



திருவள்ளூர் பல்கலைக்கழகம்

**THIRUVALLUVAR UNIVERSITY**

(State University Accredited with “B+” Grade by NAAC)

Serkkadu, Vellore, Tamil Nadu, India.



## Department of Economics

Online Economics quiz program on “The Economy and Strategic Thinking”

### Certificate of Appreciation

This is to certify that Mr., A.Abdul Kareem, Ph.D., Research Scholar , has participated in the online Economics quiz program on “The Economy and Strategic Thinking”, conducted by the Department of Economics, Thiruvalluvar University (A State University), Serkkadu, Katpadi Taluk, Vellore District, Tamil Nadu, India, 632 115, on 30th June, 2023.

**Convenor & Organizing Secretary,**  
Department of Economics,  
Thiruvalluvar University,  
Serkkadu, Vellore District,  
Tamil Nadu, India.

Registrar i/c.  
Thiruvalluvar University  
Serkkadu, Vellore – 632 115.

Certificate ID is T1B8AM-CE000016

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**INTERNATIONAL SEMINAR**  
**ON**  
**RECENT ADVANCES IN**  
**BIOELECTROCHEMICAL TECHNOLOGY**  
**RABT 2022**  
**29<sup>th</sup> APRIL 2022**

**SOUVENIR**

Organized by  
**DEPARTMENT OF BIOTECHNOLOGY**  
**THIRUVALLUVAR UNIVERSITY**  
(State University Accredited With “B+” Grade By NAAC)  
Serkkadu, Vellore - 632115, Tamil Nadu, India.  
[www.tvu.edu.in](http://www.tvu.edu.in)

*With best wishes from*

**M.M.E.S. WOMEN'S ARTS AND SCIENCE COLLEGE**



Hakeem Nagar - Melvisharam- 632 509  
Walaja Taluk, Arcot Block , Ranipet District  
(Affiliated to Thiruvalluvar University)  
Serkkadu, Vellore District – 632 115. Tamilnadu.  
Email:mmeswc@yahoo.in website:www.mmeswc.edu.in  
Phone:04172 266167, 266463



MMES Centenary Building



MMES College Secretariat

**COURSES OFFERED**

**UG COURSES – DURATION - 3Years**

- |                                 |                                                      |
|---------------------------------|------------------------------------------------------|
| B.A - English Literature        | B.Sc - Computer Science                              |
| B.Sc - Biotechnology            | B.Sc. - (Information Systems & Mgmt.)                |
| B.B.A - Business Administration | B.Sc - Interior Design and Décor                     |
| B.C.A - Computer Applications   | B.Sc - Mathematics                                   |
| B.Com - Commerce                | B . A Arabic                                         |
| B.Com - (Computer Applications) | B.Sc - Nutrition,Food Service Management & Dietetics |

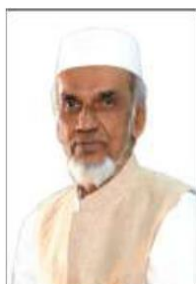
**PG COURSES – DURATION - 2Years**

- M.A - English Literature
- M.Sc - Biotechnology
- M.Sc - Mathematics
- M.Sc - Computer Science
- M.Com - Commerce
- M.Sc - Interior Design and Décor
- M.A -Arabic

**RESEARCH COURSES**

- M.Phil - Bio – Technology
- M.Phil - English
- Ph.D - Commerce
- Ph.D - Computer Science

We march towards Excellence



Dr. S. Ziauddeen Ahmed, B.A.,D.Lit  
**General Secretary**



Dr. K. Anees Ahmed, B.A., D.Lit  
**Secretary & Correspondent**



**International Seminar**

**on**

***Recent Advances in Bioelectrochemical Technology***

**(RABT 2022)**

29<sup>th</sup> April 2022

**SOUVENIR**

**Organized by**

**Department of Biotechnology**

**Thiruvalluvar University**

**(State University)**

**Serkkadu, Vellore – 632 115, Tamil Nadu, India.**



# International Seminar

on

## Recent Advances in Bioelectrochemical Technology

(RABT 2022)

Department of Biotechnology, Thiruvalluvar University

<b>Organizing Committee</b>	
<b>Chief Patron</b>	<b>Dr. D. KARTHIKEYAN, I.A.S.</b> Principal Secretary to Government, Higher Education Department, Government of Tamil Nadu.
<b>Patron</b>	<b>Dr. C. POORNACHANDRAN</b> Director, Directorate of Collegiate Education, Government of Tamil Nadu.
	<b>Prof. Dr. E. SIVAKUMAR</b> Member Syndicate, Thiruvalluvar University.
	<b>Prof. Dr. R. VIJAYARAGAVAN</b> Registrar i/c, Thiruvalluvar University.
<b>Convenor</b>	<b>Dr. R. BABUJANARTHANAM</b> Professor & Head, Department of Biotechnology, Thiruvalluvar University.
<b>Special Invitee</b>	<b>Dr. ERNEST DAVID</b> Professor (Rtd.), Department of Biotechnology, Thiruvalluvar University.
<b>Organizing Secretaries</b>	<b>Dr. A. RAJASEKAR</b> Assistant Professor & DBT-Ramalingaswami Fellow, Department of Biotechnology, Thiruvalluvar University.
	<b>Dr. S. VIJAYANAND</b> Assistant Professor, Department of Biotechnology, Thiruvalluvar University.
	<b>Dr. M.C. HARISH</b> Assistant Professor, Department of Biotechnology, Thiruvalluvar University.
<b>Guest Faculty</b>	<b>Dr. G. SOWJENYA</b> Guest Lecturer, Department of Biotechnology, Thiruvalluvar University.



**International Seminar**  
**on**  
**Recent Advances in Bioelectrochemical Technology**  
**(RABT 2022)**

Organized by  
Department of Biotechnology, Thiruvalluvar University, Vellore – 632 115.

**PROGRAM SCHEDULE**

29 <sup>th</sup> APRIL 2022	
Time	Program
08.45 am – 10.15 am	Registration
10.15 am – 10.20 am	Welcoming Dignitaries to the Dias
10.20 am – 10.25 am	Tamizhthai Vazhthu
10.25 am – 10.30 am	Inauguration of RABT-2022 by Lighting Kuthuvilakku
10.30 am – 10.35 am	<b><u>WELCOME SPEECH</u></b> <b>Dr. R. BABUJANARTHANAM</b> Convener, RABT-2022 Professor & Head, Department of Biotechnology, TVU.
10.35 am – 10.45 am	<b><u>INAUGURAL ADDRESS</u></b> <b>Dr. E. SIVAKUMAR, MBBS, Ph.D.</b> Member Syndicate, TVU.  <b>Prof. Dr. R. VIJAYARAGAVAN</b> Registrar i/c, TVU.
10.45 am – 10.55 am	<b><u>PRESIDENTIAL ADDRESS</u></b> <b>Dr. N. CHANDRASEKARAN</b> Professor & Director Centre for Nanobiotechnology Vellore Institute of Technology, Vellore.
	<b><u>FELICITATION ADDRESS</u></b> <b>Dr. ERNEST DAVID</b> Professor (Rtd), Former Head, Department of Biotechnology,  <b>Dr. C. DHANDAPANI</b> Member-Syndicate, Dean (CDC), Professor, Department of Economics, TVU.  <b>Dr. R. JEYARAMAN</b> Member-Syndicate, Professor, Department of Tamil, TVU.  <b>Dr. K. SIVACHANDRABOSE</b> Member-Syndicate, Assistant Professor, Department of Zoology,

	<p><b>Dr. J. MADHAVAN</b> Member-Syndicate, Associate Professor, Department of Chemistry, TVU.</p> <p><b><u>VOTE OF THANKS</u></b> <b>Dr. S. VIJAYANAND</b> Assistant Professor, Department of Biotechnology, TVU.</p>
<b>10.55 am – 11.00 am</b>	<b>RELEASE OF SOUVENIR</b>
<b>11.00 am – 11.10 am</b>	<b>HIGH TEA</b>
<b>11.10 am – 11.40 am</b>	<p><b><u>PLENARY LECTURE – I</u></b> (Speaker introduction by Dr. A. Rajasekar) <b>Dr. GOVARTHANAN MUTHUSAMY</b> Research Professor, Department of Environmental Engineering, Kyungpook National University, 80 Daehak-ro, Buk-gu, Daegu, 41566, South Korea.</p>
<b>11.40 am – 12.20 pm</b>	<p><b><u>PLENARY LECTURE – II</u></b> (Speaker introduction by Dr. S. Vijayanand) <b>Dr. U.S. MAHADEVA RAO</b> Professor, School of Basic Medical Sciences, Universiti Sultan ZainalAbidin, KampusKota, 20400, Kuala Terengganu, Malaysia.</p>
<b>12.20 pm – 01.00 pm</b>	<p><b><u>PLENARY LECTURE – III</u></b> (Speaker introduction by Dr. M.C. Harish) <b>Dr. BHASKAR DAS</b> Associate Professor, Department of Environment &amp; Water Resources Engineering, School of Civil Engineering, Vellore Institute of Technology (VIT), Vellore-632014. India.</p>
<b>01.00 pm – 02.00 pm</b>	<b>LUNCH BREAK</b>
<b>02.00 pm – 03.00 pm</b>	<b>SCIENTIFIC POSTER SESSION</b>
<b>03.00 pm – 03.15 pm</b>	<b>HIGH TEA</b>
<b>03.15 pm – 04.00 pm</b>	<p><b><u>VALEDICTORY SESSION – VALEDICTORY ADDRESS</u></b> <b>Dr. M. CHANDRAN</b> Controller of Examinations i/c &amp; Director i/c, CFR, Professor, Department of Zoology, TVU.</p> <p><b><u>VALEDICTORY ADDRESS &amp; DISTRIBUTION OF PRIZES</u></b> <b>Thiru. S. RAJESH KANNAN I.P.S.</b> Superintendent of Police, Vellore District.</p> <p><b><u>VOTE OF THANKS</u></b> <b>Dr. A. RAJASEKAR</b> Assistant Professor &amp; DBT-Ramalingaswami Fellow, Department of Biotechnology, Thiruvalluvar University.</p> <p><b>NATIONAL ANTHEM</b></p>

## **ABOUT THE VELLORE**

Vellore is a city and the administrative headquarters of Vellore District in the South Indian state of Tamil Nadu. Located on the banks of Palar River in the North-Eastern part of Tamil Nadu and has been ruled, at different times, by the Pallavas, Medieval Cholas, Later Cholas, Vijayanagar Empire, Rashtrakutas, Carnatic kingdom, and the British. Vellore has become one of the top educational destinations due to the presence of India's top medical institute Christian Medical College & Hospital and the best private technological institute VIT University. Vellore region is the top exporter of finished Leather goods in the country. Vellore is also home to several manufacturing & automobile companies such as Bharat Heavy Electricals Limited, MRF Limited, TVS-Brakes India etc. Vellore Fort, Government Museum, Science Park, Vainu Bappu Observatory, Amirthi Zoological Park, Religious Places like Jalakandeswarar Temple, Srilakshmi Golden Temple, Big Mosque & St.Johns church and Yelagiri Hill station are among the top tourist attractions in and around Vellore.

## **ABOUT THE UNIVERVSIITY**

The Thiruvalluvar University was established in Vellore district of Tamilnadu by the Government of Tamilnadu in October 2002 under the Thiruvalluvar University Act, 2002. (Government of Tamilnadu Act 32/2002). The University was named after the great Tamil Saint poet “Thiruvalluvar”. The University is located in a sprawling campus of about 112.68 acres at the Serkkadu near Vallimalai about sixteen km away from the Vellore City on the Ranipet-Chittoor Trunk Road. Thiruvalluvar University is a member of the Association of Indian Universities (A.I.U.). The aim of this University is to provide facilities for advancement in Research and dissemination of knowledge with a special focus on the economic and social upliftment of the marginalized who live in the four districts a viz Vellore, Thiruvannamalai, Villupuram and Cuddalore which are economically, socially, educationally and geographically backward districts wherein majority of the people live in rural areas with object poverty. The Thiruvalluvar University has currently housed ten departments namely Bio-Technology, Chemistry, Commerce, Computer Science, Economics, English, Physics, Tamil, Zoology, Mathematics and 124 colleges affiliated to the University with the jurisdiction.



## **ABOUT THE DEPARTMENT OF BIOTECHNOLOGY**

The Department was established in the year 2010, and offers M.Sc., M.Phil. and Ph.D. programmes in Biotechnology. The students are admitted by selection through an entrance exam for M.Sc. and CET for M.Phil. and Ph.D. To augment the infrastructure facilities and vibrant research, the faculty members of the department attract extramural funding from UGC, DBT, DST, UCG, DRDO, TANSCH and AYUSH agencies nearly 2.03 crore. Biotechnology department regularly organize the International & National Conferences, Symposiums, Science Day Celebrations, Eminent scientists & researchers from abroad are being in regular basis for delivering lectures to interact & ignite the research acumen among the students. Recently the exchange of research scholars to HKBU, Hong Kong through the memorandum of understating (MoU). We made 3 MOU between, HKBU, Hong KONG, National Taiwan ocean University, Taiwan University of Teesside, UK.

## **ABOUT THE SEMINAR**

International seminar on RABT - 2022 is a forum for sharing research results, practical experiences, and opportunities associated with advances in Bioelectrochemical with its interesting applications in life science. This seminar will have several sessions applies to living systems especially in terms of biochemical and physiological processes electrochemistry as it relates to biological, biomedical, and biotechnological applications. A platform to share knowledge & experience on their research findings, from all parts of the country to enrich their knowledge & share their experience by presenting & discussing various recent research findings in different arears. We will have posters presentations in several topics, including remediation technologies, data management, and data visualization.

## **THRUST AREAS**

- **Bioelectrokinetics**
- **Bioremediation, Biodegradation**
- **Microbial Influenced Corrosion**
- **Biofilms formation & Quoram Sensing**
- **Microbial Engineering**
- **Applied Nanobiotechnology**
- **Advancement in Agrobiotechnology**
- **Analytical Biotechnology & Advanced Biochemistry**
- **Biosensors & Environmental Biotechnology**
- **Applied Microbiology & Microbial Products**

ORGANIZING COMMITTEE

**CHIEF PATRON**  
**THIRU. Dr.D.KARTHIKEYAN, IAS.,**  
 Principal Secretary to Government  
 Higher Education Department  
 Government of Tamil Nadu.

**PATRON**  
**Dr.C. POORANACHANDRAN,**  
 Director  
 Directorate of Collegiate Education  
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 Thiruvalluvar University.

**CONVENOR**  
**Dr.R.BABUJANARTHANAM**  
 Professor & Head  
 Department of Biotechnology  
 Thiruvalluvar University

**ORGANIZING SECRETARIES**

**Dr.A.RAJASEKAR**  
 Assistant Professor  
 DBT-Ramalingaswami Fellow  
 Department of Biotechnology  
 Thiruvalluvar University

**Dr.S.VIJAYANAND**  
 Assistant Professor  
 Department of Biotechnology  
 Thiruvalluvar University

**Dr.M.C.HARISH**  
 Assistant Professor  
 Department of Biotechnology  
 Thiruvalluvar University

**ORGANIZING COMMITTEE MEMBER**

**Dr.G.SOWJENYA**  
 Guest Lecturer  
 Department of Biotechnology  
 Thiruvalluvar University

**EXECUTIVE COMMITTEE**

**Dr.ERNEST DAVID**  
 Professor & Head (Rtd)  
 Department of Biotechnology  
 Thiruvalluvar University

**RABT 2022**

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 www.tvu.edu.in

*International Seminar*

Recent Advances in Bioelectrochemical Technology  
 (RABT 2022)

29<sup>th</sup> Friday, April 2022

**REGISTRATION FORM**

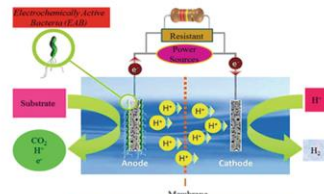
Name (in block letters) : \_\_\_\_\_  
 Gender : Male/Female  
 Designation : \_\_\_\_\_  
 Institution : \_\_\_\_\_  
 Contact Address : \_\_\_\_\_  
 Phone/Mobile No : \_\_\_\_\_  
 E-mail ID : \_\_\_\_\_  
 Mode of participation (tick) :  PARTICIPATION ONLY  
 POSTER PRESENTATION  
 Payment Details : \_\_\_\_\_  
 Transaction Id : \_\_\_\_\_  
 Dated : \_\_\_\_\_  
 Amount : \_\_\_\_\_  
 Bank : \_\_\_\_\_  
 Date : \_\_\_\_\_

Signature of the Participant  
 Signature of the Head of the Department

Note: Photocopy of this form is also accepted.  
 Please send the duly filled form to tvrabt2022@gmail.com  
 Only Registered participants are entitled for the certificate of participation.

**INTERNATIONAL SEMINAR  
 ON  
 RECENT ADVANCES IN  
 BIOELECTROCHEMICAL TECHNOLOGY  
 (RABT 2022)**

**29<sup>th</sup> APRIL 2022**



Organized by  
**DEPARTMENT OF BIOTECHNOLOGY**  
**THIRUVALLUVAR UNIVERSITY**  
 (STATE UNIVERSITY ACCREDITED WITH "B+" GRADE BY NAAC)  
 SERKKADU, VELLORE - 632115, TAMIL NADU, INDIA.  
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**ABOUT VELLORE**

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Vellore has become one of the top educational destinations due to the presence of India's top medical institute Christian Medical College & Hospital and the best private technological institute VIT University. Vellore region is the top exporter of finished Leather goods in the country. Vellore is also home to several manufacturing & automobile companies such as Bharat Heavy Electricals Limited, MRF Limited, TVS-Brakes India etc.

Vellore Fort, Government Museum, Science Park, Valnu Bappu Observatory, Amirthi Zoological Park, Religious Places like Jalakandeswarar Temple, Srilakshmi Golden Temple, Big Mosque & St.Johns church and Yelagiri Hill station are among the top tourist attractions in and around Vellore.

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**CALL FOR POSTERS**

THE DIMENSION OF THE POSTER IS 3 FT (W) x 4 FT (H). THE POSTER WILL BE PLACED VERTICALLY.

