"PATHWAY OF PROGRESS" CONFERENCE PROCEEDING

DR. SNEHAL K JOSHI
(Chief Editor)
DR. HETAL PANCHAL
(Co-Editor)

Dolat-Usha Institute of Applied Sciences and
Dhiru-Sarla Institute of Management & Commerce
[Managed by Shri Nootan Kelavani Mandal, Valsad]

"PATHWAY OF PROGRESS" CONFERENCE PROCEEDING

International Conference : AFTBIS-2025 and
National Conference : MBPGSGC-2025

Chief Editor :

Dr. Snehal K. Joshi

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“Pathway of Progress”

Conference Proceeding

Of

International Conference

Event Sponsoror

1RIVET

“Advancing Future Transformation of Business, Industry, and Society: The Synergy of AI, Data, Semiconductors, Cybersecurity, and Emerging Technologies (AFTBIS-2025)”

Held On

11th and 12th January, 2025.

Dr. Snehal K Joshi
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Editorial Board

Dolat-Usha Institute of Applied Sciences and
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“Pathway of Progress”

Conference Proceeding

Of

National Conference

“Microbial Biotechnology: Pioneering Green Solutions for Global Challenges (MBPGSGC-2025)”

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GSBTM

TRANSCRIPTING BRIGHTER BIO FUTURE

Held On

11th and 12th January, 2025.

Department of Science & Technology

Government of Gujarat

Dr. Snehal K Joshi

(Chief Editor)

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Editorial Overview

Dr. Snehal K Joshi

I/C Principal

Dept.Head (Computer Department)

Dolat-Usha Institute of Applied Sciences, Valsad

Acknowledgement

We acknowledge our **1Rivet, GSBTM(Gujarat State Biotechnology Mission) and DST(Department of Science & Technology, Govt. of Gujarat)** for their generous financial assistance and support for organizing conference.

It is with immense pride and gratitude that I present the proceedings book "Pathway of Progress" for the dual conferences, *"Advancing Future Transformation of Business, Industry, and Society: The Synergy of AI, Data, Semiconductors, Cybersecurity, and Emerging Technologies (AFTBIS-2025)"* and National Conference with theme *"Microbial Biotechnology: Pioneering Green Solutions for Global Challenges (MBPGSGC-2025),"* held on January 11th and 12th, 2025. These two parallel conferences, while addressing different yet equally transformative themes, have come together to form a unique collaborative platform for advancing the future of business, technology, sustainability, and science. As the convener of this landmark event and the chief editor of this proceedings book, I am deeply honoured to reflect upon the outstanding contributions of all the participants, our valuable resource persons, governing body of Shri Nootan Kelavani Mandal, organizing team of Dolat-Usha Institute of Applied Sciences and supporters who made this event possible and successful. I am also very much thankful to our valuable event partner 1Rivet and CEO of the organization. MBSI(Microbiology Society of India) played a major role to initiate the conference and selected our institute to host this event. I am privileged to share the collective achievements of this conference, which brought together some of

the brightest minds and visionaries from academia, industry, and research institutions around the world.

The two conferences, while distinct in their thematic focus, converge on the shared goal of exploring and advancing solutions to the global challenges of today and tomorrow. The first conference, *"Advancing Future Transformation of Business, Industry, and Society,"* centred on the transformative power of cutting-edge technologies such as Artificial Intelligence (AI), Data Science, Semiconductors, Cybersecurity, and other emerging innovations. The discussions ranged from the role of AI in automating industries and personalizing services to the advancements in semiconductor technologies and their profound influence on computing, communications, and even healthcare. The increasing importance of cybersecurity as a pillar of trust in the digital age was also extensively discussed.

The second conference, *"Microbial Biotechnology: Pioneering Green Solutions for Global Challenges,"* focused on one of the most promising frontiers in biotechnology—the role of microbes in providing sustainable, environmentally friendly solutions to pressing global challenges such as climate change, waste management, and sustainable agriculture. Researchers presented their work on the innovative applications of microbial biotechnology in biofuels, bioremediation, soil health, and waste-to-resource technologies. This conference highlighted how microbial systems are not just solutions to environmental problems but are also key enablers of the green revolution that is vital to addressing the climate crisis.

The synergies between these two conferences were evident in the collaborative discussions, as the integration of microbial biotechnology and cutting-edge technologies such as AI and data analytics is opening new frontiers in the study and application of sustainable solutions. The interdisciplinary nature of both conferences was emphasized through joint sessions, where participants discussed how advances in technology can accelerate the impact of biotechnology and vice versa.

The success of this joint conference was due to the exceptional efforts of a diverse team of researchers, academics, industry professionals, and technical staff who worked tirelessly to bring together the best minds in their respective fields. Over 400 participants from various research institutions, corporate sectors, and academia joined us in this unique event, contributing papers, articles, and posters that will enrich the pages of this proceedings book.

First and foremost, I would like to extend my sincere gratitude to all the researchers, scientists, and scholars whose work is featured in this proceedings book. The range of research presented—from AI algorithms to microbial solutions—has been truly inspiring. Your hard work, creativity, and innovative ideas are the backbone of this conference, and

the depth of your contributions has ensured that this event has left a lasting impact on all attendees. Your research has sparked new dialogues, led to fruitful collaborations, and will undoubtedly inspire future advancements in your respective fields.

The value of the research papers, articles, and poster presentations cannot be overstated. These contributions reflect the cutting-edge knowledge and pioneering efforts in AI, data, cybersecurity, and biotechnology. The interdisciplinary nature of this event has demonstrated how solutions from one field can be applied to another, whether it be leveraging AI for optimizing microbial processes or using data science to enhance the prediction capabilities of biotech solutions.

I would also like to extend my heartfelt thanks to the resource persons who graciously shared their invaluable expertise during the conference. The keynote speakers and session chairs, drawn from some of the leading research institutions and corporations worldwide, brought unique perspectives to their respective areas. Their lectures covered topics ranging from the ethical challenges of AI deployment to the latest advancements in microbial biotechnology for environmental sustainability. Their deep knowledge and thought-provoking discussions have added tremendous value to the conference and are sure to guide future research and applications.

The role of our resource persons was not limited to lectures; their presence fostered insightful panel discussions and interactive Q&A sessions, where participants could engage in meaningful dialogue. This engagement was key to bridging the gap between academia and industry, and their contributions were integral to making this event a success.

As we look back on the two days of thought-provoking sessions, it is clear that the synergies between AI, data analytics, semiconductors, cybersecurity, and microbial biotechnology will continue to shape the future of business, industry, and society. The research and discussions presented during the conference underscore the importance of integrating these fields to create innovative, sustainable, and scalable solutions.

For example, AI-driven analytics is increasingly being used to optimize microbial processes in bioremediation and biofuel production, and semiconductor technology is helping to create more efficient and powerful computational models to simulate complex biological systems. Similarly, the application of data science to the study of microbial ecosystems is opening new doors to understanding how microbes interact with their environment, leading to more effective environmental solutions.

It is our hope that the collaborations sparked during this conference will continue to grow and that the research presented here will serve as the foundation for further innovation in both technology and biotechnology. The discussions we have had over these two days are just the beginning of an ongoing dialogue that will continue to shape the way we address the world's most pressing challenges.

I would like to once again extend my deepest thanks to all those involved in making this dual-conference event a success. To the participants, researchers, speakers, organizers, and supporters, your contributions have been invaluable, and your dedication to advancing knowledge and solving global challenges is truly commendable.

This proceedings book stands as a testament to your collective efforts, and I am confident that the ideas, collaborations, and research presented here will continue to inspire and drive innovation in the years to come. As we work together towards a more sustainable, equitable, and technologically advanced future, I look forward to seeing the continued progress that will emerge from the synergy of these powerful fields.

Thank you for your participation, and for your unwavering commitment to advancing the future of business, industry, and society through technology and science.

Dr. Snehal K Joshi

Convenor & Chief Editor

AFTBIS-2025 & MBPGSGC-2025

Disclaimer

This publication contains the proceedings of the dual conferences: **"Advancing Future Transformation of Business, Industry, and Society: The Synergy of AI, Data, Semiconductors, Cybersecurity, and Emerging Technologies (AFTBIS-2025)"** and the **National Conference on the theme "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges (MBPGSGC-2025),"** held on January 11th and 12th, 2024.

The proceedings include abstracts, research papers, and research articles submitted by participating authors. Two reviewers using blindfold method approved all submissions. Following to this it was checked for plagiarism using open source plagiarism software, and only those with a similarity index of less than 20% were accepted. Authors have provided undertakings affirming that their submissions are original works.

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– Editorial Board

From the Desk of Head of the Institute

It is with immense pride and joy that I extend my heartfelt gratitude and congratulations to everyone gathered here on the occasion of the parallel conferences organized by our institute: The **International Conference on "Advancing Future Transformation of Business, Industry, and Society: The Synergy of AI, Data, Semiconductors, Cybersecurity, and Emerging Technologies (AFTBIS-2025)"**, organized by the Computer Department of the Institute and The **National Conference on "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges"**, hosted by the Microbiology Department of the Institute in collaboration with the Microbiology Society of India (MBSI). These conferences, organized on the 11th and 12th of January 2025, are a testimony to our institute's commitment to fostering innovation, interdisciplinary research, and collaboration.

The successful organization of this dual-conference event would not have been possible without the visionary leadership and continuous support of **Shri Nootan Kelavani Mandal**, our esteemed parent organization. I would like to express my deepest appreciation to the **President Shri Swatiben Lalbhai, Vice President Shri Kishanbhai Desai, Hon.Secretary Shri Kirtibhai Desai, Assistant Secretary Shri Anishbhai Shah, and all the Trustees of the Mandal.** Your unwavering support in terms of resources, planning, and strategic guidance has been crucial in making this conference a reality. Their commitment to education, research, and social impact resonates deeply with the ethos of this conference, and their efforts have created an environment where cutting-edge research and transformative technologies can thrive.

A special mention must also be made of the organizing committee, faculty members from Computer and Microbiology department and volunteers who worked diligently behind the scenes. Their commitment to ensuring the smooth execution of the conference—from coordinating sessions and managing logistics to ensuring seamless communication—was indispensable. The success of an event of this scale depends on the hard work and coordination of many individuals, and I am deeply grateful to each one of them for their contributions. Their attention to detail and professionalism made this conference an enriching experience for all involved. My sincere appreciation to the **event partner 1Rivet and CEO Mr.Harikrishna Nair** for their invaluable support.

A special note of appreciation to our esteemed **Chief Guest (Inaugural Function), the Vice Chancellor of Veer Narmad South Gujarat University**, for gracing this occasion and inspiring us with their presence and **Chief Guest(Valedictory Function), the Registrar** of **Veer Narmad South Gujarat University, for** his valuable presence**.** I also extend my

gratitude to the **Microbiology Society of India (MBSI)** team, Dr. Gaurav Shah (President-MBSI-Gujarat Chapter), the distinguished **resource persons**, **all reviewers, session chairs, judges,** the enthusiastic **researchers**, **academicians**, and the **corporate delegates** whose participation enriches these conferences.

The publication of conference proceedings with an US-ISBN, encapsulating the knowledge shared during the sessions, is a significant milestone that will contribute to academic and industrial advancements. These events embody the spirit of collaboration and innovation, paving the way for sustainable growth and transformative solutions to global challenges. Let us continue to strive for excellence and make meaningful contributions to society.

Dr. Snehal K Joshi

I/C Principal
Head of the Institute

Re Accredited by NAAC with ' B++, 2.86 CGPA ' Grade

VNSGU | VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

DR. Kishorsinh N. Chavda
Vice Chancellor

No.: VCO/24989/2024

Date: 06/12/2024

MESSAGE

Greeting from Veer Narmad South Gujarat University, Surat!

It is with great pleasure and honor that extend my warm greetings to all the distinguished delegates, scholars, researchers, academicians, and industry leaders gathered here for this prestigious International Conference on Computer Science, IT, A1, Semiconductor, and Industry 4.0, as well as the parallel National Conference on Microbiology and Biotechnology.

This event, organized by the Dolat-Usha Institute of Applied Sciences, Valsad, stands as a remarkable platform for sharing knowledge, fostering innovation, and bridging the gap between academia and industry. It is heartening to see over 300 enthusiastic participants from various domains, contributing to more than 200 research papers and articles. The sheer depth and diversity of the research presented at this conference reflect the tremendous advancements and collaborative spirit in the fields of Computer Science. IT, Artificial Intelligence, Biotechnology, and Microbiology.

I am particularly excited to note the release of the conference proceedings, which will be published by an esteemed international publisher and will carry an ISBN number. This milestone highlights the exceptional quality of research and the significant impact of this conference in shaping future developments. It is an achievement that reflects the hard work, dedication, and passion of all those involved.

I would like to take this opportunity to acknowledge and express my sincere gratitude to Dr. Snehal Joshi, Principal of Dolat-Usha Institute of Applied Sciences, for her visionary leadership, tireless efforts, and commitment to excellence in organizing this landmark event. Her vision and the invaluable contributions of the entire organizing team have made this conference a reality. Without their dedication and teamwork, this gathering would not have been possible.

As we stand at the threshold of technological and scientific breakthroughs, it is events like this that help drive progress and innovation. This conference serves as a testament to the importance of cross-disciplinary collaboration and knowledge exchange, which are essential in addressing the challenges of' our rapidly changing world.

I am confident that the discussions, deliberations, and insights gained here will not only enrich our understanding but also pave the way lot future collaborations and innovations. I wish the participants all the best in their endeavors and hope that the outcomes of this conference will continue to inspire and shape the future of science, technology, and industry.

Once again, my hear felt congratulations to all the participants, organizers, and contributors. May this conference be a great success, and may it lead to fruitful partnerships and ground-breaking discoveries.

With best wishes for a successful event.

Warm regards,

Dr. Kishorsinh N. Chavda

V ice-Chancellor

DR. RAMESHDAN GADHAVI

Registrar

MESSAGE

On behalf of Veer Narmad South Gujarat University, Surat, I extend my warmest congratulations to the organizers of the International Conference on “Advancing Future Transformation of Business, Industry and Society: The Synergy of A.I., Data, Semiconductor, and Emerging Technologies” and the National Conference on “Microbial Biotechnology: Pioneering Green Solutions for Global Challenges”, held on the 11th and 12th of January.

These conference, hosted by the esteemed Dolat Usha Institute of Applied Sciences and Dhiru Sarla Institute of Management and Commerce, Valsad, will provide a platform for insightful discussions and groundbreaking research.

We wish the organizers and participants continued success in their future endeavours.

Yours faithfully,

Veer Narmad South Gujarat University, Surat.

MS. SWATIBEN LALBHAI

President,

Shri Nootan Kelavani Mandal, Valsad

November, 2024

MESSAGE

The integration of ideas by the confluence of Medical sciences and Technology resulting in STEM has put humanity on the verge of a thrilling period in history. Present research in AI and Microbial Biotechnology in its nascent stage puts a lot of questions on its manifestations and the challenges posed by the exponential explosion of unknown possibilities. Humans will be both enriched and challenged as our species breaks its genetic legacy and achieves inconceivable heights of intelligence, material progress and longevity.

The future of this planet will be bright if these developments are accompanied by wisdom emerging out of spirituality.

I wish the distinguished minds the very best outcomes to enhance the public awareness and for the changes in the way we think and live.

SHRI KIRTIBHAI DESAI

Secretary

Shri Nootan Kelavani Mandal, Valsad

November, 2024

MESSAGE

I am happy to know that Dolat – Usha Institute of Applied Sciences and Dhiru – Sarla Institute of Management & Commerce is going to organise two parallel conferences on 11th and 12th January, 2025 and publish conference proceedings in a book with ISBN.

The topics of International Conference – Advancing Future Transformation of Business, Industry and Society: The Synergy of AI, Data, Semiconductors, Cybersecurity and Emerging Technologies and National Conference – Microbial Biotechnology: Pioneering Green Solutions for Global Challenges are interesting and need of the hour. This will really help the students and faculties to understand and gain knowledge from the conference.

I wish all the success to you and entire team of our esteemed institute a grand success.

Thanking you for extending an invitation to send message.

ANISH SHAH

Assistant Secretary
Shree Nootan Kelavani Mandal, Valsad

November, 2024

MESSAGE

Dear Dr Snehal Joshi,

On behalf of Shree Nootan Kelavani Mandal, I would like to extend my sincere congratulations and appreciation to the Dolat Usha Institute of Applied Sciences for successfully hosting the **International Conference on Advancing Future Transformation of Business, Industry and Society** and the **National Conference on Microbial Biotechnology: Pioneering Green Solutions for Global Challenges** on 11th & 12th January, 2025 in our college campus.

These conferences not only provided an invaluable platform for the exchange of innovative ideas and research but also highlighted the significant role of academic institutions in shaping the future of business, industry, and society, as well as advancing sustainability through microbial biotechnology. The topics addressed were of immense importance, and it was inspiring to witness the collaborative efforts of experts, researchers, and professionals coming together to share knowledge and chart a path forward for a more sustainable and transformative future.

I commend your dedication to creating such meaningful forums for discussion and learning, and I am confident that the outcomes of these conferences will have a lasting impact on the respective fields. I look forward to future opportunities to collaborate and engage with the Institute on similar endeavours.

Thank you and your team once again for your hard work and commitment to advancing global knowledge and innovation.

My best wishes to you & Team DUIAS and DSIM&C, Valsad for hosting the Internation and National Conferences.

1RIVET

Harikrishna Nair

CEO

1Rivet - India

MESSAGE

On behalf of 1Rivet, it is our privilege to welcome everyone to the International Conference organized by Dolat-Usha Institute of Applied Sciences, Valsad. The event's focus on pivotal areas such as Computer Science, IT, Artificial Intelligence, Semiconductors, Industry 4.0, as well as Microbiology and Biotechnology underscores the critical importance of fostering innovation and research in these domains. This collaboration between academia and industry is more vital than ever, as we collectively navigate a rapidly evolving technological landscape.

The Need for Research in Key Fields : Today's world demands groundbreaking research in areas such as AI/ML, Quantum Computing, Semiconductor etc. These fields hold transformative potential, driving advancements in automation, healthcare, education, and sustainability. It is imperative to cultivate a culture of inquiry and collaboration to ensure we remain at the forefront of these technological revolutions.

Bridging the Gap: Academia and Industry Collaboration : The synergy between academia and industry is indispensable. While academic institutions excel in foundational research and skill-building, industries bring practical insights and resources to transform theoretical concepts into real-world applications. However, a noticeable gap persists between the requirements of industries and the programs offered by colleges and universities. This disconnect underscores the need for a dynamic approach to education;

one that aligns academic curricula with the skills and expertise demanded by global industries.

Reimagining Curriculum Design : To address this gap, institutions must adopt a forward-thinking approach to curriculum design. Incorporating emerging technologies such as AI, Blockchain, IoT, and Renewable Energy Systems into academic programs will better prepare students for the challenges of tomorrow. Additionally, fostering interdisciplinary learning—blending technology with management, design, and life sciences—can create holistic professionals capable of solving complex, real-world problems.

The Global IT Scenario and India's Growth Prospects : Globally, the IT industry continues to thrive as a cornerstone of economic growth and innovation. As a leader in IT services, India has proven its capability to deliver cutting-edge solutions. However, with the global shift towards automation, data-driven decision-making, and sustainable practices, the Indian IT sector must pivot to, and in some ways have already started pivoting to, high-value areas like AI research, cybersecurity, cloud computing, and semiconductor manufacturing. Investments in upskilling and reskilling our workforce will be crucial to maintaining our competitive edge.

Promising Technologies and Future Needs : As we look ahead, technologies such as AI-driven drug discovery, sustainable semiconductor technologies, advanced robotics, and bioinformatics offer promising avenues for growth. These innovations have the potential to address critical challenges, including climate change, healthcare accessibility, and food security. Focusing research efforts on these domains will not only yield technological breakthroughs but also position India as a global leader in innovation.

In conclusion, events like this conference play a pivotal role in fostering dialogue, sharing knowledge, and driving meaningful collaborations. 1Rivet is committed to supporting initiatives that bridge the gap between academic exploration and industrial application. Together, we can pave the way for a brighter, more innovative future.

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TRANSCRIPTING
BRIGHTER BIO FUTURE

Dst
Department of Science & Technology
Government of Gujarat

Sponsored
National Conference
On
"Microbial Biotechnology: Pioneering Green Solutions for Global Challenges"

On

11th & 12th January, 2025

MBPGSGC2025

MICROBIOLOGISTS SOCIETY
MICROBES FOR BETTER TOMORROW
1996

From the Desk of State President MBSI

Dr. Gaurav S. Shah

Co-Convenor, MBPGSGC 2025

State President, Microbiologists Society, India (MBSI)

It is a privilege and an honour to serve as the Co-Convenor for the National Conference on "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges" (MBPGSGC 2025), organized under the overarching theme "Biotechnology for a Better Tomorrow." This conference is a testament to the critical role that microbiology and biotechnology play in addressing pressing environmental and societal challenges.

In today's rapidly evolving world, microorganisms are emerging as unsung heroes of innovation and sustainability. From their role in waste remediation to their contribution to sustainable agriculture, healthcare and industrial processes, the scope of microbial biotechnology is vast and transformative. This conference is not just an academic gathering but a platform to explore, discuss and share pioneering ideas that can shape a sustainable future.

The conference themes resonate deeply with contemporary global challenges, focusing on microbial innovations in environmental and agricultural sustainability, the integration of artificial intelligence in microbial diagnostics, novel drug discovery methods and biotechnological approaches to ecosystem and biodiversity conservation. These topics are at the heart of cutting-edge research and have the potential to revolutionize the way we address issues like climate change, antimicrobial resistance and ecological degradation.

As a Co-Convenor, I express my heartfelt appreciation to the organizing team of Dolat-Usha Institute, Valsad for their relentless efforts in bringing together a diverse community of researchers, academicians, industry professionals and students. Your dedication ensures the seamless execution of this significant event. I also extend my gratitude to the esteemed speakers and contributors who will illuminate this conference with their knowledge and insights. Let this conference inspire collaborations and ignite innovative ideas that transcend disciplinary boundaries. By integrating advances in microbiology, biotechnology and artificial intelligence, we can forge pathways to sustainable solutions that benefit humanity and the planet alike. I encourage all participants to make the most

of this opportunity to engage, network and exchange knowledge. Let us collectively advance the frontiers of microbial biotechnology and contribute to the vision of a greener, healthier and more sustainable tomorrow.

Dr. Gaurav S. Shah

Co-Convenor, MBPGSGC 2025

State President, Microbiologists Society, India (MBSI)

From the Desk of the Organizing Secretary

Dr. Hetal K. Panchal

HOD, Microbiology Department

DUIAS and DSIM & C, Valsad

I am delighted to welcome you all to the National Conference on "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges". As the Organizing Secretary, I am thrilled to be part of this exciting event and to have the opportunity to contribute to its success. Furthermore, as a Head of Microbiology Department of our college I am extremely excited to pronounce that our college and the Microbiology department have entered in its Silver Jubilee year in 2024.

Present conference aims to explore and advance the role of microbial biotechnology in addressing key global environmental challenges. The scope of the present conference encompasses a wide array of topics at the intersection of microbiology, biotechnology, sustainability and artificial intelligence.

Our team has worked tirelessly to create a memorable experience for all of you. We have meticulously planned every aspect of the event, from the engaging sessions and workshops to the networking opportunities and social gatherings.

We hope that this event will provide you with valuable insights, knowledge, and connections. We encourage you to actively participate in all the sessions, ask questions, and share your thoughts and ideas.

We are committed to providing you with a seamless and enjoyable experience. If you have any questions or concerns, please do not hesitate to reach out to our team.

Thank you once again for joining us. We look forward to seeing you at the National Conference on "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges".

Sincerely,

Dr. Hetal K. Panchal
(Organizing Secretary)

MICROBIOLOGISTS SOCIETY, INDIA

(Reg. No. MAH/4814/SAT)

Dr. A. M. Deshmukh

President

Contact No. +91 9822079782

Ref. No. Mbio/con/24-25/708

Message from Microbiologists Society, India

I am delighted to inform you about the upcoming Conference on Microbial Biotechnology: Pioneering Green Solutions for Global Challenges (MBPGSGC 2025), scheduled to be held on 11-12 January 2025. This prestigious event will take place at the Microbiology Department, Dolat-Usha Institute of Applied Sciences, and Dhiru-Sarla Institute of Management & Commerce, Valsad.

The conference aims to provide a platform for researchers, scholars, and professionals to discuss the latest advancements and challenges in translational research within the field of biological sciences. It will cover a wide range of topics, including but not limited to genetics, molecular biology, biotechnology, bioinformatics, and environmental biology.

Participants can look forward for engaging discussions, insightful presentations, and networking opportunities with experts from around the globe. This conference holds immense promise for fostering collaboration, sharing knowledge, and exploring innovative solutions to address the pressing issues in biological sciences.

I encourage researchers and enthusiasts to mark their calendars for this significant event. Let us come together to explore new horizons, overcome challenges and propel the field of biological sciences toward greater heights of excellence. I wish the conference a grand success.

A. M. Deshmukh

Talk by: Prof. (Dr.) Rakesh K. Trivedy

Director, EM International, Pune

rktrivedy@gmail.com

Title: Phytoremediation: A Biotechnological Tool for Low-Cost and Eco-Friendly Wastewater Treatment

Treatment of wastewater generated by various activities like domestic, industrial, and agricultural are responsible for widespread pollution of freshwaters and a host of waterborne and other serious diseases. Out of the total wastewater generated only a fraction is treated in developing countries as conventional methods of wastewater treatment are expensive, energy-intensive, and generate a lot of toxic sludges, hence are not adopted usually. In the present talk phytoremediation by using aquatic plants like water hyacinth (*Eichhornia crassipes*) shall be extensively discussed. Water hyacinth is one of the most obnoxious weeds in the world and has created havoc all over the world but has the remarkable property of removing pollutants from sewage and industrial wastes. It has the capacity to remove inorganic and organic substances, heavy metals, and even persistent organic chemicals. Besides, the hyacinth plants harvested after the treatment can be put to profitable use. A large number of treatment plants in the world are established based on water hyacinth. The design factors like other engineering methods of wastewater treatment are also developed for water hyacinth-based wastewater treatment. However, the author feels the design factors developed in countries like USA may not work in India. Several studies carried out by the author have proved that the required treatment by water hyacinth achieved in many days in USA was achieved in just two days in India. It is mainly due to climate of India but there is also a role of microbes which proliferate around water hyacinth roots and this aspect needs to be studies on an urgent basis to develop good strains of microbes for effective waste water treatment. One of the biggest advantage of using water hyacinth for waste water treatment is that you can remove nutrients, heavy metals and several toxic organic chemicals which are not removed in conventional wastewater treatment and if you want to remove them in tertiary treatment, the costs are very high, while water hyacinth does it with practically no cost. Water hyacinth after wastewater treatment can be utilized for Biogas generation, in vermicomposting and several other uses, which are discussed. However, there are several questions to be answered and several challenges to be faced which need

intensive research, e.g., the role of microbes in water hyacinth technology for wastewater treatment is not yet fully understood as mentioned above. Utilization of Biomass is again a very important challenge. Acceptance of the technology by Regulatory authorities in India is also a big challenge. Another phytoremediation technology that will be described in this talk is- Root zone technology for wastewater treatment. The root zone technology where the emergent plant species are predominantly *Typha* and *Phragmites* (in fact about 400 aquatic plant species have so far been employed for wastewater treatment). Although it requires more land area, the technology gives miraculous results in terms of wastewater treatment, where the wastewater can even be converted to drinking water. A large variety of wastes starting from sewage to dairy waste, tannery, mining waste, etc. can be treated by Root Zone Technology. Even this technology has many challenges and more studies are required on microbial aspects and performance in developing countries.

alk by: Prof. Sanket J. Joshi

Deputy Director, Amity University, Jaipur, Rajasthan.

sjjoshi@jpr.amity.edu

Title: Antimicrobial Resistance (AMR): A Global Threat

Antimicrobial resistance (AMR) is a growing global concern, where microorganisms like bacteria, viruses, and fungi develop resistance to medications commonly used to treat diseases, making infections harder to treat. This is one of the grave threats of this century that is leading to: rapidly spreading and becoming a formidable challenge worldwide; increasing healthcare costs, both in developed and developing counties; leading to prolonged hospital stays, increasing the economic and personal burden; elevating mortality rates; compromising treatment of common and difficult to treat infections; and undermining complexities in cancer chemotherapy and organ transplants. If we look back to various causes of this grave situation: overuse and misuse of antibiotics (for growing livestock and treatments of common infections with unprescribed antibiotics, i.e., self-medication); poor infection control practices (especially in third world countries); unavailability of new antibiotics to treat such resistant microbial strains; and, drastic changes in environmental factors, making it more complicated! Four antibiotic-resistant pathogens of global concern – *Staphylococcus aureus, Klebsiella pneumoniae*, non-typhoidal *Salmonella* and *Mycobacterium tuberculosis* – are well-reported bacterial pathogens worldwide. It is estimated that bacterial AMR was directly responsible for 1.27 million global deaths in 2019. In India in 2019, there were 297,000 deaths attributable to AMR and 1,042,500 deaths associated with AMR. India has the 60th highest age-standardized mortality rate per 100,000 population associated with AMR across 204 countries. In addition to death and disability, AMR has significant economic costs. The World Bank estimates that AMR could result in US$ 1 trillion additional healthcare costs by 2050. This is a staggering figure, and it's crucial that we take immediate action to mitigate it.

Urgent and immediate action is crucial to mitigate AMR. We need to adopt a "One Health" approach that brings together stakeholders from human health, animal health, and the environment to address this issue. To achieve so in a populated country like India, where we still don't have access to well-curated and strictly controlled health services,

we must: promote responsible antibiotic use; develop new antibiotics; enhance infection control; support research and surveillance; improve global coordination and awareness. Developing new antimicrobial agents can be achieved through increased investment in research and development, as well as innovative approaches to drug development. There is a shortage of new antibiotics in the pipeline and few incentives for industry to invest in research and development in this field. Only limited novel classes of antibiotics have been marketed over the past years.

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11:15 TO 11:45	MBSI award ceremony
11:45 TO 12:15	Keynote Speech
12:15 TO 01:00	Talk by : Dr. Sangeeta Singh
01:00 TO 01:45	Talk by : Dr. Sandeep Bose
01:45 TO 02:30	Lunch Break
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04:30 TO 04:45	High Tea & Cultural Program

Day 2: January 12, 2025

09:45 TO 10:30	Talk by: Dr. Sanket Joshi
10:30 TO 11:15	Talk by: Dr. Jay Bergi
11:15 TO 01:00	Talk: Dr. Rakesh Trivedi
01:00 TO 01:30	Poster Presentation Theme C/D
01:30 TO 02:15	Lunch Break
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AO1

Preparation of nutrient rich organic manures using native PGPF and their appraisal on *Rabi* maize with residual effect on green gram

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Abstract:

Present investigation was attempted to curtail dependency on chemical fertilizer along with restoration of soil health through nutrient rich organic manure prepared using native PGPF. Native fungal isolates obtained from the middle Gujarat region have abilities to solubilize P and K minerals. Two efficient isolates were characterized and identified as *Aspergillus flavipes,* T-3(NCBI Access No.:MW88450) and *Trichoderma aggressivum,* T-17(NCBI Access No.:MW88453). The strains were screened for qualitatively and quantitatively phosphorus and potash solubilization and found that T-17 released higher P (356.6 µg/ml), while T-3 released higher K (18.24 µg/ml). HPLC profile of organic acid showed that isolate T-3 produced malic, acetic and lactic acid, whereas isolate T-17 produced malic, acetic, and citric and butyric acid, predominantly. Hence used to prepare Phosphate Rich Organic Manure (PROM) and Potash Rich Organic Manure (KROM) using P and K rich natural minerals. A field experiment was conducted with different combinations of organic manures and chemical fertilizers in maize-green gram cropping system in the *Rabi*-Summer 2022-23. The results showed significant differences in plant height, seed index, protein, grain and straw yield indifferent treatments. Moreover, treatments receiving application of organic manures showed significant uptake of P and K in grain and slower with improvement in grain quality parameters. In succeeding green gram crops,

better seed and straw yield was recorded as a residual effect of organic manure applied in the main maize crop. Thus, fungi-based nutrient-rich organic manures PROM and KROM supplemented with N fixer *Azotobacter* found effective for crop nutrient management and sustainable agriculture.

