter (0.3 µm, 2.5 µm, 10 µm) showed negative correlations with the air samples' heterotrophic plate count (HPC) populations. Endotoxin showed low or slightly negative correlations with the airborne bacterial populations. There was a moderate negative correlation ($r=-0.63$) between dew point and HPC population on leaf samples, and there was a strongly negative correlation ($r=-0.70$) between dew point and coliform population on leaf samples. There was no significant difference in the microbial populations in each of the air, soil, and leaf samples across the different orchards ($p>0.05$). The study results indicate that bile could be a potential indicator of airborne coliforms in a pre-harvest environment.

ISBN: 978-93-48577-14-6

PT – 10

Advanced Microbial Biotechnologies For Sustainable Agriculture and Environment

Wafaa Mohamed Haggag[1*], Dalia Gamil Aseel[2]

[1]Plant Pathology Department, National Research Centre, Cairo, Dokki, Egypt

[2]City of Scientific Research and Technological Applications (SRTA, City), Arid Lands Cultivation Research Institute (ALCRI), Plant Protection and Bio-Molecular Diagnosis Department, Alexandria, 21934, Egypt.

*Correspondence wafaahaggag@yahoo.com

In agriculture, plant-microbe interactions are believed to be a complex network. The plant - associated microbiome affects how plants respond to pollutants, environmental stresses, pathogens, and the cycling of soil nutrients. Biocontrol, biofertilizers, bioremediation, biofortification, and other sustainable environmental development techniques are examples of microbial uses. These microbes can perform a range of functions in the environment. Independent microbial communities have the capacity to carry out a range of helpful actions that help attain sustainable aims. The impacts of increased industrialization processes and the frequent use of potentially dangerous chemicals (fertilizers and pesticides) emphasize the potential damage to microorganism biodiversity in ecosystems.

Advanced microbial biotechnology products improve sustainable agriculture and the quality of the environment by leveraging Plant Growth Promoting Microorganisms (PGPM) and beneficial microorganisms to increase crop yield, regulate abiotic/biotic challenges, and facilitate polluted soil bioremediation. PGPM and beneficial microorganisms are vital for plant life and health. These beneficial microbes help plants get nutrients, defend them from infections, and battle abiotic stressors.

Modern approaches such as metagenomics, proteomics, and precise bioformulations increase nutrient efficiency, reduce chemical dependency, and rehabilitate degraded land. Microbial biotechnology could be used with AI driven precision agriculture, genome editing methods such as CRISPR, and smart delivery systems to improve field performance. Understanding collaborative interactions between plant and soil bacteria is critical for regulating biotic and abiotic problems in crops and developing reliable products such as biostimulants and biopesticides. Plant-microbe interactions can help with activities such as soil reclamation, pollutant degradation, and saline or marginal region remediation, in addition to enhancing crop productivity. In order to achieve the goals of sustainability through microbial technology, intricate mechanistic details of action against abiotic stresses, pollutants, and pathogen attack would be extremely beneficial in developing novel and efficient biostimulants, biofertilizers, biodegraders, biopesticides, and other bioinnoculants. In addition, plant growth-promoting and beneficial microorganisms have received increased attention as a means of meeting the goals of climate-smart farming practices.

This review will look at several areas of microbial technology for sustainable development and emphasize the role of biotechnology derived from microbial sources in all of these applications, utilizing a few more advanced examples.

Keywords: Microbial biotechnology, abiotic/biotic, Bio pesticides, Bio fertilizer, Bioremediation

 ISBN: 978-93-48577-14-6

ABSTRACTS – ORAL PRESENTATION (SESSION 1)

ISBN: 978-93-48577-14-6

S1-OP1

Sustainable Applications of Natural Dyes on Textile Fibers Pretreated with Nano based Natural Products and its Bacterial Characteristic for Production of Smart Textiles

Ali N. F.

Dyeing and printing, Department, National Research Centre, 12421-Dokki, Cairo, Egypt

Abstract

Wool fibers were dyed using ecofriendly natural dyes such as curcumin and red prickly pear. Wool fibers were treated with nano composite made from natural products as chitosan, propolis and citral nano composite before being dyed with natural dyes utilizing microwave and investigations were conducted into the dyed wool fibers' fastness characteristics, color strength, color data, dye concentration, time and pH variables.for treated and untreated fibers According to the data, wool fibers that had been pretreated with the tested nanomaterials performed better than untreated. Propolis, citral and chitosan nanocomposites have antibacterial action against some harmful bacteria. as: Staphylococcus aureus G+, Escherichia coli G- and Pseudomonas aeruginosa. The results obtained indicated that the antimicrobial activity for natural dyes under investigation were good and enhanced by composite improved the antibacterial activity of the natural dyes under study. Scanning electron microscopy (SEM) was used to analyze the morphologies and structures of the wool fibers treated and untreated. The untreated wool fibers have a rough surface. in contrast to the untreated fibers, the treated wool fibers were swelled. The fibers' diameter grew, the aim of this work is the manufacture of smart and ecofriendly handloome carpets from wool fibers pretreated and dyed with natural dyes.

Keywords: Nano composite, wool, dyeing, natural dye, antibacterial activity.

S1-OP2

Biophotonic properties of honey-derived water: An indigenous discovery rooted in prophetic medicine

Dr. Dushyanthan, BHMS, MD (Prophetic Medicine)

Wayanad, Kerala

Corresponding author: eduboardpm@gmail.com

Abstract

Prophetic Medicine (Tibb-e-Nabawi) is an emerging interdisciplinary field that integrates classical prophetic knowledge with contemporary scientific inquiry. In recent years, this field has received renewed academic attention following scholarly recommendations by senior researchers and botanists, leading to its recognition and academic consideration by the Central Ministry of Health and the Ministry of AYUSH, Government of India. This institutional interest has opened new avenues for systematic research, validation, and integration of Prophetic Medicine within modern biomedical frameworks.Honey has been revered across civilizations for its therapeutic value; however, its internal constituents—particularly its aqueous fraction remain inadequately explored in contemporary biomedical science. While classical Ayurveda often considers the water content of honey asnon-essential, modern research primarily focuses on its sugars, enzymes, and antimicrobial properties. This paper presents an indigenous discovery initiated by Usman Madari, a honey farmer from Wayanad, Kerala, inspired by the epistemological framework of Prophetic Medicine. Challenging conventional assumptions, Madari proposed that enzymes and proteins in honey may

ISBN: 978-93-48577-14-6

function to preserve and stabilize its aqueous component. Using a novel extraction approach, honey-derived water was isolated and observed to exhibit distinctive biophotonic characteristics, suggesting the possibility of subtle light-associated biological interactions relevant to cellular communication and regenerative processes. Preliminary qualitative observations indicate that this honey-derived water may demonstrate enhanced biological responsiveness compared to conventional water, warranting further controlled experimental investigation. The research ecosystem supporting this work is associated with the International Institute of Medical Sciences (IIMS), Payambra, Kunnamangalam, an autonomous institute devoted to Prophetic Medicine. The campus hosts over forty medicinal plants referenced in Prophetic traditions, providing a living laboratory for integrative medical research. This paper underscores the need for systematic interdisciplinary investigation into honey-derived water and highlights Prophetic Medicine as a complementary knowledge framework with potential relevance to contemporary biomedical and biophotonic research.

S1-OP3

Potential Influence of Fruit-Associated Bacteria on Lactobacillus casei: An In-Vitro Study

Prayukta Padelkar[1], Dr. Rinkal Patel[2], Dr. Anirudh Gupta[1]*

[1]NIMS Institute of Allied Medical Science and Technology (NIAMST), NIMS University Rajasthan, Jaipur-303121

[2]Rapture Biotech International Pvt Ltd., Mumbai, Maharashtra-400064

Corresponding author: prayuktapadelkar@gmail.com

Abstract

Fruit-borne microbes constitute a distinctive bacterial repository, and relatively little is known about how these bacteria interact with the gut microbiome. To assess the potential detrimental impacts of these dietary microorganisms, it is essential to understand how they interact. Isolates of bacterial species from fresh fruit samples were collected in the present study. Theywere initially characterized biochemically followed by molecular identification as well as species confirmation through 16S rRNA sequencing. Moreover, for examining the functional impact of fruit-associated bacteria on beneficial gut microflora, Lactobacillus casei served asan exemplary model organism. In-vitro co-culture assays were employed to investigate the interaction between fruit-associated bacterial isolates and Lactobacillus casei, with cellular viability and metabolic activity assessed using the MTT assay. The findings demonstrated a range of modulatory possibilities. While some fruit-associated microbes exhibited neutral interactions, other species showed inhibitory impacts on L. casei proliferation and metabolic processes. These results suggest that the beneficial probiotic activity and, consequently, gutbacterial dynamics could potentially be influenced by micro-organisms obtained from fruits. According to the study, dietary bacteria originating from fruits may interact actively with local gut microorganisms rather than just being passing through. Overall, the outcomes emphasize the significance of taking fruit-associated bacterial communities into account in the larger framework of microbiome–diet relationships and the necessity of additional mechanistic study to better understand their function in human gut health.

Keywords: Fruits bacteria, gut bacteria, isolation, identification, in-vitro, MTT assay

ISBN: 978-93-48577-14-6

S1-OP4

Optimisation of plant growth regulator mediated in-vitro shoot culture of Solanum nigrum by managing endophytic bacterial infection

Hadavani Rishita Anilkumar,
Dept of Biochemistry, NIMS, Jaipur
Corresponding author: rishitahadavani342034@gmail.com

Abstract

Solanum nigrum is an important medicinal plant widely used in traditional and modern medicine, creating a strong demand for reliable in-vitro propagation systems. Establishment of shoot cultures in this species is frequently hindered by persistent endophytic bacterial contamination, which adversely affects explant survival, shoot proliferation, and culturestability. The present study aimed to optimise plant growth regulator mediated in-vitro shoot culture of Solanum nigrum through systematic management of endophytic bacterial infection. Nodal explants were cultured on Murashige and Skoog medium supplemented with different concentrations and combinations of cytokinins and auxins to evaluate their influence on shoot initiation, multiplication, and elongation. Parallel experiments were conducted to assess sterilisation protocols and antibacterial treatments for controlling endophytic bacteria while maintaining explant viability and morphogenic potential. Cultures were evaluated for shoot induction frequency, number of shoots per explant, shoot length, culture establishment rate, and contamination incidence. Optimisation of plant growth regulator combinations resulted in a significant improvement in shoot induction and multiplication efficiency. Integration of appropriate antibacterial treatments effectively reduced endophytic bacterial infection and enhanced overall culture performance without inducing phytotoxic effects. The combined approach of growth regulator optimisation and endophyte management produced healthy, uniform, and reproducible shoot cultures. The optimised protocol developed in this study offers a robust and reproducible method forefficient micropropagation of Solanum nigrum. Additionally, the findings highlight the importance of addressing endophytic bacterial interference during in-vitro culture establishment and provide valuable insights applicable to other medicinal plants facing similar challenges under controlled laboratory conditions for sustainable large scale propagation.

S1-OP5

Exploring The Biomedical Potentials of Mangrove Associated Actinobacteria Isolated from Mangroves in Ernakulam District

Greeshma James[1], Sajeevan T P[2], Rejish Kumar V.J.[1,3]
[1]Faculty of Ocean Science and Technology, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
[2]Department of Marine Biology, Microbiology and Biochemistry, Cochin University of Science and Technology, Kochi, Kerala 682016, India
[3]Faculty of Fisheries Science, Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
Corresponding author: greeshmajames95@gmail.com

Abstract

Actinobacteria are ecologically and economically important prokaryotes recognized for their remarkable ability to produce diverse and novel bioactive metabolites. In the present study,

actinobacteria were isolated from mangrove ecosystems in the Ernakulam district of Kerala, India. Mangrove sediment and plant samples were collected from four distinct locations: Kumbalam, Puthuvyppu, Maalippuram, and Valanthakkadu. A total of 69 actinobacterial isolates were initially screened based on morphological characteristics and Gram staining. Antimicrobial activity was evaluated against five pathogenic bacteria, Escherichia coli, Bacillus cereus, Klebsiella pneumoniae, Staphylococcus aureus, and Pseudomonas aeruginosa. Among the isolates, only 10 exhibited antagonistic activity, producing inhibition zones ranging from 6 to 22 mm. These 10 isolates were further assessed for antioxidant activity using DPPH and hydrogen peroxide scavenging assays, quorum quenching activity through broth and plate assays employing Chromobacterium violaceum as the indicator strain, and anticancer activity against lung cancer cell lines using the MTT assay. Among them, isolate GMA1 showed the highest overall bioactivity, exhibiting strong antimicrobial, antioxidant, quorum quenching, and anticancer activities. Molecular identification based on 16S rRNA gene sequencing revealed that five isolates belonged to Streptomyces (GMA1,GMA4,GMA6,GMA8,GMA9) three to Nocardia (GMA3, GMA5,GMA7) one to Prauserella muralis (GMA2), and one to an Actinomycetes bacterium (GMA10). These findings highlight mangrove-associated actinobacteria as promising sources of multifunctional bioactive compounds with therapeutic potential.

Keywords: Actinobacteria, Bioactive compounds, Mangrove, Quorum quenching

S1-OP6

Evaluation of the antibacterial potential of solvent-mediated leaf extract fractions of Streblus asper Lour. against selected Gram-positive and Gram-negative bacteria

Mouli Pal*

Molecular Biology and Genetics Unit, Department of Zoology, The University of Burdwan, Golapbag, Purba Bardhaman-713104, West Bengal, India

Corresponding author: palmouli2@gmail.com

Abstract

Streblus asper, a medicinal plant belonging to the Moraceae family, has been traditionally used in ayurveda and folk medicine for treating various ailments like filariasis, leprosy, toothache, diarrhoea, dysentery, infections including cancer. Recent studies suggest that its antibacterial activity may be linked to the presence of bioactive compounds, including flavonoids, tannins, alkaloids, and terpenoids. The present study evaluated the antibacterial activity of various solvent extract fractions (Hexane, Chloroform, Ethyl acetate, Methanol) from S. asper leaf extract against a range of Gram-positive and Gram-negative bacterial strains using the agar well diffusion method to select the effective antibacterial fraction. The minimum inhibitory concentration (MIC) of the effective extract was determined on agar plates to assess the lowest concentration required to inhibit visible bacterial growth and Tetracycline is used as the standard reference antibiotic. The extract produced distinct zones of inhibition, indicating notable antibacterial potential. Results indicate inhibitory effects against bacteria such as Bacillus megaterium, Bacillus subtilis, Staphylococcus epidermidis, Escherichia coli, and Shigella flexneri, suggesting a broad-spectrum antibacterial potential. The findings support the therapeutic prospects of S. asper as a natural antimicrobial agent and underline its relevance in the development of plant-based alternatives to conventional antibiotics in combating drug-resistant pathogens.

Keywords: Antibacterial activity, Streblus asper, MIC, Natural antimicrobial agent.

ISBN: 978-93-48577-14-6

S1-OP7

Actinomycetes from Cochin Estuary as a promising source of antibiofilm agents for aquaculture

Amritha T, Sumitha, Gopalakrishnan, Sajeevan T P, S Venu
Department of Marine Biology, Microbiology and Biochemistry, School of Marine Science, Cochin University of Science and Technology (CUSAT), Kerala
Corresponding author: s.venu1974@cusat.ac.in

Abstract

The escalating global crisis of antimicrobial resistance, compounded by the formation of resilient microbial biofilms in aquaculture, poses a severe threat to marine environments and necessitates the discovery of novel antibiofilm compounds. This study investigated the antibiofilm potential of Actinomycetes isolated from deep-sea sediment samples collected across the Cochin Estuary, a vast and underexplored frontier for bioactive microorganisms. Following isolation and morphological characterization, these isolates were screened for secondary metabolite production against diverse biofilms collected from various aquaculture systems. Initial inhibition assays led to scaled-up metabolite production, where crude extracts were evaluated for their efficacy in preventing biofilm attachment and disrupting established matrices. Our results revealed that a substantial proportion of the isolated Actinomycetes, identified specifically as Streptomyces strains, exhibited potent antibiofilm activity directly attributed to their secondary metabolites. Notably, the majority of isolates demonstrated inhibition exceeding 50%, with several strains achieving significant thresholds of 70%, 80%, and 82%, and peak performance reaching a maximum of 90% biofilm disruption. These findings highlight the significant potential of these isolates in controlling persistent pathogens by targeting their protective structures rather than traditional growth inhibition, underscoring the Cochin Estuary as a promising source for valuable antibiofilm agents to support sustainable aquaculture and combat biofilm-associated resistance.

Keywords: Antimicrobial agents, Actinomycetes, Bioactive compounds, Cochin Estuary

S1-OP8

Characterization of *Streptomyces fradiae* from Mangrove Sediment as a Potential Probiotic and Its Effects on Growth, Antioxidant Activity, Immunohematology and Resistance to *Aeromonas Hydrophila* in Nile Tilapia *Oreochromis niloticus*

Mary Juliet S[1], Greeshma James[2], Abinsha Alex[3], Rejish Kumar V J1'[4]
[1]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
[2]Faculty of Ocean Science and Technology, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
[3]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
[4]Department of Aquaculture, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi, India
Corresponding author: mj2808468@gmail.com

Abstract

Probiotics play a vital role in aquaculture by enhancing fish growth, immunity, and water quality. Among them, Actinobacteria are especially valuable due to their antimicrobial, immunostimulatory, and bioremediation properties, making them important in managing

disease outbreaks and environmental challenges in aquaculture. The present study aimed to characterize the probiotic potential of actinobacteria Streptomyces fradiae isolated from mangrove sediments and its effect on growth performance, immunohematological parameters, digestive and antioxidant enzymes and disease resistance in Oreochromis niloticus fingerlings against *Aeromonas hydrophila* over a period of 30 days. Streptomyces fradiae exhibited notable enzymatic and antimicrobial activities, and therefore selected for further evaluation of its probiotic potential. The 16S rRNA gene sequencing confirmed that the JM1 isolate Showed 99.93% identiy with *Streptomyces fradiae. Streptomyces fradiae* revealed antimicrobial activity against various aquatic pathogens such as *A. hydrophila* and *S.agalactiae* and showed antioxidant activity also. The isolate was non-hemolytic and displayed antibiotic susceptibility to most of the antibiotic tested and was resistant to trimethoprim (TR) and ampicillin (AMP). After characterization of Streptomyces as potential probiotics; its effect on Nile tilapia fingerlings as water additives at a dose of 0.5g/80L for a period of 30 days were assessed. Growth performance and feed utilization efficiency were markedly enhanced in fish treated with Streptomyces fradiae. Hematological indices and serum protein concentrations exhibited significant elevation in treatment group than control group ($P \leq 0.05$). The Digestive enzyme, 'amylase' activity increased significantly in treatment group. Furthermore, probiotic supplementation in water significantly enhanced both immune and antioxidant responses in treated group relative to the control. The probiotic treatment group demonstrated the most pronounced stimulation of immunological parameters (respiratory burst, myeloperoxidase, lysozyme, and IgM) and antioxidant activities (superoxide dismutase, catalase, and total antioxidant capacity). Fishes exposed to Streptomyces fradiae administration revealed 100% survival rates against Aeromonas hydrophila. This study suggests probiotics Streptomyces fradiae as water additives enhanced growth, antioxidant activity, immunity, water quality and disease resistance in *O. niloticus* culture systems.

S1-OP9

Production, Extraction and Characterization of Biosurfactant from a Substrate by Using Oil Contaminated Soil Microbe

Shanmugapriya M, Nagajothi Kasilingam*

[1]PG & Research Department of Microbiology, KR. College of Arts & Science, KR Nagar, Kovilpatti, Tamil nadi

Corresponding Author: nagajothi2011@gmail.com

Abstract

Biosurfactants are surface-active chemicals produced by microorganisms that have gained popularity due to their biodegradability, low toxicity, and numerous industrial and environmental applications. The current work focuses on isolating and screening biosurfactant-producing bacteria from a variety of environmental samples, including soil, oil-contaminated areas, and wastewater. Standard serial dilution and spread plate procedures on selective media were used to produce bacterial isolates. The hemolysis test, oil spreading assay, drop collapse test, and emulsification index were used for preliminary biosurfactant manufacturing screening. Promising isolates with positive biosurfactant activity were further investigated for morphological, biochemical features. Finally, the isolated organism utilize to synthesis of biosurfactants. Then the productions of biosurfactants samples were extracted from cell-free supernatant by centrifugation. Also the qualitative analysis of the extracted

biosurfactant was done by TLC and FTIR to check presence of possible functional group. The identified strains may be potential candidates for future optimization and application in bioremediation, agriculture, medicines, and industrial processes.

Keywords: Biosurfactants, Biosurfactant-producing microbes, Oil spreading assay, Emulsification index, Agriculture.

S1-OP10

Antimicrobial and Phytocemical Analysis in *Cassia Auriculata*

Akash R[1], Angel M[1], Gopika P.S[1], Insamam A[1], Julie Varsha R.S[1], Vaishnavi M.S[1], Antony S[1]

[1].Department of Microbiology, Malankara Catholic College, Mariagiri, Kaliakkavilai, Kanyakumari Dist 629 153.

Corresponding author: santony51@gmail.com

Abstract

Cassia auriculata was medicinal plants was an important source of natural bioactive compound and are widely used in a traditional medicine for the treatment of various disease. The present study aims to evaluate the phytochemical constituents and antimicrobial potential of *Cassia auriculata* plant extracts using standard laboratory techniques. The present study demonstrates that *C.auriculata* possesses significant antimicrobial activity against microorganisms isolated from diabetic patient wounds. In GC-MS analysis bioactive compounds such as 9-fluorenone thiosemicarbazone, hydrazinecarbothioamide, and cyclopentataneacetic acid were identified and showing anticancer, antimicrobial, antioxidant and antibacterial activities. These findings provide a scientific basis for its traditional use in wound healing and integration of *C.auriculata* based formulations with conventional wound care strategies may offer a promising avenue for addressing multidrug-resistant infections and improving outcomes in diabetic wound management.

Key words: *C.auriculata*, antimicrobial potential, 9-fluorenone thiosemicarbazone, multidrug-resistant, diabetic wound

S1-OP11

Study of Potential Microbial Enzyme Complex for Degradation of Plastic from Marine Environment

K.R.Beula Rani, Fathima shihana.A, Saliha Thasneem.A ,Lijina Raj.L., Jeba sherin.R, Arothini Harishmatha.A.,Aravind.R.S

Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629 153,

Corresponding author: krbr609@gmail.com

Abstract

Plastic pollution has become a serious global environmental concern due to the extensive use, persistence, and non-biodegradable nature of synthetic polymers, especially in marine ecosystems. Large quantities of plastic waste accumulate in oceans each year, adversely affecting marine biodiversity, ecological balance, and human health through the food chain. The present study was undertaken to isolate and evaluate potential microbial enzyme complexes involved in the degradation of plastic from a marine environment.Marine water samples were collected from the deep-sea region of Colachel beach, Kanyakumari District, Tamil Nadu, using sterile sampling techniques. The isolated bacterial strains were characterized based on colony morphology, Gram staining, motility, and a range of

 ISBN: 978-93-48577-14-6

biochemical tests for identification. A total of four distinct bacterial isolates were obtained and identified *as Pseudomonas sp., Staphylococcus* sp., and two *Bacillus* species. The isolates were further assessed for their interaction with selected pathogenic microorganisms using the agar well diffusion method. The toxin-producing ability of the isolates was also evaluated using culture supernatants. Among the isolated strains, Pseudomonas sp. exhibited significant antagonistic activity, indicating the production of extracellular metabolites with strong enzymatic and antibacterial properties. These results suggest the possible involvement of microbial enzymes in the breakdown of complex polymeric structures.The study concludes that marine microorganisms, particularly Pseudomonas species, possess promising potential for plastic biodegradation. Microbial degradation offers an eco-friendly, sustainable, and energy-efficient approach for managing marine plastic pollution. Further investigations on enzyme characterization and large-scale application are recommended to enhance bioremediation strategies.

Keywords: Marine plastic pollution, Plastic degrading bacteria, Extracellular enzymes, Pseudomonas species, Bioremediation, Microbial degradation, Environmental sustainability

S1-OP12

Sustainable Bioplastic Production from Agro-Waste using Soil-Derived Microbes

T. Reena., S. Sana Fathima., S.V. Abhisha., P.D. Nandhana., M. Abishek.,A.K. Deebika.,Abirami.S.V

Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153 .

Corresponding author: reenavictor06@gmail.com

Abstract

The present investigation focuses on the sustainable production of biodegradable bioplastics from agricultural waste using a soil-derived microbe isolated from a petrol pump environment. The isolated strain was identified through conventional microscopic observation and biochemical characterization and was further evaluated for its ability to synthesize polyhydroxybutyrate (PHB), a biodegradable polymer. Optimization of growth and production conditions revealed that maximum PHB accumulation occurred at an incubation temperature of 35°C and a near-neutral pH range of 7.0–7.5 after 48 hours of fermentation. Various agro-waste substrates, including banana peel, potato peel, orange peel, and water hyacinth, were utilized as economical and renewable carbon sources to reduce production costs. Among the tested substrates, banana peel demonstrated the highest PHB yield, indicating its suitability as an efficient carbon source for bioplastic synthesis. The extracted polymer was characterized using Fourier Transform Infrared (FT-IR) spectroscopy, which confirmed PHB production through the presence of characteristic functional group peaks, notably the C–O stretching vibration observed at 1729 cm^{-1}. The results highlight the significant potential of *Bacillus* species in converting low-value agricultural residues into value-added biodegradable polymers. This eco-friendly approach not only minimizes reliance on conventional petrochemical plastics but also promotes effective agro-waste management. Overall, the study emphasizes a cost-effective and environmentally sustainable strategy for bioplastic production, contributing to the mitigation of plastic pollution and supporting the development of green alternatives for future material applications.

Keywords: Bioplastics, agricultural residues, sustainability, biodegradable polymers, plastic pollution, soil-derived microbes, waste valorization, eco-friendly plastics.

ISBN: 978-93-48577-14-6

S1-OP13

Prevalence of Antibiotics Resistance Bacteria in Mosquito Breeding Stagnant Water

K. Sukesh, Sooryajith.S S, Bhoomika. S, Sreeshma. S S Harisree. V B, Aparana. AV, T Muhammed naseeb

Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153.

Corresponding author: kshmcc@gmail.com

Abstract

Microbial contamination of food and clinical samples poses a serious threat to public health, making the identification and study of pathogenic bacteria essential. This project focuses on the isolation, identification, and characterization of four important bacterial groups: Escherichia coli, Salmonella species, Bacillus species, and Proteus species. These microorganisms are commonly associated with foodborne illnesses, hospital-acquired infections, and environmental contamination, and therefore serve as key indicators of hygiene and safety standards. The study was designed to enhance practical understanding of microbiological techniques used in routine laboratory diagnostics. Standard microbiological procedures such as sample collection, culturing on selective and differential media, Gram staining, and biochemical testing were employed to differentiate and confirm the bacterial species. Emphasis was placed on observing colony morphology, growth characteristics, and biochemical reactions, enabling accurate microbial identification. This project also highlights the significance of these bacteria in public health. *E. coli* and *Salmonella* are major causes of gastrointestinal infections, Bacillus species are known for their spore-forming ability and role in food spoilage and poisoning, while Proteus species are commonly associated with urinary tract infections and wound infections. Understanding their behavior and identification helps in improving infection control practices, food safety measures, and diagnostic efficiency. Overall, this project provides foundational knowledge in bacteriological analysis and laboratory safety while reinforcing the importance of microbiology in disease prevention and public health management.

Keywords: *Escherichia coli, Salmonella spp., Bacillus spp., Proteus spp., foodborne pathogens*,

S1-OP14

Production of bio-ethanol and biogas from sugarcane bagasse using *Saccharomyces cerevisiae*

Vijila Helen, Mary[1], Sreeja[2], Noufiya[2], Alfiya[,], Jersha[2], Reeba[2], Athira[2]

[1]Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153,

Corresponding author: ajivijila78@gmail.com

Abstract

Sugarcane bagasse, an abundant agricultural waste, was utilized for the integrated production of bio ethanol and biogas to promote sustainable energy generation. The bagasse was pretreated through physical and alkaline methods to reduce lignin content and enhance cellulose availability. Enzymatic hydrolysis released fermentable sugars, which were efficiently converted into bio ethanol using *Saccharomyces cerevisiae*. Ethanol production was confirmed by GC–MS analysis. For biogas production, pretreated bagasse

 ISBN: 978-93-48577-14-6

was subjected to anaerobic digestion using cow dung as inoculum. Methane-rich biogas production was confirmed by flame test. The results demonstrated effective waste utilization, high bio fuel yield, and environmental benefits. This study highlights sugarcane bagasse as a cost-effective and eco-friendly substrate for renewable energy production.
Keywords : Bioethanol production, Biogas production, *Saccharomyces cerevisiae* , Enzymatic hydrolysis, Anaerobic digestion, Renewable energy;.

S1-OP15

Evaluation of the antibacterial properties of *Musa acuminata* peel extracts on microorganisms isolated from deteriorated cake samples

Andrewslin Jani., S. Shamna Begam., R.H. Nijieshma.
S.R. Ariya Sree., [2]J.B. Athilah[2]., P.D.Gowri Krishna[2]., A. Sujith Issac[2]
[1]Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153
Corresponding author: andrewslinjani@gmail.com

Abstract

The present investigation was carried out to evaluate the antibacterial efficacy of *Musa acuminata* (banana) peel extracts against pathogenic bacteria isolated from spoiled cake samples, with an emphasis on their applicability as natural food preservatives. Microbial pathogens were isolated from deteriorated cupcakes and identified using standard microbiological techniques, including microscopic examination and biochemical characterization. Peel extracts were prepared using different organic solvents, namely ethanol, methanol, and acetone, to compare their antimicrobial potential. The antibacterial activity of each extract was assessed by the agar well diffusion method, and the zones of inhibition were measured to determine effectiveness. In addition, preliminary phytochemical screening was performed to detect the presence of bioactive compounds, and Gas Chromatography–Mass Spectrometry (GC–MS) analysis was employed to identify the major chemical constituents responsible for antimicrobial action. Among the tested solvents, the ethanolic peel extract exhibited the strongest antibacterial activity, showing significant inhibitory effects against foodborne pathogens such as *Pseudomonas .sp*, *Escherichia coli*, and *Vibrio cholerae.* Methanolic and acetone extracts displayed moderate to low antibacterial activity when compared to ethanol. The enhanced efficacy of the ethanolic extract may be attributed to the higher solubility and extraction efficiency of bioactive phytochemicals such as phenols, flavonoids, and fatty acid derivatives. The results of this study highlight the potential of *Musa acuminata* peel as a cost-effective, sustainable, and environmentally friendly source of natural antimicrobial agents. Incorporation of banana peel extracts, particularly ethanolic extracts, could serve as an alternative to synthetic preservatives for improving the microbial safety and shelf life of bakery products.
Keywords: *Musa acuminata* peel, Antibacterial activity, Food borne pathogens, Spoiled cake samples, Phytochemical screening, GC-MS Analysis, Natural food preservatives, Ethanolic extract**.**

ISBN: 978-93-48577-14-6

S1-OP16

Proteomics Insights into the anticancer activity of bacteriocins against MDA –MB 231 Breast Cancer Cells

Mrs. Andrewslin Jani V[1], Dr. Hema T.A.[2]
[1]Manonmaniam Sundaranar University, Tirunelveli.
[2]Dept. of Microbiology, Malankara Catholic College, Mariagiri, Kaliakkavilai.
Corresponding author: hemaraj15@gmail.com

Abstract

Breast cancer remains one of the most prevalent and lethal malignancies worldwide, with triple-negative breast cancer (TNBC) representing an especially aggressive subtype characterized by the absence of estrogen receptor, progesterone receptor and human epidermal growth factor receptor 2 expression. In recent years, the search for alternative and adjunct therapeutic strategies has intensified, particularly those involving natural or bioactive compounds with dual antimicrobial and anticancer properties. While conventional cancer treatments are often effective, they are also associated with significant drawbacks, including severe side effects, systemic toxicity, and the development of drug resistance. These limitations have fuelled the urgency to identify novel agents that are both effective and less harmful to healthy tissues. Bacteriocins are ribosomally synthesized antimicrobial peptides produced by bacteria, that have emerged as promising candidates for anticancer therapy due to their selective cytotoxicity toward cancer cells, including triple-negative breast cancer (TNBC) lines, while sparing normal cells. To elucidate the cellular response of MDA-MB-231 triple-negative breast cancer (TNBC) cells to Bacteriocin treatment, this study employed an integrative multi-omics approach combining proteomic and gene expression analyses. Proteomic profiling, using two-dimensional gel electrophoresis followed by mass spectrometry enabled the identification of differentially expressed proteins. Subsequent gene ontology classification and protein–protein interaction network analysis via the STRING database revealed key disruptions in biological pathways and functional clusters, particularly those associated with cellular stress, signalling and post-translational modifications. These findings contribute to a broader understanding of bacteriocin mechanisms of action and support their potential utility as novel therapeutic agents. Ultimately, this work lays the groundwork for future translational studies and the development of bacteriocin-based strategies for the treatment of aggressive breast cancers such as TNBC.

S1-OP17

Phytochemical Analysis and Antimicrobial Evaluation of *Beta vulgaris* Extract Against Dandruff-Causing Microorganisms

Divya T Raj., Ajin R., Annie Bennet S., Dhanya T., Fathima Ramshiya M., Nithisha V., Sreejith D. B.
[1]Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India - 629 153,
Corresponding author: divyazworld2@gmail.com

Abstract

Dandruff is a common scalp disorder characterized by excessive flaking, itching, and irritation, often associated with microbial imbalance and bacterial colonization, particularly by *Staphylococcus aureus* and *Staphylococcus epidermidis*. The prolonged use of chemical-based anti-dandruff products may lead to adverse effects and microbial resistance, creating

 ISBN: 978-93-48577-14-6

a need for safer, natural alternatives. The present study evaluates the phytochemical composition and antimicrobial activity of *Beta vulgaris* (beetroot) extracts against dandruff-causing microorganisms. Fresh beetroot samples were extracted using methanol, ethanol, acetone, ethyl acetate, and distilled water, followed by qualitative phytochemical screening to identify bioactive compounds. Scalp swabs collected from individuals with visible dandruff yielded bacterial isolates that were identified using cultural, morphological, Gram staining, and biochemical tests. Antimicrobial activity was assessed using the agar well diffusion method against the isolated *Staphylococcus* species. Phytochemical analysis revealed the presence of flavonoids, tannins, saponins, betalains, carotenoids, phenolic compounds, and glycosides. All extracts exhibited antibacterial activity, with methanolic and ethanolic extracts showing the highest zones of inhibition (15 mm), followed by acetone (12 mm), ethyl acetate (8 mm), and aqueous extract (4 mm). The results indicate that the antimicrobial efficacy of *Beta vulgaris* is attributed to its rich phytochemical profile, suggesting that beetroot possesses significant antibacterial and antidandruff potential and may serve as a promising natural candidate for the development of herbal-based scalp care and antidandruff formulations.

S1-OP18

Therapeutic activity of *Psidium Guajava* against Clinical Pathogens

T.A Hema., Arshina Fathima A., Deepika P.V., Jagadeesh J , Jency U, Lemisha R S., Nitheesh S M., Solairamamoorthi J

[1]Department of Microbiology, Malankara Catholic College, Mariagiri, Kanyakumari District, India-629153

Corresponding author: hemaraj15@gmail.com

Abstract

Psidium guajava (guava) is a well-known medicinal plant widely used in traditional medicine for its therapeutic properties. The present study was undertaken to evaluate the antimicrobial activity of Psidium guajava leaf extracts against selected clinical pathogens, namely *Escherichia coli* and *Pseudomonas* species. Mature guava leaves were collected, shade dried, powdered, and extracted using different solvents including aqueous, petroleum ether, ethanol, methanol, and ethyl acetate. Antimicrobial activity was assessed by the agar well diffusion method, and the minimum inhibitory and bactericidal concentrations were determined. Among all the extracts tested, the ethyl acetate extract exhibited the highest antibacterial activity against both pathogens. Phytochemical screening of the ethyl acetate extract revealed the presence of bioactive secondary metabolites such as flavonoids, tannins, phenols, alkaloids, saponins, terpenoids, and steroids. FT-IR analysis confirmed the presence of functional groups associated with phenolic and aromatic compounds, supporting the antimicrobial potential of the extract. GC–MS analysis further identified major bioactive constituents including fatty acids and esters contributing to therapeutic activity. The findings of this study demonstrate that *Psidium guajava* leaf extract, particularly the ethyl acetate fraction, possesses significant antimicrobial properties and may serve as a promising natural alternative for the development of plant-based antimicrobial agents.

ISBN: 978-93-48577-14-6

S1-OP19

Bioprospecting of Fish Gut Microbes for Industrial Applications

Boomika Venkatesan[1], Karthik Prakash[1], Gopikrishnan Venugopal[1], Radhakrishnan Manikkam[1], Kasem Soytong[2], Jiaojiao Song[2].

[1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600 119., Tamil Nadu, India

[2]Reserch Institute of Modern Organic Agriculture (RIMOA), King Mongkut' s Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, Thailand

Corresponding author: gopivktk@gmail.com

Abstract

The gastrointestinal tract of fish has a diversified and functionally significant microbial population that serves as an underutilised source of industrially useful macromolecules. Due to their adaption to variable aquatic habitats, changing feeds, and severe physicochemical variables such as salinity, temperature, and pH, fish gut-associated bacteria have developed distinct metabolic capacities. As a result, the bioprospecting of fish gut microbiota has garnered heightened interest as a sustainable source of innovative enzymes, bioactive compounds, and probiotic candidates with extensive biotechnological significance. These microorganisms exhibit exceptional metabolic versatility, generating industrially significant enzymes such as proteases, amylases, lipases, cellulases, and chitinases, which are extensively utilised in food processing, detergent formulations, feed enhancement, textile bioprocessing, and biofuel production. Besides enzyme production, fish gut microorganisms are prospective sources of antibacterial metabolites, antioxidant compounds, and stress-tolerant macromolecules, which are important in pharmaceutical, aquaculture, and environmental applications. Their probiotic capabilities enhance host health, bolster disease resistance, and promote sustainable aquaculture operations. Recent advancements in culture-dependent screening, high-throughput functional assays, and molecular methodologies, including metagenomics, whole-genome sequencing, and bioinformatics, have markedly improved the discovery, characterisation, and utilisation of novel microbial strains from fish gastrointestinal ecosystems. These combined methodologies enable the identification of hitherto uncultured microorganisms and the functional genes responsible for the creation of important biomolecules. This work underscores the taxonomic variety of fish gut microbiota, their functional characteristics, and their industrial potential, while emphasising ecologically friendly bioprospecting methodologies. Utilising fish gut microbial resources presents a viable avenue for the creation of sustainable biotechnological solutions, enhanced industrial goods, and a circular bioeconomy model.

Keywords: Fish gut microbiota, bioprospecting, industrial enzymes, bioactive compounds, microbial biotechnology

 ISBN: 978-93-48577-14-6

ABSTRACTS – ORAL PRESENTATION (SESSION 2)

 ISBN: 978-93-48577-14-6

S2-OP1

From a Single Cow to a Conservation Movement: Community-Driven Preservation of Indigenous Cattle Breeds in India

Nethravathi M.

Founder, Kannukkuties | Indigenous Cattle Conservation Initiative, India

Abstract

The rapid transition toward high milk-yielding exotic cattle breeds has resulted in a steady decline of indigenous cattle populations in India, posing serious threats to biodiversity, traditional knowledge systems, and sustainable rural livelihoods. This document presents a community-driven conservation initiative launched in 2019 that began with the care of a single indigenous cow and has since expanded into the management of a gosala housing more than 100 native cattle. The initiative adopts an integrated approach that combines breed conservation, public awareness, experiential education, and sustainable livelihood development. Indigenous breeds such as Kangrej, Gir, Punganur, Turinjil, Sivagangai Kuttai, and Kasargode cattle are conserved through ethical rearing practices that prioritize animal welfare and non-commercial utilization. Community engagement is strengthened through school outreach programs, family visits, and interactive activities that promote awareness of the ecological, cultural, and agricultural significance of native cattle. To ensure long-term sustainability, the project also develops eco-friendly personal care, home care, and preventive health products derived from cow-based resources such as gobar and gomutra. This approach supports the inclusion of non-milking cows and bulls while creating environmentally responsible livelihood opportunities. Overall, the model demonstrates that grassroots initiatives can play a vital role in conserving indigenous cattle breeds through socially inclusive, environmentally sustainable, and culturally rooted practices.