**THRUST AREAS**

- BIO-ELECTROKINETICS
- BIOREMEDIATION, BIODEGRADATION & BIODETERIORATION
- MICROBIAL INFLUENCED CORROSION
- BIOFILMS FORMATION & QUORUM SENSING
- MICROBIAL ENGINEERING
- APPLIED NANOBIOTECHNOLOGY
- ADVANCEMENT IN AGRIBIOTECHNOLOGY
- ANALYTICAL BIOTECHNOLOGY & ADVANCED BIOCHEMISTRY
- BIOSENSORS & ENVIRONMENTAL BIOTECHNOLOGY
- APPLIED MICROBIOLOGY & MICROBIAL PRODUCTS

**BEST POSTER AWARD**

The best papers in poster presentations will be awarded. Kindly email the Poster abstracts to tvrabt2022@gmail.com. The submitted Poster abstracts will be reviewed by the expert committee and the authors will be notified about the acceptance by email.

**DATES TO BE REMEMBERED**

Last date of Abstract Submission : 25.04.2022  
 Acceptance Notification : 27.04.2022  
 Seminar date : 29.04.2022  
 Seminar kit, Working lunch and Refreshments will be provided for the registered participants.



**REGISTRATION FEE**

Category	Amount (Rs)	Spot Payment (Rs)
Students/Research Scholar	300	350
Faculty	400	450
Industry	500	550

The non-refundable Participation fee for the candidate should be remitted in the Indian Overseas Bank, Serkkadu. Account number: 2484910000049050, Account Name: Organizing Secretary RABT-18, IFSC Code: IOBA0002484 and the original bank challan with UTR number or online transfer receipt and transaction ID/Demand Draft should be enclosed with the application form, to be sent to tvrabt2022@gmail.com.

**LIST OF SPEAKERS**

1. **Dr. GOVARTHANAN MUTHUSAMY**  
 Research Professor  
 Department of Environmental Engineering  
 Kyungpook National University  
 80 Daehak-ro, Buk-gu, Daegu, 41566, South Korea.
2. **Dr. U.S.MAHADEVA RAO**  
 Professor  
 School of Basic Medical Sciences  
 Universiti Sultan Zainal Abidin  
 Kampus Kota, 20400, Kuala Terengganu, Malaysia.
3. **Dr. BHASKAR DAS**  
 Associate Professor  
 Department of Environment &  
 Water Resources Engineering  
 School of Civil Engineering  
 Vellore Institute of Technology (VIT),  
 Vellore-632014.

**For Further Details**

**Dr. A. RAJASEKAR**

Assistant Professor & Ramalingaswami Fellow,  
 Department of Biotechnology  
 Thiruvalluvar University  
 Vellore - 632 115

Mobile: 91-7639186598, E. mail: tvrabt2022@gmail.com

# MESSAGES



**Dr. R. VIJAYARAGAVAN**

REGISTRAR i/c.,  
Thiruvalluvar University,  
Serkkadu, Vellore.



### MESSAGE

“Education is the ability to listen to almost anything without losing your temper or your self-confidence”. Education is a process is a process which contributes in building socio-economic infrastructure of the nation. We feel proud to act as contributors of this social transformation. Thiruvalluvar University was instituted in the name of Saint Thiruvalluvar with a focus to uplift the downtrodden, disadvantaged populace of the backward districts of Vellore, Thiruvannamalai, Cuddalore and Villupuram with an objective to provide research for the advancement and dissemination of knowledge with a focus on the economic and social upliftment of oppressed classes.

It's a certain delight for me to be a part of the international conference “Recent advances in Bioelectrochemical Technology - 2022” organized by the Department of Biotechnology which will be held during 29<sup>th</sup> of April 2022. The future growth of human race is undoubtedly dependent upon the wise utilization and exploitation of Bioelectrochemical which could be of floral, faunal or microbial source. According to the current scenario, there is a trend of reverse evolution in sources of products, thus the utilization of Bioelectrochemical is encouraged than the exploitation of synthetic products.

I would like to take this opportunity to convey all the delegates to extract maximum knowledge by interacting with all the eminent national and international scientific personalities from this event. I also would like to congratulate Dr. R. Babu Janarthanam the convener, Dr. A. Rajasekar, the Organizing secretary and the organizing committee for the smooth organization and successful conduction of RABT- 2022.

My best wishes to all delegates participating in the conference.

**(Dr. R. Vijayaragavan)**



**Prof. Dr. M. CHANDRAN**

Controller of Examination i/c & Director, CFR,  
Thiruvalluvar University,  
Serkkadu, Vellore – 632115.



## MESSAGE

The goal of true education is to provide intelligent individual with refused character to the society. Educational institution with true commitment can endow with such noble ideals to the students who are the bright future of this nation. Raising an individual to a higher level of understanding and creating awareness of both science and technology in him/her contribute to the development of state and society. It is not only the scientific knowledge of nature and facts but also the logical and application oriented technological expertise plays a vital role in the global scenario.

Being a developing country with high population having many compounding challenges, India has adopted science and technology in an immense way. Since independence, India marches steadily and confidently towards a new era. The nature and magnitude of the current issues and challenges undergo rapid changes paving comfortable path for the new emergence of Bioelectrochemical Technology.

In pursuit of achieving this, the Department of Biotechnology, Thiruvalluvar University is organizing an International Conference on “Recent Advances in Bioelectrochemical Technology – RABT 2022” during 29<sup>th</sup> April 2022. It gives me immense pleasure to greet the members of the department and all other good Samaritans who contribute in many ways for a noble, lofty, ideal cause.

I appreciate the effectual work of Dr. A. Rajasekar, the Organizing secretary of the Conference and efficient Committee members for providing a platform to students, research scholars, academicians and industrialists across the world to share their knowledge and expertise.

I wish this Conference a very great success. My best wishes to all.

**(Dr. M. Chandran)**



**Dr. JOSEPH SELVIN**

Coordinator,  
Microbiology programme,  
School of life sciences,  
Pondicherry university, Pondicherry.



### MESSAGE

I am delighted to note International conference on “Recent Advances in Bioelectrochemical Technology –RABT 2022” to be held at Thiruvalluvar university. I congratulate Dr. A. Rajasekar, Organizing secretary who is coordinating an international event in a frontier area of science and Technology. Nowadays rationale utilization of Bioelectrochemical particularly conversion of c-biomass into green fuels are being frontier research in many countries. Biomass has been reported as a fourth largest available energy sources of the world and current annual availability of bio mass in India is estimated around 500 million metric tons. In India, the energy production being developed from biomass. Tones of biomass generated from industry, forest, agricultural, marine and urban solid waste are decaying with un controlled mechanism and leading to environmental problems by unpredictable toxic gas emission.

The effective utilization of these renewable resources as C – source for green fuels would reduce co2 emission and improve rural economy. This conference is the first and unique which will be a beginning of such events to bring together young researchers and eminent scholars to deliberate recent advances in Bioelectro chemical Technology.

I hope the participants will have a unique opportunity to interact themselves as well as with eminent scholars to enrich their research skills.

I wish this International Conference a grand success.



**Dr. N. THAJUDDIN**

Professor & Head,  
Dean, Faculty of Science,  
Engineering & Technology,  
Department of Microbiology  
School of Life Science, Bharathidasan University.



### MESSAGE

With profound happiness, I extend my appreciation to the Department of Biotechnology, Thiruvalluvar University, Vellore for organizing "International Conference on "Recent Advances in Bioelectrochemical Technology - RABT 2022" on 29th April 2022. I am pleased to note that the deliberations of the conference will be focused the various aspects on Biodiversity & Conservation, Biochemistry. Microbiology, Environmental Sciences, Bioprocess Engineering, Biomedical Technology, Bionanotechnology, Renewable & Non-Renewable resources, Bioenergy, etc. It is hoped that this International Conference will bridge the gap between what has been achieved so far and what has to be achieved with respect to the various issues related to the society & environment. Indeed, there is an urgent need to create awareness on the importance of basic and applied aspects of biotechnology and their effective utilization, I hope this conference would be an apt platform for scientists, scholars, and students to exchange their expertise and share their research experiences.

I congratulate the organizing secretary Dr. A. Rajasekar -and his team members for organizing this International Conference particularly for the benefit of post graduate students, research scholars, scientists, faculty members of various science disciplines and ultimately, the society. I am sure that this conference would definitely kindle research interest in the young minds and enrich their knowledge.

I wish the International conference a grant success,



**Dr. U.S. MAHADEVA RAO**  
Professor,  
School of Basic Medical Sciences,  
Universiti Sultan Zainal Abidin,  
KampusKota, 20400,  
Kuala Terengganu, Malaysia.



## MESSAGE

I am glad to learn that the Department of Biotechnology, Thiruvalluvar University, India is organizing an International Conference – “Recent Advances in Bioelectrochemical Technology – RABT 2022” from 29<sup>th</sup> April 2022.

Biological resources are life generated materials and processes which are naturally and sustainably renewable and biodegradable. As such, biological resources fulfill man’s essential, fundamental needs: food, feed, bioactive molecules, fuel, shelter, fiber, bio-remediation etc. They play a key role in present and future socio-economic evolutions. The Cartagena Protocol on biodiversity (1992) specifies “the genetic resources are organisms or parts of them, populations or any other biotic element of ecosystems having an effective or potential use or value for mankind”. The EU thematic strategy on the sustainable use of natural resources defines them as raw materials such as minerals, biomass and biological resources; environmental media such as air, water and soil; flow resources such as wind, geothermal, tidal and solar energy; and space as land area. The EC communication Roadmap to a resource efficient Europe defines natural resources as raw materials, energy, water, air, land and soil, biodiversity, stable climate and ecosystem services.

Currently, an increasing portion of biomedical research relies on the use of biobanks and databases. Sharing of such resources is essential for optimizing knowledge production. A major obstacle for sharing bioresources is the lack of recognition for the efforts involved in establishing, maintaining and sharing them, due to, in particular, the absence of adequate tools. Increasing demands on biobanks and databases to improve access should be complemented with efforts of end-users to recognize and acknowledge these resources. An appropriate set of tools must be developed and implemented to measure this impact.

I am sure deliberations during conference will result in recommendations for implementations by all those concerned with indigenous technology and development efforts in the country.

I wish the whole programme a great success.





**Dr. ERNEST DAVID**  
Professor (Rtd)  
Department of Biotechnology  
Thiruvalluvar University (State University)  
Serkkadu, Vellore, India – 632 115



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### MESSAGE

On behalf of the Seminar Co-Ordinator, I am happy to extend a very warm welcome to all the delegates attending the International Seminar “Recent Advances in Bioelectrochemical Technology (RABT 2022)” being conducted by Department of Biotechnology, at Thiruvalluvar University, Vellore.

This Seminar with the theme is quite contemporary and it will cover various interdisciplinary areas of science such as, Microbiology, Biotechnology and many more and offer a scientific platform for all the participants to congregate and interact with subject specialists.

I extended my greetings to all participants and wish RABT 2022 every success.

**(Dr. Ernest David)**



**Dr. R. BABUJANARTHANAM**

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Department of Biotechnology

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### MESSAGE

It gives me great pleasure to welcome you to the International seminar on “Recent Advances in Bioelectrochemical Technology 2022” organized by the Department of Biotechnology, Thiruvalluvar University. The objective of the seminar is to share the knowledge on innovations in the field of biotechnology, environmental biotechnology, microbiology and nano biotechnology.

This international seminar will definitely provide a wonderful forum for all the participants to refresh their knowledge base and explore the innovations. This seminar will strive to offer plenty of networking opportunities, providing the participants with the opportunity to meet and interact with the leading scientists and researchers, students, friends and colleagues as well as eminent professors.

I hope that the seminar will be a real exposure in Biotechnology in society interface and inspire the younger generation to its glorious past and present.

I convey my best wishes for the conference a grand success.

**(Dr. R. Babujanarthanam)**



**Dr. RAJASEKAR ARULIAH**

Assistant Professor & Ramalingaswami Fellow

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**MESSAGE**

On behalf of the organizing committee, I am happy to extend a very warm welcome to all the delegates attending the International seminar on “Recent Advances in Bioelectrochemical Technology (RABT 2022)” being conducted by Department of Biotechnology, at Thiruvalluvar University, Vellore. I am indeed happy to organize this International seminar and hope it will be useful for the participating delegates to learn and being enlightened in the areas of biotechnology area to enrich and share the views in the meet.

The International seminar with the theme is quite modern and it will cover various interdisciplinary areas of science such as Biochemistry, Biotechnology, Microbiology, Cancer Biology, Nano biotechnology and many more and provide a scientific platform for all the participants to congregate and interact with subject specialists. The International seminar covers a number of plenary talks and oral presentations on newly emerging areas of Biotechnology.

In view of wide range of topics of contemporary interest are lined up for deliberations in RABT-2022 symposium. Biotechnology being an interdisciplinary field can play very vital role in finding solutions and providing appropriate technology to combat the menace of control and prevention of human diseases.

I extended my greetings to all participants and wish RABT 2022 every success.

**(Dr. A. Rajasekar)**



**Dr. S. VIJAYANAND**

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## MESSAGE

I am pleased and privileged to welcome you all to the International Seminar “Recent Advances on Bioelectrochemical Technology 2022” to be held in 31<sup>st</sup> January 2022. The International Seminar has been planned to deliver the most recent advances in Bioelectrochemical Technology and various interdisciplinary fields of Biotechnology by eminent scientists, academicians and industrialists of various national and international repute across the globe. The Seminar will provide platform for the delegates to refresh and update their knowledge base and to debate and deliberate on the emerging trends of biotechnology. The plenary lectures during the Seminar are planned featuring interesting sessions on diverse thrust areas of Bioelectrochemical Technology. Apart from the plenary lectures, there will be poster presentation sessions for the delegates, which will serve as an ideal stage for them to share their research findings and to develop their scientific skills to the next level. I am sure that the deliberations of this seminar will be an enlightening and inspiring experience for all the participants. It is noteworthy to mention that there was an overwhelming response to the seminar from the budding scientists and students across the country.

The organizing committee has made all out efforts to make your participation worthwhile. I hope that all of you will enjoy the academic year.

I once again extend my warm welcome and greetings to everyone.

**(Dr. S. Vijayanand)**



**Dr. M.C. HARISH**

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**MESSAGE**

It gives me immense pleasure in sharing that our department will be hosting an International Seminar on “Recent Advances in Bioelectrochemical Technology 2022.

The theme chosen is of topical interest and need of the hour throughout the globe to help cleaning up polluted environments, including soils, groundwater and marine environments with help of bacteria, fungi, algae and plant species which are capable of metabolizing, immobilizing or absorbing toxic compounds from their environment. As these novel biotransformations become better understood at ecological, biochemical, and genetic levels and new strategies are available for bioremediation. Hence this seminar will open up the avenues of Bioelectrochemical research and collaborations.

I take this opportunity of conveying my best wishes to our Thiruvalluvar University authorities and Biotechnology department team for the fruitful and successful deliberation of this seminar.

**(Dr. M.C. Harish)**

# **PRESIDENTIAL ADDRESS**



**Dr. N. CHANDRASEKARAN**  
Professor & Director,  
Centre for NanoBiotechnology,  
Vellore Institute of Technology, Vellore



## **SYNTHETIC PLASTICS: IS IT A BOOM OR A BANE**

Micro and nanoplastics are the ubiquitous xenobiotics. Synthetic plastics came into being during early 1950's and later on became a big boom to economy and to the world of material science. It was an wonder material those days, and made revolution in the day to day life of a common man. Its durability, malleability, and above all the cost have made it so important in the life of a common man. On contrary its ill effect slowly started to surface now. Westerners and Europeans are giving subsidies to start synthetic polymer firms in India. Now plastic waste will engulf the world. What are the challenges that are facing us of late? Are we really aware of the consequences? What is the knowledge of science in determining, characterizing, quantifying micronanoplastics? How it is formed? Is there any sensing techniques to identify micronanoplastics?

# PLENARY LECTURES





**Dr. GOVARTHANAN MUTHUSAMY**  
Research Professor,  
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Kyungpook National University,  
80 Daehak-ro, Buk-gu, Daegu, 41566, South  
Korea.



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## **BIODEGRADATION OF PLASTICS: AN EMERGING TECHNOLOGY TO CLEAN UP THE ENVIRONMENT**

**Muthusamy Govarthanan\*, Woong Kim**

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South Korea.*

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Synthetic plastics are emerging environmental contaminants that have been found to accumulate in the ecosystem worldwide. In the environment, microorganisms function as pioneering surface colonizers and drive critical ecosystem processes including primary production, biogeochemical cycling and the biodegradation of anthropogenic pollutants. The biodegradation of synthetic plastics is a complex phenomenon. To date, most of the knowledge on the microbial ability to degrade synthetic plastics is based on a few bacteria able to grow on culture media. Hence, the great natural source of high diversity of microorganisms is not fully exploited. By using omics technologies (genomic, transcriptomic, proteomic, metabolomics), it is now possible to discover new non-culturable microorganisms involved in plastic colonization and degradation, and explore the new properties of microorganisms that arise from the interplay of genes, proteins, other macromolecules, small molecules, and the environment. Low cost, efficient technology, eco-friendly treatments capable of reducing and even eliminating plastics, are of great environmental interest. Among biological agents, microbial enzymes are one of the most powerful tools for the biodegradation of plastics. There is a huge demand in exploring these microbes which can grow in different conditions and use the plastic carbon polymers as an energy source.

