DEPARTMENT OF ANIMAL HEALTH & MANAGEMENT

ALAGAPPA UNIVERSITY

(A State University Established by Govt. of Tamilnadu in 1985)

KARAIKUDI - 630 003, TAMIL NADU, INDIA

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2nd - International Conference On

"Recent Trends in Vaccines and Biomaterials for Animal Health (RTVBAH-2025)"

RTVBAH-2025

6th & 7th February 2025

PROCEEDINGS BOOK

Second Impression -2025
2nd International Conference on Recent Trends in Vaccines and Biomaterials for Animal Health (RTVBAH -2025).

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Edited by

Prof. B. Vaseeharan
Convener & Organizing Secretary
Professor and Head
Department of Animal Health and
Management Science Block, 6th Floor,
Alagappa University Karaikudi-630 003.

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Correspondence

Prof. B. Vaseeharan, Convener & Organizing Secretary, RTVBAH-2025

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Tamil Nadu, India.

ALAGAPPA UNIVERSITY

Alagappapuram, Karaikudi - 630 003, Tamil Nadu, India.

(A State University Established by the Government of Tamil Nadu, Recognised by UGC)

[Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle]

Prof. G. Ravi, Ph.D., D.Sc.,
Vice-Chancellor

MESSAGE

I am pleased to extend a warm welcome to the 2nd International Conference on **"Recent Trends in Vaccines and Biomaterials for Animal Health (RTVBAH-2025)",** organized by the Department of Animal Health Management. Following the success of the inaugural conference last year, this event continues to highlight the department's dedication to advancing research and fostering global collaboration in the critical field of animal health. This conference's interaction of concepts and data serves as an impulse for significant insights that will enhance the academic community and the international veterinary and farming industries.

Alagappa University has consistently focused on building a culture of academic cooperation and research achievement. We take pleasure in providing academics and professionals a forum to have insightful conversations, exchange ideas, and add to the wealth of knowledge. In comparison with the previous year, the international conference held here featured more sophisticated research in key fields. I congratulate the organizing committee, keynote speakers, and all the participants for their commitment to expanding scientific understanding and tackling the difficulties in the animal health sector. I commend the participants for utilizing this platform to forge new collaborations and explore interdisciplinary approaches, and practitioners. The final proceedings of this conference surely serve as an invaluable resource for professionals and scholars who want to stay up to date on the most recent advancements in the fields of biomaterials for animal health and vaccines.

I hope that the conference is an enormous hit.

VICE-CHANCELLOR

Ph. : 04565 - 223101, 225200 • Fax : 04565 - 225202 • e-mail : vc@alagappauniversity.ac.in

PREFACE

Prof. P. Ramasamy
Former Vice Chancellor, Alagappa University

To my Distinguished Colleagues,

It is a gladness to my sincere congratulations to all of the esteemed academics, Scientists, researchers, and participants in the 2nd International Conference on **"Recent Trends in Vaccines and Biomaterials for Animal Health (RTVBAH-2025)"**. It gives me immense pride and joy to pen this preface again! It is encouraging to see the department advancing its dedication to excellence in research and innovation, and the inaugural conference's success last year provided a solid basis for this yearly event. Immunization paves the way to better health for both humans and animals in conditions where disease frequency is high and treatment is unpredictable. It has been shown that devastating animal diseases have an adverse effect on public health and well-being in addition to animal health. According to the World Health Organization (WHO), humans are immune to some diseases. Examples of contemporary trends in vaccine development include vector, mRNA, biomaterial, and nucleic acid-based vaccines. A range of prediction models must be used to assess and forecast the efficacy of any vaccination program, whether it is being created from the ground up or is already in existence. Emerging and re-emerging diseases, as well as significant sequence variability, pose challenges to conventional vaccines. Some of the obstacles to successful vaccine development comprise non-heritable parameters, host and pathogen variability, security issues, and an absence of awareness about the immunity-building process. These concerns include adjuvant, long-term vaccination efficacy, public adaptability, virulence reversal, biological characteristics specific to the recipient, business model flaws, quality maintenance, societal expectations, and many more. Experts in human and animal health should assess immunization program flaws at every level. To ensure the best possible health for both humans and animals, these scientific groups will unavoidably work together and apply cutting-edge immunization techniques. As we navigate the complexity of global challenges related to animal diseases and the crucial role of vaccines and biomaterials in mitigating these challenges, interdisciplinary collaborations, the sharing of the most recent research findings, and the exchange of ideas become a keystone for fostering discussion and accelerating the conversion of scientific discoveries into practical solutions. The contributions of distinguished scholars, business executives, and speakers will surely enhance our understanding of the latest developments, challenges, and prospects in the subject. The Conference which was held last year inventively improved more investigation, creativity, and cooperation that advances veterinary medicine and improves animal welfare globally. I hope this conference is as successful as the last one. Best of luck!
Sincerely,