Keywords

Indigenous cattle breeds; Desi cow conservation; Gosala management; Sustainable livestock systems; Community participation; Traditional agriculture; Biodiversity preservation

S2-OP2

Evaluation of Immunomodulatory Potential of *Terminalia chebula* Leaves

Evelyn Maria Sinoj

Department of Biotechnology, Hindustan Institute of Technology and Science, Padur, Kelambakkam, Chennai - 603103, Tamil Nadu, India

Abstract

Terminalia chebula is a widely used medicinal plant with reported antioxidant, anti-inflammatory, and immunomodulatory properties; however, systematic evaluation of its phytochemicals against key immune and viral host targets remains limited. The present study investigates the immunomodulatory potential of T. chebula through qualitative phytochemical screening, in silico ADME profiling, and molecular docking against human interleukin-6 (IL-6) and transmembrane protease serine 2 (TMPRSS2). Sequential extracts were screened for major secondary metabolites using standard colorimetric tests, confirming the presence of phenols, tannins, flavonoids, saponins, glycosides, and alkaloids. Selected bioactive compounds, particularly gallic acid and a less-explored aminoacethydrazide derivative, were subjected to ADME evaluation using SwissADME to assess drug-likeness and pharmacokinetic suitability. Molecular docking was performed to predict ligand–protein interactions and binding affinity. Gallic acid showed moderate interaction with TMPRSS2 and

 ISBN: 978-93-48577-14-6

IL-6, while aminoacethydrazide exhibited comparable binding energies (–4.63 kcal/mol with TMPRSS2 and –4.23 kcal/mol with IL-6), suggesting potential but not high-affinity modulation of these targets. The interaction profiles indicated hydrogen bonding and hydrophobic contacts with key active-site residues, supporting a plausible immunoregulatory role. This study highlights aminoacethydrazide as a relatively unexplored constituent of T. chebula with possible host-directed activity. Although the docking outcomes indicate moderate affinity, the findings provide a rational basis for further in vitro and in vivo validation of T. chebula phytochemicals as supportive immunomodulators in inflammatory and viral conditions.

S2-OP3

Production of Bacterial Cellulose Collagen, Silver Nitrate and PVA Cross-Linked Nanofiber by Electrospinning Method

Akila Kesavan, and M. Radhakrishnan
Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.
Corresponding author: mrkactinos@gmail.com

Abstract

In this research deals with the composite of bacterial cellulose, collagen and polyvinyl alcohol were combined together produced cross linked nanofiber through electro spinning method. BC was dissolved in DMF solution and used as base component of the NF material, collagen and PVA used as reinforcement material to improve the strength of the BC-NF. The morphology, thermal stability, were determined by SEM, it showed highly fibers network arrangement with extreme porous nature. Thermogravimetric analysis TGA showed high temperature stability and got degraded temperature range between 120 ℃ to 600 ℃ and presence of different functional group identified by FT-IR peaks and the surface wettability of BC-NF was measured by contact angle method. It determined the (hydrophilic < 90° or hydrophobic > 90°) nature. The result of BC-NF showed left angle 49.81, right 50.34 and the average contact angle wettability 50.07 it indicates the hydrophilic surface this can be used as better wound healing material. The antimicrobial activity of BC-NF tested against of four different pathogens *Pseudomonas aeruginosa, Staphylococcus aureus, Enterococcus faecalis, Escherichia coli* compared along with gentamicin disc as positive control for all the organisms showed clear zone of inhibition the collagen, silver nitrate molecules resist the bacterial cell growth and general collagen has the tissue regenerative activity all these properties are made this BC- NF suitable for wound dressing material.

Keywords: Bacterial cellulose, bio-polymer, nanofiber, electro spinning, wound dressing.

S2-OP4

Nanoliposomes Mediated Essential Oil Core-Shell Formation

S. Gunaselvi,
Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai
Corresponding author: gunaselvi23132020@gmail.com

Abstract

This project focuses on the development of nanoliposome-mediated core–shell systems for the effective encapsulation of essential oils using biopolymer-based green synthesis approaches. Nanoliposomes, owing to their lipid bilayer structure, enhance the stability,

 ISBN: 978-93-48577-14-6

bioavailability, and controlled release of bioactive compounds. In this study, herbal extracts such as black seed oil and carom seed extract were incorporated into chitosan, sodium alginate, and starch matrices to form biofilms and nanoparticle systems. The synthesized nanoparticles were characterized using standard techniques, and their antimicrobial efficacy was evaluated against bacterial strains. Among the biopolymers studied, chitosan-based biofilms exhibited superior film-forming ability and significant antimicrobial activity. The results highlight the potential of nanoliposome-assisted essential oil encapsulation as an eco-friendly and effective strategy for applications in drug delivery, biomedical coatings, and food packaging.
Keywords: Nanoliposomes, Essential oil encapsulation, Biopolymer biofilms, Chitosan nanoparticles, Antimicrobial activity, Green synthesis

S2-OP5

Comparative Evaluation of Spirulina Extract and Magnesium Chloride Nanoparticles on The Growth of Amaranthus Species

S.Janani,
Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai.
Corresponding author: jananii2506@gmail.com

Abstract

This study investigates the role of Spirulina extract and magnesium chloride (MgCl2) nanoparticles in influencing the growth performance of Amaranthus species, with a focus on sustainable approaches for plant growth enhancement. The project evaluates species-specific responses using Amaranthus polygonoides and Red Amaranthus (Amaranthus cruentus) under different treatment conditions. The observations indicated that Amaranthus polygonoides exhibited healthy germination and steady vegetative development in the presence of Spirulina extract and MgCl2 nanoparticles. Notably, plant growth was also observed under salt-treated conditions, indicating tolerance and sustained performance in the presence of these treatments. In contrast, Red Amaranthus did not establish growth, which was attributed to unsuitable soil conditions rather than the applied treatments, highlighting the importance of growth medium compatibility in comparative plant studies. Overall, the findings suggest that Spirulina extract and magnesium chloride nanoparticles can support plant growth in responsive species and may contribute to improved performance under challenging growth conditions. This workrepresents the preliminary phase of an ongoing project, with future scope directed toward developing these components into a biofertilizer formulation and evaluating their potential application in sustainable agriculture

S2-OP6

Gut Microbiome and Probiotics: Role In Human Health And Disease Prevention

Karen Lawrence
Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai.
Corresponding author: karenlawrence2610@gmail.com

Abstract

The human gut microbiome is a complex and dynamic ecosystem composed of trillions of microorganisms that play a crucial role in maintaining host health. These microbial communities are involved in essential physiological processes such as digestion, nutrient absorption, immune system modulation, and protection against pathogenic organisms.

 ISBN: 978-93-48577-14-6

Disruption of the gut microbiome, known as dysbiosis, has been associated with a wide range of health conditions including gastrointestinal disorders, metabolic diseases, allergies, and mental health issues. Probiotics are live microorganisms that, when administered in adequate amounts, confer health benefits to the host. Commonly belonging to genera such as *Lactobacillus*, *Bifidobacterium*, and *Saccharomyces*, probiotics help restore microbial balance, enhance gut barrier function, and regulate immune responses. Regular consumption of probiotic-rich foods or supplements has been shown to improve digestive health, reduce inflammation, and support overall well-being. Recent research highlights the potential of probiotics in disease prevention and management, including irritable bowel syndrome, antibiotic-associated diarrhea, obesity, and immune-related disorders. Advances in microbiome research have also emphasized the importance of personalized probiotic approaches, considering individual microbiota composition and lifestyle factors. This paper reviews the structure and function of the gut microbiome, the mechanisms of action of probiotics, and their applications in promoting human health. Understanding the gut–probiotic relationship provides valuable insights into developing targeted nutritional and therapeutic strategies aimed at improving health outcomes through microbiome modulation.

Keywords: Gut microbiome,Probiotics,Dysbiosis,Digestive health, Immune modulation, Human health.

S2-OP7

Bioshield Patch Wearable Nanobased Patch For Chemical Warfare Defense

Madhumita N

Department of Biotechnology, Hindustan Institute of Technology and Science, Tamil Nadu

Abstract

Chemical warfare agents, especially organophosphorus (OP) compounds, pose a severe threat to soldiers in the battlefield due to their rapid neurotoxicity and difficulty of early detection. This project presents a BIOSHIELD PATCH, a wearable, nanotechnology-based protective system designed to detect, neutralize, and provide real-time indication of OP exposure. Cerium oxide nanoparticles (CeO2 NPs), synthesized using eco-friendly biological methods, serve as the core active component due to their excellent redox activity, enzyme-mimicking properties, and strong OP-detoxification potential. The patch integrates dual functionality: (1) Detoxification, where CeO2 NPs break down organophosphorus compounds safely, and (2) Visual Detection, through a color-change indicator that alerts soldiers instantly during field exposure. The wearable design allows continuous skin-contact protection, lightweight use, and rapid response without requiring instruments or power sources. This nanobased bioshield provides a promising strategy for real-time chemical defence, combining biocompatibility, sustainability, and high responsiveness. The concept has strong potential for military, emergency response, and hazardous- environment applications.

 ISBN: 978-93-48577-14-6

S2-OP8

Exploring Bacteria from Different Rice Varieties for Probiotic Development

Sivaranjani G[1], Bavanilatha M[1], Kishore Kumar A[2], Radhakrishnan M[2]*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

*Corresponding Author: mrkactinos@gmail.com

Abstract

Rice, a widely consumed staple, is a potential source of beneficial microorganisms. This study explored probiotic bacteria from different rice varieties through natural fermentation. Fermented rice samples were serially diluted and plated to isolate distinct bacterial colonies for further screening. A total of twenty bacterial isolates were obtained from seven rice samples. Safety assessment using hemolytic activity revealed that five isolates exhibited hemolysis, suggesting possible pathogenicity, while the remaining fifteen isolates were non-hemolytic and considered safe for probiotic evaluation. The functional potential of the isolates was assessed through enzymatic activities, including amylase, pectinase, protease, lipase, and cellulase. Some isolates produced clear hydrolysis zones, indicating active enzyme production, while others showed no detectable activity, reflecting the functional diversity of rice-derived bacteria. Antimicrobial activity was evaluated against five pathogens: Staphylococcus aureus, Listeria monocytogenes, Salmonella sp., Bacillus cereus, and Escherichia coli. Select isolates demonstrated inhibitory effects, highlighting their potential for pathogen control and probiotic applications. Three promising isolates (KBC2-4, BYM-1, HG-4) were further assessed for probiotic properties, including auto-aggregation and co-aggregation, indicating their potential for gut adhesion and competitive exclusion of pathogens. Both assays revealed metabolic activity and extracellular interactions, providing insights into their functional stability. Additionally, bile salt tolerance was evaluated at concentrations of 0.3%, 0.5%, and 1.0%, with growth monitored at 0, 6, and 24 hours. Results showed variable survival among isolates, supporting their ability to withstand gastrointestinal conditions. Overall, fermented rice serves as a promising source of safe, functionally diverse, and potentially beneficial probiotic bacteria. The selected isolates exhibit enzymatic, antimicrobial, and adhesion properties, as well as tolerance to gut-like conditions, demonstrating their suitability for further probiotic and biotechnological applications.

Key words: Probiotic, Cell surface properties, Enzymatic activity, Fermented rice, Hemolytic activity

 ISBN: 978-93-48577-14-6

S2-OP9

Bioprospecting of Actinobacteria from Understudied Sources for Anti-Infective Metabolites

Arul Hancy Evitaa K I[1]., Ramesh Kumar V[1]., Kishore Kumar A[1]., Radhakrishnan M[2]*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

*Corresponding Author: mrkactinos@gmail.com

Abstract

Actinobacteria are prolific producers of bioactive secondary metabolites with significant anti-infective and plant growth–promoting potential. Isolation was conducted from salt pan soil (10.333897°N, 79.3979°E) and mangrove soil (10.787121°N, 79.120777°E) samples using serial dilution (10−1–10−5) on selective media AIA, SCA, and ISP2, yielding ten cultures (SP & M 1–10) that were subcultured on ISP2 and preserved as slants and glycerol stocks at -80°C. Morphological characterization showed diverse colony features: undulate to fimbriate margins, creamy to bright white colours, moist to chalky/rough textures, varied elevations, and growth patterns. Antimicrobial screening against Gram-positive (Staphylococcus aureus, Bacillus cereus), Gram-negative (E. coli, Klebsiella), and yeast (Candida, S. cerevisiae) pathogens revealed SP & M 9 with the strongest inhibition against S. aureus (16 mm on ISP2, 15 mm on ISP3), and moderate effects against B. cereus and Klebsiella across 10 media (ISP1–ISP7, SCA, AIA, R2A). For one potential culture, 15 ISP2 broth compositions optimized metabolite production, with soyabean meal + glucose + NaCl yielding the largest zones (26 mm). Methanol extraction of resin produced crude extract tested for antimicrobial activity against S. aureus (gentamycin drug control, 10% DMSO solvent control), with MIC assays for potency and anti-TB activity against Mycobacterium smegmatis (rifampicin drug control, 10% DMSO).

Keywords: Actinobacteria, Saltpan, Mangrove, Antimicrobial screening, Anti-TB activity, Mycobacterium smegmatis

S2-OP10

Single Cell Oil From Yeast

Remya J[1] , Bavanilatha M[1], Kishore Kumar A[2], Radhakrishnan M[2]*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

*Corresponding Author: mrkactinos@gmail.com

Abstract

This study aims to answer the increasing need to seek sustainable sources of lipids through the isolation and quantitative measurement of Single Cell Oil-producing yeasts obtained from different sources, which include hydrocarbon-contaminated oil and sweet substances with high sugar content. The isolation process of the yeasts was conducted with utmost care through the use of the dilution and spread plate method on selective agar media: Sabouraud Dextrose Agar. After incubation, the microscopic process using Gram staining on five desired samples successfully identified the presence of yeasts. The process

 ISBN: 978-93-48577-14-6

continued to ensure the isolation process resulted in obtaining pure cultures through the quadrant streaking method. To screen the lipid accumulation capacity of these isolates, a twostep screening approach was adopted. First, qualitative screening analysis via the Sudan Black B Spot Plate test yielded five positives with characteristic lipid inclusions. Then, a more sensitive confirmatory test via Nile Red Fluorescence Microscopy was conducted to select the two best isolates, which showed abundant intracellular lipid droplets and high fluorescence intensity. For the quantitative analysis, the promising lipid-yielding isolates were grown in Sabouraud Dextrose Broth medium. The produced biomass was collected, rinsed, and dried under 60°C for proper measurement of the dry weight. Sonication was effectively utilized for cell disruption, hence facilitating lipid extraction via a chloroform/methanol solvent system following the conventional Bligh & Dyer or Folch extraction methodologies. Finally, the extracted lipids were gravimetrically determined, and the characteristic fatty acid composition was identified through Fatty Acid Methyl Esters (FAME) analysis, thus determining the industrial applicability of these microbe isolates for the production of either biofuels or oleochemicals.

Keywords: Single Cell Oil (SCO), Yeast, Cell Disruption, Lipid Extraction, FAME Analysis.

S2-OP11

Effective Adsorptive Potential of Metal-Doped Nanoparticles And Concerning Its Effect On Heavy Metal (Cadmium) From Industrial Wastewater-A Review

Nisha U

Dept of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.

Abstract

Cadmium (Cd) contamination in aquatic environments poses a serious threat to ecosystems and human health due to its high toxicity, persistence, and non-biodegradable nature. Major industrial activities such as power generation, mining, steel manufacturing, and chemical processing are the primary contributors to cadmium discharge into water bodies. Even at trace concentrations, cadmium exposure can result in severe health issues, including carcinogenic effects, neurological disorders, respiratory complications, and kidney damage. Therefore, the development of effective, economical, and sustainable technologies for cadmium removal from industrial effluents is of critical importance. This review focuses on the emerging application of metal-doped nanoparticles as advanced adsorbents for cadmium remediation. Owing to their high surface area, tunable surface functionalities, and enhanced reactivity, metal-doped nanomaterials demonstrate superior performance compared to conventional treatment methods such as chemical precipitation, coagulation, ion exchange, and membrane filtration. Various categories of nanoadsorbents are discussed, including metal oxide nanoparticles, magnetic nanoparticles, zinc- and polymer-doped nanomaterials, carbon-based materials (graphene and carbon nanotubes), and nano zero-valent iron (nZVI). The review also examines key cadmium adsorption mechanisms, such as surface complexation, ion exchange, and electrostatic attraction. Important characterization techniques—FTIR, SEM-EDX, XRD, TEM, and VSM—are highlighted to understand nanoparticle properties and adsorption efficiency. Additionally, synthesis approaches including top-down and bottom-up methods, with emphasis on hydrothermal, sol-gel, and solvothermal techniques, are discussed. Despite promising outcomes, challenges related to large-scale application, regeneration, disposal, and performance under real wastewater

 ISBN: 978-93-48577-14-6

conditions remain. Future research directions are proposed to optimize nanoparticle design, enhance reusability, and ensure environmental safety for sustainable industrial wastewater treatment.

Keywords: Cadmium removal; Metal-doped nanoparticles; Wastewater treatment; Adsorption mechanisms; Nanoadsorbents; Heavy metal remediation; Aquatic protection

S2-OP12

Earthworm Cast Microbiome as a Source of Next-Generation Bio-inoculants for Sustainable Agricultures

Nathiya M, MS[1]. Jesisa Persis Preethi[1], R. Ashwin[2], MP[2]. Karthick Prakash, Aruna Arunachalam[2], V. Gopikrishnan[2]

[1]Dept of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

Abstract

The excessive and indiscriminate use of chemical fertilizers poses serious challenges to sustainable agriculture by disrupting soil microbial communities, reducing soil fertility, and impairing nutrient availability. These effects contribute to soil degradation, environmental contamination, and increased susceptibility of crops to pests and diseases, thereby emphasizing the need for eco-friendly alternatives such as biofertilizers. In the present investigation, bacterial strains were isolated from earthworm cast–associated Sample collected from Chengalpattu (CEC), Tamil Nadu, India, using the standard spread plate technique. A total of 56 bacterial isolates were obtained, including six actinobacterial strains recovered on ISP2 agar and designated as CEC4, CEC5, CEC6, CEC7, CEC8, and CEC9.The selected strains were comprehensively evaluated for their multifunctional agricultural potential, including extracellular enzyme activities (amylase, protease, cellulase, and lipase), heavy metal tolerance and remediation capacity against potassium dichromate (K_2 Cr $_2O_7$), and pesticide remediation potential. Furthermore, key plant growth–promoting bacterial (PGPB) traits, including nitrogen fixation, phosphate solubilization, ammonia production, indole-3-acetic acid (IAA) production, and siderophore production, were assessed. The results demonstrated that the earthworm cast–associated bacterial strains exhibited multiple beneficial functional attributes, highlighting their potential as efficient biofertilizers and sustainable alternatives to conventional chemical inputs. Although the present findings are encouraging, further molecular characterization, genomic analysis, and field-level validation are required to fully elucidate their mechanisms of action and to optimize their application in sustainable crop production systems. Overall, earthworm cast–derived bacteria represent a promising microbial resource for the development of environmentally responsible and sustainable agricultural technologies. Keywords: Actinobacteria, earthworm cast, International Streptomyces Project Medium 2(ISP2), biofertilizer, Enzyme activity, pesticides remediation, plant growth promoting bacteria

 ISBN: 978-93-48577-14-6

S2-OP13

Review of metal doped carbon quantum dots for heavy metal (Lead) removal: Emergence, Preparation, Optimization and mechanism

D.Prabu, Shalini K, Jayasurya R

Department of Chemcial Engineering, Sathyabama Institute of science and Technology, Chennai, Tamil Nadu

Abstract

Heavy metal contamination from lead (Pb2+) is toxic and lasts in aquatic environments, posing a serious risk to both human health and the environment. This review shows synthesis methods for effectively removing lead from industrial wastewater using carbon quantum dots (CQDs), particularly metal-doped CQDs. Due to their high surface area, variable surface chemistry, and small size, carbon quantum dots have become effective adsorbents. Increasing adsorption capacity, stability, and selectivity increases their removal efficiency. Along with important characterization instruments such as TEM, XRD, FTIR, and SEM, a variety of synthesis processes are also covered, including hydrothermal, microwave, and pyrolysis procedures. Processes of adsorption, such as ion exchange, surface complexation, and electrostatic attraction, as well as kinetic and isotherm models, are used to understand redox interactions. Lastly, the prospective uses of carbon quantum dots in water filtration and their capacity for regeneration are emphasized, demonstrating their potential as sustainable nanomaterials for the cleanup of the environment.

Key Words: Carbon quantum dots; Metal doping; Lead removal; Heavy metal adsorption; Water treatment; Adsorption mechanism

S2-OP14

Analyzing and Predicting the Agronomic Effectiveness of Biodegradable Beads Derived from Banana Pseudostem Using Data-Driven Models

Harini P[1], Pavithra K[1], D Venkatesan[1]

[1]Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119

Abstract

Concerns related to soil health, environmental sustainability, and long-term crop productivity have intensified due to increasing agricultural intensification and the widespread use of chemical fertilizers. In response to these challenges, the present study investigates the development and agronomic performance of biodegradable fertilizer beads produced from banana pseudostem, an abundantly available agricultural waste. The study primarily evaluates the effectiveness of these bio-based beads on tomato (Solanum lycopersicum) cultivation. Banana pseudostem was processed to prepare biodegradable beads intended to serve as a slow and regulated nutrient delivery system. The formulated beads were applied to tomato crops under controlled experimental conditions and compared with conventional fertilization practices. Important agronomic parameters such as plant height, number of leaves, flowering response, fruit yield, and overall crop vigour were systematically monitored. Additionally, soil response and nutrient utilization efficiency were analyzed to better understand the interaction between the biodegradable beads, soil, and plant system. The results indicated a significant improvement in tomato growth and yield parameters in plants treated with banana pseudostem-based beads, suggesting improved nutrient availability and sustained release characteristics. Along with experimental observations, preliminary data-

 ISBN: 978-93-48577-14-6

driven analysis was employed to identify performance trends and predict agronomic effectiveness. The findings highlight the potential of banana pseudostem-derived biodegradable beads as an environmentally friendly alternative to synthetic fertilizers, supporting waste valorization and sustainable farming practices. Overall, this work contributes to the advancement of bio-based fertilizer technologies and aligns with global sustainability objectives.

Keywords: Biodegradable fertilizer beads; Banana pseudo-stem; Sustainable agriculture; Bio-based fertilizersTomato cultivation; Waste valorization

S2-OP15

Exploration of Novel Antifouling Agents from Fish Gut–Associated Bacteria

Aashniya1, V. Gopi Krishnan[2], Sumathi[1], Ramesh Kumar Ashwin[2], Karthik Prakash[2], Aruna Arunachalam[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

*Corresponding Author: mrkactinos@gmail.com

Abstract

Biofouling is a major challenge in marine and aquaculture environments, caused by the attachment and growth of microorganisms such as bacteria and algae on submerged surfaces. This process leads to significant economic losses and operational problems in ships, pipelines, and marine equipment. Conventional antifouling strategies rely heavily on toxic chemical coatings, which pose serious environmental and ecological risks. Therefore, there is a growing need for sustainable, eco-friendly, and biologically derived antifouling alternatives. In the present study, fish gut–associated bacteria were explored as a potential source of novel antifouling agents. Fish samples were collected from the Colachel fishing harbour (8.1732° N, 77.2503° E), Tamil Nadu, India. Gut contents were aseptically processed, and associated bacterial isolates were obtained using standard microbiological techniques. The isolated strains were screened for antifouling activity against representative biofilm-forming marine bacteria using in vitro antibiofilm and growth inhibition assays. The study aims to identify bacterial isolates capable of producing bioactive metabolites with antifouling potential. The use of fish gut–associated bacteria represents a promising natural source of environmentally safe antifouling compounds. These findings may contribute to the development of sustainable antifouling strategies for marine and aquaculture applications, reducing reliance on toxic chemical antifouling agents and promoting eco-friendly biofouling control technologies.

Keywords: Biofouling; Antifouling; Fish gut bacteria; Marine biofilm; Biocontrol; Sustainable antifouling; Aquaculture

 ISBN: 978-93-48577-14-6

S2-OP16

Development of a Low-Fat, Probiotic Frozen Dessert Using a Synergistic Rare Sugar and Functional Fiber System for Enhanced Gut Health

Nithya Sri P, Kishoth Kumar M

Dhanalakshmi Srinivasan College of Engineering & Technology, Mamallapuram, Chennai, India

Abstract

Growing interest in clean-label and gut-health-oriented foods among Gen Z consumers has increased demand for low-fat probiotic frozen desserts. However, reducing milk fat in frozen systems often results in excessive ice crystal formation, weak body , and poor mouthfeel. This study aimed to develop a low-fat probiotic frozen dessert source, without artificial stabilizers or industrial homogenization. To compensate for reduced fat content, a multi-stage processing approach was employes using a synergistic combination of chicory root inulin act as prebiotic (3%), allulose (10%), and skim milk solids. Protein density was enhanced and free water reduced through controlled curd syneresis. The skim milk base was pasteurized at 80 Degree Celcius to facilitate functional fiber hydration, followed by high-shear mixing to promote inulin micro-gel formation that mimics fat-like lubricity. Probiotics cultures were inoculated at 30 Degree Celcius to maintain microbial viability, and the mixture underwent controlled freezing and aeration to regulate ice crystal size. The developed prototype demonstrated improved scoopability, smooth texture, and increased viscosity. Allulose provided significant freeing point depression-approximately 1.9 times greater than sucrose-enhancing structural stability. The combined action of inulin gelation and air cell incroporation effectively compensated for reduced milk fat, while cold-stage inoculation preserved probiotic integrity. These results indicate that integrating rare sugars and prebiotc fibers with precise thermal control enables successful development of a low-fat probiotic frozen dessert that supports gut health while meeting modern sensory expectaions.

Keyword: Gut microbiome , Probiotic Frozen Dessert, Gut Health , Inulin (Prebiotics) , Allulose

S2-OP17

Efficient Prebiotics to Enhance the Growth of Probiotics

Mangala Lakshmi Ragavan[1], Sathish Rengaraj[2], Buvaneswari[2], Rajalakshmi[2], Krupakar Parthasarathy[1]*

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2] Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamil Nadu, India

Abstract

Probiotics play a significant role in maintaining host health through multiple mechanisms. These microorganisms can produce beneficial bioactive compounds, such as polysaccharides, antimicrobial proteins, short-chain fatty acids, enzymes, and vitamins. The population of gut microbiota is mainly associated with the host's dietary pattern. Legumes naturally contain carbohydrates with potential as prebiotic sources. The consumption of dietary supplements, such as millets, legumes, and pulses, enhances the growth and performance of probiotics. This study focused on selecting effective prebiotics to enhance the therapeutic applications of probiotics. We have isolated bacteria from food sources and

characterized them as potential probiotics using in vitro assays, viz., acid and bile salt tolerance, GIT tolerance. An efficient prebiotic medium was selected based on the growth of isolated probiotic bacteria. Further, the medium was used to produce secondary metabolites for therapeutic applications.

Key words: Probiotics, Prebiotics, Postbiotis, Short-chain fatty acids, Polysaccharides

S2-OP18

Actinomycetes from Cochin Estuary as a Promising Source of Antibiofilm Agents for Aquaculture

Amritha T, Sumitha Gopalakrishnan, Sajeevan T. P., S. Venu

Department of Marine Biology, Microbiology and Biochemistry, School of Marine Science, Cochin University of Science and Technology (CUSAT)

Abstract

The escalating global crisis of antimicrobial resistance, compounded by the formation of resilient microbial biofilms in aquaculture, poses a severe threat to marine environments and necessitates the discovery of novel antibiofilm compounds. This study investigated the antibiofilm potential of Actinomycetes isolated from deep-sea sediment samples collected across the Cochin Estuary, a vast and underexplored frontier for bioactive microorganisms. Following isolation and morphological characterization, these isolates were screened for secondary metabolite production against diverse biofilms collected from various aquaculture systems. Initial inhibition assays led to scaled-up metabolite production, where crude extracts were evaluated for their efficacy in preventing biofilm attachment and disrupting established matrices. Our results revealed that a substantial proportion of the isolated Actinomycetes, identified specifically as Streptomyces strains, exhibited potent antibiofilm activity directly attributed to their secondary metabolites. Notably, the majority of isolates demonstrated inhibition exceeding 50%, with several strains achieving significant thresholds of 70%, 80%, and 82%, and peak performance reaching a maximum of 90% biofilm disruption. These findings highlight the significant potential of these isolates in controlling persistent pathogens by targeting their protective structures rather than traditional growth inhibition, underscoring the Cochin Estuary as a promising source for valuable antibiofilm agents to support sustainable aquaculture and combat biofilm-associated resistance.

Keywords: Antimicrobial agents, Actinomycetes, Bioactive compounds, Cochin Estuary

S2-OP19

Characterisation and Stability of Natural Pigments Extracted from Agricultural and Food Processing Wastes

Prabhavathi R[1], Jerina Begam B[1], Karthik Prakash M. P[2], Ashwin R[2], Selvaraj R[1], Gopikrishnan V[2]*

[1]Department of Biotechnology, Arunai Engineering College, Thiruvannamalai, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India

*Corresponding author: gopivktk@gmail.com

Abstract

The rising awareness of environmental degradation and health risks linked to synthetic dyes has heightened interest in natural pigments sourced from renewable resources. Organic waste produced from agricultural and food processing operations, such as fruit peels,

 ISBN: 978-93-48577-14-6

vegetable wastes, flower bracts, and plant by-products, constitutes a plentiful and underexploited source of natural colours. This research seeks to investigate the viability of obtaining valuable natural pigments from organic waste materials using simple, economical, and eco-friendly techniques. This study included the use of solvent-based extraction methods on chosen organic waste samples to separate pigments like betalains, anthocyanins, and carotenoids. The extracts were examined for colour intensity, yield, and stability across different pH and temperature settings. Initial characterisation revealed notable colour fluctuations and pH-responsive properties, suggesting possible use as natural colourants and pH indicators. The stability investigations demonstrated that certain pigments exhibited satisfactory colour retention under regulated settings, hence increasing their appropriateness for practical applications.
The possible uses of the derived pigments were assessed in domains including food colouring, cosmetic formulations, textile dyeing, and intelligent packaging systems. The findings indicate that pigments produced from organic waste may work as environmentally sustainable substitutes for synthetic dyes, providing both practical and aesthetic benefits. The valorisation of organic waste enhances waste reduction, resource efficiency, and sustainable development. This work underscores the need of transforming organic waste into valuable natural pigments, hence advancing circular bioeconomy principles. The results endorse the creation of sustainable pigment extraction methods that reduce environmental impact while offering economically feasible alternatives for industrial use.
Keywords: Carotenoids, Solvent extraction, Sustainable agriculture, Organic waste valorisation

S2-OP20

Natural Bioactive-Loaded Hydrogels for Wound Healing: From Plant-Derived Therapeutics to Clinical Translation - A Review

Kiruthika A R., and Jancy Mary E.,
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600119, INDIA

Abstract
Chronic wounds represent a significant global healthcare burden, affecting approximately 2.5% of the United States population with annual costs exceeding $3 billion, while some developing countries like India face heightened challenges with a chronic wound prevalence of 4.5 per 1,000 people. The integration of plant-derived bioactive compounds into three-dimensional hydrogel matrices creates a new therapeutic approach for wound care, which delivers multiple healing advantages that combine antimicrobial issues, inflammatory problems and tissue growth limitations in both acute and chronic wounds. This review examines existing research about natural bioactive hydrogel wound dressings that use plant compounds such as curcumin, Aloe vera, Centella asiatica, quercetin, calendula and berberine in polymeric networks made from chitosan, alginate, gelatin, polyvinyl alcohol and hyaluronic acid. These advanced hydrogel platforms exhibit multiple functions through their ability to release bioactive compounds in response to pH changes, temperature fluctuations, and reactive oxygen species, while maintaining extended antimicrobial effects through the synergistic action of their compounds. Additionally, they promote blood vessel formation and collagen production, which helps reduce production expenses compared to synthetic pharmaceuticals. The self-assembling peptide hydrogels, controlled drug delivery systems,

 ISBN: 978-93-48577-14-6

and polymeric nanoparticle-based biofilm disruption enable healthcare professionals to create personalised wound treatments for various medical conditions. Standardised testing methods and extensive clinical trials are conducted to evaluate the stability of bioactive compounds, changes in mechanical properties, safety, and effectiveness, leading to regulatory approval for laboratory and animal model data. Therefore, this review provides evidence-based guidelines for formulating natural bioactive-loaded bioengineered hydrogels with their characterisation protocols and future research directions to create affordable advanced wound treatment systems for worldwide use.

Keywords: hydrogel wound dressings; natural bioactive compounds; chronic wound healing; controlled drug delivery; antimicrobial effects; self-assembling peptide hydrogels; reactive oxygen species; polymeric networks; synergistic action; bioengineered hydrogels

S2-OP21

Current Status on Drug Delivery for Bone Tissue Engineering

Anushka Singh[1]#, Ashrita Srivalli Padmasolala[1]#, Prakash P[1]*, V. Ramesh Kumar[1]*, Manjunath Kamath[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, India

[2]Centre for Nanoscience and Nanotechnology, International Research Centre, Sathyabama Institute of Science and Technology, Chennai – 600119, India

* Corresponding authors: (prakash.biotech@sathyabama.ac.in; Ramr V (biotechhod@sathyabama.ac.in)

Abstract

Bone tissue engineering (BTE) aims to develop biological substitutes capable of repairing critical bone defects that cannot heal spontaneously, and the integration of drug delivery systems within engineered scaffolds has emerged as a promising strategy to enhance bone regeneration. Localised and controlled delivery of osteogenic agents overcomes the limitations of conventional systemic therapies, such as poor bone targeting and adverse side effects. This abstract reviews current approaches for delivering osteogenic signals, including drugs, growth factors, and genes, using scaffold-based platforms composed of natural polymers, synthetic polymers, and inorganic biomaterials that provide structural support and sustained release of bioactive molecules. In addition, nanocarrier systems and stimulus-responsive hydrogels are highlighted for their ability to improve bioavailability, stability, and site-specific action of therapeutic agents. Advanced strategies such as growth factor gene delivery using viral and non-viral vectors and smart delivery systems responsive to physiological cues are also discussed. Evidence from preclinical and clinical studies demonstrates that the combination of drug delivery systems with tissue-engineered scaffolds significantly enhances bone regeneration in challenging defect models; however, translational challenges related to safety, scalability, and regulatory approval remain. Emerging innovations, including personalized three-dimensional printed scaffolds, multi-factor delivery strategies, and artificial intelligence-assisted design, are expected to address current limitations and accelerate clinical translation. Overall, the integration of drug delivery technologies with bone tissue engineering represents a powerful and evolving paradigm for advanced bone regenerative therapies.

Keywords: Bone regeneration; Bone tissue engineering; Controlled release; Drug delivery systems; Osteogenic scaffolds

 ISBN: 978-93-48577-14-6

S2-OP22

Development of biodegradable and antimicrobial bio-plastic film

Nafeesa S, and Kavipraba A
Department of Biotechnology, Sathyabama Institute of science and Technology, Chennai, Tamil Nadu

Abstract

The growing environmental concerns associated with petroleum-based plastics have intensified the search for sustainable and biodegradable alternatives derived from renewable resources. Agro-industrial and fishery wastes provide an excellent opportunity for developing eco-friendly bioplastic materials while promoting waste valorization. This study focuses on the development and functional evaluation of biodegradable bioplastic films prepared using corn husk and fish scale waste. Corn husk is an abundant agricultural by-product rich in cellulose and hemicellulose, which contribute to effective film-forming properties. Fish scales, a major waste from the seafood industry, are a valuable source of collagen and gelatin, offering natural antimicrobial activity and enhanced biocompatibility for food packaging applications. The fabrication of bioplastic films involves environmentally friendly extraction methods for cellulose and collagen, followed by blending with suitable plasticizers such as glycerol to improve flexibility. Film formation using solution casting techniques is discussed. To enhance food safety and shelf life, antimicrobial functionalization with natural essential oils and nanoparticles is incorporated into the bioplastic matrix. The biodegradability of the developed films is evaluated under different environmental conditions, including soil and compost, where factors such as pH, moisture content, and microbial activity influence degradation behavior. Despite promising biodegradability and antimicrobial performance, corn husk–fish scale–based bioplastic films face challenges related to mechanical strength, moisture sensitivity, and water resistance. Nevertheless, this study highlights the potential of converting agricultural and fishery waste into value-added, biodegradable, and antimicrobial bioplastic films as a sustainable alternative to conventional plastic packaging.

Key words: Corn husk, fish scale waste , biodegradable plastic , bioplastics, antimicrobial film

S2-OP23

Smart Digital Applications–Based Decision Support System for Integrated and Sustainable Pineapple Farming

Afiya Rajan Selin
Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, India
Corresponding email: afiarajan@gmail.com

Abstract

Smart farming systems play a crucial role in enhancing agricultural productivity while ensuring sustainability and efficient resource utilization. Pineapple (Ananas comosus) is an economically important horticultural crop; however, smallholder farmers often face challenges in disease identification, nutrient management and access to timely technical knowledge due to diverse socio-economic backgrounds and limited agricultural education. Despite the increasing global demand for pineapple, driven by population growth and health awareness, limited supply creates opportunities for new farmers to improve their livelihoods through sustainable production systems. The present study highlights the role of smart digital

 ISBN: 978-93-48577-14-6

applications as a decision support system for integrated and sustainable pineapple farming. Several digital tools have been developed globally to address key sustainability challenges. Applications such as BPApp and PineApp support biodiversity conservation and sustainability monitoring, while AnanasApp focuses on optimizing fertilizer management to reduce input waste and costs. The Dimitra/FAO blockchain-based application enhances transparency in organic pineapple supply chains, particularly for indigenous farmers. Disease management is supported through tools like the Smart Pineapple Farming Assistant (SPFA), which uses image processing for accurate disease diagnosis, enabling targeted interventions instead of blanket pesticide application. Additionally, platforms such as MapMyCrop utilize AI and satellite imagery for real-time crop monitoring and QueenApp assists in production scheduling and farm planning. These smart digital applications collectively promote precision farming, reduce chemical dependency, improve resource-use efficiency, protect ecosystems and enhance economic viability. The integration of such tools demonstrates the potential of digital decision support systems to transform pineapple cultivation into a more resilient, data-driven and sustainable farming model aligned with integrated smart agriculture principles.

Keywords: Pineapple, Smart farming, Sustainability, Decision Support System, SPFA

S2-OP24

Hydrocarbonoclastic Bacteria

Abdul Rashid Khan

Product Development, Saveetha School of Engineering, SIMATS, Chennai, India

Abstract

Hydrocarbonoclastic bacteria (HCB) are a specialized group of microorganisms capable of utilizing hydrocarbons as their primary source of carbon and energy. These bacteria play a crucial role in the natural attenuation and biodegradation of petroleum hydrocarbons in both marine and terrestrial environments. Commonly found in oil-contaminated habitats, hydrocarbonoclastic bacteria include genera such as Alcanivorax, Pseudomonas, Rhodococcus, Marinobacter, and Cycloclasticus. They are particularly important following oil spills, where they contribute significantly to bioremediation by breaking down complex hydrocarbons into simpler, less toxic compounds. Hydrocarbon degradation by these bacteria occurs through enzymatic pathways involving oxygenases and dehydrogenases, which initiate the oxidation of aliphatic and aromatic hydrocarbons. Depending on oxygen availability, degradation may occur via aerobic or anaerobic pathways, with aerobic processes being more rapid and efficient. Environmental factors such as nutrient availability (nitrogen and phosphorus), temperature, oxygen concentration, and salinity strongly influence the growth and metabolic activity of hydrocarbonoclastic bacteria. In marine ecosystems, obligate hydrocarbonoclastic bacteria become dominant after oil contamination due to their high substrate specificity. Their activity not only aids in pollutant removal but also helps restore ecological balance. Because of their efficiency and eco-friendly nature, hydrocarbonoclastic bacteria are widely studied for application in bioremediation strategies aimed at mitigating oil pollution. Understanding their metabolic pathways and environmental interactions is essential for improving biotechnological approaches to environmental cleanup.

ISBN: 978-93-48577-14-6

S2-OP25

Influence of Stocking Density and Pond Type on Productivity, Health Management, and Revenue in *Litopenaeus vannamei* Aquaculture

Libin Vijayan[1], Sam Ebenezer Rajadass[2], Vignesh Sounderrajan[2], Krupakar Parthasarathy[2], Krishna Kumar Babulakshamanan[1], Rithik William[1], Samuel Gnana Prakash Vincent[1]#

[1]Centre for Marine Science and Technology, Manonmaniam Sundarnar University, Tirunelveli – 627012, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India

Corresponding author: prakash@msuniv.ac.in

Abstract

Shrimp aquaculture has rapidly transitioned toward intensive production methods, where stocking density plays a crucial role in determining productivity, health management requirements, and economic outcomes. This study provides an evaluation of *Litopenaeus vannamei* shrimp farms' production performance, management strategies, and revenue creation based on stocking density and type of farming. A total of 21 commercial shrimp farms located in Ramanathapuram and Kaniyakumari Districts, Tamil Nadu, were surveyed, covering earthen ponds, lined ponds and mixed pond systems working under intensive and supra-intensive culture conditions. Pond parameters, stocking density, water quality management, feed methods, aeration, health management techniques, probiotic administration, survival rate, biomass output, culture length, and farm-level revenue production were all the subjects of primary data collection. To make comparison analysis easier, farms were categorised into low, medium, and high stocking density groups. Stocking density, pond type, management intensity, probiotic use, and economic success were all evaluated descriptively. The results indicate that farms operating at higher stocking densities largely utilised lined ponds and exhibited greater reliance on probiotic supplements, regular water exchange, and rigorous aeration to maintain water quality and manage disease incidence. Earthen ponds often sustained moderate stocking densities with comparatively reduced probiotic dependence, benefiting from natural sediment buffering. Increased total biomass output and crop revenue were linked to higher stocking densities, but they were also linked to higher management inputs and disease risk, especially during seasonal stress. Revenue production showed a positive trend with stocking density when supported by effective management methods, but poorly managed high-density systems saw decreasing efficiency. Overall, the study shows that, pond design, type of farming and management influence shrimp aquaculture productivity and economic performance, while stocking density plays a substantial role. The results offer useful information for improving stocking tactics in intensive prawn farming systems to increase output and profitability while reducing hazards to human health and the environment.