**Keywords:** Plastics, Bioremediation, Environment, Microorganisms



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## **OXIDATIVE STRESS: AN EXAMPLE OF HORMESIS**

**Mahadeva Rao, U.S., Anantrao, N.H.**

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Background of study: Hormesis is a biphasic dose response ('U' or 'J' shaped) to an exogenous agent showing a low dose beneficial effect and a high dose toxic effect. Similar biphasic responses have also been observed in normal physiological functions of cells and organisms and during adaptation to stress. Oxidative stress: It is an imbalance in the production and disposal of reactive oxygen species (ROS) leading to oxidative damage to biomolecules and cell structures. Production of ROS is unavoidable in aerobic organisms because of the peculiar atomic structure of oxygen. Endogenous antioxidant systems dispose off the ROS preventing the potential oxidative damage. ROS mediated oxidative damage is implicated in the pathogenesis of a wide variety of age related, and inflammatory human disorders. Beneficial role of ROS: ROS generation and oxidative stress are essential for survival of the organism since in moderate amounts, their consequences may be essential to maintain normal health. Excess levels of oxidative stress will lead to oxidative damage and consequent human disorders. Disposal of ROS: Endogenous antioxidant systems play an important role in preventing the ROS mediated oxidative damage by maintaining a state of 'redox homeostasis'. Disturbances in the state of redox homeostasis due to increased endogenous production / entry of exogenous ROS or deficiency/defects in endogenous antioxidant systems would lead to oxidative damage and the consequent human disorders. Conclusion: We have presented a concise review giving production and disposal as well as beneficial and harmful effects of ROS proposing that oxidative stress is an example of hormesis.



**Dr. BHASKAR DAS**

Associate Professor,  
Department of Environment & Water Resources  
Engineering,  
School of Civil Engineering,  
(VIT), Vellore-632014. India.



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## **THE POTENTIAL APPLICATION OF CONSTRUCTED WETLAND MICROBIAL FUEL CELL IN WASTEWATER TREATMENT AND THEIR OPPORTUNITIES FOR IMPROVEMENT**

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The present practice of wastewater treatment is not only inadequate but also energy intensive. On the contrary it has been found that the energy stored in the biomass of wastewater is several times more than that energy requirement for its treatment. Hence, contemporary research in wastewater spearhead to tap this energy to make the treatment process at least energy (carbon) neutral, if not energy incentive. Among the different approaches for the energy extraction from wastewater, anaerobic digestion (methane), thermochemical reaction (biochar, bio-oil, and pyro gas), microbial electrolysis cell (hydrogen), microbial fuel cell (electricity), etc. are popular and having potential in the future. Microbial fuel cell is a leading-edge technology where microbial metabolic process generate direct energy from the anaerobic oxidation of organic matter. Major requirement for working of a typical MFC is availability of redox gradient, between the anode and cathode chamber, which are maintained artificially but can be achieved naturally with constructed wetland (CW). Various study confirmed that the redox gradients in constructed wetlands are more consistent than conventional MFCs and attained naturally when MFC is coupled with constructed wetland. The current work presents the summary of recent studies conducted on constructed wetland microbial fuel cells (CW-MFCs) for better performance with different hydraulic retention time, electrode material and spacing, organic and COD loading rates, different flow regime and, presence of plants species and nutrient. Because of these optimizations, CW-MFCs have emerged as eco-friendly and robust systems that can extract green energy from continuous flow of WW while undergoing its simultaneous treatment, giving it an edge over traditional CW's. However, the existing challenges include lack of consistency in microbial performances, maintaining performance while upscaling, utilizing generated energy in practical ways.

# **ABSTRACTS OF POSTER PRESENTATION**

## GREEN SYNTHESIS OF FLUORESCENT CARBON DOTS AND STUDY ITS CHARACTERIZATION

Kaviyapriya Kirubanithy<sup>1</sup>, Amutha Santhanam<sup>1\*</sup>

<sup>1</sup>*Nanobiotherapeutics Laboratory, National Centre for Nanoscience and Nanotechnology, Guindy Campus, University of Madras, Chennai 600025, India*

The synthesis of fluorescent carbon dots from bio-mass waste in a simple, green, and easy way is investigated in this paper. The hydrothermal carbonization mechanism was implemented for the synthesis of fluorescent carbon dots using peanut shells. The synthesized fluorescent carbon dots by hydrothermal method shows excellent fluorescent properties. Under 365nm UV light, it emits a brilliant blue fluorescence. Because of their excellent water solubility, stability, and non-toxicity, as-synthesized fluorescent carbon dots have a significant benefit. For excitation at 365nm, the fluorescence quantum yield computed using quinine sulphate as a reference was 1 % (v/v). The presence of surface functional groups with oxygen and nitrogen can be seen using Fourier transform infrared spectroscopy (FTIR). The carbon quantum dots had an average lifespan of 1.2 nanoseconds. The DPPH free radical experiment demonstrates that the produced fluorescent carbon dot has good antioxidant scavenging action in vitro. Because of the features of fluorescent carbon dots, it can be used in photo catalysis, bio-sensing, and bio-imaging applications.

**Keywords:** Carbon quantum dots, hydrothermal method, bio-imaging.

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## CHARACTERIZATION OF FLUORESCENCE CARBON QUANTUM DOT FOR IMAGING APPLICATION

P. Dineshkumar <sup>1</sup>, Kaviyapriya Kirubanithy <sup>1</sup>, and Amutha Santhanam <sup>1\*</sup>

<sup>1</sup> *Nano-biotherapeutics Laboratory, National Centre for Nanoscience and Nanotechnology, University of Madras (Guindy Campus), Chennai 600025, India.*

Fluorescence Carbon Quantum Dots (FCQDs) are new generation carbon nanomaterials that have a great attraction over years concede to their unique properties. In this method, we adopt a simple and eco-friendly approach to the hydrothermal synthesis of water-soluble FCQDs from the coconut shell. With a relative Quantum yield of 0.7%, the as-prepared FCQDs possess a desired functional group and express the strong blue-emitting fluorescence. When excited at 360nm, FCQDs exhibit an indirect bandgap of 4.2 eV and good fluorescence characteristics, according to optical measurements. With the use of TCSPC, the fluorescence decay lifetime demonstrates 0.99ns. HRTEM revealed that the synthesized FCQDs have a spherical form and a particle size distribution of 4-6nm. The hemolytic activity for as prepared FCQDs shows 0.7% for 500µg/ml indicating that they are non-toxicity to RBCs and have good biocompatibility. The DPPH antioxidant results reported that FCQDs have the highest antioxidant activity. These significant properties open an application for sensing, photocatalysis, fluorescence Imaging, food packaging, and biomedical. Thus, the synthesized FCQDs with improved antioxidant properties are suitable for biomedical, bioimaging, chemical, and industrial applications.

**Keywords:** Fluorescence Carbon Quantum Dots, quantum yield, bioimaging, HRTEM

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**NANO GEL PREPARATION WITH FUNCTIONALIZED HNT AND  
CARBOXYMETHYL CELLULOSE FOR BIO APPLICATION**

**Swetha S<sup>1</sup>, Muthulakshmi V<sup>1</sup>, Amutha Santhanam<sup>1\*</sup>**

*<sup>1</sup>Nano-biotherapeutics Laboratory, National Centre for Nanoscience and Nanotechnology,  
University of Madras, Guindy Campus, Chennai 600025.*

Nanogels based materials have gained attraction because of its biocompatibility, biodegradability and good water absorbing capacity. This study focus to generate nanogels crosslinked via Schiff base chemistry, a prototype of amino-functionalized halloysite (HNT) attached to aldehyde functionalized-Carboxymethyl cellulose (CMC). The oxidation of carboxymethyl cellulose was done with sodium periodate, while the functionalization of Halloysite Nanotubes was done with (3-aminopropyl) triethoxysilane (APTES). The surface functional groups were confirmed using FTIR. Using the Dynamic Light Scattering (DLS) approach, the particle size was determined. Thermogravimetric analysis and ZETA potential were used to measure the particle surface charge and thermal stability (TGA). Nanogels can be used in a variety of biological applications due to their great biocompatibility and biodegradability, such as wound healing, targeted drug administration, cancer therapy, and so on.

**Keywords:** Nanogel, Carboxymethyl cellulose (CMC), Halloysite Nanotubes (HNT), FT-IR.

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**SYNTHESIS AND CHARACTERIZATION OF TUNGSTON NANOPARTICLE  
FROM THE BACTERIUM *DEINOCOCCUS RADIODURANS***

**G. Velmathi<sup>1</sup>, N. S. Kavitha<sup>1</sup> & Amutha Santhanam<sup>1\*</sup>**

<sup>1</sup>*Nano-biotherapeutics Laboratory, National Centre for Nanoscience and Nanotechnology, University of Madras, Guindy Campus, Chennai 600025.*

*Deinococcus radiodurans* is known for extreme radiation resistance. This bacterium is red pigmented and rich in carotenoids. The main role of carotenoids is in radio resistance and in addition to oxidative stress tolerance. This bacterium is able to survive well in extreme environments such as oxidant stresses compared with other bacteria. This study is mainly investigated the ability of *D. radiodurans* (MTCC 4465) to biosynthesis Tungsten nanoparticles (WO<sub>3</sub>NPs) and study its characterization. Tungsten nanoparticles (WO<sub>3</sub>NPs) may be reduced to WO-, with the capping groups to stabilize the WO<sub>3</sub>NPs. The synthesized particles are characterized by ultraviolet and visible (UV/Vis) absorption spectroscopy, X-ray diffraction (XRD), dynamic light scattering (DLS), and Fourier transform infrared spectroscopy (FTIR). The study of UV-Vis absorption shows peak at 289 nm and proven the formation of Tungsten nanoparticles. X-ray diffraction study shows average crystalline size of Tungsten Nanoparticles with 0.6nm by using Scherrer formula and Williamson Hall plot method. The particles will be explored for its biological activities in future.

**Keywords:** *Deinococcus radiodurans*, Tungston nanoparticle, Characterization,

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**BIOREMEDIATION AND DETOXIFICATION OF TRYPAN BLUE BY BACILLUS  
SP. ISOLATED FROM TEXTILE EFFLUENTS**

**P. Jeevitha & J. Hemapriya\***

*Department of Microbiology, DKM College, Vellore, Tamilnadu, India*

Azo dyes are commonly used in many commercial industries. 16 bacterial isolates were isolated from textile effluents, of which 4 isolates (HB1, HB2, HB3 and HB4) showed ability to decolorize Trypan blue dye. Based on the standard morphological and biochemical characteristics, HB3 isolate that showed maximum decolorization of Trypan blue was identified as *Bacillus* sp. HB3 isolate showed 96.6 % decolorization of Trypan blue within 24 h of incubation. Maximum decolorization of Trypan blue was found to be achieved at 35 °C, neutral pH in the presence of glucose (Carbon source) and Yeast extract (Nitrogen source). The activity of azo reductase, lignin peroxidase, tyrosinase, manganese Peroxidase was investigated for their role in biodegradation of Trypan blue. Specific activity of the azoreductase enzyme was found to be 0.46 U mg<sup>-1</sup> protein. The crude protein extract subjected to SDS-PAGE resulted in the formation of a clear band (original band) against blue back ground which indicated the location of active azoreductase enzyme

**BACTERIAL MEDIATED BIOSYNTHESIS OF SILVER NANOPARTICLES (AG NPS) AND EVALUATION OF ITS ANTIBACTERIAL EFFICACY**

**S. Saritha<sup>1</sup> & V. Prabha<sup>2\*</sup>**

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Nanotechnology has recently emerged as an elementary division of science and technology that investigates and regulates the interaction of synthetic and biological materials. Nanotechnology is currently employed as a tool to explore the darkest avenues of medical sciences to combat diseases caused by drug resistant microbes. Silver nanoparticles (AgNPs) have been known for its inhibitory and bactericidal effects in the past decades. Silver Nanoparticles was synthesized by ecofriendly biogenic approach mediated by using the *Streptomyces erythreus* culture. The synthesized nanoparticles were characterized by UV-visible spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDAX) and Transmission electron microscopy (TEM). The antibacterial activity of the biogenic Ag nanoparticles were carried out by conventional Kirby-Bauer well diffusion method against Gram positive (*Staphylococcus aureus*, *Bacillus cereus*) and Gram negative (*Escherichia coli*, *Vibrio vulnificus*) bacterial strains. Silver nanoparticles exhibited maximum antagonistic activity on *Vibrio vulnificus* (14 mm) and *Bacillus cereus* (13 mm).

**BIOREMEDIATION OF METHYL ORANGE, A SYNTHETIC TEXTILE AZO DYE  
BY A HALOTOLERANT BACTERIAL STRAIN**

**A. Shyamala<sup>1</sup>, J. Hemapriya<sup>2</sup>, & S. Vijayanand<sup>3\*</sup>**

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*2. Department of Microbiology, DKM College, Vellore, Tamilnadu, India*

*3. Department of Biotechnology, Thiruvalluvar University, Vellore, Tamilnadu, India*

Increasing industrialization and urbanization results in the discharge of waste to the environment, which in turn creates more pollution. The discharge of toxic effluents from various textile industries adversely affects the water resources, soil fertility, aquatic organisms and ecosystem integrity. Bioremediation of textile dyes has been of considerable interest since it is inexpensive, eco-friendly and produces a less amount of sludge. In the present study, effluent samples were collected from various textile and dyeing industries located in and around Arni, Tiruvannamalai District, Tamilnadu, India and were exploited for the screening and isolation of bacterial strains that were capable of decolorizing the textile dye, Methyl Orange. Physico- chemical properties of the effluent samples were analyzed. Five bacterial strains, TVU-M1 to TVU-M5 capable of decolorizing Methyl Orange were screened and isolated from various effluent samples. Out of which, TVU-M4 isolate (*Bacillus* sp. Strain TVU-M4) exhibited maximum decolorization efficiency of 88.24 % within 32 h of incubation. HPLC chromatogram and FTIR spectrum of 24 h extracted metabolites showed significant change in the positions of peaks, when compared to control dye spectrum, indicating the biodegradation of Methyl Orange.

**BIOGENIC APPROACH FOR THE SYNTHESIS OF TITANIUM DIOXIDE  
NANOPARTICLES USING A HALOPHILIC BACTERIAL ISOLATE -  
CHROMOHALOBACTER SALEXIGENS STRAIN PMT-1**

**P. Tharanya<sup>1</sup> & S. Vijayanand<sup>2\*</sup>**

*1. Department of Biotechnology, MMES College, Mel Visharam, India*

*2. Department of Biotechnology, Thiruvalluvar University, Vellore-632115, India*

Green nanotechnology in the development of material synthesis is of considerable importance to expand their biological applications. Currently, a wide array of inorganic nanoparticles has been synthesized by using biogenic enzymatic methods and their applications in many cutting-edge technological areas have been explored. In the present work, Titanium dioxide nanoparticles were synthesized by using the culture supernatant of Chromohalobacter salexigens strain PMT-1 cells. Further, the sample was characterized by UV-Visible spectroscopy, X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM). The antibacterial activity of the biosynthesized TiO<sub>2</sub> nanoparticles was tested against Staphylococcus aureus, Escherichia coli and Serratia marcescens. Maximum zone of inhibition was observed against Escherichia coli. Thus the biogenic TiO<sub>2</sub> nanoparticles can be explored in biomedical and nanotechnology applications without any adverse side effects.

**EFFECT OF ARSENIC TRIOXIDE ON THE ACID PHOSPHATASE (ACP)  
AND ALKALINE PHOSPHATASE (ALP) IN THE SELECTED TISSUES  
OF FRESH WATER FISH, *OREOCHROMIS MOSSAMBICUS***

**\*S. Sankar Samipillai & M. Kamarajan**

*PG and Research Department of Zoology, Govt. Arts College, Chidambaram-608102,  
Tamilnadu*

The present study is aimed to analyse the effect of Arsenic trioxide on the acid phosphatase and alkaline phosphatase in the brain, gill, liver and kidney tissues of fresh water fish, *Oreochromis mossambicus* for 14 days. In the present study, the level of acid phosphatase and alkaline phosphatase were increased in the Arsenic trioxide exposed fish. The present results showed that increased level of acid and alkaline phosphatase might be due to the effect of arsenic toxicity.

**Keywords:** Arsenic trioxide, *Oreochromis mossambicus*, acid phosphatase (ACP), alkaline phosphatase (ALP)

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**EVALUATION OF *IN VIVO* ANTI-CANCER ACTIVITY OF ETHANOLIC EXTRACT OF *PLUMBAGO ZEYLANICA* AGAINST DALTON'S ASCITIC LYMPHOMA IN MICE**

**M. Hema Mani<sup>[1]</sup> & A. Jayachitra<sup>[2]</sup>**

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**Aim:** Traditional medicine serves people worldwide for a long time. In recent years, there has been significant interest in the use of traditional medicine information in cancer research. In traditional and common medicine for cancer treatments, Ethanolic Extract of *Plumbago zeylanica* (EEPZ) has been used to treat cancer. The aim of this study was to evaluate the effect on intraperitoneally injected Dalton Ascitic Lymphoma (DAL) cell lines in Swiss Albino mice, by ethanolic extract of *Plumbago zeylanica* (EEPZ) leaves. **Materials and Methods:** DAL cells (1x10<sup>6</sup> cells/ml/mouse) had injected into the mice intraperitoneally. The EEPZ was administered orally to the tumour-bearing group of animals at doses of 200 mg/kg and 400mg/kg body weight for 14 consecutive days. The measurement and comparison of derived parameters, haematological parameters, serum enzyme, and lipid parameters were carried out. The standard medicine was 5-Fluorouracil (20 mg/kg). **Result:** Both doses of EEPZ reduced average body weight gains, decreased viable tumour cell count for packed cell volume (PCV), and increased mice's lifetime for DAL treatment, with a reduction in blood flows, serum enzymes and lipid profile close to normal values. With the p<0.01 control group, all values were statistically important. The protective effect of Dalton Ascitic Lymphoma (DAL) extracts can be suggested for these observations. **Conclusion:** All these findings lead to the conclusion that both EEPZ doses have an Anti – DAL protective effect.

**Keywords:** Cancer, *Plumbago zeylanica*, EEPZ, DAL.

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**DIVERSITY AND HEAVY METAL TOLERANCE OF ENDOPHYTIC FUNGI  
FROM MEDICINAL PLANT LEAF OF *ABUTILON INDICUM***

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Endophytic fungi are a type of fungus that grows inside plants and exhibits neither any symptoms of the disease. The endophytic association may also have originated either from time higher plants actually emerged on the planet more than 400 years ago, according to earlier fossil evidence of plant-associated fungus. Endophytic have indeed been virtually isolated from plants encountered in all categories of niches on the continent and play an important role in natural ecosystem biodiversity. In the present, we investigated to the endophytic fungal divergence and its metal tolerance from medicinal plant leaf of *Abutilon indicum*. The isolates of endophytic fungal were less sensitive to  $Zn^{2+}$ , 59 % and 67 % of these isolates being able to grow well in  $Zn^{2+}$  amended medium (TI > 50 %), the enhanced growth of endophytic fungal in toxic metal plates. These isolates may have potential application in phytoremediation.