Prof. P. Ramasamy
Formerly: Vice Chancellor, Alagappa University, Professor and Head, Department of Biotechnology, University of Madras, Director – Research, Sree Balaji Medical College and Hospital, BIHER, Chennai-600044, Tamil Nadu, India.

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Dr. **A. SENTHILRAJAN**
Registrar

MESSAGE

Dear Admired Contestants,

With the immense pleasure and joy, I welcome you to the proceedings of the 2nd International Conference on **"Recent Trends in Vaccine and Biomaterials for Animal Health (RTVBAH-2025)"**. As the Registrar of Alagappa University, it is an honour to host this Vital assembly of scholars, researchers, and industry professionals committed to the advancement of field of animal health. In the constantly changing field of veterinary medicine, the creation of novel vaccines and biomaterials is essential to protecting our animal friends' health. The conference held on previous year served a platform for the knowledge, ideas and cutting-edge research that undoubtedly contributed the improvement of animal health and the topics covered the interdisciplinary nature of the challenges in opportunities. We are all united by our shared dedication to enhancing the health and welfare of animals. I extend my sincere gratitude to the organising committee, keynote speakers, presenters and participants for their invaluable contributions to the success of this conference. I am confident that the insights and ideas shared during this conference pave the way for groundbreaking discoveries and transformative solutions. May the concepts developed and partnerships established here inspire future initiatives that bring noticeable enhancements to the well-being and health of our animal companions.

With warm regards,

REGISTRAR
ALAGAPPA UNIVERSITY
KARAIKUDI

Alagappapuram
Karaikudi - 630 003
Sivagangai District
Tamil Nadu, India.

Tele : **04565 - 226 001**
Fax : **04565 - 225 525**
Web : **www.alagappauniversity.ac.in**
Email : **registrar@alagappauniversity.ac.in**

Dr. Palmy Jesudhasan, PhD
Research Microbiologist
United States Department of Agriculture (USDA-ARS)
Poultry Production and Product Safety Research Unit
Fayetteville, AR 72701 USA
Email: **Palmy.Jesudhasan@usda.gov**

I am delighted to present this year's International Conference on **"Recent Trends in Vaccines and Biomaterials for Animal Health" (RTVBAH-2025)**, a significant gathering of leading experts, researchers, and professionals committed to advancing the frontiers of science in this vital area. This conference, hosted by Alagappa University, aims to foster innovation, collaboration, and interdisciplinary exchange to address the critical challenges in vaccine research and biomaterials.

Vaccines and immunological biomaterials have witnessed transformative progress in recent years, reshaping the landscape of global health and disease prevention. These advancements have not only enhanced the efficacy and accessibility of vaccines but also paved the way for sustainable strategies to combat emerging diseases and safeguard public health. This conference serves as a platform for exchanging ideas, sharing knowledge, and forging new collaborations that promise to further enrich this dynamic field.

Alagappa University has always championed excellence in research and academic partnerships. The university takes pride in providing a stage for scientists, practitioners, and policymakers to engage in meaningful dialogue, share groundbreaking research, and explore solutions to global health challenges. The topics discussed during this conference will undoubtedly contribute to addressing pressing issues in public health, including vaccine innovation, immunological safety, and sustainable health interventions.

I extend my heartfelt gratitude to the organizing committee, distinguished speakers, and participants for their dedication and contributions to the success of this event. The insights and innovations shared here will not only shape the future of vaccines and biomaterials but also reinforce our collective commitment to improving lives across the globe.
May this conference inspire pioneering research, foster impactful collaborations, and leave a lasting legacy in the field of immunology and public health.