Keywords: *PGPF, PROM, KROM, Maize, Green gram*

AO2

Extraction of Bacterial Pigments and Its Application

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Abstract:

Pigments are compounds that impart colors or shades to things. Pigments can be synthetic or natural in nature. Synthetic pigments have caused environment pollution and human health vulnerabilities. So, it is necessary to discover novel natural colorants such as bacterial pigment which were safer and better than synthetic pigments. Nontoxic nature of pigments produced by microorganisms is environment friendly for utilization in textile, cosmetics, and foods industries. More over biological pigments have medicinal important used as antimicrobial and antifungal activities which important for generation of new drugs and biomedical therapies. In our study, pigment producing bacteria were isolated on nutrient agar medium. Out of 47 isolates from garden soil, we were isolated 5 different pigments like golden yellow, orange, green, creamy, pink from the bacteria. *Serratia marcescens* which produce prodigiosin were used for further study. Pigment was used to treat for dyeing three kinds of wool, cotton and nylon fibres and checked its stability. All fibres were checked with cleaning agents, water softeners activities, fabric whitener, anti-redeposition, perfume, wash protection agent and processing agent. Wool fibre has more stability than the others. Moreover, prodigiosin were used as antimicrobial activities against *Pseudomonas aeruginosa, Salmonella typhi, Staphylococcus aureus* as well as antifungal activity against *Fusarium, Curvularia* and *Alternaria species.* In addition to, it also used to decorate the various item such as colored candles.

Keywords*: Prodigiosin, Antibacterial, Curvularia, Textile.*

AO3

Exploring Biogenic Selenium Nanorods: Their Role as EPS-Fused Biofertilizers for Enhanced Plant Growth

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Abstract:

In the current study the selenite-reducing bacterial strain PMVW3, isolated from Vaiguinim Beach, Goa, India, was identified as *Pseudoalteromonas* sp. PMVW3 using 16S rRNA gene sequencing. This strain exhibited high tolerance to sodium selenite (Na_2SeO_3) concentrations of up to 380 mM in Zobell Marine Broth (ZMB). Biosynthesis of selenium nanoparticles (SeNPs) was initiated within 48 hours, as evidenced by the development of a brick-red color in the growth medium and the appearance of a characteristic UV-Vis spectrophotometry peak at 265 nm. Optimal SeNP production was achieved at pH 7 with 2 mM sodium selenite at 28 °C. Morphological analysis of the SeNPs using scanning electron microscopy (SEM) revealed a rod-shaped structure, while energy-dispersive X-ray (EDX) spectroscopy confirmed the elemental composition of selenium. X-ray diffraction (XRD) analysis further verified the crystalline nature of the SeNPs, and transmission electron microscopy (TEM) highlighted distinct nanorods with visible crystal lattices. To enhance their application, exopolysaccharide (EPS) extracted from a marine strain of *Shewanella* sp. was incorporated to create EPS hybrid SeNP formulations in a 6:1 ratio. These EPS-SeNP hybrid significantly enhanced rice seed (*Oryza sativa* var. Jaya) growth, promoting a 1.5-fold increase compared to treatments with EPS or sodium selenite alone. The study highlights the potential of marine bacteria to biotransform toxic selenite into elemental selenium, offering promising applications in bioremediation and nanotechnology.

Additionally, the novel use of EPS hybrid SeNPs as an eco-friendly biofertilizer highlights their relevance in advancing sustainable agricultural practices.

Keywords*: Selenium nanoparticles, Extracellular polymeric substance, green nano biotechnology*

AP1

Phytochemical investigations and antimicrobial activities of various tropical climbers

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Abstract:

The plant contains various phytochemicals namely terpenoids, alkaloids, saponins, tannins, flavonoids which are basically the secondary metabolites. Plant Secondary metabolites are known to reveal medicinal and physiological activities. In the present study, phytochemical investigation of various tropical climbers was made and their potent antimicrobial activity was assessed. In *Momordica charantia*, flavonoid was found highly potent against *Escherichia coli* and *Pseudomonas aeruginosa* while alkaloids were found highly potent against all the tested organisms namely, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, *Proteus vulgaris*, *Serratia marcescens*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Bacillus cereus*, and *Bacillus megaterium*. By studying various phytochemicals of *Basella alba*, saponins was potent only against *Bacillus subtilis*, flavonoid was found potent against *Escherichia coli* and *Pseudomonas aeruginosa* while alkaloids were found highly potent against all the tested organisms namely, *Escherichia coli*, *Pseudomonas aeruginosa, Enterobacter aerogenes*, *Proteus vulgaris*, *Serratia marcescens*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Bacillus cereus*, *Bacillus megaterium*. The leaf extract of *Momordica charantia*was characterized for their phytochemical properties by performing HPLC.

Keywords: *Momordica charantia, Basella alba, Phytochemicals, Antimicrobial activity*

AP2

An accurate assessment of soil microbial biodiversity using plant biodiversity and hyper spectral remote sensing

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Abstract:

Soil is likely to contain billions of microorganisms (Soil microbial flora). They give mechanical and nutritional support to higher plant by formation of soil, fixing atmospheric nitrogen and degrading complex organic matter into simple compounds. Therefore, study of soil microbial flora gives impactful insights about overall health and plant diversity of given ecosystem. Field-based biodiversity enumeration / estimates of Soil microbial flora using traditional methods cover smaller regions of forest cover. Execution of these studies for larger areas of forest cover is time consuming and cost prohibitive. Providentially, plants and microorganism are highly reliant on each other (both physiologically as well as physically). In present study significant relationship were found between measured soil microbial flora and plant diversity in deciduous forest ecosystem ($R2 \geq 0.70$). Consequently, established association is exploited in developing accurate models (Validation RMSE $\leq 10\%$) to measure and map diversity of microorganisms using hyperspectral remote sensing.

Keywords: *Soil microbial flora, Plant diversity, Hyperspectral remote sensing*

AP3

Optimization and Application of Phytase Enzyme in Area of Nutrition for Poultry and decreasing Phosphorus Level in Environment using Phytase as Poultry Feed

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Abstract:

Phytic acid was discovered in 1903, and is found to be nearly ubiquitous component in cereals and grains. It is found to be 80% or more in plants, especially in legumes. Monogastric animals feeding on plants or grains are unable to utilize the phosphate which is bounded to phytic acid. Thus, there are number of phytate degrading enzymes which have been reported and studied, one of them is phytase enzyme. Phytase is also found to be used in the area of nutrition, environment and biotechnology. It has capability to hydrolysed phytate to myoinositol and inorganic phosphate. It releases phosphorus, making its availability for absorption and utilization by monogastric animals (hens, chickens, pigs, swines, etc.) and thereby reducing bounded phosphorus excretion which is in unusable form in environment. Dietary addition of phytase in monogastric animals has shown that it can decrease total phosphorus level in the manure. In several trails, it becomes apparent that manure from chickens fed phytase contained more soluble phosphorus than manure from chickens fed control diet. It was found that microorganisms having ability to produce phytase enzyme and hence can be utilized by monogastric animals as additional supplement in feed. Thus phytase producing bacteria were isolated from the different samples of poultry farm soil available in Valsad and nearby area on PSM (phytase screening medium). Enzyme activity and optimization of enzyme production

was studied followed by partial purification and SDS PAGE for its estimation of molecular weight. Application of phytase enzyme was studied on poultry as the isolated enzyme was found to be extracellular in nature and showed the conversion of phytate to inorganic phosphorus and a positive step towards the problem of eutrophication.

Keywords: *Phytic acid, Phytase, Bacteria, Poultry, Environment remediation*

AO5

Biodegradation of Terepthalic Acid and Sunlight Yellow Dye by Bacillus amyloliquefaciens (EF03)

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Abstract:

Synthetic textile industries release copious amounts of wastewater containing pollutants like dyes and Terepthalic acid into the surrounding water bodies and soil. These pollutants are known allergens, carcinogens and have toxic effects of living organisms. Soil and effluent from textile processing units is a good source for microorganisms with potential degradation activity with respect to pollutants that are high in concentration in these sources. Microbial degradation is a more cost-effective and eco-friendly method of removal of TPA and dyes from synthetic textile industry wastewater. Different microbial species genera like Arthrobacter, Bacillus, Comamonas, Delftia, Pseudomonas, Rhodococcus, Sphingomonas have shown promising biodegradation activity. In this study microorganisms isolated from effluent and dumping ground soil from textile processing units in G.I.D.C, Sachin area were screened for various degradation activities and isolate DW04 showing promising activity was selected for further analysis. Experiments to study the effect of different parameters like Nitrogen source (Organic, Inorganic), pH, temperature, RPM, Inoculum volume, Initial substrate concentration were performed with single and combined substrate combinations. Orthogonal array (L9) and RSM (central composite design) were used to identify significant parameters and their optimum values. The isolate showed growth associated dye and TA biodegradation. pH and RPM were found to be the most significant parameter in combinations setup. A statistical model for biodegradation of both substrates was generated.

Keywords: *Biodegradation, Textile effluent, Dye, Terepthalic acid, Polyethylene terepthalate*

A06

Alternative Approach to Chemically Synthesized Fruit Ripeners with Microbially Produced Ripening Hormone Ethylene

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Abstract:

Fruits contain essential nutritional as well as economic aspects. Fruits mature through a series of molecular and physiological events. Ripening of climacteric fruits is a highly regulated process in which signal transduction occurs in a cascade, leading to gene activation, enzyme synthesis, and finally physiological changes induced by enzymatic actions. Various chemical- based artificial ripeners are used to accelerate fruit ripening process and post-harvest handling. These chemicals showed several health issues on human health hence precaution or control should be needed. Use of ethylene for ripening of fruits is not harmful for human consumption although it is quite expensive since it is produced by fuel cracking. Several microorganisms are able to produce ethylene in good quantities and we can use it for ripening of various fruits. Among the 70 isolates from the 27 different samples 21 isolates showed positive for ethylene production. The ethylene production by E-4 isolate was maximum in Potato peel waste medium after optimization of various parameters. Molecular characterization and phylogenetic grouping of the ethylene producing isolate revealed that the isolate E-4 was Enterobacter cloacae. The effect of fruit ripening treatments such as commercially available ethylene gas sachets and ethylene producing bacteria on ripening of mango were analysed in detail. The physical

and biochemical characters of mango were measured after completion of the ripening process in each treatment. There was a saving of four days with chemical based ethylene gas and two days with microbially synthesized ethylene in the treated mango compared to fruits kept for natural ripening.

Keywords: *Ethylene, Ripening, mango, microorganisms, climacteric fruits.*

A07

Isolation of probiotic organisms from various sources

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Abstract:

Aim of the study is to isolate Lactobacillus sp. as probiotic organism from different sources, the colony characteristics, morphology are noted, biochemical tests and probiotic characteristics are checked. The use of probiotic organism is increasing day by day as a result of scientific evidence that shows the beneficial effect of probiotic in human health. The use of probiotic is ongoing trend and besides scientific evidence that suggest the benefits of it. The purpose of study is to give general idea about probiotic, documentation and properties of the organism present in probiotic.

Keywords: *Probiotic, Lactobacillus, characteristics, morphology, beneficial effect*

A08

The Effect of Some Heavy Metal Accumulation on Physiological and Anatomical characteristics of Colocasia Esculenta (L.) Schott

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Abstract:

Colocasia Esculenta (L.) Schott plant is a member of monocotyledon, family Aracaceae usually found growing near rivers and streams. The above plants were collected from a river bank contaminated by industrial waste water from Valsad District, to study the effect of heavy metals like Lead (Pb) and Mercury (Hg) found in industrial wastewater on the above plant. Collected plants were exposed to varying concentration of Pb & Hg for around 3 weeks in-vitro to study physiological and anatomical changes in plants due to accumulation of heavy metals. Results showed changes and modifications in whole plant when sun-dried and observed microscopically, anatomically, and physiologically. Also increase in chlorophyll content was observed with the accumulation of higher concentration of Pb& Hg in plants.

Keywords: *Colocasia esculenta, heavy metal, chlorophyll contain, petiole anatomy*

A09

High-throughput metagenomic exploration of industrial effluent contaminated soil microbial diversity reveals the xenobiotic aromatic and aliphatic hydrocarbons degradations

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Abstract:

The soil with industrial effluent contamination is one of the major concerns and widely studied soil ecosystem to revel its rich microorganisms for various hydrocarbons degradation and broad application in bioremediation. However, previous knowledge of the genomic properties and functional characteristic of the soil microbes is limited. In current study, we used high-throughput metagenomic sequencing to comprehensively study the microbial community of industrially effluent contaminated soils of three different sites of Dadra and Nagar Haveli Silvassa, India. Metagenomic analysis revels that α-proteobacteria, β-proteobacteria and γ-proteobacteria are the major predominating classes which plays significant role in major hydrocarbon and petroleum compound degradation. The functional characterization on the basis of KEGG annotation represents enzymegroupsandpathwaysinvolvedindegradationofabroadsetofxenobioticaromatic compounds, including toluene,xylene,chlorobenzoate,aminobenzoate, nitrotoluene, flurobenzoate, chloroalkane and chloroalkene, ethylbenzene, chlorobenzene, and polyaromatic hydrocarbons. Some others like drug metabolism, drug resistance and metal resistance as well. The overall data represents the great potential of the studied soil microbiome in the xenobiotic aromatic degradation which provides the putative applications in bioremediation.

Keywords: *Bioremediation, Hydrocarbons, KEGG, Metagenomics, Xenobiotics*

AO10

Microbial Consortium in Kitchen Waste Composting: Evaluation of Compost Parameters and Quality Assessment

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Abstract:

Recently, the rapid increase in the amount of organic waste has led to the problem of environmental pollution. According to the Indian National Environment Report- 2023, the country produces around 1.5 million tons of municipal solid waste (MSW) every day. Present study is an effort to find a technique for reducing the amount of solid waste being collected and dumped. For this purpose, kitchen waste composting was studied. Organic solid waste (OSW) mainly includes kitchen waste, agriculture waste, animal manure, horticulture waste, water sludge, domestic waste and processing residues. Carbohydrates, lipids and protein are the main components of food waste. Composting was carried out from the kitchen waste in household bin with microbial inoculum. This study aims to evaluate the sustainability benefits of home composting and also aims to enhance decomposition rates and compost quality. A diverse microbial consortium was prepared and employed in composting experiments. Various composting parameters such as pH, particle size, conductivity, bulk density, total organic matter, total organic carbon, total nitrogen, C:N ratio, moisture, total phosphate, total potash, heavy metal content, and E4/E6 ratio, were monitored, and the quality of the compost was evaluated after complete composting.

Keywords: *Municipal solid waste, Kitchen Waste Composting, Microbial Inoculum, Household bin, Composting Parameters*

A011

Isolation and Screening of PHB-Producing Microorganisms from Fermented Soil Samples

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Abstract:

Polyhydroxy butyrate (PHB), a biodegradable and eco-friendly biopolymer, is synthesized by microorganisms as an intracellular storage compound under nutrient-limited conditions. This study focuses on the isolation, screening, and characterization of PHB-producing microorganisms from fermented soil environments, which are rich in microbial diversity and organic matter. Fermented soil samples were collected and processed for microbial enrichment using nutrient-limiting media to promote PHB accumulation. Isolates were screened for PHB production through Sudan Black B staining and Nile blue A fluorescence assays, followed by quantitative estimation using solvent extraction methods. Selected isolates were characterized through morphological, biochemical, and molecular approaches to identify high-yielding PHB producers. The results highlight the potential of fermented soil as a valuable resource for isolating efficient PHB-producing strains, offering promising applications in the development of sustainable alternatives to conventional plastics.

Keywords: *Polyhydroxy butyrate (PHB), Bioplastic.*

A012

Exploring Algal Consortia as a Green Alternative: Enhancing Soil Health and Crop Yield in India

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Abstract:

Algal biofertilizers have become an environmentally friendly alternative to chemical fertilizers due to the growing demands on agriculture and the need to reduce their negative effects on the environment. Biofertilization is a sustainable agricultural practice that uses organic fertilizers. Biofertilizers are live microorganisms that improve plant nutrition by mobilizing or increasing the availability of nutrients in the soil. These microorganisms directly or indirectly contribute to the growth, productivity and physiological properties of plants. Biofertilizers promote plant growth and development by increasing access to mineral nutrients, biological nitrogen fixation, phosphorus dissolution, and growth hormone production. The effects of different algal biofertilizers on the Tomato (*Solanum lycopersicum* L.) plant were assessed in a study. Different algal biofertilizer treatments, one chemical fertilizer treatment, and a control group that did not receive fertilizer were all included in the experimental design. The study aimed to evaluate how well algal biofertilizers performed in comparison to conventional chemical fertilizers. Comparing tomato plants treated with algal biofertilizers to those treated with chemical fertilizers, the results showed a significant improvement in growth parameters, nutrient content, and hormone analysis. According to these results, algal biofertilizers are superior to traditional chemical fertilization techniques in improving soil nutrients and plant hormones while also promoting the growth of plant. This study emphasizes how algal biofertilizers can improve crop quality as a sustainable and advantageous substitute for chemical fertilizers.

Keywords: *Algal Consortium, Effective Biofertilizer, Sustainable agriculture, Solanum lycopersicum*

A013

Exploring Biocontrol Activity of Potential Isolates against *Fusarium oxysporum* f. sp. *lycopersici*

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Abstract:

Fusarium oxysporum f. sp. *lycopersici* (FOL) is a prominent phytopathogen causing wilt disease in tomato, resulting in severe losses in tomato production worldwide. The use of biocontrol agents (BCAs) as a sustainable alternative to chemical fungicides providing ecofriendly solution for disease management. This study investigates biocontrol potential of various fungal isolates against FOL by dual culture plate assayand checked for its inhibitory activity. The experimental setup was focusing on ability of isolates to restrict the radial growth of FOL on solid media till 7 days after inoculation (DAI). Statistical analysis, using SPSS software, in which Two-way ANOVA with post hoc testsuggested significant differences in pathogen inhibition percentage. Results indicated that isolates UBN14, and UBN5 demonstrated strong antagonistic effect and inhibited FOL growth to 64%, and 61% respectively. These findings suggest that the utilization of potential fungal BCAs can contribute to reduce the negative impact of FOL infections in tomato crop. On the basis of morphological and microscopic examination these isolates were categorized under *Trichoderma* genus. This research emphasizes the importance of utilization of BCAs into disease management programs to promote sustainable agricultural practice.

Keywords: *F. oxysporum, BCA, Sustainable agriculture, Dual culture plate assay*

AO14

Whole genome sequencing of *Bacillus safensis* LCR7, a plant growth promoting bacteria isolated from *Lantana camara*

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Abstract:

Endophytes are mostly non-pathogenic inhabitants of healthy plant tissues and have been found to promote plant growth and health. The endophytic bacterial strain LCR7 was isolated from the roots of the invasive weed *Lantana camara*. *In vitro* screening was performed to assess its plant growth promoting (PGP) traits to be specific for growth on nitrogen free media; Phosphate, Potassium, Zinc, Calcium solubilization; Auxin and siderophore production. Results of *in vitro* assays predicted the isolate to be a promising plant growth promoting bacteria. The isolate was identified by 16s rRNA molecular gene sequencing. The sequence was submitted to the National Centre for Biotechnology Information (NCBI) and accession number was acquired. To explore, the PGP attributes of the isolate was conducted at genomic level whole genome sequencing was conducted with Torrent Suite Software. The isolate was identified as *Bacillus safensis* LCR7 (Gene Bank accession number - OQ 619180). Detailed genomic analysis revealed that the genome consists of a circular chromosome; having total genome length of 5,355,400 (5.35 MB) encompassed 6091 coding sequences and G+C content 75.2%. Among them, 55 genes mapped and predicted with plant growth promoting activities with Torrent Suite Software which includes 4 genes for growth on nitrogen free media, 3 genes for Phosphate solubilization, 4 genes for potassium solubilization, 4 genes for Zinc solubilization, 2 genes for Calcium solubilization, 5 genes for Auxin production and 33 genes for siderophore production were identified. Our results suggest that *Bacillus safensis* LCR7 is a strong

candidate to be used for plant growth promotion or as part of bioinoculants for agriculture. The genomes of endophytic bacteria are largely unexplored and hence data presented in current study will provide valuable information on the molecular genetics of isolated endophyte.

Keywords: *Bacterial endophyte, Bacillus safensis LCR7 strain, Whole Genome Sequencing (WGS), Torrent Suite Software, Plant growth promotion*

AO15

Evaluation of Biofertilizers Derived from Different Organic Wastes for Crop Growth Enhancement in Field Trials

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Abstract:

This study investigates the efficacy of four different biofertilizers derived from organic waste for enhancing crop growth. The biofertilizers tested include: T_1 = Soil + Farm Yard Manure (FYM), T_2 = Soil + Organic Manure (Paper-Based Vermicompost), T_3 = Soil + Organic Manure (Fruit Peels), and T_4 = Soil + Organic Manure (Plant-Based, Anaerobic Digestion). The paper-based vermicompost (T_2) was prepared using vessel vermincomposting with *Eisenia fetida* worms, while T_4 was created through anaerobic digestion with a microbial blend including *Bacillus subtilis*, *Lactobacillus spp.*, and *Aspergillus niger*. Field trials were conducted with five crops: Mung Bean (P_1), Cowpea (P_2), Pigeon Pea (P_3), Senna (P_4), and Brahmi (P_5), over two years. Pooled statistical data (SPD) analysis indicated that the application of T3 (Fruit Peels) at 200 g per 7-8 kg soil pot promoted optimal growth in *Vigna radiata* (Mung Bean) and *Bacopa monnieri* (Brahmi), whereas T2 (Paper-Based Vermicompost) at 25 g per 7-8 kg soil pot was most effective for enhancing growth in *Vigna unguiculata* (Cowpea), *Cajanus cajan* (Pigeon Pea), and *Senna alexandrina* (Senna). These results suggest that the use of crop-specific biofertilizers can significantly enhance plant growth and yield, highlighting the importance of tailored fertilization strategies for different

Keywords: *Biofertilizers, Organic Waste, Vermicomposting, Fruit Peels, Farm Yard Manure, Anaerobic Digestion.*

A016

Sustainable approach for managing crop diseases using Phyto-endophytes

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Abstract:

The growing use of chemical pesticides in agriculture raises serious concerns about environmental sustainability and food safety. This study explores an eco-friendly alternative for managing crop diseases: the use of endophytes, which are beneficial microorganisms living within plant tissues. These plant-associated endophytes, mainly bacteria and fungi, do not harm the host plant and are present in a variety of plant species. They play a key role in boosting plant health and productivity by enhancing disease resistance and suppressing pathogens.Endophytes support plant health through mechanisms such as producing antifungal compounds, competing for nutrients, and triggering the plant's natural defence responses. Recent research underscores the promise of endophytes in fostering sustainable agriculture by reducing dependence on synthetic pesticides while improving crop yield and resilience.Adopting endophyte-based strategies in crop management promotes ecological balance and strengthens the agricultural system's ability to withstand emerging diseases. Ongoing research is crucial to better understand the relationship between endophytes and their host plants, opening doors to innovative, sustainable solutions for crop protection and productivity.

Keywords: *Entophytes, Sustainable approach, Eco-friendly,Sustainable crop protection,Biocontrol mechanisms*

AO17

Characterization of Actinomycetes isolated under Salt Stress Conditions from Navsari Coastal region for Plant Growth-Promoting Traits and Inoculation effects on *Solanum lycopersicum*

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Abstract:

Excessive usage of chemical products in agriculture leads to environmental degradation, land loss, and reduced soil fertility. Plant-growth-promoting microorganisms are an effective alternative technique for sustainable agriculture. This study highlights the role of mangrove-associated microbes in supporting plant health through growth promotion and biocontrol properties. Mangrove plant rhizosphere associated actinomycetes were isolated and screened for their plant growth-promoting, biocontrol activities and biostimulant effects on *Solanum lycopersicum.* Total ninety Actinomycetes isolates were obtained on three different media. Among these, Seventeen isolates were selected for further study based on the ability such as salt tolerance, plant growth promoting attributes and enzyme production. The isolates showed potential for plant growth promotion by producing nutrient-solubilizing traits (phosphate solubilization, indole-3-acetic acid production) and biocontrol activities (ammonia, HCN, antifungal activity). The isolates also exhibited heavy metal tolerance and various enzyme activities relevant to plant growth-promoting rhizobacteria (PGPR). Antifungal ability of the isolates was measured by the percentage inhibition of fungal growth. Pot culture experiments were conducted to evaluate their effects on plant root and stem length, as well as germination rate.

Keywords: *Mangrove, Actinomycetes, Salt Stress, PGP*

A018

Comprehensive Review on the Biodegradation of Plastics: Progress, Challenges and Environmental Implications

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Abstract:

Development and modernization, high versatility, relatively cheap cost and desirable attributes of synthetic plastics have greatly contributed to their wide applications. Although, its disposal is a major bottleneck. They have tendency to accumulate in the environment for a dubiously long period of time and thus traverse from one habitat to another and then get incorporated into the food chains, posing a serious threat to communities, ecosystems and the planet. There is an urgent need for a proficient, all-inclusive and sustainable remediation solution as a practical alternative to manage, process and dispose of plastic waste instead of its indiscriminate disposal. Although, there are several processes like incineration, landfilling and recycling available but are unsustainable, costly and have serious consequences on the ecosystem as well as the environment including wildlife, marine life and human health. Thus, the contemporary focus has been emphasized on the need of replacements such as biodegradable plastics and alternative disposal approaches, specifically, the potential of microorganisms to degrade synthetic plastics without adverse impacts. In this regard, extensive research efforts have focused on identifying microorganisms and their enzymes with plastic-degrading abilities to convert these polymers into environment-friendly carbon compounds as a sustainable approach. This review aims to provide information regarding types of plastics, their applications,

current status of plastic waste management and degradation approaches with more weightage on the multifaceted roles played by microorganisms and probable enzymatic mechanisms. Furthermore, discussion on current challenges in plastic degradation and future perspectives for the continuous advancement of plastic biodegradation.

Keywords: *Plastics, Biodegradation, Microorganisms, Environment*

A019

Biobased Polymers (Bioplastics): Sustainable Alternatives for a Greener Future- A Review

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Abstract:

Due to increasing environmental burden of plastics waste and rapid increases in the cost of petroleum, the development of "Nature friendly" materials have attracted extensive interest. Bio-based polymers are one of the most innovative and environment friendly materials developed so far. Bioplastics are polymers produced from natural or renewable sources and can be biodegradable. This review deals with the development, types, and applications of bioplastics, focusing on key materials such as polylactic acid (PLA), polyhydroxyalkanoates (PHA), polyhydroxybutyrate (PHB). PHA and PHB are promising bioplastics with unique properties that make them suitable for a wide array of applications. Despite challenges, advances in production and material blending are making them more competitive as compare to traditional plastics and they serve as valuable assets in the shift towards sustainable materials. However, challenges such as cost, durability, and biodegradability under environmental conditions need to be addressed to achieve widespread adoption. Innovations in compostability, recycling, and material blending strategies are essential to optimize bioplastics environmental impact and enhance their role in a circular economy.

Keywords: *Bioplastics, Polylactic acid, Polyhydroxyalkanoates, Polyhydroxybutyrate, Biodegradability, Environmental impact*

AP4

Exploring Ginsenol's Bioactivity: *In Silico* Analysis for Sustainable Agriculture Solutions

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Abstract:

The increasing challenges posed by agricultural pests and diseases highlight the need for innovative biocontrol strategies. This study investigates a novel biocontrol compound, Ginsenol, isolated from the rhizospheric fungi associated with sesame plants. Gas chromatography-mass spectrometry (GC-MS) analysis confirmed the presence and identified the molecular structure of ginsenol, providing a foundation for its bioactivity assessment. Following identification, we conducted molecular docking studies using three computational tools: PyRx, Discovery Studio, and SwissDock. Molecular docking studies revealed strong interactions between ginsenol and critical effector proteins AvrRps4 (PDB ID: 4B6X) from *Pseudomonas syringae* pv. *pisi* and SIX6 (PDB ID: 8EBB) from *Fusarium oxysporum* f.sp. *lycopersici*. These interactions support ginsenol's mechanism of inhibiting pathogen growth and enhancing crop resilience. The outcome obtained from in silico analysis suggested that the bioactive compound namely, ginsenol bind effectively showing -6.5 kcal/mol binding energy for *Pseudomonas syringae* pv. *pisi* and -6.7 kcal/mol for *Fusarium oxysporum* f.sp. *lycopersici*. These findings suggest that ginsenol may serve as a promising biocontrol agent, contributing to sustainable agricultural practices by mitigating pest and disease threats while minimizing chemical inputs. Further investigations into its mechanism of action and field efficacy are warranted to fully harness its potential in crop protection.

Keywords: *GC-MS, Ginsenol, Biocontrol, Molecular Docking*

AP5

Development of an aerobic bacterial consortium capable of degrading Acid Orange 116 dye

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Abstract:

Dyes are difficult biodegradable molecules, used in various different industries such as textile and tannery industries etc. The aromatic chemical structure of dye seems to be the main reason behind low biodegradability of such dyes. Acid orange 116 is a commercially important diazo dye which is not easily biodegradable. Development of an aerobic bacterial consortium capable of degrading Acid Orange 116 dye has been attempted. Present work investigates the dye degradation potential of the developed aerobic bacterial consortium that is isolated and identified from samples collected from three different places, one from dumping site (DSSA) and two sludge sample from pharmaceuticals industry (PSSA and PSSB). Nine isolates were shortlisted after primary screening on the basis of its dye decolorization potential with shortest period of time and highest decolorization efficiency. Individually and in the form of consortium decolorization efficiency of acid orange 116 was evaluated in terms of adsorption capacity and Langmuir isotherm. Further work is aimed to optimize culture conditions for the maximum degradation of this dye.

Keywords: *Textile dyes, Isolation and Screening, Bacterial consortium, Biodegradation and Bioremediation, Application*

AP6

Screening and Analysis of Efficient Phenol-Degrading Bacterial Consortium

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Abstract:

Phenol and phenolic compounds, commonly found as pollutants in textile, petrochemical, pharmaceutical, oil, and food industries, present significant environmental hazards. These compounds are highly toxic, easily absorbed through the skin and respiratory system, and can cause severe irritation and even be lethal if ingested. Their accumulation in the environment, which has increased since the industrial revolution, poses risks to human health. To address this study was conducted to isolate phenol-degrading bacterial consortia from contaminated environments, including an oil extraction site, hydrocarbon-polluted soils, and textile wastewater. Using the enrichment culture technique in Bushnell-Hass Medium (BHM) with phenol as the sole carbon and energy source, eleven distinct consortia were successfully isolated. The phenol degradation performance of these consortia was assessed via the 4-aminoantipyrine spectrophotometric method (λ max = 505 nm). After 10-day incubation in BHM, growth was measured by optical density across a phenol concentration range of 100 to 1000 mg/L. All consortia demonstrated potential for complete phenol removal at 500 mg/L within 72 hours, with the WSU and SSta consortia exhibiting the highest biodegradation efficiency, achieving 100% degradation at this concentration. These all consortia were further observed to tolerate phenol concentrations up to 1300 ppm. This study highlights WSU and SSta as naturally adapted and efficient phenol-metabolizing candidates, suggesting their promising application for bioremediation in phenol-contaminated environments.