**Keywords:** *Abutilon indicum*, Diversity, Endophytic fungal, Heavy metals,

**SCREENING FOR ANTIOXIDANT ACTIVITIES FROM THE CRUDE PLANT  
EXTRACTS OF HIBISCUS SP.**

**Indumathi P and Abi Beulah**

Plants have played an important role in the life of human being as they provide the basic need of mankind that is food, clothing, shelter, and medicines. They have formed the basis of traditional medicine system among which are Ayurvedic, Unani etc. that have been in existence for many decades and continue to provide mankind with new remedies. In developing countries, a large section of the population relies on medicinal plants for primary health care requirements. The traditional medicines are becoming popular because they are cheap, abundant with less adverse effect on health. In recent years, focus on plant research has increased globally to find out the immense potentials of medicinal plants used in various traditional systems. Various medicinal plants have been studied which could be used as potent phytochemical agents in the therapeutic treatment of various diseases; one among them is Hibiscus known for its delicacy and medicinal properties which has several health benefits. Research reports highlighted the dried calyces as the potential source of bioactive molecules that exert potent antioxidant-antiradical activity, anti-inflammatory action, antiobesity, antihyperlipidemic, antihypertensive, inhibition of blood platelets aggregation, diuretic, antiurolithicatic, antimicrobial, anticancer, hepatoprotective, renoprotective, antitumour, immunomodulatory properties. Thus, the present study is designed to investigate the antioxidant activities from the plant extracts of Hibiscus sp.

Hence, in the current study, we screened the antioxidant capacity of crude extracts of Hibiscus and showed that the ethanolic leaf extracts of Hibiscus sp. is high and these extracts exhibit strong antioxidant activities compared to that of the standard compounds. The results would help to ascertain the potency of the crude extract from Hibiscus could act as potential source of natural antioxidants. It can be used for minimizing or preventing lipid oxidation in pharmaceutical products and retarding the formation of toxic oxidation products. Further studies on definitive mechanisms of its chemotherapeutic activities and potential effects in vivo are warranted.



**COPD ASSOCIATED GENE EXPRESSION SUPPORTING ENTRY OF SARS-COV-2 AND DESIGN OF POTENTIAL EPITOPIC VACCINE**

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Patients with Chronic obstructive pulmonary disease (COPD) have an increased risk for SARS-CoV-2. Here we analyzed the transcriptomes of COPD patients and gene expression of 7 genes was studied. Higher expression of ACE-2 and TMPRSS2 genes in COPD patients makes them susceptible to SARS-CoV-2. Epitopes targeting these genes were identified from conserved regions of envelope protein and surface glycoprotein present in SARS-CoV-2. We used immunoinformatics approaches to analyze the mutations in the envelope protein and surface glycoprotein of SARS-CoV-2. We used multiple sequence alignment for the retrieved conserved region of these proteins from different isolates of COVID-19 and identified multiple specific epitopic regions for T- and B-cells. Furthermore, these results revealed the comprehensive high potential probable epitopic determinants based on high scores matrix and binding affinity towards the T- and B-cells.

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**IN SILICO IDENTIFICATION OF VACCINE TARGETS AGAINST FOWL  
ADENOVIRUS FOR *GALLUS GALLUS DOMESTICUS***

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Fowl adenovirus is an opportunistically spreading virus, which easily affects the weaker immune system. It causes contagious diseases in the chicken which are aged from 3-6 weeks. It also leads to high mortality ranges from 70% to 90% in the poultry industry. Adenoviral disease, gizzard erosion, inclusion body hepatitis are some of major disease caused by Fowl adenovirus which has 5 different species and 13 stereotypes. However, controlling of this disease is very challenging. To overcome and develop cost effective vaccine against this diseases, a multi-epitope vaccine was designed by using the structural proteins of the fowl adenovirus Hexon, Penton and fiber along with the non-structural 100k protein as vaccine candidate. By using antigenic B-cell and T-cell epitopes obtained using the immune informatics methods, the multi-epitope vaccine was designed using avian beta defensin as adjuvant to enhance the immunogenicity in the vaccine construction. The vaccine candidate's tertiary model were predicated and validated. Molecular Docking, *in silico* immune simulation and cloning were performed. The newly designed multi-epitopic vaccine may effectively control the infection caused by fowl adenovirus.

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**AMELIORATIVE EFFECT OF CINNAMON MEDIATED CRYOPRESERVATIVE  
AND ITS EFFECTS ON HYPERTENSION INDUCED MALE INFERTILE  
SUBJECT; A PILOT STUDY**

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**Introduction:** In recent day's infertility cases were 40 to 50 % of prominent by male, because of poor semen quality and low amount of sperm cells. Smoking, Alcohol, Drivers, Heat exposure, Genetic factors, Covid-19 these are the things major causing male infertility. **Aim:** Hence the current pilot study focus on preserving hyper-tension induced infertile subjects sperm cells by cinnamon extender and its ameliorative effect on sperm viability. **Ethics and Methods:** With proper institutional permission from Narayani Hospital from Vellore, the semen collected from the 20-45 years of age group with infertile (recently recovered from COVID-19) and processed for major conventional semen parameters as per WHO, 2020. The informed consent form was obtained and maintained confidentially. Followed by biochemical and viability analysis was done by standard procedures. In parallel, cinnamon micro-particles were synthesized, characterized and processed for sperm preservative for selected dosages with particular time intervals.

**Results:** The semen parameters (count, morphology and motility) and biochemical parameters (ca, Na, K, Se, Mg and total seminal proteins ) confirms the infertile due to high blood pressure because last two years covid-19 impact on their lifestyle. Followed by cinnamon micro-particles treated sperm cells and its viable nature indicates that, improved viability in infertile sperm cells as like fertile and noticeably further damage form infertile were avoided.

**Conclusion:** Cinnamon is rich with zinc and antioxidant property, and here act as cryopreservative agent on hyper tension induced infertile subjects.

**Keywords:** Male infertility, Cinnamon, Trace elements, total seminal proteins, Covid-19.

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**BIOLOGICAL CONSTRUCTED ZINC OXIDE NANOPARTICLES USING WITH  
ORANGE PEEL AQUEOUS EXTRACT PREVENTS ULTRAVIOLET-A  
RADIATION INDUCED PHOTOAGING**

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In this study, we wanted to look into the synthesis and characterization of zinc oxide nanoparticles derived from orange peel aqueous extract (ZnONPs-OPAE), which could be used to prevent UVA radiation-induced Photoaging. In orange peel extracts, zinc acetate dihydrate (1 mM) solution was used as a precursor for ZnONPs synthesis. Fourier transform infrared (FTIR) spectroscopy, ultraviolet-visible spectrophotometer (UV-Vis), transmission electron microscope (TEM), X-ray diffraction (XRD), and dynamic light scattering (DLS) were used to investigate the structure and properties of ZnONPs. Color conversion in the reaction sample from brown to yellow indicated the construction of ZnONPs, and this sample was shown to have UV peaks at 305 nm. DLS studies confirmed the existence of ZnONPs, and their size was determined to be 54 nm. Furthermore, the presence of pure ZnONPs was confirmed by an XRD pattern. FTIR confirmed the existence of biologically active functional groups responsible for converting bulk zinc acetate to ZnONPs. TEM analysis revealed that the shape of the NPs was spherical. Following these findings, we looked at the effect of ZnONPs-OPAE on UVA radiation-mediated photoaging in mouse fibroblast cells (L929). The cells are protected from UVA radiation by ZnONPs-OPAE, which inhibits cytotoxicity, ROS production, mitochondrion membrane damage, and apoptosis. Furthermore, ZnONPs-OPAE inhibits photoaging responses in L929 cells by suppressing protein expression of MAPKs, AP-1, and MMPs. ZnONPs-OPAE demonstrated a potent photoaging agent that might be used to develop novel sunscreen agents in the future.

**Keywords:** Zinc oxide nanoparticles, orange peel aqueous extract, Ultraviolet radiation, Photoaging

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**IMPACT OF PESTICIDES AND ITS BIODEGRADED METABOLITES; *IN-VIVO*  
APPROACH (SEED GERMINATION AND ZEBRA FISH) MODEL**

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Biodegradation of Monocrotophos has led to the synthesis of several compounds. However, the fate of these compounds has not been studied. Therefore, the current study was focused on the determination of these end products in In-vivo studies using seed germination and zebra fish model. In seed germination assay it is evident that the end product such as dimethyl sulphate has any negative impact in germination of seeds. In the zebra fish model study when metabolites were added there was no significant changes in physiological characteristics of fish, which directly implicates that the bacterial degraded product does not cause any disturbance to the ecosystem when it is discharged. It was clearly evident that the disruption of epithelial cells was expressed in gills and liver whereas, the fishes augmented with the effective strain did not show any disruption.

**Keywords:** Biodegradation, Monocrotophos, seed germination, Zebra fish,

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**BIO REMOVAL AND BIODEGRADATION OF HEAVY METALS AND  
PESTICIDES USING EM TECHNOLOGY: A BIOMIMETIC STUDY**

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Environmental contamination with pesticides (malathion) and heavy metal (chromium) is found to be a major concern. The amount of pollutants present in soil and water is more than the permissible limit. These pollutants exist in the environment due to the excessive usage for increasing their yield. The present study integrates the biodegradation and bio removal of the contaminants obtained from polluted lake sediments. The isolates showed good PGPR activity and were then optimized for different parameters such as carbon source, nitrogen source and p<sup>H</sup>. It was found that at P<sup>H</sup> (7.0), glucose (1%) and NH<sub>4</sub>Cl (0.5%) provided better growth. The degradation study reveal that 90% degradation was achieved within 72 hours and the reduction in toxicity of heavy metals was detected using Atomic Absorption Spectroscopy (AAS). It was found to be 85% reduction in the heavy metals toxicity. Based on the preliminary identification the genus of the organism was found to be *Bacillus sp.*

**Keywords:** Heavy Metals, Pesticides, biodegradation, Environment

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**IDENTIFICATION OF CHANGES IN THE BACTERIAL DIVERSITY IN SOIL  
AMENDED WITH HEAVY METAL COCKTAIL (LEAD, NICKEL AND  
CADMIUM): A POT CULTURE MEDIATED METAGENOMIC STUDY**

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Heavy metals such as lead (Pb), nickel (Ni) and cadmium (Cd) are known to cause ill effects to the various life forms existing in the ecosystem. Although there are several reports found in the removal of heavy metal, our current study was focused on the bioremoval of the heavy metal mixture using Vetiver augmented with effective bacterial strain VITMSJ3 and *Esienia fetida* (earthworm). The percentage uptake of each metal during the process was found to be 89%, 82% and 75% for Pb, Ni and Cd respectively. The soil samples from each of the treatments was assessed for its metagenomic profile identifying the OTU's (Operational Taxonomic Units). Further it was clearly evident that the bacterial population and diversity changed upon augmentation of the effective bacterial strain. Interestingly all the earthworms in bacterial augmented set-up were alive, whereas earthworms in non - augmented were found to be dead. This was observed clearly through metagenomics, where the diversity index was maximum for untreated group which has the abundance of alphaproteobacteria. However, the bacterial augmented set-up had an increase in the abundances of fermicutes as the supplemented organism is *B. xiamenensis* which has dominated the indigenous population and enhanced the uptake in plants as well as in earthworms.

**Keywords:** Ecosystem; Bioremoval; Metagenomic; Operational Taxonomic Units; Abundance; Indigenous population

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**INHIBITORY EFFECT OF PLANT AND ENDOPHYTIC BACTERIAL  
METABOLITES AGAINST *HENOSEPILOCHNA VIGINTIOCTOPUNCTATA*  
(HADDA BEETLE)**

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Agriculture has always been India's one of the most important sector. Therefore, to get a better yield, farmers use insecticides, pesticides, and other compounds. But, the application of insecticides has led to the increased concentration of compounds in soil, fruits and vegetables. The current study was attempted to obtain bacteria from neem leaves capable of producing secondary metabolites that could possess larvicidal activity against *H. vigintioctopunctata*. Among the tested isolates, isolate VITJR2 was found to be effective as it showed good larvicidal activity. Also, the various concentration of neem extract was tested to assess its larvicidal activity on the test organism. Further, the mechanism involved in larvicidal activity was studied by a histopathological study where the epithelial lining of the gut was found to be disrupted in insects treated with bacterial secondary metabolites and neem extract. The 16S rRNA gene sequencing revealed the effective isolate to be the closest neighbour of *Bacillus paranthracis*.

**Keywords:** Agriculture, larvicidal activity, neem extract, endophyte, metabolites

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**CRUDE OIL DEGRADATION AND BIOSURFACTANT PRODUCTION  
POTENTIAL OF ORGANISMS ISOLATED FROM GARAGES IN VELLORE**

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Hydrocarbons are the backbone of the 21<sup>st</sup> century, but the extent of damage they can cause to the environment is considerable. Crude oil is a mixture of various organic compounds. It is mainly constituted of heterocyclic compounds, hydrocarbons, and a few heavy metals. The hydrocarbons in crude oil have PAHs (Polycyclic Aromatic Hydrocarbons) like naphthalene, anthracene, and phenanthrene. They can also be a single ring, condensed ring, or aromatic ring structured compound. During the processing of these fuels, the hydrocarbons in various forms enter the water sources and soil in multiple ways polluting them. The aim of the present study is to isolate the indigenous bacteria from the contaminated sites and to evaluate its potential for biosurfactant production and degradation of crude oil. The preliminary studies include the isolation of bacterial samples by standard isolation protocols. Based on biosurfactant screening assays such as drop collapse, oil dispersion, and emulsification index the organism showing the highest biosurfactant production and crude oil degradation was selected and proceeded for further study. Lab-induced degradation studies were carried out using Bushnell Hass medium with crude oil as a carbon source.

**Keywords:** Crude oil, Biosurfactant, Degradation, Hydrocarbons

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**BIODEGRADATION OF QUINALPHOS AND BIOREMOVAL OF LEAD USING A NOVEL YEAST OBTAINED FROM POLLUTED SOIL: A POT CULTURE-BASED STUDY**

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Pesticides are manmade compounds which are used to increase the yield. There are several type of pesticides that are used for different plants. Quinalphos is an organophosphorus pesticide which has been used extensively in the agricultural field. Therefore, the presence of these pesticides in the soil has increased many times more than the permissible limit. The current study was focused on the bioremoval of Lead (Pb) and biodegradation of quinalphos using yeast obtained from polluted site. The isolate obtained was found to be positive for all plant growth promoting traits except HCN production and was also found to be a strong biofilm former capable of producing long chain quorum sensing molecule which was detected using *Agrobacterium tumefaciens* NTL4 reporter strain. The maximum tolerable concentration revealed the capability of VITMRJ3 to resist lead and quinalphos upto a concentration of 1500ppm. The isolates obtained were found to be non-hemolytic. Further, a pot culture study will be carried out for the effective uptake through phyto and rhizoremediation.

**Keywords:** Heavy metal, pesticide, plant growth promoting traits, phytoremediation, Rhizoremediation

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**BIODEGRADATION AND BIOREMOVAL OF CHLORPYRIFOS AND LEAD (PB)  
USING BACTERIA: A HYDROPONIC BASED BIOREMOVAL STRATEGY**

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Pollution by heavy metal and organophosphorus pesticide is one of the major environmental problems. Organophosphorus pesticides are predominantly used as pesticide for several plants to obtain better yield. Therefore, the presence of these pesticides in the soil has increased several times more than the permissible limit. Hence, degradation of these pesticides is the need of the hour. Chlorpyrifos is an organophosphorus pesticide and it is used extensively in the agriculture field. The current study was focused on the biodegradation of chlorpyrifos and bioremoval of Lead (Pb) using bacteria obtained from polluted lake sediment. The isolate VITKLJ3 AND VITKLJ5 was found to be capable of forming biofilms and preliminary screening also revealed that the isolates were non-hemolytic. It was also observed that both the isolates were found to be positive for PGPR traits such as IAA, ammonia production and HCN. The maximum tolerable concentration for VITKLJ3 and VITKLJ5 was 1000ppm (Lead) and 500pm (Chlorpyrifos) respectively. The isolates were found to be compatible with each other and were co-cultured for the bioaugmentation into the hydroponic system along with *Typha* sp. for the effective biodegradation of chlorpyrifos and bioremoval of lead.

**Keywords:** Biodegradation, Bioremoval, Bioaugmentation, Lead, Chlorpyrifos

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**BIODEGRADATION OF LAMBDA CYHALOTHRIN AND BIOREMOVAL OF  
CADMIUM USING INDIGENOUS BACTERIA**

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Heavy metals and pesticides have been found to cause severe diseases in multicellular organisms. With increasing industrialization, the use of these pollutants is increasing every day. A total of 20 isolates were obtained from various sampling sites and VITSRJ6, VITSRJ7 and VITSRJ8 were capable of growing upto a concentration of 900 ppm of cadmium and lambda cyhalothrin (LC). The preliminary screening revealed three isolates to be non-haemolytic and isolate VITSRJ8 to be an effective strain as it showed strong biofilm formation. The isolate VITSRJ8 also produced long chain quorum sensing molecule which was detected using *Agrobacterium tumefaciens* NTL4 reporter strain. The degradation study revealed that the isolate was capable of degrading LC within 72h of incubation. The phenotypic characterization of VITSRJ8 showed the ability to utilize citrate and was capable of fermenting mannitol with motility. Triple sugar iron agar showed alkaline slant and acidic butt with gas production. Further, a bioreactor was designed for the removal of Cd and degradation of LC.