Key words: Shrimp farms, Litopenaeus vannamei, Stocking density, Earthen ponds, lined ponds, probiotic supplements.

 ISBN: 978-93-48577-14-6

S2-OP26

Real-Time Soil Monitoring Using Internet of Things for Agriculture

Nishaank S. K[1]., Madhumithaa J[1]., T. Bernatin[1], V. Gopikrishnan[2]

[1]School of Electrical and Electronics Engineering, Sathyabama Institute of Science and Technology, Chennai, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India

Corresponding author: bernatin12@gmail.com

Abstract

Agriculture is an important area that helps in maintaining food security, especially in developing countries, but it is increasingly impacted by factors such as climate variability, soil degradation, pest attacks, improper water management, and inappropriate fertilizer use. Unpredictable weather conditions like uneven rainfall, high temperatures, and droughts are major causes of decreased crop production, water scarcity, and susceptibility to pests and fungal diseases. Moreover, the improper use of nitrogen-based fertilizers and poor crop management techniques result in environmental degradation, economic losses, and soil fertility decline. Recent developments in smart agriculture based on Internet of Things (IoT) technology help in real-time monitoring and intelligent decision-making to overcome these issues. Sensor-based technologies using electrochemical sensors, biosensors, optical sensors, gas sensors help in obtaining accurate and real-time information about soil moisture, nutrient content, pesticide concentration, and environmental factors. These technologies help in the precise application of water and fertilizers, early detection of pests and diseases, and effective use of resources. Combining IoT-based monitoring with data-driven agricultural systems improves sustainable agriculture, eliminates waste, reduces costs, and increases crop productivity. Smart farming technologies that enable predictive analysis and real-time soil monitoring help in environmentally sustainable agriculture and stable food security - Agriculture is an important area that helps in maintaining food security, especially in developing countries, but it is increasingly impacted by factors such as climate variability, soil degradation, pest attacks, improper water management, and inappropriate fertilizer use. Unpredictable weather conditions like uneven rainfall, high temperatures, and droughts are major causes of decreased crop production, water scarcity, and susceptibility to pests and fungal diseases. Moreover, the improper use of nitrogen-based fertilizers and poor crop management techniques result in environmental degradation, economic losses, and soil fertility decline. Recent developments in smart agriculture based on Internet of Things (IoT) technology help in real-time monitoring and intelligent decision-making to overcome these issues. Sensor-based technologies using electrochemical sensors, biosensors, optical sensors, gas sensors help in obtaining accurate and real-time information about soil moisture, nutrient content, pesticide concentration, and environmental factors. These technologies help in the precise application of water and fertilizers, early detection of pests and diseases, and effective use of resources. Combining IoT-based monitoring with data-driven agricultural systems improves sustainable agriculture, eliminates waste, reduces costs, and increases crop productivity. Smart farming technologies that enable predictive analysis and real-time soil monitoring help in environmentally sustainable agriculture and stable food security.

 ISBN: 978-93-48577-14-6

S2-OP27

Bioprospecting of Fish Gut–Associated *Pseudomonas* sp. as a Probiotic Candidate for Sustainable Aquaculture

Gokul Praveen[1], Safrina Power Singh[1], Karthik Prakash M. P[2], Gopikrishnan Venugopal[2]*, Radhakrishnan Manikkam[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India

Abstract

The fast growth of aquaculture has exacerbated issues of disease outbreaks, environmental contamination, and the over use of drugs, which foster antimicrobial resistance. Probiotics sourced from the gut microbiota of native fish provide a viable option for improving fish health and production sustainably. This research sought to bioprospect gut-associated bacteria from Barramundi (Lates calcarifer) obtained from the coastal waters of Chennai, India, to find prospective probiotic candidates. The gut contents were aseptically homogenised, serially diluted, and cultured on selected and non-selective medium, leading to the identification of twenty morphologically diverse bacterial strains. The isolates were evaluated for essential probiotic characteristics, including antagonistic activity against significant fish pathogens (*Staphylococcus aureus, Aeromonas salmonicida, Aeromonas caviae, Vibrio harveyii, Vibrio vulnificus, and Edwardsiella tarda), production of extracellular enzymes (amylase, protease, lipase, and cellulase), siderophore* production, and resistance to acidic pH and bile salts. Two strains (K5 and K8) shown enhanced probiotic potential among the isolates. Both exhibited significant antibacterial activity, produced several enzymes, and secreted siderophores. Strain K8 exhibited increased resistance to acidic environments and bile salts, whereas K5 showed superior cell surface hydrophobicity, indicating stronger gut adherence. Both strains exhibited auto-aggregation and antioxidant activity, hence reinforcing their functional potential. Gram staining revealed that the chosen strains were Gram-negative, and molecular identification of K8 using 16S rRNA sequencing verified its classification within the genus *Pseudomonas* sp., The results underscore the fish gut microbiota as a significant source of environmentally sustainable probiotics. Utilising indigenous microbial resources may reduce reliance on antibiotics, enhance gastrointestinal health, and foster sustainable aquaculture methods.

Keywords: Probiotic screening; Aquaculture sustainability; Antagonistic activity; Extracellular enzymes; Siderophore production; pH and bile tolerance

S2-OP28

Bioprospecting of Fish Gut–Associated *Pseudomonas stutzeri* (GM30) as a Probiotic Candidate for Sustainable Aquaculture

Safrina Power Singh[1], Gokul Praveen[1], Karthik Prakash M. P[2], Gopikrishnan Venugopal[2]*, Radhakrishnan Manikkam[2]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

 ISBN: 978-93-48577-14-6

Aquaculture is one of the fastest-growing food production sectors worldwide; however, its sustainability is increasingly challenged by disease outbreaks, antibiotic resistance, and environmental degradation. In this context, probiotics derived from native fish gut microbiota offer a promising and eco-friendly alternative for improving fish health and productivity. The present study aimed to isolate, characterize, and evaluate probiotic bacterial strains from the gastrointestinal tract of the marine fish *Mugil cephalus* (grey mullet) collected from the coastal waters of Chennai, India. A total of twenty-eight morphologically distinct bacterial isolates were obtained using selective and non-selective media. These isolates were screened for probiotic attributes including antagonistic activity against common fish pathogens (*Aeromonas salmonicida, Vibrio harveyi,* and *Edwardsiella tarda*), extracellular enzyme production, siderophore synthesis, cell surface hydrophobicity, pH and bile salt tolerance, auto-aggregation, antioxidant activity, and molecular identification. Among the isolates, two strains (GM1 and GM30) exhibited superior probiotic potential. Both strains demonstrated strong antimicrobial activity, with inhibition zones of up to 20 mm against *A. salmonicida*. They also produced multiple digestive enzymes, including protease, amylase, lipase, cellulase, and pectinase, indicating their ability to enhance host nutrient utilization. Siderophore production, moderate to high hydrophobicity, auto-aggregation capacity, and tolerance to acidic and bile conditions further supported their probiotic suitability. Molecular identification using 16S rRNA sequencing confirmed GM30 as *Pseudomonas stutzeri*. The findings highlight the fish gut microbiome as a valuable source of functional probiotics and bioactive biomolecules. Harnessing such native strains can significantly reduce antibiotic dependence, improve fish health, and promote sustainable aquaculture practices.\
Keywords: Pseudomonas stutzeri; Probiotic screening; Aquaculture sustainability; Antimicrobial activity; Extracellular enzymes

S2-OP29

Network Pharmacology–Based Investigation of *Bacopa monnieri* for Neural Therapeutics

Aadharshini A. S[1], Arsha A. S[1], Priya Dharisini Anbalagan[2], Sri Samyuktha Yadav Palanikumar[2], Grace Lydia Phoebe[1]*, Devi B[1]*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2]Analytics Avenue for Research and Development, Analytics Avenue LLP, Technology Business Incubator, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding authors: devibaskar90@gmail.com

Abstract

Bacopa monnieri is a well-established medicinal herb traditionally used for cognitive enhancement and neurological health, yet its molecular mechanisms remain incompletely characterized. This study employs a network pharmacology approach to elucidate the multi-component and multi-target neurotherapeutic mechanisms of Bacopa monnieri across diverse neural pathologies. Bioactive phytoconstituents were identified from public databases and screened based on pharmacokinetic parameters. Potential molecular targets were predicted and intersected with genes associated with a broad spectrum of neural disorders, including core neuroprotective disorders such as Alzheimer's disease, Parkinson's disease, Huntington's disease, dementia, epilepsy, stroke, amyotrophic lateral

 ISBN: 978-93-48577-14-6

sclerosis, multiple sclerosis, and traumatic brain injury; neurodevelopmental and neuropsychiatric conditions including autism spectrum disorder, attention deficit hyperactivity disorder, schizophrenia, bipolar disorder, mania, anxiety, insomnia, major depressive disorder, and obsessive–compulsive disorder; as well as neuro- oncologic and other neural pathologies such as glioblastoma multiforme, pituitary adenoma, meningioma, medulloblastoma, and neuroblastoma. Compound–target and protein–protein interaction networks were constructed to identify key hub targets, followed by Gene Ontology and KEGG pathway enrichment analyses. The results reveal that Bacopa monnieri modulates critical pathways. These findings highlight the systems-level, synergistic neurotherapeutic potential of Bacopa monnieri and provide a mechanistic framework for future experimental validation and drug development.
Keywords: Bacopa monnieri; network pharmacology; neuroprotection; phytochemicals; multi-target therapeutics; brain disorders

S2-OP30

Development of a Novel Brine Fermentation Method for High-Value Probiotic Tomato-Based Systems Targeting Gut Microbiome Modulation

Ananya Iqbal, Meher Fathima, Catherine Oviya, Meera Josephine Linda
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
Corresponding author: ananyaiqbal7@gmail.com

Abstract

Conventional tomato sauces rely on synthetic preservatives, high levels of sugar and sodium contributing to adverse health outcomes including metabolic disturbances and gut microbiome imbalance. Thermal processing of conventional tomato sauces destroys the heat-sensitive nutrients thereby eliminating potential bioactive compounds and probiotics, creating nutritionally compromised products that children consume regularly functioning as a flavor black box. With 30-50% of children affected by picky eating (dietary selectivity) and pediatric dysbiosis rates having seen a progressive increase in the last decade, there is an urgent need for nutritious alternatives. Current tomato-based products in the market are labeled as safe foods however it offers no gut-brain benefits, exacerbating nutritional deficiencies affecting cognitive development in children. This necessitates alternative biological or fermentation based strategies. We propose reviving slow fermentation, a traditional nutrient-enriching method, enhanced by computational design. Through in-silico bioprospecting, we selected Lactobacillus plantarum and Lactobacillus fermentum for targeted gut-brain benefits. This computational approach is supported by established microbiological methods for both probiotic selection and fermentation design, which aids in neuroactive metabolite predictions. The proposed system employs natural fermentation to enhance umami flavors, addressing picky eating through improved palatability without compromising nutrient content. A novel brine fermentation system (2.5% salt, curry leaf infusion) maintains texture while avoiding thermal degradation, preserving lycopene, vitamins, and introduces probiotics selected via computational analysis. This design framework represents a testable hypothesis for transforming tomato matrices into functional delivery systems for pediatric gut microbiome modulation, with experimental validation planned as future work.

 ISBN: 978-93-48577-14-6

Keywords: Brine fermentation, Flavor black box, Gut microbiome, Gut-brain modulation, In-silico design, Neuroactive metabolites, Pediatric dysbiosis, Probiotic fermentation, Tomato-based systems

S2-OP31

Role of gut microorganisms in plastic degradation by plastic-eating insect larvae Tenebrio molitor

Ramesh R and P. R. Meganathan*
CSIR-National Environmental Engineering Research Institute, Hyderabad Regional Centre, IICT Campus, Tarnaka, Hyderabad-500007.
*Corresponding author: meganathan.pr@csir.res.in.

Abstract

Plastic pollution is an important environmental problem, which needs urgent solutions. Recent investigations suggest that plastic-eating insect larvae could be one of the possible solutions for plastic-waste management. Also, the earlier analyses exhibited that gut microbiome of plastic-eating insect larvae plays important role in degradation of plastics. However, Indian studies related to plastic-eating insect larvae and their associated gut microbiome is limited. This investigation aims to analyse the role of gut microorganisms in plastic degradation by the yellow mealworm, Tenebrio molitor. The ability of yellow mealworm to ingest polystyrene (PS) was evaluated at the laboratory level. The results were compared with the control group and the weight loss and other physiological changes were observed. To find the involvement of gut microbes in plastic-degradation in T. molitor, the gut and frass samples of PS-fed larvae were collected and microbes were isolated. The microbial consortia were inoculated in media containing PS as carbon source and incubated at 37°C for 15 days. After the incubation period, the PS was collected and the modification of PS was examined by FTIR. Also, the media after incubation was analysed. The analyses showed changes in the FTIR spectra of PS incubated with microbes as compared to the reference. The results suggests that the gut microbes present in the plastic-eating insect larvae play an important role in biodegradation of PS. The present study suggests that further exploration of gut microbiome of plastic-eating insect larvae could provide biological solutions for plastic waste management.

Keywords: Tenebrio molitor; Polystyrene (EPS); Gut microbiome; Biodegradation; Sustainable development; Plastic pollution

S2-OP32

Thiol-Functionalized *Citrus limetta* Biochar for Efficient Heavy Metal Removal from Wastewater

Vinitha Lakshmanan, Vindhiya P, D. Venkatesan
Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Abstract

Heavy metal contamination of wastewater is a major environmental concern due to the toxicity and persistence of these metals. This study focuses on the development of a thiol-functionalized biochar derived from Citrus limetta (mosambi) peel for efficient removal of heavy metals from aqueous systems. Mosambi peel, an abundant agricultural waste, was converted into biochar via controlled pyrolysis and subsequently functionalized using

 ISBN: 978-93-48577-14-6

thiourea to introduce thiol (–SH) groups on the surface. The presence of thiol groups enhances metal ion binding through strong metal–sulfur interactions. The prepared biochar was characterized to confirm successful functionalization and surface properties. Batch adsorption studies were carried out to evaluate the effects of pH, contact time, adsorbent dosage, and initial metal concentration. The thiol-functionalized biochar exhibited significantly higher adsorption efficiency than pristine biochar, indicating the effectiveness of the surface modification. Adsorption behavior demonstrated favorable kinetics and capacity for heavy metal uptake. Overall, the study highlights the potential of thiol-functionalized mosambi biochar as a low-cost, sustainable, and eco-friendly adsorbent for wastewater treatment applications, contributing to environmental remediation and waste valorization.
Keywords: Biochar; Citrus limetta; Thiol functionalization; Heavy metal removal; Wastewater treatment

S2-OP33

Biotransformation of Organic Waste Through Enzymatic Hydrolysis: A Review on Bioactive Peptides and Simulation of Hydrolysis Kinetics

Akshaya G, Tejhashwini L. K, Ramesh Kumar V, Thyagarajan R*
Department of Biotechnology, School of Bio and Chemical Engineering,
Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
*Corresponding author: biotech@sathyabama.ac.in

Abstract

The rising global needs in managing food waste and environmental sustainability have compounded the pressure to develop novel solutions to convert underutilized organic residues. Out of these, enzymatic hydrolysis has gained momentum as a sustainable, efficient, and eco-friendly bioprocess to convert agri-food by-products into high-value bioactive compounds. This review paper offers an all-inclusive study of recent progress in the enzyme conversion of organic waste products including fruity peels, seeds, and other plant materials into bioactive peptides with proven antioxidant, antimicrobial, anti-inflammatory, and polyfunctional applications in relation to their applicability as nutraceutical, cosmeceutical, and functional food products. Besides the biochemical and process engineering considerations, this work highlights the increased reliance on computer-based methods, specifically using MATLAB-based modeling kinetics of hydrolysis, in modeling the reaction dynamic, optimizing process parameters, and maximizing peptide yield. The combination of experimental enzymatic hydrolysis with in silico modeling not only helps eliminate experimental iterations but also facilitates more accurate control, as well as scalability of the process. By synthesizing knowledge bases in biotechnology, computational simulations, and sustainable engineering, this review highlights the promise of enzymatic hydrolysis and kinetic modeling as a disruptive platform toward a circular bioeconomy that could lead to converting organic waste streams into useful biomolecules on a large scale.
Keywords: Bioactive peptides; enzymatic hydrolysis; organic waste valorization; MATLAB simulation; hydrolysis kinetics; sustainable bioprocessing; agri-food by-products.

 ISBN: 978-93-48577-14-6

S2-OP34

Comparative Phytochemical Analysis of Aqueous Extracts of *Azadirachta indica* and *Cuminum cyminum*

P. Sumithira[1], Kavipriya J., Rajabhavani P.[2]

Department of Microbiology, St. Anne's Arts and Science College, Chennai, Tamil Nadu

Abstract

Medicinal plants have been used since ancient times as primary sources of therapeutic agents for the treatment and prevention of various diseases. Plant-based drugs are gaining renewed interest due to their safety, availability, and bioactive potential. Phytochemical screening is a crucial step in identifying biologically active compounds responsible for the medicinal properties of plants. The present study aimed to conduct a comparative phytochemical analysis of aqueous extracts of *Azadirachta indica* (Neem) leaves and *Cuminum cyminum* (Cumin) seeds. The aqueous extracts were prepared using standard procedures and subjected to qualitative phytochemical screening to detect alkaloids, flavonoids, tannins, saponins, steroids, terpenoids, carbohydrates, phenols, proteins, and glycosides. The results revealed the presence of alkaloids and flavonoids in *Azadirachta indica*, while *Cuminum cyminum* showed the presence of alkaloids, flavonoids, terpenoids, and glycosides. The findings support the traditional medicinal uses of both plants and indicate their potential application in pharmaceutical and biomedical research.

Keywords: Phytochemical analysis, *Azadirachta indica*, *Cuminum cyminum*, aqueous extract, medicinal plants

S2-OP35

Development of a Chitin-Based Biofertilizer from Crab Shell Waste Enriched with Vermicompost-Derived Microbial Consortia

Yaswanth Narendran M., and Rajalakshmi G.

Department of Biotechnology, Hindusthan College of Arts & Science (Autonomous), Coimbatore – 641028, Tamil Nadu, India

Abstract

The sustainable management of marine by-products and enhancement of soil fertility are critical components of climate-resilient agriculture. Chitin-based biofertilizers present an eco-friendly approach that simultaneously valorizes crustacean waste and improves crop productivity. The present study aims to develop a biofertilizer formulated from crab shell–derived chitin, enriched with chitinolytic and plant growth–promoting microorganisms sourced from vermicompost. Crab shell waste, processed into fine powder, serves as a multifunctional component in the formulation. It acts as a rich source of chitin, promoting the proliferation of chitin-degrading microbial populations that play a role in nutrient cycling and pathogen suppression. Additionally, the inherent calcium content of crab shells contributes to improved soil structure, enhanced root growth, and better overall plant development. Vermicompost, known for its high microbial diversity, provides a natural reservoir of beneficial bacteria and fungi that facilitate nutrient mineralization, enhance soil enzymatic activity, and stimulate plant growth through the production of bioactive compounds. The proposed work involves systematic preprocessing of crab shell waste, optimization of chitin-enriched carrier substrates, and inoculation with selected microbial consortia isolated from

 ISBN: 978-93-48577-14-6

vermicompost. Emphasis is placed on developing a stable formulation with high microbial viability and shelf life. The biofertilizer will be evaluated based on microbial population dynamics, chitinase enzyme activity, macro- and micronutrient content, and its influence on seed germination, plant growth parameters, and disease incidence under controlled pot experiments and/or field conditions. The expected outcome of this research is a value-added biofertilizer that efficiently converts marine waste into a sustainable agricultural input. This formulation has the potential to improve nutrient use efficiency, reduce dependency on chemical fertilizers and pesticides, and support circular bioeconomy principles while promoting environmentally sustainable farming practices.
Keywords: Chitin-based biofertilizer; Crab shell waste; Vermicompost microbes; Sustainable agriculture; Circular bioeconomy

S2-OP36

Enhanced Production of Lipase from Oil Contaminated Soil Associated Bacterium

Deepika S[1], Gayathri Kannan[1], Dayanandan Anandan[2], J. Theborel[1], M. Bavanilatha[1]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, India.

[2]Centre for Molecular and Nano Medical Sciences, Sathyabama Institute of Science and Technology, Chennai-600 119, India.

Abstract

Soils polluted by oil constitute a unique ecological niche that fosters the development of microorganisms that may produce resilient hydrolytic enzymes like lipase. This study investigated the possibility of extracting effective lipase-producing bacteria from oil-contaminated soil. To separate different colonies, samples were serially diluted and plated on the proper media. Rhodamine B olive oil agar, where fluorescent halos under UV light showed lipase secretion and phenol red olive oil agar, where yellow pH-shift zones indicated fatty acid release, were used for primary screening at 37°C for 48 hours. The most effective producer was identified by secondary screening, which was based on a p-NPP spectrophotometric test conducted on cell-free supernatants and read using a microplate reader. Submerged fermentation was then used to achieve enhanced production. A one-factor-at-a-time method was used to improve the media composition and culture conditions, such as pH, temperature, agitation, carbon and nitrogen source were systematically optimized to improve lipase yield over unoptimized conditions. Using dialysis and ammonium sulfate precipitate, crude lipase was partially purified. To determine functional resilience, the stability of the partially purified enzyme was assessed at various temperature and salt concentrations. Overall, this study presents an efficient method for increased enzyme production through process modification and shows the potential of oil-contaminated soil as a valuable source of high-yielding lipase producing bacteria.
Keywords: Oil-contaminated soil; Screening and optimization; Submerged fermentation; Enzyme stability.

 ISBN: 978-93-48577-14-6

S2-OP37

Production of biodegradable straw and cup embedded with *Trigonella foenum – graecum*

Maghasri. T[1], Dr. Jayshree Nellore[1], P. Atchuthan[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India

[2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, Indi

Abstract

This study addresses the environmental hazard of conventional plastic straws, which persist for decades and threaten marine ecosystems. It proposes a fully biodegradable single-use straw and cup fabricated from seaweed-derived biopolymers (carrageenan, agar, alginate) combined with fruit and vegetable peel powders, and embeds fenugreek seeds to create a post-use regenerative function for plant growth or aquaculture feed. The objectives are to (i) extract and blend the biopolymers with peel additives, (ii) mold the mixture into straws and cups, (iii) characterize chemical compatibility via FT-IR, (iv) evaluate water absorption, biodegradability, toxicity, and seed viability, and (v) compare performance with conventional plastic items. Literature indicates that prior edible straws from apple, durian, banana, and other fruit peels degrade at temperatures up to 65 °C but suffer limited heat resistance, motivating the composite approach. The experimental workflow involves drying seaweed extracts, mixing with peel powders and reagents, hot-air oven curing at 80 °C, and subsequent SEM, FT-IR, and biodegradation testing. Preliminary FT-IR results confirm successful incorporation of carrageenan, agar, and alginate, while initial molding showed rapid melting, prompting formulation optimization for hot-drink stability. Expected outcomes include rapid soil-burial degradation, and successful seed germination, offering a dual-function material that reduces plastic waste and provides ecological benefits. Challenges such as heat resistance and rapid dissolution will be tackled through composite optimization and further testing, laying groundwork for scale-up and broader sustainability impact.

S2-OP38

Marine Algae Based Green Synthesis of TiO_2 Photocatalysts for Microplastic Degradation: A Comprehensive Review

Keerthana Reddy S[1], Lohitha Kranti D[1], Aswini R[1], Saqib Hassan[1], Ramesh Kumar V[1], Ganesh Kumarb*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India

[2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India.

Abstract

Microplastic contamination persists as a critical environmental challenge due to the chemical stability, long degradation timescales, and bioaccumulation potential of synthetic polymers. Conventional treatment methods provide physical removal but rarely achieve molecular degradation, necessitating more advanced and sustainable remediation technologies. Photocatalysis using titanium dioxide (TiO_2) has emerged as a promising pathway for mineralizing microplastics through reactive oxygen species (ROS)-driven oxidation; however, pristine TiO_2 is limited by UV-only activity, rapid charge recombination, and resource-

 ISBN: 978-93-48577-14-6

intensive fabrication. Recent advances in green nanotechnology demonstrate that marine algae can serve as multifunctional biological platforms for TiO_2 synthesis, supplying natural reducing agents, dopants, and structural templates. Marine-algae-derived TiO_2 exhibits narrowed band gaps, enhanced light absorption, increased surface functional groups, and improved electron–hole separation, enabling efficient microplastic degradation under visible and solar irradiation. Studies report accelerated oxidation, chain scission, and fragmentation of polyethylene, polypropylene, polystyrene, and polyester microplastics using these biogenic photocatalysts. The synergy between renewable marine biomass and photocatalytic nanotechnology presents a viable pathway toward scalable, eco-engineered microplastic remediation. Further progress requires integration with continuous-flow reactors, real-water validation, and environmental risk assessment to enable transition from laboratory development to practical deployment.

Keywords: Microplastics; Photocatalysis; Marine algae; Green synthesis; Titanium dioxide (TiO_2).

ISBN: 978-93-48577-14-6

ABSTRACTS – ORAL PRESENTATION (SESSION 3)

 ISBN: 978-93-48577-14-6

S3-OP1

Biological suppression of Honeydew - associated *Aspergillus flavus* in mango by Guava Epiphytic Bacteria

S. Renga Sushma, and C. Mariappan

PG & Research Department of Microbiology, Sri Paramakalyani College, Alwarkurichi-627412, Tamil Nadu

Corresponding author: sushmaselvaraj21@gmail.com

Abstract

Honeydew secreted by sap-sucking insects promotes secondary fungal colonization on mango (Mangifera indica L.) surfaces, leading to sooty mould development and quality loss. The present study evaluates epiphytic bacteria isolated from guava (Psidium guajava) leaves for their ability to suppress honeydew-associated Aspergillus flavus isolated from mango. Selected bacterial isolates significantly inhibited fungal growth under in vitro conditions and exhibited plant growth-promoting traits, including siderophore and indole-3-acetic acid production. Gas chromatography–mass spectrometry analysis revealed the presence of antifungal bioactive metabolites. The findings highlight the potential of guava epiphytic bacteria as eco-friendly biological agents for managing honeydew-associated fungal contamination in mango.

Keywords: Mango, honeydew, Aspergillus flavus, epiphytic bacteria, biological control

S3-OP2

Potential Antifouling Compound from Marine Actinobacteria

B. Madhumitha

Department of Biotechnology, Arunai Engineering college, Tiruvannamalai, Tamilnadu

Corresponding author: badhrimadhu@gmail.com

Abstract

Biofouling is the development of marine microorganisms, plants and other marine organisms on the surfaces of an object, which is in contact with water (e.g. ships, boats etc.). Biofouling is a very serious problem in the marine environment because which causes marine pollution by the high usage of fuel, high emission of carbon di oxide, difficulty in moving ships, roughness of ships and also high cost of cleaning and high manpower. In order to overcome this marine biofouling, many antifouling technologies were identified. Most of the antifoulants used against biofouling are mainly the chemicals, like TBT –Tributyltin which was later found that this chemical is very toxic to the marine environment. The ban of this toxic chemical as an antifoulant paved the way for Biotechnologists to get into the search of natural antifoulants (from plant extracts, from the secondary metabolites of microbes etc.). Exploration for natural antifoulants in the environment, marked that there are very less number of microorganisms are used for the antifouling compounds. Under this exploration “Actinobacteria” a marine microbe found in the marine ecosystem was identified. This review explicates about the Actinobacteria’s antifouling activity and portrays its ecofriendly nature with the marine environment.

Keywords: Biofouling, problems of biofouling, antifouling technology, Actinobacteria

 ISBN: 978-93-48577-14-6

S3-OP3

Development of Biopolymer from Degradable plant waste leaves

R. Thyagarajan, S. Aasiya
Department of Biotechnology,
Corresponding author: aasiyasounthorrajan@gmail.com

Abstract

Conventional plastic packaging materials have poor control over moisture and oxygen, which leads to faster spoilage and reduced shelf life of perishable food products. Plastic packaging often contains harmful chemicals such as BPA and phthalates, which may migrate into food under conditions like heat, light, and humidity. To develop a biodegradable biopolymer from plant leaves and evaluate its microbial degradationefficiency. To extract natural polymers from selected leaves and prepare biopolymer. To evaluate physical and chemical properties of the prepared biopolymer. To identify soil bacteria capable of degrading the biopolymer. To assess degradation efficiency through weight loss & clear zone analysis of an eco-friendly biodegradable biopolymer is successfully produced from ceiba pentandra. Identification of efficient microbial degradation. The final product obtained is a thin, flexibility biodegradable biopolymer made from plant waste leaves (ceiba pentandra). Demonstration of effective microbial degradation.

Keywords: Biopolymers, ceiba pentandra, BPA , plastic packaging material.

S3-OP4

Flame Lily Tuber Extract Mediated Biosynthesis of Ilver Nanoparticles and Its Antioxidant, Antimicrbial Activities

Thirumal Sivakumar*
Department of Botany, Annamalai University, Annamalai Nagar-608 002, Tamil Nadu, India.
Department of Botany, Thiru A. Govindasamy Govt. Arts College, Tindivanam-604 001, Tamil Nadu, India
Corresponding author: drtsivanano@gmail.com

Abstract

Biosynthesis of silver nanoparticles using Flame lily (Gloriosa superb L.) tuber extract. Synthesized silver nanoparticles were characterized by UV-visible spectroscopy (UV-Vis), Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction technique (XRD). The phytochemical screening of tuber extract was analyzed using biochemical methods. The Flame lily tuber extract synthesized silver nanoparticle was revealed by UV- Vis spectrum to monitor the formation of the nanoparticles, which exhibits a blue shifted absorption peak at 435 nm. XRD pattern showcases, well-defined peaks appearing at 2θ positions and average size of the nanoparticles was found as 7.86 nm. FT-IR spectra were recorded for the cassia leaf extract and AgNO 3 nanoparticles to identify the biomolecules involved in the synthesis process. The higher magnitude of phenolic compounds, with antioxidant potential, supported the reducing action on the metal oxides. The presence of amino acid, protein and lipids in considerable percentage helped to stabilize the growth of the nanoparticles. The phytochemical evaluation indicates the presence of chemical constituents including flavonoids, alkaloids, steroids, terpenoids, saponins, gums, tannins, resins, coumerins, glycosides. This study shows that the different solvent extract of tuber of flame lily has bioactivity. The obtained phytochemical constituent results demonstrate that the methanol tuber extract of flame lily could be used as antioxidant and antimicrobial activity. However,

isolation of individual phytochemical constituents might be useful to formulate a novel drug. Further the compound needs to be isolated to confirm the activities of the individual compounds. Agar well -diffusion method was used to study the antibacterial activities on selected pathogenic species. The synthesized AgNO 3 nanoparticles showed better and comparable antibacterial activities with respect to the activities of synthetic drugs.

Key words: Flame lily, AgNPs, phytochemical study, XRD, antioxidant, antmicrobial activities.

S3-OP5

Green Synthesis and Characterization of Zinc Oxide Nanoparticles from *Vitex Negundo* Leaf Extract and Its Biological Activities

Abishek Alagesan and Sanjivkumar Muthuswamy

PG & Research Department of Microbiology, K.R. College of Arts & Science, K.R. Nagar, Kovilpatti -628503, Tamil Nadu, India

Corresponding author: sanjivmuthu@gmail.com

Abstract

In this investigation, green synthesis of zinc oxide nanoparticles (ZnO-NPs) was produced by an eco-friendly, plant-based precipitation method, and subsequently assess its biological applications under *in-vitro* conditions. Initially, the nanoparticles were phyto-synthesized using aqueous leaves extract of *Vitex negundo* followed by characterized through standard procedures. It executed as the presence of ZnO-NPs with the UV–Visible absorption ranges in between 360 - 370nm with the basic functional groups were O–H, C=O, C=C, and C–O. The antimicrobial efficacy of various concentrations of phytosynthesized ZnONPs was determined against both bacterial and fungal pathogens and it revealed the highest growth inhibition against *E. coli* (23 mm) at 15µl concentration with the respective MIC and MBC values of 0.625µg/ml and ≤2.5µg/ml. Similarly, the antifungal activity represented the maximum (21mm) zone of growth inhibition against *Candida fruticans* at 20µl concentration. Furthermore, the biotherapeutic properties such as *in-vitro* total-antioxidant and anti-inflammatory of phytosynthesized ZnONPs were tested. The result inferred that the maximum *in-vitro* total antioxidant activity (80.86%), DPPH (89.26%), nitric oxide (87.31%) and hydroxyl radical (96.83%) scavenging activities were noted at 120µg/ml concentration of ZnONPs with their respective IC_{50} values of 78.69, 83.42, 76.89 and 87.46µg/ml. Finally, In anti-inflammatory activity study, the maximum concentration (350µg/ml) of produced nanoparticles showed inhibition percentage of 93.21% with the IC_{50} value of 140.65µg/ml. Based on these results, it could be concluded that the green synthesized ZnONPs has effective biomedical potential with antimicrobial, antioxidant, anti-inflammatory properties.

Keywords: Zinc oxide nanoparticles (ZnO-NPs), Green synthesis, Antibacterial activity, Antioxidant properties

 ISBN: 978-93-48577-14-6

S3-OP6

Isolation and Characterization of phosphate solubilizing Bacteria from Agricultural Soil and their Applications

Anusuya. A and Sanjivkumar Muthuswamy
PG and Research Department of Microbiology, K.R College of Arts & Science, Kovilpatti, Tamilnadu, India
Corresponding author: muthukumar_micro@krcollege.net

Abstract

Phosphate solubilizing bacteria (PSB) are beneficial soil microorganisms capable of converting insoluble forms of phosphorus into soluble forms available for plant uptake. The present study aimed to isolate and evaluate efficient PSB from agricultural soil samples and assess their potential applications as bio fertilizers and in phytoremediation. Soil samples were collected from cultivated fields and subjected to serial dilution followed by inoculation on Pikovskaya's agar medium. Colonies exhibiting clear halo zones around the growth were selected as phosphate solubilizers and further characterized by morphological and biochemical tests. Quantitative estimation of phosphate solubilization was carried out in liquid medium and organic acid detection by HPLC analysis. The isolated bacterial strains showed significant phosphate solubilization efficiency, indicating their ability to enhance phosphorus availability in soil. In addition, selected PSB demonstrated tolerance to heavy metals, suggesting their possible role in phytoremediation of contaminated soils. The findings highlight the importance of PSB as eco-friendly bio fertilizers and as supportive agents in sustainable agriculture and environmental restoration.

Keywords: Phosphate solubilizing bacteria, agricultural soil sample, pikovskaya's agar medium, phosphorus solubilization, sustainable agriculture, bio fertilizer, environmental restoration, phytoremediation; heavy metal tolerance.

S3-OP7

Development of Pumpkin-Based Phosphate Solubilizing Liquid Biofertilizer for Horticultural Crops

Gowri Murugan, and Kannan Duraisamy
Department of Microbiology, K.R College of Arts & Science, K.R. Nagar, Kovilpatti Tamilnadu, India-628503.
Corresponding author: dkannanhari@gmail.com

Abstract

Phosphorus is an essential macronutrient required for the growth and development of horticultural plants. However, a major portion of soil phosphorus exists in insoluble forms, making it unavailable for plant uptake. Chemical phosphate fertilizers, though effective, cause environmental pollution and long-term soil degradation. To overcome this issue, the present study focuses on the development of a phosphate solubilizing liquid biofertilizer using beneficial bacteria and an organic substrate. In this work, pumpkin (Cucurbita pepo) was used as a natural substrate to support the growth of phosphate solubilizing bacteria (PSB) using *Pseudomonas sp* and *Bacillus sp*. The bacteria have the ability to convert insoluble phosphate into soluble forms through the production of organic acids and enzymes. The pumpkin-based medium was inoculated with phosphate solubilizing bacteria and incubated under controlled conditions to produce a liquid biofertilizer. Phosphate solubilization activity was assessed by measuring the increase in soluble phosphate content.

 ISBN: 978-93-48577-14-6

The results indicate that pumpkin is an effective and economical substrate for the production of phosphate solubilizing liquid biofertilizer. This biofertilizer can enhance phosphate availability in soil, promote sustainable horticultural plant growth, and reduce dependence on chemical fertilizers. The study highlights an eco-friendly and cost-effective approach for improving soil fertility and crop productivity.

Keywords: Pumpkin- Based Growth Medium, Phosphate Solubilizing Microbes P*seudomonas sp* and *bacillus sp* , Liquid Inoculant, Eco-Friendly ,Horticulture crops Biofertilizer.

S3-OP8

Alkaloid extraction and GC-MS characterization study of *Thespesia populnea*

Gurumarimuniyasamy. M, and Parameswari. A
[2]M.Sc., Microbiology,
Department of Microbiology, K. R College of Arts & Science, Kovilpatti, Tamil Nadu, India
Corresponding author: parameswari_micro@krcollege.net

Abstract

Thespesia populnea (family: Malvaceae) is a medicinal plant traditionally used for the treatment of inflammation, skin disorders, and hepatic ailments. The present study was carried out to extract alkaloids from *Thespesia populnea* and to characterize the phytochemical constituents using Gas Chromatography–Mass Spectrometry (GC–MS) analysis. Dried and powdered plant material was subjected to alkaloid extraction using acid–base solvent extraction techniques. Preliminary qualitative tests confirmed the presence of alkaloids in the extract. The obtained alkaloid-rich fraction was further analysed by GC–MS to identify the bioactive compounds based on their retention time and mass spectral fragmentation patterns, compared with the NIST library database. GC–MS analysis revealed the presence of several alkaloid-related and biologically active compounds with reported pharmacological properties such as antimicrobial, antioxidant, anti-inflammatory, and hepatoprotective activities. The findings of this study support the traditional medicinal use of *Thespesia populnea* and highlight its potential as a natural source of bioactive alkaloids. Further studies on isolation, structural elucidation, and pharmacological evaluation of the identified compounds are recommended.

S3-OP9

Comparative Fermentative Efficiency of *Saccharomyces boulardii* and *Saccharomyces cerevisiae* in Bioethanol Production from Wheat and Corn Stalks

Indhumathi S and Kannan Duraisamy
Department of Microbiology, K.R College of Arts & Science, K.R Nagar
Kovilpatti, Tamil Nadu, India.
Corresponding author: dkannanhari@gmail.com

Abstract

The growing need for renewable and eco-friendly energy sources has increased interest in bioethanol production from agricultural residues. Wheat and corn stalks are lignocellulosic wastes that are abundantly available and inexpensive, making them suitable raw materials for bioethanol production. In this study, ethanol was produced from wheat and corn stalks using the yeast such as Saccharomyces cerevisiae and Saccharomyces boulardii. The collected substrates were initially subjected to pretreatment methods to reduce lignin content

 ISBN: 978-93-48577-14-6

and improve cellulose accessibility. Enzymatic hydrolysis was then carried out to convert complex polysaccharides into fermentable sugars. The resulting hydrolysates were fermented separately using S. cerevisiae and S. boulardii under optimized laboratory conditions. Ethanol production was confirmed using standard biochemical and analytical methods. The results demonstrated that both yeast strains were capable of fermenting the sugars obtained from wheat and corn stalks, with S. cerevisiae showing comparatively higher ethanol yield, while S. boulardii exhibited good fermentation stability and stress tolerance. The study concludes that wheat and corn stalks can serve as effective substrates for bioethanol production and that alternative yeast strains such as S. boulardii may have potential applications in lignocellulosic bioethanol production. This approach supports waste valorization and contributes to sustainable bioenergy development.