Keywords: *Phenol biodegradation, bacterial consortia, environmental bioremediation, phenolic pollutants*

AP7

A Metagenomic analysis of mangrove soil to uncover the Microbial Diversity and its associated Functional Potentialities

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Abstract:

Mangroves are saline tolerant forests existing as a unique ecosystems and rich biodiversity, prevalent in the tropic and subtropical regions. The current research focuses to study the microbial and molecular diversity, through metagenomic approaches to understand the poorly understood association of the microbial communities and its role for mangrove adaptations. High-throughput sequencing technologies, including 16S rRNA gene sequencing and shotgun metagenomic sequencing, were employed to identify the taxonomic composition, functional genes, and metabolic pathways present in the soil microbiome. Our findings reveal a diverse community of microorganisms with significant contributions to key biogeochemical processes such as Methane metabolism, Carbon fixation, Nitrogen fixation and oxidative phosphorylation. This research provides new insights into the complex microbial interactions in mangrove soils and underscores the importance of microbial diversity in maintaining the ecological integrity of these critical ecosystems.

Keywords: *Mangrove forest, Metagenomics, Microbial diversity, Soil microbiome, Functional potential, Biogeochemical cycles*

AP8

Decolorization of Reactive Dyes by Mangrove Rhizospheric Bacteria

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Abstract:

Soil samples were collected from the mangrove rhizospheric region of Valsad, Gujarat, to screen for cultures capable of decolorizing reactive dyes. Five distinct reactive dyes viz. Reactive Red 111, Reactive Red 195, Reactive Yellow 145, Reactive orange 122 and Reactive Black 5 were studied for decolorization, with Reactive Red 111 exhibiting the highest decolorization efficiency. In static conditions, with peptone and NaCl serving as nutrient and salt sources respectively, the mixed culture achieved a notable decolorization rate of 42.5 mg/L/h. The study also involved optimizing various parameters, including salt concentration, peptone concentration, pH, temperature, nutrient source, inoculum volume, and dye concentration. The findings highlight the potential of this marine soil culture in the decolorization of wastewater containing reactive dyes.

Keywords: *Reactive dyes, Decolorization, Optimization, Mangrove rhizosphere*

AP9

Exploration of Plant Growth Promoting Properties and Potential Role in the Production of Plant Secondary Metabolites by Endophytic Bacteria from the Flower of the Medicinal Plant *Impatiens balsamina* L.

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Abstract:

Endophytic bacteria live in plant tissues which utilized in plant protection against phytopathogens with several growth promotion properties. This study aims to investigate the diversity of endophytic bacteria from the flowers of traditional medicinal plants that has medicinal properties. The importance of plant growth-promoting microorganisms in plant growth has been established. However, there are few reports of Balsam flowers containing functional endophytes. Isolation of endophytic bacteria was done by spread plate method. Altogether, 12 endophytic bacteria from the flower of medicinal plants (*I. balsamina*) were obtained. Isolates were screened for the various plant growth promoting properties and with heavy metal tolerance capacity. Further screening of antagonistic activity, which was done by agar well diffusion method for *Ralstonia solanacearum*, *Xanthomonas oryzae* and for *Fusarium oxysporum* dual plate technique was used. After screening potential isolates were inoculated to boost up shoot length, root length, and vigour index of fenugreek seedlings in an *in vitro* study utilising fenugreek herb as an indicator crop. This research shows that these isolates could be employed as bioinoculants in the manufacture of spices.

Keywords: *Endophytic bacteria, Traditional medicinal plants, PGP activity*

AP10

Biocatalytic Transformation of Floral Biomass: A Green Route to Nutraceutical Production

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Abstract:

Floral waste, a substantial byproduct of religious and commercial activities, presents a significant environmental concern. However, this waste is a rich source of bioactive compounds with potential health benefits. Floral biomass, a valuable and often underutilized resource, holds immense potential for producing high-value nutraceuticals through biocatalytic transformations. Microbial fermentation offers a sustainable and eco-friendly approach to converting floral waste biomass into value-added nutraceuticals. This review delves into the recent advancements in microbial fermentation techniques for increasing the value of floral waste biomass. Various microorganisms have fermented diverse flower waste materials. By employing microorganisms like *Saccharomyces cerevisiae*, *Lactobacillus plantarum*, and *Aspergillus niger*, the bioactive profile of flower waste can be substantially improved, with increased antioxidant, antimicrobial, and anti-inflammatory properties. The fermentation process is influenced by temperature, pH, moisture content, and nutrient supplementation. The resulting fermented products exhibit enhanced bioactive compound profiles, including polyphenols, flavonoids, and carotenoids, with potent antioxidant, antimicrobial, and anti-inflammatory properties. Additionally, the production of enzymes, vitamins, and minerals through microbial fermentation of floral waste has been explored. This review highlights the potential of microbial fermentation as a sustainable strategy to address the environmental challenges posed by floral waste while providing a valuable source of nutraceuticals. Future research should focus on identifying novel microbial strains, optimizing fermentation processes, and scaling up nutraceutical production for commercial applications.

Keywords: *Floral waste, Microbial Conversion, Nutraceuticals, Bioactive compounds Sustainable technology*

AP11

Formulation and Prerequisite of Biocontrol agents for Sustainable Practices in India

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Abstract:

The resurgence of plant diseases and insect pests has led to significant crop losses in India. While synthetic pesticides have long been used for pest control, their harmful effects on human health and the environment have led to demand for safer alternatives. This has driven research into Biocontrol agents. India, with its rich biodiversity and indigenous knowledge, offers great potential in pest and disease management using botanical and microbial biopesticides. Despite promising research, few biopesticides have been registered or commercialized in India. This paper discusses the importance of biopesticides in sustainable farming, their formulations, and the need for greater adoption in Indian agriculture. Key biocontrol agents, such as *Bacillus thuringiensis* (Bt), *Trichoderma sp., Beauveria bassiana* and *Azadirachta indica*, have shown potential in managing pests and have been successfully registered and widely used, but many other agents remain underutilized. The paper also discusses the challenges faced in biopesticide development and regulatory issues, and give potential solutions for incorporation of Biocontrol agents into Integrated Pest Management (IPM) in India.

Keywords: *Biocontrol agent, Plant diseases, Formulations, Sustainable farming, Integrated Pest Management (IPM)*

AP12

Degradation And Decolourization Of, Textile Dye By Bacteria Isolated From Textile Industry

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Abstract:

The continuous rise in population and the expansion of industrial activities in sectors such as textiles, leather, plastics, cosmetics, and food processing industries have created a growing demand for novel dyes. Among these, the textile industry stands out as a significant contributor to environmental pollution, particularly through the discharge of azo dye effluents. Current physical and chemical techniques for treating azo dye effluents often fall short due to challenges like pH sensitivity, temperature dependence, and dye concentration variability. The limitations of physico-chemical approaches have driven global research interest in developing alternative, cost-effective, and eco-friendly methods. In contrast, biological approaches utilizing microorganisms, including bacteria, fungi, algae, and yeast, have proven to be more practical and sustainable for wastewater treatment. Bacterial strains such as *Pseudomonas, Bacillus, Corynebacterium*, and *Aeromonas* have demonstrated significant potential in degrading and decolorizing azo dyes. These bacteria achieve dye breakdown through enzymatic mechanisms, such as azo reduction by azo reductases and oxidation by laccases. The process involves breaking down dye molecules into less toxic by-products. Factors like pH, temperature, dye concentration, and nutrient availability significantly influence the efficiency of these microbial processes. Scaling up biological dye degradation methods is possible through the use of bioreactor systems, including suspended growth and attached growth reactors. These systems enhance microbial activity and optimize dye removal efficiency. Biological treatments offer a cost-effective and sustainable, with the added advantage of being environmentally friendly.

Keywords: *Azo dye pollution, Microbial enzyme systems, Bacterial biodegradation, Bioreactor system, Eco-friendly wastewater treatment*

AP13

Biosorption Of Chromium By Banana Peel And Their Degradation By Bacteria

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Abstract:

The presence of heavy metals in water due to industrial activities poses significant risks to human health. When these metals accumulate in the body, they can be toxic and may lead to carcinogenic effects after prolonged exposure. One effective method for removing heavy metals from drinking water is bio-sorption, which utilizes banana peels as a biomass material for adsorption. This approach offers a cost-effective alternative to traditional adsorbents like activated carbon. To assess the effectiveness of banana peels in removing heavy metals, a synthetic water solution was created with specific metals. Key parameters such as pH, agitation speed, biosorbent dose, initial metal concentration, and contact time were varied to evaluate their impact on bio-sorption efficiency. The banana peels were characterized using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups, including hydroxyls, carboxylic acids, alkanes, and amines. Additionally, Scanning Electron Microscopy (SEM) revealed that the surface of the peels was rough and uneven, while Energy-Dispersive X-Ray Spectroscopy (EDS) was employed to analyze the elemental composition of the peels, identifying carbon (C), oxygen (O), potassium (K), chloride (Cl), and silicon (Si).

Keywords: *Banana peel, Bio-soprtion, Heavy metals-Degradation.*

AP14

Biosorption of chromium by chicken feather and their degradation by bacteria

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Abstract:

Heavy metals found in wastewater, often released by various industries, have become a serious environmental concern. However, an innovative solution lies in using chicken feathers to help degrade these metals through a process called biosorption. Research has shown that activated carbon derived from chicken feathers (ACCF) can effectively remove ions of metals like cadmium (Cd^{2+}), copper (Cu^{2+}), chromium (Cr^{3+}), nickel (Ni^{2+}), lead (Pb^{2+}), and zinc (Zn^{2+}) from water. Heavy metals are naturally occurring elements with high atomic weight and a density at least five times greater than that of water. Several studies have examined how metal-enriched environments affect the concentrations of chromium, lead, cadmium, zinc, and copper in chicken feathers. Adsorption tests with chicken feathers have shown that factors like chromium concentration, reaction temperature, pH levels, adsorbent dosage, contact time, and pretreatment with 1% NaOH significantly influence the process. In various studies, chicken feathers treated with alkali (1% NaOH) were highly effective in removing hexavalent chromium [Cr(VI)] from water in batch experiments. The adsorption process was optimized using the Box-Behnken design (BBD) under response surface methodology (RSM). Additionally, Scanning Electron Microscopy (SEM) and Fourier Transform Infrared (FTIR) analysis were performed on the ACCF before and after biosorption, confirming the effectiveness of this method. In summary, chicken feathers represent a low-cost, sustainable option for removing heavy metals like Cr(VI) from water, offering a promising solution to a persistent environmental issue.

Key words: *Chicken feather, bio-sorption, Heavy metals-Degradation*

AP15

Biological Degradation of Plastics and Microplastics

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Abstract:

Plastics are a significant ecological pollutant due to their persistence in the environment and limited degradation pathways. Global plastic production has increased dramatically since 1950, leading to widespread contamination, with only a small fraction recycled or incinerated. Plastics and microplastics (MPs) are found in various ecosystems and pose risks to biodiversity and human health due to their durability, toxicity, and ability to adsorb pollutants. This review examines microbial biodegradation as a promising solution for plastic pollution. Despite challenges such as the recalcitrance of traditional plastics, lack of functional groups, and high molecular weight, microbial diversity offers potential for effective biodegradation. Microorganisms such as bacteria and fungi release enzymes capable of breaking down plastics into less harmful substances. Advances in microbial enzymatic degradation, combined with pretreatment methods, could improve degradation efficiency and mitigate environmental impacts. The study highlights the importance of exploring microbial communities and their interactions with plastics to develop sustainable and efficient biodegradation technologies.

Keywords: *Plastics, Microplastics, Biodegradation, Microorganism, Enzyme, Pretreatment*

AP16

Review: Biofilm- A Next Generation Biofertilizer

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Abstract:

A biofilm is characterized as a beneficial community of microorganisms, including bacteria and other microorganisms that are attached to a surface. These microorganisms' cells are encased in a self-produced matrix of extracellular polymeric substances (EPS), which adhere to one another and help stabilize the structure of the soil, solubilize nutrients, and improve water retention. When applied, biofilm biofertilizer, a biological fertilizer method, creates thin microbial layers. A single microbial species or a variety of microorganisms can form biofilms. When bacteria adhere to a surface, the process of biofilm production starts. In order to overcome the low survivability of the microbial inoculants under extreme environmental circumstances, biofilm biofertilizers—which use combinations of agriculturally valuable microorganisms contained in a mucilaginous matrix—can be a new generation of biofertilizer. The development and growth of biofilm are caused by a number of reasons. Quorum sensing, hydrodynamics, bacterial appendages, horizontal gene transfer, toxic antitoxin system, and environmental conditions are all included. In addition, biofilm production plays a significant role in bacterial infections and diseases, such as endocarditis, tooth decay, and persistent lung infections in people with cystic fibrosis. It aids in preserving soil productivity, improving soil structure, water retention, and nutrient solubilization, reducing the need for chemical fertilizers, reducing plant stress, increasing soil fertility, improving soil qualities, and shielding plant roots from environmental stresses. Enhance soil microbial variety to boost crop yields, encourage nutrient cycling, boost fertilizer effectiveness, prevent plant diseases, enhance plant root colonization, encourage long-term plant growth, and make homemade biofertilizer more

efficient. Biocontrol has shown that the biofilm-based biofertilizer is an organic barrier against disease. As a result, it is an environmentally responsible and sustainable answer for modern agriculture and will be vital to its future.

Keywords: *Microbial communities, Eco-friendly, Sustainable agriculture*

AP17

A Review: Various Applications of Microbial Polysaccharides

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Abstract:

Carbohydrates are a major source of food and energy for most living organisms. Microbial polysaccharides are a long chain of carbohydrates, composed of several smaller monosaccharides produced by microorganisms. Microbial polysaccharides are important for the energy storage, adaptation, pathogenicity of microorganisms, communication. Microbial polysaccharides including capsular polysaccharides (CPSs), exopolysaccharides (EPSs), lipopolysaccharides (LPSs)play vital roles in pathogenicity of plant pathogens and help with agriculture sustainability. In bacteria, Lactic acid producing bacteria, gram negative bacteria, marine bacteria for an example *Xanthomonas campestris, Lactobacillus reuteri, Sphingomonas elodea* produce polysaccharides like dextran, xanthan gum, hyaluronic acid, bacterial cellulose, curdlan, fucoidan, chitosan, pectin are some of the most useful microbial polysaccharides in plant pathogenesis and as well as in other applications. Microbial polysaccharides cause significant impact on the ecosystem and environmental global challenges by providing sustainable alternatives as a biofertilizer, to reducing plastic pollution, in bioremediation, pest control, in biofuel production, sustainability, promote eco-friendly food and health applications. The major challenges of microbial polysaccharides is limited knowledge, cost, it's challenging productions and maintenance but now due to recent use of genetic engineering, microbial polysaccharides can be modify in desired ways by manipulating biosynthesis pathways, by encapsulation, by using genetically engineered strains methods for the protection of the plant against plant pathogens, promoting plant growth, symbiosis, stress toleration and also help in increase soil fertility in agriculture application and it is also helpful in many other applications

like food, pharmaceuticals, wastewater treatments and many more. The utilization of microbial polysaccharides presents a globally applicable strategy for achieving these objectives while minimizing the negative environmental impacts.

Keywords: *Polysaccharides, Pathogenesis, Sustainability, Genetic engineering*

AP18

Comparative Study of Antioxidants and Antimicrobial properties of fresh vs. Dried Spirulina

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Abstract:

Spirulina is a cyanobacterium that belongs to the "blue-green" or cyanophyceaee family of algae, which grow quickly through photosynthesis. Because of its abundance in proteins (60–70%), vitamins, and trace elements, this microbe has been consumed since ancient times, when it first arrived on Earth 3.5 billion years ago. Fresh and dried spirulina, which is well-known for having a rich composition of bioactive chemicals with potential health advantages, will be compared in this study for their antioxidant and antimicrobial properties. The capacity of both fresh and dried spirulina samples to combat free radicals and stop the growth of microorganisms will be assessed. DPPH radical scavenging and ferric reducing antioxidant power (FRAP) assays will be used to measure antioxidant activity. Using well diffusion and broth dilution techniques, antimicrobial activity will be evaluated against common pathogens such as *Salmonella typhimurium*, *Staphylococcus aureus*, and *Escherichia coli*. To improve drying methods that maintain bioactive qualities for wider uses in pharmaceuticals, functional foods, and food preservation, more research will be done.

Keywords: *Spirulina, Bioactive compounds, Antimicrobial activities, Antioxidant activities*

AP19

From Pollution to Solution: Actinomycetes contribution to Oil residue Waste Degradation

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Abstract:

Gram-positive, filamentous bacteria called Actinomycetes are members of the class *Actinobacteria* and order Actinomycetales. These microbes are mostly found in soil and decomposing organic waste, and they help ecosystems break down organic matter and recycle nutrients. Characterized for their DNA with a high G-C concentration, another well-known characteristic of actinomycetes is the production of several bioactive metabolites. For instance, *Streptomyces* generates the therapeutically significant antibiotics Erythromycin, Tetracycline, and Streptomycin. Streptomyces species are employed in agriculture as biocontrol agents against plant diseases and also aid in soil health. Some actinomycetes are useful in bioremediation, especially in the breakdown of petroleum hydrocarbons, in addition to their ecological and therapeutic roles. Oil pollution is a serious environmental issue that damages both marine and terrestrial ecosystems. It is caused by spills, industrial discharge, and leaks. Polycyclic aromatic hydrocarbons (PHAs), one of the hazardous substances found in soil, can linger in the environment and cause long-term harm. Actinomycetes can degrade complex hydrocarbons, such as alkanes and PHAs, thanks to their special metabolic processes. These pollutants are broken down by the enzymes they release, such as alkaline hydroxylase, hydrocarbon monooxidases, and aromatic ring-hydroxylation. Species Because they are especially good at breaking down hydrocarbons, species including *Streptomyces* sp. MB9*, Rhodococcus*, and *Nocardia* etc. are useful for cleaning up habitats damaged by oil.

Keywords: *Actinomycetes, PHAs, Hydrocarbon, Oils, Pollution, Degradation, Waste*

AP20

Isolation and identification of Collagenase-producing microorganisms, their potential application

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Abstract:

The main intent of this review is to evaluate methods for identifying and isolating bacteria that produce collagenase and their possible utility in the food and therapeutic field. Collagenase is a proteolytic biocatalyst with many applications in medicine, industry and research. Collagen is one of the main structural proteins in connective tissues, collagen is essential for several physiological functions, such as remodeling and tissue repair. Collagenase is an enzyme that has many applications in food technology, including meat tenderization, preparation of bioactive functional ingredients, and the preparation of peptides. Collagenase can be used to tenderize meat, and some studies have shown that it can improve the colour and other quality characteristics of meat. This enzyme breaks down collagen, improving wound healing. The review addresses several collagenase sources, especially those originating from microorganisms, highlighting the benefits of employing bacteria for enzyme synthesis because of their quick growth and capacity to generate vast amounts of enzymes. It describes how to separate bacteria that produce collagenase from a variety of settings, such as soil and clinical samples, and describes the enzymatic characteristics of these bacteria. The challenges and possible uses of microbial collagenase in food as well as in therapeutic contexts are also covered in the paper, along with the need for more research to enhance the methods for generating and using the enzyme. All things considered, this review opens the way for advancements in biotechnology and regenerative medicine by highlighting the potential of microorganisms that produce collagenase as a practical tool for developing applications in food industries

as well as in innovative wound healing therapies. The findings of this study contribute to our understanding of collagenase's role in various fields.

Keywords: *Meat tenderization, Wound healing, Enzyme production, Bacterial collagenases, Microbial identification, Biomedical applications*

AP21

Effects of acetic acid bacteria in starter culture on the properties of sourdough and steamed bread

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Abstract:

Today's consumers demand a diverse range of nutritious, flavorful, and long-lasting food products without artificial preservatives. Sourdough, a traditional fermentation process involving cereal flours and water, has gained modern significance. Lactic acid bacteria, yeast and Acetic Acid Bacteria drive this process, dominating the sourdough microflora and enhancing bread dough fermentation. Key factors include dough yield, temperature, starter culture type, medium acidity, and substrate. Sourdough is categorized into three types (I, II, and III), with Type III being the most widely used in commercial production. Benefits, including: Extended shelf Life, Increased value, Delayed staling, enhanced flavor, Improved nutritional value, Enhanced sensory characteristics. Additionally, sourdough inhibits spoilage bacteria and mold growth, contributing to its extended shelf life. This review aims to provide an overview of the current understanding of sourdough's microbial ecology, chemical composition, and technological applications.

Keywords: *Acetic Acid Bacteria, Sourdough, Rheology, Steamed Bread Quality, Volatile Compounds*

AP22

Isolation of Laccase Producing Fungal Strains for Lignin Degradation and Industrial Bio-bleaching Applications

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Abstract:

Lignin, a structurally complex and abundant polymer within plant cell walls, serves as a critical component in plant's structural integrity but presents substantial challenges in industries reliant on lignocellulosic breakdown, including pulp and paper production. Traditional chemical methods for lignin degradation are energy-intensive and environmentally detrimental, often releasing toxic byproducts. This research explores the potential of fungal laccase enzymes as a sustainable, bio-based alternative for lignin degradation and industrial bio-bleaching. Laccase enzymes, primarily found in wood-degrading fungi, catalyse oxidative reactions that facilitate lignin breakdown, offering an eco-friendly approach to lignin removal. The study involved isolating and confirming laccase-producing fungal strains from diverse natural sources such as soil and decayed wood. Sixty-seven fungal cultures were screened for ligninolytic activity in potato dextrose medium supplemented with guaiacol, a substrate for laccase. Among these isolates, the fungal isolate that was identified as *Lividopora benetosta* exhibited the highest laccase production. Further, this study optimized conditions for laccase production by adjusting carbon and nitrogen sources, pH, temperature, and the presence of inducers. In application, laccase enzyme has been used for bio-bleaching processes for paper pulp, with the objective of reducing dependency on chlorine-based chemicals. The optimized enzymatic treatment effectively lowered lignin content while minimizing environmental impact. These findings suggest that fungal laccase enzymes hold significant promise as an

alternative to traditional lignin degradation and bleaching methods in the pulp and paper industry. By advancing the use of laccase in lignin modification, this research supports the shift toward sustainable industrial practices with reduced ecological footprints.

Keywords: *Lignin, Laccase, Lividopora benetosta, Guaiacol*

AP23

Screening and Isolation of Keratinolytic Actinomycetes from the soil and study of their potential for feather waste degradation

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Abstract:

Feather waste, a significant byproduct of the poultry industry, poses environmental challenges due to keratin being resistant to biodegradation. Actinomycetes, recognized for their metabolic diversity, produce keratinase - an enzyme capable of degrading keratin. This study aimed to identify potent keratinolytic actinomycetes to degrade keratinous waste, encouraging sustainable waste management and the recycling of valuable byproducts. The objectives of this study included screening, enrichment, and isolation of actinomycete strains with high keratinolytic activity, optimizing conditions for maximum keratinase production, and developing a consortium of efficient isolates for enhanced degradation. The methods encompassed qualitative screening for protease activity, quantitative keratinase estimation using the Folin-Lowry method, and identification through morphological and 16S rRNA analysis. The key parameters such as temperature, pH, and substrate concentration were optimized to achieve high keratinase yields. Expected outcomes included the isolation of potent keratinolytic strains that demonstrated efficient feather degradation. The amino acid-rich byproducts generated can be valuable in animal feed, organic fertilizers, and growth media, providing an eco-friendly alternative to conventional waste management methods. Industrial applications included using keratinases in leather dehairing processes, where these enzymes effectively removed hair from hides without harsh chemicals, reducing associated environmental pollutants. Additionally, enzyme-rich feather hydrolysates showed potential as plant growth promoters, supporting soil fertility and healthier crop yields, contributing to a sustainable agricultural cycle.

Keywords: *Actinomycetes, Keratinase, Plant growth promotion, Folin Lowry*

AP24

Characterization of lactic acid bacteria as probiotics

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Abstract:

Probiotics are live microorganisms that, when consumed in sufficient amounts offer health benefits. Lactic acid bacteria as probiotics, they help to maintain gut health, improve immune system and reduce the effects of lactose intolerance. In this review provides comprehensive analysis of the characterization of probiotic from lactic acid bacteria including strain selection criteria and critical functional characteristics necessary for survival and activity in the gastrointestinal tract. The importance of strain specific properties, such as acid and bile tolerance, intestinal adhesion and resistance to environmental stress. The characterization section presents various methods for assessing probiotic viability, stability and safety. Currently, there are many types of probiotic products available like liquids, capsules, tablets, etc. Probiotic produce in different sources, such as dairy and non-dairy product. Fermented dairy products, like yogurt and kefir have been use as carriers for probiotics due to their nutrient rich composition. Recently, focused on non-dairy products, like fruits, vegetables and cereals have gained as potential carriers for probiotic bacteria. This review also discusses different health benefits of probiotics in some disease conditions such as, lactose intolerance, inflammatory bowel diseases, and allergy. Additionally, Probiotic strains are used in the food industry to control spoilage and pathogenic microorganisms, thereby increasing shelf life and safety of the product and improve nutritional value. The aim of this review is to present comprehensive overview of lactic acid bacteria as probiotics, their characteristics, mechanisms of action and different application of food products to enhance human health and food safety.

Keywords: *Probiotics, Lactic Acid Bacteria, Characterization, Mechanism of Action, Health Benefits, Survival and Adaptation*

AP25

Isolation screening of pectinase producers, and study of its biotechnological application

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Abstract:

Pectinases, enzymes that degrade pectin, have significant applications in food, agriculture, textiles, and biofuel industries. This study focuses on isolating and screening pectinase-producing microorganisms from diverse environmental sources to explore their biotechnological potential. Soil and decomposing fruit samples, known for harboring pectinolytic organisms, were collected and plated on pectin-containing selective media. Potential producers were identified by clear zones around colonies, indicating enzymatic activity. The dinitrosalicylic acid (DNS) method and viscometer was used to quantify pectinase activity, while optimal production conditions, including pH, temperature, and nutrient sources, were determined to maximize enzyme efficiency. The biotechnological applications of pectinase were explored in juice clarification, and bioscouring of cotton. Using fruit and vegetable waste as substrates for pectinase production demonstrated an eco-friendly approach to sustainable waste management. Pectinase enzymes produced from Vegetable waste were utilized to enhance juice yield and clarity in fruit processing, showcasing its potential for cost-effective, environmentally friendly industrial processes. Additionally, in the textile industry, pectinase provides a sustainable alternative to harsh chemicals for cotton bioscouring, reducing the environmental impact of traditional methods. This research underscores the importance of pectinase in sustainable biotechnology, addressing the growing demand for eco-friendly solutions across industries. By highlighting the versatility and environmental benefits of microbial enzymes, this study contributes to advancing green industrial practices and supports further exploration of microbial biotechnology.

Keywords: *Pectinase, Dinitrosalicylic acid, Bioscouring*

AP26

Boosting Plant Nutrition and Growth Through Zinc-Solubilizing Bacteria

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Abstract:

This study investigates zinc-solubilizing bacteria (ZSB) as an environmentally friendly strategy to combat zinc deficiency in crops, which represents a significant agricultural challenge impacting roughly around 30% of soils globally. This research emphasizes the isolation and characterization of various ZSB strains to evaluate their potential for enhancing zinc bioavailability and promoting plant growth. Soil samples from diverse rhizospheres were collected and screened in order to isolate promising ZSB strains. These strains underwent evaluations for zinc solubilization, which included both qualitative and quantitative assays, while also being assessed for other traits that promote plant growth. The ZSB strains that were isolated were characterized through a combination of morphological, cultural and biochemical analyses; their identities were subsequently confirmed using 16S rRNA gene sequencing. Cultural conditions were carefully optimized to maximize zinc solubilization activity; Pot assays conducted under controlled conditions were implemented to assess their effectiveness in improving plant growth. This research significantly contributes to the advancement of sustainable microbial-based fertilization methods; it offers a potential solution to alleviate zinc malnutrition in crops, while also reducing dependency on synthetic fertilizers. Future research directions could include field trials across diverse environments, investigations into molecular interactions between ZSB and plants and the development of commercial biofertilizer formulations. Additionally, exploring the synergistic effects of ZSB with other beneficial microorganisms may further enhance the efficacy of biofertilizer formulations for sustainable agricultural practices; this is important because it could lead to more effective solutions in the field.

Keywords: *Zinc solubilizing bacteria, Plant growth promotion, Sustainable Agriculture, environmentally friendly*

AP27

Optimization and Characterization of Exopolysaccharide Produced by Lactic Acid Bacterium Isolated from fermented food and study of its application

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Abstract:

Exopolysaccharides (EPS) are biopolymers secreted by bacteria, particularly under stress, and are increasingly recognized for their applications in health, food, and environmental sectors. Lactic acid bacteria (LAB), especially those producing EPS during fermentation, are valued for their unique properties such as high molecular weight and viscosity. This study investigates the EPS production capabilities of an isolate identified as *Weissella confusa*, confirmed through capsule staining, biochemical tests, and 16S rRNA sequencing. This work has optimized EPS production considering various factors such as carbon and nitrogen sources, pH, temperature, incubation time, and inoculum size. The findings revealed that *W. confusa* produced substantial amounts of EPS, suggesting its potential as a cost-effective and eco-friendly solution for diverse applications. Notably, the EPS from this strain has promising implications for plant growth promotion. The EPS enhances soil structure and moisture retention, crucial for plant health, by improving nutrient availability and preventing leaching. Furthermore, it aids plants in withstanding abiotic stresses like drought and salinity by forming a protective layer around roots that minimizes water loss and sodium uptake. Additionally, *W. confusa*-derived EPS may directly stimulate plant growth through the production of growth regulators or indirectly by fostering beneficial microbial communities in the rhizosphere. This interaction can lead to improved nutrient uptake and overall plant vigor. Thus, utilizing EPS from *W. confusa* offers a sustainable approach to enhancing agricultural productivity while promoting soil health.

Keywords: *Exopolysaccharide, Weissella confusa, lactic acid bacteria, plant growth promotion*

AP28

Isolation and Characterization of Bio-surfactant-producing Organisms from Oil-contaminated Sites and Studying Its Application in Bioremediation

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Abstract:

Crude oil contamination presents significant environmental challenges due to its complex composition of hydrocarbons and organic compounds. Yeast, with their ability to degrade hydrocarbons and produce effective biosurfactants, demonstrate significant potential for oil spill remediation and microbial enhanced oil recovery (MEOR) through their capacity to emulsify crude oil efficiently. Various yeast strains were isolated from different soil samples such as garages, petroleum pumps, oil mills. Various techniques were used to analyzed biosurfactant properties, such as drop collapse method, oil displacement test, emulsification index measurement, hemolytic activity assay, and surface tension reduction analysis. The study also quantified biosurfactant recovery using techniques like acid precipitation and solvent extraction revealing its yield influenced by the types of hydrocarbons present in the environment. The strains isolated were identified by using 18sr RNA. For high yield of biosurfactants, temperature, pH and carbon nitrogen ratio factors were used to enhance their potential ability for application in diverse environmental conditions. It detected by (FTIR) Fourier Transform Infrared Spectroscopy. Furthermore, the study explores additional applications of these biosurfactants in bioremediation. The naturally produced biosurfactants offer eco-friendly and sustainable alternatives to synthetic surfactants. This research contributes to the knowledge on microbial surfactants and paves the way for innovative, sustainable solutions to address crude oil pollution.