**Keywords:** Cd, LC, biodegradation, bioremoval

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**BIOTECHNOLOGICAL POTENTIAL OF ENDOPHYTIC BACTERIA VITLTMJ4  
IN PRODUCTION OF VANILLIN AND ANTIBACTERIAL ACTIVITY OBTAINED  
FROM INDIGENOUS *CITRUS LIMON* (KAJI NEMU) FRUIT**

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**Abstract**

*Citrus limon* (Assam lemon) is an indigenous plant of Assam which is known for its high concentration of ascorbic acid and also boosts metabolism and reduces cholesterol. The current study was aimed at studying the presence of endophytic bacteria in Assam lemon and exploring their potential in the production of secondary metabolites. Endophytic bacteria were isolated from the Assam lemon both from direct and indirect method. The isolate VITLTMJ4 obtained showed effective inhibition against *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* in cross streak method. The effective strain was mass multiplied and the chloroform extract was found to be inhibiting all the tested pathogens. Further, the chloroform extract was fractionated using solid phase extraction column and the pure compound capable of inhibiting pathogens was obtained. The pure compound will be further identified using Gas chromatography-mass spectrometry, Fourier-transform infrared spectroscopy and Nuclear magnetic resonance spectroscopy. The effective isolate was also capable of bioconverting isoeugenol to vanillin. The production of vanillin was identified using HPLC.

**Keywords:** Endophytes; *Citrus limon*; Cross streak; Antibacterial

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## IDENTIFICATION OF A NOVEL METABOLITE CAPABLE OF TREATING MULTIPLE INFECTIONS

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Garlic *allium sativum* is a widely consumed spice in the world which also provide several health benefits. The hill garlic of kodaikanal, Tamil Nadu, India is the vegetable which has not been explored for most of its properties. Therefore, current study was aimed at studying the presence of endophytic bacteria and exploring the untapped potential of the metabolites produced by the organism. Isolates were screened for antibacterial property upon testing its hemolytic activity. The isolates were obtained and was tested for its antibacterial activity against *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* by cross streak method, where the metabolites of VITYMJ1 were capable of inhibiting the growth of *Staphylococcus aureus* *Bacillus cereus* and *Pseudomonas aeruginosa* which was observed as clear inhibition zone. Further the effective isolate VITYMJ1 was mass multiplied, the metabolic compounds produced by the isolate were extracted using chloroform, dichloromethane and hexane. The compounds present in the garlic was also extracted using methanol, chloroform and hexane. The pathogens were seeded and all the extracts were added to the wells along with vehicle control. Methanolic extract of garlic was found to inhibit *Bacillus cereus* and *Pseudomonas aeruginosa*. However, for the endophytic bacteria the chloroform extract was found to inhibit the growth of *Staphylococcus aureus*, *Bacillus cereus* and *Pseudomonas aeruginosa*.

**Keywords:** Endophytes; Kodaikanal garlic; Cross streak; Antibacterial activity

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**BIOTECHNOLOGICAL IMPLICATIONS OF ENDOPHYTIC BACTERIAL METABOLITES FROM *AVERRHOA CARAMBOLA* AND *SPONDIAS MOMBIN* AND ITS ANTIBACTERIAL ACTIVITY AND PLANT GROWTH PROMOTING ACTIVITY**

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Plants are hosts to one or more endophytic microorganisms. However, the plant-endophytic interaction is one of the least studied biochemical systems. Endophytes like fungi, bacteria and actinomycetes primarily reside in the tissues beneath the epidermal cells. In the present study fruits such as *Averrhoa carambola* (Star fruit) and *Spondias mombin* (Hogs plum) were selected as they are known to be rich in antioxidant properties and are not explored in terms of endophytic bacteria. The endophytic bacteria was isolated by impregnation method and was tested for anti-bacterial activity. In cross streak method the pathogens were seeded and all the 12 isolates were individually streaked vertically on the Muller Hinton agar (MHA) media. Among all the isolates VITPMJA7, VITPMJA11, VITMSJ6 and VITMSJ7 was capable of showing effective anti-bacterial activity. The isolate VITPMJ11 was mass multiplied and the compounds were extracted using various solvents. The extracts were further fractionated using SPE column and the fraction capable of inhibiting the pathogen was identified by well diffusion method. The effective compound will be identified using various high-throughput methods.

**Keywords:** Endophytes, *Averrhoa carambola*, *Spondias mombin*, Cross streak and antibacterial

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## ROLE OF EXTRACELLULAR NUCLEIC ACIDS IN BIOFILMS

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Biofilms are the cities of microbes that develop as a transition from an individual organism to community living sessile forms. In recent years around 80% of infections are associated with biofilms. The reason behind this is the “Matrixome”- which is a great barrier reef for the microbes residing inside. The significance of the extracellular nucleic acids in the biofilm has been underestimated but recent studies highlight their importance in the biofilm architecture. Studies reveal that eDNA (extracellular DNA) exists in Z-form in the matrix providing an integral support in building up of biofilms and play multifaceted roles such as conferring resistance, nutrient source, horizontal gene transfer and in dispersal of the biofilms. eRNA (extracellular RNA) has also been attributed to conserve the structural scaffolds of the matrix in *Staphylococcus aureus*. The small non-coding RNA (sRNA) have been found to have a role in release of eDNA thereby contributing to biofilm formation. These nucleic acids also find a role in pathogenicity. Thus, a critical understanding of the matrix components and their interaction is crucial. Elucidating the intricate interactions of the nucleic acids would help us in designing new therapeutics. Designing Peptide Nucleic Acids (PNA) targeting eDNA/eRNA or sRNA for suppressing the genes involved in biofilm formation would create a new era of drugs for chronic biofilm associated infections.

**Keywords:** Biofilm, eDNA, PNA, sRNA, eRNA



**PRODUCTION AND CHARACTERIZATION OF RHAMNOLIPID  
BIOSURFACTANT FROM *PSEUDOMONAS STUTZERI* SJ3 ISOLATED FROM OIL  
POLLUTION SITE**

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In the present work, production of biosurfactant was studied from the bacterial strains isolated from the soil samples collected from oil contaminated sites in Karaikal ONGC, Puducherry, India. Six morphologically distinct hydrocarbonoclastic bacterial strains (SJ1-SJ6) isolated on oil agar plates were further screened for biosurfactant production (BP). Based on the screening results, the isolate SJ3 that showed surface tension reduction value of  $31.6 \text{ mN m}^{-1}$ , oil displacement zone of 26 mm, positive results of drop collapse test with the emulsification index percentage ( $E_{24\%}$ ) of 68.14% and the bacterial adherence to hydrocarbon percentage of 79.2% was selected as the most potential BP strain and it was identified as *P. stutzeri* using 16S rRNA gene sequencing. Growth and BP optimization revealed 36 h of incubation period, 150 rpm agitation, pH 7.5, 37°C, 1% salinity, 2% glucose as carbon source and 1% yeast extract as nitrogen source were the ideal conditions with the biosurfactant yield of 2.61 g/l. FTIR and MALDI-TOF analysis of the crude biosurfactant showed the presence various functional groups and it was a rhamnolipid. The crude biosurfactant showed antibacterial activity, anti-termite activity, larvicidal activity

**Keywords:** Oil degrading bacteria, hydrocarbonoclastic bacteria, FTIR, MALDI-TOF, Rhamnolipid, Emulsification activity, Antibacterial activity, Anti-termite activity, Larvicidal activity

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**IMMUNITY ENHANCEMENT OF *PENAEUS VANNAMEI* USING  
BIOSURFACTANT-PRODUCING PROBIONT *ACHROMOBACTER XYLOXIDANS*  
IN COMPARISON WITH MERCANTILE PRODUCTS**

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The present study focused on the isolation of biosurfactant producing marine bacteria from the gut of a marine fish *Scatophagus argus* collected from Nagapatinam fishing harbor, Tamil Nadu, India and evaluating its potential applications in shrimp aquaculture as probiotic bacteria. Two hundred and sixty shrimps were used for the feeding experiment with a total study period of 50 days. In the feeding experiment, shrimps were divided into 3 groups, group (A): the control group i.e., shrimps grown only using feed and not mixed with any of the probiotic (B): fed on *A. xyloxidans* as probiotics, and group (C): fed on a commercial probiotic (Vibrio Cure). Group fed with *A. xyloxidans* as a probiotic, increased the survival rate of *P. vannamei* up to 98.41±3.85% at the end of 50 days study period. The challenge experiment has assessed disease resistance to *Vibrio harveyi*. In contrast to the control group, histopathological and hematological parameters of the groups treated have been completely documented. *A. xyloxidans* effectively stimulated and enhanced the absorption of foreign particles by phagocytic activity hemolymphatically. This study provides knowledge about, isolation and characterization of probiotic candidates from marine sediment that can easily be adapted to shrimp farm aquaculture and thus can be commercialized as a potential probiotic candidate in the future.

**Keywords:** *Scatophagus argus*, Aquaculture, Probiotic, Biosurfactant, *Achromobacter xyloxidans*, *Penaeus vannamei*.

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**BIOREMEDIATION OF ALUMINIUM USING *ASPERGILLUS FLAVUS* AN  
ESTUARIAN FUNGUS**

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Aluminum is the most abundant metal on earth and exists primarily as insoluble deposits of silicates where this trivalent element is essentially biologically inactive. However, acidification of the environment and industrial wastes has led to the mobilization of aluminum as soluble and toxic species. Aluminum toxicity is a major constraint for crop yields on acid soils worldwide. Aluminium in human diet derives from food, water, drugs, cosmetics, aluminium utensils and containers. Aluminium toxicity for human's results from replacing Mg<sup>2+</sup> and Fe<sup>2+</sup> by Al<sup>3+</sup>, which induces numerous disturbances in the organism. connected with intercellular communication, secretory functions, and cellular growth. The severest danger of toxic aluminium action lies in its neurotoxicity (neuronal atrophy, mainly in substantia nigra, striatum and locus ceruleus, and the decreased nucleoli size). Neurotoxic aluminium action probably consists in the displacement of magnesium ions in ATP by aluminium, which induces changes in the function of all enzymes utilizing ATP as a substrate, and in the inhibition by aluminium of polymerase activity in the brain Hence the present study on bioremediation of aluminium. The present study was on bioremediation. potential of an *Aspergillus flavus* strain isolated from lupanar estuary on toxic aluminium compound for this potent strain, 72hrs of incubation period, 30rpm agitation PH 3. temperature-30C, 0.5% of NaCl, 3% starch as C source and 0.3% yeast extract as N source were found to be ideal parameters at which uptake of aluminium was studied using 5000 ppm of aluminium as aluminium chloride salt, aluminium accumulation was estimated using ICP-OES at 324.8 nm revealed the maximum accumulation of 1500ppm. on further adaptation tolerance up to 5% solution of aluminium sulphate and aluminium chloride with equal production of biomass was observed.

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**ENVIRONMENTAL BIOMONITORING USING BIOSENSORS**

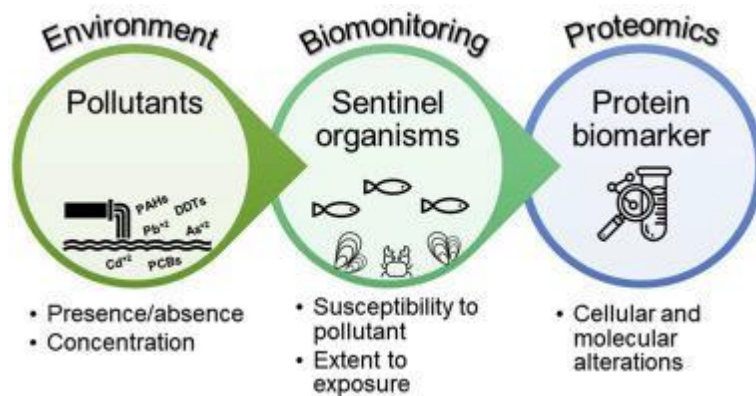
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The modern world faces a majority of problem nowadays. Environmental pollution is one of the major problems throughout the world. It is caused by release and accumulation of various harmful substances due to industries, rapid urbanization and human population growth. Environmental pollutants widely spread in the air, soil, and water which in turn affects all the living system especially human health and life. Due to potential harmful pollutants increasing, it is necessary to build monitoring systems which has newer technologies. Biosensors are most important biomonitoring system having numerous applications. Biosensors is useful for monitoring actual conditions of soil, water and air samples to detect pollutants such as pesticides, potential toxic elements, pathogens, toxins and endocrine disrupting chemicals. Toxicants can be many types which we are using day to day life like organochlorine pesticides, fungicides, industrial chemicals and heavy metals. Biosensors classified into many types such as enzyme- based biosensors, whole-cell based biosensors, antibody-based biosensors and DNA/aptamer biosensors.

Importantly, demand for freshwater increasing for rising living standards. Most of the companies and water plant have recycling process of Waste water. Waste water can introduce so many pollutant compounds, heavy metals, organophosphates and pesticides.

The most commonly monitoring biosensor is rapid, selective, sensitive, accurate and real-time devices for detecting and screening pollutants led to the development of most advanced equipment. Major part of this study of environmental pollutant monitoring says that ‘human exposed to pollutants via the sentinel organisms which can directly bioaccumulate and cause severe side effects in human body’.



Emerging applications of Biosensor in environmental biomonitoring is to detect

➤ Genotoxic compounds

In modern life, the number and consumption of pharmaceutical products are increasing. However, large quantities of these products are released into the environment and are accountable for aquatic pollution. Many studies have detected that the presence of antibiotics in pharmaceutical effluents. The interaction between immobilized DNA and genotoxicity antibiotics affects chemical oxygen demand (COD), biological oxygen demand (BOD), and total organic carbon (TOC) indicated that all tested wastewater was able to alter cell integrity and cause DNA molecular damage, and cause most genotoxic effect.

➤ Contaminants like heavy metals and pesticides

One of the most serious pollution problems are the heavy metals. Even at low concentrations, they are dangerous for the human health and the environment. Heavy metals are not biodegradable. The most commonly observed pollutants from heavy metals in the environment are: lead, zinc, mercury, cadmium and copper.

Pesticides and Herbicides used for plants which can help plants but bioaccumulated in the soil and water. These compounds are very toxic and carcinogenic.

Dioxins are by-products of various industrial processes and are persistent organic pollutants have major impact on environment and it can be transported long distance and it doesn't deteriorate easily and disrupts endocrine signalling.

Biosensors are used for detecting these chemical compounds and used to quantify the pollutants. The most special use is evaluating the ecological risk.

**DETECTION OF NATURAL TOXINS (GLYCOALKALOIDS) USING BIOSENSOR  
IN FOOD INDUSTRY**

**Kalai Arasi. V, Punithavalli. D**

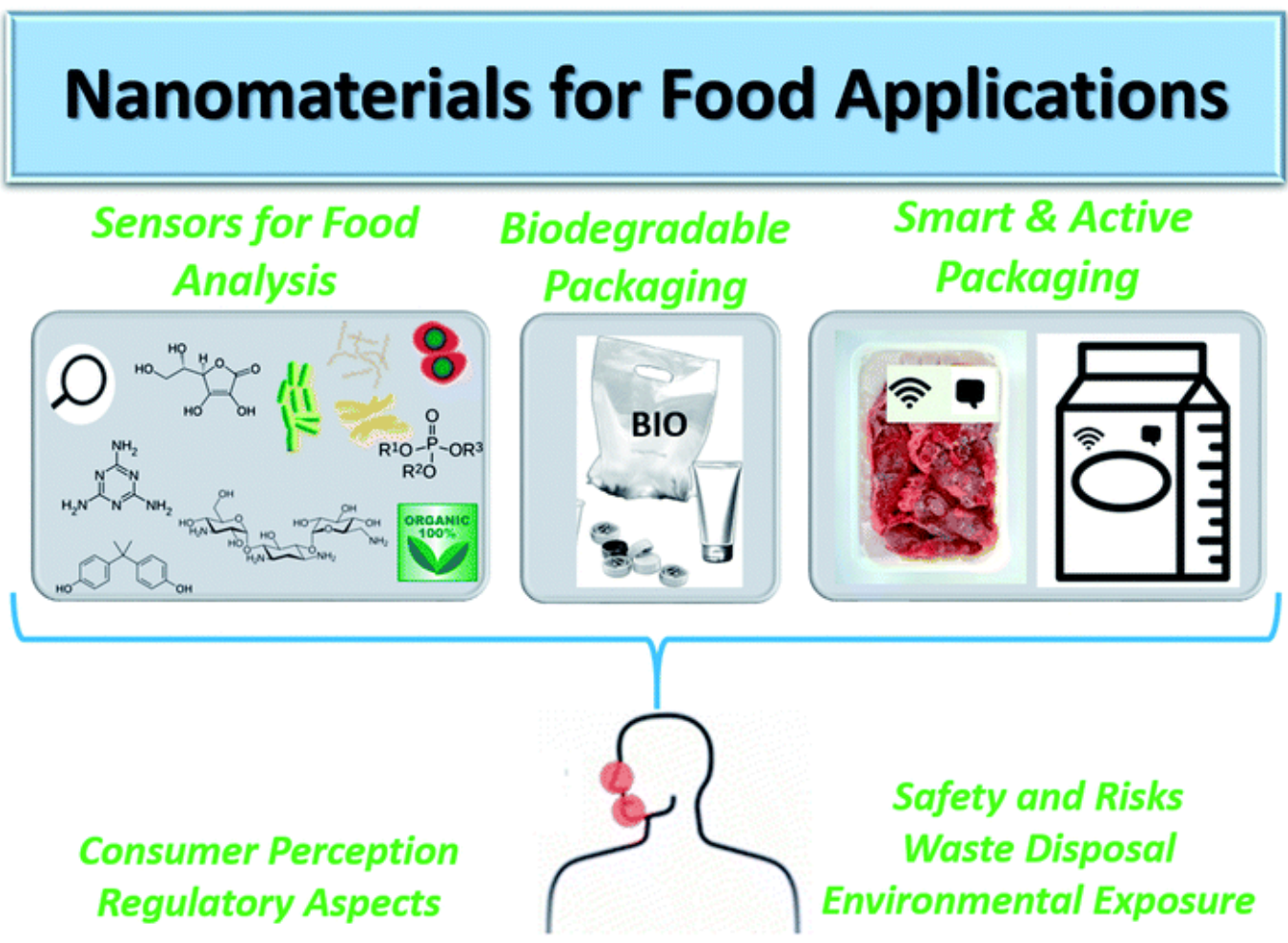
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A biosensor is a measurement device that constitutes the biological element that functions as a target recognition entity, in conjunction with a transducer that converts a biological recognition which results in signal output. Biosensors in the food industry may be used to analyze nutrients and to detect the natural toxins and for monitoring processing of food and used to detect the genetically modified organisms. The detection principle of electrochemical techniques can be achieved by potentiometry, voltammetry, amperometry. In the last decade bio sensing is extensively developed by their potential in food sectors. Commercially available biosensors for food industries are still rare and limited, regardless. In food industry the use of biosensors serves as the analytical tool for quick detection for quality and safety applications of the food. Food is a fundamental necessity of all the human beings and microorganism's. Microorganism such as bacteria, pathogens, viruses, pesticides and natural toxins will affect the nutritional quality of the food. The monitoring of food and its nutritional quality is done by biosensors. There is the increased interest towards the development of bioelectronics devices for food natural toxins. Some of natural toxins includes glycoalkoloids in potatoes, aflatoxin is seen in peanut butter and cynogenic glycoside toxin in cassava.