I wish the conference every success.
Palmy Jesudhasan

Prof. Dr. Ina Salwany Md Yasin
Deputy Director
Institute of Bioscience
Universiti Putra Malaysia
43400 UPM Serdang Selangor,
Malaysia
Email: Salwany@upm.edu.my

I am truly honored to join the International Conference on **"Recent Trends in Vaccines and Biomaterials for Animal Health" (RTVBAH-2025)** as a keynote speaker. This conference stands as a beacon of dedication by the scientific and academic communities to address critical challenges in animal health while promoting sustainable solutions.

My keynote, **"The Role of Fish Vaccines in Combating Antimicrobial Resistance in Sustainable Aquaculture,"** emphasizes the transformative role of vaccines in advancing animal health management. As the aquaculture industry grows, the excessive use of antibiotics to combat bacterial diseases has raised concerns about antimicrobial resistance (AMR), which poses a serious global threat. Vaccines offer a safer, more sustainable alternative by reducing antibiotic dependency, improving fish health, and increasing productivity. They are a crucial step toward safeguarding not only aquaculture but also the broader ecosystems and global health.

Alagappa University serves as a wonderful platform for fostering collaboration and sharing knowledge. By bringing together researchers, practitioners, and industry leaders, this conference creates opportunities for meaningful exchanges and sparks innovative solutions. These discussions will pave the way for advancements in vaccines and biomaterials, benefiting not just academic research but also agriculture and veterinary practices worldwide.

I deeply admire the efforts of the organizers and participants in promoting scientific excellence and sustainable practices in animal health. I look forward to engaging in insightful discussions, exchanging ideas, and contributing to a future where agriculture and veterinary sciences thrive through innovation and collaboration.

PREFACE

Prof. B. Vaseeharan
Convener and Organizing Secretary
RTVBAH-2025

With immense delight and anticipation, I express my warmest welcome to the proceedings of the 2nd International Conference on **"Recent Trends in Vaccines and Biomaterials for Animal Health" (RTVBAH-2025)",** a global gathering that unites professionals, researchers, and academics from various sectors worldwide. As the Organizing Secretary of this esteemed conference, I am honored to present this compilation of scholarly contributions that encapsulate the essence of our collective pursuit of knowledge and innovation. The RTVBAH-2025, held on 6th and 7th February 2025 at the Conference Hall, Science campus served as a dynamic platform for the exchange of ideas, insights, and cutting-edge research across a myriad of disciplines. Our first objectives were to develop interdisciplinary cooperation, encourage meaningful discourse, and open the door for breakthroughs that cut across national borders. This collection, which features a wide range of research papers, talks, and conversations that occurred during the conference, is a tapestry of intellectual rigor. The authors, who come from all over the world, have contributed their knowledge, viewpoints, and creative solutions to the intricate problems that confront our globalized society. The articles explore each domain's most recent advancements, new trends, and possible solutions. You will come across a wealth of information as you read this book, which reflects the scope and depth of our combined intellectual pursuits. I want to sincerely thank the organizing committee, the keynote speakers, the session chairmen, the reviewers, and everyone else who helped make the conference a success. Your devotion and hard work have been crucial in creating this intellectual mosaic. To sum up, this proceedings book is evidence of the spirit of cooperation that characterizes the RTVBAH-2025.

Thank you for being a part of this enriching journey.

Warm regards,
Prof. B. Vaseeharan
Convener and Organizing
Secretary,
RTVBAH-2025.

2nd International Conference on
"Recent Trends in Vaccines and Biomaterials for Animal Health"
(RTVBAH 2025)

Date: 6th & 7th, February 2025
Venue: Faculty of Science, Conference Hall, 4th Floor, Science Campus, Alagappa University

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Inaugural Invitation 06.02.2025