Keywords: Bioethanol production; Wheat; Corn stalk; Lignocellulosic biomass; Saccharomyces cerevisiae; Saccharomyces boulardii; Pretreatment; Enzymatic hydrolysis; Fermentation; Renewable bioenergy

S3-OP10

Exploration of Sardine Gut Microbes for Sustainable Protease Production

Kaviya.M and Sayen Merlin Sophia.S
Department of Microbiology, K.R College of Arts &Science, K.R Nagar
Kovilpatti, Tamil Nadu, India.
Corresponding author: ssophia10@gmail.com

Abstract

Proteases are important industrial enzymes with wide applications in food, pharmaceutical, detergent, and biotechnology industries. Marine fish gut microorganisms are known to be efficient producers of extracellular enzymes due to their adaptation to protein-rich environments. The present study focuses on the isolation of protease-producing microbes from the gut of sardine fish and the initiation of enzyme production using solid-state and submerged fermentation techniques. Gut samples were aseptically collected and cultured for microbial isolation. Screening for protease production was carried out using casein agar medium, where clear zones around colonies indicated proteolytic activity. Selected isolates were further subjected to fermentation studies. Submerged fermentation was initiated using casein as the substrate to induce protease production, while solid-state fermentation was carried out using dry wheat powder as the solid substrate. Both fermentation processes were set up to evaluate the potential of the isolates for enzyme production. At the current stage, fermentation has been initiated and the study is in progress. Further work includes optimization of culture conditions, enzyme extraction, activity assays, and characterization of the produced protease. The results obtained so far indicate that sardine gut microorganisms possess promising proteolytic potential. This study highlights the importance of marine-derived microbes as valuable sources of industrial enzymes and emphasizes the potential of cost-effective substrates for sustainable protease production

Keywords: Protease, Sardine fish gut, Solid-state fermentation, Submerged fermentation, Casein, Wheat powder

 ISBN: 978-93-48577-14-6

S3-OP11

Characterization study of mucilage from Bael leaf (*Aegle marmelos*) and Anti wound healing activity of *Aegle marmelos*

Lathiksha Shankar. R, and Parameswari. A
Department of Microbiology, K. R. College of Arts & Science, Kovilpatti, Tamil Nadu, India
Corresponding author: parameswari_micro@krcollege.net

Abstract

Aegle marmelos (Bael) is a medicinal plant widely used in traditional medicine for its healing and antimicrobial properties. The present study aimed to isolate and characterize mucilage from *Aegle marmelos* leaves and to evaluate its anti-wound healing and antimicrobial activities using non-animal experimental methods. Fresh bael leaves were collected, dried, powdered, and subjected to aqueous extraction followed by precipitation to obtain mucilage. The isolated mucilage was characterized for physicochemical parameters such as fat, gum content, carbohydrates, moisture content, ash values, and qualitative tests for mucilage. The antimicrobial activity of the mucilage extract was evaluated using in-vitro agar diffusion methods against selected bacterial strains. Nutrient agar plates were inoculated with standardized microbial cultures, and test samples at different concentrations were introduced into wells. Zones of inhibition were measured after incubation and compared with standard antimicrobial agents. Anti-wound healing activity was assessed using suitable wound-related parameters, including enhancement of wound contraction and epithelialization, without the use of laboratory animals. The results demonstrated that *Aegle marmelos* leaf mucilage possesses favourable physicochemical characteristics, significant antimicrobial activity, and promising wound-healing potential. The study supports the use of *Aegle marmelos* as a natural therapeutic agent and pharmaceutical excipient in wound care formulations.

S3-OP12

Marine-Derived Prodigiosin: Isolation, Characterization, and Application Potential

Mariya Joans. M and Sayen Merlin Sophia.S
Department of Microbiology, K.R College of Arts & Science, K.R Nagar, Kovilpatti, Tamil Nadu, India.

Abstract

Prodigiosin is a red tripyrrole secondary metabolite that is predominantly produced by *Serratia* species and has been recognized for its diverse biological properties, such as antimicrobial, wound-healing, anticancer, immunomodulatory, and UV-protective properties. With the rising concerns about the toxicity and environmental hazards of synthetic pigments, microbial prodigiosin has emerged as a green alternative for biomedical and cosmetic uses. In the current study, prodigiosin-producing bacteria were isolated from marine samples based on red pigment production. The isolate was presumptively identified as *Serratia* sp. based on the colony characteristics and pigment-based tests. The isolated pigment was found to be pink in acidic condition and yellow in alkaline condition, indicating the presence of prodigiosin. To enhance pigment production, different growth media such as Nutrient Broth, Luria-Bertani Broth, Peanut Seed Broth, and Peptone Glycerol Broth were tested. Among these, Peptone Glycerol Broth was found to be most favourable for pigment production. The prodigiosin pigment was isolated by solvent extraction and identified by UV-Visible spectrophotometry, which indicated the characteristic absorbance pattern of

ISBN: 978-93-48577-14-6

prodigiosin. This study emphasizes the potential of prodigiosin isolated from marine sources as a natural, versatile pigment with promising applications in the cosmetic and biomedical industries as a safer alternative to synthetic dyes.

Keywords: Prodigiosin, *Serratia* sp, Natural Pigment, Cosmetic applications

S3-OP13

Production And Characterization of Copper Oxide Nanoparticles from an Aqueous Leaves Extract of *Acalypha Indica* (Kuppaimeni) And Its Applications

Nivedha Sekar and Sanjivkumar Muthusamy*

PG & Research Department of Microbiology, K. R. College of Arts & Science, K.R. Nagar, Kovilpatti- 628503, Tamil Nadu, India.

Corresponding author: sanjivmuthu@gmail.com

Abstract

In this study, Copper oxide nanoparticles (CuO-NPs) from an aqueous leaf extract of local herb kuppaimeni was synthesized and subsequently assess its biological applications under *in-vitro* conditions. Initially, the nanoparticles were phyto-synthesized followed by characterized through standard procedures. It executed as the presence of CuO-NPs with the UV–Visible absorption ranges of 480nm with the basic functional groups were -CH_2-, -C-H-, O–H, C=O, C=C, and C–O. The antimicrobial efficacy of various concentrations of phytosynthesized CuONPs was determined against both bacterial and fungal pathogens and it revealed the highest growth inhibition against *Streptococcus pneumoniae* (24mm) at 20µl concentration with the respective MIC and MBC values of 0.3125µg/ml and ≤2.5µg/ml. Similarly, the antifungal activity represented the maximum (20mm) zone of growth inhibition against *Candida albicans* at 15µl concentration. Furthermore, the biotherapeutic properties such as *in-vitro* total-antioxidant and anti-inflammatory of phytosynthesized CuONPs were tested. The result inferred that the maximum *in-vitro* total antioxidant activity (90.12%) and DPPH (94.26%) scavenging activities were noted at 110µg/ml concentration of CuONPs with their respective IC_{50} values of 80.19 and 78.40µg/ml. In anti-inflammatory activity study, the maximum concentration (200µg/ml) of produced nanoparticles showed inhibition percentage of 90.63% with the IC_{50} value of 118.15µg/ml. Based on these results, it could be concluded that the green synthesized CuONPs has effective biomedical potential with antimicrobial, antioxidant and anti-inflammatory properties.

Keywords: Copper oxide nanoparticles, *Acalypha* sp., Antimicrobial property, Antioxidant property

S3-OP14

Microbial Production of Acetic Acid from Banana Peel Waste Utilizing Yeast

Hari Priyadharshini P and Nagajothi Kasilingam*

Departmnt of Microbiology, KR. College of Arts & Science, KR Nagar, Kovilpatti,

Corresponding author: haripriyaponmadasamy@gmail.com

Abstract

Banana peel is a plentiful agro-waste high in fermentable carbohydrates, producing it a promising cheep-cost feedstock for organic acid production. This study focus the production of acetic acid from banana peel utilizing yeast *Saccharomyces cerevisiae* through microbial fermentation Process. Banana peels were collected and processed to obtained fermentable sugars used by fermented medium. The medium was inoculated was *Saccharomyces*

 ISBN: 978-93-48577-14-6

Cerevisiae and incubated under controlled temperature and pH conditions. Organic acid production was monitored by pH reduction and confirmed using titrimetric and qualitative organic acid tests. The results showed a noticeable decrease in pH, indicating acid formation. *Saccharomyces cerevisiae* predominantly produced acetic acid. In Acetic acid production from yeast fermentation, highlighting the efficiency of banana peel as feedstock. This study investigates an environmental friendly and economical strategy for converting banana peel waste into value-added organic acids using microbial fermentation. This process contributes to waste management, environmental sustainability, and potential industrial applications in food and pharmaceutical sectors.
Keywords: Banana peel, Microbial Fermentation, Acetic acid, Production, Titration, confirmatory tests, FTIR.

S3-OP15

Evaluation of Crude Fungal Cellulase Produced by *Aspergillus, Penicillium* and *Trichoderma* from Corn Cob and it's Eco-Friendly Detergent Application

Raja Archana . A and Muthukumar .A
Department of Microbiology, ,K.R College of Arts & Science,K.R Nagar , Kovilpatti ,Tamilnadu , India -628503.

Abstract

The prolonged use of chemical detergents leads to fabric fading, fibre damage and environmental pollution due to their harsh chemical action.Enzymes play a significant role in eco-friendly detergent formulations by improving fabric softness, brightness, and cleaning efficiency. The present study, explores the potentials for enhanced cellulase enzymes produced by three fungal genera—*Aspergillus, Penicillium,* and *Trichoderma* were comparatively evaluated for their suitability in detergent applications. The fungus were cultivated under submerged fermentation conditions using corn cob as a substrate, a reduction in fungal mycelial density was observed in the presence of zinc oxide, indicating its inhibitory effect on fungal growth. and crude cellulase was extracted by centrifugation. Enzyme activity was determined using the DNS method with carboxymethyl cellulose as substrate and qualitatively assessed by SDS -PAGE method. The detergent compatibility of the produced cellulases was assessed by evaluating their actions by washing performance tests on cotton fabric. The effectiveness of cellulase treatment was analysed based on visual cleanliness, fabric softness, and surface appearance in comparison with detergent-only washing. Among the three fungal cellulases, variations were observed in enzyme activity, stability, and detergent performance, indicating strain-specific differences. This study highlights the potential of fungal cellulases as eco-friendly detergent additives and provides a comparative insight into selecting an efficient microbial source for sustainable detergent applications.
Keywords: Cellulase, DNS method, SDS PAGE, Detergent, zinc oxide.

 ISBN: 978-93-48577-14-6

S3-OP16

Comparative Phytochemical Profiling and In vitro Antimicrobial Evaluation of Methanolic and Aqueous Extracts of *Cocos nucifera* Sprouts

Kannan Duraisamy, P.Jeya veni, S.K.Jeyashri, M.Karthika, R.Karthika, K.Kavitha.
Department of Microbiology, K.R. College of Arts & Science, K.R.Nagar, Kovilpatti Tamil Nadu, India - 628503.
Corresponding author: dkannanhari@gmail.com

Abstract

Cocos nucifera sprout is an emerging natural product rich in phytochemicals with potential therapeutic applications. This study aimed to assess the phytochemical constituents and antimicrobial activity of fresh and methanolic sprout extracts. Bacterial strains including *Clostridium sp., Lactobacillus sp., Staphylococcus sp., Micrococcus sp*., and *Pseudomonas sp*. were isolated and characterized using selective media and biochemical tests. Antibacterial activity was determined through the agar well diffusion method. Fresh sprout extract did not exhibit inhibitory action, while methanolic dried extract showed significant antimicrobial effectiveness. The highest inhibition was recorded against *Staphylococcus sp*., indicating strong susceptibility. Phytochemical analysis revealed the presence of alkaloids, phenols, proteins, amino acids, quinones, and resins. FT-IR confirmed major functional groups linked with bioactive compounds. GC-MS analysis identified fatty acids such as dodecanoic and hexadecanoic acids as dominant constituents. The study supports the use of coconut sprout extract as a valuable antimicrobial and nutraceutical candidate.

Keywords: *Cocos nucifera* sprout, phytochemical screening, methanolic extract, agar diffusion, bioactive compounds.

S3-OP17

Production of Single Cell Protein from Papaya fruit peel waste

Shalini Murugiah and Nagajothi Kasilinigam*
Department of Microbiology, K.R College of Arts & Science, Kovilpatti, Tamilnadu, India.

Abstract

Single cell protein is dead dry cells of microbes like Bacteria, yeast, algae, fungi. It act as a food or feed supplement and give an modifications to traditional protein. A huge amount of protein is required by human and animals this cannot be provided by conventional method. Utilize food processing turnover in the production of single cell protein as a feedstock would reduce pollution. In this work fruit peel were evaluated for the production of single cell protein using *Lactobacillus* and *candida* by submerged fermentation. fruit peel powder was undergo boiling at 70°C to inhibit the papain enzyme . The fermentation was carried out with 10 ml of inoculum with 500 ml fermentation medium with substrate at 35°C for 5 days. After fermentation, the microbial biomass was separated by centrifugation process. The maximum yield was obtained from *lactobacillus* 3g SCP in 500 ml as compared to *candida* 2.5g in 500ml. The fruit Peel waste was converted into a better value added products using the frequently available and beneficial microorganism *Lactobacillus* produce SCP production more economically feasible and eco-friendly.

Keywords: Microbial Fermentation, papaya peel, *Lactobacillus,* single cell protein, FTIR.

 ISBN: 978-93-48577-14-6

S3-OP18

Natural Pigments from the Endophyte *Aspergillus westerdijkiae* and Evaluation of Their Bioactivities

Abirami Baskaran[1], El-Sayed R. El-Sayed[1,2], Filip Boratynski[1]

[1] Department of Food Chemistry and Biocatalysis, Wrocław University of Environmental and Life Sciences, Norwida 25, 50-375 Wrocław, Poland

[2] Plant Research Department, Nuclear Research Center, Egyptian Atomic Energy Authority, Cairo, Egypt

Corresponding author: abirami.baskaran@upwr.edu.pl

Abstract

Endophytic fungi associated with forest plants represent a largely unexplored reservoir of bioactive compounds with significant potential for natural pigment production in therapeutic and industrial applications. In this study, an endophytic fungus isolated from the twig of Betula pendula collected in the Mokrzański Forest near Wrocław, Poland, was identified as Aspergillus weste rdijkiae based on morphological characteristics and molecular analysis.The fungus was cultivated in liquid medium for 14 days, after which pigments were extracted from the fungal biomass. Thin-layer chromatography (TLC) confirmed the presence of pigment compounds, and subsequent FLASH chromatography enabled the isolation of two major pigment fractions: orange and brown. The brown pigment fraction exhibited notable antimicrobial activity, while both fractions demonstrated antioxidant potential. Cytotoxicity assays revealed growth inhibition of 42.63% against the breast adenocarcinoma cell line MCF-7 and 70.05% against the lung carcinoma cell line A549. Structural elucidation of the isolated pigments was conducted using FTIR, NMR, and UHPLC analyses. The orange fraction was identified as a mixture of aspergillic acids or their isomers chelated with metal complexes, including aluminium neoaspergillin and ferrineoaspergillin. The brown fraction was determined to be a ≥95% pure compound identified as preussin, with trace amounts of penicillic acid. These findings highlight the considerable potential of endophytic fungi as novel sources of bioactive natural pigments and underscore their promising applications in medical and pharmaceutical research.

Keywords: endophyte, pigment, UHPLC

S3-OP19

Microbe-Mediated Synthesis of Nano-Biofertilizers for Sustainable Tropical Fruit Cultivation

Sakshi Singh*, Anil Buriya, Afiya Rajan Selin

Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India

Corresponding author: sakshisinghroing@gmail.com

Abstract

Sustainable tropical fruit production faces increasing challenges due to declining soil fertility, excessive chemical fertilizer use, and climate-induced stresses. Microbe-mediated synthesis of nano-biofertilizers represents an emerging and eco-friendly approach that integrates microbial biotechnology with nanotechnology to enhance nutrient use efficiency and crop productivity. Beneficial microorganisms such as plant growth–promoting rhizobacteria (PGPR), fungi, and actinobacteria possess the ability to biologically synthesize and stabilize nanoparticles using their metabolites, enzymes, and extracellular polymers. These

 ISBN: 978-93-48577-14-6

biologically derived nanomaterials, when combined with microbial biofertilizers, offer controlled nutrient delivery, improved soil health, and reduced environmental impact. Nano-biofertilizers synthesized through microbial routes enhance nutrient solubility, root absorption, and translocation in tropical fruit crops such as banana, mango, citrus, papaya, and pineapple. The nanoscale size and high surface area of these formulations enable precise nutrient delivery, minimize leaching losses, and promote sustained nutrient availability. Additionally, microbe-derived nano-biofertilizers stimulate root growth, enhance microbial diversity in the rhizosphere, and improve plant resilience against biotic and abiotic stresses. Unlike chemically synthesized nanoparticles, biologically produced nano-biofertilizers exhibit superior biocompatibility and lower eco-toxicity, aligning well with organic and climate-smart agriculture practices. This approach contributes significantly to sustainable horticulture by reducing dependency on synthetic fertilizers, lowering production costs, and mitigating soil and water pollution. The integration of microbial bioprospecting and nano- based natural products provides a promising pathway for achieving higher productivity and quality in tropical fruit cultivation while supporting the United Nations Sustainable Development Goals related to food security, environmental protection, and sustainable agriculture.

Keywords: Nano-biofertilizers, Microbial biotechnology, Sustainable agriculture, PGPR, Tropical fruit cultivation

S3-OP20

Microbial Fertilizers: An Ecofriendly Approach for Sustainable Agriculture

Gaurav Meena*, Abinaya Karunakaran, Pratyasha Acharya, Afiya Rajan Selin

Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India

Corresponding author: gauravjareda2001@gmail.com

Abstract

Microbial biofertilizers are living microorganisms that improve plant nutrient availability when applied to soil, seed, or roots. Microbial biofertilizers represent an ecofriendly and sustainable alternative to conventional chemical fertilizers, playing a crucial role in improving agricultural productivity while preserving environmental health. These biofertilizers consist of beneficial microorganisms such as nitrogen-fixing bacteria (e.g.- Rhizobium, Azotobacter), phosphate-solubilizing microbes, potassium-mobilizing bacteria and mycorrhiza fungi, which enhance the availability of essential nutrients to plants through natural biological processes. By colonizing the rhizosphere or plant tissues, these microorganisms improve nutrient uptake, stimulate plant growth through the production of phytohormones and enhance soil structure and fertility. The use of microbial biofertilizers reduces dependence on synthetic fertilizers, thereby minimizing soil degradation, groundwater contamination, and greenhouse gas emissions associated with intensive chemical inputs. Additionally, they promote sustainable soil microbial diversity and improve plant resistance to biotic and abiotic stresses such as pathogens, drought and salinity. Unlike chemical fertilizers, biofertilizers are biodegradable, cost-effective and compatible with organic farming practices, widely recommended for sustainable food security. Despite their significant advantages, challenges such as variable field performance, limited shelf life, and lack of farmer awareness restrict their widespread adoption. Advances in microbial strain selection, formulation technology and integrated nutrient management strategies are addressing these constraints and

enhancing the efficiency of biofertilizers under diverse agro-climatic conditions. Overall, microbial biofertilizers offer a promising, environmentallysound approach for achieving sustainable agriculture, improving crop productivity, and ensuring long-term food security while conserving natural resources.

Keywords: Microbial biofertilizers, Sustainable Agriculture, Plant Nutrient Availability, Beneficial Microorganisms, Soil fertility

S3-OP21

Exploiting Plant Growth–Promoting Rhizobacteria in Sustainable Horticulture Crop Production

Kashwin Ilangovan*, Nandhakumar Seenuvasan, Afiya Rajan Selin

Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India

Corresponding author: kash777mail@gmail.com

Abstract

Plant growth–promoting rhizobacteria (PGPR) play a pivotal role in advancing sustainable horticulture by enhancing crop productivity while reducing dependence on chemical inputs. These beneficial microorganisms colonize the rhizosphere and stimulate plant growth through multiple mechanisms, including biological nitrogen fixation, solubilization of phosphorus and micronutrients, production of phytohormones and induction of systemic resistance against pathogens. In horticultural crops, PGPR-based interventions contribute not only to improved growth, yield, and quality of fruits, vegetables and ornamentals but also to effective microbial biocontrol of soil-borne and foliar diseases. Their ability to suppress pathogens through antibiosis, competition and production of lytic enzymes makes PGPR an eco-friendly alternative to synthetic pesticides. Integration of PGPR as biofertilizers further improves soil health, nutrient-use efficiency and microbial diversity, supporting long-term sustainability of horticultural systems. Despite proven benefits, wider adoption is limited by variability in field performance, formulation challenges and environmental interactions. Future research should focus on developing robust microbial consortia, advanced carrier materials, and precision delivery systems tailored to specific horticultural crops and agro-climatic conditions. Emerging approaches such as genomics, metabolomics and microbiome engineering offer new opportunities to enhance PGPR efficacy and consistency. Exploiting PGPR within integrated nutrient and disease management strategies holds strong potential to ensure resilient, climate-smart, and sustainable horticultural crop production in the future. Adoption of PGPR-based technologies will also support circular bioeconomy models, reduce environmental pollution, enhance farmer profitability and align horticulture with global goals for food security, biodiversity conservation and sustainable agricultural development under changing climatic scenarios worldwide in coming decades globally.

Keywords: PGPR; Sustainable horticulture, Biofertilizers, Biocontrol, Rhizosphere, Soil health, Nutrient-use efficiency, Climate-smart agriculture

 ISBN: 978-93-48577-14-6

S3-OP22

Sensor-Based Precision Horticulture for Sustainable Management of Perennial Fruit Crops

Abinaya Karunakaran*, Gaurav Meena, Prtyasha Acharya, Afiya Rajan Selin
Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India
Corresponding author: abinayakarunakaran12@gmail.com

Abstract

Perennial fruit crops are the foundation of horticulture production systems worldwide but, their lengthy development cycles and high resource requirements provide serious obstacles to sustainability in the face of climate change. By facilitating real-time monitoring and site-specific decision-making, sensor-based precision horticulture has become a cutting-edge strategy to maximize orchard management. In order to produce continuous data on soil–plant–atmosphere interactions, this method combines cutting-edge sensors, such as soil moisture and nutrient sensors, canopy and fruit growth sensors, microclimate sensors, remote sensing, and Internet of Things (IoT)-enabled platforms. In perennial fruit orchards, the use of sensor-based technologies enables accurate irrigation scheduling, focused nutrition management, and early identification of biotic and abiotic stressors. By supplying inputs based on actual crop needs, precision horticulture reduces needless water use, nutrient losses, and chemical inputs while maintaining output and fruit quality. Sensor-driven management practices support improved root-zone health, enhanced soil microbial activity, and long-term orchard sustainability. Additionally, the integration of sensor data with predictive models and decision-support systems enhances farm-level resilience and efficiency by enabling timely interventions and adaptive management strategies. Sensor-based precision horticulture is very consistent with sustainable horticultural goals since it promotes resource efficiency, reduces environmental impact, and supports climate-smart orchard systems. This strategy directly supports the Sustainable Development Goals of the UN, especially SDG-2 (zero hunger), SDG-6 (clean water and sanitation), and SDG-12 (responsible consumption and productio). All things considered, sensor-based precision horticulture offers a viable route to long-term production and sustainable management of perennial fruit crops in contemporary horticultural
systems.

Keywords: Sensor-based precision horticulture, Perennial fruit crops, Sustainable orchard management, Smart farming technologies, Resource-use efficiency

S3-OP23

Smart IOT- air based flower harvester

Dr.C.Mabel Joshaline[1], Ms.J.Annie Jennifer, J. Chellapandi[3], M. Kesavakumar[2] and V. Mithun[2]
[1]Department of Rural Development Science, Arul Anandar College, Madurai
[2]Department of Computer Science, Department of Computer Science, Arul Anandar College, Madurai
Corresponding author: jesmabmary2512@gmail.com

Abstract

Floriculture is one of the highly profitable venture in Agriculture. The major flower crops cultivated in Madurai District are Jasmine, Mullai and Pitchi. Agronomy of flowers

 ISBN: 978-93-48577-14-6

involves tremendous input of nutrients and is labour intensive. The major drawback is harvesting of these flowers since they had to be completed daily to prevent shedding of mature flowers. In villages farmers start to work from 02.00 a.m during times of huge demand or festive time. This work proposes a Smart IoT and air based flower harvester / picker which can save the farmer in the above mentioned problems and save him from the clutches of debt. This Smart Air-Based Flower Picking System using sensors and airflow technology. The main aim of this system is to identify and pick fully matured flowers without damaging buds, leaves, or plants. A camera and light source are used to confirm the maturity stage of the flowers. By employing the basic simple image processing logic, the system identifies and confirms the maturity stage of the flower is fully bloomed or still a bud. Thus only mature flowers are selected for harvesting. Once detected, a low-pressure air suction mechanism is activated. The airflow gently detaches the flower from the plant by using the natural weakness of the flower stem. The picked flower is directly collected into a soft plastic or cloth bag. This method avoids physical contact, reduces damage, and maintains flower quality. The proposed system is low cost, easy to use, and suitable for village-level implementation. It reduces dependency on manual labor and helps farmers pick flowers on time. This project demonstrates how sensor technology and simple automation can solve real- world agricultural problems effectively.

S3-OP24

A Study on Qualitative Phytochemical Analysis of Aqueous Extracts of *Allium sativum* l. And *Ocimum sanctum*

Vaidehi K, Susan Mary Ceyril, Yashika Sharma

Department of Microbiology, St. Anne's Arts and Science College, Chennai, Tamil Nadu, India

Abstract

Medicinal plants are valuable sources of bioactive compounds and play a significant role in traditional as well as modern healthcare systems. *Allium sativum* L. (Garlic) and *Ocimum sanctum* (Tulsi) are two widely used medicinal plants in Indian ethnomedicine, known for their antimicrobial, antioxidant, anti-inflammatory, and immunomodulatory properties. The present study aimed to perform a qualitative phytochemical screening of aqueous extracts of garlic bulbs and tulsi leaves to identify their major bioactive constituents. Aqueous extracts were prepared using standard extraction methods and screened for the presence of alkaloids, flavonoids, saponins, tannins, phenols, terpenoids, steroids, glycosides, carbohydrates, and proteins. The aqueous extract of *Allium sativum* showed the presence of saponins, tannins, terpenoids, steroids, glycosides, and carbohydrates, whereas alkaloids, flavonoids, phenols, and proteins were absent. In contrast, the aqueous extract of *Ocimum sanctum* revealed the presence of alkaloids, proteins, phenols, and tannins, while saponins, flavonoids, steroids, terpenoids, glycosides, and carbohydrates were absent. The results confirm that both plants are rich sources of secondary metabolites, supporting their traditional medicinal use and potential application in pharmaceutical and therapeutic formulations.

Keywords: Phytochemical analysis, *Allium sativum*, *Ocimum sanctum*, aqueous extract, medicinal plants

 ISBN: 978-93-48577-14-6

S3-OP25

Optimization of Production Media for Tannase and Gallic acid Production Using Banana Flower Stalk as Substrate.

Rohini Tamilanban [1*], Rajalakshmi Arumugam [2]

[1]Department of Microbiology, NMSSVN College, Madurai- 625019, Tamil Nadu, India.

[2]Department of Biotechnology, Sri Kaliswari College, Sivakasi-626130, Tamilnadu, India

* Corresponding Author mail: rohiniblessy@gmail.com; rajimullai291289@gmail.com

Abstract:

Tannase (E.C. 3.1.1.20), is an inducible extracellular enzyme produced by several microbes, animals, and plants. Microbial tannases are preferred because they are more stable and produced in higher yields than similar enzymes obtained from other sources. Tannic acid was the best carbon source for enzyme induction. Tannic acid and gallic acid were the most effective inducers for tannase, followed by tannin. The present study aims to produce tannase enzyme and gallic acid from fungal isolates A. niger and A. flavus using Banana Flower Stalk as a substrate. Optimization parameters such as different nutrient media, Carbon source, Nitrogen source, Phosphate source, Chloride source, incubation period, tannic acid (inducer) concentration, pH, and temperature were investigated for maximum tannase production. The optimum conditions were found to be in M7 medium along with Banana Flower stalk as a carbon source, incubation period (96 hrs), at pH (6) for both Tannase and Gallic acid maximum yield.

Key words: Submerged cultures, Tannase, Aspergillus niger, Aspergillus flavus, Banana Flower Stalk, Gallic acid.

S3-OP26

Bacteriophages as Next-Generation Biocontrol Agents in Agriculture: Prospects and Future Directions

Sivaranjani Gopalakrishnan, Suresh Dhanaraj*

Department of Microbiology, Vels Institute of Science, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai, Tamil Nadu

Abstract

The intensification of agriculture has accelerated the emergence of bacterial phytopathogens and antimicrobial resistance (AMR), undermining crop productivity and food safety. Conventional control strategies relying on chemical bactericides and antibiotics are increasingly ineffective and environmentally unsustainable. Bacteriophages—viruses that specifically infect bacteria—have re-emerged as highly promising biocontrol agents due to their host specificity, self-amplifying nature, and minimal ecological footprint. This poster highlights current and prospective applications of bacteriophages in agriculture, emphasising their potential role in sustainable crop protection, livestock health management, and post-harvest food safety.

 ISBN: 978-93-48577-14-6

ABSTRACTS – ORAL PRESENTATION (SESSION 4)

 ISBN: 978-93-48577-14-6

S4-OP1

An updated review on the recent progress in the toxicological studies of parabens and phthalates on the endocrine system

A. Ruth Angeline
Govt College, Nandanam, Chennai, Tamil Nadu

Abstract

Every day, humans are exposed to a wide range of chemicals from numerous sources. A variety of contaminants are released into the environment when personal care products (PCPs) are used. In recent years, different varieties of beauty care products have been introduced, and their usage has greatly increased. Although the concentration of harmful chemicals used in PCPs is minimal, they have adverse effects on humans and their well-being. These chemicals mainly affect the endocrine system and limit human reproductive success. Parabens and phthalates are typical EDCs present in PCPs used every day. Some previous studies have noted the harmful effects of paraben and phthalates, such as disruption in thyroid gland secretion, sperm production, and reproductive hormone secretion, causing infertility, carcinogenesis, and pregnancy-related issues. Conversely, other studies did not identify any or negligible effects on the human endocrine system. Therefore, in this review, the harmful effects of paraben and phthalates on the human endocrine system are examined with an updated review of various in vitro and in vivo studies to understand the toxic effects of paraben and phthalates. In summary, the toxic effects of paraben and phthalates on the human endocrine system mainly depend on the dosage, geographical location, lifestyle changes, and duration of exposure.

S4-OP2

Carbon Capture Technologies: A Comprehensive Review of Current Methods and Future Directions

Devi Shri V, Esakkitha K, Michael Rahul Soosai
Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu

Abstract

The increasing emissions of greenhouse gases continue to drive climate change, carbon capture has come to represent a critical approach for lowering atmospheric concentrations of carbon dioxide (CO2). This review, examines post-combustion carbon capture technologies, focusing on recent developments in techniques such as biochar from agricultural waste such as sugarcane bagasse and rice husk, membrane separation, adsorption, direct air capture, algal-based systems, and catalyst-based approaches. These technologies are compared with respect to capture efficiency, scalability, sustainability, and economic feasibility. The overview makes an identification of strengths and weaknesses of such technologies based on extensive comparative analysis of the literature. Major issues such as high costs of operation, energy consumption, and infrastructure requirements are addressed with particular emphasis on utilizing low-cost sustainable material that can be done on a mass scale. Moreover, the review presents directions that are likely to be pursued in the future, including the integration of carbon capture with renewable energy systems. By so doing, it marks out future prospects of combining these strategies with renewable energy systems to help achieve global climate targets, particularly the achievement of net-zero emissions by 2050.

 ISBN: 978-93-48577-14-6

Keywords: Carbon capture Technologies, Greenhouse gas mitigation, Direct Air Capture(DAC), Pyrolysis-Based CO2 Capture, Sustainable Materials

S4-OP3

Biogenic Synthesis of Intracellular Silver Nanoparticle by Endophytic Ascomycetes Fungi from Calotropis gigantea Seeds (L.) R. Br

A. Kavi Praba*, Raghul Rajah, Aakash Sumesh Kumar, Arthi V.
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai- 600 119, Tamil Nadu, India
Corresponding author: kavipraba.a.bte@sathyabama.ac.in

Abstract

The biosynthesis of monodispersed nanoparticles, along with the determination of potentially responsible biomolecules, is the major bottleneck in the area of bio-nanotechnology research. The current investigation focused to synthesize the Silver Nanoparticles (AgNPs) using an endophytic fungus isolated from Calotropis gigantea (L. Br) seed, located in Chennai, India. The fungus was identified for its morphological and molecular characteristics. The fungus identified as Pichia Kudriavzevii strain based on 16SrRNA sequencing. The produced particles were spherical shaped in nature and shows the surface plasma resonances 10nm. FTIR spectra of nanoparticle showed the C=C bonding, N-compound, C-O stretching vibration denotes the presences of alkene, protein and aromatic compound on the surface of silver nanoparticle produced by Pichia kudriavzevii. Synthesised NanoParticle revealed thee mean negative zeta potential and electrophoretic mobility of -29.8 mV and -0.000255 cm 2 /Vs respectively. The nanoparticles produced were proteinaceous compounds as capping agents with -29.8mV zeta potential and revealed the antibacterial activity against gram positive bacterial strain.

Keywords: Biosynthesis, Endophytic fungus, Calotropis gigantea seed, copper nanoparticles, SEM, XRD.

S4-OP4

Antimicrobial effects of guava leaf extract against *Streptococcus sp* and *Candida sp*

S.Akshya Priya, R.Kalaivani, D.Susan Caroline, M.Umamaheshwari, J. Jerrina Mariyal
C.S.I Ewart Women's Christian College, Melrosapuram-603 204, Tamil Nadu

Abstract

Medicinal plants have gained increasing attention as alternative antimicrobial agents due to rising antibiotic resistance and their natural origin. Psidium guajava (guava) leaves are traditionally used in folk medicine for treating infections, owing to their rich phytochemical composition. The present study evaluates the antimicrobial activity of guava leaf extract against Streptococcus species (Gram-positive bacteria) and Candida species (fungal pathogen). Fresh guava leaves were collected. washed, and grinded using mortar and pestle. An aqueous extract was prepared and tested for antimicrobial activity using the disc diffusion method. Standard microbial strains of Streptococcus sp. and Candida sp. were cultured on appropriate media like Nutrient agar and Sabouraud Dextrose Agar then inoculated onto Mueller Hinton agar plates. Sterile discs impregnated with guava leaf extract were placed on the inoculated plates and incubated under suitable conditions. The antimicrobial efficacy was assessed by measuring the zone of inhibition around the discs. The results demonstrated clear inhibitory zones against both test organisms, with stronger

activity observed against Streptococcus sp. compared to Candida sp. The antimicrobial effect is attributed to bioactive compounds such as flavonoids, tannins, phenolics, and saponins present in guava leaves. This study confirms that guava leaf extract possesses significant antimicrobial potential and may serve as a natural, eco-friendly alternative to synthetic antimicrobial agents. Further studies are recommended to isolate active compounds and evaluate their clinical applications.

Key words: Psidium guajava, Guava leaf extract, Antimicrobial activity, Streptococcus sp., Candida sp., Disc diffusion method, Phytochemicals, Antibiotic resistance, Medicinal plants, Natural antimicrobial agents

S4-OP5

Exploring Cryosphere bacteria for Plant growth promotion and Disease Control

Jayakrishan M[1], P. Prakash[1], Kishore Kumar Annamalai[2], M. Radhakrishnan[2] *

[1]Department of Biotechnology, Sathyabama Institute for Science and Technology, Chennai 600 119, Tamil Nadu, India.

[2]Centre for Drug Discovery and Development, Sathyabama Institute for Science and Technology, Chennai 600 119, Tamil Nadu, India.

*Corresponding Author Email: mrkactinos@gmail.com

Abstract

This study explores the potential of cryosphere bacteria for plant growth promotion and disease control. Samples were collected from Ny-Ålesund and later procured from the Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology. A total of 100 morphologically distinct bacterial isolates were initially selected, which were narrowed down to 66 isolates using the KOH test. These isolates were screened for plant growth-promoting traits and enzymatic activities. The results revealed 12 isolates with siderophore production, 32 with nitrogen fixation, 9 with phosphate solubilization, 58 with ammonia production, 27 with indole acetic acid (IAA) production, and 66 with acetoin production. Enzymatic activities included 10 isolates with cellulase, 38 with lipase, 33 with protease, and 31 with amylase. Based on these screenings, two bacterial isolates were selected for further biocontrol assays. These isolates exhibited a 25 mm zone of inhibition against Ralstonia solanacearum, the causative agent of wilt disease. In vitro plant growth promotion assays using the paper towel method demonstrated an average shoot length of 20.3 cm and root length of 2.5 cm. Further studies will include pot experiments and characterization of the bacterial cultures.

Keywords: Cryosphere Bacteria, Plant Growth Promotion, Disease Control, Plant Growth Properties, Ralstonia solanacearum

S4-OP6

Development of Lowcost adsorptive material for the treatment of Ground water Engineering

Rachel.P*, Sangeetha. P. B, Annam Renita.A

Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai 119. Tamil Nadu

Abstract

Groundwater contamination due to excessive hardness, dissolved salts, and organic impurities poses a serious threat to public health, especially in rural and semi-urban regions.

 ISBN: 978-93-48577-14-6

Conventional water treatment methods are often expensive and inaccessible to low-income communities, creating a need for low-cost and sustainable alternatives. This project focuses on the development of a low-cost adsorptive material using coconut shell, an abundantly available agricultural waste, for the treatment of groundwater. In this study, coconut shell adsorbents were prepared through acid and alkali activation to enhance their surface properties and adsorption efficiency. The treated adsorbents were employed in batch adsorption experiments to evaluate their effectiveness in improving groundwater quality. Key physicochemical parameters such as pH, total hardness, electrical conductivity, chloride concentration, and chemical oxygen demand (COD) were analyzed before and after treatment using standard analytical methods. The results demonstrate a significant reduction in hardness, conductivity, chloride, and COD levels after treatment with both acid- and alkali-treated coconut shell adsorbents, indicating effective removal of dissolved inorganic and organic contaminants. Changes in pH were observed to move toward permissible limits, confirming the stabilizing effect of the adsorbent. Among the two treatments, alkali-treated coconut shell showed comparatively better performance in reducing hardness and conductivity, while acid-treated adsorbent was more effective in COD removal. Overall, the study concludes that acid- and alkali treated coconut shell adsorbents are efficient, economical, and environmentally sustainable materials for groundwater treatment. The proposed method offers a promising solution for decentralized water purification systems, contributing to safe drinking water access and waste valorization.
Keywords: Groundwater treatment; Coconut shell adsorbent; Acid and alkali activation; Adsorption; Hardness removal; Sustainable water purification

S4-OP7

Production Of Biodegradable Straw and Cup Embedded with Trigonella foenum – Graecum

Maghasri. T

Department of Biotechnology, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu – 600119, India.

Abstract

This study addresses the environmental hazard of conventional plastic straws, which persist for decades and threaten marine ecosystems. It proposes a fully biodegradable single-use straw and cup fabricated from seaweed-derived biopolymers (carrageenan, agar, alginate) combined with fruit and vegetable peel powders, and embeds fenugreek seeds to create a post-use regenerative function for plant growth or aquaculture feed. The objectives are to (i) extract and blend the biopolymers with peel additives, (ii) mold the mixture into straws and cups, (iii) characterize chemical compatibility via FT-IR, (iv) evaluate water absorption, biodegradability, toxicity, and seed viability, and (v) compare performance with conventional plastic items. Literature indicates that prior edible straws from apple, durian, banana, and other fruit peels degrade at temperatures up to 65 °C but suffer limited heat resistance, motivating the composite approach. The experimental workflow involves drying seaweed extracts, mixing with peel powders and reagents, hot-air oven curing at 80 °C, and subsequent SEM, FT-IR, and biodegradation testing. Preliminary FT-IR results confirm successful incorporation of carrageenan, agar, and alginate, while initial molding showed rapid melting, prompting formulation optimization for hot-drink stability. Expected outcomes include rapid soil-burial degradation, and successful seed germination, offering a dual-

 ISBN: 978-93-48577-14-6

function material that reduces plastic waste and provides ecological benefits. Challenges such as heat resistance and rapid dissolution will be tackled through composite optimization and further testing, laying groundwork for scale-up and broader sustainability impact.

S4-OP8

Eggshell-Derived CaO on Rice Husk Biochar: A Novel Heterogeneous Catalyst for Waste Oil Biodiesel

Lakshmi Natarajan, Karthikeyan
Department of Chemical Engineering, Sathyabama Institute of Science and Technology
Chennai, Tamil Nadu – 600119, India.

Abstract

Biodiesel is one of the types of biofuels, derived from organic matters such as edible oil, non- edible oil, waste cooking oil (WCO), algae. Now a days used cooking oil, chicken eggshell and rice husk has not been utilized perfectly. Waste Cooking oil (WCO) serves as a good feedstock for biodiesel production. Chicken eggshell derived CaO and rice husk biochar was used as catalyst. The eggshells were powdered and calcined at 900°C for 3-4 hours. Subsequently the rick husk was pyrolysis at 500°C for 5-6 hours. The eggshell derived CaO and rick husk biochar was doped and then characterization. The doped catalysts werecharacterised by X-ray diffraction (XRD), thermogravimetric analysis (TGA), scanning electron microscope (SEM), fourier transform infrared spectroscopy (FT-IR), energy dispersive X-ray spectroscopy (EDX). By using different transesterification reaction variables on the catalyst performance were also investigated. The highest conversion, 80% was btained at 30:1 methanol-to-waste cooking oil molar ratio, 65°C, 5 wt. % catalyst loading and 3 hr reaction time. Additionally, durability of catalyst was examined. It was found that high activity and durability were obtained by washing with hot water. It found that the use of chicken eggshell and rice husk as a heterogeneous catalyst for biodiesel production provides a cost-effective and environmentally friendly way of green fuel production.