Natural toxins are harmful substances that are created spontaneously by living organisms.

Potatoes include glycoalkaloids which are the natural anti-disease and anti- pathogen chemicals. Potatoes are the natural protective substances against the disease causing pathogens and infections known as glycoalkaloids. They are secondary metabolites from plants responsible for the bitter taste, recent studies described that it has the ability to inhibit the growth of cancer cells and plays a major role as synergistic agents and therapies. The mechanism of action of glycoalkoloids is their stronger binding to  $3\beta$ - hydroxysterols such as cholesterol and release the contents into the cell. In this study we focus on the highly sensitive detection of  $\alpha$ -solanine and  $\alpha$ -chaconine using cholinesterase-based sensors. The use of genetically modified acetyl cholinesterase (AChE), requires the highly sensitive device.

Butyrylcholinesterase (BChE) enzyme is used and it is immobilized in polymer directly on the surface of working electrode. The toxicity of compared to and the inhibition of glycoalkaloids mixture was performed over biosensors resulting in detection of synergic effect.



**GREEN SYNTHESIS AND CHARACTERIZATION OF SILVER AND ZINC OXIDE NANOPARTICLES USING *GYMNEMA SYLVESTRE* POTENTIALLY PRODUCES TOXICITY IN TRIPLE NEGATIVE BREAST CANCER CELLS MDA-MB-231**

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To study the biological fabrication and characterization silver (AgNPs) and zinc oxide nanoparticles (ZnONPs) using *Gymnema sylvestre* and their toxicity to triple negative breast cancer cells MDA-MB-231. In the existing work, ZnONPs and AgNPs were synthesized using leaf extract of the Indian medicinal plant *Gymnema sylvestre* and it was characterized by Scanning electron microscope and Atomic force microscopy. This ZnONPs and AgNPs to have potentially validated anticancer role in triple negative breast cancer cells MDA-MB-231 *in vitro* approach. The plant-based synthesized ZnONPs and AgNPs were evaluated against the inhibitory role on triple negative breast cancer cell lines. We significantly observed that ZnONPs and AgNPs induce efficient toxicity of MDA-MB-231 cells by increasing ROS, mitochondrion membrane damage and apoptotic morphological alterations. Thus, the biologically synthesized ZnONPs and AgNPs were identified as good performance to inhibit triple negative breast cancer cell growth even at low concentrations.

**Keywords:** *Gymnema sylvestre*, ZnONPs, AgNPs, Toxicity, Triple negative breast cancer, Apoptosis



**MICROBIALREMEDICATION - KEY TOOLS FOR THE DIARY EFFLUENT  
TREATMENT**

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The production of milk on dairy farms and the processing of milk and milk products at dairy plants make up the dairy industry. Along with producing many kinds of milk, the industry makes butter, cheese, yogurt, and ice cream. Large quantity of water required in a milk processing plant depends upon the size of the plant, generally expressed in terms of the maximum weight of milk handled in a single day, and the processes involved. The daily volume of water required may vary widely, depending mainly on the availability of water and the control of all water using operation in the amount of water needed for the operations which involves continuous flow, for rinsing and washing and is not necessarily proportional to the amount of product processed. Most of the waste water discharged into water bodies, disturbs the ecological balance and deteriorates the water quality. The casein precipitation from waste decomposes further into highly odorous black sludge. Effluent from milk processing unit contains soluble organics, suspended solids, trace organics which releases gases, causes bad taste and odour, impart colour and turbidity, and promote eutrophication. Microbialremediation is a ecosafe approach for treating the dairy effluent without disturbing the environment. This review deals about characteristic of dairy effluent and Microorganisms used in the bioremediation of the dairy industry wastes.

**AIR LAYERING THROUGH USED TEA DUST**

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Compost application to agricultural land can result in changes in soil physical properties such as structure, water retention and infiltration rates, biological properties and crop yields. Moreover, organic materials such as compost can act as a valuable source of plant available nutrients (e.g. nitrogen (N), phosphorus (P), potassium (K), sulphur (S) and magnesium (Mg)) and thereby reduce the need for manufactured fertilizer inputs. The fruit plants are propagated by several methods, which can be grouped under two main heads, (i) sexual method - propagation by seeds and (ii) asexual method - propagation by grafting. The asexual methods of plant propagation can mainly be divided into four groups, namely, (i) Cutting, (ii) Layering, (iii) Budding and (iv) Grafting. Layering is used for the propagation of which do not graft easily or root readily from the cuttings. Layering can be carried out in autumn or spring. Deciduous plants respond well in either season, but evergreens respond better to spring layering. Air layering is done by peeling the bark from the middle of a branch and covering this exposed wood with moss and plastic wrap. Roots will form inside the moss, and one can cut the rooted tip from the plant. In this study, we used exposed tea dust instead of moss. Different concentrations and combinations of used tea dust with garden soil used for the packing material of air layering technique. As the result we got enormous result from the layered Jasmine plant materials.

**CHEMICAL COMPOSITION AND MOSQUITOCIDAL EFFICACY OF  
PANCHAGAVYA AGAINST ANOPHELES STEPHENSI, AEADES AEGYPTI AND  
CULEX QUINQUEFASCIATUS**

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The current study looks towards reporting the chemical compounds present in the panchagavya (PG), free radicals scavenging and mosquitocidal activity of PG in the laboratory condition. GC-MS analysis revealed fifteen chemical compounds present in the PG. Free radical scavenging was done by 2,2-diphenyl-1-picrylhydrazyl, 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic acid), hydroxyl and superoxide assays and the IC<sub>50</sub> was calculated as 37, 37.5, 35 and 38 µg/ml respectively. Mosquitocidal efficacy of PG was studied by the experiment on larvicidal, pupicidal, Adulticidal, fecundity, longevity, and ovicidal activity against *An. stephensi*, *Ae. aegypti* and *Cx. quinquefasciatus*. PG exhibited better larvae and pupae mortality against I-IV instar of *Cx. quinquefasciatus* (LC<sub>50</sub>:148.765, 162.534, 187.619, 210.835 and 234.624 ppm, LC<sub>90</sub>: 286.636, 306.390, 350.276, 390.735 and 419.195 ppm). The highest adult mortality was found against *An. stephensi* (91.10 ±1.74%) with the IC<sub>50</sub> and IC<sub>90</sub> values of 128.114 and 260.609 ppm. *An. stephensi* showed highly decreased fecundity and longevity even at a low concentration of PG. Inhibition of 100% egg hatchability of *An. stephensi* was obtained at 250 ppm followed by *Ae. aegypti*, and *Cx. quinquefasciatus* at 300 ppm respectively. On comparing with other mosquito vectors *An. stephensi* was effectively inhibited by PG at each stage of their life cycle. These results provide the first proof that PG could be a successful natural agent for controlling different mosquito vectors.

**Keywords:** Panchagavya, superoxide, larvicidal, mosquito vectors, *An. stephensi*.

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**PHYTOSYNTHESIS OF SILVER NANOPARTICLES FROM *JATROPHA INTEGERRIMA* JACQ. FLOWER EXTRACT AND THEIR POSSIBLE APPLICATIONS AS ANTIBACTERIAL AND ANTIOXIDANT AGENT**

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*Jatropha integerrima* Jacq. flower extract was used for the synthesis of silver nanoparticles in the current study. Various spectroscopic analyses were used to characterize the synthesized nanoparticles (JIF-AgNPs). The antibacterial efficacy of JIF-AgNPs was studied by well diffusion technique. In addition, the impact of JIF-AgNPs on free radicals were evaluated. On the ultraviolet–visible spectrum, the nanoparticles exhibit the highest absorbance at 422 nm. Based on the Fourier transform infrared spectrum, phenols and amino acids were involved in capping the JIF-AgNPs. Crystalline sphere-shaped nanoparticles with an average size of 50.07 nm and zeta potential of –19.0 mV were confirmed by X-ray diffraction, transmission electron microscopy, and dynamic light scattering analysis respectively. The JIF-AgNPs exhibit the highest and lowest growth inhibitory activity towards *E. coli* and *B. subtilis*. The JIF-AgNPs exhibited significant radical scavenging activities against DPPH, hydroxyl, Superoxide, and ABTs. Thus, synthesized nanoparticles were a good alternative to develop an antibacterial and antioxidant agent.

**Keywords:** *Jatropha integerrima* Jacq., Silver nanoparticles, X-ray diffraction, *E. coli*, Superoxide.

**ECO-FRIENDLY APPROACH OF NORFLOXACIN (NFN) DETOXIFICATION IN  
SOIL USING BIO-ELECTRO CHEMICAL SYSTEM**

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Norfloxacin (NFN) is a second-generation synthetic fluoroquinolone that is regularly used to treat urinary tract infections. Its widespread use as a prescribed treatment drug has caused it being detected at elevated concentrations in aquatic and territory systems. Soil contamination with NFN has raised increasing concern because of its high solubility in water and toxicity to biological communities. This study aims at investigating the process and prospects of utilizing bio-electrochemical system (BES) for the removal of NFN from synthetically contaminated soil using *Bacillus subtilis* HV-7 isolated from animal house sludge. The BES was setup with desired operating conditions: Initial NFN concentration (12.5 - 100 mg/L), pH (4 - 10) and applied potential voltage (0.4 - 1.2 V) with 10 µL of overnight grown culture. Samples were collected at regular intervals and analyzed for NFN degradation using gas chromatography. The intermediates produced during degradation were analyzed through gas chromatography-flame ionization detector (GC-FID), and the possible degradation pathway was elucidated. The results indicated that BES could be effective for degradation of NFN.

**Keywords:** Norfloxacin (NFN), antibiotic degradation, bio-electrochemical system (BES)

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**RABT/2022/PP/40**

**MICROBIAL LOAD OF THE FRESH WATER FISH *CHANNA PUNCTATUS*  
COLLECTED FROM THE LAKE WATER OF TIRUVANNAMALAI DISTRICT,  
TAMILNADU**

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The present work was aimed to see the microbial load in the fresh water fish *Channa punctatus* collected from Anappathur lake and Anakkavur pond in Cheyyar Taluk of Tiruvannamalai District, Tamilnadu since the water is surrounded with textile industries. Collection spot of Anappathoor lake is located in Cheyyar town at latitude 12.60N and longitude 79.6<sup>0</sup>E in Cheyyar Taluk of Tiruvannamalai district and it is 13 km away from Cheyyar town. Another kind of collection spot of Anakkavur is located in Cheyyar town at latitude 12.62996<sup>0</sup>N and longitude 79.57357<sup>0</sup>E in Tiruvannamalai district and it is 10 km away from Cheyyar town. Anappathoor Lake has the total water area of 50 hectares and Anakkavur pond has the total water area of 50 square feet. To see the microbial load in the tissues such as gills, guts and mussels of the fish *Channa punctatus* (spotted snakehead fish), fish samples in different size groups (7, 8 and 9 cm in length) were collected in live condition from these areas by the help of fishermen who involve for fishing activities.

In *Channa punctatus* collected from Anappathur lake, total bacterial count and total yeast and mould count in the tissue gill were recorded to be 35000 Cfug and 120 Cfug, respectively. In the gut content of the same species, total bacterial count and total yeast and mould count were recorded to be 45000 Cfug and 220 Cfug, respectively. In the tissue of muscles, total bacterial count and total yeast and mould count were recorded to be 28000 Cfug and 180 Cfug, respectively. In *Channa punctatus* collected from Anakkavur pond, total bacterial count and total yeast and mould count in the tissues gills were recorded to be 228200 Cfug and 230 Cfug, respectively. In the gut content of the same species, total bacterial count and total yeast and mould count were recorded to be 330000 Cfug and 455 Cfug, respectively. In the tissue muscles, total bacterial count and total yeast and mould count were recorded to be 225600 Cfug and 650 Cfug, respectively. It is concluded from this study that the *Channa punctatus* collected from pond water was found to contain more amount of total bacterial count and total yeast and mould count compared to the same kind of fish collected from lake water. These variation may be due to the environmental fluctuation happening more in pond water.

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**AN OVER VIEW ON MICROBIAL ENGINEERING IN PHARMACEUTICAL AND  
BIOFUEL PRODUCTION**

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Microbial Engineering as Engineering in Microbiology by the strict contribution of engineered microbes like Archaea, Bacteria and Eukaryotic microbes. In agriculture and Biotechnology microbial vaccines, development of biotechnology microbial engineering could be recognized as high potential technology in Food science, Medicine, Research and Manufacture of biofuels. Pharmaceuticals the development of Serum and Drugs to fight against disease. Recombinant pharmaceuticals products are Yeast and Bacteria to produce Insulin, Human growth hormone, production of Biofuels, Isobutanol. Butanol was made in *E. coli*, by Integrating clostridial pathway in its genome via CRISPR/Cas9 technique. Further the optimized strain was used for production of NPs of diverse nature such as Actinorhodin, Muray quinone, Piericidin A1, Dehydrorabelomycin and Actinomycin D. Glutanicum is established as a major industrial producer of proteins, including biologics and enzymes as well as utilized in the production of diverse secondary metabolites as Carotenoids, Terpenes, and Flavonoids. The capacity of microorganisms to create biofuels and microorganisms such as algae, yeasts, bacteria, and fungi. The recent approaches in microbial biofuel production are well explored and recognized and a possibility of micro algal cultivation strategies for the production of biofuels.

**Keywords:** Microbial Engineering, Recombinant pharmaceuticals, production of Biofuels.

**CHARACTERIZATION OF METHANOLIC EXTRACT OF SEaweEDS AS ENVIRONMENTALLY BENIGN CORROSION INHIBITORS FOR MILD STEEL CORROSION IN SODIUM CHLORIDE ENVIRONMENT**

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Biocorrosion is an aggregation of microbes on the metal surface that induces ion degradation by oxidation and reduction of chemical and electrochemical reactions. Extracellular electron transfer (EET) process was a significant phenomenon in ion deterioration. To block the EET process, the inhibitor was used to destroy or prevent extracellular electron transfer during microbial metabolism. In the present study, methanolic extraction of two different seaweeds acts as a bio-inhibitor against the corrosive biofilm forming bacteria *B.megaterium* SKR7 on the mild steel. The optimized concentration of biofilm inhibition efficiency of methanolic extract *P.pavonica* (MEPP) and *S.tenerrimum* (MEST) was found to be 75% and 73% at 25 ppm respectively. It was confirmed by assay of antimicrobial activity and weight loss measurement which is represented the reduction of corrosion rate S3 (A) 0.355 mm/y and S3 (B) 0.442 mm/y of both seaweed extracts than control (1.598 mm/y). This observation was confirmed by the electrochemical studies by the significant decrease in charge transfer resistance ( $R_{ct}$ ) and the surface analysis of FTIR and SEM analysis were confirmed the seaweeds inhibit the biofilm. MEPP and MEST revealed the existence of organic and bioactive compounds like N, S, O blocks the electron transfers during the biofilm formation on a metal surface and thus inhibits corrosion rate. The study concluded seaweed extracts act as mixed-type of inhibitors, thus effectively inhibit the biofilm formation and are easily accessible at low cost, eco-friendly.

**Keywords:** Microbial influenced corrosion, *Bacillus megaterium*, Extracellular Electron Transfer, *Padina pavonica*, *Sargassum tenerrimum*.

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**CHARACTERIZATION OF BACTERIAL COMMUNITY IN OIL-  
CONTAMINATED SOIL AND ITS BIODEGRADATION EFFICIENCY OF LONG  
CHAIN (>C40) HYDROCARBON**

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In this study, two biosurfactant producing *Pseudomonas aeruginosa* sp. were isolated from motor oil contaminated soil for crude oil, alkane and PAH degradation studies. Metagenomics analysis identified as phyla proteobacteria was the dominant. Isolated two bacterial species were well grown in mineral salt medium with 1% of crude oil, alkanes (dotriacontane and tetratetracontane) and PAH (pyrene, benzopyrene and anthracene) as sole carbon sources. Total biodegradation efficiency (BE) of strains pp3 and pp4 in Crude oil degradation evaluated by the analysis of gas chromatography and mass spectrometry was 50% and 86% respectively. BE of pp3, pp4 and mixed consortium in alkane biodegradation were 46%, 47% and 36% respectively. BE of pp3, pp4 and mixed consortium in PAH biodegradation were 22%, 48% and 35% respectively. Based on the results revealed that strain pp4 was more efficient bacteria to degrade the crude oil, alkane and PAH than pp3. This was due to the higher production of biosurfactant by pp4 than pp3 and also confirmed in the test of emulsification index (E24). FTIR results showed that the produced biosurfactant could partially solubilize the crude oil hydrocarbons, alkanes and PAH and confirmed as biosurfactant are glycolipid (rhamnolipid). Thus, the obtained results from the GCMS showed that all hydrocarbons were utilized by bacteria as carbon source for biosurfactant production and utilize the high molecular weight hydrocarbons. Based on the present study we can suggest that identified potential biosurfactant producing bacteria are used for biodegradation of poly aromatic hydrocarbons includes the high molecular weight hydrocarbon (>C40).