Keywords: *Crude oil, Yeast, Biosurfactant, Bioremediation*

AP29

Study of Exopolysaccharide Producing Bacteria and its Application for Anticorrosive Biofilm

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Abstract:

Metal corrosion shortens the lifespan of infrastructure, leading to costly repairs and replacements. Reducing corrosion is essential for both economic and environmental reasons. Traditional corrosion inhibitors rely on synthetic chemicals, which possess environmental risks, driving the search for eco-friendly biological alternatives. Exopolysaccharides (EPSs) is a natural compound produced by microorganisms, have gained attention as green corrosion inhibitors due to their biocompatibility, biodegradability, and bioactive properties. EPSs have versatile applications across various industries such as food, pharmaceuticals, cosmetics, agriculture, and packaging where they function as thickeners, stabilizers, and biofilm formers. This study focuses on the role of EPS in corrosion inhibition. EPS-producing microorganisms were isolated from soil and water samples and screened through qualitative and quantitative assessments. EPS yield was then enhanced by optimizing growth conditions, including carbon and nitrogen sources, concentrations, and incubation time. The corrosion protection efficiency of these EPSs was evaluated through FTIR analysis to determine the effect of corrosion rates on steel coupon. Results showed that EPSs can form a protective biofilm on metal surfaces, effectively lowering the corrosion rate. Using EPSs as green corrosion inhibitors not only extends infrastructure lifespan but also reduces environmental impact, offering a sustainable solution for assessing protection.

Keywords: *Metal corrosion, Exopolysaccharide, Eco-friendly, Corrosion Inhibition*

AP30

Radiotrophic Fungi: The Earth Healers Thriving in High Radioactive Environments

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Abstract:

Radiotrophic fungi, such as *Cladosporium sphaerospermum* and *Cryptococcus neoformans*, possess the remarkable ability to utilize ionizing radiation as an energy source through melanin-mediated radio-synthesis. This unique capability allows them to survive and thrive in extreme environments, including radioactive waste sites and contaminated soils. Their potential applications in the environmental and agricultural sectors are significant. In environmental remediation, Radiotrophic fungi can be employed to bio remediate radioactive waste, reduce environmental radiation levels, and restore contaminated ecosystems. Their ability to sequester heavy metals and degrade organic pollutants further enhances their utility in managing industrial and nuclear waste. In agriculture, radiotrophic fungi can improve soil health in degraded lands by facilitating nutrient recycling and enhancing microbial diversity, contributing to sustainable farming practices. Additionally, their radioprotective properties can safeguard crops exposed to radiation, ensuring food security in regions affected by nuclear accidents or cosmic radiation. This abstract highlights the diverse applications of radiotrophic fungi, emphasizing their role in addressing critical challenges in environmental sustainability and agricultural resilience.

Keywords: *Radiotrophic fungi, radiosynthesis, bioremediation, soil health, sustainable agriculture*

AP31

Screening and Isolation of Keratinolytic Bacteria for Poultry Waste Management and Use of Its Hydrolysate for Soil Amendment

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Abstract:

The poultry industry generates enormous amounts of waste, with feathers alone constituting approximately 90% of total poultry by-products and accounting for an estimated 8 million tons annually worldwide. These feathers are primarily composed of keratin, a tough, fibrous protein resistant to degradation due to its complex, cross-linked structure. keratinolytic bacteria offer a promising, eco-friendly solution by naturally degrading keratin and converting feather waste into valuable byproducts. This study aimed at screening and isolation of keratinolytic bacteria capable of degrading chicken feathers and to explore the potential use of their keratin hydrolysate as an eco-friendly plant growth promoting factor. Bacterial cultures were confirmed for their keratinolytic activity in minimal salt medium (MSM) supplemented with chicken feathers as the sole carbon and nitrogen source. Degradation of insoluble protein keratin was quantified using the Folin Lowry Assay. The two bacterial isolates with the highest keratinolytic efficiency were identified. These isolates were used in combination to form a bacterial consortium for their keratinolytic activity which was confirmed through the Lowry Assay. Further optimization was conducted to determine ideal conditions for efficient keratin hydrolysis. The resulting keratin hydrolysate was evaluated for its impact on plant growth using wheat and methi seeds by pot assay. Additionally, the hydrolysate was used to enrich cocopeat, creating a fortified nutrient-rich substrate for enhanced plant growth. This study demonstrates a sustainable approach to poultry waste management, reducing environmental waste and promoting crop productivity. The findings highlight keratinolytic bacteria as an effective, eco-friendly alternative to chemical fertilizers for enhanced agricultural outcomes.

Keywords: *Keratinolytic bacteria, Chicken feathers, Hydrolysate, Follin Lowry*

AP32

Use of Microbial Consortia for Mitigation of Harmful Phenolic Compounds

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Abstract:

Phenol, a harmful environmental pollutant, is primarily produced by industrial activities like petrochemicals, plastic manufacturing, and wastewater discharge. Its high toxicity poses risks to aquatic life and human health, including respiratory issues, skin irritations, and potential carcinogenic effects. Traditional treatments face limitations, including high operational costs and incomplete degradation. In contrast, biodegradation using microbial consortia has emerged as an efficient, eco-friendly, and cost-effective alternative for phenol degradation. This study focuses on the enrichment, isolation, and characterization of bacterial strains capable of degrading phenol. A synergistic microbial consortium was developed to enhance phenol degradation in contaminated environments. The efficiency of phenol degradation was quantified using the 4-Aminoantipyrine (4-AAP) method. Key parameters influencing degradation, such as the composition of the microbial consortium, maximum tolerance to phenol concentration, temperature, pH levels, oxygen availability were systematically evaluated to optimize the bioremediation process. Additionally, the immobilization of this effective microbial consortium was employed to assess the maximum degradation of phenolic by-products from 4 different industrial waste effluents. This study demonstrates a sustainable approach to manage phenolic waste through bioremediation. Bioremediation is a promising solution for managing phenolic waste, converting toxic compounds into harmless substances, contributing to environmental protection and sustainability goals. As industries seek innovative solutions, bioremediation effectively mitigates risks associated with phenolic pollutants.

Keywords: *Phenol degradation, Consortium, 4-Aminoantipyrine method, Immobilization, Bioremediation*

AP33

Stubble Decomposer Microbes: The Environment Heroes

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Abstract:

Delhi faces severe pollution every year with stubble burning in Punjab and Haryana being a contributor. Stubble burning leading to air pollution, greenhouse gas emissions and loss of valuable organic matter. Italso impact soil, health and agricultural sustainability. Our proposed solution involves the application of decomposer microbes to manage stubble residue effectively. Decomposer microbes such as *Trichodermaviride* and *Bacillussubtilis*when sprayed on stubble have ability to accelerate the breakdown of stubble into simpler organic compounds. The benefits of this approach are two-fold: 1) environment 2) agriculture. It reduces harmful pollution, including particulate matter and greenhouse gases, while improving soil structure and fertility. This solution addresses a critical environment challenge and for innovative microbial technologies to create a synergy between pollution control and agriculture benefits.

Key words: *Stubble burning, Pollution, Decomposer, Fertilizer*

AP34

Study of Faecal Contamination in Seawater of Girgaon Chowpatty: A Public Health Concern

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Abstract:

Escherichia coli, a facultative bacterium primarily colonising the human large intestine, is excreted through faecal matter, eventually entering sewage systems and natural water reservoirs. Its presence in environmental sources serves as a reliable bioindicator for faecal contamination, particularly in coastal and recreational waters. Detecting E. coli is crucial for assessing faecal pollution and the potential presence of faecal coliforms and pathogenic microorganisms that pose a threat to public health. This study evaluates faecal contamination of Girgaon Chowpatty waters using the Most Probable Number (MPN) technique to assess microbiological quality of seawater. Weekly samples from January to December 2024 were inoculated in MacConkey broth tubes (double strength, single strength-0.1 ml, and single strength-1 ml) in triplicate. Tubes showing growth with pink colour and gas production in inverted Durham tubes were cultured on MacConkey agar plate. Colonies displaying characteristic E. coli morphology (pink, round colonies with bile precipitation) were selected for further analysis. Confirmation was performed using Modified MUG (4- methylumbelliferyl-β-D-glucuronide) EC broth. The antibiotic susceptibility of isolates was assessed via the Kirby-Bauer method, alongwith laboratory E. coli as a control. The findings highlight the discharge of inadequately treated sewage into Girgaon Chowpatty waters, leading to significant fecal contamination. This contamination poses serious public health risks, as it can cause infections ranging from mild gastrointestinal disturbances to severe conditions resulting from contact through the urinary and gastrointestinal tracts, or via open wounds.

Keywords*: Sea water, Escherichia coli, Faecal Coliforms, MPN, Modified MUG EC broth*

AP35

Effect of bioweedicides on soil dynamics

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Abstract:

In agriculture sector, growth of weeds is a biggest problem, weeds interfere with growth of major plants and responsible to decrease crop yield. An effect of chemical weedicides on soil dynamics in terms of their long-term impact on soil health, microbial communities & nutrient cycling. It effects on soil structure, reduce nutrient availability, increases soil salinity, alteration on soil PH, it causes phytotoxicity to non-target plants, also found a residual effect on plant growth. While bio weedicide has potential advantages in reducing the use of synthetic chemicals, their impact on soil dynamics needs careful evaluation. There are various parameters related to soil dynamics are assessed when using bio weedicide in soil.it is assessed using various techniques such as soil microbial analysis(16s rRNA sequencing, metagenomic analysis.),soil enzyme activity, nutrient profile analysis, PH, carbon dynamics in soil, phytotoxicity & plant growth trials, soil phyco-chemical analysis, plant growth studies etc. there are various application of bio weedicide in soil dynamics such as enhancement of soil microbial activity, reduction of soil toxicity, improved carbon sequestration, sustainable nutrient cycling , minimize soil erosion etc. so, bio weedicide play a crucial role in maintaining soil health while managing weeds, making them an integral part of sustainable agriculture.

Keywords: *Bioweedicides, carbon sequestration, phytotoxicity*

AP36

Powering sustainability: Waste water treatment for energy generation

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Abstract:

Microbial fuel cells are bioelectrochemical systems in which the chemical energy is converted into electrical energy. The microbes oxidize substrate and generate electrons and protons in anaerobic conditions which are collected and transferred through the PEM generating electricity. In the current study, many alternative approaches are studied for optimum generation of electricity through the microbial fuel cell, such as sulfate removal, denitrification, nitrification and further modifications in design, components of MFC units, electrode configuration, addition of redox-active agents, electron-donating mediators, and biofilm acclimation. The power generation with single-chamber MFC with bacterial isolates San1 gave a power density of 2.17 W/m², San3 of 2.27 W/m², San8 of 9.68 W/m² respectively whereas the double-chamber MFC with isolates San1 of 2.81 W/m², San3 of 2.18 W/m², San8 of 0.84 W/m² respectively. In Dual-chamber MFC, San1 having salt bridge 3% with $K[Fe(CN)_6]$ generated 3 W/m² and salt bridge 5% with KCL generated 9.37 W/m². The consortia however generated power density of 1.09 W/m² and 2.10 W/m² for double chamber and single chamber respectively. The algal strain generated the highest power density of 37.50 W/m². Microbial isolate San 9 showed an effective reduction in the COD of wastewater and higher power generation as compared to the isolates San1, San3 and San8. Further optimization will become an effective alternative of wastewater treatment and with additional benefit of power generation.

Keywords: *MFC, electricity, bioelectrochemical system, sludge, COD*

AP37

Isolation, Screening and Characterization of Biosurfactant producing microorganisms

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Abstract:

Biosurfactants are surface-active substances created by microorganisms, providing environmentally friendly options compared to synthetic surfactants. The current focus is on isolating and screening microbes that can produce biosurfactants from hydrocarbon-rich contaminated soils, which were identified as potential sources for these producers. Enrichment methods using media based on hydrocarbons were implemented to promote the growth of biosurfactant-producing microorganisms. Various screening techniques, such as the oil displacement assay, emulsification index, and drop-collapse test, were employed to evaluate surface activity. Promising isolates were retrieved and underwent further characterization. Several factors that influence biosurfactant production were examined, including the type of carbon source, nitrogen source, and temperature.so these isolates would further be examined for future application for various environmental activities which could be Oil spill removal, Heavy metal removal and treatment of wastewater.

Keywords: *Biosurfactant, Drop collapse test, Emulsification Index, Oil displacement assay*

AP38

Biosorption of Heavy Metal

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Abstract:

Heavy metal pollution in wastewater has emerged as a significant environmental challenge on a global scale. The presence of heavy metal contaminants raises serious concerns due to their potential to bioaccumulate in the food chain, which can adversely impact human health. Various methodologies have been employed to remove heavy metals from wastewater, including conventional techniques such as chemical precipitation, coagulation, flocculation, ion exchange, and membrane filtration. In recent years, biological treatment methods, particularly those employing microbial sources, have garnered considerable interest for their efficacy in removing and recovering heavy metals. These biological approaches are often favoured due to their cost-effectiveness and reliability compared to conventional chemical and physical methods. Biosorption represents a process that utilizes biomass to bind and concentrate specific metal ions from aqueous solutions. This technique offers several advantages over alternative technologies, including enhanced efficiency, reduced costs, and environmental sustainability. Thus, biosorption serves as an effective method for the removal of heavy metals, dyes, and organic compounds from wastewater.

Keywords: *Biosorption, dye removal, Environment sustainability, Heavy metal*

AP39

Analysis of Biosurfactants Activity Produced by Actinomycetes from Different Mangrove Regions in South Gujrat

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Abstract:

The mangrove environment changes significantly depending on geography, location, pH, high temperature, salinity, moisture, and nutrients; thus, the mangrove-associated organisms are diverse and distinct. Gujarat has the second-largest mangrove cover (1103 sq/km) of the country (4628 sq/km). Gujarat, in western India, contains the largest area of mangroves, which are spread over the Gulf of Kutch, Saurashtra, and South Gujarat. Mangrove ecosystems are rich in microbial diversity including Actinomycetes. Actinomycetes are known for their ability to produce wide range of the bioactive compounds as secondary metabolites such as antimicrobial compounds, antibiotic, biosurfactants, plantgrowth hormones etc. Biosurfactants are surface-active compounds or bioemulsifiers because their amphiphilic structure enables them to reduce surface and interfacial tension, making them valuable for diverse industrial, environmental, and medical applications.

Keywords: *Actinomycetes; Biosurfactants; Bioactive compound; Mangrove*

AP40

Optimization and determination of mycelial growth of *Agaricus bisporus* with varied environmental and cultural conditions

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Abstract:

Agaricus bisporus commonly known as button mushrooms are the most widely consumed and cultivated mushrooms also is an economically important crop worldwide. Agricultural waste can be used as a compost for its growth. *Agaricus bisporus* is isolated by tissue culture method from mature fruiting bodies on Potato Dextrose Agar (PDA) plate after incubation it gives white to off white, cotton like or fluffy at first and later smoother and compact mycelium growth. Mycelium is dense and filamentous. Its growth can be affected by environmental factors such as carbon-nitrogen ratio (C: N ratio), Moisture content, Temperature, pH, and other microbial contaminants. The mycelium growth of Agaricus bisporus is optimized at temperature 18 to 20°C, pH is kept slightly acidic (pH 6) and dark or low light condition. Its mycelial growth can vary from 50-70 mm on PDA plate. Bacterial contamination can be controlled by adding 50 microgram / ml of Chloramphenicol to PDA media. Its mycelial growth is determined by several techniques such as visual observation, microscopic observation (septate hyphae), chitin determination assay and race tube technique.

Keywords: *Agaricus bisporus, environment factors, optimization, mycelial growth, PDA*

AP41

Biosynthesis of Zinc Oxide Nanoparticles and it's applications

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Abstract:

Zinc Oxide Nanoparticles (ZnO-NPs) are tiny particles of zinc oxide with a diameter of less than 100 nm. It's synthesis through biogenic methods have gained significant attention due to their unique properties and potential application in various biological fields. Zinc is mostly found in environment mostly in the soil from igneous rock (black soil). It is also found from food product such as red meat and poultry. Many microbes such as bacteria, actinomycetes, fungi and yeast have capacity to produce zinc oxide nano particles. These organisms producing zinc can be isolated from the waste water plant, polluted Lake, dairy products etc. For detection of nanoparticles analytical methods are used which involves UV rays and Zeta potential techniques. Also Scanning electron microscope and Transmission Electron Microscope is used for detection of particle size. ZnO NPs are applicable as drug delivery system, antibacterial agent, bio imaging, biosensors and Nano fertilizers for improved crop growth.

Keywords:-*Zinc Oxide Nanoparticles, Synthesis, Application*

AP42

Microbial Melanin: Production, Characterization, and its Application in Sustainable Bioprocessing

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Abstract:

Melanin, a versatile class of natural pigments, is characterized by its dark brown to black color, hydrophobicity, negative charge, and structural heterogeneity. These biopolymers are synthesized via oxidative polymerization of phenolic and other precursor compounds. Based on their chemical structure, melanins are categorized into eumelanin, pheomelanin, allomelanin, pyomelanin, and neuromelanin. Melanin can be sourced from a variety of organisms, including bacteria, fungi, plants, and animals. Its extraction commonly involves acid precipitation, alkali treatment, and centrifugation, followed by purification steps using solvents like ethanol, methanol, and acetone. Advanced techniques such as UV-Visible spectroscopy, nuclear magnetic resonance (NMR), scanning electron microscopy (SEM), transmission electron microscopy (TEM), high-performance liquid chromatography (HPLC), and Fourier-transform infrared (FTIR) spectroscopy are employed for comprehensive characterization of melanin. Naturally derived melanin, particularly from microbial sources, has garnered significant attention for its diverse bioactivities, including antibacterial, anticancer, bioadsorbent, and therapeutic properties. These bioactivities, along with melanin's inherent photoprotective capabilities, make it a valuable resource for applications in nanobiotechnology, drug delivery, organic semiconductors, environmental bioremediation, and cosmeceuticals. Recent advancements in bioprocessing technologies focus on optimizing the industrial-scale production of microbial melanin as a sustainable and eco-friendly alternative to synthetic melanin. This transition aligns with the global emphasis on sustainable bioprocessing, unlocking the potential of natural melanin for diverse and innovative applications across industries.

Keywords: *Natural melanin, microbial production, Extraction, Characterization, Sustainable bioprocessing*

A020

Revealing the Potential of Lignocellulosic Biomass: Boosting Cellulase Production by Optimizing Fermentation Parameters for Sustainable Application

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Abstract:

The growing need for energy and raw materials, alongside environmental concerns about waste biomass, underscores the potential of lignocellulosic biomass for sustainable development. This study aims to enhance cellulase production by optimizing fermentation parameters and facilitating the efficient breakdown of lignocellulosic materials like rice straw and sugarcane bagasse. Cellulase is a vital enzyme in converting cellulose, Earth's most abundant renewable resource, into simpler sugars suitable for biofuel production and other applications. We collected cellulosic-rich soil samples from Valsad, isolating 15 cellulolytic fungi primarily screened on Mineral salt media having CMC as sole carbon source & maintained as pure culture. Depending upon the maximum diameter of clear zone observed on theagar medium & cellulolytic efficiency 2 fungal strains (F2 & F6) selected for enzyme production. By adjusting parameters such as pH, temperature, carbon source, nitrogen sources, and incubation duration, we examined their effect on cellulase activity, identifying conditions that maximize enzyme production. Results indicate that optimized fermentation significantly boosts cellulase yield, enhancing the sustainable degradation of lignocellulosic biomass. This research highlights the potential of fungal cellulase in biofuel production, paper and pulp processing, and biochemical manufacturing, addressing both energy requirements and environmental sustainability.

Keywords: *Lignocellulosic Biomass, Fermentation Optimization, Fungal Cellulolytic Enzyme, Environmental Pollution, Agricultural Waste Utilization*

AP43

Isolation of Detergent-Degrading Bacteria from Soil and Optimization of Degradation Parameters towards Enhanced Bioremediation Strategies

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Abstract:

Detergents are the major contaminants that pollute the environment and inhibit microbial activity and plant growth. In this study, nine bacterial strains capable of degrading detergent were isolated from contaminated sites, with isolate AD7 showing the maximum degradation efficiency. In optimization of degradation study, Maximum degradation occurred after 72 hours of incubation in Minimal Salt Medium (MSM) at 30°C and pH 8, enhanced by 1% (w/v) xylose and 0.5% (w/v) ammonium chloride as a carbon and nitrogen source. Optimization significantly improved degradation compared to optimized conditions. Further isolate AD7 cells entrapped in alginate polymer and were reusable for three cycles with good degradation efficiency. Further toxicity and seed germination studies confirmed that degraded detergents were less harmful, supporting AD7 as a promising candidate for bioremediation of detergent-contaminated sites.

Keywords: *Bioremediation, Detergent degradation, Optimization, Microbial toxicity*

AP44

Review on: Biological Treatment of Chemical Effluent

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Abstract:

An global expectation is to make a sustainable biological , non-hazardous eco-friendly environment and disposal of wastewater treatment by several methods. As the processing method, the different waste material are produced at different stages which includes dyes and wastewater. The chemical and wastewater released in environment shows negative impact on aquatic animals, plants as well as humans. The discharge before releasing in water bodies must be treated with different method to remove the effluents from it. The techniques used for treatment incudes chemical treatment method, physicochemical treatment and biological treatment methods. The present studies shows more attention on biological treatment methods as it is cost effective and produce less or no sludge.The biological treatment methods involve Microorganism mostly microalgae , bacteria and in some instance fungi, yeast, and enzyme decolorize dyes into simple and non-toxic compounds. Bacterial culture isolated from wastewater plant have capacity for decolorization and biodegradation of toxic chemical dyes. This review shows the most of part related to the effect of various parameter like pH ,temperature, dye concentration and dye removing efficiency of bacteria through biodegradation and decolorization mechanism performance.

Keywords: *Effluent treatment, Micro-organisms, Decolorization, Bioremediation Process*

AP45

Green Synthesis of Zinc Oxide Nanoparticles using *Andrographis Paniculata* and *Moringa Oleifera* extracts: Photochemical Profiling and Antioxidant Properties

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Abstract:

Green nanoparticles synthesized from biological components are biocompatible, eco-friendly and cost-effective. They possessmyriad properties benefitting agriculture, environment, medicine and energy. These eco-friendly nanoparticles help provide sustainable solutions for therapeutic and environmental challenges.The present work intends to prepare green nanoparticles from extracts of *Andrographis paniculata* which possesses antioxidant, anticancer, antimicrobial and anti-inflammatory propertiesand *Moringa oleifera,* rich in flavonoids and tannins which contributes to anti-microbial, wound healing and anti-oxidant effects.Hot extraction of active metabolites from these medicinal plants was done using a range of non-polar and polar solvents like methanol, petroleum ether, chloroform, and water. Preliminary tests confirmed the presence of several bioactive compounds like flavonoids, tannins, alkaloids, terpenoids, glycosides, saponin, phenols and steroids.These phytochemicals are necessary in providing reducing and stabilizing abilities crucial for nanoparticle synthesis. Green synthesis of nanoparticles using leaf extracts from both plants was done using zinc oxide as the reductant. Spectrophotometric analysis to determine the efficiency of green synthesized nanoparticles revealed that nanoparticles formed fromaqueous and chloroform extracts were most potent amongst various solvents used in the present study. Green nanoparticles from both the extracts

also possessed antioxidant properties as confirmed by free radical scavenging assay. The bioactive compounds present in the extracts not only enhances synthesis of nanoparticles but also supports their functional properties,making them prospective components for therapeutic use in medicine and healthcare.

Keywords*: Green synthesis, Nanoparticles, Bioactive compounds, Phytochemicals*

A021

Optimization of Media Components and Reaction Conditions of Extremozymes for Enhanced Activities

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Abstract:

Laccases are multi-copper oxidase enzymes, which can catalyze oxidation of phenolic as well as non-phenolic compounds have a wide range of applications in the pharmaceutical, medical, textile, and food industries. It is the most extensively studied enzymes in the modern age. In the present study, the bacterial strain JB1 was isolated from the industrial sludge and screened as the most potential strain for laccase production. Plackett-Burman Design (PBD) was used to screen 7 factors relevant to enhancing laccase production. Later, Central Composite Design (CCD) was applied to optimize three components: Cellulose (1.5 % W/V), Urea 0.7 (%W/V), and $MgSO_4$ (0.05mM). Under which the highest enzyme activity 2.218 U/ml achieved which signifies the efficiency of the approach for enhancing enzyme production. The presence of peak at 200 nm and absence of peak at 600 nm is indicative of white laccases or yellow laccases which determines the type of laccase enzyme. Temperature and pH stability of laccase enzyme showed 60% stability up to 70 °C for more than two hours and near 60 % stability up to pH 14 for more than two hours giving the enzyme tremendous application in biodegradation as well as in the food and pharmaceutical industries.

Keywords: *Plackett-Burman Design (PBD), Central Composite Design (CCD), UV-spectra, XRD*

AP46

Isolation and Screening of β-fructofuranosidase Producers for Prebiotics

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Abstract:

Fructooligosaccharides (FOS) are significant and prominent prebiotics that affect various physiological functions by promoting positive impact on health. They are derived from various substrates by microbial enzyme, β-fructofuranosidase(Ffase) or invertase. Prebiotics have recently received noteworthy attention due to several beneficial effects on health because of their low calorific, non-cariogenic and bifidogenic properties. Fructooligosaccharides are commercially produced from several microorganisms by the action of microbial enzyme β-fructofuranosidase(Ffase)with disaccharides or polysaccharides, such as sucrose or inulin as substratesand fungi are undoubtedly the most potent producers of this extracellular enzyme. The present study is aimed at isolation andscreening of indigenous filamentous fungi for their abilitiesto produce β-fructofuranosidase. Prospective soil samples from nearby areas of sugar manufacturing industries were obtainedto isolate and screen for potent β-fructofuranosidase producers. Several fungi were isolated when grown on basal culture medium at 30°C for 96 hours. Preliminary screening of all isolates for their β-fructofuranosidase activity was based on the ability of fermentation broth to reduce 1,3,5-triphenyl tetrazolium chloride (TTC); a soluble colorless substance to pink colored complex. Forty different isolates of filamentous fungi were screened through preliminary screening which were subjected to secondary screening to determine Ffaseactivity by DNS method. *Aspergillus* sp. was found to possess the highestenzyme activity.This organism probably has the potential to convert cheap agricultural wastesto maximize fructooligosaccharide production and hence can be exploited through biotechnological processes to enhance prebiotics production.

Keywords: *Prebiotics, Fructooligosaccharides, Agricultural waste, Fungi*

AP47

Role of Nanoparticles in Biodegradation: Bridging Environmental and Biomedical Applications

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Abstract:

Nanoparticles (NPs) have emerged as transformative tools in biodegradation, offering innovative solutions for environmental remediation and biomedical applications. Their unique physicochemical properties, such as high surface area, tunable surface chemistry, and catalytic efficiency, make them effective in enhancing microbial activity and degrading recalcitrant pollutants. In environmental applications, NPs act as catalysts or carriers, accelerating the breakdown of persistent organic pollutants, heavy metals, and pharmaceutical residues in wastewater and soil. Metal and metal oxide nanoparticles, such as zero-valent iron and titanium dioxide, have demonstrated significant potential in promoting pollutant degradation under diverse conditions. The synergy between nanoparticles and microbial consortia further amplifies the efficiency of biodegradation processes, enabling the treatment of complex waste streams. In the biomedical domain, nanoparticles facilitate drug delivery systems, enhance the breakdown of harmful biomolecules, and support tissue engineering. Their role in targeted therapy and controlled release systems underscores their importance in reducing environmental and physiological side effects. Integrating nanotechnology into biodegradation not only mitigates pollution but also opens pathways for innovative biomedical therapies. However, challenges related to nanoparticle toxicity, environmental persistence, and large-scale applications remain critical areas for further research. This review highlights the dual role of nanoparticles in biodegradation, emphasizing their interdisciplinary relevance in addressing global challenges in sustainability and healthcare advancements.

Keywords: *nanoparticles, biodegradation, environmental remediation, biomedical applications, nanotechnology*

AP48

Comparative Study of Bioethanol Produced from Different substrates by Saccharomyces cerevisiae

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Abstract:

Compared to fossil fuels, bioethanol is a desirable biofuel with the potential to improve environmental safety and energy security.The generation of bioethanol has been studied using a variety of resources .The initial generation, including corn, rice , wheat, etc. Bioethanol is produced using second-generation lignocellulosic Material and third-generation algal biomass as substrate .*Saccharomyces* cerevisiae is yeast that ferments carbohydrates from feedstocks to produce bioethanol. *Saccharomyces* cerevisiae has produced a crucial structure that is highly effective for the production of bioethanol and has numerous benefits.Various factors influence the process of bioethanol production. It is both economical and environmentally beneficial.

Keywords: *Bioethanol, Saccharomyces cerevisiae, Fermentation*

A022

Zinc Solubilizing and Sulphur Oxidizing Bacteria as Plant Probiotic for Summer Groundnut

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Abstract:

Zinc (Zn) and Sulfur (S) are crucial micronutrients for plant health, but their availability in the soil is often limited, even when applied as chemical amendments. Not all of the added nutrients are accessible to plants, making it essential to enhance their bioavailability. Microbial inoculants have been found effective in improving nutrient uptake. A research study investigated the use of Zinc Solubilizing Bacteria (ZSB) and Sulfur Oxidizing Bacteria (SOB) as beneficial microbes for summer groundnut (peanut) cultivation. Native strains of ZSB (*Beijerinckiafluminensis* AAU ZSB F2) and SOB (*Pseudomonas aeruginosa* AAU PF 3 and *Bacillus tropicus* AAU SOB 1) were tested in a micro-plot experiment with bacterial consortia, individual strains, and control treatments to evaluate their effects on plant growth, yield, and quality. The treatment with 100% recommended fertilizer (RDF), Zinc Sulfate ($ZnSO_4$), Gypsum, ZSB and SOB resulted in the highest plant height, pod count, and yield. Specifically, the plant height reached 19.72 cm at 30 days and 35.61 cm at 60 days, with 12.33 pods per plant and pod yield of 8.86 g/plant. Kernel yield was 8.8 g/plant and the highest protein content (31.82%) was found in this treatment. The treatment with RDF, Gypsum and SOB alone resulted in the highest oil content (54.12%) in the kernels. Soil pH varied with microbial treatments; SOB reduced soil pH, while ZSB increased it. There was no significant difference in organic carbon and available phosphorus. However, the combined treatment with $ZnSO_4$, Gypsum, ZSB, and SOB increased the available zinc and sulfur in the soil, as well as the uptake of these nutrients by the plants. This study demonstrated that microbial inoculants effectively enhance nutrient availability, improve growth, and increase yield, offering an eco-friendly and cost-effective alternative to chemical fertilizers for sustainable agriculture.

Keywords: *Sulphur Oxidizing Bacteria, Zinc Solubilizing Bacteria, Plant Probiotics, Groundnut, Sulphur, Zinc*

AP49

Enzyme-Assisted production of natural and sustainable cosmetics

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Abstract:

The cosmetic industry is increasingly driven by consumer demand for natural, sustainable, and chemical-free products. As the market shifts towards eco-friendly solutions, enzymes have emerged as efficient and versatile biocatalysts, offering a promising approach for the sustainable production of cosmetics. Enzymes can facilitate the synthesis of bio-based ingredients, enhance the extraction of natural pigments, and improve the overall quality of cosmetic formulations. This presentation explores the various applications of enzyme-assisted processes in the cosmetic industry, emphasizing their potential to replace harmful chemicals with natural, biodegradable alternatives. Key benefits of enzyme-assisted manufacturing include improved product safety, reduced environmental impact, and increased sustainability throughout the production process. Additionally, enzymes contribute to higher yields, faster reactions, and enhanced precision in ingredient synthesis, all of which align with the growing trend of green chemistry and eco-conscious consumerism. By utilizing enzymes, the cosmetic industry can reduce reliance on petrochemical derivatives, minimize waste, and lower energy consumption, all while ensuring the quality and effectiveness of products. This work aims to inspire the cosmetic sector to embrace enzyme technology as a viable solution for creating cleaner, more sustainable beauty products. As demand for green cosmetics continues to rise, enzyme-assisted production will play a pivotal role in shaping the future of the industry.