Keywords: Biodiesel, egg shell derived CaO, rick husk biochar, transesterification, heterogenous catalyst.

S4-OP9

Comparing the efficiency of integrated Photo oxidation and Electrooxidation Processes in Pharmaceutical Wastewater Treatment

Sanjana. R*,Sathish. S
Department of Chemical Engineering, Sathyabama Institute of Science and Technology,
Chennai, Tamil Nadu – 600119, India.

Abstract

The pharmaceutical industry generates complex wastewater containing active pharmaceutical ingredients, antibiotics, and recalcitrant organic compounds that are inadequately treated by conventional wastewater treatment technologies. The persistent nature and biological activity of these contaminants pose significant environmental and public health risks, highlighting the need for advanced and sustainable treatment solutions. Advanced oxidation processes (AOPs), particularly photooxidation and electrooxidation, have gained increasing attention due to their ability to generate highly reactive hydroxyl radicals capable of degrading complex organic pollutants. This study investigates and compares the efficiency of integrated photooxidation and electrooxidation processes for

 ISBN: 978-93-48577-14-6

pharmaceutical wastewater treatment. The performance of individual photooxidation and electrooxidation systems, as well as their integrated configuration, was evaluated based on chemical oxygen demand (COD) and biological oxygen demand (BOD) reduction, pollutant removal efficiency, and mineralization potential. The integrated photo-electrooxidation process demonstrated superior treatment performance, achieving COD removal efficiencies of 70-80% and BOD reduction of 80-90%, compared to 50-65% COD and 55-70% BOD removal observed for standalone processes. The enhanced performance of the integrated system is attributed to synergistic interactions between photo-induced and electrochemically generated reactive species, which promote increased radical generation, reduced electron-hole recombination, and accelerated degradation kinetics. The results indicate that integrated photooxidation electrooxidation offers a sustainable, efficient, and environmentally friendly approach for pharmaceutical wastewater treatment. This integrated advanced oxidation strategy has significant potential for industrial wastewater management and supports global sustainability goals related to clean water and responsible industrial practices.
Keywords: Pharmaceutical wastewater, Advanced oxidation processes, Photooxidation, Electrooxidation, COD and BOD removal, Sustainable wastewater treatment.

S4-OP10

Anti-biofilm activity of Streptomyces PRA11 from Kashmir region against carbapenem resistant Gram – Negative bacteria

Thenmozhli. G. S, and Radhakrishnan. M*
Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.
*Corresponding author: mrkactinos@gmail.com

Abstract

The production of anti-biofilm compounds from rare ecosystem gives a great remedy for clinical biofilm, which is a serious global health issues, resistant to drug, host defence systems and other external factors leads to chronic infections. Therefore, it is important to search new bioactive metabolites against biofilm pathogens from rare habitat Actinobacteria. The present study aimed to evaluate the Streptomyces from riverbed of Kashmir for antibiofilm properties. For the study, about 18 actinobacterial strains were isolated from Liddar River, Kashmir. Actinobacterial extracts were prepared by submerged fermentation using ethyl acetate and evaluated for anti-biofilm activity against biofilm pathogens by crystal violet – microtitre plate (CV-MtP) method, which revealed that the strain PRA11 showed prominent anti-biofilm activity (91.1% inhibition against Klebsiella pneumoniae). In addition, it eradicated the mature biofilm for about 66.4% for K. pneumoniae at 200 µg/mL concentration and 74.04% inhibition of metabolic activity in biofilm biomass. Optimization of growth parameters using the One-Factor-at-a-Time approach enhanced metabolite production, and ethyl acetate extraction yielded highly active compounds with significant biofilm inhibition ability. GC–MS analysis of PRA11 extract identified ten compounds, with 2,4-Di-tert-butylphenol (36.7%) as the predominant metabolite. These results highlight Streptomyces PRA11 as a potent source of anti-biofilm metabolites, and underscore the biotechnological potential of unexplored soils as reservoirs of novel actinobacterial strains for combating MDR biofilm-associated infections.
Keywords: Anti-Biofilm, CV-MtP method, Kashmir, Metabolic activity, Streptomyces.

 ISBN: 978-93-48577-14-6

S4-OP11

Studies On Techno-Economic Analysis Of Decentralized Algae Biodiesel Plants Using Agro-Marine Waste

Akshaya R.S., Meenakshy N.S. and Dr. M. Karthikeyan
Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, India

Abstract

The increasing demand for sustainable energy and environmental concerns associated with fossil fuels have intensified interest in microalgae-based biodiesel as a renewable alternative. Microalgae exhibit high lipid productivity, rapid growth rates, and the ability to utilize agro-marine waste, making them a promising feedstock for decentralized biodiesel production. This study presents a techno-economic analysis of decentralized algal biodiesel plants employing agro-marine waste as a nutrient and carbon source. At the current stage, substantial experimental progress has been achieved, including catalyst synthesis and detailed characterization. The ongoing phase involves bio-oil extraction from seaweed, followed by transesterification to produce biodiesel and evaluation of fuel properties. Capital and operating costs, energy consumption, and process efficiency were systematically analyzed to assess economic feasibility. The utilization of agro-marine waste significantly reduces nutrient costs while promoting sustainable waste management. Sensitivity analysis identifies key parameters such as biomass productivity, lipid yield, and energy input that strongly influence production economics. Furthermore, the study discusses technical challenges and highlights future prospects, including process optimization, catalyst improvement, scale-up strategies, and biorefinery integration to enhance economic viability. Overall, this work demonstrates the strong potential of microalgal biodiesel integrated with agro-marine waste valorization as a sustainable solution for decentralized renewable energy systems.

Keywords: Microalgae, Biodiesel, Techno-Economic Analysis, Agro-Marine Waste, sustainable Energy, Microbial Bioprospecting

S4-OP12

Cu2+ Doped ZIF-8 As Adsorbent for Ibuprofen Removal From Water

Dr. Sathish Sundaram, Yeshwanthika Vijayakumar, Krishnaveni Balakrishnan
Department of Chemical Engineering, Sathyabama Institute of Science &Technology, Chennai-119. Tamil Nadu

Abstract

Cu2+-doped ZIF-8 was synthesized and evaluated as an efficient adsorbent for the removal of ibuprofen from aqueous solutions. Copper incorporation was achieved through an in-situ doping method, resulting in a stable framework with enhanced adsorption properties. The specific surface area of pristine ZIF-8 was in the range of 1250-1400 m2/g, which decreased to 950-1150 m2/g after Cu doping, indicating successful metal incorporation. Adsorption studies showed rapid ibuprofen uptake, with equilibrium attained within 60-90 minutes. Isotherm analysis revealed that the adsorption behaviour followed the Langmuir model, with a maximum adsorption capacity ranging from 310 to 360 mg/g, demonstrating a significant improvement over undoped ZIF-8. Kinetic studies indicated that the adsorption process obeyed a pseudo- second-order model, suggesting the involvement of strong interactions between ibuprofen molecules and Cu-modified active sites. Thermodynamic analysis

 ISBN: 978-93-48577-14-6

confirmed that the adsorption process was spontaneous and endothermic in nature. Regeneration studies showed good reusability, with the adsorbent retaining 80-87% of its initial adsorption efficiency after five cycles. These results demonstrate that Cu2+-doped ZIF-8 is a promising adsorbent for the effective removal of pharmaceutical contaminants from water.

Keywords: Cu2+-doped ZIF-8, Adsorption kinetics, Pharmaceutical wastewater, Environmental remediation.

S4-OP13

Bioprospecting of mesophilic bacteria from high artic region for protease production

Shalinishree P[1], Theboral J[1], Bharathi S[2], Radhakrishnan M[2*]

[1]Department of biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

*Corresponding Author: mrkactinos@gmail.com

Abstract

Proteases from bacteria adapted to extreme environments have gained considerable attention due to their stability and efficiency under diverse conditions, making them attractive for industrial applications. In this study, 40 mesophilic bacterial strains previously isolated from the High Arctic region of Svalbard (Latitude: 78.923538° N, Longitude: 11.909895° E) were subcultured on nutrient agar and preserved as slants for further analysis. Nineteen strains showing consistent growth were shortlisted and screened for extracellular protease production on skim milk agar, from which six strains exhibiting prominent zones of clearance were selected for detailed evaluation. Protease activity of these six candidates was assessed using the well diffusion method, leading to the selection of two high-performing strains, ASB 28 (36 mm) and ASB 33 (20 mm). Morphological characterization revealed distinct colony features, with ASB 28 displaying a light cream-yellow pigmentation and ASB 33 exhibiting a cream light-brown appearance. Optimization of protease production was carried out by varying carbon and nitrogen sources, pH, and temperature, followed by day-wise monitoring of enzyme activity. In future studies, upon achieving maximal enzyme production, partial purification of the crude protease will be performed, and the enzymes will be analyzed by SDS-PAGE and zymography to confirm proteolytic activity and estimate their molecular weight. Overall, this study highlights the bioprospecting potential of High Arctic mesophilic bacteria as promising sources of industrialy relevant proteases and lays the groundwork for subsequent functional and application-oriented investigations.

Keywords: Mesophilic bacteria, High Arctic, Svalbard, Protease production, Optimization, SDS-PAGE, Zymography, Antimicrobial screening.

 ISBN: 978-93-48577-14-6

S4-OP14

Incorporation of Edible Plant Extracts as Natural Food Preservatives: Green Extraction Methods, Antibacterial Mechanisms and Applications

Jayharini Balakumar [1] , Divyadharshini Indrajith[1]
Grace Lydia Phoe[1], Prabhakar Singh[1], Bharathi S[2*]
[1]Department of biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India
[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

Abstract

Wound healing is a crucial physiological process necessary for restoring the skin integrity, acknowledged by WHO as a global concern. It can manifest as either an acute or chronic condition, but complications are more common in chronic and diabetic wounds affecting approximately 40 million of people worldwide. According to Future Market Insights (2025), the global chronic wound care market can reach USD 27,076.5 million by 2035, addressing the growing demand for effective treatments and according to WHO, around 26.8 million people in USA live with diabetes and 6 million suffering from chronic wounds. To speed up the wound healing process maintaining the healthy healing environment is necessary. Conventional synthetic dressings (gauze, cotton) often fail to provide moist environment, antimicrobial property, and biocompatibility leading to increased complication and treatment costs. To overcome these limitations recent studies focuses on finding alternatives like natural biopolymers from either plant or animal based. Among them *Moringa oleifera* has become a promising candidate for its unique bioactive compounds, such as flavonoids (Vicenin-2) and phenolic compounds (caffeic acid) assist to antioxidant defense, enhance collagen formation and modulation of inflammation. In addition, *Moringa oleifera* exhibits remarkable water retention and film-forming ability proving the moist wound healing environment. Furthermore, when it combined with collagen and chitosan, a synergetic environment can be achieved for effective wound healing. This review emphasizes the role of *Moringa oleifera*, chitosan and collagen as a promising polymer for wound healing, along with highlighting the advantages of other plant and animal-based polymers in wound care.

Keywords: Chitosan, Collagen, Moringa oleifera, Wound healing, Natural dressing

S4-OP15

Non-Small Cell Lung Cancer (NSCLC): A Comprehensive Review of Risk, Biology, and Therapeutic Innovations

Ramanan K, Kavi Praba A*, Indumathi S. M.*, Raghul Rajah S.
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India
***Corresponding author:** biotech@sathyabama.ac.in

Abstract

Non-Small Cell Lung Cancer is found to be the leading cause of cancer-related deaths worldwide, and it constitutes nearly 85% of all lung cancer cases. Despite advances in diagnosis and therapy, the disease continues to pose a major public health challenge. This review includes an analysis of epidemiology, risk factors, histological subtypes, pathogenesis, clinical management, and emerging research and therapies for NSCLC. Key risk factors- including tobacco exposure, environmental pollutants, and genetic factors are

 ISBN: 978-93-48577-14-6

analyzed, especially in never-smokers. The key driver mutations involved in NSCLC, genomic alterations, oncogene addiction, and carcinogenesis are discussed. Recent advancements in screening and diagnosis, including Low-Dose Computed Tomography, biomarker testing, and liquid biopsies, have enabled early detection of cancer and stratification of risks associated with it. Stage-wise treatment strategies are discussed, and a shift toward precision medicine, such as targeted therapies and immune checkpoint inhibitors, has been highlighted. Despite improvements in the treatment and diagnosis of cancer in patients, challenges remain in therapeutic accessibility and screening efficacy in never-smokers. This paper is concluded by exploring future directions for using Next-Generation Sequencing, multi-omics profiling, to guide individualized care, easy accessibility of therapeutics, and reduce the global disease burden.
Keywords: Non-Small Cell Lung Cancer, Genetic Factors, Targeted Therapy, Personalized Medicine.

S4-OP16

Formulation and Antibacterial Assessment of a Herbal Ointment Against Streptococcus and Staphylococcus

Ms. Kavi Praba A.*, Risci Kanth K A S, S Nidya Sri, A Nanda Gopaalan
Department of Biotechnology, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Chennai- 600 119, Tamil Nadu, India.
Corresponding author: kavipraba.a.bte@sathyabama.ac.in

Abstract

Skin infections caused by Streptococcus and Staphylococcus species remain a significant clinical challenge due to increasing antimicrobial resistance and the limited efficacy of existing topical therapies. The present study aimed to formulate and evaluate a herbal ointment using Thespesia populnea fruit and Senna siamea leaf extracts, and to identify potential lead molecules capable of inhibiting key bacterial toxins, namely streptolysin O and hemolysin, through computational analysis. Herbal ointments were prepared using different concentrations of plant extracts in an oleaginous base and evaluated for physicochemical properties, stability, spreadability, washability, non-irritancy, and antibacterial activity. Antibacterial activity was assessed using the agar well diffusion method against Streptococcus and Staphylococcus species, where Senna siamea showed notable zones of inhibition against both organisms, while Thespesia populnea demonstrated activity against Streptococcus species. Molecular docking studies were performed on selected bioactive compounds screened for drug-likeness using Swiss-ADME tools. Among the compounds analyzed, cinnamic acid exhibited favorable binding energies with both streptolysin O and hemolysin, forming stable interactions, suggesting its potential as a lead inhibitor. The results indicate that the formulated herbal ointment is safe, stable, and exhibits antibacterial efficacy, and that selected phytochemicals may serve as promising candidates for toxin-targeted therapy in the management of bacterial skin infections.
Keywords: Herbal ointment, Thespesia populnea, Senna siamea, Streptolysin O and hemolysin, Molecular docking

 ISBN: 978-93-48577-14-6

S4-OP17

Plant-Based Nano-Biomanufacturing of SARS-CoV-2 Nucleocapsid Protein for Diagnostic Applications

Sudhanarayani S. Rao, Krupakar Parthasarathy*
Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India
Corresponding author: pkrupakar.cddd@sathyabama.ac.in

Abstract

The nucleocapsid (N) protein of SARS-CoV-2 is one of the potential antigens to be used in serological and nano-enabled diagnostic platforms. Plant-based expression systems have emerged as a viable biomanufacturing platform for the production of recombinant viral proteins due to recent advances in agricultural biotechnology. Compared to conventional microbial and mammalian expression systems, this review emphasizes the scalability, economic viability, and biosafety of plant-based expression systems for the production of SARS-CoV-2 N protein. Nucleocapsid protein with hight yield and purity can be produced using plant-based expression systems, making it amenable for incorporation into ELISA-based and nanotechnology-based assays. Moreover, plant-derived antigens can be readily integrated with nano-formulation and sensing technologies, strengthening the role of agriculture in diagnostic supply chains. Plant-based nano-biomanufacturing offers a versatile and resilient approach to the production of diagnostic reagents, further solidifying the importance of agricultural biotechnology in future pandemic responses.

Keywords: Nucleocapsid, Nanotechnology, Diagnostics, Agriculture

S4-OP18

Antimicrobial Peptide Designing from *Bacillus licheniformis* Bacteriocin Using *In Silico* and *In Vitro* Analysis: A Promising Therapeutic Agent for Shigellosis

Mangala Lakshmi Ragavan[1], Sushmita Rajan[2], Krupakar Parthasarathy[1], Hemalatha Srinivasan[2*]
[1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India
[2]B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai, India.

Abstract

Bacteriocins are antimicrobial peptides produced by bacteria that change the composition of the gut microbiota and decrease pathogenic colonization. This facilitates the enrichment of the beneficial gut microbiome. The current study aims to isolate a potential probiotic strain to design an antimicrobial peptide against Shigella boydii. The isolate was identified as Bacillus licheniformis and characterized as a potential probiotic candidate. Further, in Silico studies with the human intestinal protein (3IFB) and the S. boydii protein (2Q8M) docked with a peptide designed from B. licheniformis. The epitopes are predicted through MHC and screened for potential antimicrobial peptides. Bacteriocins were characterized using various analyses, viz., FTIR, HPLC, NMR, and LC-MS. The toxicity of the extracted protein at different concentrations was analysed by using an animal model study (zebra fish). The bacteriocin and antimicrobial peptide showed significant antagonistic activity against *S. boydii.* Therefore, B. licheniformis was found to have excellent antimicrobial activity, which can be used as a therapeutic agent against shigellosis.

 ISBN: 978-93-48577-14-6

Keywords: Probiotics, bacteriocins, antimicrobial peptide, Bacillus licheniformis, Shigella boydii

S4-OP19

The Contribution of Environmental Microbiology to Organic Fertilizer Production (EMO Fertilizer)

T. Bhuvaneshwari, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari, J. Jerrina Mariyal
Department of Microbiology, C.S.I. Ewart Women's Christian College (Affiliated to the University of Madras), Melrosapuram – 603204, Tamil Nadu, India

Abstract

The excessive and continuous use of chemical fertilizers in modern agriculture has lead to soil degradation, nutrient imbalance, environmental pollution, and a decline in beneficial soil microflora. To address these challenges, the present study focuses on the development and evaluation of EMO (Effective Microorganism–based Organic) fertilizer as an eco-friendly and sustainable alternative to chemical fertilizers. EMO fertilizer is prepared by fermenting a consortium of beneficial microorganisms such as lactic acid bacteria, yeast, actinomycetes, and photosynthetic bacteria using organic substrates under controlled conditions. These microorganisms enhance nutrient cycling, improve soil structure, suppress harmful pathogens, and promote plant growth naturally. The prepared EMO fertilizer is applied to selected crops to assess its effect on soil fertility and plant growth parameters, including seed germination, plant height, leaf number, and yield. Soil quality analysis is also carried out to evaluate changes in organic matter content and microbial activity. The production process is simple, cost-effective, and suitable for small-scale farmers within a limited budget. The results of this study demonstrate that EMO fertilizer improves crop productivity while maintaining environmental safety. This project highlights the significant role of environmental microbiology in promoting sustainable agriculture and reducing dependence on synthetic fertilizers.

Keywords: EMO (Effective Microorganism–based Organic) soil fertility and plant growth parameters, including seed germination, plant height, leaf number, and yield.

S4-OP20

Isolation of Pectin from *Brassica oleracea* (Broccoli stem) for the Synthesis of Bioplastic Films for Commercial and Food Packaging Purposes

Preetham Sai K[1], M. Bavanilatha[1]*, V. Ganesh Kumar[2]
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
[2] Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
***Corresponding authors:** bavanilatha.biotech@sathyabama.ac.in

Abstract

The global dependency on petroleum-based plastics has resulted in serious environmental concerns, including soil contamination, marine pollution, and climate change. To overcome this challenge, bio-polymer based alternatives derived from renewable resources can be used as alternatives. Pectin isolated from Broccoli stem (Brassica oleracea), an underutilised agricultural by-product, is explored for the fabrication of sustainable bioplastic film with potential applications in smart food packaging. Broccoli stem pectin was selected due to its

 ISBN: 978-93-48577-14-6

high yield and extensive gelling properties, offering a promising substitute to conventional sources such as citrus peels and apple pomace. The extracted pectin will be incorporated into bioplastic films with functional properties, including anti-fungal, anti-microbial, and pH-responsive behaviour, enabling the films to act as intelligent indicators of food spoilage. Further, the mechanical strength and flexibility of the films will be optimised to fabricate biodegradable carry bags, addressing the need for durable yet eco-friendly alternatives to single-use plastics. It also aligns with the principles of the circular economy by valorising agricultural waste into high-value products. Expected outcomes include the development of smart bioplastic packaging with superior mechanical properties, prolonged shelf life and minimised environmental footprint.

Keywords: Bioplastic, Pectin, Broccoli stem, Smart food packaging, Antimicrobial film, pH-responsive film, Biodegradable bags, Sustainable materials

S4-OP21

Sensor-Based Precision Horticulture for Sustainable Management of Perennial Fruit Crops

Abinaya Karunakaran[1]*, Gaurav Meena[1], Prtyasha Acharya[1], Afiya Rajan Selin[2]

[1]Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India

[2]Department of Horticulture, Central University of Tamil Nadu, Thiruvarur – 610001, Tamil Nadu, India

Corresponding email: abinayakarunakaran12@gmail.com

Abstract

Perennial fruit crops are the foundation of horticulture production systems worldwide but, their lengthy development cycles and high resource requirements provide serious obstacles to sustainability in the face of climate change. By facilitating real-time monitoring and site-specific decision-making, sensor-based precision horticulture has become a cutting-edge strategy to maximize orchard management. In order to produce continuous data on soil–plant–atmosphere interactions, this method combines cutting-edge sensors, such as soil moisture and nutrient sensors, canopy and fruit growth sensors, microclimate sensors, remote sensing, and Internet of Things (IoT)-enabled platforms. In perennial fruit orchards, the use of sensor-based technologies enables accurate irrigation scheduling, focused nutrition management, and early identification of biotic and abiotic stressors. By supplying inputs based on actual crop needs, precision horticulture reduces needless water use, nutrient losses, and chemical inputs while maintaining output and fruit quality. Sensor-driven management practices support improved root-zone health, enhanced soil microbial activity, and long-term orchard sustainability. Additionally, the integration of sensor data with predictive models and decision-support systems enhances farm-level resilience and efficiency by enabling timely interventions and adaptive management strategies. Sensor-based precision horticulture is very consistent with sustainable horticultural goals since it promotes resource efficiency, reduces environmental impact, and supports climate-smart orchard systems. This strategy directly supports the Sustainable Development Goals of the UN, especially SDG-2 (zero hunger), SDG-6 (clean water and sanitation), and SDG-12 (responsible consumption and production). All things considered, sensor-based precision horticulture offers a viable route to long-term production and sustainable management of perennial fruit crops in contemporary horticultural systems.

 ISBN: 978-93-48577-14-6

Keywords: Sensor-based precision horticulture, Perennial fruit crops, Sustainable orchard management, Smart farming technologies, Resource-use efficiency

S4-OP22

Efficient Prebiotic to Enhance the Growth of Probiotic

Mangala Lakshmi Ragavan[1], Sathish Rengaraj[2], Buvaneswari[2], Rajalakshmi[2], Krupakar Parthasarathy[1]*

[1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore – 641028, Tamil Nadu, India

Abstract

Probiotics play a significant role in maintaining host health through multiple mechanisms. These microorganisms can produce beneficial bioactive compounds, such as polysaccharides, antimicrobial proteins, short-chain fatty acids, enzymes, and vitamins. The population of gut microbiota is mainly associated with the host' s dietary pattern. Legumes naturally contain carbohydrates with potential as prebiotic sources. The consumption of dietary supplements, such as millets, legumes, and pulses, enhances the growth and performance of probiotics. This study focused on selecting effective prebiotics to enhance the therapeutic applications of probiotics. We have isolated bacteria from food sources and characterized them as potential probiotics using in vitro assays, viz., acid and bile salt tolerance, GIT tolerance. An efficient prebiotic medium was selected based on the growth of isolated probiotic bacteria. Further, the medium was used to produce secondary metabolites for therapeutic applications.

Keywords: Probiotics, Prebiotics, Postbiotics, Short-chain fatty acids, Polysaccharides

S4-OP23

Enhancing the Growth of Commensal Gut Bacteria Using Dietary Supplements to Increase Lactase Production: A Statistical Approach

Mangala Lakshmi Ragavan[1], Madhan Muthukumar[2], Janaranjani[2], Rajalakshmi[2], Krupakar Parthasarathy[1]*

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore – 641028, Tamil Nadu, India

Abstract

Milk consumption is common among consumers, and it is an essential component of many dairy products. However, many people have lactose intolerance due to lactase enzyme deficiency. The gut microbiota has the ability to produce lactase, which frequently ferments lactose in the intestine. Bacteria isolated from human origin and tested for various tolerance assays. The isolate was inoculated on millet-based medium and incubated at 37℃ for 24 to 48 h. Screening of millets was done using Plackett Burman Design (PBD). The substrate ortho-nitrophenyl-ß-galactoside (ONPG) was used to measure the lactase activity. The isolate was identified as Bacillus licheniformis. It shows good survival under simulated GIT conditions (pH-5, 0.8% bile salt, 4% NaCl, 3 mg/ml pepsin, and 1 mg /ml pancreatin). PBD results indicate that Echinochloa esculenta has more positive effects on B. licheniformis

 ISBN: 978-93-48577-14-6

growth rate than others. B. licheniformis specific growth rate was increased up to 1.36 Log CFU/ml at 30 th h by utilizing 95% of substrate (E. esculenta). In addition, it shows significant lactase activity (52 U/ml) under optimized conditions. Thus, E. esculenta consumption may improve lactose digestion by enhancing the population of gut microbiota, especially in people who have lactose intolerance.

Keywords: Millet, probiotics, prebiotics, lactase, Plackett Burman Design

S4-OP24

Potential Anti-Infective Properties of *Streptomyces* sp. C27 Isolated from the Forest Ecosystem, India

Vijayalakshmi Ganesan, Radhakrishnan Manikkam

Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Abstract

The hunt for new and potent antimicrobial metabolites from biological niches is imperative due to the sharp rise in the worldwide burden of antibiotic resistance and the corresponding fall in the identification of new antimicrobial compounds. Additionally, the prevalence and death rate from diseases caused by priority pathogens like Mycobacterium tuberculosis have been steadily rising on a global scale. In light of this, the current work attempts to explore actinobacteria's antimycobacterial capabilities. because Actinobacteria are known to produce a lot of antibiotics. Totally seventeen actinobacterial strains were isolated from Chickmagaluru, Karnataka, and evaluated for antimicrobial activity against human, poultry, and fish pathogens, as well as fungi. Screening revealed that 50% of the strains exhibited activity against at least one pathogen. Notably, strain C27 demonstrated potent antimicrobial properties, producing antagonistic metabolites through solid-state fermentation from day 2. The crude ethyl acetate extract of C27 showed remarkable inhibition (94%) against Mycobacterium tuberculosis H37Rv and multidrug-resistant M. tuberculosis and is found to be Streptomyces sp.. These findings highlight the potential of actinobacteria from this region as sources of novel antimicrobial compounds, particularly against tuberculosis. Further investigation is warranted to explore the therapeutic potential of strain C27 and its metabolites.

Keywords: Actinobacteria, forest ecosystem, anti-microbial, anti- tuberculosis, Streptomyces.

S4-OP25

Combined Effect of Biochar and Beneficial Microorganisms on Soil Health and Plant Growth

J. Blessy, Susan Caroline

Department of Microbiology, C.S.I. Ewart Women's Christian College, Melrosapuram – 603204, Tamil Nadu, India

Abstract

Soil degradation and excessive use of chemical fertilizers have reduced soil fertility and crop productivity in many agricultural systems. Sustainable and eco- friendly approaches are needed to improve soil physical, chemical, and biological properties. Beneficial microorganisms such as plant growth-promoting rhizobacteria (PGPR) and mycorrhizal fungi play an important role in nutrient mobilization, disease suppression, and enhancement of plant growth.This study focuses on the combined effect of biochar and beneficial

 ISBN: 978-93-48577-14-6

microorganisms on soil health and plant growth . The experiment evaluates the individual and combined application of biochar and selected beneficial microorganisms on soil parameters such as pH, organic carbon content, nutrient availability, and microbial activity. Plant growth parameters including seed germination, plant height, biomass production, and root development are also assessed. Biochar provides a favorable habitat for microorganisms by improving soil structure, moisture retention, and nutrient adsorption, while beneficial microbes enhance nutrient uptake and stimulate plant growth through biological processes. The combined application of biochar and beneficial microorganisms is expected to show a synergistic effect, resulting in improved soil fertility and enhanced plant growth compared to individual treatments. This integrated approach offers a sustainable strategy for improving agricultural productivity while reducing dependence on chemical inputs. The findings of this study may contribute to the development of environmentally friendly soil management practices for sustainable agriculture.

S4-OP26

Bioprospecting of Insect Nests: A New Pathway for Antibiotics

A. Aruna, and V. Gopikrishnan

Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Abstract

In recent years searching for new antibiotics has increased worldwide because of the serious problem of antibiotic resistance among the microbes. The need for new antibiotics has been met largely by the semi synthetic tailoring of natural product scaffolds discovered in the middle of the twentieth century. Bioprospecting is the search and discovery of natural products that have a useful pharmacological and biological application. Chemical ecology studies are needed to better understand the relationships between species and how the production of secondary metabolites influences these associations. The symbiotic relationship between insects, fungi, actinobacteria and bacteria has been investigated and new findings in the area have shown how these relationships have evolved and which substances are involved in this co-operation. It is known that ants, termites, and bees have a symbiotic relationship with fungi and actinobacteria, which produce products of potential pharmacological or agricultural importance. The search for new natural products in this area is not only to find potential antibiotics, but to evaluate if these substances have other biological effects and activities, such as anticancer, antileishmania and antichagasic. The need for new strategies to obtain antibiotics is urgent, since resistance is one of the main factors of mortality in patients treated with this type of medication. Analyzing this symbiotic relationship among living beings, it seems to be an innovative strategy to seek new medicines. Consequently, insect nest material is being investigated as a new source of novel antimicrobial producing microbes, which could be harnessed for therapeutic potential.

Keywords: Antileishmania, Antichagasic, Anticancer

 ISBN: 978-93-48577-14-6

S4-OP27

Titanium Dioxide Nanoparticles by *Bacillus* Species: A Significant Connective Nanoproduct for Antibacterial, Antibiofilm, Antioxidant, Antimicrofouling, and Anticorrosion Properties

Bhuvaneshwari Parthasarathy[1], Radhakrishnan Manikkam[2], Ayyasamy Pudukkadu Munusamy[1]*

[1] Department of Microbiology, Periyar University, Salem – 636011, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: pmayyasamy@gmai.com

Abstract

The rise in industrialization, urbanization and anthropogenic activities accelerates unsafe water with contaminants and also creating corrosion, fouling leading to economic losses. The drastic attraction towards nanotechnology was due to its diverse high surface area-volume, high stability, non-toxicity, optical, photocatalytic, self-cleaning property and in enhancement of corrosion protection NPs serve as environmental clean-up agent. Titanium dioxide (TiO 2) nanoparticles (NPs) biosynthesized by Bacillus .sp was characterized by UV-spectrum with a absorption peak at 362 nm, FTIR attributing the corresponding functional groups that bind metal surface with bacterial agents at 679 cm -1 , XRD analysis demonstrated its rutile and anatase forms highlighting the crystalline nature, SEM images conformed the spherical shape of NPs defining its sizes to be of 66 – 70 nm and EDAX mapping depicted the Ti and O elemental contribution in the TiO 2 NPs. Biosynthesized TiO 2 NPs also exhibited pathogenic disinfection against MDR and XDR (E. coli (B1), Staphylococcus aureus (B2), Klebsiella pneumonia (B3), Enterococcus faecalis (B4), Pseudomonas aeruginosa (B5) with maximum growth inhibition among them B2 and B5 as a strong biofilm producers were efficiently inhibited by 100 µg/mL of TiO 2 they also showed good anti-oxidant property. TiO 2 with stabilizing agent like PVA acted as a coating material over steel sheets which protected biocorrosive at 80 – 85% and corrosion rate at 95 % in tap water, 75% in acidic condition and 80% in alkaline condition. These CR was analyzed by weight-loss experiment where the mass loss was reduced with the protective layer of TiO 2 . The TiO 2 NPs also outperformed as vibrant larvicidal agent where at 100 µg/mL it caused structural deformities and cellular damage, the mortality rate increased with the increase in TiO 2 concentrations. TiO 2 NPs attained IC 50 values of 57 and 29 µg/mL at 24 and 48 hours in the 4 th instar larvae of Aedes mosquito.

Keywords: Titanium dioxide; biofilm; corrosion; microfouling; larvicidal

S4-OP28

Studies on Synthesis and Characterization of Biopigments Produced by an Aerobic Bacterium Isolated from Rhizosphere Soil

S. Sona[1], K. Midhunkumar[1], P. M. Ayyasamy[1]*

[1] Department of Microbiology, Periyar University, Salem – 636011, Tamil Nadu, India

Corresponding author: pmayyasamy@gmail.com

Abstract

Synthetic pigments can be produced artificially using coloured substance and manufactured through chemical process. The synthetic pigments have long shelf life but environmentally toxic, contains heavy metals and prolonged exposure can cause many health hazards.

 ISBN: 978-93-48577-14-6

Bacterial pigments are sustainable alternative to synthetic dyes applied as colourants in food industry, pharmaceutical and dyes in textiles because of their eco- friendly production and bioactive properties. It also a colourful compound produced by bacteria, serving roles from UV protection to signalling and are categorized as intracellular or extracellular. Carotenoids are natural, lipid-soluble pigments responsible for yellow, orange and red colours in many organisms, including bacteria, plants, algae and fungi. The bacterial pigments are classified as carotenoids, melanin, phenazines and prodigiosin etc. The bacterial bio-pigment various applications in food industry, cosmetics, pharmaceutical, non-toxic and environmentally friendly. In the present study, pigment producing bacterial strains were isolated from rhizosphere soil samples of agricultural area. A pioneering bio-pigment producing bacterial strain was screened and identified as Bacillus sp. The extraction of bio- pigments from bacterial strain were done using solvent such as methanol and acetone and extracted the pigment was identified as carotenoids. The further study includes characterization of crude pigment by GC-MS, TLC and FTIR analysis. On application studies the bio-pigment were used in textile dyeing, food colouring agent and preservatives etc.

Keywords: Synthetic pigment, Bio-pigment, Carotenoids, GC-MS and FTIR.

S4-OP29

Tumor Spheroids and Organoid Models for Mechanistic Evaluation of Nano-Derived Bioactives in Cancer Drug Screening

T. Thangam, Krupakar Parthasarathy*, Subha Prakashini R., Hemamalani A. U.

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: cddd@sathyabama.ac.in,

Abstract

Three-dimensional (3D) tumor models, such as spheroids and organoids, represent a paradigm shift in drug testing using in vitro oncology by meticulously replicating the complexity and the extracellular matrix (ECM) cues of the original tumor microenvironment. By mimicking the physiological gradients, such as hypoxia induction and nutrient diffusion, these models serve as an excellent platform for the evaluation of the efficacy of nano-derived bioactive compounds. Unlike traditional monolayers, the 3D cell culture models exhibit half minimal inhibitory concentrations (IC50) which align closely with the clinical outcomes, providing significant predictive data for therapeutic potential. Furthermore, the researchers use organoid models to study tissue development and toxicity through their advanced imaging and molecular profiling capabilities. The path to high-throughput screening becomes obstructed because of ongoing difficulties that impact both scalability, reproducibility, and standardization processes. The development of these 3D models needs refinement to create an improved research tool that bridges the translational gap, which will enhance the effectiveness of nano-based anticancer drug testing. The review emphasizes that the heterogeneous distribution of nanoparticles through dense three-dimensional models leads to drug resistance, which necessitates the researchers to study both penetration depth and spatial assessment methods to understand the effects of hypoxia on treatment resistance. These models provide more than basic screening capabilities because they enable researchers to study the detailed biological processes that lead to apoptosis and reactive oxygen species (ROS) production and the metabolic changes caused by nano-bioactive substances.

ISBN: 978-93-48577-14-6

Keywords: 3D cell culture; Tumor spheroids; Organoids; Nano-bioactives; Cancer screening; Drug resistance; IC_{50} values

S4-OP30

Bioremediation Potential and Mechanistic Response of Indigenous *Chlorella* sp. to Quaternary Heavy Metal Stress Isolated from an Industrially Polluted Site

Anandhi Anandaraj, Rajasekar Thirunavukkarasu*

Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: microraja09@gmail.com

Abstract

The study investigated the synergistic toxicity and phycoremediation efficiency of an indigenous, heavy-metal-tolerant microalgae (*Chlorella sp.)* isolated from an industrial effluent-impacted site. This research evaluated the microalga's resilience against a quaternary master mix of chromium (Cr), lead (Pb), copper (Cu), and zinc (Zn). Microalgal cultures were subjected to varying concentrations ranging from 5 to 50 ppm over a 72-hour experimental duration. Toxicity was precisely quantified by determining the half maximal Concentration (EC_{50}) through growth inhibition analysis, while physiological stress was monitored via the spectrophotometric determination of chlorophyll a and b content. To capture the kinetics of the remediation process, metal removal efficiency was evaluated at 24-hour intervals using Atomic Absorption Spectroscopy (AAS). Comprehensive mechanistic insights into the interaction between multi-metal ions and the algal cell wall were obtained through Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy with Energy Dispersive X-ray analysis (SEM-EDX). FTIR spectra confirmed that carboxyl and hydroxyl functional groups served as the primary binding sites for biosorption. Furthermore, SEM-EDX mapping provided visual evidence of significant surface morphological damage and localized metal deposition, highlighting the robust yet strained response of the *Chlorella* sp. to multi-metal toxicity.

Keywords: Phycoremediation, Quaternary heavy metals, indigenous *Chlorella sp*, Ec50, FTIR, SEM-EDX, AAS

S4-OP31

Role of Indigenous Bacteria in Detoxification of Pesticides and Heavy Metal Contaminants

Ramesh Kumar Ashwin[1], V. Gopikrishnan[1], Radhakrishnan Manikkam[1], Sakthi Dharmalingam[1], Nathiya Murugan[2]

[1]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2]Departmrnt of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: gopivktk@gmail.com

Abstract

Bioprospecting of associated bacteria from natural ecosystems offers an eco-friendly strategy for addressing chemical contamination and enhancing agricultural sustainability. In the present study, bacterial strains VCIB11 and CEC5 isolated from forest soil and earthworm casts were evaluated for their ability to reduce pesticide residues and chromium

 ISBN: 978-93-48577-14-6

stress, along with their plant growth–promoting bacterial (PGPB) properties. PF was maintained as the untreated control, while A1 and N2 represented bacterially treated samples. HPLC/LC–MS analysis of the control sample PF showed a dominant parent compound peak at RT 3.098 min (20.8% relative area) and several persistent peaks between RT 9.56–16.63 min, indicating chemically stable residues. In contrast, treated samples exhibited pronounced chromatographic alterations. Sample A1 showed major peaks at RT 2.18 min (12.3%), 2.77 min (11.1%), 3.17 min (11.3%), and 4.39 min (9.4%), while N2 displayed transformed peaks at RT 2.20 min (14.1%), 3.17 min (8.7%), 4.65 min (7.4%), and 12.95 min (10.1%), reflecting microbial transformation and reduction of late-eluting parent compounds. GC–MS analysis further confirmed biodegradation through enrichment of low-molecular-weight fragments at m/z 57, 75, 98, 117, and 144 in treated samples, which were minimal in the control. Both strains also demonstrated effective chromium reduction, indicating tolerance and detoxification capability under metal stress. In addition, VCIB11 and CEC5 exhibited key PGPB traits, including nutrient mobilization and growth-supporting activities, highlighting their multifunctional role. Overall, the combined evidence confirms the potential of bacteria from forest soil and earthworm casts as efficient bioagents for pesticide remediation, chromium reduction, and sustainable agricultural applications.