09.15am - 10.15am	Spot Registration	
10.30am	Tamil Thai Vazhthu and Vallal Vazhthu	
10.31am - 10.35am	Lighting the Lamp & Honoring the Guest	
10.36am - 10.45am	Welcome Address and Scope of the Conference	**Prof. B. Vaseeharan** Convenor and Organizing Secretary, DAHM
10.46am - 10.55am	Inaugural Address	**Prof. G. Ravi** Vice-Chancellor, Alagappa University
10.56am - 11.10am	Presidential Address	**Prof. P. Ramasamy** Former Vice-Chancellor, Alagappa University
11.11am - 11.20am	Special Address	**Dr. Palmy Jesudhasan** (USDA-ARS), USA
11.21am - 11.30am	Thematic Address	**Prof. Ina Salwany Md Yasin** Universiti Putra Malaysia
11.31am - 11.40am	Keynote Address	**Sr. Prof. J. Jeyakanthan** Dean of Science, Alagappa University
11.41am - 11.45am	Vote of Thanks	**Dr. P. Srinivasan**, Professor, DAHM
11.46am - 12.00 noon	**TEA BREAK**	

DAY-1

Plenary Session-I (06.02.2025)

Session Chair:	**Prof. B. Vaseeharan,** Professor and Head, DAHM	
Session Co Chair:	**Dr. Palmy Jesudhasan,** (USDA-ARS), USA	
Coordinator:	**Prof. V. Ramasubramanian**, Bharathiar University, Coimbatore	
Rapporteur:	**Dr. N. M. Prabhu**, Associate Professor, DAHM	
12.01pm - 12.45pm	**Plenary Speaker 1** "The Role of Fish Vaccines in Combating Antimicrobial Resistance in Sustainable Aquaculture"	**Prof. Ina Salwany Md Yasin** Universiti Putra Malaysia
12.46pm - 01.30pm	**Plenary Speaker 2** "Marine Finfish Diseases and It's Health Management Through Vaccination"	**Dr. P. Rameshkumar** MRC of CMFRI, Mandapam
01.31pm - 02.15pm	**LUNCH BREAK**	

Plenary Session-II (06.02.2025)

Session Chair:	**Prof. Ina Salwany Md Yasin,** Universiti Putra Malaysia	
Session Co Chair:	**Prof. E. Preetham,** Cochin University of Science and Technology	
Coordinator:	**Prof. P. Rameshkumar,** MRC of CMFRI, Mandapam	
Rapporteur:	**Dr. P. Srinivasan,** Professor, DAHM	
02.16pm - 03.00pm	**Plenary Speaker 3** "Vaccines in Aquaculture"	**Prof. V. Ramasubramanian** Bharathiar University, Coimbatore
03.01pm - 03.45pm	**Plenary Speaker 4** "Role of Bioinformatics in Vaccine Design and Development for Cancer Prevention"	**Prof. A. Bharathi** Sir Theagaraya College, Chennai

03.46pm - 04.45pm	**Session Evaluators** **Prof. Ina Salwany Md Yasin** **Dr. Palmy Jesudhasan** **Dr. M. Biruntha, DAHM**	**Oral Presentation** RTVBAH-OP 01 to RTVBAH-OP 15
04.46pm - 05.00pm	**TEA BREAK**	
05.01pm - 06.00pm	**Cultural Events**	

DAY-2
Plenary Session-III (07.02.2025)

Session Chair:	**Prof. Ina Salwany Md Yasin,** Universiti Putra Malaysia	
Session Co Chair:	**Prof. M. Govindarajan,** Annamalai University	
Coordinator:	**Prof. A. Bharathi,** Sir Theagaraya College, Chennai	
Rapporteur:	**Dr. V. Nithya,** Assistant Professor, DAHM	
10.00am - 10.45am	**Plenary Speaker 5** "Application of Electron Beam for Animal Vaccine Preparation"	**Dr. Palmy Jesudhasan** (USDA-ARS), USA
10.46am - 11.30am	**Plenary Speaker 6** "Vaccination Strategies for Disease Management in Aquaculture"	**Prof. E. Preetham** Cochin University of Science and Technology
11.31am - 11.45am	**TEA BREAK**	
11.46am - 12.30pm	**Plenary Speaker 7** "Nano-Biomaterials in Vector Management: A Greener Approach for Dengue and Zika Control"	**Prof. M. Govindarajan** Annamalai University
12.31pm - 01.30pm	**Session Evaluators** **Prof. Ina Salwany Md Yasin,** **Dr. Palmy Jesudhasan,** **Dr. P. Kumar, DAHM**	**Oral Presentation** RTVBAH-OP 16 to RTVBAH-OP 27
01.31pm - 02.15pm	**LUNCH BREAK**	
2.16 pm - 2.35pm	**Plenary Speaker 8** "Future of Biotechnological Business"	**Prof. S. Karthikeyan** VIT, Vellore
02.36pm - 03.00pm	**Plenary Speaker 9** "Influence of Edible Vaccine, IgY in Cultivable Shrimp Species Against Bacterial and Viral Infection"	**Prof. T. Citrarasu** Manonmaniam Sundaranar University, Tirunelveli
03.01pm - 04.15pm	**Session Evaluators** **Prof. Ina Salwany Md Yasin,** **Dr. Palmy Jesudhasan,** **Dr. N. M. Prabhu, DAHM**	**Poster Presentation** RTVBAH-PP 01 to RTVBAH-PP 17
04.16pm - 04.30pm	**TEA BREAK**	