Keywords: *Enzyme-assisted production, Sustainable cosmetics, Bio-based ingredients, Eco-friendly*

AP50

Addressing Screening Challenges for Microbial Biosurfactants with a Rigorous Multi-Method Approach

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Abstract:

Microbial biosurfactants, known for their eco-friendly and biodegradable nature, are promising alternatives to synthetic surfactants with applications spanning bioremediation, food processing, and pharmaceuticals. However, their large-scale production remains limited by low yields, high costs, and the complexities of downstream processing. This study aims to address these challenges.Present study involved standardizing multiple screening approach to mitigate the limitations of traditional assays. Various methods such as Cetyltrimethylammonium bromide (CTAB) - methylene blue agar assay and blood hemolysis analysis often produce false positives and negatives results due to interference from non-biosurfactant compounds and subjective interpretation. CTAB assay may misidentify non-biosurfactant producers due to such interference, while blood hemolysis does not detect all biosurfactants, leading to false negative for biosurfactant producers. To improve the screening for efficient biosurfactant producers, a combined approach involving CTAB agar assay, oil emulsification test, foaming assay, and blood hemolysis analysis were adapted. 76 bacterial isolates from six oil-contaminated sites were screened using various methods, exposing assay limitations. While 53 isolates displayed beta hemolysis, widely considered an indicator of biosurfactant production, only 37 were positive in the Oil Spreading Assay. Additionally, 9 alpha and 9 gamma hemolytic isolates demonstrated oil displacement. The CTAB-Methylene Blue Assay detected 32 isolates with blue colonies and transparent halos, suggesting significant biosurfactant activity but restricted to anionic biosurfactants. Positively screened isolates underwent further

identification via MALDI-TOF analysis. The promising isolates further undergo optimization for biosurfactant production, followed by a streamlined, rapid cost-effective downstream process development expanding their commercial applications.

Keywords: *Microbial biosurfactants, Cetyltrimethylammonium bromide (CTAB) - methylene blue agar assay, Blood hemolysis test, Emulsification test, Oil spreading assay*

AP51

Microbial Insights: Synergistic Effects of *Bacillus aerius* and Fly Ash on Plant Vascular Development

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Abstract:

FLY ASH (FA) is a particulate matter that is produced as ash by combustion of coal in thermal power plants, leaving behind residual particles. Because of its high nutrient content, fly as is being utilized more and more as a soil supplement; however, further research is necessary to determine how it affects plant physiological systems. One rhizobacterium that has been found to have the ability to improve plant development under difficult soil conditions is *Bacillus aerius*. The purpose of this study is to assess cambial activity in plant roots and stems using hand-sectioning methods. Cambial activity, which is essential for vascular differentiation and secondary development, is a sign of a plant's ability to adapt and thrive in altered soil circumstances. This study investigates the potential synergistic effects on vascular development and plant health by combining fly ash-enriched soil with microbial treatment. According to preliminary findings, *Bacillus aureus* has a beneficial effect on cambial dynamics, promoting vascular tissue development and cell division in both roots and stems. The results highlight how microbial inoculants can maximize plant development in unconventional soil amendments, providing information about creative and sustainable farming methods.

Keywords: *Bacillus aerius, Arachishypogaea* L.*, Morphology, Cambial activity, Fly ash-amended soil*

AP52

Phage Therapy as a Biocontrol Strategy: A Review of Its Impact on Agricultural Practices and Food Security

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Abstract:

Phage therapy, a promising biocontrol strategy, is gaining attention as an alternative to traditional chemical treatments for plant diseases, particularly those caused by antibiotic-resistant pathogens. With the rise in antibiotic resistance among plant pathogens and the environmental harms of chemical pesticides, phage therapy presents a sustainable solution. This treatment method, with a history dating back over a century, offers distinct advantages, including high specificity to target pathogens, reduced risk of resistance development, and non-toxic effects on the environment. Phages can also positively influence soil microbial communities, unlike broad-spectrum chemical treatments. Despite significant advancements in phage optimization and protective formulations, further research is needed to understand the physiological properties of phages and their interactions with plant hosts and soil ecosystems. For phage therapy to be widely adopted, it is essential to ensure their safety for non-target organisms and to improve phage stability and shelf-life for diverse agricultural applications. As antibiotic-resistant plant diseases become more prevalent, phage therapy holds promise as a key component in safeguarding food security and advancing sustainable agriculture. This presented review provides essential insights into phage applications in plant disease management, helping address global challenges in crop protection and agricultural sustainability.

Keywords: *Phage therapy, Antibiotic resistance, Biocontrol, Sustainable agriculture,Crop protection*

AP53

Microbial communities in soil health and plant growth enhancing soil health and biodiversity through nitrogen fixation symbiosis in leguminous plant

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Abstract:

Leguminous plants play a pivotal role in ecosystem stability and biodiversity maintenance through their symbiotic nitrogen fixation capabilities with soil microbes, particularly rhizobia. These plants are essential components of both natural ecosystems and agricultural systems, renowned for their ability to fix atmospheric nitrogen via symbiosis with Rhizobial bacteria. This technique improves soil fertility and decreases the need for synthetic nitrogen fertilisers. Soil microbial communities, including bacteria, fungi, archaea, and other microorganisms, contribute to soil health and ecosystem functioning by facilitating nutrient cycling, organic matter decomposition, and soil structure formation. Mycorrhizal fungi further support plant nutrient uptake, while other microbes provide protection against pathogens. Plant species, soil type, and environmental circumstances all have an impact on how soil microbial communities form and function. Examples of legume-microbe symbiosis include rhizobia with soybean (Glycine max) and arbuscular mycorrhizal fungi (AMF) with peas. The presence of nitrogen-fixing plants is closely linked to ecosystem stability, underscoring their importance in sustainable agriculture and environmental conservation.

Keywords: *Nitrogen fixation, Arbuscular mycorrhizae, Rhizobium spp.*

AP54

Optimization of polyhydroxybutyrate production from waste sources

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Abstract:

Various bacteria synthesize Polyhydroxyalkanoates (PHAs) polymers in response to carbon reserve. They are biodegradable & biocompatible in nature. In the present study, we aim to optimize the production of (PHB) using various waste sources. According to OFAT isolate w1(6) showed a maximum 57% production using oil as a carbon source at30ºc for 72 hr. Response surface methodology (RSM) was used to study the interactive effects of carbon concentration, nitrogen concentration, and inoculum on PHB production. The optimized medium conditions with the constraint to maximize PHB content and concentration were 0.8% carbon, 0.5% nitrogen and 1.25 % of inoculum size showed 1.29g/l of PHB. The selected isolate, was classified up to genus level by studying their morphological and biochemical characteristics and the extracted PHA polymer was characterized by FTIR. The isolate was a good candidate for the industrial production of PHA.

Keywords: *PHB, OFAT, RSM, FTIR*

AP55

Sustainable Removal of Toxic Heavy Metals Cd (II) from Aqueous Solutions Using *Gracilaria Sp. And Turbinaria sp.*: an ecofriendly approach

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Abstract:

This study investigates the eco-friendly removal of cadmium ions Cd (II)) from aqueous solutions using marine macroalgae *Gracilaria sp. and Turbinaria sp.* as sustainable biosorbents. Both seaweed species were analyzed for their biosorption efficiency under varying conditions of pH, contact time, initial metal concentration, and Biomass dosage. Results indicate the potential of both macro algae species in effectively sequestering Cd (II) ions from aqueous solutions, with Brown seaweed T*urbinaria sp.* demonstrating slightly higher biosorption efficiency (highest uptake of heavy metal 78.92 %) compared to red seaweed *Gracilaria sp.* (lowest uptake of heavy metal 45.30 %). The findings underscore the potential of *Gracilaria sp. And Turbinaria sp.* As cost-effective, eco-friendly solutions for heavy metal remediation, contributing to sustainable environmental management. It can be pivotal step in direction of the application of this biosorption technique in biotechnology field at large scale.

Keywords: *Biosorption, Turbinariasp, Gracilaria sp., Toxic heavy metal*

AP56

Isolation, Screening and Characterization of Biosurfactant producing

microorganisms

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Abstract:

Biosurfactants are surface-active substances created by microorganisms, providing environmentally friendly options compared to synthetic surfactants. The current focus is on isolating and screening microbes that can produce biosurfactants from hydrocarbon-rich contaminated soils, which were identified as potential sources for these producers. Enrichment methods using media based on hydrocarbons were implemented to promote the growth of biosurfactant-producing microorganisms. Various screening techniques, such as the oil displacement assay, emulsification index, and drop-collapse test, were employed to evaluate surface activity. Promising isolates were retrieved and underwent further characterization. Several factors that influence biosurfactant production were examined, including the type of carbon source, nitrogen source, and temperature.so these isolates would further be examined for future application for various environmental activities which could be Oil spill removal, Heavy metal removal and treatment of wastewater.

Keywords: *Biosurfactant, Drop collapse test, Emulsification Index, Oil displacement assay*

AP57

Exploring the potentialities of dye degrading microbes for textile waste water management

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Abstract:

The textile industry is a significant contributor to environmental pollution due to the extensive use of synthetic dyes. In India, it comprises a vast number of mills and factories. As of latest data, there are thousands of textile units in India including small-scale and large-scale manufacture. In terms of waste generation, the textile industries known for its substantial environmental impact, studies suggest that textile sector can produce around 20,000 tons of waste per day, highlighting the urgent need for sustainable practice. In the current study, isolation of various dye-degrading microorganisms from contaminated sites was carried out and evaluated for their ability to decolorize and degrade different types of synthetic dyes. Bacterial strains (*Bacillus* spp, *Psuedomonas aeruginosa*) and fungal strain (*Aspergillus niger*, *Trichoderma viride*) isolated from various sources like dye contaminated soil and textile waste water have shown to have the ability to effectively decolorize and degrade these dye pollutants leading to improved water quality. Results indicating that certain bacterial strains and fungal strains exhibited remarkable decolorization rates, with some achieving over 90% removal within 48 hours and 24 hours respectively. Furthermore, application of microbial consortia demonstrated enhanced degradation capabilities compared to individual isolates, suggesting synergistic interactions among microorganisms.

Keywords: *Textile dyes, Microbial Degradation, Decolorization, Wastewater Treatment*

AP58

Biodegradation of heavy metals by the use of consortiums

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Abstract:

Bioremediation is a process that uses consortium refers to an employing a group of different microorganisms working together to degrade or neutralize contaminants in the environment. These microbial consortia often consist of various bacteria, fungi or other microorganisms. It harnesses natural biological process to break down harmful substances such as oil spills, heavy metals, pesticides or industrial chemicals into less harmful, less toxic or non-toxic forms. Bioremediation can be done in situ or ex situ. The chemical processes are driven by the metabolic activity of microorganisms or plants that breakdown the contaminants. individual isolates, suggesting synergistic interactions among microorganisms.

Key words: *Bioremediation, Biodegradation, Bioremediation Triangles, Heavy metals, Aerobic, Anaerobic, Consortium, Ex situ and in situ bioremediation.*

AP59

Production of Multi-Utility Bioenzyme From Organic Waste& Its Application In Daily Life Study of Its Physico-Chemical Properties

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Abstract:

Numerous cleaning products contains chemicals that can be harmful to humans, animals & plants in the environment if ingested. The " EPA & quot; (Environmental Protection Agency) categorizes many of these chemicals as &volatile organic compounds; that can cause harm in several ways. In the time of pandemic crisis such as COVID-19, it is essential to regularly disinfect all inanimate surfaces around us that contains community transmission. A greener way to disinfect it is by creating a laboratory at home & synthesizing an environment friendly disinfectant. The primary objective of this research is to reduce the number of pollutants that enter the ecosystem by using Bioenzymes, thereby protecting the environment & contributes to society& shift towards a sustainable, chemical- free environment. Every year, large amounts of peel waste are generated from the fruits & vegetables /household cooking. These wastes are highly rich in bioactive compounds, hence the production of value-added products is a novel step towards the sustainable utilization of these wastes. The Bioenzymes (also known as Eco-enzymes/Garbage enzymes) is produced by the simple fermentation process using microorganisms, jaggery& water. It is natural, non-toxic, non-flammable, & increases stability of soil. The physical characteristics like pH, Total Dissolved Solids, color,

smell were studied for the produced Bioenzymes. The physico-chemical test revealed the presence of secondary metabolites like alkanoids, flavonoids, tannins, quinones, saponins, cardenolides in them which are known for their antibacterial, antifungal, antiviral, Anti-inflammatory, antifeedant, insecticidal & foaming properties.

Keywords: *Bioenzyme, organic waste, sustainability, environment-friendly, peel waste*

AP60

Quorum quenching: disrupting bacterial communication for a sustainable future

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Abstract:

Quorum Sensing plays an important role in bacterial communication, while Quorum quenching is a mechanism to inhibit the quorum sensing which has wide implications in different sectors viz. healthcare, agriculture, biofilm formation, aqua culture. QQ can be achieved by interfering in signalling molecule & pathway. QS is achieved by producing signalling molecule N- acyl- homoserine lactones in gram negative bacteria which facilitate synchronised gene expression, including virulence and bioluminescence as in *Vibrio fischeri.* The volatile compounds produced by *Pseudomonas fluorescens B- 4117* and *Serratia plymuthical IC1270* can disrupt the QS when AHL producing bacteria were treated with these VOCs or with dimethyl disulphide (DMDS). In case of agriculture quorum sensing can be beneficial or harmful as well. As it increases plant defense mechanism and pathogen virulence simultaneously. Problems can be solved by using QQ enzymes such as lactonase, acylases, oxidoreductase. *Pseudomonas segetis strain P6*, inhibits QS by degrading AHLs and promotes plant growth. Antagonistic approach shows that strain P6 not inhibit the growth of plant pathogens (*D. solani, P. atrosepticum, P. carotovorum subsp. carotovorum and P. syringae pv. Tomato).* Coculture technique using strain P6 (1:100 ratio) produced molecules after 24 hrs incubation which triggered the bio sensing activity but in lower degree. Strain P6 inhibited the motility and protease activity in *D. solani*, and suppressed caseinase activity and motility of *P. artrosepticum*, whereas *P. cartovorum* remains unaffected.

Keywords: *Quorum sensing, quorum quenching, cell-to-cell communication, lactonase, acylases*

AP61

Isolation and Identification of Beneficial Microbial Diversity from Neera

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Abstract:

Neera, the sweet sap obtained from the unopened flowers of coconut palms, is packed with nutrients and has a low Glycemic index (GI of 35), making it an excellent option for those with diabetes. This nutrient-rich drink is known for its beneficial minerals, antioxidants, vitamins, and amino acids, positioning it as a valuable functional beverage. Isolating and identifying beneficial microorganisms present in Neera, which may enhance its health properties and fermentation potential. Understanding the microbial communities in Neera can provide insights into natural fermentation processes, improving product quality and shelf life. Beneficial microbes can also contribute to the sap's nutritional profile, making Neera a more effective functional food. Through such techniques as culturing and molecular analysis, the diverse microorganisms found in Neera, highlighting those that may support gut health and overall well-being. Promoting Neera not only supports coconut farmers by providing a profitable alternative to traditional products but also paves the way for innovative health drinks that align with consumer demand for natural and nutritious options. As the market for health-focused beverages expands, harnessing the microbial diversity of Neera presents a unique opportunity to create value-added products that enhance its appeal. Overall, the isolation and identification of beneficial microorganisms in Neera could unlock new health benefits, positioning it as a key player in the health drink sector while also supporting sustainable coconut farming practices.

Keywords: *Neera, Glycemic index, beneficial microbes, Fermentation*

B01

Integrating Genomic Analysis and Active Learning for Optimized Surfactin Production in *Calidifontibacillus erzurumensis*

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Abstract:

This study highlights an innovative and alternative approach to enhance surfactin production in *Calidifontibacillus erzurumensis* by integrating genomic insights with smart optimization techniques. The organism's genome was analyzed using Gapseqto reconstruct its metabolic network, identify essential nutrient sources, and design an optimized growth medium. Comparative testing with the standard Landy medium, supplemented with additional components, demonstrated significant improvements in surfactin yield. A Plackett-Burman design further pinpointed ammonium chloride and glucose as the key factors influencing production. To fine-tune these conditions, we applied an active learning strategy using Latin Hypercube Design (LHD). By modelling surfactin production data with heteroskedastic Gaussian Process Regression (GPR) and optimizing the q-Noisy Expected Improvement (q-NEI) acquisition function, we identified seven refined medium combinations for testing. This iterative process successfully increased surfactin production from 1.1 g/L to 2.4 g/L. These findings demonstrate how integrating genomic tools with data-driven approaches can effectively optimize secondary metabolite production.

Keywords: *Calidifonti bacillus erzurumensis, surfactin, metabolic network, active learning, Gaussian Process Regression*

BP1

Conventional methods Vs AI-assisted drug screening: a holistic approach for novel drug discovery

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Abstract:

Artificial intelligence (AI) is computer system capable of performing tasks. In drug discovery, AI leverages algorithms, machine learning and large datasets to accelerate and optimize traditionally slow and costly process of drug development. Several drugs have been discovered by using traditional methods like Phenotypic screening viz. Aspirin, Chloroquine, Target-based screening viz. Statins, microbial Isolates and its modification viz. Penicillin, Streptomycin, Erythromycin, Tetracycline. These traditional methods have several drawbacks such as high cost, time consuming, low success rate, narrow focus on single target, etc. These drawbacks can be tackled by using AI-assisted drug screening methods. Several companies have developed drugs using AI. Benevolent AI repurposed Baricitinib for treatment of COVID-19 by inhibition of Clathrin-mediated endocytosis and cytokine signalling pathways, Exscientia with Japan's Sumitomo Dainippon Pharma developed DSP- 1181 to treat OCD that works against 5-HT_{1A} receptor agonist. Insilico medicine discovered INS018_055 that targets idiopathic pulmonary fibrosis. Exscientia developed EXS-21546 that targets adenosine receptors for immuno-oncology treatments. The drugs developed with help of metabolomics combined with AI are Metformin repurposed for cancer therapy that alters mitochondrial function. Ivabradine affects lipid metabolism and has impact on heart failure. The future of AI in novel drug discovery holds immense potential, as it accelerates drug development, design novel molecules, identify new targets and optimize clinical trials.

Keywords: *AI, Traditional method, metabolomics, novel drugs*

BP2

Tilling by Sequencing in plants with some examples

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Abstract:

Before, TILLING was a lengthy process for identifying mutations in specific genes, commonly a Point Mutations (SNPs). TILLING is an extension part of Eco-TILLING, which is utilised for detecting natural genetic mutations in genes. TILLING by Sequencing (TbyS) is an advanced technique that identifies single nucleotide polymorphisms (SNPs) within TILLING populations through high-throughput sequencing. This reverse genetic approach can be applied to any plant or animal species that can undergo mutagenesis. The reverse genetics process is a molecular technique that involves altering the gene sequence to achieve the desired function of a gene. This paper outlines the procedure for TbyS. The steps involved in TbyS include three-dimensional pooling of genomic DNA, templates, preparation of libraries for high-throughput sequencing, and bioinformatics processes for analysing sequencing data. There is a compact database which has stored some data regarding plant genes, Phenotypes regarding mutation, Gene's Functions and with NCBI ID if available.

Key words: *Tilling, sequencing, Mutation, Nucleotide, Polymorphism, Phenotypes. Gaussian Process Regression*

C01

Isolation of Cyanobacteria from various habitats and checking their efficacy in antimicrobial compound production and metal biosorption

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Abstract:

Cyanobacteria are Gram-negative microbes which are also known as blue-green algae. In this study, 35 different aquatic and terrestrial samples were collected from different regions of India. All the samples were inoculated in liquid BG-11 medium for enrichment. These enriched samples were used to isolate cyanobacteria on a BG-11 agar medium. 20 cyanobacterial species were isolated and identified based on their morphological characteristics. Different parameters like growth rate, chlorophyll estimation, and protein estimation were performed. 10 species were tested for the production of antimicrobial compounds from algal pellets and supernatants against 3 Gram-negative (*Escherichia coli NCIM 2574, Pseudomonas aeruginosa NCIM 5029, and Salmonella typhimurium NCIM 2501*) 1 Gram Positive (*Staphylococcus aureus NCIM 2079*) bacteria. *Oscillatoria sp.* (C2) pellets showed the highest inhibitory activity against *Escherichia coli* 22 mm. An *Oscillatoria sp.* (C4) pellets and supernatants were found to be most effective against *Pseudomonas aeruginosa* and *Salmonella typhimurium* giving 14 mm and 15 mm size inhibition zones respectively. The *Phormidium sp.* (C29) supernatant showed inhibitory activity against *Staphylococcus aureus* with *a* 15 mm zone size. The same isolates were used to check Zinc (Zn) and Copper (Cu) biosorption efficacy with both immobilized and free biomass for 50

ppm and 100 ppm concentrations. Biosorption of Zn and Cu metals with immobilized cells showed good results compared to free biomass for both concentrations. All the parameters were performed in triplicates. This study demonstrates the good efficacy of isolated cyanobacterial species in antimicrobial compound production and metalbiosorption.

Keywords: *Cyanobacteria, Biomass, Antimicrobial compounds, Biosorption*

CO2

Protein Kinase CK2 Inhibition: Quinoxaline Derivatives as Novel Therapeutic Agents for Cancer

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Abstract:

CK2 is a multifunctional serine/threonine protein kinase found in the cellular organisms; and involved in a several processes including cell cycle, cell death, DNA repair, and transcription.Upregulation of CK2 has been reported in many cancer types where it contributes to uncontrolled cell proliferation and apoptotic resistance. Several studies have reported CK2 inhibitors that can effectively decrease cancer cell proliferation rate and exert apoptotic effect. Through inhibiting CK2, these compounds interfere with oncogenic signalling networks such as the PI3K/AKT and NF-κB that are both essential for tumour cell viability. CK2 inhibitors also decrease cancer cell motility, angiogenesis, and metastatic potential. Quinoxaline derivatives have emerged as a promising class of CK2 inhibitors with great structural features and capabilities to pursue selective inhibition. Quinoxalines are considered an important basis for anti-cancer drugs because they have been shown to be selective ATP competitive inhibitors in many kinases, including VEGFR, PDGFR, JAK-2, and FLT-3, as well as CK2.4, 5, 6, 7-tetrabromobenzotriazole (TBB), a quinoxaline derivative and a potent CK2 inhibitor, acts by competing for the ATP-binding site of the enzyme and inhibits critical survival and proliferation pathways in tumour cells. Recent development and synthesis of quinoxaline-based inhibitors with potential to induce apoptosis, inhibit DNA repair pathways, and synergize with existing chemotherapeutic drugs indicates their promise in anticancer treatment. The present study summarizes the role of CK2 in cellular metabolism and explores the development of quinoxaline derivatives as CK2 inhibitors for their therapeutic potential in cancer.

Keywords: *Casein kinase 2 (CK2), protein kinase, CK2 inhibitors, quinoxaline derivatives, cancer therapy*

CO3

Isolation of Antibiotic-Resistant Bacteria and Evaluation of Antibacterial Activity of *Ipomoea spp.* Plant Extracts against Isolates

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Abstract:

The elevated trouble of drug-resistant bacterial organisms poses a huge menace to a wide range emphasizing the need for alternative therapies.This study evaluates herbal remedies as substitutes for standard antibiotics in treating infections caused by unsusceptible strains.The overuse of conventional antibiotics has intensified resistance highlighting the necessity for innovative pharmacological approaches.Pathogenic bacterial strains were segregated from specimens collected from hospitals and clinical laboratories including pus blood and urine, antibiotic susceptibility testing was conducted as per CLSI guidelines and its results showed a remarkable spectrum of resistance. Herbal efficacy was assessed using extracts from different parts of *Ipomoea saggitifolia*, *Ipomoea carnea*, and *Ipomoea cairica*, prepared with various solvents through maceration. Antibacterial properties were evaluated using the agar diffusion method, measuring the zone of inhibition (ZOI). The findings showed notable antibacterial activity in various parts of the plant, influenced by solvent choice. The water-based stem extract was more effective, while the methanol-based leaf extract also demonstrated efficacy. Some extracts significantly inhibited drug-resistant bacteria, suggesting that these herbal remedies may contain bioactive compounds that could serve as alternatives to conventional antibiotics.

Keywords: *Antibiotic-resistance, Anti-bacterial agents, Agar Diffusion, Drug Resistant Pathogen, Susceptibility test, Plant Extracts, Ipomoea spp.*

C04

Acinetobacter spp. septicity: A Review of Etiology, Multidrug Resistance Traits, Mechanisms and its Management via Multiple Therapeutic Approaches

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Abstract:

Pathogens are a leading cause of numerous life-threatening diseases, with *Acinetobacter spp*. emerging as a significant global health concern in recent years. These bacteria are highly adaptable, thriving in both natural and hospital environments. *Acinetobacter spp*. are among the most challenging antibiotic-resistant, gram-negative bacteria, frequently causing biofilm-associated infections that are notoriously difficult to treat with conventional antibiotic therapy. Biofilm, structured communities of bacteria encased in a protective matrix on biotic or abiotic surfaces, play a critical role in the pathogenesis and resistance of these infections. Bacteria within biofilms exhibit increased resistance to antibiotics and chemical agents, largely due to the reduced efficacy of these agents in penetrating the biofilm matrix. Effective treatment strategies must therefore target the biofilm matrix, necessitating the hydrolysis of its components. Given the limitations of antibiotic therapy, research has shifted towards traditional therapeutic approaches, including the use of plant extracts rich in phytochemicals. Medicinal plants are gaining prominence for their potential in developing novel therapeutic compounds. *Tinospora cordifolia*, a widely recognized medicinal plant, has been used in the treatment of various diseases due to its rich content of bioactive compounds. This review explores the current understanding of *Acinetobacter spp*. infections, the challenges posed by biofilm formation, and the potential of *Tinospora cordifolia* and other plant-based therapies in combating these resilient pathogens.

Keywords: *Acinetobacter*, Biofilm formation, Antibiotic Resistance, *Tinospora cordifolia*

CO5

Antimicrobial activity of leaf and stem extracts of *Argyreia nervosa* against highly resistant etiological agents

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Abstract:

The incidence of Multidrug-resistant (MDR) bacteria in the healthcare sector has become an emerging threat worldwide. Synthetic antibiotics are becoming ineffective in treating the MDR bacteria. Scientific research has indicated that medicinal plants can serve as a viable and effective alternative to the chemical drugs being used for the treatment of infectious diseases. *Argyreia nervosa* (Burm. F.) Bojer (Convolvulaceae) has been used in traditional medication for curing several human ailments. The leaves and stems have been used by traditional healers to treat purulent infections and skin diseases. In the current study prevalence, bacterial and fungal strains were isolated from purulent drainage and were identified by 16SrRNA and 18SrRNA gene sequencing. Stem and leaf extracts were prepared using different extraction techniques, to be specific maceration, decoction and Soxhlet extraction. The extracts were analysed for their antimicrobial activity against multi-drug-resistant strains. The decoction extract of the leaves exhibited the highest zone of inhibition (24±1.00) against *Staphylococcus aureus* with 100 µg/ml minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). The result of antimicrobial activities was statically analysed by two way ANOVA followed by Tukey's HSD post hoc test with 95% confidence level.

Keywords: *Decoction, Multi drug resistant, Minimum inhibitory concentration, Staphylococcus aureus*

C06

Silver Nanoparticles as holy grail to treat oral candidiasis in cancer patients

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Abstract:

The diagnosis of oral candidiasis is very important among cancer patients because many of them are suffering from *C.albicans* and non-*C.albicans* infections as well as thousands of cases are active today. Treatments of this disease usually involve the use of antifungal drug. The effectiveness of the current antifungal drug is limited due to the emergence of resistant *Candida*. The drug-resistant *Candida* needs to be treated with novel alternative drug. Silver nanoparticles (AgNPs) are a boon to treat such infection in this era. The objective of the present study was to diagnose oral candidiasis and to synthesize herbal silver nanoparticles. Sample collection, isolation, identification, confirmation of isolates and its antifungal susceptibility test were performed. Synthesis of AgNPs from Cinnamon, Clove, and Cinnamon-Clove Mix extracts. Characterization of AgNPs by observing the colour change and UV-Visible spectroscopy. The anticandidal activity of synthesized herbal AgNPs was evaluated. The total 157 isolates were obtained by collecting 186 samples. The 49% of drug-resistant *Candida* were found. Cinnamon, Clove, and Cinnamon-Clove Mix mediated AgNPs were synthesized. The colour change from colourless to brown and the optical density peak between 400 to 450 nm confirms the synthesis of AgNPs. By performing anticandidal activity of AgNPs we got the zone of inhibition against resistant Candida "Clove AgNPs > Cinnamon-Clove Mix AgNPs > Cinnamon AgNPs." The results confirm that *Candida* has been associated with oral candidiasis, a new emerging life-threatening infection among cancer patients undergoing chemotherapy and radiotherapy. AgNPs are effectively used to treat such infections. The advantages of AgNPs are viz. lower toxicity, cost efficiency, easy large-scale production, and being environmentally safe.

Keywords: *Candida species, Oral candidiasis, silver nanoparticles, Anticandidal*

C07

Solid State Fermentation in Fungi: An Innovative Approach for Bioactive Metabolite Production

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Abstract:

Bioactive metabolites are gaining significant attention due to their diverse biological effects, such as reducing risk factors for cardiovascular disease and exhibiting antioxidant, anti-mutagenic, anti-carcinogenic, anti-allergenic, and anti-microbial activities. This study explored the fermentation of abundant agricultural by-products in India—rice bran, wheat bran, maize bran, and sugarcane bagasse—using single and co-cultures of *Aspergillus oryzae* and *Rhizopus oryzae.* The functional properties of the fermented extracts were compared to those of their non-fermented counterparts, focusing on antioxidant activity, phenolic content, and bioactive metabolite profiles. Skincare-related functionalities and potential industrial applications were assessed through detailed biochemical analyses.The results revealed that co-culture fermentation significantly enhanced bioactive metabolite content across all substrates, with sugarcane bagasse, wheat bran, and maize bran showing the highest yields. Monoculture fermentation with *A. oryzae* demonstrated better outcomes than with *R. oryzae,* particularly for wheat bran and maize bran. The co-culture of both fungal strains yielded optimal results, especially with sugarcane bagasse. These findings underscore the efficacy of fermentation in enhancing the functional properties of agricultural by-products, providing a sustainable method to valorize waste materials. The study highlights the potential of mixed-culture fermented extracts as valuable ingredients for cosmetics and antioxidant-rich products, particularly in skincare formulations.

Keywords: *Extraction, Antioxidants, Phenolics, Cosmetic, Skincare*

C08

Advanced Copper Precursor Optimization for High-Performance, Eco-Conscious Copper Oxide Nanoparticles: Enhanced Synthesis, Characterization, and Green Applications

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Abstract:

Nanotechnology is transforming industries by enabling breakthroughs in medicine, energy, and materials through precise atomic-scale control, leading to more efficient and sustainable solutions. This study emphasizes the optimization of copper precursors namely copper acetate and copper nitrate in synthesis and diverse applications of copper oxide nanoparticles (CuO NPs). For the first time, we report a green synthesis of CuO NPs using pineapple peel waste, with copper acetate and copper nitrate as precursors, offering a sustainable solution to repurpose agricultural waste. The synthesized CuO NPs using both copper acetate and copper nitrate were extensively characterized using UV-Vis spectrophotometry, FTIR, zeta potential, DLS, EDX, XRD, and TEM, revealed that copper nitrate proved to be a better precursor as it produced nanoparticles with superior yield and much optimal size. These CuO NPs were then utilised and tested for in-vitro antifungal based assays against *Fusarium oxysporum* f. sp. *ciceri*, the pathogen responsible for fusarium wilt in chickpea roots, at concentrations ranging from 0 to 1000 ppm. Radial growth inhibition (% IRG) assessments were performed to determine the most effective dose for synthesized CuO NPs. Results showed a dose-dependent inhibition of fungal growth, with higher concentrations resulting

in greater efficacy. Notably, CuO NPs synthesized with copper nitrate exhibited the highest % IRG at 1000 ppm, indicating their potential as the most effective antifungal agents among the tested formulations.