Keywords: Associated bacteria, Bioremediation, Pesticide degradation, Chromium reduction, Plant growth–promoting bacteria, Sustainable agriculture**.**

S4-OP32

The Fish Gut Microbiome and Probiotics in Aquaculture: Mechanisms, Challenges, and Future Perspectives

Karthik Prakash M. P[1], Gopikrishnan Venugopal[1]*, Boomika Venkatesan[2], Safrina Power Singh[2], Sanjivkumar Muthusamy[3], Radhakrishnan Manikkam[1]

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: gopivktk@gmail.com

Abstract

Aquaculture represents a rapidly expanding sector in global food production; however, its sustainability faces significant challenges due to disease outbreaks, environmental stressors, and the growing prevalence of antimicrobial resistance. The gut microbiome of fish represents a dynamic and intricately complex ecosystem, crucial for host nutrition, immune function, metabolic regulation, and resistance to diseases. This review consolidates more than twenty years of investigation to emphasise the taxonomic and functional diversity of fish gut microbial communities and their significance for sustainable aquaculture. This study investigates the fundamental ecological and host-related elements that influence the formation of microbiomes, such as dietary habits, water quality, salinity levels, temperature variations, developmental stages, and genetic factors of the host. Special attention is directed towards the applications of probiotics and the mechanisms through which they operate, including the competitive exclusion of pathogens, the production of antimicrobial metabolites, immune modulation, and the enhancement of nutrient assimilation. We contend that it is the functional traits, rather than solely the taxonomic identity, that play a crucial role in determining probiotic efficacy and the stability of the microbiome over time. Recent

 ISBN: 978-93-48577-14-6

advancements in high-throughput sequencing, metagenomics, metabolomics, and the integration of multiomics have significantly enhanced our comprehension of host–microbe interactions. Innovative technologies such as synthetic biology, CRISPR-based microbiome engineering, and artificial intelligence-driven predictive modelling are explored as valuable instruments for creating precision-guided probiotic strategies. Nonetheless, significant obstacles persist, especially in terms of strain specificity, ecological compatibility, regulatory alignment, and the long-term validation within commercial farming environments. In summary, interventions centred around the microbiome signify a groundbreaking approach for sustainable aquaculture, integrating molecular advancements with ecological responsibility, One Health concepts, and the assurance of global food security.

Keywords: Fish gut microbiome; Probiotics; Aquaculture; Metagenomics; Microbiome engineering; Sustainable aquaculture

S4-OP33

Biosurfactant-Assisted Decolorization and Detoxification of Synthetic Dyes

Kishore Kumar Annamalai[1], Radhakrishnan Manikkam[1]*, Manigundan Kaari[2], Eshwarnath Vallipuram Sudhakar[1], Sergio Leiva[3]

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2] Dong-A University, Busan, South Korea

[3] Institute of Biochemistry and Microbiology, Universidad Austral de Chile, Valdivia, Chile

Corresponding author: mrkactinos@gmail.com

Abstract

The discharge of synthetic dyes from industrial activities represents a major environmental concern due to their toxicity, persistence, and resistance to conventional treatment methods. In the present study, two biosurfactant-producing bacterial strains, KC15 and KC23, identified as *Pseudomonas* spp., were evaluated for their ability to tolerate, decolorize, and detoxify commonly used synthetic dyes, namely malachite green (MG), methylene blue (MB), and Congo red (CR). Dye tolerance screening was initially performed using plate assays supplemented with increasing concentrations of each dye. Both strains exhibited substantial growth across all tested concentrations, indicating high tolerance and adaptability to dye-stressed conditions. Based on tolerance efficiency, batch broth degradation experiments were conducted to assess biosurfactant-assisted dye decolorization. Decolorization was monitored spectrophotometrically under optimized incubation conditions. The results revealed a maximum degradation efficiency of 94% for malachite green, followed by 74% for methylene blue and 62% for Congo red. The enhanced degradation performance is attributed to biosurfactant production, which improves dye solubility, reduces surface tension, and enhances microbial–dye interactions, facilitating effective breakdown of complex dye molecules. Variation in degradation efficiency among the dyes may be due to differences in molecular structure and susceptibility to microbial enzymatic activity. The combined dye tolerance and degradation capabilities of *Pseudomonas* strains KC15 and KC23 highlight their potential application in the bioremediation of dye-contaminated wastewater. This biosurfactant-assisted microbial approach offers an eco-friendly and sustainable alternative for reducing dye toxicity and environmental pollution.

Keywords**:** Biosurfactant, *Pseudomonas*, Dye tolerance, Dye degradation, Malachite green, Methylene blue, Congo red, Bioremediation

 ISBN: 978-93-48577-14-6

S4-OP34

Exploring Natural Reservoirs of Bioactive Compounds: Solvent-Dependent Antimicrobial and Anti-Tuberculosis Activities of Medicinal Plants

Sakthi Dharmalingam[1], Sanjeevi Prasath Sridhar[2], Radhakrishnan Manikkam[1], Ranjani Singaraj[2]

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Nanoscience and Nanotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: sanjeeviprasath.irc@sathyabama.ac.in

Abstract

Medicinal plants serve as a rich source of bioactive compounds with diverse therapeutic potential. In this study, selected natural samples Azadirachta indica (neem), Nigella sativa, Brasenia schreberi (water shield), Andrographis paniculata (nilavembu), Justicia adhatoda (aadathoda), and Abelmoschus manihot (sunset hibiscus) were investigated for their biological activities. Phytochemical extracts were prepared using methanol and hexane as solvents and evaluated for anti-tuberculosis, antimicrobial, anti-biofilm, and antioxidant properties. The methanolic extracts exhibited strong antimicrobial activity, while the hexane extracts demonstrated notable anti-tuberculosis efficacy, highlighting solvent-dependent bioactivity. Comprehensive phytochemical profiling using GC-MS and LC-MS analyses revealed a wide range of bioactive constituents, further supported by in silico molecular docking studies that elucidated potential compound target interactions. This integrated experimental and computational approach underscores the therapeutic relevance of traditional medicinal plants and their potential as promising candidates for future antimicrobial and anti-tuberculosis drug discovery.

Keywords**:** Medicinal plants; Antimicrobial activity; Anti-tuberculosis activity; In silico docking; Phytochemicals.

S4-OP35

Bioprospecting of Fish Gut–Associated Actinomycetes

Tamil Selvam Saravanan[2], Bharathi Selvaraj[1], Radhakrishnan Manikkam[2], Gopikrishnan Venugopal[2*]

[1] Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

Abstract

Oceans hosts immense, yet underexplored microbial diversity, offering remarkable opportunities for discovering novel bioactive compounds and beneficial microorganisms. Among these, marine animal–associated microbes represent a unique ecological niche, yet fish gut-associated actinobacteria remain significantly underexplored. In this study, we investigated the functional potential of actinobacteria isolated from the gut of Indian squid (*Uroteuthis duvaucelii*) and Indian mackerel (*Rastrelliger kanagurta*), focusing on their pharmaceutical, probiotic, and plant growth-promoting properties. From 39 bacterial isolates, one promising strain—designated SQA4—was isolated. SQA4 exhibited notable antimicrobial activity, producing inhibition zones of 14–16 mm against *Staphylococcus*

 ISBN: 978-93-48577-14-6

aureus and 12 mm against *Candida albicans*. Its crude ethyl acetate extract showed strong anti-tubercular activity with 31% inhibition of *Mycobacterium smegmatis* and 61% inhibition of *Mycobacterium tuberculosis* H37Rv at 200 µg/mL. The strain also demonstrated 72.5% antibiofilm inhibition against *Acinetobacter baumannii* and 62.1% antioxidant scavenging activity. Physiologically, SQA4 produced multiple hydrolytic enzymes (amylase, lipase, protease, cellulase), utilized diverse carbon and nitrogen sources, and tolerated a wide pH range (3–11). It also displayed strong PGP traits, including ammonia and acetoin production, IAA synthesis, phosphate and zinc solubilization, and nitrogen fixation. Probiotic evaluation showed positive for acid and bile tolerance, good MATH adhesion, and strong autoaggregation, coaggregation, and biofilm formation, indicating robust colonization potential. Overall, SQA4 emerges as a multifunctional marine-derived bacterium with promising applications in therapeutics, agriculture, and probiotic development.

Keywords**:** Actinobacteria, Antimicrobial, Antibiofilm, PGP (Plant-growth-promotion) and Probiotics.

S4-OP36

Exploration of Arctic Fjord Bacteria for Cold-Active Enzyme Production

Sai Mahesh Kumar S[1], Manigundan K[2], Radhakrishnan M[1]*

[1] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Dong-A University, Busan, South Korea

Corresponding Author**:** **mrkactinos@gmail.com**

Abstract

Ecosystems found in Arctic fjords are an important source of psychrophilic microorganisms that can produce cold-active enzymes with important industrial applications. This study examined the low-temperature enzymatic potential of bacterial isolates that were obtained from Kongsfjorden and Krossfjorden during the Arctic sampling campaign. Using plate-based assays incubated at 4–15 °C, a preliminary screening for amylase, protease, lipase, and cellulase activities was performed on 94 isolates, 35 of which were psychrophiles and 59 of which were mesophiles. Several psychrophilic strains demonstrated strong cold-active enzymatic capabilities, exhibiting distinct substrate-hydrolysis zones in cold environments. Shortlisted isolates with the highest activity were further evaluated using basic quantitative assays, such as temperature-dependent activity profiling and low-temperature stability assessment. Certain psychrophilic candidates demonstrated their suitability for cold-environment applications by maintaining detectable activity even at 4–10 °C. The functional potential of these enzymes was further supported by a straightforward application-oriented demonstration (cold-water substrate-degradation test). The isolates' initial phenotypic and biochemical characterisation was finished, and the next step was to identify them molecularly using 16S rRNA sequencing. The results demonstrate the great biotechnological potential and diversity of Arctic-derived bacteria for the synthesis of cold-active enzymes. This short-term study lays a solid basis for gene-level identification, targeted enzyme purification, and possible downstream uses in food processing, detergents, and environmentally friendly industrial processes.

Keywords: Cold-active enzymes; Psychrophilic bacteria; Arctic fjords; Kongsfjorden; Krossfjorden; Enzyme screening; Low-temperature biocatalysis; Hydrolytic enzymes; Industrial biotechnology; Microbial diversity

ISBN: 978-93-48577-14-6

S4-OP37

Production, Optimization, and Toxicity Assessment of a Marine-Derived Amylase from an Epiphytic *Vibrio* Isolate

Vaishnavi Thirukumaran, Gurusakthi Sri M., Rajasekar Thirunavukkarasu*
Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
*Corresponding author: microraja09@gmail.com.

Abstract

The demand for robust, marine-derived enzymes is escalating in the food and pharmaceutical sectors. Marine macroalgae serve as a rich ecological niche for epiphytic bacteria with potent enzymatic capabilities. This study aimed to isolate, optimize, and characterize amylase-producing bacteria from three diverse seaweed species and evaluate their safety for industrial application.Thirty-five bacterial isolates were obtained, of which 24 (80%) exhibited amylolytic activity. The three most potent isolates (one from each seaweed) underwent One-Factor-at-a-Time (OFAT) optimization for carbon and nitrogen sources, temperature, time, metal ions and substrate. The overall superior isolate was identified using 16S rRNA sequencing and phylogenetic analysis. The extracellular amylase was partially purified using ammonium sulphate and ethanol precipitation, with molecular weight confirmed via SDS-PAGE. Safety was evaluated through hemolysis assays (Blood agar and quantitative toxicity). Molecular identification revealed the lead isolate to be a *Vibrio* sp., with an enzyme activity of 110 U/mol after optimization. SDS-PAGE confirmed the presence of the amylase enzyme. Crucially, the isolate exhibited gamma-hemolysis on blood agar and demonstrated minimal toxicity (<5) in quantitative assays, indicating a safe metabolic profile. The findings suggest that seaweed-associated *Vibrio* sp. is promising, non-pathogenic sources of high-affinity amylase. This study provides a foundational framework for utilizing marine epiphytes as sustainable bio-factories for "green" enzyme production, bypassing the safety concerns typically associated with the *Vibrio* genus.

Keywords: Amylase, Marine macroalgae, *Vibrio sp*., Optimization, Partial purification, Hemolysis.

S4-OP38

From Biogenesis to Therapeutics: The Expanding Landscape of Selenium Nanoparticles

Blessy Cleatus[1], T. Rajasekar[2], James John[1]*
[1] Department of Medical Laboratory Technology, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Rajiv Gandhi Road, Chennai – 600119, Tamil Nadu, India
[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Rajiv Gandhi Road, Chennai – 600119, Tamil Nadu, India
Corresponding author: jamesjohn.ahs@sathyabama.ac.in

Abstract

Selenium nanoparticles (SeNPs) have emerged as a rapidly advancing class of nanomaterials due to their unique physicochemical properties, broad biomedical potential, and comparatively lower toxicity than conventional selenium compounds. Growing interest in SeNPs has led to the development of multiple synthesis strategies, including physical, chemical, and biological approaches. However, chemical routes often involve toxic reagents and high-energy requirements, limiting their compatibility with biomedical applications. In

 ISBN: 978-93-48577-14-6

contrast, biological or “green” synthesis using plants, bacteria, fungi, and other microorganisms offers an eco-friendly, cost-effective, and biocompatible alternative that produces stable, monodisperse nanoparticles enriched with natural capping biomolecules. SeNPs exhibit remarkable therapeutic properties—acting as potent antioxidants, antimicrobials, anticancer, antidiabetic, and anti-inflammatory agents—and demonstrate protective effects against heavy-metal and drug-induced toxicities. Their tunable surface chemistry, reduced systemic toxicity, and enhanced biological uptake further expand their relevance in drug delivery, diagnostics, imaging, and environmental remediation. This review provides a comprehensive overview of selenium forms, synthesis mechanisms, advances in green nanotechnology, and the biomedical applications of SeNPs, highlighting their translational potential and future prospects in nanomedicine.

Keyword: Selenium nanoparticles; biological synthesis; diagnostics; therapeutics; environmen

S4-OP39

Biosynthesis and Charecterization of Silver Nanoparticles Using Ficus Carica Leaf Extracts and Production f Nanofertilizers

R.Megala*, Nithish Kumar.R[1]

Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore

*Corresponding Author: megala.r@hicas.ac.in

Abstract

The present study focuses on the green biosynthesis of silver nanoparticles (AgNPs) using *Ficus carica* leaf extracts and their potential application in the production of nanofertilizers. Plant-mediated synthesis offers an eco-friendly, cost-effective and sustainable alternative to conventional chemical and physical methods. The aqueous leaf extract of *Ficus carica* acted as a reducing and stabilizing agent in the synthesis of AgNPs, indicated by a visible color change and confirmed through spectroscopic analysis. The synthesized nanoparticles were characterized using techniques such as UV–Visible spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), and Scanning Electron Microscopy (SEM) to determine their optical properties, functional groups, crystalline nature, size, and morphology. The AgNPs were further incorporated into fertilizer formulations to develop nanofertilizers, aiming to enhance nutrient availability and uptake efficiency in plants. The application of AgNP-based nanofertilizers demonstrates promising potential in improving plant growth while reducing nutrient losses and environmental impact. This study highlights the role of green nanotechnology in sustainable agriculture and resource-efficient fertilizer development.

Keywords

Biosynthesis, Silver nanoparticles, *Ficus carica*, Green synthesis, Characterization, Nanofertilizers, Sustainable agriculture.

 ISBN: 978-93-48577-14-6

S4-OP40

Comparative Evaluation of Bioactive Properties of Justicia adhatoda and Vitex negundo with Emphasis on Antimicrobial, Antioxidant, and Mosquito Repellent Potential

Inbaraj Selvaraj[1], Sumathi Ramanathapuram Karupannan*

[1]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamilnadu, India.

Corresponding author: sumathi.r.k@hicas.ac.in

Abstract

Medicinal plants have long been recognized as valuable sources of bioactive compounds with therapeutic and ecological significance. The present study aims to comparatively evaluate the bioactive properties of *Justicia adhatoda* and *Vitex negundo*, with special emphasis on their antimicrobial, antioxidant, and mosquito repellent potential. Plant leaves were collected, shade-dried, and subjected to aqueous extraction. The antimicrobial activity of the extracts was assessed against selected bacterial and fungal pathogens using standard agar diffusion methods. Antioxidant potential was evaluated through in vitro assays such as DPPH free radical scavenging activity and reducing power assays. Mosquito repellent efficacy was determined using laboratory-based repellency tests against common mosquito species, measuring protection time and percentage repellency.

Key Words: Justicia adhatoda, Vitex negundo Antioxidant activity, cell lines, antioxidant effect and cytotoxic effects

ISBN: 978-93-48577-14-6

ABSTRACTS – ORAL PRESENTATION (SESSION 5)

ISBN: 978-93-48577-14-6

S5 – OP1

Multitarget Therapeutic Insights into *Artocarpus heterophyllus* and *Artocarpus hirsutus* for Diabetic Foot Ulcers: A Network Pharmacology Approach

Arrun Al Rashid A[1#], Lisanth S P[1#], Rizwan Ahamed Najimudeen[2], Priya Dharshini Anbalagan[2], S Usha Nandhini[1*], Prabhakar Singh[1*]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, 600119, India.

[2] Analytics Avenue for Research and Development, Analytics Avenue LLP, Sathyabama Institute of Science and Technology – Technology Business Incubator, Chennai, Tamil Nadu, 600119, India.

*# Authors equally contributed **

Corresponding author: (usha.biotech@sathyabama.ac.in), (prabhakar.singh.bte@sathyabama.ac.in)

Abstract:

Diabetic foot ulcers (DFUs) are among the most debilitating complications of diabetes mellitus, driven by a complex interplay of chronic inflammation, oxidative stress, impaired angiogenesis, and delayed wound repair. Given the multifactorial nature of DFU pathology, therapeutic strategies capable of modulating multiple molecular targets simultaneously are highly desirable. *Artocarpus heterophyllus* and *Artocarpus hirsutus* are medicinal plants known for their antioxidant, anti-inflammatory, and wound-healing properties, yet their mechanistic roles in DFU management remain largely unexplored. In the present study, a network pharmacology-based approach was employed to elucidate the potential molecular mechanisms of these two *Artocarpus* species against DFUs. Bioactive compounds were screened based on pharmacokinetic parameters, and their putative targets were predicted using established databases. Disease-associated targets related to DFUs were retrieved and intersected with compound targets to identify common genes. Protein–protein interaction network analysis highlighted key hub genes, while Gene Ontology and Kyoto Encyclopedia of Genes and Genomes pathway enrichment analyses revealed significant involvement of biological processes and signalling pathways associated with inflammation, angiogenesis, oxidative stress regulation, and extracellular matrix remodelling. These findings suggest that *A. heterophyllus* and *A. hirsutus* exert therapeutic effects through synergistic, multitarget, and multipathway modulation of DFU-related mechanisms. This study provides a systematic pharmacological basis supporting the potential of *Artocarpus* species as promising phytotherapeutic candidates for the management of diabetic foot ulcers, warranting further experimental validation.

Keywords: Diabetic Foot Ulcers, *Artocarpus heterophyllus*, *Artocarpus hirsutus*, Network pharmacology, Chronic inflammation

 ISBN: 978-93-48577-14-6

S5-OP2

Hybrid polymer composite scaffolds for soft tissue engineering

Dheeptha Balaji and Devi B*
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119
*Corresponding author: devibaskar90@gmail.com

Abstract

Tissue engineering is a rising field of innovation and research with the integration of multidisciplinary techniques and methods for multifunctional scaffolds and prosthetics with improved functionality and performance. Soft tissue engineering holds immense promise in regenerative medicine, offering solutions for the repair or replacement of damaged soft tissues such as skin, muscles, blood vessels, and nerves. Central to this approach is the use of scaffolds—3D structures designed to support cellular attachment, proliferation, and differentiation while mimicking the native extracellular matrix (ECM). This review outlines the progression of tissue engineering from traditional two-dimensional culture systems to advanced biomimetic scaffolds engineered for soft tissue regeneration. Key material categories are highlighted: plant- derived polymers, synthetic polymers, and hybrid composites, highlighting their respective mechanical and biological properties. Special emphasis is placed on the recent more technologically advanced innovations such as electrically conductive polymers, hydrogel-based systems, and electrospun nanofibers. While these innovations present substantial advantages, challenges such as mechanical mismatch, limited bioactivity, inadequate vascularization, and clinical translation hurdles remain. Proposed solutions include biomimetic surface modification, integration of nanostructures, controlled degradation profiles, and the use of angiogenic cues and 3D bioprinting for improved scaffold design. Furthermore, the use of sustainable and scalable plant-based materials offers an environmentally conscious pathway for large-scale production. Collectively, these insights present a comprehensive view of the current landscape and future directions of scaffold development in soft tissue engineering, aiming to bridge the gap between laboratory research and clinical application.

Keywords: tissue engineering, hybrid polymer scaffold, plant-derived polymer, cartilage tissue engineering, hydrogel-based scaffold

S5 – OP 3

Impact of per- and polyfluoroalkyl substances (PFAS) on marine microalgae

Hibah Afsheen[1], Inbathamizh, L [1]. Anaswara, A.R [2]. Dinesh, S [3]. Inbakandan, D [2] and Kumar, C [2*]
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai 119.
[2]National Facility for Coastal & Marine Research (NFCMR) and Centre for Ocean Research (DST-FIST Sponsored centre), MoES – Earth Science &Technology Cell, Sathyabama Institute of Science and Technology, Chennai 600 119, Tamil Nadu, India.
[3]Spinco Biotech Pvt Ltd, Perungudi Industrial Estate, Chennai – 600 096
Corresponding Author: marinebiokumar@gmail.com

Abstract

The extensive use of per- and polyfluoroalkyl substances (PFAS) in numerous sectors of the economy, and the numerous sectors of the economy has resulted in their widespread and consistent existence in the environment, mainly in aquatic ecosystems, which has been

 ISBN: 978-93-48577-14-6

evaluated as having a high level of risk, despite the presence of a rational use and disposal policy for these substances. The first living organisms contaminated with PFAS are microalgae, which are the primary producers and vital parameters of the ecological state of aquatic ecosystems. The aim of this study is to review the different ecological and physiological effects of PFAS on the different species of microalgae and to initiate a discourse on this highly relevant topic. We identified microalgae species whose growth (number of cells) and photosynthetic activity were negatively affected in the presence of PFAS. The type of PFAS used (most notably, PFOA and PFOS) and the concentration and time of exposure appeared to be the most important factors governing the response. We also discuss the knowledge we have on microalgae and their capacity to take up and remove PFAS from the environment. As the interaction of microalgae with PFAS has not yet fully understood, we can conclude that it is of great ecological importance and must be studied to better understand the impact of PFAS on microalgae and to develop a sustainable method to control PFAS contamination in water bodies.

Keywords

Per- and polyfluoroalkyl substances (PFAS), Microalgae, Biosorption, Aquatic toxicity, Photosynthetic inhibition, Oxidative stress, Bioaccumulation, PFOS, PFOA, Environmental pollution.

S5 – OP 4

Harnessing Trichogramma-Based Microbial Biocontrol Strategies for Sustainable Pest Management in Warm-Season Vegetables

Prtyasha Acharya*, Gaurav Meena, Abinaya Karunakaran and Afiya Rajan Selin

Department of Horticulture, Central University of Tamil Nadu, Thiruvarur (India) – 610001

*Corresponding email: pratyashapihu143@gmail.com

Abstract

The productivity and nutrient quality of warm-season vegetables such as *okra, tomato, brinjal and chillies* had been drastically reduced with the interaction of lepidopteran pests. Excessive reliance on the chemical insecticides and pesticides caused disturbance in ecological aspects, contamination / residual pollution and also development of resistance. The use of *Trichogramma* spp., over the minute small egg parasitoid wasps, be the best microbial-based biological control agent for establishing sustainable pest management. Trichogramma cards, composed of parasitised host eggs incorporated to biodegradable substrates, providing a simple, residual-free as well as eco-friendly way for managing pests in open-field as well as covered horticulture production. The present study outlines the biological mechanism of parasitism, production aspects of cards, field efficacy of *T. chilonis* and *T. pretiosum* in warm-season vegetable ecosystems. By combining with other microbial agents such as *Bacillus subtilis* and *Beauveria bassiana* with *Trichogramma* can enhance the system resilience and pheromone-based forecasting along with digital pest monitoring. The study also supports the United Nations SDGs 2 and 15 that encourage the integrated smart and sustainable farming systems. It also emphasized on Trichogramma-based microbial biocontrol as an essential component of sustainable and climate-resilient crop protection in current production of warm season vegetable crops.

Keywords: *Trichogramma spp.,* Microbial Biocontrol, Sustainable Management, Warm-Season Vegetables, SDGs

 ISBN: 978-93-48577-14-6

S5-OP5

Quercetin as a Bioactive Additive for Sustainable Food Packaging: Extraction Strategies and Performance in Biopolymer Films

Niranjana P[1]., Rakshaiya Yadav G[1]., Sowmiya G[2]., Rajasekar Thirunavukkarasu[2]*., Ramesh Kumar V[1]*., Jesia Persis Preethi[1]*

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu,India

*Corresponding Author: microraja09@gmail.com , **jeni.christ20@gmail.com** , rameshkumar.biotech@sathyabama.ac.in

Abstract:

Quercetin has gained increasing attention as a multifunctional bioactive compound for active and intelligent food packaging due to its antioxidant, antimicrobial, and pH responsive properties. This review systematically evaluates recent advances in quercetin extraction, stabilization and incorporation into biodegradable polymer-based films, with emphasis on their relevance to sustainable packaging systems. A comparative assessment of conventional and emerging extraction techniques including maceration,microwave-assisted,ultrasound-assisted,enzyme-assisted and supercritical fluid extraction is presented, highlighting their efficiency, scalability and suitability for food grade applications. The influence of polymer matrices such as poly(vinyl alcohol),chitosan, sodium alginate, gelatin and polylactic acid on quercetin dispersion, release behaviour and functional performance is critically analysed. Particular attention is given to structure-property relationships governing mechanical strength, barrier properties, antioxidant efficacy, antimicrobial activity and colorimetric freshness indication. Application-based evidence from fruit and seafood packaging demonstrates that quercetin-functionalized films effectively retard oxidative degradation, suppress microbial proliferation and extend shelf life through controlled release mechanisms. Finally current limitations related to extraction standardization, polymer compatibility and quercetin stability are discussed and future research directions required for industrial translation are outlined.

Keywords: Quercetin, Active packaging, Intelligent packaging, Microwave-assisted extraction, Ultrasound-assisted extraction, Poly(vinyl alcohol),Chitosan, Sodium alginate, Biopolymer films

S5-OP6

Nanophosphate biofertilizers from phosphate solubilizing Bacteria via green synthesis : a review

Shiv Santhose S, Siddharth Kannan, Kavi Praba A, Indumathi S M

Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Tamil Nadu, 600119, India

Abstract

Phosphorus is a key macronutrient required for photosynthesis, ATP-based energy transfer, nucleic acid synthesis, and cell signaling. However, the majority of soil phosphorus remains complexed into insoluble complexes, particularly calcium, iron, and aluminum phosphates, thus forming a major limitation for crop growth. Applications of chemical phosphate fertilizers

 ISBN: 978-93-48577-14-6

are widely done. However, their nutrient use efficiency has been very low since a large amount of applied P gets rapidly fixed into the soil, which causes environmental pollution and has resulted in eutrophication, soil degradation, and escalation in farming costs. Phosphatesolubilizing bacteria are an eco-friendly alternative that solubilize insoluble phosphorus into plant-available forms through the secretion of organic acids, activity of phosphatases, proton extrusion, and through Fe^{3+} chelation by the release of siderophores. Certain genera like Bacillus, Pseudomonas, Rhizobium, and Enterobacter are highly effective in enhancing P uptake, root development, and crop productivity. Green synthesis of nanophosphate fertilizers using PSB represents the recent development. Herein, microbes have been used as natural nanofactories to produce phosphate nanoparticles from enzymatic action and functional groups on the microbial cell surface by excluding the toxic chemicals. Such a nanophosphate biofertilizer presents superior nutrient use efficiency, improves the soil enzymatic activities, enhances the tolerance of plants against stresses, and minimizes the loss of P by runoff or leaching. Thus, PSB-mediated nanophosphates represent a sustainable, cost-effective strategy for improving agricultural productivity.

Keywords: Phosphate-solubilizing bacteria (PSB); Nanophosphates; Green synthesis; Bio-nanofertilizers; Sustainable agriculture; Soil fertility; Abiotic stress tolerance; Microbial biotechnology; Environmental sustainability.

S5-OP7

Network Pharmacology and In Silico Evaluation of Anti-Amyloid Phytochemicals: A Comprehensive Review

M S Sowmya Narayan, Rean Vergis Manu, S Usha Nandhini, L Inbathamizh
Department of Biotechnology, Sathyabama Institute of Science and Technology, Tamil Nadu, 600119, India

Abstract

Amyloid-β (Aβ) aggregation represents a central pathological mechanism in Alzheimer's disease (AD), where misfolded Aβ peptides accumulate as soluble oligomers and fibrillary plaques that disrupt synaptic function, induce neuroinflammation, and accelerate neuronal loss (Hampel et al., 2021). Despite the development of Aβ-targeting monoclonal antibodies and secretase inhibitors, clinical benefits remain limited. These therapies often fail to neutralize highly toxic soluble oligomers, show inconsistent blood–brain barrier penetration, and do not fully address the multifactorial nature of AD, which involves concurrent tauopathy, oxidative stress, mitochondrial dysfunction, and inflammatory signaling (Tolar et al., 2020; Tolar et al., 2021). Such limitations highlight the need for multi-target, low-toxicity therapeutic candidates capable of modulating multiple interconnected neurodegenerative pathways. Computational approaches have increasingly enabled the identification of phytochemicals with strong anti-amyloid potential. Molecular docking studies conducted between 2018 and 2025 consistently demonstrate that flavonoids (such as quercetin, luteolin, myricetin), phenolic acids, and terpenoids show significant binding affinities toward key AD-associated targets, including Aβ fibrils, BACE1, acetylcholinesterase (AChE), and tau-associated kinases. Representative studies report binding energies typically ranging from –6.0 to –8.5 kcal/mol, with spice-derived compounds showing strong inhibitory potential against AChE, BuChE, and related targets (Alom et al., 2023). Network pharmacology analyses further reveal convergent modulation of high-degree proteins such as APP, AChE, MAPK14, STAT3, and ESR1, suggesting broad pathway-level influence on amyloid processing, cholinergic

ISBN: 978-93-48577-14-6

transmission, oxidative stress, and apoptosis. ADMET analyses for many top scoring compounds support favorable drug-likeness, including predicted blood–brain barrier permeability, acceptable gastrointestinal absorption, and low toxicity. Complementary molecular dynamics simulations confirm the structural stability of these ligand–target complexes, reinforcing their potential as CNS-active lead scaffolds. Overall, integrated computational evidence highlights phytochemicals as promising multi-target modulators capable of influencing several pathways implicated in amyloidogenesis and neurodegeneration. This synthesis underscores the growing value of molecular docking, network pharmacology, and ADMET-driven workflows in advancing natural compound based therapeutic discovery for Alzheimer's disease.

Key words: Alzheimer's disease, Amyloid-β, Phytochemicals, Molecular docking, Network pharmacology, ADMET, Tau, Neuroprotective agents

S5- OP8

Comparative gut microbiome dysbiosis and probiotic signatures in inflammatory and metabolic disorders using IDS and MCI metrics

Varsha.R and Dr.H Jemmy Christy
Department of Bioinformatics, Sathyabama Institute of Science and Technology, Chennai – 600119
Corresponding author: bioinfohod@sathyabama.ac.in

Abstract

The human gut microbiome plays a crucial role in maintaining immune and metabolic homeostasis. Alterations in microbial composition, known as gut dysbiosis, have been strongly associated with chronic inflammatory and metabolic disorders. In this study, we investigate gut microbiome alterations in two disease conditions—Inflammatory Bowel Disease (IBD) and Non-Alcoholic Fatty Liver Disease (NAFLD)—with a focus on microbial diversity, dysbiosis patterns, and probiotic-associated taxa. Publicly available human gut microbiota datasets were retrieved from established microbiome data repositories. Samples were categorized based on disease condition and analyzed using diversity-based metrics, including Local Diversity Score (LDS) and Microbial Community Index (MCI), to assess microbial imbalance and community disruption. Comparative analysis was performed to identify common bacterial taxa contributing to dysbiosis across both disease conditions, as well as beneficial probiotic-associated bacteria showing reduced abundance.Preliminary results indicate overlapping dysbiotic signatures between IBD and NAFLD, supporting the concept of a gut–liver–inflammation axis. Reduced microbial diversity and altered abundance of key commensal bacteria were observed, highlighting potential targets for probiotic-based therapeutic strategies. The application of LDS and MCI scores provided a quantitative framework for evaluating microbiome imbalance across inflammatory and metabolic diseases. This study demonstrates the utility of integrative microbiome analysis and diversity metrics in understanding disease-associated gut dysbiosis and provides a foundation for future investigations into probiotic interventions and microbiome-driven diagnostics.

Keywords: Gut microbiome, Dysbiosis, Probiotics, IBD, NAFLD, LDS, MCI, Human gut microbiota

 ISBN: 978-93-48577-14-6

S5-OP9

Selenium based nano particle: synthesis, application and advance in pah removal

Vijayan P R*, Jasper Pearlson Selvakumar D, D Venkatesan
Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119

Abstract

Every day, industries release large amounts of wastewater filled with harmful heavy metals, which don't break down easily and can pollute rivers, groundwater and may risk for ecosystems and human health. Current treatment methods often fall short. We need efficient materials like selenium nanoparticles that can trap and remove heavy metals like PAH. This work aims to synthesize selenium Nanoparticles with enhanced surface area, porosity and structural stability tailored for heavy metal degradation, and to assess the recyclability and environmental safety of the developed selenium nanoparticles for potential use in real wastewater treatment applications. Selenium nanoparticles offer high surface area and tunable structure for effective heavy metal removal. Incorporating selenium nanoparticles enhances the selenium nanoparticles efficiency, stability, and performance. The methodology involves selenium nanoparticles synthesis using chemical reduction methods, and to characterize them using techniques like FTIR, SEM, XRD and EDS to understand their physical and chemical properties. The results show that synthesized MOF is 94% effective in removal of heavy metal for a range of 450-550 ppm concentration with catalyst dosage in the range of 1-6g/L carried out at 40-60˚C temperature. Reusability and low metal leaching offer long-term environmental safety making the product suitable for real wastewater treatment applications. These findings indicate that the synthesized selenium nanoparticles functions effectively under the specified environmental conditions, giving reliable degradation outcomes across pH, temperature and concentration range.

Keywords: Sustainable, Catalyst, Recyclability, Reusability.

S5-OP10

Smart Wound-Healing Scaffolds Based on Moringa for MRSA-Infected Diabetic Ulcers

Raghul Rajah S and Devi Baskar*
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai. Tamil Nadu, India.
*Corresponding Author Mail: devibaskar90@gmail.com

Abstract

Diabetic foot ulcers (DFUs) represent a major global health challenge, largely due to persistent bacterial biofilm formation and the increasing prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) infections. Conventional therapeutic approaches often fall short, failing to effectively address multidrug resistance and impaired tissue regeneration, thereby highlighting the urgent need for smart, multifunctional wound-care systems. This review explores an innovative dual-action platform based on *Moringa*-derived smart scaffolds designed for the targeted management of MRSA-infected DFUs. The therapeutic efficacy of this system stems from the rich phytochemical composition of *Moringa oleifera*, which exhibits potent antimicrobial, antioxidant, and pro-healing properties. To overcome the limitations associated with crude plant extracts—such as chemical instability and low bioavailability—these bioactive compounds are strategically encapsulated within poly(lactic-co-glycolic acid) (PLGA) nanoparticles. The nanoparticles are subsequently incorporated

 ISBN: 978-93-48577-14-6

into electrospun nanofibrous scaffolds that mimic the extracellular matrix (ECM), thereby supporting cell adhesion, angiogenesis, and tissue regeneration. Moreover, this platform enables controlled, sustained, and stimuli-responsive release of *Moringa* bioactives, tailored to the acidic and reactive oxygen species (ROS)-rich microenvironment characteristic of chronic wounds. By integrating phytotherapy with nanomedicine, this smart scaffold system offers a sophisticated approach to simultaneously combat aggressive microbial infections and promote wound healing, addressing critical unmet clinical needs in DFU management.

Keywords: Diabetic foot ulcers; *Moringa oleifera*; smart scaffolds; MRSA; reactive oxygen species.

S5-OP11

Review on Mango-derived Biomaterials and Biopolymers: Emerging Applications in Biotechnology

Meghna Rathish and Kavipraba A*

Department, of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai-600119

Abstract

Mango (*Mangifera indica L.)* belongs to the category of tropical fruits which are globally accepted for their prevailing taste but acts as an underutilized naturally derived Biomaterials resource for green biotechnology. Beyond their exceptional nutritional profile by being rich in bioactive compounds like phytochemicals, flavonoids, carbohydrates, lipids and proteins available in mango peel, mango seed, mango kernel and its leaves yield out value-added biopolymers with increased potential in industrial biotechnological value. These Mango-derived biomaterials demonstrate wide properties including biocompatibility along with unique gelation ability, texture enhancing capability, nanocomposite function and thermal moldability properties which in turn positions them as eco-friendly replacements to the synthetic polymers in the next-generation applications. Mango peel pectin, mango seed kernel starch, mango pulp-leaves based cellulose and mango peel polyhydroxyalkanoates are the Biomaterials and biopolymers which are widely discussed along with the techniques of extraction, purification, molecular properties and challenges of the individual Mango-derived biomaterials. The key potential applications of the naturally derived Biomaterials are mainly Eco-friendly packaging material with enhanced barrier properties used for food industries involving biorefining of mango fruit which decreases the impact of environmental pollution. This review article primarily highlights Mango as a key source for high-performance bioactive materials and the pivotal role of biotechnology in development of sustainable materials science.

Keywords: Bioactive compounds, Biocompatibility, Biopolymers, Green Biotechnology, High-performance Bioactive Materials, Mango-derived Biomaterials, Sustainable Materials Science

 ISBN: 978-93-48577-14-6

S5-OP12

Exploring bacteria from different rice varieties for probiotic development

Sivaranjani G[1]., Bavanilatha M[1]., Kishore Kumar A[2]., Radhakrishnan M[2*]

[1]Department of biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

Corresponding Author: mrkactinos@gmail.com

Abstract

Rice, a widely consumed staple, is a potential source of beneficial microorganisms. This study explored probiotic bacteria from different rice varieties through natural fermentation. Fermented rice samples were serially diluted and plated to isolate distinct bacterial colonies for further screening. A total of twenty bacterial isolates were obtained from seven rice samples. Safety assessment using hemolytic activity revealed that five isolates exhibited hemolysis, suggesting possible pathogenicity, while the remaining fifteen isolates were non-hemolytic and considered safe for probiotic evaluation. The functional potential of the isolates was assessed through enzymatic activities, including amylase, pectinase, protease, lipase, and cellulase. Some isolates produced clear hydrolysis zones, indicating active enzyme production, while others showed no detectable activity, reflecting the functional diversity of rice-derived bacteria. Antimicrobial activity was evaluated against five pathogens: *Staphylococcus aureus, Listeria monocytogenes, Salmonella sp., Bacillus cereus, and Escherichia coli*. Select isolates demonstrated inhibitory effects, highlighting their potential for pathogen control and probiotic applications. Three promising isolates (KBC2-4, BYM-1, HG-4) were further assessed for probiotic properties, including auto-aggregation and co-aggregation, indicating their potential for gut adhesion and competitive exclusion of pathogens. Bath assays revealed metabolic activity and extracellular interactions, providing insights into their functional stability. Additionally, bile salt tolerance was evaluated at concentrations of 0.3%, 0.5%, and 1.0%, with growth monitored at 0, 6, and 24 hours. Results showed variable survival among isolates, supporting their ability to withstand gastrointestinal conditions. Overall, fermented rice serves as a promising source of safe, functionally diverse, and potentially beneficial probiotic bacteria. The selected isolates exhibit enzymatic, antimicrobial, and adhesion properties, as well as tolerance to gut-like conditions, demonstrating their suitability for further probiotic and biotechnological applications.

Key words: Probiotic, Cell surface properties, Enzymatic activity, Fermented rice, Hemolytic activity

S5-OP13

Synthesis of fish-oil biodiesel using bone meal–ZnO catalyst and its application assessment in IC engines

Palaniselvam. KG , Praveen Kumar. G ,Dr. M. Karthikeyan M. Tech., Ph.D.

Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119, India.

Abstract

The growing demand for sustainable and environmentally benign energy sources has accelerated research into biodiesel derived from renewable feedstocks. Fish oil, an abundant by-product of the seafood processing industry, represents a promising non-edible

feedstock for biodiesel production due to its high lipid content and low competition with food resources. In this study, biodiesel was synthesized from fish oil using a novel heterogeneous catalyst prepared from waste bone meal modified with zinc oxide (ZnO). The use of bone meal as a catalyst support not only adds value to biowaste but also aligns with circular economy principles. The bone meal–ZnO catalyst was synthesized through a simple impregnation and calcination process and characterized to evaluate its structural and catalytic properties. Transesterification of fish oil was carried out under optimized reaction conditions, including methanol-to-oil ratio, catalyst loading, reaction temperature, and time. The catalyst demonstrated high catalytic efficiency, resulting in improved biodiesel yield and ease of separation compared to conventional homogeneous catalysts. Furthermore, the heterogeneous nature of the catalyst enabled reusability, reducing overall process cost and environmental impact. The produced fish oil biodiesel was characterized for key fuel properties such as viscosity, density, flash point, and calorific value, which were found to be in good agreement with international biodiesel standards. Application studies indicated that the biodiesel can be effectively used as an alternative fuel in diesel engines with reduced emissions and improved combustion performance. Overall, this work highlights the potential of waste-derived bone meal ZnO catalyst as an eco-friendly and cost-effective solution for sustainable biodiesel production.