Valedictory Invitation 07.02.2025

04.35pm - 04.45pm	Welcome Address	**Dr. M. Biruntha,** Assistant Professor, DAHM
04.46pm - 05.15pm	Report of the Conference	**Dr. N. M. Prabhu**, Associate Professor, DAHM
05.16pm - 5.30pm	Valedictory Address	**Prof. A. Senthilrajan** Registrar, Alagappa University
05.31pm - 05.45pm	Felicitation Address	**Prof. Ina Salwany Md Yasin,** Universiti Putra Malaysia
		Dr. Palmy Jesudhasan, (USDA-ARS), USA
05.46pm - 05.59pm	Vote of Thanks	**Prof. B. Vaseeharan** Convenor and Organizing Secretary, DAHM
6.00 pm	**National Anthem**	

PLENARY SPEAKERS

		Sir Theagaraya College, Chennai – 600021, Tamil Nadu, India	
7	RTVBAH- PS 07	Nano-Biomaterials in Vector Management: A Greener Approach for Dengue and Zika Control Marimuthu Govindarajan[a,b] [a]*Unit of Natural Products and Nanotechnology, Department of Zoology, Government College for Women (Autonomous), Kumbakonam 612 001, Tamil Nadu, India.* [b]*Unit of Vector Control, Phytochemistry and Nanotechnology, Department of Zoology, Annamalai University, Annamalainagar 608002, Tamil Nadu, India.*	07
8	RTVBAH- PS 08	Influence of edible vaccine, IgY in cultivable shrimp species against bacterial and viral infection T. Citarasu [a *], G. Uma [a], J. R. Anusha [a], T. Kumaran [b] and R. Raja Jeya Sekar [c] [a]*Aquatic Animal Health Laboratory, Centre for Marine Science and Technology, Manonmaniam Sundaranar University, Rajakkamangalam, Kanyakumari District, Tamilnadu 629502, India* [b] *P. G & Research Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari District, Tamilnadu, 629174, India* [c] *P. G. Department of Zoology, South Travancore Hindu College,* *Kanyakumari District, Tamil Nadu 629002, India*	08
9	RTVBAH-PS 09	Future of Biotechnological Business Sivasanmugam Karthikeyan* *Vellore Institute of Technology, Vellore.*	09