**Keywords:** *Pseudomonas aeruginosa* sp, Biodegradation, Metagenomic analysis, Biosurfactant, Crude oil

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**CHARACTERIZATION OF TWO NOVEL STRAINS OF *PSEUDOMONAS AERUGINOSA* ON BIODEGRADATION OF CRUDE OIL AND THE ROLE OF DEGRADATIVE ENZYMES**

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Crude oil contaminant is one of the major problem to environment and its removal process considered as most challenging tool currently across the world. In this degradation study, crude oil hydrocarbons are degraded on various pH optimization conditions (pH 2, 4,6,7,8 and 10) by using two biosurfactant producing bacterial strains *Pseudomonas aeruginosa* PP3 and *Pseudomonas aeruginosa* PP4. During crude oil biodegradation, degradative enzymes alkane hydroxylase and alcohol dehydrogenase were examined and found to be higher in PP4 than PP3. Biodegradation efficiency (BE) of crude oil by both PP3 and PP4 were analysed by gas chromatography mass spectroscopy (GCMS). Based on strain PP3, the highest BE was observed in pH 2 and pH 4 were found to be 62% and 69% than pH 6, 7, 8 and 10 (47%, 47%, 49% and 45 %). It reveals that PP3 was survived effectively in acidic condition and utilized the crude oil hydrocarbons. In contrast, the highest BE of PP4 was observed in pH 7 (78%) than pH4 (68%) and pH's 2, 6, 8 and 10 (52%, 52%, 43% and 53%) respectively. FTIR spectra results revealed that the presence of different functional group of hydrocarbons (OH, -CH<sub>3</sub>, C=O, C-H) in crude oil. GCMS results confirmed that both strains PP3 and PP4 were survived in acidic condition and utilized the crude oil hydrocarbons as sole carbon sources. This is the first observation on biodegradation of crude oil by the novel strains of *Pseudomonas aeruginosa* in acidic condition with higher BE. Overall, the extracellular enzymes and surface active compounds (biosurfactant) produced by bacterial strains were played a key role in crude oil biodegradation process.

**Keywords:** *Pseudomonas aeruginosa*, Crude oil degradation, pH optimization, Enzyme Activities, Biosurfactant

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**OCCURRENCE AND CONTAMINATION LEVEL OF NEONICOTINOIDS IN  
AGRICULTURE SOIL AND DEGRADATION OF COMPLEX METABOLITE  
THROUGH PHOTO-BIODEGRADATION**

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Imidacloprid (IMI) is existence in the soil environment with a half-life habitually more than hundred days. This study targets to determine, identify and characterize photo-biodegradation bacteria from neonicotinoids (NEOs) contaminated agricultural field soils. The sub-surface soil had a higher level contamination of NEOs, in specifically greater concentration of IMI ( $3445.2 \pm 0.09 \mu\text{g/g}$ ) and thiacloprid ( $4084.4 \pm 0.09 \mu\text{g/g}$ ) has been found. Three bacteria *Ralstonia pickettii* (PBMS-2), *Bacillus cereus* (PBMS-3) and *Shinella zoogloeoides* (PBMS-4) was identified from soil-free stable enrichment cultures. The biodegradability of IMI ( $50 \text{ mg L}^{-1}$ ) by three bacteria under different colors of light-emitting diodes (LEDs) with a constant 12 V power supply was tested and found that the blue-LEDs had greatest efficiency in supporting biodegradation of IMI which is called photo-biodegradation. In specific, the rate of photo-biodegradation of IMI by *Ralstonia pickettii* (87%), *Bacillus cereus* (80%) and *Shinella zoogloeoides* (80%) was measured. Besides this study also tested the effect of aeration (rpm), pH, and temperature on photo-biodegradation of IMI. There were seven intermediate metabolites were measured as biodegradation products of IMI under photo-biodegradation conditions and they are; IMI-urea, IMI-desnitro, 6-chloronicotinic acid, 6-hydroxy nicotinic acid, IMI- aminoguanidine, IMI-nitrosoguanidine and 4,5-hydroxy IMI, these metabolites are may non-toxic to the environment.

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**FORMULATION OF NOVEL VEGETABLES AND FRUITS WASTE CULTURE  
MEDIUM FOR THE CULTIVATION OF INDUSTRIALLY IMPORTANT FUNGI**

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The present study was aimed to formulate the Vegetable and Fruit peel wastes culture medium for studying the growth of two Industrially Beneficial Fungi (*Aspergillus niger* and *Rhizopus stolonifer*). Four different Vegetable and Fruit peel wastes viz., Garlic peel waste, Plantain flower peel, Orange peel waste and Pineapple peel waste were selected for the present research. The Vegetable and Fruit peel wastes are the good source of Pectin and the fungi *Aspergillus niger* and *Rhizopus stolonifer* are capable for producing the Pectinase enzyme. *Aspergillus niger* and *Rhizopus stolonifer* digest the Pectin present in the Vegetable and Fruit peel wastes by producing the enzyme Pectinase and grow well. The growth of the fungi in Vegetable and Fruit peel wastes culture medium was compared with the Standard fungal culture medium Sabouraud's dextrose agar (SDA). It was observed that the growth of *Aspergillus niger* and *Rhizopus stolonifer* are good and luxuriant in Sabouraud's dextrose agar when compared to Vegetable and Fruit peel wastes culture medium. For *Aspergillus niger*, maximum growth was observed in Plantain flower peel, Orange peel waste, Garlic peel waste and Pineapple peel waste. Surprisingly for *Rhizopus stolonifer*, growth was uniform in Sabouraud's dextrose agar, Plantain flower peel and Orange peel waste. Garlic peel waste has showed less amount of *Rhizopus stolonifer*. The fungi *Rhizopus stolonifer* does not showed any growth on Pineapple waste peel medium because the presence of high sugar content may inhibit the *Rhizopus stolonifer* growth. In conclusion, we recommend the Orange peel waste and Garlic peel waste for the Microbial industries to use that waste as a substrate for the production of Microbial industrial products where the fungi *Aspergillus niger* and *Rhizopus stolonifer* are involved. The present study will provide the concept of "Zero waste economy" to this society.

**Keywords:** Fungal culture medium, Vegetable peel wastes, Fruit peel wastes, *Aspergillus niger* and *Rhizopus stolonifera*.

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## BIODEGRADATION OF PLASTICS BY MICROORGANISMS AND PRODUCTION OF ORGANIC PAPER FROM BANANA WASTE

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In the present scenario people are living with polythene and plastics because day to day life is filled with plastics and its any source being taken easy for living. Hence the present study focus on polythene degradation with two bacterial strains viz *Pseudomonas aeruginosa* and *Staphylococcus aureus*, isolated from the soil sample located in Sacred Heart College, Tirupattur, Tamil Nadu, India. In this work Low Density Plastic are screened the weight loss percentage after the degradation of polythene by the bacterial strains such as *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The degradation study was carried out for a period of 30 days in minimal salt medium and the study was regularly monitored with interval of 5 days. The maximum percentage weight loss is observed with 20.71 plastic film (LDPE) by *Pseudomonas aeruginosa* and *Staphylococcus aureus* on 30 days at 37°C (partial degradation). Further, the degraded plastics were incorporated into vermicompost and complete degradation of plastics were done. Banana fiber waste is a natural fiber with high strength, which can be blended easily with cotton fiber or synthetic fiber to produce composite material. In this fiber extraction process, a substantial amount of lingo cellulosic waste are generated. In this extract banana fiber (EBF) and waste banana fiber (WBF) were characterized in terms of chemical and morphological properties to produce handmade paper. WBF was characterized with lower  $\alpha$  – cellulose, Lignin content longer fiber length. By recycling the Banana fiber waste bags, cups and organic papers were made. This process reduces the deforestation and increases the afforestation.

**Keywords:** Plastics degradation, Vermicompost, Banana waste, Reduction of cutting the trees, Afforestation and Environmental benefits.

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## BIOELECTRICITY PRODUCTION USING MFC

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Microbial fuel cells (MFCs) are a category of fuel cells which possess potential applicability as an alternative power-generating device, as well as in wastewater treatment. The name itself suggests that these prospective devices can generate electricity with the help of microbes. MFCs can utilize a range of fuels, including domestic and industrial wastewater. In addition, organic matter from other sources (including the human body) can also be used as fuels for MFCs. The microbes decompose the organic matter present in these fuels, and in the process, generate electrons. These electrons, in turn, give rise to useful electrical energy. Decomposition of polluting organic matter in the fuel feed produces water and carbon dioxide, cleaning the wastewater as a result. Therefore, MFCs are dual-utility devices. This chapter includes the background and significance of MFCs, their working principle, component parts comprising MFCs, and various technologies developed so far based on MFC technology.

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## ANTIBIOGRAM OF WILD AND MUTATED BACTERIAL PATHOGENS

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Antibiotics are the Secondary metabolites produced by the microorganisms that affects the growth of another microorganisms particularly bacteria. The present study was aimed to study the Antibiotic sensitivity of Wild and Mutated bacterial pathogens against Standard Antibiotics. The bacterial pathogens selected for the present study was collected from Department of Microbiology, Sacred Heart College (Autonomous), Tirupattur, Tamil Nadu, India and maintained in Nutrient agar slants at 4 °C. Eleven Bacterial pathogens selected for the present research are *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Proteus mirabilis*, *Salmonella typhi*, *Shigella flexneri*, *Shigella dysenteriae*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter* sp. and *Enterococcus faecalis*. Six selected Antibiotics were Ampicillin, Streptomycin, Vancomycin, Tetracycline, Rifampin and Chloramphenicol. The bacterial cultures are mutated by placing the bacterial culture broth under UV light in Laminar flow cabinet at 250 nm. Disc diffusion assay proposed by Kirby and Bauer was used to study the Antibioqram of Wild and Mutated bacterial pathogens. It was concluded that the UV Mutated bacterial pathogens are highly susceptible to the Antibiotics when compared to the Wild bacterial strains.

**Keywords:** Antibioqram, Antibiotics, UV mutagenesis, Wild bacterial pathogens, Mutated bacterial pathogens and Antibiotic sensitivity test.

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**PREPARATION OF ECO-FRIENDLY BIODEGRADABLE BIOPLASTIC FOR  
PREVENTING PLASTIC POLLUTION**

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Bioplastic are eco-friendly plastics made up of easily Biodegradable substance like Tapioca starch, Glycerin, Cellulose, Protein and Renewable biomass. The accumulation of plastic waste has become major concern in environment. Plastic are used in worldwide and almost used in every place such as house hold packaging material, industries, cell phones, bottles and textiles. The major impact of plastic material on the environment is that it takes many years to decompose. Conventional plastic not only take many decades for decomposition but also remain as micro particles in the soil. As synthetic or petroleum -based plastics create a severe impact on environment, it is very essential to produce eco-friendly bioplastics to meet the needs of both commercial and industrial sectors. In order to reduce the environmental pollution caused by Conventional plastics, the present research has been planned to prepare the eco-friendly biodegradable Bioplastics. It was also found that the used Bioplastics also can act as a manure for enhancing the growth of plants. Bioplastics are environmentally friendly because their production results in the emission of less carbon dioxide, which thought to cause Global warming. In conclusion, Bioplastic is the great solution for plastic pollution.

**Keywords:** Conventional plastics, Plastic pollution, Eco-friendly Biodegradation, Biodegradable substance, Bioplastics and Plant growth.

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**EFFECT OF CYANOBACTERIA ON GROWTH AND YIELD PARAMETERS IN  
RICE VARIETY (ADT 43)**

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The present study is focused on the effect of cyanobacteria as a biofertilizer on growth and yield attributes of rice (ADT 43). The pot experiments were designed with three replications. The growth parameters such as shoot length and root length and yield parameters such as plant height, number of tillers, number of panicle and grain weight were observed. The present results suggest that the application of cyanobacteria promotes growth and yield attributes of rice when compared to control. The maximum range of growth and yields parameters were recorded more in cyanobacteria added plant when compared to other treatments. The results revealed that addition of cyanobacteria as biofertilizer has significant effects on yield attributes of rice and properties of soil.

**Keywords:** Cyanobacteria, Rice variety, Growth parameters, Yield parameters

**TACKLING THE ANTIBIOTIC RESISTANCE THROUGH ATTENUATION OF BIOFILM FORMATION BY BIO-ACTIVE COMPOUND IN THE TREATMENT OF STAPH INFECTIONS**

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Staphylococcus aureus being nosocomial bacterium causes wide range of infections from minor skin boils to life threatening septicemia in humans and animals. It secretes an extracellular polymeric substance (EPS), known as biofilm. An increased morbidity and mortality due to staph infections are caused by chronic biofilm-associated pathogenesis. Biofilm forms through the aggregation of bacterium and results in many complications. The formation of biofilm takes place on the available surface and proceeds in four sequential steps; absorption, attachment, growth and accumulation. It increases the bacterial antibiotic resistance and recurrence of infection against antimicrobial therapy. Staph associated with biofilm also shows the differences in cell growth, size, virulence factors production. The pathogenesis of staph is mediated by virulence factors such as toxins, immune modulators and exo-enzymes. Biofilm protects the staph against unreceptive conditions like temperature fluctuations, limitation or depletion of nutrients and significantly protects the cells against antibiotics. Thus, facilitating the bacterium to grow at different metabolic states either aerobic or anaerobically and also in dormant forms. Therefore, conventional use of antibiotics for staph infections and development of new antibiotic resistance strains has been unresolved issue in clinical settings. In this context, disruption of biofilm formation by alternative bioactive-compound, Reserpine can be a promising strategy to handle biofilm associated clinical staph infections.

**Keywords:** Staphylococcus aureus, Biofilm, Antibiotic resistance, Reserpine.

**IMPACT OF OIL SPILLAGE ON THE HEAVY METAL  
CONCENTRATION OF THE SEA WATER OF BURMA NAGAR  
BEACH OF ENNORE-CHENNAI COAST, TAMILNADU**

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The Present study was carried out at Burma Nagar of Ennore-Chennai coast, Tamil Nadu to see the heavy concentration of the sea water impacted with oil spillage. Two sampling stations were fixed viz. Station -I and Station-II on the basis of 500m distance. Sea water samples were collected for the period of six months (February – April in 2017 and January – March in 2018) from the Burma Nagar of beach of Chennai coast for the analysis of heavy metal concentration using AAS methods.

When the water sample analyzed for heavy metal accumulation in the Burma Nagar beach of Chennai coast during the period of February – April, 2017, the concentration levels of Pb, Cu, Zn, Hg, As, Cr, Cd, Mn and Ni were found to be 25.5, 14.95 and 14.93, 12.39 and 12.37, 5.34 and 5.33, 3.2 and 3.1, 1.24 and 1.23, 0.89 and 0.88 and 0.45 in stations I and II, respectively. Among the heavy metals concentration analyzed in stations I and II, the concentration level was found to be **Pb > Cu > Zn > Hg > As > Cr > Mn > Cd**. Among the two sampling stations compared in Burma Nagar beach, the concentration level of heavy metals was found to be high in station I followed by station II and this may be due to dilution of oil spillage in the particular area although the distance between two stations is about 500m. From this result, it is found that Pb had the higher values (25.5)

followed by Cu (14.95 and 14.93), Zn (12.39 and 12.37-), Hg (5.34 and 5.33), As (3.20 and 3.12), Cr (1.24 and 1.23), Mn (0.89 and 0.88), Cd (0.45) in the stations I and II, respectively.

While the water sample analyzed for heavy metal accumulation in the Burma Nagar beach of Chennai coast during January –March, 2018, the concentration levels of Pb, Cd, Mn, Zn, Hg, Cu, Cr, Ni and As were found to be 30.56 and 30.4, 5.44 and 5.40, 5.32 and 5.30, 2.98 and 2.96, 2.55 and 2.54, 2.55 and 2.52, 2.02 and 2.01, 0.26 and 0.21 in sites I and II, respectively. Among the heavy metals concentration analyzed in stations I and II of Burma Nagar beach of Chennai coast, the concentration level was found to be **Pb > Cd > Mn > Zn > Hg > Cu > Cr > Ni > Ar**. Among the two sampling stations compared in Burma Nagar beach, the concentration level of heavy metals was found to be high in station I and this may be due to dilution of oil spillage in the particular area after the lapse of eight months period with the distance of about 500m. From these results, it is found that Pb had the higher values (30.56- 30.4) followed by Cd (5.44- 5.40), Mn (5.32- 5.30), Zn (2.96- 2.98), Hg (2.55- 2.54), Cu (2.55- 2.52), Cr (2.02- 2.01), Ni (0.26- 0.21) in the stations I and II, respectively. It is predicted that there was an impact due to the oil spillage in coastal water of Ennore region happened during 2017 and thereafter 2018.

## ISOLATION OF ENDOPHYTIC BACTERIA VITMSJ2 FROM STAR FRUIT AND ITS ANTIBACTERIAL PROPERTIES

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Star fruit (*Averrhoa carambola*) is an indigenous plant of Rangia, Assam. It is known for its low calories and great source of vitamins and nutrients such as Vitamin B5, Calcium, folate, K, Mg and protein. In our current study we have focused on the isolation of endophytic bacteria from star fruit. A total of two isolates i.e., VITMSJ1 and VITMSJ2 were isolated from star fruit. The isolates were further inoculated in Muller hinton agar medium seeded with human pathogens such as *E. coli*, *Pseudomonas aeruginosa*, *S. aureus* and *Bacillus cereus*. Isolate VITMSJ2 was found to be effective as it showed inhibition zone around the streak. The isolate VITMSJ2 was considered to be effective and was mass multiplied. The metabolites were extracted using three solvents i.e., DCM, Hexane and Chloroform. Further, well diffusion method showed that chloroform extract contained the metabolites which inhibited the pathogens. The chloroform extract was further fractionated and the fraction containing the active ingredients were identified. The pure compound was detected using gas chromatography mass spectrometry. It will be further studied for the detection of functional group through Fourier transformer infrared spectroscopy and finally the effective strain will be found.