Keywords: Fish oil biodiesel, Renewable biofuels, Non-edible Feedstocks, Heterogeneous catalyst, Bone meal–ZnO catalyst, Transesterification process.

S5-OP14

Analyzing and Predicting the Agronomic Effectiveness of Biodegradable Beads Derived from Banana Pseudostem Using Data-Driven Models

Harini P, Pavithra K, D Venkatesan

Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu – 600119

Abstract

Concerns related to soil health, environmental sustainability, and long-term crop productivity have intensified due to increasing agricultural intensification and the widespread use of chemical fertilizers. In response to these challenges, the present study investigates the development and agronomic performance of biodegradable fertilizer beads produced from banana pseudostem, an abundantly available agricultural waste. The study primarily evaluates the effectiveness of these bio-based beads on tomato (*Solanum lycopersicum*) cultivation. Banana pseudostem was processed to prepare biodegradable beads intended to serve as a slow and regulated nutrient delivery system. The formulated beads were applied to tomato crops under controlled experimental conditions and compared with conventional fertilization practices. Important agronomic parameters such as plant height, number of leaves, flowering response, fruit yield, and overall crop vigour were systematically monitored. Additionally, soil response and nutrient utilization efficiency were analyzed to better understand the interaction between the biodegradable beads, soil, and plant system. The results indicated a significant improvement in tomato growth and yield parameters in plants treated with banana pseudostem-based beads, suggesting improved nutrient availability and sustained release characteristics. Along with experimental observations, preliminary data-driven analysis was employed to identify performance trends and predict agronomic effectiveness. The findings highlight the potential of banana pseudostem-derived biodegradable beads as an

ISBN: 978-93-48577-14-6

environmentally friendly alternative to synthetic fertilizers, supporting waste valorization and sustainable farming practices. Overall, this work contributes to the advancement of bio-based fertilizer technologies and aligns with global sustainability objectives.

Keywords: Biodegradable fertilizer beads; Banana pseudo-stem; Sustainable agriculture; Bio-based fertilizers; Tomato cultivation; Waste valorization

S5-OP15

Agro-waste to smart biofilm: biodegradable corn husk film enhanced with cinnamon extract

R. Sai Prathiksha

Department of Biotechnology, Hindustan Institute of Technology and Science, Padur, Kelambakkam, Chennai - 603103, Tamil Nadu, India

Abstract

Plastic pollution from conventional food packaging continues to escalate, driving the need for sustainable, biodegradable alternatives. This project investigates the development of bio-based films derived from corn husk—an abundant agro-waste resource. The films were enriched with cinnamon extract to introduce antimicrobial and antioxidant potential, while glycerol served as a plasticizer to improve flexibility and reduce brittleness. Preliminary film-casting trials helped optimize the formulation, yielding stable and flexible films suitable for basic food-packaging applications. Antimicrobial testing, performed using vancomycin as a positive control, indicated measurable inhibitory activity from the cinnamon-infused films. Additionally, titanium dioxide nanoparticles were synthesized as a prospective future enhancement for improving UV protection and mechanical strength. Overall, this work demonstrates the potential of agro-waste valorization in producing biodegradable packaging materials with promising functional and environmental benefits.

Keywords: Biodegradable food packaging; Agro-waste valorization; Corn husk biopolymer films; Cinnamon extract; Antimicrobial activity; Glycerol plasticizer; Sustainable packaging; Titanium dioxide nanoparticles.

S5-OP16

Bioextraction of Magnesium as Growth Promoting Plant Nutrient from Magnesite Mine Soil through a Laboratory Bioreactor Approach and Application on Plant Growth

M. Nandhini[1], V. Gopikrishnan[2] and P.M. Ayyasamy[1*]

[1]Department of Microbiology, Periyar University, Salem - 636011, Tamil Nadu

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai -600119, Tamil Nadu

*Emai: pmayyasamy@periyaruniversity.ac.in

Abstract

Magnesium (Mg) is an essential secondary macronutrient and a central component of the chlorophyll molecule, necessary for photosynthesis, energy metabolism, and enzyme activation. It facilitates nutrient uptake, protein synthesis and transport of carbohydrates. Deficiency typically appears on older leaves as interveinal chlorosis like yellowing due to its lacking. Magnesium also promotes the management of a plant's leafy layer, plant growth and increases yield quality. Most Mg produced globally comes from natural minerals such as dolomite and magnesite in the form of $MgCO_3$. In the magnesite mine sites, the leftover

 ISBN: 978-93-48577-14-6

wastes still contain a reliable amount of Mg. The Mg present in raw magnesite is in its carbonate form and hence it has to be mineralized to convert it into plant available soluble forms of Mg. In the present study, the mineralization of Mg has been studied in synthetic mineral salt medium supplemented with $MgCO_3$, glucose as the appropriate energy sources and 1% inoculum of *Bacillus* sp. (SMS115). To find mineralization of Mg using the bacterial strain SMS115, a combinable approach with varying concentrations of carbon source, pH, temperature and soil organic matter has been studied under laboratory conditions. The results showed that the bacterium SMS115 exhibited a significant mineralization of Mg in synthetic medium when 1% glucose as the sole carbon source and at a pH of 7. In the bioreactor study, varying nature of magnesite mine soil namely gneissic, cryptocrystalline, dolomite and calcite were subjected to mineralization of Mg with the bacterial strain of SMS115 for a period of 30 days. Among 4 different bioreactors used the extraction of inter and intra cellular Mg showed maximum which was recorded in bioreactor 1 containing cryptocrystalline. Interpreting to SEM, EDX, FTIR and XRD analysis, the mineralization of Mg in the synthetic medium was established. Further, plant growth study was carried out provided with Mg as plant macronutrient. This clearly defines that the availability of Mg can be increased through biological transformation which in turn has helped in plant growth.

Keywords: Extraction, Magnesium, Bioreactor Study, Magnesite Mine, Mineralization

S5-OP17

Treatment of dye wastewater by using hydrochar in batch process

Kishore. R, Manikandan.C, Dr.A.Annam Renita
Department of Chemical Engineering, Sathyabama institute of Science and Technology, Chennai – 600119. Tamil Nadu.

Abstract

The discharge of dye-laden wastewater from textile and allied industries poses a serious environmental threat due to its high color intensity, toxicity, and resistance to biodegradation. In this study, hydrochar, a carbon-rich material produced via hydrothermal carbonization of biomass, is investigated as a low-cost and sustainable adsorbent for the treatment of dye wastewater in a batch process. Hydrochar was synthesized under controlled hydrothermal conditions and characterized using standard physicochemical techniques to evaluate its surface morphology and functional groups. Batch adsorption experiments were carried out to examine the effects of key operational parameters such as initial dye concentration, adsorbent dosage, solution pH, contact time, and temperature on dye removal efficiency. The adsorption behavior was analyzed using kinetic and isotherm models to elucidate the mechanism of dye uptake. Results demonstrated that hydrochar exhibits high adsorption capacity and rapid dye removal, attributed to its porous structure and abundant surface functional groups. The adsorption process followed pseudo-second-order kinetics and showed good agreement with commonly applied isotherm models, indicating favorable interaction between dye molecules and hydrochar surface. The findings highlight the potential of hydrochar as an efficient, eco-friendly, and economically viable adsorbent for dye wastewater treatment. This study supports the utilization of waste-derived hydrochar in sustainable wastewater management and offers valuable insights for its application in industrial effluent treatment.

Keywords:

Hydrochar; Dye wastewater treatment; Batch adsorption; Adsorption kinetics; Adsorption isotherms; Sustainable wastewater treatment.

ISBN: 978-93-48577-14-6

ABSTRACTS – POSTER PRESENTATION

ISBN: 978-93-48577-14-6

S1-PP1

Determination of Antimicrobial activity of recombinant human IL-8 (CXCL8) against MDR *E. coli* and Methicillin - Resistant *Staphylococcus aureus*

Raghav T. S[1], Yabes P[1], Dr. M. Bavani Latha[1], Jayshree Nellore[1], D. Saravanan[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Laboratory Animal Technology and Research, Sathyabama Research Park, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India.

Corresponding Author: raghavshankar06@gmail.com

Abstract

Probiotic microorganisms are well established modulators of the gut microbiome and are known to stimulate the production of host chemokines, including interleukin-8 (IL-8/CXCL8), through epithelial and immune signalling pathways. While the role of IL-8 in neutrophil recruitment and mucosal immunity has been extensively documented, its direct antimicrobial activity remains comparatively underexplored, particularly in the context of multidrug-resistant (MDR) bacterial pathogens. In the present study, the antimicrobial activity of recombinant human IL-8 (CXCL8) was evaluated against MDR Escherichia coli and methicillin-resistant Staphylococcus aureus (MRSA). The study design was informed by existing literature demonstrating probiotic-mediated induction of IL-8, thereby linking microbial stimulation of chemokine production to a potential downstream antimicrobial function. Standardized antimicrobial susceptibility assays were employed under cell-free conditions to assess the direct inhibitory effects of CXCL8 on bacterial growth. This work experimentally examines a functional outcome of probiotic-induced chemokine signalling by focusing on the direct antimicrobial properties of IL-8. The findings contribute to the emerging concept of chemokines as non-classical antimicrobial molecules, and support the relevance of host-derived immune mediators as adjuncts in strategies targeting antimicrobial resistance.

S1-PP2

Screening of extracellular enzymes from actinomycetes with special reference to glutaminase

Anitha A

Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India.

Corresponding author: anithaanandhananitha2@gmail.com

Abstract

Actinomycetes are filamentous, Gram-positive bacteria that are commonly found in soil and aquatic environments. They are well-known for producing a wide range of extracellular enzymes that are crucial to industry. Actinomycetes' metabolic variety and ability to release enzymes into the surrounding medium, which streamlines downstream processing, have drawn a lot of attention to the screening of extracellular enzymes from these organisms. Among these enzymes, L-glutaminase is particularly interesting due to its uses in biosensors, pharmaceuticals for anticancer treatment, and the food sector as a flavour enhancer. The isolation, screening, and identification of powerful actinomycetes that produce extracellular enzymes particularly glutaminase are the main objectives of this study. Due to their special capacity to catalyse the deamidation of glutamine into glutamic acid and

 ISBN: 978-93-48577-14-6

ammonia, glutaminases are used in a variety of sectors, including the food and pharmaceutical industries. The stability, cost, and ease of synthesis of microbial glutaminases found in bacteria, actinomycetes, yeast, and fungi make them more important than animal glutaminases. The main source for actinomycete isolation using selective media is soil samples from various environments. Plate assay methods are used for initial screening for extracellular enzymes as cellulase, lipase, protease, and amylase. L-glutamine-containing medium are used in specific screening for glutaminase synthesis, and ammonia release a sign of enzyme activity is detected. The ideal conditions for the formation of L-glutaminase were found to be pH 7, 30°C, 96 hours, and 3.5% salinity. There are financial benefits to solid state fermentation. Finding strains that produce a lot of glutaminase and may be useful for industry is made easier with effective screening. Molecular, biochemical, and morphological methods are used to characterise specific isolates. By investigating actinomycetes as a source of extracellular glutaminase, new strains with improved enzyme yield, stability, and substrate selectivity can be found. All things considered, this study emphasises the biotechnological significance of actinomycetes and stresses methodical screening techniques for the synthesis of economically valuable extracellular enzymes, particularly glutaminase.

S1-PP3

Evaluation of cryosphere bacteria for their plant growth promoting traits

EJ. Balasaraswathy[1], A. Atchaya[1], S. Usha Nandhini[1], P. Prakash[1], M. Radhakrishnan[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600 119, Tamil Nadu, India.

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai -600119, Tamil Nadu

Corresponding author: mrkactinos@gmail.com

Abstract

The cryosphere, which is composed of snow-covered soils, glaciers, and permafrost areas where life persists despite extremely low temperatures, can be defined as the frozen, but biologically active layer of the Earth. Microorganisms in these areas have special skills that could be helpful for sustainable agriculture. In this study, bacteria were separated from cryospheric soil samples of the rhizosphere and assessed for their plant growth-promoting characteristics, which are microbial functions or characteristics that enhance nutrient uptake to support plant growth and stress tolerance, as well as metabolic activity. Fifty cultures were recovered and subcultured from glycerol stocks. Gram staining, string test, and morphological observations were used for initial screening, then plant growth promoting traits assays were carried out for selection of potential strains like enzyme activity assays. PGP confirmatory trait assays were then performed. Three promising bacterial isolates exhibiting several PGP characteristics were selected for further investigation based on the results of these experiments. These isolates demonstrated resistance to metal-induced stress when tested for their tolerance to heavy metals at varying concentrations. This study highlights the potential of rhizobacteria derived from the cryosphere as environmentally friendly bioinoculants.

Keywords: Cryosphere, Plant Growth Promoting Traits, Biofertilizer, Sustainable Agriculture, Stress Tolerance.

 ISBN: 978-93-48577-14-6

S1-PP4

MICROBES- An effective tool for the biodegradation of plastics

S. Dharani Abirama Sundari
Biotechnology, The IES-GATE Training Academy, Tambaram, Tamil Nadu, India.
Corresponding author: dharani.abi11@gmail.com

Abstract

An emerging and constant environmental problem that has caused serious pollution and ecological harm is the amount of plastic burden on the planet. Only 9% of the 353 million metric tons of plastic waste produced worldwide each year is being recycled. The residual garbage contributes to the worldwide plastic pollution problem by creating more landfills, incinerators, and unsafe dump sites. Bacteria play a critical role in the biodegradation of metals and plastics, contributing to the worldwide effort to handle plastic pollution. Specifically, the bacteria and fungi can break down the plastic polymers into bacteria and fungi can break down complex plastic polymers into simpler substances, using plastics as an energy source. Though the precise methods in this process have not been completely investigated, the available research and data indicate that a significant number of microorganisms can be engaged in the biodegradation of plastic. Hence, using different bacterial strains for effective plastic degradation to enhance human health and safety would be a purposeful tool to reduce the current plastic burden on earth.

S1-PP5

Evaluation of biosurfactant producing bacteria for dye degradation

Monisha T[1], Pavithra M[1], Radhakrishnan M[2]*, Ushanandhini S[1], Eshwarnath V S[2]
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600 119, Tamil Nadu, India.
[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India.
Corresponding author: mrkactinos@gmail.com

Abstract

The continuous discharge of synthetic dyes into the environment has become a major cause of water and soil pollution, posing serious threats to ecosystems and human health. Conventional dye removal methods are often costly and may generate secondary pollutants. Therefore, biosurfactant-producing bacteria represent an eco-friendly and economical alternative for dye degradation due to their ability to reduce surface tension and enhance the breakdown of complex dye molecules. The present study aimed to evaluate biosurfactant-producing bacteria for their potential role in dye degradation. Soil samples were collected from two different sources: dye-contaminated soil from Kanchipuram (DCS) and rhizosphere soil from Thotta betta Down, Ooty (TBD). Bacterial isolates were obtained using Actinomycetes Isolation Agar, Nutrient Agar, ISP-3 Agar, and BH Agar. A total of 48 isolates were recovered from DCS samples and 71 isolates from TBD samples. The isolates exhibited diverse colony morphology with variations in colour (red, orange, and white) and shape (round and irregular), indicating the presence of diverse bacterial populations. All isolates were screened for biosurfactant production using hemolytic activity, emulsification index, oil displacement test, and phenol– sulfuric assay. Based on these screening methods, isolates from DCS 34 and isolates from TBD 17 showed positive biosurfactant activity. Further characterization revealed that all selected isolates were Gram-positive and string

test negative. Two potent isolates, TBD 17 and DCS 34, were selected for dye degradation studies using Mineral Salt Medium at dye concentrations of 100, 300, and 500 ppm. Dye degradation was confirmed by spectrophotometric analysis. TBD 17 degraded 96.8% of methylene green dye, while DCS 34 degraded 97.5% of methylene blue dye.

Keywords
Biosurfactant, Dye degradation, Bioremediation, Bacterial isolates, Dye tolerance, Synthetic dye removal, Environmental pollution control, Surface-active compounds

S1-PP6

Isolation and Characterization of bacterial Cellulose-producing bacteria from Cryosphere Region

Hemavathi.D[1], Lavanya.R[1], S. Usha Nandhini1, S. Jayashree[2], M. Radhakrishnan[2], S. Sai Mahesh Kumar[2]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600 119, Tamil Nadu, India.

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India.

Corresponding author: mrkactinos@gmail.com

Abstract

The cryosphere bacteria are cold-loving microorganisms that survive and adapt to extremely low temperature environments. These microbes possess unique metabolism, capabilities and may produce valuable biopolymer such as cellulose. Bacterial cellulose is an extracellular biopolymer synthesized by certain bacteria and is known for it's purity and distinctive physicochemical properties. Rhizosphere soil samples were collected from the cryosphere region, and samples S13 and S15 were taken for the isolation and characterisation of bacterial cellulose-producing bacteria. The soil sample were subjected to serial dilution followed by spread plate technique on Glucose Yeast Extract (GYE) medium to obtain bacterial isolates. A total number of 34 bacteria isolates were obtained from the sample and these isolates are subjected to preliminary screening used by gram staining and string test. The potential cellulose-producing isolates were confirmed using the Skrull test, followed by an acid production test to evaluate their cellulose-producing ability. The cultures were inoculated into Hestrin-Schramm (HS)medium and maintained under static condition after 8-9 days the pellicle is obtained. The purified bacterial cellulose was characterized using Fourier Transform Infrared Spectroscopy (FTIR) to confirm cellulose functional groups. Further analyses including Thermogravimetric Analysis (TGA), X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Response Surface Methodology (RSM), and frequency analysis are proposed to evaluate the thermal stability, crystallinity, surface morphology, and production efficiency of bacterial cellulose. This study highlights the potential of cryosphere-derived bacteria as promising sources of high-quality bacterial cellulose.

Keywords: Cryosphere, Bacterial cellulose, FTIR, TGA, XRD, SEM

 ISBN: 978-93-48577-14-6

S1-PP7

Sustainable Extraction, Purification and Characterization of Astaxanthin from Shrimp and Crab Shell Waste

SP. Kaviya, and R. Anitha

Department of Biotechnology, Hindustan Institute of Technology and Science, Chennai, India.

Abstract

Marine shell waste generated from shrimp and crab processing represents an underutilized bioresource with significant potential for sustainable recovery of high-value natural pigments. Astaxanthin, a carotenoid pigment known for its strong antioxidant activity, has wide applications in aquaculture, agriculture, nutraceutical, and pharmaceutical industries. The present study focuses on the extraction, purification, and characterization of astaxanthin from shrimp and crab shell waste using a low-energy and eco-conscious approach. Fresh shrimp and crab shells were thoroughly cleaned to remove residual tissues and impurities, followed by shade drying for several days to prevent thermal and photo-degradation of the pigment. The dried shells were finely powdered and subjected to solvent-based extraction of astaxanthin. The extracted pigment was further purified using chromatographic techniques. Characterization of the purified pigment was carried out using High Performance Liquid Chromatography (HPLC) to assess purity and retention behaviour, while Liquid Chromatography–Mass Spectrometry (LC–MS) analysis confirmed the molecular mass and structural identity of astaxanthin. The results demonstrate that shrimp and crab shell waste can serve as an effective and sustainable source of natural astaxanthin when processed using appropriate pre-treatment and extraction strategies. This study highlights the importance of marine waste valorization through biotechnological approaches and supports the development of environmentally friendly alternatives to synthetic pigments, contributing to sustainable development in environmental management and agricultural applications.

Keywords: Astaxanthin; Shrimp and crab shells; Marine waste valorization; Sustainable biotechnology; HPLC; LC–MS

S1-PP8

Integrated Climate Smart Agriculture in Tamil Nadu Using Microbial, Indigenous, and Artificial Intelligence Based Innovations

M Daarathi

Department of Biotechnology, Bishop Heber College, Trichy, Tamilnadu, India

Corresponding author: daarathiselvam@gmail.com

Abstract

Sustainable agriculture in Tamil Nadu faces increasing challenges from climate change, soil degradation, and persistent pathogen pressures, creating the need for integrated and locally adapted solutions. This study presents recent advances in microbial biocontrol agents, biofertilizers, bio stimulants, indigenous rice landraces, and artificial intelligence enabled precision technologies to develop a climate resilient farming framework suited to Tamil Nadu agro ecological conditions. Research from Tamil Nadu Agricultural University demonstrates that microbial inoculants such as plant growth promoting rhizobacteria including *Azospirillum* and *Bacillus*, arbuscular mycorrhizal fungi, and endophytic microbes improve rice and vegetable yields by 20 to 60 percent while enhancing nutrient use efficiency and stress tolerance through nitrogen fixation, phosphorus and potassium solubilization, induced

 ISBN: 978-93-48577-14-6

systemic resistance, phytohormone production, and volatile organic compounds. Region specific studies further report that seed borne endophytes suppress Fusarium infections while promoting rice growth, alongside vegetable based Green Guardian systems for pathogen management. Bio stimulant applications enhance drought and salinity tolerance through osmolyte accumulation and upregulation of stress responsive genes such as DREB. In parallel, AI based precision farming systems including solar powered automation have achieved notable improvements in productivity and water use efficiency, benefiting more than 3500 farmers annually. Conservation of indigenous rice landraces through community seed banks strengthens resilience by preserving genetic traits adapted to local climatic extremes. Integrated use of microbial inputs, bio stimulants, precision technologies, and indigenous germplasm has reduced chemical inputs by 30 to 50 percent, lowered production costs, and increased farm profitability by 15 to 30 percent. Addressing challenges such as microbial shelf life through nano encapsulation improves scalability. Overall, this framework positions Tamil Nadu as a model for sustainable and climate resilient agriculture aligned with global food security goals.

Keywords: biocontrol, bio stimulant, Tamil Nadu agriculture, climate resilience, PGPR, indigenous seeds

S1-PP9

Exploring Plant and Animal Derived Biopolymers for Wound Healing: A Focus on *Moringa oleifera*, Chitosan and Collagen as a Fabrication Agent

Jayharini Balakumar [1], Divyadharshini Indrajith[1] Grace Lydia[1], Phoe Prabhakar Singh[1], Bharathi S[2*]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

[2]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

Corresponding author ID: bharathi.s.irc@sathyabama.ac.in

Abstract

Wound healing is a crucial physiological process necessary for restoring the skin integrity, acknowledged by WHO as a global concern. It can manifest as either an acute or chronic condition, but complications are more common in chronic and diabetic wounds affecting approximately 40 million of people worldwide. According to Future Market Insights (2025), the global chronic wound care market can reach USD 27,076.5 million by 2035, addressing the growing demand for effective treatments and according to WHO, around 26.8 million people in USA live with diabetes and 6 million suffering from chronic wounds. To speed up the wound healing process maintaining the healthy healing environment is necessary. Conventional synthetic dressings (gauze, cotton) often fail to provide moist environment, antimicrobial property, and biocompatibility leading to increased complication and treatment costs. To overcome these limitations recent studies focuses on finding alternatives like natural biopolymers from either plant or animal based. Among them *Moringa oleifera* has become a promising candidate for its unique bioactive compounds, such as flavonoids (Vicenin-2) and phenolic compounds (caffeic acid) assist to antioxidant defense, enhance collagen formation and modulation of inflammation. In addition, *Moringa oleifera* exhibits remarkable water retention and film-forming ability proving the moist wound healing environment. Furthermore, when it combined with collagen and chitosan, a synergetic

ISBN: 978-93-48577-14-6

environment can be achieved for effective wound healing. This review emphasizes the role of *Moringa oleifera*, chitosan and collagen as a promising polymer for wound healing, along with highlighting the advantages of other plant and animal-based polymers in wound care.
Keywords: Chitosan, Collagen, Moringa oleifera, Wound healing, Natural dressing

S1-PP10

Isolation and Characterization of Microbial Protease with Potential Detergent Application

Mareeswari M[1], Kanika k [1], Prakash P, Bharathi S[2*]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

[2]Centre for Modern Organic Agriculture Research, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

*Corresponding Author: bharathi.s.irc@sathyabama.ac.in

Abstract

Natural plant extracts are increasingly being investigated as safe and effective alternatives to artificial preservatives in food systems. With a focus on environmentally friendly and sustainable extraction methods, this study highlights the contribution of edible plant extracts to enhancing food quality and extending shelf life. The ability of green extraction techniques to improve the stability and yield of bioactive compounds responsible for the strong antibacterial and antioxidant properties of plant extracts is examined. Key antibacterial mechanisms, including disruption of bacterial cell walls and membranes, inhibition of metabolic enzymes, interference with nucleic acid synthesis, induction of oxidative stress, and suppression of quorum sensing, biofilm formation, efflux pumps, and β-lactamase activity, are summarized. In addition, standardized approaches for evaluating antibacterial efficacy and methods for incorporating plant extracts into food matrices are discussed. Recent studies indicate that plant extracts can effectively preserve meat, seafood, dairy, and fresh produce while meeting consumer demand for naturally preserved and clean-label products. Despite these promising outcomes, large-scale industrial application remains limited due to challenges related to extraction efficiency, standardization, and regulatory approval. Future research should therefore focus on optimizing green extraction methods, standardizing evaluation procedures, and establishing clear regulatory frameworks to promote the sustainable use of plant extracts in the food industry.

Keywords: edible plant extracts, natural preservatives, food quality, shelf life, antibacterial activity, green extraction methods, clean-label foods.

 ISBN: 978-93-48577-14-6

S1-PP11

In Silico and Experimental Evaluation of Phytocompounds Targeting Biofilm Formation and Motility in *Pseudomonas syringae*

Sumaiya Begum Thuraputheen, Karthikeyan Ramalingam*
School of Life Sciences, B.S. Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai 600048, Tamilnadu, India.
Corresponding author email address: karthikeyansls@crescent.education

Abstract

Pseudomonas syringae is a globally significant phytopathogen responsible for substantial agricultural losses across a wide variety of economically important crops. Its remarkable adaptability and extensive strain diversity contribute to persistent disease outbreaks, largely driven by key virulence traits such as biofilm formation and motility. These traits enhance environmental survival, host colonization, and disease progression. Although copper-based formulations and antibiotics have traditionally been employed to manage infections, their prolonged and repeated use has resulted in the emergence of antibiotic-resistant strains. In the present study, an integrated in silico and experimental approach was employed to identify potential phytocompound-based inhibitors targeting proteins associated with biofilm formation and motility. Two major virulence-associated proteins involved in biofilm formation and motility were selected as targets and subjected to docking with 100 phytocompounds. Based on binding affinities and interactions, a lead phytocompound was shortlisted for experimental validation. Subsequent experimental assays demonstrated a significant reduction in both biofilm formation and bacterial motility upon treatment. Overall, this study highlights a promising strategy for controlling diseases caused by *Pseudomonas syringae*, while reducing reliance on conventional chemical control measures.

S1-PP12

Retrograde Axonal Transport of α-Synuclein: Evidence Supporting the Enteric Nervous System as an Early Site of Parkinsonian Pathogenesis

Erika Sara Ciby
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai–600 119, Tamil Nadu, India

Abstract

Parkinson's disease is diagnosed after significant neuronal loss, while gastrointestinal dysfunction may occur years before motor symptoms. The gut-first hypothesis proposes that PD pathology may begin in the enteric nervous system (ENS) and spread to the brain via the vagus nerve. To summarise published evidence supporting gut-to-brain transmission of misfolded α- synuclein (α-syn) and to highlight the relevance of microbiome-targeted interventions, particularly probiotics. A literature-based evidence synthesis was conducted using peer-reviewed articles identified through PubMed and Google Scholar searches using terms related to PD, gut microbiome, α- synuclein, ENS, vagus nerve and probiotics. Experimental evidence demonstrates that pathological α-syn can propagate from the gut to the brain through neural pathways in vivo, supporting retrograde transport mechanisms (Kim et al. 2019). Human epidemiological studies further support a role for vagal involvement, with reduced PD risk reported following truncal vagotomy (Svensson et al. 2015). However, findings vary depending on vagotomy type and study design (Liu et al. 2017). Additionally, probiotics have shown clinical benefit for constipation in PD, suggesting a potential

ISBN: 978-93-48577-14-6

supportive role in stabilising gut function (Tan et al. 2021). Current evidence supports the ENS as a potential early site involved in PD pathogenesis and reinforces the gut–brain axis as a preventive and therapeutic target. Probiotics may represent a promising adjunct strategy, although further mechanistic and long-term clinical studies are needed.

Keywords: Parkinson's disease; gut microbiome; probiotics; α-synuclein; enteric nervous system; vagus nerve.

S1-PP13

Isolation of PHB Producing Bacterial Source for Bio Plastic Production

Subhasri. R

Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai–600 119, Tamil Nadu, India

Corresponding author: sangeethasangeetha8148@gmail.com

Abstract

The increasing environmental pollution caused by synthetic plastics has created an urgent need for biodegradable alternatives. Polyhydroxybutyrate (PHB) is a microbial biopolymer that serves as a promising substitute for conventional plastics due to its biodegradability, biocompatibility, and thermoplastic properties. This study focuses on the isolation of PHB-producing bacteria from natural sources for potential application in bioplastic production. Samples are typically collected from PHB-rich environments such as soil, compost, industrial waste sites, and wastewater, where nutrient imbalance promotes intracellular PHB accumulation. Bacterial isolates are obtained using serial dilution and spread plate techniques on nutrient agar. Preliminary screening for PHB producers is carried out using staining methods such as Sudan Black B and Nile Blue A, which detect intracellular lipid granules. Positive isolates are further subjected to microscopic observation and biochemical characterization for identification. Quantitative estimation of PHB production is performed through solvent extraction methods followed by spectrophotometric analysis. Optimization of culture conditions including carbon source, nitrogen limitation, pH, temperature, and incubation time enhances PHB yield. Isolated PHB-producing bacteria, commonly belonging to genera such as Bacillus, Pseudomonas, and Ralstonia, demonstrate significant potential for sustainable bioplastic production. This research contributes to eco-friendly material development and supports waste valorization strategies, reducing dependence on petroleum-based plastics. The study highlights the importance of microbial resources in advancing green technology and addressing global plastic pollution challenges.

S1-PP14

Screening of Extracellular Enzymes from Actinomycetes with Special Reference to Glutaminase

Gayathri Devi.P

Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai–600 119, Tamil Nadu, India

Abstract

Actinomycetes are filamentous, Gram-positive bacteria that are commonly found in soil and aquatic environments. They are well known for producing a wide range of extracellular enzymes that are crucial to industry. The metabolic variety of actinomycetes and their ability to release enzymes into the surrounding medium, which streamlines downstream

ISBN: 978-93-48577-14-6

processing, have drawn considerable attention toward the screening of extracellular enzymes from these organisms. Among these enzymes, L-glutaminase is particularly interesting due to its applications in biosensors, pharmaceuticals for anticancer treatment, and the food sector as a flavour enhancer. The main objectives of this study are the isolation, screening, and identification of potent actinomycetes capable of producing extracellular enzymes, particularly glutaminase. Glutaminases are used in various sectors, including the food and pharmaceutical industries, due to their unique ability to catalyse the deamidation of glutamine into glutamic acid and ammonia. Microbial glutaminases derived from bacteria, actinomycetes, yeast, and fungi are considered more important than animal glutaminases because of their stability, cost-effectiveness, and ease of synthesis. Soil samples collected from various environments serve as the primary source for actinomycete isolation using selective media. Initial screening for extracellular enzymes such as cellulase, lipase, protease, and amylase is carried out using plate assay methods. Specific screening for glutaminase synthesis is performed using L-glutamine-containing medium, where ammonia release, a sign of enzyme activity, is detected. The ideal conditions for the formation of L-glutaminase were found to be pH 7, 30°C, 96 hours, and 3.5% salinity. Solid-state fermentation offers financial benefits for enzyme production. Effective screening facilitates the identification of strains producing high levels of glutaminase with potential industrial applications. Specific isolates are characterised using molecular, biochemical, and morphological methods. By investigating actinomycetes as a source of extracellular glutaminase, new strains with improved enzyme yield, stability, and substrate selectivity can be identified. Overall, this study emphasises the biotechnological significance of actinomycetes and highlights the importance of systematic screening techniques for the production of economically valuable extracellular enzymes, particularly glutaminase.

S1-PP15

Screening of Seawater Microorganisms for their Potential in Plastic Degradation

Yuvasri. S, Dr. B. Devi
Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai–600 119, Tamil Nadu, India
Corresponding author: yuvasri.sekarlakshmi@gmail.com

Abstract

Plastic pollution has become a significant environmental issue because it does not break down and builds up in marine ecosystems. Traditional methods for managing plastic waste often fall short and can harm the environment, making it necessary to find sustainable alternatives. Microbial bioremediation has emerged as a promising eco-friendly method for addressing plastic pollution, particularly through marine microorganisms that have adapted to tough conditions. This study focuses on examining seawater microorganisms to see if they can help in breaking down plastic. Seawater samples were gathered from a coastal area and incubated with low-density polyethylene (LDPE) plastic strips to encourage microbial growth and biofilm formation. Microorganisms living on the plastic surface were isolated using standard microbiological methods and tested for their ability to survive and grow while using plastic as their only source of carbon. Changes in biofilm formation and microbial activity were tracked over a set incubation period. The study seeks to identify potential plastic-degrading microorganisms and assess their readiness for further study and use in marine plastic cleanup. The results of this initial screening offer insights into how

 ISBN: 978-93-48577-14-6

marine microbes interact with plastic materials and underline the potential of seawater microorganisms in decreasing plastic buildup in marine environments. This research supports the creation of sustainable and biologically driven methods for managing plastic waste.

S1-PP16

Production, Characterization and Biological Evaluation of Siderophore from Cryosphere Bacteria

Siva Lakshmi Priya. N[1], Sai Mahesh Kumar. S[2], Dr. M. Radhakrishnan[2], Dr. G. Brindha[1]

[1]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

Corresponding author: mrkactinos@gmail.com

Abstract

Siderophores are low molecular weight and high-affinity iron coordination complexes that play a role in microbial survival under iron limited conditions, particularly in cold conditions. This study focuses on the isolation, production, optimisation, and physicochemical characterization of siderophores that are synthesized from psychrophilic bacteria isolated from cryosphere bacteria. The isolated Bacterial strains from the rhizosphere soil sample isolates were screened for siderophore production using Chrome Azurol S (CAS) assay. These are optimized under various conditions like temperature, pH, and nutrient conditions to increase the siderophore yield. The chromatographic analyses shows that the siderophore to be a type of compound with high thermal stability and iron-binding capacity. The used here assays shows and proves significant antimicrobial activity against pathogens and promotes the iron up- take. This work underscores the unique source of functional siderophores for an sustainable agricultural interventions.

Keywords: Psychrophilic bacteria, Cryosphere microbiology, Iron chelation, CAS assay, Cold-adapted microbes, Antimicrobial activity, Iron uptake enhancement

S1-PP17

Exploring Enzymes Producing Bacteria from Kalpakkam Ecosystem

Sakthi Shivani.P

Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119,Tamil Nadu, India

Corresponding author: sakthishivani03@gmail.com

Abstract

Microorganisms are one of the most important sources of enzymes with wide-ranging applications in industrial, medical, and environmental sectors. microbial enzymes are preferred over plant and animal enzymes due to their high specificity, cost-effectiveness, rapid production, and ease of large-scale cultivation (Pandey et al., 2017). bacterial enzymes, in particular, are extensively used in industries such as food processing, detergents, pharmaceuticals, textiles, and waste management. Natural ecosystems serve as reservoirs of diverse microorganisms with unique metabolic capabilities. among these, coastal and marine environments are considered promising sources of enzyme-producing bacteria because of their dynamic environmental conditions, including fluctuations in salinity,

ISBN: 978-93-48577-14-6

temperature, pH, and nutrient availability (Thatoi et al., 2013). microorganisms adapted to such conditions often produce enzymes that are stable and active under extreme or variable conditions, making them suitable for industrial applications.the kalpakkam coastal ecosystem, located along the southeast coast of india, supports a rich microbial diversity due to its unique ecological characteristics. isolation of bacteria from coastal soil and water samples enables the identification of strains capable of producing extracellular enzymes of industrial importance. standard microbiological methods such as spread plate technique, subculturing, and enzyme screening assays are commonly employed for this purpose further screening, optimization of production parameters, and characterization of enzymes are essential steps to enhance enzyme yield and efficiency. Therefore, the present study aims to isolate, screen, optimise, and characterise enzyme-producing bacteria from the Kalpakkam coastal ecosystem, highlighting their potential for future biotechnological applications.

S1-PP18

Production, characterization and biological activities of EPS from cryosphere bacteria

Mahasivanantham[1], Sai Mahesh Kumar S[2], Dr Radhakrishnan M[2], Dr Mohana Priya R[1]

[1]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore, Tamil Nadu

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

Corresponding author: mrkactinos@gmail.com

Abstract

Exopolysaccharides (EPS) produced by cryosphere bacteria are vital biomolecules that enable microbial survival in extreme cold environments and represent promising resources for biotechnology. This study investigates the production, characterization, and biological significance of EPS synthesized by psychrophilic and psychrotolerant isolates from glacial and permafrost habitats. EPS production was initially confirmed through plate assays, which demonstrated polysaccharide secretion and biofilm-forming potential under low- temperature conditions. Quantitative estimation and compositional profiling using spectrometric assays revealed high carbohydrate content enriched with uronic acids and neutral sugars. Structural characterization by Fourier Transform Infrared (FTIR) spectroscopy identified functional groups such as hydroxyl, carboxyl, and glycosidic linkages, while High- Performance Liquid Chromatography (HPLC) resolved diverse monosaccharide constituents including glucose, galactose, and mannose. To complement biochemical analyses, genomic sequencing was employed to identify EPS biosynthetic gene clusters, providing insights into the genetic basis of polymer assembly and regulation in cryospheric bacteria. Biologically, these EPS exhibited roles in ice crystal inhibition, desiccation tolerance, and heavy metal sequestration, underscoring their ecological importance in sustaining microbial communities in subzero niches. Beyond ecological relevance, cryospheric EPS demonstrate translational potential in biomedicine, food technology, and environmental biotechnology, serving as natural cryoprotectants, bioemulsifiers, and sustainable biomaterials. Collectively, the integration of plate assays, spectrometric analyses, FTIR, HPLC, and sequencing provides a comprehensive framework for understanding cryosphere-derived EPS, highlighting their dual role as survival determinants and reservoirs of novel biomaterials.

Keywords: cryosphere bacteria, Extrapolymeric substance, Fourier transform infrared spectroscopy, High-performance liquid chromatography, Genome sequencing.

 ISBN: 978-93-48577-14-6

S1-PP19

Evaluation of Antifungal Properties of Actinobacteria

Rejith R.S. Kumar [1+], Parkavi. K. P[1+], Thenmozhi. G.S [2], Radhakrishnan. M [2*], Mahalakshmi. K[3], Usha Nandhini. S[1]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai-600 119, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai– 600 119, Tamil Nadu, India

[3]Department of Microbiology, Sri Balaji Dental College, Chennai, Tamil Nadu.

Corresponding author: mrkactinos@gmail.com

Abstract

Actinobacteria are renowned producers of bioactive secondary metabolites with potential antimicrobial applications. This study evaluated the antifungal properties of actinobacterial isolates against pathogenic Candida species. Twenty isolates were screened from the Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai. Strains BMI-A6 and BMI-A2 exhibited significant activity against Candida krusei and Candida pelliculosa using the agar plug and well diffusion methods in ISP2 medium. Optimization revealed enhanced metabolite production with mannitol as a carbon source, soybean as a nitrogen source, and $CaCl_2$ as a mineral source, yielding maximum inhibition zones of ~20 mm. Peak production occurred on day 10 during submerged fermentation. Crude metabolites were extracted using methanol, ethyl acetate, chloroform, n-hexane, and dichloromethane, with minimum inhibitory concentrations (MIC) determined via microbroth dilution. Partial purification was achieved by thin-layer chromatography (TLC), and characterization via high- performance liquid chromatography (HPLC). The potent strain BMI-A6 was identified through morphological, physiological, cultural, and molecular (16S rRNA sequencing) analyses. These findings highlight actinobacterial metabolites as promising candidates for novel antifungal agents against clinical Candida pathogens.