Keywords: *Copper oxide nanoparticles, Copper precursors, Eco-friendly synthesis, Antifungal agent, Chickpea*

CP1

Isolation and identification of bacteria from marine water to study their antimicrobial activity against resistant human pathogen

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Abstract:

Pathogenic bacteria are gradually becoming resistant to conventional antibiotics due to overuse or misuse of antimicrobial drugs. As antibiotic resistance bacteria are a major threat to public health, so it makes compulsion to search for new antibiotics that effectively eradicates resistant bacteria. The marine environment is a rich source of biologically active compounds as several unique molecules are derived from microorganisms. They produce many different metabolites with many therapeutic applications. The present study was undertaken to isolate marine bacteria from daman of DNH and DD (Dadra Nagar Haveli And Daman Diu) analyzed for production of antimicrobial substances against pathogenic bacteria by agar well diffusion method. These results in the screening of 5 bacteria isolates that showed antimicrobial activity. Out of these 5 bacterial isolates, HA4 and HA16 showed high antimicrobials activity against *Staphylococcus aureus,E. coli, Pseudomonas aeruginosa, Klebsiella pneumoniae*.HA4 and HA16 were analyzed by 16s rRNA gene sequencing and identified as *Halomonas pacifica* and *Halomonas jhonsoniae* respectively**.** These antimicrobial substances produced byHA4 and HA16 will be identified and characterized for its efficient antimicrobial activity.

Keywords: *Marine bacteria, Secondary metabolites, Antimicrobial metabolites, Clinical pathogens*

CP2

Microbial synthesis of Zinc oxide nanoparticles and its application as antimicrobial agent in topical creams.

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Abstract:

Microbially produced ZnO nanoparticles (ZnO NPs) are of great interest and carry much higher advantages over chemical and physical methods like eco-friendliness, low cost and biocompatibility. The use of microorganisms, such as bacteria and yeasts, allowed the exploitation of biological routes for the synthesis of ZnO NPs with improved stability and functionalities. The results of the present study indicated the biocompatibility of microbially synthesized ZnO NPs, warranting their application in a range of biomedical applications. For better yield of ZnO NPs, growth conditions, suitable Zn^{+2} salt as a substrate and it's concentration were optimized. Analytical techniques were used for comprehensive characterization, such as UV-Vis spectroscopy to attain the optical properties, FTIR for spectroscopic identification of functional groups, SEM to analyze morphological features of nanoparticle structure and nanoparticle size analyser for measuring the particle size. Antibiotic resistance is a serious problem for public health. Due to mutation and excessive use of drugs, the emergence of multi-drug-resistant pathogenic microbes has become a major issue. To combat this issue, novel, safe and effective antimicrobial agents are required. ZnO NPs proved to be the effective antibacterial agent against a wide variety of Gram-positive and Gram-negative bacteria. Additionally, incorporation of ZnO NPs in topical antimicrobial creams for wound healing was studied.

Keywords: *ZnO nanoparticles, Microbial biosynthesis of nanoparticles, antimicrobial agent, topical cream.*

CP3

Enzymatic Potential of Microbial Beta-Glucanases: A Review of Production, Characterization, and Applications

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Abstract:

Beta-glucanases, a class of hydrolytic enzymes, are gaining significant attention for their potential in diverse industrial applications. These enzymes catalyze the breakdown of β-glucans, a major component of plant cell walls, into simple sugars. Microbial sources, such as bacteria and fungi, offer a sustainable and cost-effective platform for producing these enzymes.These enzymes play a vital role in beta-glucans bioconversion into simpler sugars, facilitating various industrial applications.Key factors affecting enzyme production, such as substrate type, pH, temperature, and fermentation conditions, are discussed, along with advancements in genetic engineering and fermentation technologies that optimize enzyme yields.Beta-glucanases have significant applications in various industries, including biofuel production, where they aid in the breakdown of lignocellulosic biomass into fermentable sugars for ethanol production; food processing, where they improve the texture and digestibility of products like bread and beverages; and animal feed, enhancing nutrient absorption. Furthermore, beta-glucanase is used in nutraceuticals for its potential health benefits, such as immune modulation and gut health.The review highlights the challenges in scaling up beta-glucanase production and the ongoing research to improve enzyme stability, cost-effectiveness, and efficiency in industrial applications. Future directions for optimizing microbial strains and expanding the enzyme's applications in biotechnology are also discussed.

Keywords:*Beta-glucanase, microbial enzymes, biofuel production, food processing, Health care*

CP4

Bacteriocins production from Lactic acid bacteria and their applications in the food industry.

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Abstract:

Bacteriocins, ribosomally synthesized peptides produced by Lactic Acid Bacteria (LAB), are antimicrobial agents that inhibit the growth of various microorganisms, including foodborne pathogens. Fermented foods such as milk and olives are considered less prone to causing infections or intoxications due to the presence of antimicrobial substances like hydrogen peroxide, diacyls, and bacteriocins produced during fermentation. LAB, a closely related group of bacteria with similar physiological traits, are commonly used as starter cultures or probiotics, primarily due to their ability to produce antimicrobial compounds like bacteriocins. Bacteriocins play a critical role in biopreservation, particularly in controlling the growth of spoilage bacteria in food packaging films, while simultaneously enhancing food quality. However, the U.S. Food and Drug Administration (FDA) has approved only a few LAB bacteriocins for use as biopreservatives, with nisin being the most widely recognized. Recent advancements in bioengineering and molecular biology have enabled the production of recombinant bacteriocins with enhanced bactericidal activity and a broader inhibitory spectrum, addressing challenges such as the emergence of nisin-resistant mutants. Bacteriocins are classified into four major classes (1, 2, 3, and 4), with Class 1 and Class 2 being the most relevant in their antimicrobial mechanisms. Factors like temperature, pH, and medium composition significantly influence bacteriocin production by LAB. Due to their non-toxic, safe, non-immunogenic, thermostable properties and broad-spectrum bactericidal activity, LAB bacteriocins are regarded as promising bio-preservative agents. Their effectiveness in antimicrobial packaging and edible films is

driving innovation in the food industry. This review examines the history, characteristics, classification, structure, mode of action, and applications of bacteriocins, with a particular focus on their growing relevance in the food industry.

Keywords: *Lactic Acid Bacteria, Bacteriocin, Food Application, Antibacterial Packaging*

CP5

Isolation And Characterization Of Antimicrobial-Resistant (Amr)

Bacteria From Various Sources

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Abstract:

Antimicrobial resistance (AMR) among bacteria presents a critical challenge to public health, animal health, and food safety, with resistant strains emerging across clinical, environmental, and agricultural settings. Sewage and wastewater serve as major reservoirs for AMR bacteria, where resistance genes from various sources disperse through water systems. This review outlines the primary steps involved in the isolation and characterization of AMR bacteria from diverse sources, highlighting key techniques and their roles in understanding AMR spread and resistance mechanisms. The process begins with targeted sample collation from clinical specimens, environmental sources, animal and food products, and agricultural waste, and health care facilities. Bacterial isolation utilizes selective media, enrichment culture, and the streak plate method to obtain pure colonies. Antimicrobial susceptibility testing (AST), including disk diffusion, minimum inhibitory concentration (MIC), and automated methods, provides essential data on resistance profiles. Characterization of resistance mechanisms is achieved using molecular tools such as PCR and whole-genome sequencing (WGS), which facilitate the detection of resistance genes and mobile genetic elements. Plasmid profiling and conjugation assays further elucidate gene transfer potential. Phenotypic and genotypic analysis methods, such as 16S rRNA sequencing and multi-locus sequence typing (MLST), are employed to investigate bacterial diversity and identify resistance patterns, including multidrug-resistant (MDR), extensively drug-resistant (XDR), and pan-drug- resistant (PDR)

strains. Epidemiological tools, including pulsed-field gel electrophoresis (PFGE) and MLST, aid in tracking AMR spread across sources. The review emphasizes that comprehensive surveillance and responsible antibiotic use are pivotal to addressing the global AMR crisis.

KEYWORDS: *Antimicrobial resistance (AMR), Multi drug resistant (MDR), Pan drug resistant, antimicrobial susceptibility testing (AST), 16S rRNA sequencing.*

CP6

Isolation and Characterization of Antibiotic Producing Novel Bacillus species from Soil Ecosystem.

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Abstract:

Background: Antibiotics are secondary metabolites produced by microorganisms via enzymatic catalysis involving a series of biosynthetic pathways. An antibioticis at types of antimicrobial substance are responsible for the regulation and control of microbial population in soil, compost and water. Antibiotics most commonly used for treating Bacterial infections along with treating RTIs, GTIs, UTIs in different biological sectors. Such antibiotics are mainly produced by Pencillium, Streptomyces, Cephalosporin and Bacillus.

Research Plan and Results: The main objective of the study was to isolate antibiotic producing Bacillus species from soil. Bacterial cultures of Bacillus species are capable of producing antibiotic were isolated from soil ecosystem. Isolates were tested against pathogens causing gastro and respiratory tract infections. Four potential isolates obtained were subjected to biochemical identification and also were checked for their efficiency against standard bacterial cultures. Among them isolate number 3 was found to be Bacillus. It was identified as *Bacillus licheniform*. These obtained Bacillus species was subjected to determine the effect of various parameters like PH, temperature, glucose concentration, Optimum PH for antibiotic production was found to be 8, Optimum temperature Was found to be 35°c, Optimum concentration of glucose was found to be 2% carbohydrates in the form of sugars and starches were employed for the production of the antibiotic. Among sugars, sorbitol gave the maximum yield of antibiotic. Comparative study was

shown to better inhibit refined extract than crude extract. The purpose of this study deals with successfully producing potential antibiotics which inhibit or kill organisms, suggesting potential of antibiotics produced by bacillus species for the therapeutic applications.

Keywords:*Antibiotic, Bacillus species, soil, therapeutic applications.*

CP7

Antimicrobial Peptides: Therapeutic potential and Methods of Characterization

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Abstract:

The innate immune system relies heavily on antimicrobial peptides (AMPs), which have broadspectrum activity against viruses, fungi, and bacteria. Alexander Fleming's findings of natural antimicrobial activity led to the identification of a variety of peptides from a range of biological sources, which in turn led to the discovery of AMPs. Recombinant DNA technology or chemical procedures can be used to synthesise AMPs, which enables the creation of peptides with specific characteristics. The historical background emphasises the need to understand the structure - function relationship of AMPs and the use of characterisation methods like X-ray crystallography and Nuclear Magnetic Resonance (NMR) spectroscopy. Their effectiveness against resistant pathogens is attributed to a variety of modes of action, such as immunological regulation, intracellular targeting, and membrane disruption. Furthermore, when used with traditional antibiotics, AMPs can have synergistic effects and prevent the production of biofilms. The capacity of AMPs to overcome the obstacles presented by antimicrobial resistance highlights their therapeutic potential and makes them attractive options for further medication development. To include AMPs into conventional medicinal procedures, more research into formulation and specific delivery methods is required. The present review summarizes AMP production, characterisation, and therapeutic potential. It also highlights the significance of AMPs in tackling the worldwide health emergency of drug-resistant infections, need for more research into their therapeutic uses and modes of action.

Keywords: *Antimicrobial peptides, Therapeutic potential, Intracellular targeting, antimicrobial resistance, Structure-function relationship*

CP8

Bacterial keratinase: Use in different perspectives

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Abstract:

Keratinases are special protease which attack the highly recalcitrant keratin substance. Keratin-rich wastes in the form of feather, hair, nails and horn are highly available as by-products of agro industrial processing.This paved the way for the search of keratinolytic microorganisms having the ability to hydrolyse " hard to degrade " keratinous waste. The increased needs for energy conserving and recycling, summed with the huge increase in poultry industry, have strongly stimulated the search for alternatives for the management of recalcitrant keratinous wastes.Keratinase, which are produced by several bacteria that have been often isolated from soils and poultry wastes, show potential use in biotechnological processes involving keratin hydrolysis. Although these isolates are mostly restricted to the genera *Streptomyces* and *Bacillus,* the diversity of keratinolytic bacteria is significantly greater. Bacterial keratinases are mostly serine proteases, although increased information about keratinolytic metalloproteases, particularly from bacteria, became this review highlights keratinase enzymes are available. These enzymes are useful in processes related with the bioconversion of keratin waste into feed and fertilizers. Re promising applications have been associated with keratinolytic enzymes, including enzymatic dehairing for leather and cosmetic industry, detergent uses, and development of biopolymers from keratin fibers. The present review in to the use of keratinases to enhance drug delivery in some tissues and hydrolysis of prion proteins arise as novel outstanding applications for these enzymes.

Keywords: *Keratin, Keratinase,keratinolytic, Feather, leather, proteolysis*

CP9

Repurposing Drugs to combat Multi-Drug Resistant *Mycobacterium tuberculosis*

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Abstract:

The Whole world is currently facing the most common infectious disease called Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, which is an intracellular pathogen. Over 1.5 million people each year face death; this may be due to the inadequate use or insufficient drug dosage to treat mtb. India faced the largest TB burden, which has affected all age groups. A Few years ago, Tuberculosis was treated by the Rifampin antibiotic; hence, TB cases decreased for a few decades. But due to overdose or insufficient dose of antibiotics, the emergence of antibiotic resistance like Multidrug resistant (MDR) and extensively drug-resistant (XDR) strains of *M. tuberculosis* aroused through a combination of innate and acquired mechanisms. Rapid evolution of resistant strains of Tuberculosis is going to be achieved by repurposing the drug, some novel compounds, or targeting FtsZ-an essential cell-division protein; which were targeted by regeneration of some antibiotics. Furthermore, numerous innovative repurposed drugs are currently under clinical trials, and may offer a positive response for a better and brighter tomorrow. This new innovative approach may overcome the drug resistance and serve as a potent therapeutic agent for curing Tuberculosis. Repurposing anti-TB drugs may hold great potential in the medical field in near future. In the current study, the focus is on repurposing the novel antibiotics, their roles and other strategies for treating Tuberculosis.Different drugs like Moxifloxacin, Linezolid, Clofazimine, Paroxetine, Nebivolol, Nitazoxanide, and Rifamycin are the most importantly repurposed drugs used to treat antibiotic resistant strains of *M. tuberculosis*, of which some are under clinical trials.

Keywords: *Tuberculosis, MDR Strains, XDR Strains, Drug Repurposing*

CP10

Microbiological analysis and antimicrobial activity of packed honey

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Abstract:

Honey is a natural product made by honeybees. Honey has been used since ancient times for taste, aroma and even as an antibiotic agent. Honey contains bacteria, yeast, molds and some beneficial properties for humans. Different biochemical methods are used to identify the organisms. Honey gives an antibiotic effect due to its supersaturated solution and glucose oxidase activity. The healing property of honey is due to antibacterial activity and high viscosity helps to provide protection barrier to prevent infection. Honey has antibacterial action it has effectiveness against bacteria, e.g. *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Acinetobacter.* The *lactobacillus* are abundant in honey, helps to protect against pathogens and providing antimicrobial properties. There are plenty of national, international as well as local brands are manufacturing honey, but the question still remains the same which honey is good?Which serves the purpose of consumers use?This review aims to identify the microbial contaminates and antimicrobial activity of packed honey of any brand available in the Indian market. This review may give insights of possible adulteration, Standard quality control procedures followed during processing and packaging of honey, etc. will be helpful to select what brand can be used.

Keywords: *Honey, Microbial contaminants, Probiotics, Antibacterial activity, Medicinal importance*

CP11

Study of anti-microbial action of pimple patch against *Staphylococcus aureus* strains obtained from pus sample

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Abstract:

The increasing prevalence of acne and pimple caused by *Staphylococcus aureus* has led to the development of pimple patches infused with antimicrobial agents. This study evaluates the antimicrobial efficacy of pimple patches against *Staphylococcus aureus* strains; these strains of *S. aureus* were isolated from pus samples using a selective and differential medium like Salt Mannitol Agar (SMA), enriched and differential medium like Superimposed Blood Agar (SIBA). The isolates were identified using biochemical tests and their virulent nature was confirmed by observing hemolysis and by performing coagulase test. Their susceptibility to various antibiotics was carried out Kirby Bauer method additionally the efficacy of pimple patches as an anti-microbial agent was tested using agar cup assay method. The finding of this work will help microbiologist to ascertain efficiency of commercially available pimple patches. The data obtained can confirm claims made by different manufacturers of pimple patches.

Keywords: *Staphylococcus aureus, Pimple patches, Antimicrobial efficacy, Kirby-Bauer method, Agar cup assay, Salt Mannitol Agar (SMA).*

CP12

Sulfa Drugs: History, Mechanism, Preparation and Clinical Applications:

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Abstract:

Sulfa drugs, also known as sulfonamides, are a class of antimicrobial agents that have been widely used to treat bacterial infections since their discovery in the 1930s. The first sulfa drug, sulphanilamide, was introduced by German chemist Gerhard Domagk, revolutionizing the treatment of bacterial infections. Sulfa drugs inhibit bacterial growth by competing with para-aminobenzoic acid (PABA), a necessary component for folic acid synthesis, essential for bacterial DNA replication. Clinically, sulfa drugs are effective against a broad spectrum of gram-positive and gram-negative bacteria, including *Streptococcus, Staphylococcus*, and *Escherichia coli*. They are commonly used to treat urinary tract infections, skin and soft tissue infections, and respiratory tract infections. Additionally, sulfa drugs are used in combination with other antibiotics to treat HIV-related infections and malaria. Despite the emergence of antibiotic resistance, sulfa drugs remain an important part of antimicrobial therapy, particularly in developing countries due to their affordability and accessibility. Side effects are rare but may include allergic reactions, nausea, and liver toxicity. Overall, sulfa drugs have played a significant role in the history of antimicrobial therapy and continue to be a valuable treatment option for various bacterial infections.

Keywords: *sulfadrugs, sulfonamides, antimicrobial agents, bacterial infections, antibiotic resistance*

CP13

Antimicrobial Resistance (AMR): The Current Scenario

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Abstract:

Antimicrobial resistance (AMR) is one of the greatest threats to human health across the globe. Antimicrobial resistance is the acquired ability of a microorganism to withstand antimicrobial medicines. Haphazard use of antimicrobial drugs is the single most important cause of development of *acquired resistance* along with poor infection control practices in hospitals, uncontrolled sale of antibiotics over the counter without prescriptions, inadequate sanitary conditions. The spread of AMR into different strata of people across the globe makes it difficult scientific and economic challenges causing millions of deaths every year. Intrinsic resistance occurs due to change in genetic makeup of the microorganism. Antimicrobial resistance develops by decreased permeability of drug across cell wall, drug efflux pump, enzymatic deactivation as in β-lactamase producing bacteria and by modifying target site as observed in Methicillin resistant *Staphylococcusaureus*. Around 4.95 million deaths due to drug-resistant infections were recorded in 2019. In India, in 2019, AMR had led to the third highest number of deaths tertiary to cardiovascular disease and chronic respiratory disorder in 2019 and higher than deaths due to neoplasms. Annual deaths worldwide due to AMR continue to rise and are projected to reach as high as 10 million by the year 2050. Whereas AMR refers to resistance in bacteria, fungi, viruses and protozoans, antibiotic resistance refers to resistance specifically in bacteria. In this presentation, details of antimicrobial resistance - AMR resistance mechanisms, morbidity and death, and possible treatments will be described.

Keywords: *Antimicrobial resistance, Methicillin resistant, AMR resistance mechanisms, AMR led death*

CP14

Sulforaphane: As a Novel Drug to Treat Cancer

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Abstract:

Cancer remains a formidable challenge in modern medicine, representing a leading cause of mortality globally. Among various types of cancer, leukaemia, a malignancy of the haematopoietic tissues, including the lymphatic system and the bone marrow, is particularly devastating. The prevailing therapeutic tactics predominantly hinge on aggressive interventions like chemotherapy and radiotherapy. The excessive use of these drugs results in leukemia cells developing resistance to chemotherapy Therefore, developing new therapeutic drugs with greater effectiveness and reduced side effects is crucial for increasing average life span. The Swiss ADME web tool was used to study the pharmacokinetics parameters and physicochemical properties of sulforaphane (SFN). Gastrointestinal absorption prediction and bioavailability radar positioning suggested that the SFN has favourable drug-like properties for oral administration. In a differential gene expression study conducted on Thp-1 cell line (acute leukemia), SFN upregulated Bax, caspases-3 and caspases-9 genes while downregulated antiapoptotic genes Bcl-2 and Bcl-xL. Thus, SFN displayed favourable drug-like properties, highlighting its therapeutic potential either as a standalone treatment or in synergy.

Keywords: *Cancer, Novel drug, Sulforaphane (SFN), SwissADME web tool*

CP15

Design and synthesis of some new 1,2,4-triazole derivatives as antimicrobial agents.

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Abstract:

A series of some new 1,2,4-triazoles (3a-j) attached to various 2-Chloro-*N*-(aryl)-acetamide have been designed, synthesized and tested for their *in vitro* antimicrobial and antitubercular activity against eight bacteria (*S. aureus*, *B. cereus*, *E. coli*, *P. aeruginosa*, *K. pneumoniae*, *S. typhi*, *P. vulgaris*, *S. flexneria*), four fungi (*A. niger*, *A. fumigatus*, *A. clavatus*, *C. albicans*) and *Mycobacterium tuberculosis* $H_{37}R_v$. The synthesized compounds appeared with promising antimicrobial and antitubercular activities. All the synthesized compounds were structurally elucidated on the basis of IR, ^{1}H NMR and elemental analysis.

Keywords: *1,2,4-Triazole, 2-Chloro-N-(aryl)-acetamide, antimicrobial and antitubercular activity*

CP16

Synthesis, Characterization and Antimicrobial Study of some Isoxazole derivatives synthesized from Chalcone

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Abstract:

In this work we have synthesized a series of {5-Chloro-2-[(5-(aryl)isoxazol-3-yl)amino] phenyl}(2-fluorophenyl) methanone 2a-j by reaction of a series of N-[4-chloro-2-(2-fluorobenzoyl)phenyl]-3-(aryl)acrylamides 1a-j with hydroxylamine hydrochloride . A series of acryl amides(chalcones) 1a-j were synthesized by reaction of a N-[4-Chloro-2-(2-fluorobenzoyl) phenyl] acetamide and various aromatic aldehydes in presence of base catalyst. The Structure of the synthesized compounds 2a-j was confirmed by IR, ^{1}H NMR, ^{13}C NMR and Mass Spectral analysis. All newly synthesized Isoxazole derivatives were targeted to in vitro antibacterial and antifungal studies against *S.Aureus, S.Pyogenus*, *E.Coli, P.Aeruginosa, C.Albicans, A.Niger* and *A.Clavatus*.

Keywords: *Chalcone, Isoxazole, Antibacterial, Antifungal*

CP17

Isolation, Characterization, and Antimicrobial Potential of Probiotic Strains: An Alternative Approach to Pathogen Inhibition

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Abstract:

Probiotics are increasingly being studied for their potential in addressing antibiotic resistance, as they produce bioactive compounds with antimicrobial properties. In this study,isolation and screening of probiotic microorganisms from various sources was done using various media such asMRS agar, M17 agar, LBS agar. Total fourteen promising isolates cultivated as a pure culture on MRS agar. Biochemical tests, including carbohydrate fermentation and catalase assays, were performed to assess probiotic traits of the isolates.Antimicrobial susceptibility tests for the obtained isolates were conducted with the Kirby-Bauer disc diffusion assay using antibiotics such as gentamicin (10 µg), chloramphenicol (30 µg), ciprofloxacin (5 µg), tetracycline (30 µg), erythromycin (15 µg), streptomycin (300 µg), penicillin G (10 µg), and ampicillin (10 µg). Antibiotic disc diffusion assay demonstrated that BMS 5 exhibited the lowest zone of inhibition with streptomycin (8.67 mm), followed by OMS 8 (19.67 mm), CMD1 (29 mm), and CMD14 (29.67 mm). Additionally, an agar well diffusion assay assessed the inhibitory effect of crude probiotic peptides extracted from probiotic strains CMD1, BMS5, OMS8 and CMD14. Extracted peptides demonstrated significant antimicrobial activity against pathogens including *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Klebsiella pneumoniae, Proteus vulgaris.*Using MALDI-TOF analysis, out of 14, five strains were confirmed as probiotic species and remaining isolates needed further investigations.The

outcome of the studies indicate that the identified probiotic strains exhibit significant antimicrobial activity, suggesting their potential as natural alternatives for inhibiting pathogenic microorganisms.

Keywords: *Probiotics, Antimicrobial Resistance, Probiotic Peptides, Kirby-Bauer Assay.*

CP18

Occimum tenuiflorum: In Silico Phytochemical Analysis and Molecular Docking Against SARS-CoV-2

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Abstract:

Tulsi (*Occimum tenuiflorum*), a medicinal plant with several pharmacological characteristics, has secondary metabolites that may have antiviral activity. This study uses computational techniques to examine Tulsi's phytochemicals and assess their potential efficacy against SARS-CoV-2, the cause of COVID-19. Secondary metabolites of *Occimum tenuiflorum* were analysed for physicochemical properties, toxicity, and pH balance using ADMET predictions. Structural data in SMILES and SDF formats were obtained from PubChem. Molecular docking with SARS-CoV-2 target proteins was performed using SWISS-DOCK and PATCH-DOCK, and interactions were visualized using RasMol and PyMOL.The data indicate that Tulsi-derived secondary metabolites could be viable candidates for further research as antiviral medicines against COVID-19. This in-silico study demonstrates the power of computational techniques in accelerating medication discovery for emerging diseases.

Keywords: *Occimum tenuiflorum, phytochemicals, SARS-CoV-2, molecular docking, DMET, in silico analysis*

CP19

Disinfectants and Antiseptic Effective Agents Against MicrobialContamination

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Abstract:

Disinfectant and antiseptic are essential tools in combating microbial contamination and preventing infectious disease; the active chemical agents are widely used to prompt some speculation on the development of microbial resistance. Effective disinfectant demonstrates broad spectrum anti-microbial activity this review compares efficiency safety and application of disinfectant (eg. Quarternary ammonium compound, hydrogen peroxide) and antiseptic (eg. Povidone iodine, chloroamine -T) proper use, dilution, and contact time is essential for optimal efficiency. This drug formulation and industrial application due to its ability to effectively target and neutralize the wide spectrum of pathogen. It role in the synthesis of pharmaceutical and its application in biochemical

Keywords: *disinfectant, antiseptics, infection control, anti-microbial agent, sterilization, germicidal*

C09

Bibliometric and visualized analysis on bacteriophages effective against MDR bacteria

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Abstract:

Antibiotic resistance is undoubtedly the biggest growing challenge across the globe where MDR (Multidrug-resistant) bacteria and ARPBs (Antibiotic Resistance Pathogenic Bacteria) has led to an unavoidable decline of effective antimicrobial compounds. Despite a history of success, right now antibiotics are under review and research because of an increase in MDR/APRBs. This has led to exploration of inexpensive, natural, and efficient antimicrobial agents to counter the MDR/ARPB threat. One of such antimicrobial agents has been found to be bacteriophage as an effective and host-specific antimicrobial agent. The present work was taken up with an aim to provide an overview on current insights and developments in the field of AMR and Bacteriophages. The study delves into the bibliometric analyses of the pertinent research work done with bacteriophage as the antimicrobial agent against a selected group of pathogens. The review takes into account the relevant publications from 2001 to 2024 on AMR and Bacteriophages, as retrieved from Web of Science (WOS), PUBMED and other peer reviewed open access journals. The keywords with which the entire bibliometric study is based are “Bacteriophages”, “Phage”, “AMR”, “AMR and Phage”, “Phage Therapy”.The bibliometric analysis of the countries, journals, authors, institutions, research area and, keywords were analyzed and visualized using VOS viewer, and biblio shiny in R software.

Keywords: *Bacteriophages, AMR, MDR, ARPB, Biobliometric Analysis, biblioshiny, Phages, Phage Therapy*

C010

Marine Actinomycetes: A rich source of metabolites as novel antimicrobial compounds

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Abstract:

Marine actinomycetes are widely distributed through the marine ecosystem having diverse species producing different secondary metabolites. The secondary metabolites derived from such marine actinomycetes have immense scope in environmental, agricultural and many industrial fields. Since decades terrestrial actinomycetes have been explored and proved vital for production of many potential bioactive components, particularly antibiotics. In recent studies, their marine counterparts that flourish in ocean ecosystem producing novel metabolites have been explored. The marine ecosystem represents a unique source for the discovery of novel secondary metabolites primarily having antimicrobial effects; while some exhibit anticancer properties and inhibitory effects on certain enzymes as well. These metabolites have structural diversity and unique mechanism of action making them valuable for novel drug discovery. By focusing on recent discoveries and innovations, this review highlights the importance of marine actinomycetes for creating contemporary drugs to combat antimicrobial resistance and to fulfill the gap created due to increased demand of antimicrobial agents in this era of emerging diseases.

Keywords: *Marine Actinomycetes; secondary metabolites; drug discovery*

CP20

Antimicrobial study of some new thiazolidinone derivatives

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Abstract:

Novel series of compounds containing thiazolidinone derivatives have been synthesized and their characterization was done by IR, 1HNMR and NMR data. The antimicrobial activity of synthesized compound was studied against some Gram positive and Gram negative organism in DMSO by broth dilution methods. A differential effect of the compounds were found in bacterial strains investigated and the solvents used, suggesting that the antimicrobial activity is dependent on the molecular structure of the compound, solvent used and the bacterial strains under consideration. Newly synthesized compounds have been evaluated for antimicrobial activity against a variety of bacterial strains in which some of these derivatives exhibited potential antibacterial and antifungal activity.

Keywords: *Thiazolidinone derivatives,Thioglycolic acid,1,4-Dioxane,Anhydrous $ZnCl_2$,DMSO*

CP21

Rice Water As Natural Remedy To Manage Urinary Tract Infection

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Abstract:

Urinary Tract Infection represent one of the most wide-spread infections. Long-term antibiotic therapy is an effective approach to treat Urinary Tract Infection but its generate adverse effects including most of the pathogenic strains resistance to the majority of antibiotics, several life threatening side effect, repeated high cost and low efficiency of antibiotics. To solve this problem, enhance the interest towards new alternatives based on the natural remedies such as Ajwain, Cranberry, Coconut water, Dal chini, Rice water, Aloe Vera, Tulsi are used to treat and manage Urinary Tract Infection. Rice water extract has antimicrobial activity to inhibit the microorganisms, Antioxidant activity helps in neutralizing free radicals, reducing oxidative stress and Anti-inflammatory activity reduces inflammation. Rice water extracts such as ferulic acid, starch, phenolic compound, phytic acid, vitamins, minerals are used to manage the urinary tract infection.