**Keywords:** Endophytes; *Averrhoa carambola*; Cross streak; Antibacterial

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**BIOSYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES  
FROM *Psidium gujava. L***

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Nanoparticles and nanostructure usually ranging from 1 to 100nm, based on specific characteristics such as size, morphology and distribution which exhibit their remarkable potential in the field of biology and medicine. Nowadays, Nano materials are at the emerging trends in the field of Nano particles. In this present study the silver Nano particles were synthesised from *Psidium gujava.L* which is used as Nano key for green environment. In the aqueous and acetone plant extract act as both reducing agent and capping agents. The green synthesis silver nanoparticles were characterized by using UV - visible spectrophotometer, FTIR, SEM with EDX, XRD and antibacterial assay, phytochemical techniques was also performed. The result obtained in our study of both aqueous and acetone extract of *Psidium guajava.L* shows the antimicrobial activity and also contain different biomolecules. For future study the biosynthesized nanoparticles have great effect on an industrial scale and cytotoxic effects on human cells.

**Keywords:** Guava Leaves, extract, silver nanoparticles, antibacterial activity, phytochemical analysis.

## EFFECT OF *TERMINALIA CATAPPA* IN AQUARIUM WATER

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Indian almond, *Terminalia catappa* species is known in English under names such as Bengal almond, Singapore almond, Malabar almond, Talisay almond and Tropical almond. The plant has been commonly used among aquarists to promote the natural environment for better health of animals. The extracts of the plant were known to be able to reduce water pH and heavy metal toxicity besides being an excellent source of nutrient as well as an antibacterial alternative in ornamental fish culture. The plant has been widely used to treat various type of illness in both traditional and modern medicine as anti-cancer, antioxidant agent and anti-fungal agent. In aquaculture, the leaves of *Terminalia catappa* have been used for wound healing against bacterial, fungal and parasite infection. The Objectives of this Study were to evaluate the Antimicrobial activity, Phytochemical and Characterization of water Extract of Dried *Terminalia catappa* and to evaluate its toxicity in ornamental Fishes. In this Study *Terminalia catappa* leaves extract were supplemented into the rearing aquarium to determine the effect of the extract on growth and changes in the water Parameters like pH, Temperature, ammonia level and chlorine level. The result shows that after adding these Leaf extract the parameters of the aquarium water was maintained. Future Research could elucidate the Possibilities of *Terminalia Catappa* in commercial use for the benefit of patients suffering from Bacterial Infections.

**Keywords:** *Terminalia catappa*, Ornamental fish, Toxicity, Water Parameters, Phytochemical Screening, FTIR, Thin Layer Chromatography.

## POTENTIAL TARGETS AND BIOMARKERS FOR LUNG ADENOCARCINOMA

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Lung adenocarcinoma (LUAD) is one of the leading causes of cancer death globally. The heterogeneous disease of LUAD tumor cells make mucus. It is the most common type of lung cancer at about 40% of all NSCLC cases. It is more common in women and persons who have never smoked. The present study aims to investigate the underlying mechanisms implicated with the identification of potential drug targets for lung adenocarcinoma. LUAD-associated gene expression dataset (GSE5364) was obtained from GEO database. Based on the GEO2R tool, we screened the differentially expressed genes (DEGs) between the patients with LUAD and normal individuals. The gene interaction network of 669 LUAD up-regulated genes are used for the gene interaction network construction and analysis. The topological parameter analysis has shown the genes with more direct interactions are considered as the hub genes and are important in the network. The genes *CDK1*, *CCNB1*, *NCAPG*, *TOP2A*, *RRM2*, *CCNB2* and *BUB1* with the maximum number of functional interactors, can be used as potential therapeutic targets for LUAD and followed by clustering analysis resulted in five densely interconnected gene clusters. We further performed functional enrichment analysis and found important pathways associated with LUAD in Cell Cycle, Oocyte, Progesterone mediated oocyte maturation, Human t-cell leukemia virus infection, Cellular senescence, P53 signaling pathway. The predominant genes involved in the enriched pathways are *CCNB1*, *MCM4*, *MCM2*, *CCNA2*, *BUB1B*, *CCNB2*, *MAD2L1*, *PLK1*, *BUB1*, *TTK*, *CDC20*, *CDK1*, *CHEK1* and *RRM2*. The results obtained in our study will be helpful for researchers in better understanding the molecular level associations during the Lung Adenocarcinoma progression.

**Keywords:** Lung Adenocarcinoma, Gene interaction network, Clustering analysis, Functional enrichment, Target genes.



**ANTIBACTERIAL ACTIVITY OF MEDICINAL PLANT EXTRACT AGAINST  
BACTERIA ISOLATED FROM INFECTED RIVER FISH**

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Aquaculture has been a growing activity for the last 20 years worldwide and this impressive development has been attended by some practices potentially damaging to animal health. The bacterial infections are considered the major cause of mortality in aquaculture. Recently, research has been initiated to evaluate the feasibility of herbal drugs in fish diseases. In the present study five different medicinal plant leaves (*Aegle marmelos*, *Solanum nigrum*, *Momordica dioica*, *Coleus amboinicus*, *Acalypha indica*) were collected, dried and the extracts were obtained using ethanol as a solvent. Infected fish was collected from Ladavaram River and bacteria was isolated from the skin of fish. The aim of present study was to characterize the bacteria at morphological, molecular and biochemical level. Plant extracts were subjected to phytochemical screening and its antibacterial activity was performed against bacteria isolated from infected fish. Bacteria were isolated from outer surface (skin) of fishes by taking swab and inoculating in nutrient agar. The colonies were then sub cultured and all the colonies were similar. The isolate was further subjected to 16S rRNA gene sequencing. Finally, the isolated bacterium was gram negative, rod shaped, non-motile. Phytochemical screening of plant extracts showed the presence of Alkaloids, Carbohydrates in all plant extracts. As a result of antibacterial activity, the bacterium was resistance to only one plant extract (*Aegle marmelos*) with zone of inhibition.

**Keywords:** Medicinal plants, phytochemical screening, antibacterial activity, bacteria from fish, biochemical test and 16S rRNA gene sequencing.

**BIOPHYSICAL CHARACTERIZATION AND FUNCTIONAL ANALYSIS OF  
ENOLASE PROTEIN IN *ANUSTRCA ANNLIPIES***

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*Anustrca annlipes* (fiddler crab), often called as crab, are decaped crustaceans of the uca family. They belong to the ocypodidae family, which contains over a hundred species of semiterrestrial sea crabs. 11 of the 13 genera in the ocypodidae crab family are made up of more than 100 fiddler crab species. The species can be found on sea and brackish intertidal mud flats, lagoons and swamps, mangroves, salt marshes, and sandy or muddy west coasts. *Anustrca annlipes* also promotes the turnover and mineralization of critical nutrients, as well as several species-specific body colour patterns that can act as intra- and intra-specific signals. In comparison to female and smaller male uca annulipes crabs, they excavate their tunnels. An antimicrobial is a substance that kills or inhibits the development of bacteria. Antimicrobial medications are classified based on the bacteria they predominantly target. Through review number of antimicrobial protein from *Anustrca annlipes* were identified. So, the antimicrobial protein enolase from *Anustrca annlipes* sequence were retrieved from NCBI databases. Gene annotation were carried out through using amigo tools. Gene expression analysis done through using Jcat server. Sequential and functional analysis were carried out through online bioinformatics software tools

**Keywords:** *Anustrca annlipes*, enolase protein, amigo tools, jcats, bioedit

**INSILICO HOMOLOGY MODELING OF MALTASE GLUCOAMYLASE IN  
*GELASIMUS BOREALIS***

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Fiddler crabs (*Gelasimus borealis*), often known as crabs or calling crabs, are decapod crustaceans that belong to the Uca family. They are brachyuram crabs belonging to the Ocypodidae family, the most recent aquatic organisms to reach the shore. Fiddler crabs make up 11 of the 13 genera in the ocypodidae crab family, with over 100 species. Fiddler crabs are easily recognised by their distinctively asymmetrical claws, which can be found on the coasts of the sea and brackish intertidal mudflats, lagoons and swamps, mangroves, salt marshes, and sandy or muddy coasts of western Africa, the western Atlantic, the eastern Pacific, the Indo-Pacific, and the Algarve regions of Portugal. An antimicrobial is a substance that kills or inhibits the development of bacteria. Antimicrobial drugs have the ability to kill bacteria. Antimicrobial drugs are classed according to the microorganisms they are most effective against. A number of antimicrobial proteins derived from *Gelasimus borealis* have been found through a review. The antimicrobial protein maltase glucoamylase from *Gelasimus borealis* sequence were retrieved from NCBI database. Primary and structural analysis carried out through protparam and coil. Structural analysis were carried out through gor and sopma, modelled structure were validated with the help of save serves. Motif and functional analysis were carried out through scan prosite.

**Keywords:** maltase glucoamylase, *Gelasimus borealis*, protparam. coil, gor, sopma, scan prosite, swiss model.

**HEPATO AND RENOPROTECTIVE ACTIVITY OF *KAPPAPHYCUS ALVAREZII*  
ETHANOLIC EXTRACT IN CISPLATIN CAUSES HEPATIC, KIDNEY  
HARMFULNESS IN *ALBINO* WISTAR RATS**

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In the current study, an ethanol extract of *Kappaphycus alvarezii* was tested for its ability to protect albino rats from cisplatin-induced hepato and nephrotoxicity. A substantial increase in serum hepato specific enzymes of AST, ALP, ALT, and Bilirubin in rats was obtained by the addition of cisplatin at a dosage of 5 mg/kg. The total cholesterol and triglyceride stages were significantly higher compared to control. After 30 days, of administration of *K. alvarezii* seaweed extract (250, 350, 450 mg/kg body wt.), the increased levels of liver marker enzymes compared to cisplatin-induced species was due to considerable reduction. Some important amino acids like creatinine, uric acid and serum urea, levels had been found to be higher, while alkali metals like sodium and potassium, similarly alkaline earth metal like calcium other elements like phosphorous, and protein levels had been found to be lower, with significant normalization of histological architecture compared to cisplatin-induced rats. The presence of nine different compounds was revealed by the GC-MS results. Overall, the current study found that an ethanol extract of *K. alvarezii* could protect hepato and nephro damage in *albino* rats against hepatotoxicity and nephrotoxicity caused by cisplatin, and this was most likely mediated by active compounds in the extract.

**Keywords:** *Kappaphycus alvarezii*, Nephrotoxicity, Hepatotoxicity, Cisplatin and Wistar *albino* rats.

**AN INNOVATIVE WAY TO SAFE-GUARD THE GUT MICROBIOTA FROM  
ANTIBIOTICS BY GENETICALLY ENGINEERED PROBIOTICS**

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Babujanarthanam**

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The gastrointestinal tract (GIT) accommodates large and diverse group of symbiotic microbes referred to as probiotics. They play beneficial role in maintenance of homeostasis by providing nutrients and energy that regulate the host immune system. The most common probiotics strains that mediate health beneficial include Lactobacillus and Bifidobacteria. The strains of Bifidobacterium and Lactobacillus are predominant and subdominant groups of the GIT microbiota respectively. These beneficial probiotics are generally attributed to the ability to regulate intestinal permeability, normalise host intestinal microbiota, maintain gut immune barrier function and balance between pro-inflammatory and anti-inflammatory cytokines. However, these positive effects of probiotics are not always rendered due to modulation in the GIT microbiome. The increased use of antibiotic drugs also eradicates the gut bacteria that results in loss of benefits and disruption of balance between microbial ecosystem towards the invading microbes. Thus, it contributes to the poor immune response which makes difficult to treat many bacterial and viral diseases. The ability to examine fully sequenced genomes has accelerated the application of genetic approaches to elucidate the functional roles of probiotics. In this context, it is necessary to limit antibiotic effects on gut microbiome. The important probiotic species of lactobacillus and bifidobacteria can be genetically engineered (GE) to produce certain enzymes against antibiotics. These GE probiotics can armour the gut microbiome and fight against the infections. The current research proposes to construct the genetically modified new probiotics strains that protect the local gut microbiome from antibiotics and reduce adverse effects of antibiotics. In this regard, GE lactobacillus strain to produce Beta-lactamase enzyme that breakdown most of the Beta-lactam class of antibiotics (60%) including ampicillin and amoxicillin. These GE Probiotics when ingested in adequate amounts can create a lactamase shield to protect local gut microbiome and against damaging effects of antibiotics.

**Keywords:** GIT, Probiotics, Antibiotics, GE probiotics, Beta-lactamase.

**ANTIBACTERIAL ACTIVITY AND PHYTOCHEMICAL ANALYSIS OF PLANT  
EXTRACT ON SYZYGIUM CUMINI**

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The present study described the antibacterial activity carried Muller Hinton agar plate well diffusion method against gram positive bacteria such as *pseudomonas Aeruginose*, *Staphlococcus Aureus*. Gram negative bacteria *Escherichia coli* investigated carried out on the soxhlet apparatus acetone extract of the leaves *Syzygium cumini* and Phytochemical investigation contain carbohydrate, phenol, flavonoid and tannin.

**Keywords:** Syzygium cumini, Antibacterial activity, Phytochemical analysis.

**RABT/2022/PP/64**

**TWEAKING BIOELECTROCHEMICAL PERFORMANCE OF MFCS USING NON-  
PRECIOUS ELECTRODE AND SEPARATOR MATERIALS**

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Microbial Fuel Cells (MFCs) are bioelectrochemical devices that convert biochemical energy in waste biomass directly into usable electricity. Apart from serving as a unique and clean source of energy, MFCs have been proven to serve as biosensors, desalination, bioremediation, carbon sequestration, etc. Although microbial catalysts using wide substrate versatility and output abilities have been identified, the prohibitive high cost and low power still hinder their wide use. To enhance the power density of MFCs, various strategies such as use of effective electrode materials, cathode catalyst, and separators have been developed. The current work used single chamber microbial fuel cells (SCMFC) with a working volume of 250 mL and used modified gas diffusion electrode (GDE) with non-precious catalysts and Pt/C coated direct air-cathodes for comparison. Among them, the use of efficient ion-conductive membranes has greatly improved the performance of MFCs. Enrichment and maintenance of the anode was ideal with the low-cost Nafion substitute material. The high proton conductivity and the low oxygen influx properties of the separator greatly improved the anaerobic conditions of the anolyte. In addition, the use of modified architecture at the separator- cathode interface has resulted in higher power densities by reducing the internal resistance of the reactor. Experimental data showed in addition to precious metal alloys, transition metal oxide and carbon-based earth abundant catalysts with tunable green synthesis methods can result in obtaining efficient cathode catalyst materials. Use of efficient, non-precious catalysts for the oxygen reduction reaction has proved to stabilize the function of MFC based power generation while reducing material and fabrication, maintenance costs of the electrodes involved. Further, the use of these novel materials and techniques can address scale up issues of MFCs. These approaches can advance the use of MFCs as a reliable and sustainable energy source.

**Keywords:** Microbial Fuel Cell, Bioelectrochemical cell, biosensor, wastewater treatment, water reclamation, gas diffusion electrode, oxygen reduction.

**CONSTRUCTION OF DIRECT Z-SCHEME g-C<sub>3</sub>N<sub>4</sub>/BiYWO<sub>6</sub> HETEROJUNCTION PHOTOCATALYST WITH ENHANCED VISIBLE LIGHT ACTIVITY TOWARDS THE DEGRADATION OF METHYLENE BLUE**

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Construction of the Z-scheme heterojunction photocatalyst achieved highly improved photocatalytic ability by its high redox ability of the photoinduced e<sup>-</sup>-h<sup>+</sup> pairs. In the study, Z scheme g-C<sub>3</sub>N<sub>4</sub>/BiYWO<sub>6</sub> heterojunction photocatalyst is prepared by the single step hydrothermal method. Further, its photocatalytic ability was assessed by degrading methylene blue under visible light exposure. Also, Z-scheme g-C<sub>3</sub>N<sub>4</sub>/BiYWO<sub>6</sub> heterojunction photocatalyst exhibits excellent photoelectrochemical property and it is stable after three cycles, which indicates its good reusability nature. These enhancements are due to the newly formed heterostructure that facilitates the migration and separation efficiency of the photoproduced e<sup>-</sup>-h<sup>+</sup> pairs. Hence, the synthesized Z-scheme g-C<sub>3</sub>N<sub>4</sub>/BiYWO<sub>6</sub> heterostructure could be an excellent material for wastewater remediation works.



**EXOGENOUSLY APPLIED DEGRADABLE CHELATORS (EDTA, OA AND CA)  
ENHANCES *MEDICAGO SATIVA* PHYTOEXTRACTION EFFICIENCY IN HEAVY  
METALS CONTAMINATED SOILS**

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Accumulation of Heavy metal in agricultural soils is an important environmental issue. Among various methods used to remove heavy metals from soil. In addition to the use of plants, chelating agents activates heavy metals in the soil and enhances the extraction ability of plants. Easily biodegradable chelating agents such as EDTA, OA and CA are also effective in this regard heavy metals in soil and plants, three chelating agents (EDTA, OA and CA) and *Medicago Sativa* were used for a joint remediation technology using chelators and plants. Contaminated soil from mechanic workshop showed a high concentration of heavy metals. Soil washing procedure using chelating agents also showed good results. Phyto-remediation property of *MEDICAGO SATIVA* (Alfa Alfa) seed in contaminated soil using pot method also showed remarkable germination property. From the results it could be concluded that phyto-remediation method using chelating agents and plants would be beneficial to the social to prevent soil pollution.

**Keywords:** Heavy metal, *Medicago sativa*, EDTA, OA, CA, phytoremediation.

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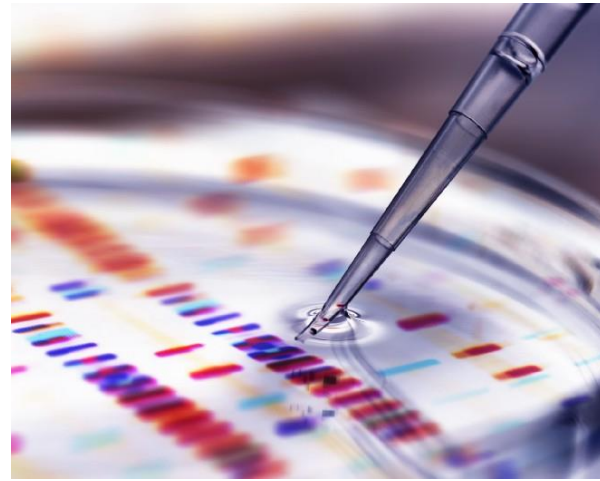
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