Keywords: Actinobacteria, antifungal activity, Candida krusei, Candida pelliculosa, secondary metabolites, submerged fermentation, minimum inhibitory concentration, 16S rRNA sequencing

S1-PP20

Bacteriocins as Adjuncts to Antibiotic Therapy Against Multidrug-Resistant *Staphylococcus aureus*

Thasnim Begum Shahjahan[1], Jesia Persis Preethi[1], Revathy Kalyanasundaram[2], Krupakar Parthasarathy[2]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: pkrupakar.cddd@sathyabama.ac.in

Abstract

The growing problem of multidrug-resistant *Staphylococcus aureus* (MRSA) has made the treatment of infections increasingly difficult and has highlighted the need for new and supportive antimicrobial approaches. Lactic acid bacteria (LAB), commonly present in

ISBN: 978-93-48577-14-6

milk and fermented dairy products, are well known for producing bacteriocins—natural antimicrobial peptides that can inhibit the growth of harmful bacteria. This study focuses on exploring the potential of LAB-derived bacteriocins as effective agents against MRSA, particularly when used in combination with antibiotics. Milk samples were collected and LAB were isolated using MRS agar medium. The isolates were preliminarily identified through Gram staining and catalase testing. Their antimicrobial activity against MRSA was first screened using the spot-on-lawn assay and further evaluated by the agar well diffusion method. Bacteriocins produced by selected LAB isolates were partially purified using ammonium sulphate precipitation and further purified by high-performance liquid chromatography (HPLC). The antibacterial activity of the purified bacteriocins was assessed both individually and in combination with conventional antibiotics to study their synergistic effects. In addition, this study investigates how bacteriocins act on MRSA cells and their ability to reduce the development of antibiotic resistance during combination therapy. Taxonomic identification of the most promising LAB isolates was also carried out. Overall, this work aims to provide a better understanding of how bacteriocins can enhance antibiotic effectiveness and suppress resistance. The findings may support the use of LAB- derived bacteriocins as natural and safe adjuncts to antibiotics in the management of MRSA infections.

S1-PP21

Bacteriocins from *Lactobacillus*: A Natural Alternative to Antibiotic

Anugraha Rajangam[1], Jayshree Nellore[1], Revathy Kalyanasundaram[2], Krupakar Parthasarathy[2]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, India

Corresponding author: pkrupakar.cddd@sathyabama.ac.in

Abstract

Bacteriocins from Lactobacillus species have gained significant interest as natural, ribosomally made antimicrobial peptides. They are important for food preservation, probiotic use, and medical discoveries. These peptides usually show strong activity against foodborne and antibiotic-resistant germs, and they are considered safe for human consumption. Advances in molecular studies have clarified their genetic makeup, structural features, and how they work. Bacteriocins often work by forming pores in membranes and disrupting vital cellular functions. In the food industry, bacteriocins made from Lactobacillus have been effectively used as biopreservatives to improve safety and extend the shelf life of dairy, meat, and fermented products. New research also shows their probiotic benefits for gut health, such as altering the intestinal microbiota and blocking gastrointestinal pathogens. However, challenges like production scalability, stability, and getting regulatory approval limit their wider use. Recent progress in genetic engineering, omics technologies, and delivery methods may help address these issues. This review summarizes current knowledge about the classification, molecular features, antimicrobial range, and possible uses of Lactobacillus-derived bacteriocins. It highlights their potential as sustainable alternatives to traditional antibiotics.

 ISBN: 978-93-48577-14-6

S1-PP22

Mechanistic Design of a Time-Released Probiotic Capsule Integrating Prebiotic and Postbiotic Payloads for Enhanced Functional Stability

Varsha Maalika G. M[1], Saqib Hassan[1], Revathy Kalyanasundaram[2], Krupakar Parthasarathy[2]
[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India
Corresponding author: pkrupakar.cddd@sathyabama.ac.in

Abstract

Conventional probiotic formulations often exhibit reduced efficacy due to poor survival during gastrointestinal transit and limited functional activity at the target site. To address these limitations, this study presents a mechanistic design framework for a time-release probiotic capsule integrating prebiotic and postbiotic components to achieve sequential and sustained biological functionality. The proposed system is based on a controlled-release matrix engineered to temporally regulate the availability of each component within the gastrointestinal environment. Initial release of prebiotic substrates is designed to prime microbial metabolic activity and support probiotic adaptation under hostile conditions such as low pH and bile exposure. This is followed by the protected release of viable probiotic cells, enhancing survival and colonization potential. Subsequent liberation of postbiotic molecules enables functional effects independent of cell viability, including immunomodulatory and metabolic signaling. The mechanistic rationale underlying this design emphasizes coordinated interactions between substrate availability, microbial physiology, and functional metabolite activity, operating at a systems level rather than as isolated components. This integrated approach highlights how temporal control of release dynamics can modulate probiotic stability and functionality. The proposed framework advances probiotic delivery beyond conventional formulations by emphasizing mechanism driven design principles, offering a foundation for future experimental validation and translational applications in gut microbiome modulation.

S1-PP23

Microbial synthesis of nanoparticles using fungi and Actinomycetes

A. Kenamma, J. Jerrina Marial, D. Susan Caroline, R. Kalavani, M. Uma Maheshwari
C.S.I Ewart Women's Christian College, Chengalpattu - 603204, Tamil Nadu, Chennai
Corresponding author: suzi4jesus@gmail.com

Abstract:

Microbial synthesis of nanoparticles has gained significant attention as a green, sustainable, and biologically driven approach for the production of nanomaterials with diverse applications. Among microorganisms, fungi and actinomycetes are particularly promising candidates for nanoparticle synthesis due to their high metal tolerance, robust enzymatic systems, and ability to secrete large quantities of extracellular biomolecules. These organisms facilitate nanoparticle formation through enzymatic reduction, metabolite-mediated processes, and biosorption mechanisms, enabling both intracellular and extracellular synthesis of metal nanoparticles. Fungi such as Aspergillus, Penicillium, Fusarium, and Trichoderma species are widely reported for synthesizing silver, gold, zinc oxide, and iron oxide nanoparticles. Their filamentous nature and high protein secretion

 ISBN: 978-93-48577-14-6

capacity allow efficient extracellular synthesis, ease of downstream processing, and improved nanoparticle stability. Actinomycetes, particularly Streptomyces species, are known for their unique secondary metabolites and reductase enzymes that play a crucial role in nanoparticle nucleation and stabilization. Actinomycete-mediated nanoparticles often exhibit uniform size distribution, enhanced surface functionality, and strong biological activity. Microbially synthesized nanoparticles demonstrate remarkable biomedical properties, including antimicrobial, antifungal,anticancer, antioxidant, and anti-biofilm activities. These nanoparticles have shown potential in drug delivery, wound healing, biosensing, bioimaging, and tissue engineering applications due to their enhanced biocompatibility and reduced toxicity. Despite these advantages, challenges such as optimization of culture conditions, scalability, reproducibility, and regulatory acceptance remain. Overall, fungal and actinomycete-mediated nanoparticle synthesis represents a promising frontier in green nanotechnology, offering environmentally benign alternatives for producing functional nanomaterials for advanced biomedical and industrial applications.
Keywords: Microbial synthesis, drug delivery , nanoparticles, green nanotechnology; Fungi; Actinomycetes; Streptomyces; Enzymatic reduction; Extracellular biosynthesis; Metal nanoparticles; Secondary metabolites; Biocompatibility; Biomedical applications

S1-PP24

Microbial degradation of plastics and synthetic polymers in soil and aquatic systems

L. Dharshini, J. Jerrina marial D . Susan Caroline, R. Kalavani, M. Uma Maheshwari,
C.S.I Ewart Women's Christian College, Chengalpattu- 603204, Tamil Nadu, India.
Corresponding author: suzi4jesus@gmail.com

Abstract

The widespread use of plastics and synthetic polymers has resulted in significant environmental pollution in terrestrial and aquatic ecosystems, posing severe ecological and human health risks due to their recalcitrant nature and persistence. Microbial degradation offers a promising and sustainable strategy for mitigating plastic pollution by utilizing the metabolic capabilities of bacteria, fungi, and algae to break down polymeric materials into environmentally benign compounds. This study focuses on the isolation, characterization, and application of plastic- degrading microorganisms from diverse soil and aquatic habitats. Both culture-dependent and culture-independent approaches, including enrichment culture techniques, 16S rRNA and ITS gene sequencing, and metagenomic analysis, are employed to identify microbial taxa with high degradation potential. The research further investigates the enzymatic mechanisms involved, including the roles of hydrolases, esterases, and depolymerases, and examines the influence of environmental factors such as temperature, pH, salinity, and nutrient availability on degradation efficiency. Laboratory-based microcosm and bioreactor experiments simulate real-world soil and aquatic conditions to evaluate the rate and extent of polymer breakdown. The study also explores the synergistic effects of microbial consortia and bioaugmentation strategies to enhance degradation of polyethylene, polystyrene, and polypropylene. The findings are expected to advance our understanding of microbial plastic degradation pathways, inform the development of eco-friendly bioremediation technologies, and provide practical solutions for plastic waste management in contaminated environments. This research contributes to the broader goals of environmental sustainability, pollution mitigation, and the application of microbial biotechnology for restoring soil and water health.

 ISBN: 978-93-48577-14-6

Keywords: Plastic pollution; Microbial degradation; Bioremediation; Plastic-degrading microbes; Enzymatic pathways; Metagenomics; Soil and aquatic systems

S1-PP25

Biosynthesis of gold nanoparticles using medicinal herbs and characterization studies

K. Ashalata Behara, J. Jerrina Marial ,D. Susan Caroline, R. Kalaivani, M . Uma Maheshwari
C.S.I Ewart Women's Christian College, Chengalpatt - 603204, Tamil Nadu, Chennai
Corresponding author: suzi4jesus@gmail.com

Abstract

Biosynthesis of gold nanoparticles (AuNPs) using medicinal herbs has emerged as a green, sustainable, and biocompatible alternative to conventional chemical and physical synthesis methods. Medicinal plant extracts contain a wide range of bioactive phytochemicals, including flavonoids, phenolics, terpenoids, alkaloids, and proteins, which act as natural reducing and stabilizing agents during nanoparticle formation. These biomolecules facilitate the reduction of gold ions (Au^{3+}) to elemental gold (Au^{0}), resulting in the formation of stable nanoparticles under mild reaction conditions without the use of toxic chemicals. The synthesis process is typically confirmed by a visible color change due to surface plasmon resonance, which is further characterized using various analytical techniques. Ultraviolet-visible (UV-Vis) spectroscopy is employed to monitor nanoparticle formation and stability, while Fourier-transform infrared (FTIR) spectroscopy identifies functional groups involved in reduction and capping. Particle size, morphology, and distribution are analyzed using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). X-ray diffraction (XRD) confirms the crystalline nature and phase purity of the synthesized AuNPs, and dynamic light scattering (DLS) and zeta potential measurements provide information on particle size distribution and colloidal stability. Herb-mediated gold nanoparticles exhibit enhanced biocompatibility and unique physicochemical properties, making them suitable for various biomedical applications, including drug delivery, bioimaging, photothermal therapy, antioxidant activity, and anticancer treatment. Despite their advantages, challenges such as standardization of plant extracts, reproducibility, and large-scale production need to be addressed. Overall, biosynthesis of gold nanoparticles using medicinal herbs represents a promising approach in green nanotechnology for developing safe and effective nanomaterials for biomedical applications.

Keywords: Gold nanoparticles, Green synthesis, Medicinal plant extracts, Phytochemical reduction, Characterization, Biomedical applications

 ISBN: 978-93-48577-14-6

S1-PP26

Screening marine microbes for bioactive compounds with anticancer activity

A. Kavitha, J. Jerrina Marial D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari
C.S.I Ewart Women's Christian College, Chengalpatt - 603204, Tamil Nadu, Chennai
Corresponding author: suzi4jesus@gmail.com

Abstract

Marine ecosystems harbor an extraordinary diversity of microorganisms, including bacteria, fungi, and actinomycetes, which produce unique bioactive compounds due to the extreme and competitive nature of their habitats. These marine microbes have emerged as a promising source for novel anticancer agents, offering structural diversity and mechanisms distinct from terrestrial microorganisms. The increasing prevalence of cancer and limitations of conventional chemotherapy underscore the need for new therapeutic molecules with enhanced efficacy and reduced toxicity. This study focuses on the isolation and screening of marine microbial strains from diverse environments such as coral reefs, deep-sea sediments, and mangrove ecosystems. Isolated strains were subjected to primary bioactivity screening for cytotoxic effects against various human cancer cell lines. Promising strains underwent secondary metabolite extraction and characterization, using techniques such as high-performance liquid chromatography (HPLC), mass spectrometry, and nuclear magnetic resonance (NMR) to identify potential anticancer compounds. Additionally, in vitro assays were performed to evaluate apoptosis induction, cell cycle arrest, and inhibition of cancer cell proliferation. Early results demonstrate that marine microbes produce novel metabolites with significant anticancer potential, highlighting their utility in drug discovery pipelines. This research emphasizes the importance of marine microbial bioprospecting as a sustainable approach to develop next-generation anticancer therapeutics. By combining microbiology, biotechnology, and pharmacology, marine-derived bioactive compounds can serve as a foundation for innovative cancer treatments, expanding the arsenal of natural-product-based chemotherapeutics and contributing to global health initiatives.

Keywords: Marine microbes; Anticancer metabolites; Bioactive compounds; Cytotoxicity screening; Secondary metabolites; Drug discovery; Apoptosis

S1-PP27

Green synthesis of metal nanoparticles using plant extracts and their biomedical applications

P. Priya, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari.
C.S.I Ewart Women's Christian College, Chengalpatt-603204, Tamilnadu, India
Corresponding author: suzi4jesus@gmail.com

Abstract

Green synthesis of metal nanoparticles using plant extracts has emerged as an eco-friendly, cost- effective, and sustainable alternative to conventional physical and chemical synthesis methods. Traditional nanoparticle synthesis often involves toxic chemicals, high energy consumption, and hazardous by-products, limiting their biomedical applicability. In contrast, plant-mediated synthesis utilizes natural phytochemicals such as flavonoids, phenolics, terpenoids, alkaloids, and proteins as reducing, stabilizing, and capping agents, eliminating the need for harmful reagents. Various metals including silver, gold, zinc oxide, copper, and iron oxide nanoparticles have been successfully synthesized using extracts from leaves, roots, fruits, seeds, and bark of medicinal plants. The physicochemical properties of green-

 ISBN: 978-93-48577-14-6

synthesized nanoparticles, such as size, shape, surface charge, and stability, can be influenced by plant species, extraction conditions, and synthesis parameters. These biologically synthesized nanoparticles exhibit enhanced biocompatibility, reduced cytotoxicity, and improved functional activity, making them highly suitable for biomedical applications. In the medical field, plant-derived metal nanoparticles demonstrate significant antimicrobial, antifungal, antiviral, antioxidant, anti-inflammatory, and anticancer activities. Silver and gold nanoparticles, in particular, have shown promising results in wound healing, drug delivery systems, bioimaging, and cancer therapy due to their targeted action and minimal side effects. Furthermore, green-synthesized nanoparticles are being explored in diagnostics, biosensors, tissue engineering, and vaccine delivery platforms. Despite their advantages, challenges such as large-scale production, reproducibility, and standardization remain. Overall, green synthesis using plant extracts represents a promising approach for developing safe and effective nanomaterials for advanced biomedical applications, aligning with the principles of green chemistry and sustainable nanotechnology.

Keywords: Green synthesis; Plant-mediated nanoparticles; Metal nanoparticles; Biomedical applications; Phytochemicals; Biocompatibility; Anticancer activity

S1-PP28

Role of microbiome engineering in enhancing both plant growth and disease resistance

A. Haripriya, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari
C. S. I Ewart Women's Christian College, Chengalpat - 603204, Tamil Nadu, India
Corresponding author: suzi4jesus@gmail.com

Abstract

The plant microbiome plays a pivotal role in regulating plant growth, nutrient acquisition, and disease resistance. Recent advances in microbiome engineering offer the potential to modulate plant-associated microbial communities to enhance crop productivity while simultaneously suppressing pathogens. This study investigates the role of microbiome engineering in promoting plant growth and disease resistance through targeted manipulation of the rhizosphere, endosphere, and phyllosphere microbial communities. Beneficial microbes, including plant growth-promoting rhizobacteria (PGPR), endophytic fungi, and antagonistic bacteria, are identified and characterized using both culture-dependent and culture-independent approaches, including 16S rRNA/ITS sequencing and metagenomic profiling. Microbial consortia are engineered to optimize nutrient cycling, production of phytohormones, and secretion of antimicrobial compounds. Laboratory and greenhouse experiments are conducted to evaluate the effects of these engineered microbiomes on plant growth parameters, nutrient uptake, and resistance against key fungal, bacterial, and viral pathogens. Environmental factors such as soil type, pH, moisture, and nutrient availability are also assessed for their influence on microbial colonization and activity. The study aims to elucidate mechanistic insights into host–microbe interactions and demonstrate the potential of microbiome engineering as a sustainable agricultural strategy. Findings from this research are expected to contribute to the development of eco-friendly biofertilizer and biocontrol formulations, provide novel solutions for integrated pest and nutrient management, and advance the field of precision microbiome management for sustainable crop production.

Keywords: Plant microbiome; Microbiome engineering; Plant growth promotion; Disease resistance; Microbial consortia, Biocontrol agents; Metagenomics

ISBN: 978-93-48577-14-6

S1-PP29

Bioremediation potential of polar microbes in oil spill cleanup

K. Bemmy Gracy, J. Jerrina Marial, D. Susan Caroline, R. Kalaivani, M. Uma Maheshwari
C. S. I Ewart Women's Christian College, Chengalpat - 603204, Tamil Nadu, India.
Corresponding author: suzi4jesus@gmail.com

Abstract

Oil spills in polar regions pose a significant environmental challenge due to extreme climatic conditions, fragile ecosystems, and the slow natural recovery rates inherent to these environments. The cold temperatures, high salinity, and limited nutrient availability in polar soils and waters make conventional remediation approaches largely ineffective. This study investigates the bioremediation potential of indigenous polar microorganisms, including psychrophilic and psychrotolerant bacteria and fungi, for the degradation of petroleum hydrocarbons under low-temperature conditions. Microbial communities are examined using both culture-dependent and culture-independent approaches, including enrichment techniques, molecular identification through 16S rRNA gene sequencing, and metagenomic analysis to elucidate diversity, structure, and functional potential. The study further evaluates the production of cold-active enzymes, such as lipases, oxygenases, and dehydrogenases, and biosurfactants that enhance hydrocarbon bioavailability and degradation efficiency. Laboratory-based microcosm experiments simulating polar environmental conditions are conducted to assess biodegradation rates, while the influence of critical environmental factors, including temperature, salinity, nutrient levels, and oxygen availability, on microbial activity is systematically analyzed. The integration of molecular, biochemical, and experimental data provides insights into the mechanisms employed by polar microorganisms to metabolize hydrocarbons in extreme environments. The findings are expected to advance the development of eco-friendly, effective, and sustainable bioremediation strategies for managing oil spills in cold ecosystems and to inform environmental policy and conservation practices in polar regions, contributing to long- term ecosystem resilience and protection.
Keywords: Oil spills; Polar regions; Bioremediation; Psychrophilic and psychrotolerant microorganisms; Petroleum hydrocarbon degradation; Cold-active enzymes; Biosurfactant production; Indigenous microbial communities; Metagenomics; Extreme cold environments.

S1-PP30

Preliminary Screening and evaluation of probiotic properties of lactic acid bacteria from the arctic region

K. Priyanka[1], G. Sanjana Singh[1], S. Usha Nandhini[1], Prabhakar Singh[1], M. Radhakrishnan[2], Sai Mahesh Kumar[2]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: mrkactinos@gmail.com

Abstract

Probiotics are live microorganisms that confer health benefits to the host by maintaining gut microbial balance, enhancing immune responses, and preventing gastrointestinal disorders. Despite their widespread use, most commercially available probiotic formulations are limited to Lactobacillus and Bifidobacterium species, which often exhibit restricted genetic diversity,

 ISBN: 978-93-48577-14-6

inconsistent survival in the gastrointestinal tract, and growing concerns related to antibiotic resistance. These limitations highlight the need for the exploration of novel and resilient probiotic candidates from extreme environments. In this study, bacterial isolates obtained from Arctic fjord environments were investigated for their potential probiotic properties. Environmental samples collected from Arctic fjords were subjected to isolation of cold-adapted bacteria, followed by preliminary phenotypic and biochemical characterization, including KOH string test and Gram staining. The isolates were further screened for essential probiotic attributes such as acid and bile tolerance, which are critical for survival under gastrointestinal conditions. In addition, auto-aggregation and co-aggregation assays were performed to evaluate the ability of the isolates to adhere and interact with pathogenic microorganisms, an important criterion for effective probiotic function. Molecular identification and characterization of promising isolates will be carried out using 16S rRNA gene sequencing, providing insights into their taxonomic identity and safety. Based on their functional and molecular characteristics, selected Arctic fjord–derived bacterial strains may serve as potential candidates for the development of novel probiotic products. The findings of this study are expected to contribute to the identification of next-generation probiotics from cold-adapted microbial resources, with prospective applications in human health, animal feed, aquaculture, and functional food industries.

Keywords: Arctic fjord bacteria, Probiotic potential, Cold-adapted microorganisms, 16S rRNA sequencing

S1-PP31

Evaluation of Bacteria for PGP Properties from Soil Sample

Balaji M.[1], Ramesh Kumar[1], Grace Lydia Phobe[2], Sai Mahesh Kumar[2] and M. Radhakrishnan

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Corresponding author: mrkactinos@gmail.com

Abstract

This study evaluates the Plant Growth Promoting (PGP) potential of bacteria isolated from the soil region to address the challenges of sustainable agriculture in cold climate regions. Bacterial isolates were screened for key direct and indirect PGP traits, including phosphate solubilization, atmospheric nitrogen fixation, Indole-3-Acetic Acid (IAA) production, and siderophore synthesis. Furthermore, the isolates were tested for their ability to produce cold-active enzymes (e.g., cellulase, amylase) and stress-alleviating compounds like ACC deaminase, which mitigate ethylene-induced stress in plants. Results indicate that specific genera, such as Pseudomonas, Arthrobacter, and Acinetobacter, maintain robust PGP activities at sub-optimal temperatures, where mesophilic biofertilizers typically fail. In vivo trials on cold-stressed wheat seedlings demonstrated significant increases in root length, biomass, and chlorophyll content following inoculation. These findings suggest that cryosphere-derived bacteria are promising candidates for developing bioinoculants, providing a biotechnological solution for enhancing crop productivity in high-altitude and high-latitude agricultural systems.

 ISBN: 978-93-48577-14-6

Keywords: Cryosphere; Psychrophiles; Plant Growth Promoting Rhizobacteria (PGPR); Biofertilizers; Cold Stress Tolerance; Phosphate Solubilization; Sustainable Agriculture; Extremophiles

S1-PP32

Bioprospecting of bacteria for plant growth promotion

Guna Karthic M.[1], Ramesh Kumar[1], Grace Lydia Phobe[1], Ashwin R[2]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India

Abstract

The excessive use of synthetic weedicides and fungicides has resulted in persistent soil and water contamination, posing serious risks to ecosystems and human health. The accumulation of these agrochemicals also disrupts native soil microbial communities and induces physiological stress in crops, thereby threatening long-term agricultural sustainability. Consequently, there is a critical need for effective and environmentally friendly strategies to detoxify pesticide residues while simultaneously supporting plant growth and health. Plant growth-promoting bacteria (PGPB), including species of Pseudomonas, Bacillus, and Azospirillum, represent a promising dual-function biological approach. These beneficial microorganisms enhance plant growth through mechanisms such as nutrient solubilization, biological nitrogen fixation, and the production of stress-alleviating phytohormones. In parallel, PGPB contribute to bioremediation by enzymatically transforming and degrading complex pesticide molecules into less toxic or non-toxic metabolites. The application of well- designed PGPB consortia therefore offers a sustainable strategy to simultaneously remediate pesticide-contaminated agroecosystems and improve crop resilience and productivity. This integrated biological approach has strong potential to reduce dependence on synthetic agrochemicals and promote environmentally sustainable agricultural practices.

Keywords: Plant growth-promoting bacteria; Bioremediation; Pesticide degradation; Sustainable agriculture; Soil microbiome; Agrochemical pollution

S1-PP33

Suspension Culture Approach for Bioactive Metabolite Production from Mint Tulsi (Ocimum sp.) for Therapeutic Applications

Nadiyah Thajudeen, Deepika V., Ramesh Kumar V., Prakash Pandurangan*

Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600119, Tamil Nadu, India.

Corresponding author: kpprakashmtech@gmail.com

Abstract

Plants of the genus Mentha are valued for their diverse secondary metabolites, including phenolics and flavonoids, which contribute to antioxidant, antimicrobial, and anticancer activities. These bioactive compounds have attracted increasing interest for their potential role in plant-based therapeutic development. The present study investigates Mentha arvensis, for its anticancer and biofunctional potential using an integrated in silico and experimental approach. To support sustainable and controlled production of bioactive

 ISBN: 978-93-48577-14-6

metabolites, efforts are underway to establish cell suspension cultures of M. arvensis. Extracts prepared from leaves of field-grown plants and from suspension culture biomass will be subjected to phytochemical analysis, including qualitative screening and quantitative estimation of total phenolic and total flavonoid contents. Antioxidant activity will be evaluated using standard in vitro assays and antimicrobial efficacy will be assessed against selected microbial strains. Phytochemical profiling of the aqueous extracts will be performed using gas hromatography–mass spectrometry (GC–MS) to identify major bioactive constituents. The anticancer potential of the extracts will be evaluated in vitro to assess cytotoxic effects against lung cancer cell lines. The integration of computational prediction with phytochemical characterization and biological validation aims to establish Mentha arvensis as a promising source of bioactive metabolites. Additionally, this work emphasizes the development of a sustainable biotechnological platform for metabolite production, contributing to functional phytochemical research and plant-based anticancer drug discovery.

Keywords: Mentha, Suspension Culture, Bioactive Metabolites, Anticancer

S1-PP34

Engineered Peptide Constructs for Immune Response Modulation against Viral Pathogens

Danya Sri[1], Aaqila Sujautheen[1], Sam Ebenezer Rajadas[2]#, Vignesh Sounderrajan[2], Bavanilatha M.[1], Jesia Persis Preethi[1]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.

Corresponding author: samebenezer.r.cddd@sathyabama.ac.in

Abstract

Engineered peptide constructs have become a promising new type of antiviral vaccine and immunomodulators that can overcome a number of limitations of the traditional vaccine platforms. The impact of antigenic drift, immune evasion, drug resistance, unequal stribution of vaccines, and lack of sufficient durability of available vaccines continue to be a major world health and economic burden posed by viral pathogens. Recent breakthroughs in eptide-based vaccines technologies have made it possible to design multiepitope constructs with high specificity, safety, and manufacturability at high rates, in addition to wide opulation coverage via optimal HLA targeting .Antigens have recently been enhanced by recent advancements in lipidated peptides, self-assembled nanofibers, peptide-nanoparticle conjugates, virus-like particle display systems, and mRNA-encoded peptide platforms. Both preclinical and early clinical studies have shown these strategies to be highly Th1-biased immune responses, increase cytotoxic T-cell activation, and resistance to viral variants. It is important to note that peptide-based vaccine candidates have demonstrated long-term T-cell protection, cross-variant reactivity, especially in immunocompromised populations, where antibody-based vaccines tend to fail (United Biomedical COVID-19 vaccine candidate (code 612) and COVID-19 Vaccine for T-cell Immunity (Candidate-1)). Despite them, such issues as a scarcity of late-phase clinical data, unverified immune correlates of protection, complexities in manufacturing due to the use of biomaterial-assisted systems of delivering the vaccine, and regulatory uncertainties persist. The next step will involve combined actions in immunoinformatics, mechanistic immunology, scalable production, and non-discriminatory

use of global distribution. In general, engineered peptide vaccines and immunomodulators are a flexible and scalable next-generation solution to antiviral immunotherapy, which has high potential to respond to pandemics quickly, protect against any variant, and become more globally accessible.

Keywords: Engineered peptide vaccines; Multiepitope immunotherapy; Antiviral vaccine design; T-cell–mediated immunity; Nanomaterial-assisted delivery; Pandemic preparedness

S1-PP35

Non-Tuberculous Mycobacterial Infections: Emerging Threats, Diagnostic Challenges, and Future Directions

Monisha Rao[1], Krithika Saravanan[1], Sam Ebenezer Rajadas[2]#, Vignesh Sounderrajan[2], Jayshree Nellore[1], Jancy Mary[1]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2] Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.

Corresponding author: samebenezer.r.cddd@sathyabama.ac.in

Abstract

Non-Tuberculous Mycobacteria have become the pathogens of global concern as indicated by the growing incidence rate with significant geographic differences in the distribution of the species, especially the rise in prevalence of the *Mycobacterium abscessus* complex. Although advances are being made in molecular diagnostics, standard culture is a slow process, and the ability to differentiate colonization and active disease has continued to be a significant challenge. Potential diagnostic innovation is provided by nanopore sequencing, machine learning-aided imaging, and microbiome-based biomarkers. Clinically, therapy is long term and species specific and poor outcome of *Mycobacterium abscessus* is due to intrinsic and inducible antibiotic resistance. The future is the host-directed therapies, phage therapy, and novel antimicrobials. There are important prevention requirements in environmental reservoirs, healthcare-related outbreaks, and One-Health. This review has defined the research gaps that are considered critical as a standardized surveillance, development of biomarkers, and strong clinical trials.

Keywords: epidemiology, immunopathogenesis, *Mycobacterium abscessus complex*, species diversity, chronic lung disease, molecular diagnostics.

S1-PP36

Antigenotoxic effect of paramylon from Euglena gracilis against heavy metal stress cadmium in Allium cepa root tips

Thirushna[1], Devi[1], Srinivasan[2]*,

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai, India.

Corresponding author: srinivasan.cor@sathyabama.ac.in

Abstract

Cadmium is a highly toxic heavy metal widely present in the environment and is known to induce oxidative stress and genotoxic damage in plant systems. Exposure to cadmium

 ISBN: 978-93-48577-14-6

results in the generation of reactive oxygen species, leading to DNA damage, chromosomal aberrations, and inhibition of cell division. The present study was carried out to evaluate the antigenotoxic potential of paramylon, a β-1,3-glucan polysaccharide isolated from the microalga Euglena gracilis, against cadmium-induced genotoxicity using the Allium cepa root tip assay. Healthy onion bulbs were exposed to cadmium chloride to induce chromosomal damage, followed by pre- and co-treatment with paramylon at different concentrations. Genotoxic effects were analyzed by determining the mitotic index and scoring various chromosomal aberrations in root meristematic cells. The results showed that cadmium treatment caused a significant reduction in mitotic activity and a notable increase in chromosomal abnormalities such as chromosome breaks, bridges, stickiness, and lagging chromosomes. In contrast, roots treated with paramylon along with cadmium exhibited a marked increase in mitotic index and a significant reduction in the frequency of chromosomal aberrations when compared to cadmium-alone treatment. This indicates the protective role of paramylon against cadmium-induced genotoxic stress. The antigenotoxic effect of paramylon may be attributed to its strong antioxidant and free radical scavenging properties, which help in reducing oxidative DNA damage. The findings of this study suggest that paramylon from Euglena gracilis possesses significant antigenotoxic activity and may be used as a natural protective agent against heavy metal-induced genotoxicity.

S1-PP37

Exopolysaccharide-Producing Bacteria from Fish Intestines: Screening, Production, and Characterization

Ramachandiran M[1], Karthik Prakash MP[2], V. Gopikrishnan[2], K. Kavitha[1]

[1]Department of Biotechnology, Hindusthan College of Arts and Science, Coimbatore- 641028 Tamil Nadu, India;

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600 119, Tamil Nadu, India.

Corresponding author: gopivktk@gmail.com

Abstract

Exopolysaccharides (EPS) produced by gut-associated microorganisms have gained considerable attention due to their diverse biological activities and applications in aquaculture and biotechnology. This study focuses on the isolation, production, and characterization of EPS from bacteria obtained from the intestinal microbiota of fish. The gastrointestinal tract was aseptically dissected, and intestinal contents were homogenized, serially diluted, and cultured on Congo Red Agar (CRA) for the selective screening of EPS-producing colonies based on mucoid and pigmented morphotypes. Selected CRA-positive isolates were cultivated under optimized conditions to enhance EPS production. The extracellular polymers were recovered from both cell-associated fractions and culture supernatants, followed by purification by dialysis and lyophilization. EPS yield was quantified, and preliminary physicochemical characterization was conducted. Total carbohydrate content was determined using the phenol–sulfuric acid method, while residual protein contamination was measured using the Bradford assay. Structural characterization was performed using Fourier-transform infrared (FTIR) spectroscopy to identify functional groups. Molecular weight estimation and thermal stability analysis were also carried out to assess polymer integrity. The findings indicate that the fish gut microbiota represent a promising reservoir of biologically active EPS, exhibiting antioxidant, immunomodulatory,

and probiotic-like properties. This study highlights the potential of fish gut-derived EPS as a natural biopolymer for improving aquaculture health and for developing functional biomaterials.

Keywords: Fish gut microbiota; Exopolysaccharides; Congo Red Agar; EPS-producing bacteria; FTIR spectroscopy; Functional biopolymers; Aquaculture health

S1-PP38

Immunomodulators in Tuberculosis Disease Management

Chennupati Shalini[1], Bachina Naga Siri[1], Vignesh Sounderrajan[2#], Sam Ebenezer Rajadas[2], Inbathamizh L[1], Jayashree S[1]

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India.

Corresponding author: vignesh.s.cddd@sathyabama.ac.in

Abstract

Tuberculosis remains a major global health challenge due to its complex immunopathology, prolonged treatment regimens, and the emergence of drug-resistant *Mycobacterium tuberculosis* strains. The outcome of Tuberculosis infection is largely determined by the dynamic interaction between the pathogen and the host immune system, where both insufficient and excessive immune responses contribute to disease progression and tissue damage. Although conventional antimicrobial therapies have significantly reduced Tuberculosis mortality, they fail to adequately address host immune dysregulation, treatment-associated inflammation, and post-tuberculosis lung pathology. Recent advances in immunology have highlighted immunomodulation as a promising adjunct strategy, focusing on host-directed therapies that enhance protective immunity while limiting immunopathology. Various immunomodulatory agents, including cytokine regulators, metabolic modulators, autophagy inducers, natural bioactive compounds, and microbiome-based interventions, have shown potential in preclinical and early clinical studies. However, challenges persist due to heterogeneity in host immune responses, lack of standardized immune biomarkers, limited translational studies, and insufficient clinical trials. Emerging approaches such as immune phenotyping, systems biology, and personalized immunomodulatory strategies offer new avenues to optimize Tuberculosis treatment outcomes. This review critically examines current immunomodulatory mechanisms and therapeutic strategies in tuberculosis treatment, identifies key limitations in existing literature, and defines crucial research gaps related to immune targeting, translational validation, and clinical implementation, emphasizing the need for integrated and host-specific immunomodulatory interventions.

Keywords:

Tuberculosis, Immunomodulation, Host-directed therapy, Immune response, Immunopathogenesis, Therapeutic strategies

ISBN: 978-93-48577-14-6

S1-PP39

Bioprospecting of Fish Gut–Associated *Pseudomonas* sp. as a Probiotic Candidate for Sustainable Aquaculture

Gokul Praveen[1], Safrina Power Singh[1], Karthik Prakash M P[2], Gopikrishnan Venugopal[2*], Radhakrishnan Manikkam[2].

[1]Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai 600119, Tamil Nadu, India

[2]Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai 600119.

Abstract

The fast growth of aquaculture has exacerbated issues of disease outbreaks, environmental contamination, and the over use of drugs, which foster antimicrobial resistance. Probiotics sourced from the gut microbiota of native fish provide a viable option for improving fish health and production sustainably. This research sought to bioprospect gut-associated bacteria from Barramundi (Lates calcarifer) obtained from the coastal waters of Chennai, India, to find prospective probiotic candidates. The gut contents were aseptically homogenised, serially diluted, and cultured on selected and non-selective medium, leading to the identification of twenty morphologically diverse bacterial strains. The isolates were evaluated for essential probiotic characteristics, including antagonistic activity against significant fish pathogens (*Staphylococcus aureus, Aeromonas salmonicida, Aeromonas caviae, Vibrio harveyii, Vibrio vulnificus, and Edwardsiella tarda), production of extracellular enzymes (amylase, protease, lipase, and cellulase), siderophore* production, and resistance to acidic pH and bile salts. Two strains (K5 and K8) shown enhanced probiotic potential among the isolates. Both exhibited significant antibacterial activity, produced several enzymes, and secreted siderophores. Strain K8 exhibited increased resistance to acidic environments and bile salts, whereas K5 showed superior cell surface hydrophobicity, indicating stronger gut adherence. Both strains exhibited auto-aggregation and antioxidant activity, hence reinforcing their functional potential. Gram staining revealed that the chosen strains were Gram-negative, and molecular identification of K8 using 16S rRNA sequencing verified its classification within the genus *Pseudomonas* sp., The results underscore the fish gut microbiota as a significant source of environmentally sustainable probiotics. Utilising indigenous microbial resources may reduce reliance on antibiotics, enhance gastrointestinal health, and foster sustainable aquaculture methods.

Keywords: Probiotic screening; Aquaculture sustainability; Antagonistic activity; Extracellular enzymes; Siderophore production; pH and bile tolerance

ISBN: 978-93-48577-14-6

S1-PP40

Marine Algae Based Green Synthesis of TiO_2 Photocatalysts for Microplastic Degradation: A Comprehensive Review

Keerthana Reddy S[1], Lohitha Kranti D[1], Aswini R[2], Saqib Hassan[1], Ramesh Kumar V[1], Ganesh Kumar[2*]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai, India.

ganeshkumar@sathyabama.ac.in

Abstract

Microplastic contamination persists as a critical environmental challenge due to the chemical stability, long degradation timescales, and bioaccumulation potential of synthetic polymers. Conventional treatment methods provide physical removal but rarely achieve molecular degradation, necessitating more advanced and sustainable remediation technologies. Photocatalysis using titanium dioxide (TiO_2) has emerged as a promising pathway for mineralizing microplastics through reactive oxygen species (ROS)-driven oxidation; however, pristine TiO_2 is limited by UV-only activity, rapid charge recombination, and resource-intensive fabrication. Recent advances in green nanotechnology demonstrate that marine algae can serve as multifunctional biological platforms for TiO_2 synthesis, supplying natural reducing agents, dopants, and structural templates. Marine-algae-derived TiO_2 exhibits narrowed band gaps, enhanced light absorption, increased surface functional groups, and improved electron–hole separation, enabling efficient microplastic degradation under visible and solar irradiation. Studies report accelerated oxidation, chain scission, and fragmentation of polyethylene, polypropylene, polystyrene, and polyester microplastics using these biogenic photocatalysts. The synergy between renewable marine biomass and photocatalytic nanotechnology presents a viable pathway toward scalable, eco-engineered microplastic remediation. Further progress requires integration with continuous-flow reactors, real-water validation, and environmental risk assessment to enable transition from laboratory development to practical deployment.

Keywords

Microplastics; Photocatalysis; Marine algae; Green synthesis; Titanium dioxide (TiO_2).

S1-PP41

Natural Antibacterial Scaffold for 3D Fish Muscle Culture

S.Sandhya[1],D.Suganthi[1],Dr.Jayshree Nellore[2],Ms.Grace Lydia Phoebe,Dr.V.Karthick[1]

[1] Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai, India.

[2]Centre for Ocean Research, Sathyabama Institute of Science and Technology, Chennai, India.

Mail ID: jayshree.biotect2021@gmail.com

Abstract

The development of clean, contamination-free 3D fish muscle tissue is gaining attention in aquaculture and cellular agriculture. However, bacterial contamination during scaffold-based fish muscle culture remains a significant challenge. Natural biopolymers like alginate, soy protein, carrageenan, etc. are widely recognized for their biocompatibility, gelling ability, and

 ISBN: 978-93-48577-14-6

mild antimicrobial properties. Soy protein is rich in natural antioxidants and bioactive compounds, can further enhance the antibacterial potential of biomaterial systems. Combining various ingredients of biopolymers, this study offers a promising strategy to create a natural, antibacterial scaffold suitable for supporting grouper muscle cell adhesion while reducing microbial contamination. This composite scaffold may help create a bioactive material capable of resisting bacterial contamination, promoting muscle cell attachment, and maintaining structural integrity. Characterizing such scaffolds for morphology, stiffness, swelling, degradation, and cell compatibility can lead to advanced solutions for cell-based fish culture, bioengineering, and antimicrobial applications. Evaluating the structural integrity, antibacterial efficacy, mechanical strength, and cell attachment capacity of such a scaffold is essential for its application in 3D fish muscle tissue engineering.

Keywords: cultured fish meat, hydrogel Scaffolds, biomaterials, Antimicrobial properties, sustainable seafood.

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
ACCREDITED WITH GRADE "A++" BY NAAC
CATEGORY - 1 UNIVERSITY BY UGC

International Conference on Biotechnology for Sustainable Development in Environment and Agriculture (ICMBSD-2026)

Jointly Organized by
Centre for Drug Discovery and Development,
Centre for Modern Organic Agriculture Research &
School of Bio & Chemical Engineering

6th – 7th February 2026

SPONSORS

Vital Science Industry

PrEl's Biotech India Pvt. Ltd
(Providing Eco-Logical solutions)

SASS
SRI AMMAN SCIENTIFIC & SURGICALS
Dealers In Lab Chemicals, Glasswares,
Instruments & Plastic Wares

Biopol Biosciences
Where Innovation meets Lifescience

Surana
Sports & Gifts
Kanchipuram

ISHTA™
Panchagavya
Aavyukth Cow Products