Keywords: *Urinary tract infection, Antimicrobial, Anti-inflammatory, Antioxidant.*

CP22

Covid – 19 : History, Effects and Treatment

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Abstract:

Covid – 19 was found in Hubei, China in December, 2019.It spread globally and became a pandemic worldwide. The Covid-19 hasaffected214 countries and different areas across the globe.In 2020, the number of infected positive (+ve) cases were around 13.1 million and 5,71,527 deaths were reported all over the world.Contaminated aerosols (virus – laden, smoke from tobacco, cigarettes) are suspected to serve as a major possibility for transmission of this contagious virus.If a person is infected by covid – 19, there are chances of the spreading of virus to some other person or a group of people, if not handled appropriately.Control and preventive measures were undertaken by the world to fight back the vast spread of this communicable viral. As a result,soon Covid-19 vaccines were invented and used mainly in three doses in India.Three vaccines namely Co – vaccine, Covishield and Booster Dose were developed as a counter initiative to fend off the virus. Production of the vaccines was done by Serum Institute of India Pvt. Ltd. Also since vaccines were mainly used as a counter initiative by the majority of the people all over the world, there are a lot of myths regarding the side effects of the use of covid - 19 vaccines which need to be addressed.Noticeable symptoms and effects kick in onto the body of the host sooner or later once they are infected. The initial 1-3 days mark the onset of symptoms, further during the days 4-9 infection in the lungs takes place, during days 8-15 infection in blood is observed. The final 15-22 days mark the onset of death.People belonging to the age group of above 65 are the most vulnerable against this virus since they have a weakened immune system due to aging. Babies not more than 6 months are also prone to this virus.

Keywords: *Covid – 19, Co – vaccine, Covishield, Booster Dose*

CP23

Carotenoids from Halophilic Bacteria: MicrobialSolutions for Antioxidant and Therapeutic Applications

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Abstract:

Halophilic bacteria, adapted to extreme saline environments, are a promising and sustainable source of carotenoids with exceptional antioxidant and therapeutic properties. These naturally derived pigments present a safer alternative to chemically synthesized carotenoids, which pose significant health and environmental risks. The extraction process is efficient and cost-effective, utilizing solvents such as methanol, cell disruption techniques, and advanced analytical tools like high-performance liquid chromatography (HPLC). Comprehensive pigment characterization can be achieved through genomic analysis, UV-Vis spectrophotometry (400–600 nm), reverse-phase HPLC, and thin-layer chromatography. Carotenoids from halophilic bacteria demonstrate remarkable antioxidant activity, offering cellular protection against oxidative stress and free radical damage. These compounds also serve as a rich source of provitamin A and confer numerous health benefits, including anticancer properties, regulation of apoptosis, inhibition of cancer progression, and neuroprotection. Furthermore, they have shown potential in reducing the severity of neurodegenerative diseases such as Alzheimer's and Parkinson's and lowering cardiovascular risks. Recent advancements such as metabolic engineering and fermentation optimization, have further enhanced carotenoid yield and purity, making large-scale production more feasible. However, challenges such as strain optimization, scalable bioprocessing, and cost-efficient downstream processing remain to be addressed. Exploring the ecological role of carotenoids in halophilic bacteria may also uncover novel bioactivities and broaden their application spectrum. The potential of

halophilic bacteria as a bioresource for carotenoid production highlights their pivotal role in advancing health, nutrition, and pharmaceutical innovations while addressing global sustainability challenges.

Keywords: *Halophilic bacteria, Carotenoids, Pigment extraction, Pharmaceuticals*

CP24

Investigating Halophilic Carotenoid-Producing Bacteria from South Gujarat Saltern Pans

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Abstract:

Marine halophilic bacteria are indeed diverse microorganisms that thrive in high-salt environments, such as seawater, salt flats, and saline lakes. These bacteria have unique metabolic pathways and physiological adaptations that makes them valuable in diversified applications. Exploration of Carotenoids from bacteria may open up the potential applications due to its unique chemical property as well as antioxidant potential. In present study,efforts were made to isolate carotenoids pigment producing bacteria from the various saltern pan of South Gujarat using screening medium such asZobell Marine Agar 2216, Brown Medium (15% (w/v) and 25% (w/v)NaCl), Halophilic Medium (10% (w/v) NaCl), Nutrient Agar Medium (10% (w/v) NaCl). The orange, yellow and pink pigment producing bacteria grown on halophilic media were subjected to MALDI-TOF for preliminary identifications. The carotenoids producing isolates were found to be belong to *Micrococcus sp., Paracoccus sp., Micrococcus sp., staphylococcus sp., Bacillus sp.*based on MALDI-TOF analysis, which are reported for a very rare C50, C30 carotenoids production. Additional efforts were undertaken to extract carotenoids from biomass using various solvent-based treatments. Moving forward, further research will focus on the extraction, purification, and characterization of carotenoids using advanced analytical tools, aiming to unlock their potential for future applications.

Keywords*: Saltern Pan*, *Halophiles*, *Bacteria,Carotenoids, MALDI-TOF*

CP25

Biodecomposition of Banana Residue(pseudostem)

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Abstract:

Nowadays, there are several problems occurring in soil due to high use of chemical decomposer. So, we are introducing the use of biological decomposer on banana residue(pseudostem). The entire biomass(pseudostem) of the plant which contains nutrients and large amount of organic carbon which is left in the field and it takes several months to degrade naturally. Therefore, main purpose is decomposed and utilizes these potential waste. *Pseudomonas aeruginosa, Saccharomyces cerevisiae*, etc has ability to decomposed pseudostem of banana. Preparation of compost pit(pit method) can be done by wastes cut into pieces and then, collection and inoculation of microbial species. During this study, observation of significant changes in different physico-chemical properties like pH, Temperature, Moisture content, Humidity, Carbon, Nitrogen & Phosphorus content of decomposing material should be done.

Keywords: *Biodecomposer , Banana stem, Pit method*

CP26

Kombucha: A Probiotic Beverage Revolutionizing Health and Beverage Industries

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Abstract:

Kombucha, a traditional fermented beverage prepared using black or green tea, sugar, and a symbiotic culture of bacteria and yeast (SCOBY), has garnered significant attention for its diverse health benefits and multifunctional applications. This naturally derived drink serves as a promising alternative to synthetic drugs, owing to its rich profile of bioactive compounds such as polyphenols, organic acids, vitamins, and probiotics. These compounds are characterized through advanced assays, including ABTS, FRAP, DPPH, HPLC, and ESI-MS. Kombucha exhibits a range of desirable properties, including unique appearance, colour, taste, carbonation, low alcohol and sugar content, antioxidant activity, nutritional value, immune support, and probiotic content. These attributes make kombucha a versatile resource in industries such as pharmaceuticals, medical applications, food and beverages, cosmetics, and more. Additionally, the cellulose in SCOBY renders kombucha useful for biofilm applications, further expanding its industrial relevance. Kombucha's health benefits, such as enhanced digestion, immune modulation, and oxidative stress reduction, have made it a staple in modern diets. This study bridges traditional knowledge with scientific advancements, emphasizing kombucha's role as a sustainable and health-promoting beverage. Future directions include personalized probiotic formulations, zero-waste production processes, integration into skincare products, and utilization in eco-friendly materials. These advancements highlight kombucha's potential to drive innovation in functional food development, fostering its growth as a key component in modern nutrition and sustainable practices.

Keywords: *Fermented Beverage, SCOBY, Biofilms, Zero-Waste Processes, Health Benefits*

CP27

Microbial Production and Characterization of Polyhydroxyalkanoates (PHA) from Cost-EffectiveSubstrates

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Abstract:

Polyhydroxyalkanoates (PHAs) are a class of biodegradable and biocompatible polyesters with significant potential for producing environmentally friendly bioplastics. A key challenge in PHA production is its high cost, which can be mitigated by utilizing alternative carbon sources such as wastewater, agro-industrial waste, and other renewable feedstocks. Various microorganisms, including *Cupriavidusnecator*, *Halomonas spp.*, *Bacillus megaterium*, and genetically modified strains like *Escherichia coli*, have been identified as efficient PHA producers, enabling sustainable production processes. PHAs exhibit desirable properties such as biodegradability, high recyclability, biocompatibility, and mechanical versatility, making them suitable for diverse applications. PHA-producing microorganisms can be detected and stained using dyes like Nile Blue and Sudan Black B. Advanced characterization techniques, including UV-Vis spectrophotometry (220 nm), gas chromatography-mass spectrometry (GC-MS) for compositional analysis, and Fourier-transform infrared spectroscopy (FTIR) for structural elucidation, provide critical insights into the chemical and functional properties of PHAs. Optimizing the carbon source concentration and composition has been shown to enhance microbial growth, biofilm formation, and PHA accumulation. PHAs hold immense potential in applications such as biodegradable food packaging, drug delivery systems, and tissue engineering, offering a sustainable solution to reducing plastic waste and mitigating environmental pollution. Utilizing waste materials as feedstock not only lowers production costs but also promotes waste valorization and supports the transition to a circular economy. Future

advancements in metabolic engineering, microbial strain optimization, and integrated biorefinery technologies are expected to enhance PHA yield and expand its industrial applications, paving the way for a sustainable bioplastics revolution.

Keywords: *Polyhydroxyalkanoates, Bioplastics, Sustainable production, Characterization, Optimization*

CP28

Production of selective bioweedicides to control monocot and dicot weeds

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Abstract:

Weeds pose a significant challenge to global agriculture, reducing crop yields and increasing costs of production. Whereas chemical herbicides, while effective, often lead to environmental degradation, soil toxicity, and the evolution of herbicide-resistant weed species. Microbial bio-weedicides utilizing naturally occurring microorganisms and their metabolites to target and suppress weed growth. This study explores the potential of microbes, including bacteria, fungi and actinomycetes. Advances in microbial fermentation and bioprocess optimization have enhanced the efficiency of bio-weedicide production. This bioweedicides is used to control weeds without harming the crop plants and soil economy. It targets specific type of weeds such as monocots and dicots. The introduction of microbial weedicide into weed management strategies promises reduced environmental impact, improved soil health, and minimized risks to non-target organisms. While microbial bio-weedicides present a promising solution, challenges remain, including scaling up production, ensuring consistency in field performance, and navigating regulatory frameworks. Bio-weedicides are produced by the solid or submerged fermentation process using various type of pure and agro-waste substrate. Future research should focus on enhancing microbial strain efficacy, understanding their mechanisms of action and developing cost effective production technologies to facilitate large scale adoption in sustainable agriculture.

Keywords: *Bio-weedicide, biological control, weed management, agriculture.*

CP30

Production Of Multi-Utility Bioenzyme From 'Organic Waste', Its Application In Daily Life & Study Of Its Physico-Chemical Properties

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Abstract:

Numerous cleaning products contains chemicals that can be harmful to humans, animals & plants in the environment if ingested. The "EPA" (Environmental Protection Agency) categorizes many of these chemicals as 'volatile organic compounds' that can cause harm in several ways. In the time of pandemic crisis such as COVID-19, it is essential to regularly disinfect all inanimate surfaces around us that contains community transmission. A greener way to disinfect it is by creating a laboratory at home & synthesizing an environment friendly disinfectant. The primary objective of this research is to reduce the number of pollutants that enter the ecosystem by using Bioenzymes, thereby protecting the environment & contributes to society's shift towards a sustainable, chemical- free environment. Every year, large amounts of peel waste are generated from the fruits & vegetables /household cooking. These wastes are highly rich in bioactive compounds; hence the production of value-added products is a novel step towards the sustainable utilization of these wastes. The Bioenzymes (also known as Eco-enzymes/Garbage enzymes) is produced by the simple fermentation process using microorganisms, jaggery& water. It is natural, non-toxic, non-flammable, & increases stability of soil. The physical characteristics like pH, Total Dissolved Solids, color, smell was studied for the produced Bioenzymes. The physico-chemical test revealed the presence of secondary metabolites like alkanoids, flavonoids, tannins, quinones, saponins, cardenolides in them which are known for their antibacterial, antifungal, antiviral, Anti-inflammatory, antifeedant, insecticidal & foaming properties.

Keywords: *Bioenzyme, organic waste, sustainability, environment-friendly, peel waste*

CP31

Determination of hydrocarbon degrading potentially of fungal isolates from oil contaminated soil

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Abstract:

Nowadays, one of the serious problems affecting the environment is petroleum hydro carbon contamination, includes: oil spill, tank leakage, lubrication, petroleum exploitation, transportation & services. Various techniques including mechanical & chemical methods have been employed for the bioremediation &degradation of hydrocarbons pollutants from the environment. Among microorganisms used in biodegradation technology now days, fungi are efficient, reliable, cost-effective & environmentally friendly that can be used to clean -up & detoxify hydrocarbon contaminants. Biodegradation using fungi ensure the complete degradation , &Mineralization of petroleum hydrocarbon contaminants into carbon dioxide , water , inorganic compound & cell biomass. Fungal species with a high potential to biodegrade petroleum hydrocarbon pollutants, Fungal species like *Aspergillus spp., Penicillium spp., Fusarium spp., Trichoderma spp., Alternaria spp.* etc. The fungal species with high potential for biodegrading petroleum compound & PAHs, offering promising prospects for the decontamination of oil contaminated soil.

Keywords: *Biodegradation & Bioremediation, soil fungi, hydrocarbon, petroleum*

CP32

Synthesis, characterization of zinc ferrite nanoparticles

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Abstract:

Ferrite nanoparticles drawn the attention of researchers because of their unique properties. Co-precipitation technique synthesis zinc ferrite (Znfe2O4). Zinc ferrite prepared by hydrothermal method. Average particle size calculated by Debye Scherer formula 3.54cm and Xray density of powder is 1.6466gm/cc3. Antibacterial, Antioxidant and Anticancer properties of zinc ferrite nanoparticles were evaluating nanoparticles characterize using X-ray diffraction. Agar disk diffusion and 2,2-diphenyl-1-picrylhydrazyl hydrate test use antibacterial properties. Molecular interaction study had been performed using Bovine Serum Albumin. Bio-application like antimicrobial activity, Anticancer properties and biomolecule interaction. Zinc ferrite had strong antimicrobial effect on *Escherichia coli* and *Staphylococcus aureus*.

Keywords: *Anticancer, Antimicrobial, Bovine Serum Albumin, Hydrothermal, X-ray diffraction*

CP33

Applicability of sulfate oxidizing and reducing bacteria for improvement of plant growth nutritional properties

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Abstract:

Sulfur is a critical macronutrient for plant, essential for the synthesis of amino acids, enzyme and secondary metabolites. However, intensive farming, reduced sulfur inputs and soil degradation have led to sulfur deficiencies in agricultural fields, adversely affecting crop growth yield and quality. The role of sulfur-reducing (SRB)and sulfur-oxidizing microorganisms (SOB), including bacteria and fungi in enhancing sulfur bioavailability and soil fertility. This challenge, SRB and SOB were isolated from sulfur-deficient agricultural Soils, Chemical industrial effluents, Hot Spring and sulfur rich natural habitats. Isolation and Screening involved enrichment techniques and media targeting Sulfur metabolism, followed by biochemical assays and molecular characterization. Efficient strains such as *Desulfovibrio, Thiobacillus*, *Aspergillus*, *Penicillium* demonstrated significant sulfur transformation Capabilities and application in sulfur - deficient soils resulted in enhanced sulfur availability as Confirmed by Soil organic sulfur (SOS) analysis. Phytochemical analysis of treated crops revealed improve the level of chlorophylII, Proteins, and Sulfur-Containing secondary metabolites. Areduction in soil acidity, Promoting better nutrient uptake and overall soil health. Sulfur-transforming microbes as biofertilizers to overcome sulfur deficiencies Sustainably. By improving nutrient cycling, these microbes reduce dependency on Chemical fertilizers, enhance Crop Productivity and support eco-friendly agricultural Practices.

Keywords: *Biofertilizers, Crop Productivity, eco-friendly practices, Soil fertility and health*

CP34

Review on assessment of multiple parameters of river water

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Abstract:

Ecological and hydrological factors such as seasonal changes water flow and physical-chemical properties of rivers influence microbial diversity and abundance. The microbial quality of the rivers water was poor due to direct contamination by human and animal excreta and other activities. The river water cannot be used for domestic purpose without any test and treatment. Contamination of natural water sources is one of the main health problems worldwide, which could be caused by chemicals, metals, or microbial agents. To resolve this problem, selection of methodology to identify and quantify microbial population, ecological function, and implication for water quality management is crucial. It includes the traditional culture-based techniques, molecular and physical-chemical method. This analysis corelate human activities on microbial contamination.

Keywords: *Microbial analysis, River water, Contamination, Ecological, Microbial population*

CP35

Degradation of cypermethrin &it's metabolite 3-phenoxy benzoic acid by using bacterial cultures & it's applicability for soil bioremediation

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Abstract:

All over the world, due to overuse of chemical pesticides, fertility of the soil decreases day by day and these pesticides show detrimental effects on human beings, plants, animals & environments. Cypermethrin is a pyrethroid pesticide. The half-life of the cypermethrin in the soil varies from 2-8 weeks depending on the physicochemical properties of the soil. the toxicity of the cypermethrin is Neurotoxicity, carcinogenesis and immune suppression. Experiment carries out in several stages. Sample collection, enrichment, isolation and screening and cypermethrin degradation study. Soil sample is collected from the fields where cypermethrin is usually used. The analytical methods are Gas chromatography, Gas chromatography-mass spectroscopy(GC/MS). The metabolite of cypermethrin, 3-phenoxy benzoic acid is also hazardous to humans and environment.so it is necessary to remove this hazardous chemical from the soil. Bioremediation is the alternative method. Biodegradation of cypermethrin into 3-PBA into the simpler harmless substances which play important role in protection of human and environment.

Keywords: *3-phenoxy benzoic acid, biodegradation, cypermethrin, Neurotoxicity*

CO11

Unveiling Microalgae Diversity from Soil and Water Samples from various Rice Fields of Silvassa, UT of DD & DNH, India

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Abstract:

Present study focuses on revealing unexplored microalgae diversity of soil and water samples across Silvassa, UT of DD & DNH. Microalgae, one of the most primitive life form so earth, have been investigated since long, for various pigments ,including phycobili proteins and other metabolites. These wonderful life forms can grow, with minimum nutrients, even normal ground-water, with minimum nutrients added. Physicochemical characterization of soil samples revealed near neutral pH and more than 50% water holding capacity, and favourable metal ion composition. Paddy field soil samples, water samples from water logged in fields and nearby waterbodies, were used for cultivation of microalgae. Growth of microalgae in natural waters and BG-11 showed similar growth patterns, indicating minimal nutrient requirements, for its growth. Microscopic observation of cultivated cyanobacteria, revealed presence of *Nostoc, Anabaena, Oscillatoria, Synechococcus, Chlorella, Microcystis* etc. The study holds potential about further exploration of isolation and screening for production of various phycobiliprotein pigments and valuable metabolites.

Keywords: *Microalgae;Phycobiliproteins;Paddyfield;Oscillatoria;Synechococcus.*

CP36

Bio-colorant production by pigment producing bacteria isolate from soil

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Abstract:

Bio-pigments have numerous emerging commercial applications in the fields of paints, cosmetics, dyes, and the food industry as natural colorants. In the present study, experiments were conducted to enhance the production and optimization of bio-pigments. Three potential strains, PX1, PX2, and PX3, were selected for pigment production. For strain PX1, the highest pigment yield was observed at pH 7, 72 hours of incubation, ammonium sulfate as a nitrogen source, a temperature range of 25–30 °C, and dextrose as a carbon source. For strain PX2, the highest pigment yield was achieved at pH 7, 72 hours of incubation, potassium nitrate (KNO_3) as a nitrogen source, a temperature range of 25–30 °C, and mannitol as a carbon source. For strain PX3, the highest pigment yield was observed at pH 7, 72 hours of incubation, ammonium citrate as a nitrogen source, a temperature of 37 °C, and maltose as a carbon source. By harnessing the power of bacteria, we aim to develop a new era of natural pigments, reducing dependence on synthetic dyes and promoting eco-friendly practices.

Keywords: *Bio-pigment, Natural colorants, Carbon source, Nitrogen source*

CP37

Isolation and Characterization of Cobalt and Nickel Tolerant Plant Growth-Promoting Bacteria for Sustainable Phytoremediation

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Abstract:

Heavy metals are naturally present in the Earth's crust and cannot be degraded or destroyed, posing significant challenges to environmental and agricultural sustainability. Industrial activities exacerbate soil degradation, with soil organic carbon levels in India declining from 1% to 0.3%. This study focuses on the isolation and characterization of cobalt- and nickel-tolerant bacteria with plant growth-promoting rhizobacterial (PGPR) traits from industrially polluted soils in Navsari and Valsad, Gujarat. A total of 42 cobalt-tolerant and 47 nickel-tolerant bacterial isolates were obtained using Luria and nutrient agar supplemented with 0.5 mM cobalt and nickel chlorides respectively. Among them, 21 cobalt-tolerant and 34 nickel-tolerant isolates demonstrated growth at concentrations up to 5 mM (1187.50 ppm). Biofilm formation assays confirmed extracellular polymeric substance production in 10 cobalt-tolerant and 21 nickel-tolerant isolates. PGPR traits such as phosphate solubilization, siderophore production, and indole-3-acetic acid (IAA) production are under evaluation. Bacterial isolates demonstrating both cobalt and nickel tolerance with PGP traits will be identified through 16S rRNA sequencing and MALDI-TOF mass spectrometry. This study highlights the potential of metal-tolerant PGPR, particularly those showing dual metal resistance and plant growth-enhancing capabilities, to develop eco-friendly and cost-effective phytoremediation strategies.

Keywords: *Heavy metal, PGP traits, 16S rRNA Sequencing, MALDI-TOF Mass Spectrometry*

CP38

Biodegradation of Sulfamethoxazole by Microorganisms Isolated from Pharmaceutical Wastewater: A Review

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Abstract:

The increasing presence of pharmaceutical contaminants in aquatic environments is a growing concern, with sulfamethoxazole (SMX) being one of the most commonly detected antibiotics in wastewater. SMX is not readily removed by conventional treatment methods, leading to its accumulation in water bodies and potential ecological and health risks. This review examines the biodegradation of SMX by microorganisms isolated from pharmaceutical wastewater. Various studies have reported the isolation of bacterial strains capable of degrading SMX under specific conditions. The review highlights the mechanisms involved in SMX biodegradation, including enzymatic activity, co-metabolism, and the role of environmental factors such as temperature, pH, and nutrient availability. Additionally, the potential of genetically engineered microorganisms and bioaugmentation approaches in enhancing SMX degradation is explored. Recent advancements in analytical techniques, such as chromatography and mass spectrometry, have facilitated the identification of degradation products, providing insights into the metabolic pathways. The review also discusses challenges in scaling up biodegradation processes for real-world applications, emphasizing the need for further research on microbial consortia, bioreactor systems, and optimization of operational parameters for effective pharmaceutical wastewater treatment. Ultimately, this review aims to provide a comprehensive understanding of SMX biodegradation, its environmental implications, and its potential role in developing sustainable solutions for the treatment of pharmaceutical pollutants.

Keywords: *biodegradation, sulfamethoxazole, pharmaceutical wastewater, microorganisms, environmental pollution*

CP39

Biodegradation of Cefadroxil by Microbial Isolates from Pharmaceutical Wastewater: Mechanisms and Applications

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Abstract:

Cefadroxil, a broad-spectrum cephalosporin antibiotic, is commonly used in the treatment of bacterial infections but has been increasingly detected in pharmaceutical wastewater, posing a significant environmental challenge. Its persistence in aquatic environments, coupled with the inefficiency of conventional treatment methods in removing such contaminants, necessitates the exploration of alternative remediation strategies. This review focuses on the biodegradation of cefadroxil by microorganisms isolated from pharmaceutical wastewater. Recent studies have identified diverse bacterial and fungal strains capable of breaking down cefadroxil under controlled conditions. The review discusses the microbial metabolic pathways involved, including hydrolysis, oxidation, and enzymatic activities that facilitate the degradation of cefadroxil. Key factors such as pH, temperature, nutrient availability, and co-substrates, which influence microbial degradation efficiency, are examined in detail. Additionally, the review highlights the importance of microbial consortia and the potential for bioaugmentation and bioremediation strategies in enhancing cefadroxil degradation. Advanced analytical techniques, including high-performance liquid chromatography (HPLC) and mass spectrometry, have been pivotal in identifying degradation intermediates and elucidating the degradation mechanisms. This review further addresses the challenges of scaling up biodegradation processes for real-world applications and the need for optimization in bioreactor systems. Ultimately,

understanding the biodegradation potential of microorganisms for cefadroxil will contribute to more effective, sustainable solutions for pharmaceutical wastewater treatment, reducing the environmental impact of antibiotic contamination.

Keywords: *biodegradation, cefadroxil, pharmaceutical wastewater, microorganisms, environmental remediation*

CP40

Microbial phosphorus removal in waste stabilization and wastewater treatment system

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Abstract:

Phosphorus is an essential nutrient required by living organisms and plays a vital role in various physiological processes. However, it can become a pollutant when present in high concentrations under certain environmental conditions. Excessive phosphorus levels can accelerate the eutrophication process in lakes and other natural water bodies. The microbial phosphorus removal process widely used for removing phosphorus from wastewater to avoid eutrophication of water bodies. Numerous microbial strains obtained from rhizosphere soil have been shown to be successful in removing phosphorus according to a review of the literature. The growth condition for the strain that exhibited maximum phosphate solubilization included specific carbon and nitrogen sources under anoxic environment. These bacterial isolates could potentially be used for the remediation of phosphate-contaminated environments.

Keywords: *Microbial phosphorus removal, Wastewater treatment, Rhizospheric soil*

CP41

Phytochemical and pharmacological evaluation of leave and flower extracts of *Ipomoea cairica* (L.) Sweet (Convolvulaceae)

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Abstract:

Ethnomedicine has been popular since man's history and is known to cure numerous ailments. *Ipomoea cairica*(convolvulaceae) is an invasive vine species and regarded as a weed. Interestingly, it has been proven to have significant cathartics, anti-oxidant, anti-microbial, spasmolytic, anti-inflammatory, antipyretic, and anticancer. In the present study, extraction and screening of various plant constituents has been done using dried powder of leaves and flowers using solvents such as water, ethanol, dichloromethane, petroleum ether and n-hexane by Soxhlet method. Next to it, phytochemical screening tests results showed the presence of carbohydrates, phenol, alkaloid, glycoside and terpenoids. In addition, ethanol and petroleum ether extract showed the maximum Zone of Inhibition and Minimum Inhibitory Concentrations of 62.5 µg/ml and 100 µg/ml respectively against *E. coli* with standard antibiotic as a positive control. Further, the antioxidant activity of various extracts is assessed by DPPH, FRAP and ABTS activities which exhibited IC_{50} value 18.6 µg/ml for ethanol extract. Further research will delve into the anticancer and anti-inflammatory potential of the extracts. By identifying the specific bioactive compounds and developing advanced formulations, this study aims to unlock the full therapeutic potential of *Ipomoea cairica*.

Keywords: *Ipomoea, Phytochemicals, Antioxidant, Antimicrobial*

CP42

Air pollution: Effect on Environment & Human body

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Abstract:

In developing countries problem of industrialization and increasing population degrades the society with polluted air. Air pollution is caused by solid and liquid particles and certain gases that are suspended in the air. These particles or gases can come from vehicles, factories, dust, pollen, mold, spores, volcanoes and wildfires. Outdoor air pollution is a challenge for public health hazards like cardiovascular disease respiratory diseases, chronic obstructive pulmonary disease (COPD) and asthma which spread throughout the world. Mesophilic bacteria are a type of bacteria that can cause disease in humans and are responsible for human infections like Aeromonas, listeria monocytogenes. Studies revealed that modern- technology waste incineration plants, which comply with the legislation emissions are a cancer risk factor or have adverse effects on reproduction or development. Industrialization most efficient air pollution control like collectors including cyclone or dynamic particles. There are many pollutants that are major factors in disease in humans. Among them Suspended Particulate Matter (SMP), mixed in the atmosphere and effect penetrate the respiratory system via inhalation, causing respiratory and cardiovascular diseases and cancer. The only way to tackle this problem is through public awareness coupled with a multidisciplinary approach by scientific experts; national and international organizations must address the emergence of this threat and propose sustainable solutions.

Keywords: *Air pollution, Mesophilic Bacteria, Health Hazards*

CP43

Zinc-Curcumin and Curcumin-Ascorbic Acid Complexes: A Synergistic Approach Against Bacterial Amphiphiles

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Abstract:

Biofilm-associated infections pose a significant challenge due to their resistance to standard antibiotics, complicating treatment. In industrial settings, biofilms cause contamination and reduced efficiency, driving the search for alternative inhibitory strategies. This study explores the synergistic effects of the Zn-curcumin complex and curcumin-ascorbic acid in inhibiting bacterial amphiphile production in *Pseudomonas fluorescens* CHA0 and *Bacillus licheniformis* K125. Sixteen cultivation media were screened to identify formulations that suppress both biosurfactant and amyloid production. The effectiveness of these conditions was evaluated through surfactant activity assays, ThT fluorescence, thin-layer chromatography, and standard staining techniques to confirm the absence of targeted metabolites. By disrupting amyloid fibres and biosurfactants, this approach offers a novel means of inhibiting biofilm formation and modulating bacterial behaviour. These findings underscore the potential of these complexes as innovative antibacterial agents for clinical and industrial applications, promoting human health and environmental sustainability.

Keywords: *Amyloid, biosurfactant, metal-curcumin complex, curcumin-ascorbic acid and surface tension reduction*

C012

Antimicrobial Natural Compounds from the Flora of North East India

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Abstract:

India has one of the highest rates of bacterial illnesses in the world. In India, as per a recent estimate, nearly 4 lakhs children under the age of five years die each year which is about 25% of all child fatalities in the country. Infectious disease-related mortality in India is currently 417 per 100,000 people. North Eastern region of India is a mega-centre of biological richness and is referred to as an Indo-Burma Biodiversity Hotspot. The region is also very rich in microbial diversity. Owing to the region's distinct biological, geological, and geographical characteristics with multiple ethnic tribal groupings, it possesses a wealth of knowledge regarding traditional cures and medicinal plants. The effective exploitation of these unique natural resources has been the author's ongoing focus and large number of natural compounds were isolated from plants and microorganisms with pharmaceutically significant bioactivities. An antibiotic compound 2-methylheptylisonicotinate was isolated from *Micromonospora auratinigra*, possessing antibacterial activity through a membrane-disrupting mechanism. Further, many anti-bacterial and antimalarial natural compounds were identified from different plant sources. Many of them showed very good activities against *Mycobacterium smegmatis* (ATCC®607™) and *Candida sp.* (ATCC®90028™). Anti-viral natural compounds were also identified using bioinformatics tool. A process for bioplastics was developed from bacteria.[9] Further an anti-diabetic compound acarbose was identified from the culture extract of *Arthrobacter* sp. SWl using by LC-MS and NMR spectroscopy. Herbal drug was also developed successfully from this huge resource of North East India. All these results will be highlighted in this presentation.

Keywords: *Medicinal plants, phytochemicals, 2-methylheptylisonicotinate, acarbose, Micromonospora auratinigra, antifungal, antibacterial*

CP44

Review: Bacterial Disease: Urinary Tract Infection

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Abstract:

A urinary tract infection is bacterial infection caused by *E. coli* in part of the urinary tract. When it affects the lower urinary tract, it is known as simple cystic or bladder infection, when it affects the upper urinary tract is known as pyelonephritis or a kidney infection. About 60% of women and 12% of men will have at least one UTI in their lifetime as well as 8% of pregnant women are affected by UTI. According to a recent global survey the rate of UTI worldwide is estimated to be around 404.6 million new cases per year with nearly 23678.6 deaths attributed to UTI annually globally. A UTI causes symptoms like back pain, fever, bloody urine, urine that smells bad, vomiting, pain during urinating. A diagnostic test for a urinary system is a blood test, urine test, CT scan, ultrasound cardiography, renal scan, kidney, ureter, and bladder. In this review we discuss the UTI infection, symptoms, diagnostic, worldwide scenario.

Keywords: *Cystitis, Bloody urine, Urine test, UTI, urinary tract*

CP45

Review: Probiotics and functional foods role of microbial communities

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Abstract:

Probiotics are live microorganisms, usually bacteria or yeast, that are thought to provide health advantages when taken in sufficient quantities. They are commonly characterized to as & quot; good& quot; or & quot; friendly & quot; bacteria because they can aid in the maintenance of a healthy gut flora, which is necessary for digestion and immunity. Probiotic products typically contain lactobacillus, bifidobacterium, saccharomyces, streptococcus, enterococcus, escherichia, and bacillus. Probiotics are most typically found in fermented foods including yogurt, kefir, kimchi, pickles, and dietary supplements. It critical to distinguish distinct roles and learn more about the underlying processes, which include intestinal microflora change and competitive exclusion. Probiotics are utilized in the baking and dairy beverage sectors. It may contribute to better health. They were used to treat food allergies, diarrhea, lactose intolerance, acute rotavirus, and colon cancer. Additionally, it is used to treat irritable bowel syndrome.

Key Words: *Probiotics, Lactobacillus, Fermented Foods, And Friendly Bacteria.*

CP46

Antimicrobial Evaluation of Some New Methylene Based Benzothiazoleincorporated Schiff base derivatives

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Abstract:

In this study, a series of new Schiff base derivative was synthesised from 6,6'- methylene bis(2-amino-4-methyl benzo[d]thiazole). The synthesised compounds were characterized by elemental analysis, IR and 1 H NMR spectra. Antimicrobial properties of Schiff base derivatives were investigated against two Gram positive bacteria (*Staphylococcus aureus, Streptococcus pyogenes*), two Gram negative bacteria (*Escherichia coli, Pseudomonas aeruginosa*) and three strains of fungi (*Candida albicans, Aspergillus niger, Aspergillus clavatus*) by using broth micro dilution method.

Keywords: 4,4'-methylene bis N- substituted benzylidine-2-methyl aniline, 6,6'-methylene bis(2-amino-4-methyl benzo[d]thiazole), Methanol, Glacial acetic acid.

CP 47

Study of Peptide Antibiotic Production and Its Efficacy Against Methicillin-Resistant Staphylococcus aureus Isolated from Clinical Sample

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Abstract:

Methicillin-resistant *Staphylococcus aureus* (MRSA) is one of the most significant antibiotic-resistant pathogens and it poses a serious challenge to public health due to the limited availability of effective treatment options. Thus, research on finding new antimicrobial compounds to be used for development of new-generation drugs is essential. This study aimed towards isolation, identification and characterization of a peptide-antibiotic from naturally-occurring Bacillus species, effective against multi drug-resistant MRSA. Peptide-antibiotics are of significant interest due to their relatively low toxicity and reduced capability of inducing bacterial resistance. Screening and isolation of antibiotic producing Bacillus was carried out using crowded-plate technique followed by confirmation with Wilkins-overlay method. The activity of the antibiotic was studied using the central-streak method against 28 isolates from which 21 were medically important Uro-pathogens, 6 standard-laboratory cultures and 1 MRSA. From the 28 isolates, 3 Gram-positives, 15 Gram-negatives and the MRSA were inhibited. The peptide nature of the antibiotic was qualitatively confirmed using Folin-Lowry. An MRSA isolate resistant towards 40 out of 51 antibiotics confirmed by Kirby-Bauer method was used to study the effect of the peptide-antibiotic using growth-inhibition assay by agar-cup method. This study also focuses on optimization of growth conditions for maximum production of the antibiotic and different extraction procedures such as ammonium-sulphate precipitation, solvent-extraction, for efficient isolation and to enhance the concentration of the antibiotic produced. The

outcome of this research is to obtain a peptide-antibiotic that holds substantial potential as a therapeutic agent against MRSA for further clinical development to combat antibiotic-resistant staphylococcus infections.

Keywords: *Peptide antibiotic, Antibiotic resistance, Methicillin-resistant Staphylococcus aureus, Solvent extraction*

DP1

Effect of Low Temperature Stratification on Germination of *Clitoria ternatea*

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Abstract:

The world today is diverting itself from conventional medicinal and dietary strategies towards more sustainable and plant-based medications and formulations. Mostly owing to the side effects as observed with synthetic formulations and also the target less efficacy. Moreover, the plant based systems provide more opportunities to explore the effectiveness for treatment by just incorporating them in the daily dietary habits or just inculcating proper management of up taking the extract preparation which will require less processing and hence more effective in their native forms or chemical composition. Various studies carried out for assessing the diverse plants and their products have focused on their uses in treatment and therapy by augmenting their phytochemical composition or their use as microgreen in diet. It has been reported that storage of plant seeds at low temperature increases the rate of germination. The present study aims at checking the effect of stratification on germination of *Clitoria ternatea.* The stratification was done by incubating the seeds at 4 °C for 12 h, 24 h and 48 h. It was observed that there was no significant change in germination rates but comparatively the relative germination rate was found better at 12 h but length of microgreen was better at 48 h and the wet weight of the same were observed to be relatively good at 12 h.

Keywords: *Germination rate, Microgreens, Stratification.*

DP2

Electroenzymatic remediation of wastewater

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Abstract:

With increasing population and urbanization, water pollution becomes a great threat for our environment and it adversely affect the whole ecosystem. Many hazardous and toxic water pollutants disturb the aquatic as well as marine bio system. Hence, their removal form the water is very important for the sustainable development of whole society. Enzymes are found to be highly efficient biocatalyst for the treatment of several resistance pollutants due to their high reactivity and selectivity. However, low stability and reusability under harsh condition limits their uses. Several methodologies such as enzyme engineering, medium engineering, and enzyme immobilization have been employed to improve the enzyme properties. This review aims to study the immobilization of several enzymes on various electrode materials for the removal of organic pollutant from the wastewater. Immobilization support provide microenvironment which can protect enzymes from sudden change in conditions. The application of several materials as immobilizing medium, like metal, metal, oxide nanoparticle-polymer composite, graphene oxide, carbon nanotube, porous Celite beads for various enzymes such as horseradish peroxide (HRP), oxidases, peroxidase, laccase, tyrosinase have been extensively studied.

Keywords: *Enzymes, electrode, immobilization, wastewater*

D01

Study of Biodelignification effect on Wheat straw

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Abstract:

Ample amount of lignocellulosic biomass on earth features plausible feedstock material for various sustainable products such as bioplastics, biofuels and biomedical applications. However, delignification is needed for converting this complex material into valuable products. Among various pretreatment methods, biological delignification is particularly attractive due to its environmental friendliness. This study focuses on the production of ligninolytic enzymes, specifically fungal Laccase and Lignin peroxidase. 15 terrestrial samples were collected from different regions of South Gujarat and isolated using Potato dextrose agar medium. Through the screening, three potential fungi F-5, F-8, F-9 were selected and identified as *Fusarium chlamydosporum*, *Polyporus benetostus* and *Trichoderma erinaceum* through ITS region based molecular method, and their compatibility confirmation was done using cross streak assay method. Various parameters such as incubation time, pH, temperature, fungal ratio, moistening agent, substrate, co-substrate and nitrogen source were optimized through OFAT method. Maximum production of Laccase (4507.1 U/g) and LiP (3974.3 U/g) by the fungal consortium was obtained. Partially purified enzyme mixture was utilized to delignify wheat straw. Chemical analysis (NREL method) and FTIR analysis confirmed compositional and structural changes after pretreatment step.

Keywords: *Biodelignification, Laccase, Lignin peroxidase*

D02

Unlocking the Potential of Microbial Proteases: A Statistical Optimization Approach

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Abstract:

Proteases are a class of enzymes that catalyze the hydrolysis of peptide bonds which are the building blocks of any protein molecule. They have an important role in diverse industrial applications. In this study, the main aim was to isolate and optimize a potent protease-producing microorganism. Soil samples from different geographical locations were screened for protease-producing organisms, and the isolate with the highest proteolytic activity was selected. To enhance protease production, a statistical experimental design- Plackett-Burman Design (PBD), was used to identify significant factors that influence enzyme production. By systematically varying key parameters such as various concentrations of nutrient components (carbon source, nitrogen source, salt), incubation time, temperature, and pH, optimal conditions for maximum protease yield were determined. The optimized process resulted in a significant increase in protease production, which shows the effectiveness of statistical design by PBD in process optimization. This study provides a basis for producing microbial protease at a large scale which may have potential applications in various sectors or industries.

Keywords*: Protease, Optimization, Plackett Burman Designing (PBD)*

D03

Immobilization of Enzymes using Entrapment Techniques: A Comparative Study of Methods and Applications

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Abstract:

The study investigates the biosynthesis of zinc oxide nanoparticles (ZnO NPs) using the fungus *Aspergillus terreus,* emphasizing their cytotoxic effects on cancer cells, particularly MCF-7 breast cancer cell lines. The fungal strain was cultivated in Czapek-Dox liquid medium, and the resulting biomass was utilized for nanoparticle synthesis. The synthesized ZnO NPs exhibited significant antimicrobial and anticancer properties, attributed to their unique electrostatic characteristics and photodynamic capabilities, which enhance drug delivery and induce apoptosis in cancer cells. Furthermore, the study explores the immobilization of L-asparaginase onto ZnO NPs, which improves enzyme stability, reusability, and therapeutic efficacy. This immobilization technique not only enhances the performance of the enzyme in drug delivery systems but also opens new avenues for its application in cancer therapy. The findings underscore the potential of biosynthesized ZnO NPs as a promising candidate for innovative drug delivery systems, paving the way for advanced therapeutic strategies in the treatment of malignancies.

Keywords- *Enzyme Immobilization, Entrapment techniques, Nanoparticles, cytotoxic effects, Actinomycetes*

D04

Laccase enzyme production by different fungal species and its applications in various fields

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Abstract:

Laccases are enzymes that play a key role in breaking down a wide variety of compounds, including both phenolic and non-phenolic substances. Because of their ability to catalyze these reactions, they have become highly valuable in industries such as bioremediation, food processing, and textiles. Fungi that produce laccases are divided into two categories: white-rot and brown-rot fungi. Among the most notable producers of these enzymes are species like *Trametes versicolor, Pleurotus eryngii, Pleurotus ostreatus,* and *Chaetomium thermophilum*. This review takes a closer look at how these enzymes are produced by different types of fungi, particularly those from the ascomycetes, deuteromycetes, and basidiomycetes groups, the factors that influence the production of laccases, including how the availability of substrates, pH levels, temperature, and oxygen can impact enzyme synthesis. The industrial uses of laccases are also discussed in depth. In bioremediation, for example, laccases are employed to break down environmental pollutants, such as phenolic compounds, pesticides, and dyes. In the textile industry, they help with dye decolorization and the processing of fabrics. In the food industry, laccases are used to remove unwanted phenolic compounds and to boost antioxidant activity in certain products. The review also touches on newer applications, such as their use in bio electrochemical systems and as biocatalysts in organic chemical synthesis. By bringing together recent research and technological innovations, this review aims to consolidate what is known about fungal laccases, while also identifying gaps in the current research. It points to areas where

further studies are needed, particularly in improving the stability, efficiency, and cost-effectiveness of these enzymes. Such improvements will be crucial in expanding the use of laccases in sustainable industrial practices.

Keywords*: Laccase, Phenolics, Anti-oxidant activity*

D05

Study on the production of Xylanase by Actinomycetes from coastal region of Navsari District

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Abstract:

An excellent microbial group for the production of enzymes that break down lignocellulose is Actinomycetes. Actinomycetes produce enzymes that can break down organic materials such as cellulose, hemicellulose, and lignin. For the industrial production of thermo stable xylanase, actinomycetes are ideal. Xylanases, which include endo-xylanases and xylosidases, are a class of depolymerizing enzymes that are frequently employed to hydrolyze xylan (found in hemicellulose) into monomeric sugars. They frequently work in concert with other enzymes to fully hydrolyze Gujarati hemicellulose Actinomycetes from Navsari. Microbial enzymes are environmentally benign, exhibit specificity, and function in mild reaction conditions, their manufacture has been gaining traction in the business. Xylanases are one example that is becoming more and more significant for the food business. They are used in the manufacturing of new prebiotics, bakery goods, and beverage processing.

Keywords: *Alkaline Xylanase, Actinomycetes, Xylanase, Prebiotics*

D06

Deciphering Protein–Protein Interactions using Molecular Techniques

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Abstract:

The studies of protein–protein interactions (PPIs) are essential to many cellular and biological processes. PPIs cause changes in gene expression, affect enzyme kinetics, and modulate cellular communications. The virtues and limitations of traditional methods for clarifying interaction dynamics are highlighted, including co-immunoprecipitation, chemical cross-linking, and yeast two-hybrid tests. Furthermore, there are sophisticated techniques that provide improved sensitivity and resolution for examining intricate protein networks, including nuclear magnetic resonance (NMR) spectroscopy, X-ray diffraction, and mass spectrometry. In order to ensure the integrity and quality of protein samples for analysis, the review highlights the significance of sample preparation methods such as mechanical and hand grinding. Additionally, PPI research is improving as a result of technology breakthroughs that increase data precision and enable automation. This study attempts to give researchers a useful resource for choosing relevant strategies suited to their particular proteomics research topics by combining existing knowledge and methodology. To develop strong interaction networks and gain a thorough understanding of PPIs, several approaches must be integrated. Our capacity to clarify the intricacies of protein interactions will improve with further development of molecular techniques, which will ultimately aid in the creation of focused treatment plans and a better comprehension of cellular biology.

Keywords: *Protein-protein interactions, Yeast two-hybrid assay, Co-immunoprecipitation, Chemical cross-linking, Advance techniques*

DP3

Biohydrogen production: an alternative fuel of future

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Abstract:

Biohydrogen have a huge uproar in recent time due to its ecological, economical and technological benefits and being a safe and renewable energy source. Furthermore, the depletion in fossil fuels and its harmful impact on environment increases interest of scientific community future zero pollution biofuel alternative. The traditional methods for hydrogen production has limitations of low yield and high production cost while the biological processes such as dark fermentation, photo fermentation, photo dark fermentation addresses these limitations. Photo fermentation is a process in which organisms convert organic substances in hydrogen and oxygen in presence of light. *Rhodopseudomonas, Rhodobacter capsulata, Rhodobacter sphaeroides* GL-1*, Anabaena* variabilis produce hydrogen through photo fermentation. Photo dark fermentation is a two-stage process which combines process of photo fermentation and dark fermentation by many anaerobic and photosynthetic bacteria. *Caldicellulosiruptor*, *Rhodopseudomonas capsulata, Clostridium pasteurianum, Rhodopseudomonas palustris* WP3-5 produce hydrogen through photo dark fermentation. *Thermotoga napolitanas, clostridium acetobutylicum* ATCC824*, Bacillus coagulum, clostridium spp*. produce hydrogen through dark fermentation. *Rhodobacter sphersides*GL-1 showed higher hydrogen production rate (2100ml/L/hr) by photo fermentation by using lactate as a substrate. The culture of *Clostridium pasteurianum* and *Rhodopseudomonas palustris* WP3-5 showed high hydrogen yield (14.2 mol H_2 mol/sucrose) by photo dark fermentation. *Thermotoganeapolitana* showed highest yield (3.85 mol H_2/mol glucose) by dark fermentation.

Keywords: *Biohydrogen, production rate, Dark fermentation, Photo fermentation, Photo fermentation*

DP4

A Review on: Pectinase enzyme and its application in Food Industry

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Abstract:

Pectinases, members of a hydrolases family of enzymes, are one of the important enzymes of the biotechnological sector. They hold 25% share in the global food and beverages enzyme market. These enzymes are sustainable and environment friendly. Pectolytic enzymes play an important role in food processing industries & alcoholic beverage industries. These enzymes degrade pectin & reduce the viscosity of the solution so that it can be handled easily. These enzymes are mainly synthesized by plants & microorganisms. In food industries, pectinase plays a wide role in clarifying fruit juices, increasing juice yield, intensifying wine coloring, making jams & jellies, softens fruits, and ferments coffee & tea. The future of pectinase enzymes looks promising with potential applications in many industries, including textile, paper & pharmaceutical along with its promising role in the food industry. So, in the current era study of pectinase enzymes is highly valuable as it offers great opportunities to address Industrial, environmental & health-related challenges.

Keywords: *Beverages, Environment, Fermentation, Food industry, Hydrolase, Pectinase, Sustainability*

DP5

Production and Purification of Staphylokinase Produced from *Staphylococcus aureus* Isolated from Clinical Samples

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Abstract:

This study highlights the potential of Staphylokinase as a therapeutic enzyme with applications in thrombolytic therapy. Through optimal production and efficient purification, Staphylokinase could be a promising alternative to existing fibrinolytic agents. Staphylokinase (SAK) is an important fibrinolytic enzyme produced by *Staphylococcus aureus*, capable of dissolving fibrin clots and has potential therapeutic applications in thrombolytic therapy. This study investigates the production and purification of Staphylokinase from *S. aureus* strains isolated from clinical samples. The enzyme's production was optimized through fermentation, followed by purification using techniques such as ammonium sulphate and dialysis.

Keywords: *Staphylokinase, Fibrinolytic, Ammonium sulphate, Dialysis*

DP6

Investigation of Sustainable Chitosan Production from Shrimp Shell Waste: Comparative Analysis of Chemical and Biological Methods

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Abstract:

Crustacean shell waste from seafood processing poses significant environmental challenges, particularly in marine ecosystems. Chitin, a major component of shrimp shells, can be transformed into chitosan, a high-value biopolymer with diverse applications. Conventional chitosan production involves chemical methods that utilize harsh reagents, raising concerns about environmental sustainability. This study investigates microbial and enzymatic strategies for the eco-friendly production of chitosan from shrimp shell waste. Shrimp shells obtained from fish markets of Buhari and Bardoli (Gujarat) were analyzed for their chitin content, showing values of 88% for Buhari samples, 85% for Bardoli samples, and 89% for commercially sourced chitin powder. Both chemical and biological methods were utilized for chitosan extraction. The chemical process, comprising demineralization, deproteinization, and deacetylation, resulted in chitosan yields of 72% and 67% from Buhari and Bardoli samples, respectively, with slightly reduced quality compared to commercial chitosan. The biological approach assessed five bacterial strains for their chitinase and chitin deacetylase activities, with SSI06-1, *Bacillus paramycoides*, and *Pseudomonas mosselii* emerging as promising candidates. SSI06-1 exhibited the highest chitosan yield (1.0 g/L, 50%), followed by *Bacillus paramycoides* (0.7 g/L, 35%) and *Pseudomonas mosselii* (0.6 g/L, 30%). Although the chemical method yielded higher quantities of chitosan, the biological approach was more environmentally sustainable. The produced chitosan will

be tested for antimicrobial properties in biodegradable food packaging, presenting a sustainable approach to seafood waste valorization and contributing to advancements in green biotechnologies.

Keywords: *Chitin, Chitosan, Bioconversion, chitinase, chitin deacetylase, antimicrobial activity*

DP7

Phytoremediation Techniques for Wastewater Treatment

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Abstract:

Water pollution is a crucial issue leading to environmental degradation. Increased urbanization, industrialization and anthropogenic activities are the main reasons for water pollution. Untreated industrial effluents and domestic waste discharges into water bodies have aggravated water pollution problems. Nevertheless, it is a huge challenge to supply clean water to rural and urban regions. Also, several pollutants in water like heavy metals, dyes and hazardous chemicals pose serious risk to human health and also contaminate the nearby agricultural lands and sites. Several potential methods currently available to resolve water pollution issues include Adsorption, Membrane technique, coagulation-membrane filtration, supercritical water oxidation, activated sludge process etc. These methods although helpful to some extent are laborious, cumbersome, expensive or not applicable at large scales. The need of the hour is an inexpensive, yet efficient technique to treat wastewater. Phytoremediation- an eco friendly, In-situ technique; where aquatic plants with an ability to eliminate pollutants and contaminants are employed for treatment of contamination sites. Several techniques and mechanisms are employed as part of phytoremediation to treat waste water. Phytoextraction, Phytofiltration, Phytovolatilization, Phytostabilization, Phytostimulation and Phytodegradation are some of the approaches of phytoremediation. The main focus of this study is to review different phytoremediation strategies, their fundamental mechanisms, applications, practical limits and recent technological advancements. The present study emphasizes phytoremediation of wastewater as an effective and sustainable treatment method which offers affordable answers to the world-wide water crisis problem. The techniques described will prove a viable path for mitigation of water pollution problems and an environment friendly future.

Keywords: *Phytoremediation, Wastewater, Sustainable method, Water pollution*

D07

Potentiality of *Metarhizium* (=*Nomuraea*) *rileyi* (Farlow) Samson against Lepidopteran pest

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Abstract:

Nowadays, crop production is hindered by several biotic and abiotic factors. Among them, lepidopteran pests are currently a major threat to the agricultural ecosystem. The extensive use of synthetic pesticides for pest management results in many kinds of issues, including harm to the environment, residue in products, insect resistance, and pest resurgence. Certain other microbial pesticides (including *Beauveria bassiana*, *Metarhiziumanisopliae*, *M. rileyi*, *Lecanicilliumlacani*, *etc*.) act againstinsect-pests. In pest management, entomopathogenic fungi tend to be deployed as a substitute for dealing with these issues. *M. rileyi* is an evident entomopathogenic fungus that causes natural infection of various lepidopteran pests.Numerous scientists have observed that *M. rileyi*both naturally cause disease and are efficient against a variety of lepidopteran pests. Several scientists have identified that more than 51 lepidopteran species are susceptible *M. rileyi*.Several studies revealed that due to infection of *M. rileyi,* there is a30 to 80 percent reduction in pest infestation.

Keywords: *Entomopathogenic fungus, Metarhizium (Nomuraea) rileyi, insect-pests, Lepidopteran pest*

DP9

Assessment of *Fusarium oxysporum* Culture Filtrate as a Bioelicitor for Mitigating Biotic Stress and Enhancing Growth in Tomato and Brinjal

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Abstract:

Fusarium oxysporum (FO), a versatile fungal species, exhibits dual roles in agriculture, functioning as both a pathogenic agent and a beneficial microorganism. Pathogenic strains of FO causing Fusarium wilt, resulting in substantial crop losses, whereas certain non-pathogenic strains demonstrate biocontrol potential by suppressing harmful pathogens through competition, secondary metabolite production, and host resistance induction. This study investigates the efficacy of *Fusarium oxysporum* culture filtrate (FOCF) as a biotic elicitor for mitigating biotic stress and improving growth parameters in *Solanum lycopersicum* (tomato) and *S. melongena* (brinjal). FOCF was prepared by culturing *F. oxysporum* in potato dextrose broth (PDB) for 21 days. The filtrate obtained on the 15th day exhibited maximum fungal biomass and protein content. Seeds of the tomato (Remik Khatta variety) and brinjal (Remik Utsav variety) were treated with varying concentrations of FOCF. A significant improvement in germination was observed at 10% FOCF for brinjal and 20% FOCF for tomato, compared to untreated seeds of brinjal and tomato. Furthermore, FOCF-treated seedlings demonstrated a concentration-dependent enhancement in protein content, with maximum levels recorded in 10% FOCF-treated brinjal and 20% FOCF-treated tomato seedlings. Further studies are underway to evaluate the effects of FOCF on physiological changes, yield, and disease index of brinjal and tomato

crops by sowing treated and untreated seeds in Fusarium-infested soil. The findings may suggest that FOCF holds promise as a sustainable bioelicitor to enhance crop performance and mitigate disease impacts in Fusarium-infested conditions.

Keywords: *Tomato, brinjal, Biocontrol agents, Fungal Culture filtrate, defence related enzymes*

D08

Green, Eco-Friendly and Cost-Effective Management of Post-Harvest Anthracnose Disease in Mango

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Abstract:

The agricultural sector faces significant challenges due to a growing population, increasing food demands and worsening climate conditions. Current plant disease prevention methods rely heavily on agrochemicals, which negatively influence the environment. Mango is most popular Asian fruit and commonly called as "King" of all fruits. In the post-harvest condition, mango is susceptible to many fungal diseases like anthracnose, rhizopus rot, stem end rot*etc*. The first investigation was carried out to determine the effect of pre harvest KCl treatment on anthracnose disease development. Among the evaluated treatments, lowest per cent disease incidence was found in 2.5 g l^{-1} KCl treatment. While, highest incidence was found in control II (without water) treatment. Therefore, fruit treated with 2.5 g l^{-1}KCl are most effective and 0.5 g l^{-1}KCl was less effective treatment against anthracnose. Use of adequate amount of potassium developed resistance against many pathogens and provide good quality fruits. The second investigation was carried out to know the effect of different leaf layers (botanicals) on the suppression of post-harvest anthracnose disease and its effect on shelf life of mango cv. Kesar. Among the evaluated different treatments, fruits covered with neem leaves showed lowest disease incidence as compared to control. The shelf life was significantly found higher in fruit covered with neem leaves.The experiment exhibit the results with scientific reasoning of aroma and

volatile compound of different leaf form a thin film around the fruit that work as anti-repellent, antifungal and it prevent the entry of pathogen. Thus, KCl and botanicals might be a substantial alternative of chemical for managing post-harvest diseases and green,eco-friendly, cost-effective, as well as safe to consumers and the environment.

Keywords: *Green, Mango, Post-harvest, Anthracnose, Leaf layer, Eco-Friendly, KCl*

DP10

Bacterial-Assisted Phytoremediation: Evaluating Lead-Tolerant Bacteria for Plant Growth Promotion in Jute under Lead Stress

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Abstract:

Bacterial assisted phytoremediation is a promising technology that uses the combined action of plants and microbes to address environmental pollution. This study focuses on the role of heavy metal-tolerant bacteria, especially lead (Pb)-tolerant strains, in enhancing plant growth under metal stress. Pb is a toxic contaminant in soil, affecting the growth and functions of plants. Four bacterial strains-*Bacillus paramycoides*, *Bacillus licheniformis*, *Bacillus subtilis*, and *Staphylococcus hominis* were selected for their plant growth-promoting (PGP) traits such as siderophore production, HCN generation, and zinc solubilization. Among them, *B. paramycoides* and *B. licheniformis* showed the highest PGP properties and were further used to treat jute seeds exposed to varying concentrations of lead (5–150 mg/L). The results showed that seed treatment with *B. paramycoides* and *B. licheniformis* improved percentage of germination,and vigor index, indicating their potential for use in phytoremediation. Further biochemical assays and lead bioaccumulation studies are currently in progress to better understand the mechanisms behind enhanced plant growth and metal uptake. These findings suggest that bacterial-assisted phytoremediation can effectively reduce heavy metal toxicity in soils and improve plant growth under stress conditions.

Keywords: *Lead tolerant bacteria, PGP traits, Jute, seed germination, growth attributes*

DP11

Maximizing Chitinase Production through Strategic Gene Expression from *Bacillus* sp. and *Pseudomonas* sp.

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Abstract:

The present study aimed to assess the potential of *Bacillus* sp. and *Pseudomonas* sp. for chitinase enzyme production and to explore the genetic strategies for overexpression of chitinase gene. Five bacterial species such as *Bacillus paramycoides, B. licheniformis, B. subtilis, Pseudomonas aeruginosa* and *P. mosselii* were selected and screened for chitinolytic activity. Among all, *Pseudomonas mosselii* and *Bacillus paramycoides* showed chitin degradation with clear zones on nutrient agar supplemented with colloidal chitin. Further these strains were used for chitinase production using nutrient broth supplemented with colloidal chitin (NB+CC). It was found that *P. mosselii* demonstrated maximum chitinase activity in NB+CC at 37°C after 30 hours of incubation as compared to *B. paramycoides*. Genomic DNA of *B. paramycoides* and *P. mosselii* i.e. approx. 10 kb was successfully isolated and further steps involved the development of a chitinase gene construct and its expression in *E. coli* BL21 (DE3) is currently under progress. This study shows that boosting the chitinase gene can help plants to fight against pathogens offering new ways to protect crops.

Keywords: *Chitinase-producing bacteria, chitinase gene, isolation, cloning, expression, optimization*

DP13

Transforming Waste Into Bio-Enzyme, An Eco-Friendly Approach For Wastewater Treatment

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Abstract:

The water crisis has been one of the common problems faced by India since then until now. Additionally, the water pollution caused by release of toxic effluents into water bodies by industries and other human developments have made the scenario even worse. Water pollution not only affects the aquatic life but also directly and indirectly hampers the ecosystem at large. Hence, there is always a space for development of wastewater treatment approaches that are not only economically feasible but also ecologically sustainable. One such approach following the idea of "Best out of waste" has shown to be an effective cure for the same. The fruits and vegetables waste generated from homes, restaurants and other events have magical ability to treat polluted water. These wastes, along with jaggery and water, are mixed in a ratio of 1:3:1, it is then kept for anaerobic fermentation for about 3 months. The resulting fermented product is called a Bio-enzyme. Analysis of Bio-Enzyme has shown it to possess antibacterial and antifungal activities. Bio-enzyme shows significant effect when used for wastewater treatment. Polluted water was treated with Bio-Enzyme for a period of few days. Post treatment, parameters like pH, Biological oxygen demand (BOD), Chemical oxygen demand (COD), Total Dissolved solids (TDS), Total solids (TS), Alkalinity, Acidity, Hardness and Chlorides were analysed. The results indicate that the Bio-Enzyme treatment has been shown to decrease significant levels of BOD, COD, TDS, TS, Alkalinity, Acidity, Hardness and Chlorides levels in the polluted water. Therefore, Bio-Enzyme can be one of the best eco-friendly as well as economically feasible approaches for treating wastewater.

Keywords: *Bio-Enzyme, Fermentation, polluted water, wastewater treatment*

The *Pathway of Progress* conference proceedings captures the highlights of two groundbreaking events held on January 11th and 12th, 2025: the "Advancing Future Transformation of Business, Industry, and Society" conference (AFTBIS-2025) and the "Microbial Biotechnology: Pioneering Green Solutions for Global Challenges" conference (MBPGSGC-2025). Together, these parallel conferences offer a unique platform for exploring the intersection of technology, sustainability, and science.

The AFTBIS-2025 conference delved into the transformative impact of Artificial Intelligence, Data Science, Semiconductors, Cybersecurity, and other emerging technologies, shaping the future of industries and societies. Meanwhile, the MBPGSGC-2025 focused on microbial biotechnology as a key solution to environmental challenges, including climate change, waste management, and sustainable agriculture.

Through collaborative discussions, the synergies between cutting-edge technologies and sustainable biotechnology were explored, revealing new opportunities for addressing global challenges through innovation.

Dr. Snehal K Joshi
(Chief Editor)

Dr. Snehal K Joshi is chief editor of this conference proceeding book possess his degree in Computer Engineering field from NIT. He pursued his master's degree in Information Technology and Ph.D. in the field of Image processing. He is having nine years of corporate and 25 years of academics' experience at Undergraduate and Post-Graduate level. Dr. Snehal K Joshi served as Dean of Computer Science Faculty of Veer Narmad South Gujarat University (State University) for six years. He also served as syndicate and senate member of the Veer Narmad South Gujarat University, Surat. He has contributed a lot in development of several curriculums and syllabus for the University as member of academic council for thirteen years and member of Board of studies for over 20 years. He is Department Head of Computer Science and Application and Institute Head of Dolat-Usha Institute of Applied Sciences and Dhiru-Sarla Institute of Management & Commerce, Valsad. He is member of research advisory board of three Universities. He has written thirteen books out of which eleven are technical books. His 12 research papers are published in various international and national journals. He has authored several book chapters published by various publishers including CRC Press.

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Dr. Hetal Panchal is co-editor of this conference proceeding book. She possesses her Master Degree in Microbiology subject and Ph.D. in Microbiology specialization. She is a true academician having more than 20 years of teaching experience at Dolat-Usha Institute of Applied Sciences and Dhiru-Sarla Institute of Management & Commerce, Valsad affiliated to Veer Narmad South Gujarat University. She is Department Head of the Microbiology at present. She has contributed in academics by presenting and publishing several research papers and guiding Ph.D. research scholars.

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