ORAL PRESENTATION

POSTER PRESENTATION

S. No	Ref. No	Title	
1	RTVBAH- PP 01	Novel Anti-microbial peptides to combat AMR associated with *Pseudomonas aeruginosa* Debolina Chatterjee and Karthikeyan Sivashanmugam[*]	37
2	RTVBAH- PP 02	Algal-Marine Nanoparticle Hybrid, an Alternative for Sustainable Aquaculture Noiranjana Dasgupta [a], Karthikeyan Sivashanmugam [a*]	38
3	RTVBAH- PP 03	Therapeutic application of marine compound-based hydrogels in treating diabetic wounds Ishwarya Ramachandran and Punnadath Preetham Elumalai[*].	39
4	RTVBAH- PP 04	Smart Wound Healing: A pH-Responsive Transdermal Patch for Targeted Drug Delivery and Infection Control Ajay Athis, Aishwarya Jayakumar, Suganthy Natarajan[*]	40
5	RTVBAH- PP 05	Chitosan-encapsulated 7-Methoxycoumarin Conjugated with Folic Acid: A Novel Glioblastoma Therapy Aarifa Mohamed Asik, Suganthy Natarajan[*]	41
6	RTVBAH- PP 06	Antibacterial, antioxidant, cytotoxicity, and phytochemical screening of *Moringa oleifera* leaves Muthulakshmi Muthumanickam [a], Rameshthangam Palanivel [b*], Sindhamani Subbiah [a].	42
7	RTVBAH- PP 07	Antimicrobial activity and GC-MS Analysis of Tribulus terrestris L. Ambiga Chinnathambi [a], Rameshthangam Palanivel [b*], Dharani Karthikeyan [c]	43
8	RTVBAH- PP 08	Antibacterial activity and GC-MS analysis of *Pedalium murex* leaf extracts Ambiga Chinnathambi [a], Rameshthangam Palanivel [b*], Shri Kaleeswari Sivachandran [c]	44
9	RTVBAH- PP 09	Phytochemical profiling, GC-MS analysis and antibacterial activity of aqueous methanol fraction of Terminalia bellirica AmbigaChinnathambi[a], Rameshthangam	45

		Science Block, Karaikudi – 630003.	
17	RTVBAH-PP 17	Interactive effects of freshwater acidification and anti-epileptic drug depakote on biochemical changes and neurotoxicity in freshwater fish *Labeo rohita* Ashokkumar Sibiya, Baskaralingam Vaseeharan [*]	53
18	RTVBAH-PP 18	Synthesis of chlorophyll-based zinc oxide nanoparticles from *Ulva rigida* extract and their biomedical applications Balu Jeyalakshmi and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630004, Tamil Nadu, India.	54
19	RTVBAH-PP 19	Enhanced diabetic wound healing with hyaluronic acid-coated ZnO nanoparticles synthesized from *Mimosa pudica* Chandran Sandhiya and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India	55
20	RTVBAH-PP 20	Green synthesis and characterization of Zinc oxide nanoparticles from *Annona squamosa* leaf against wound healing activity Priyadharshini Suresh, Vaseeharan Baskarlingam* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus 6th Floor, Alagappa University, Karaikudi 630004, Tamil Nadu, India	56
21	RTVBAH-PP 21	Biomaterials and Host Response of Medicinal Plant derived Compounds as Feed Additives for Growth Enhancement and Disease Resistance in Indian major carps Manikandan Ramesh [a], Collince Omondi Awere [b], Baskaralingam Vaseeharan [a] Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi, 630003, Tamil Nadu, India	57

22	RTVBAH-PP 22	Unveiling the multifunctional bioactivities of coral proteins against inflammation, bacterial infections and cancer Muthukaruppan Kabila and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus, 6th Floor, Alagappa University, Karaikudi-630 004, Tamil Nadu, India.	58
23	RTVBAH-PP 23	Development of vaccine using inactivated *Vibrio alginolyticus* against fish pathogens Thangavel Gobika, Baskaralingam Vaseekaran* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi.	59
24	RTVBAH-PP 24	Development of a novel vaccine formulation using *Solanum torvum* and *Terminalia catappa* fruit extracts with chitosan adjuvant against fish pathogens Joseph William Jayaseeli, Baskaralingam Vaseeharan* Biomaterials and biotechnology in animal health lab Department of animal health and management Alagappa university, Karraikudi-630003	60
25	RTVBAH-PP 25	Therapeutic Potential of *Tridax procumbens* Flower Extracts in Wound Healing: A Natural Approach to Tissue Regeneration Nachiyappan Shanmuga Priya and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630004, Tamil Nadu, India.	61
26	RTVBAH-PP 26	Development of a papaya seed oil-Infused chitosan edible coating for shelf-life extension of grapes Azhagappan Arasappan and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health And Management, Science Campus 6th Floor, Alagappa University, Karaikudi-630 004, Tamil Nadu. India.	62
27	RTVBAH-PP 27	Exploring the effects of squid collagen and its hydrolysate on mice photoaging Murugesan Priyadarshini and Baskaralingam Vaseeharan*	63

		Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus, 6th Floor, Alagappa University, Karaikudi-630 004, Tamil Nadu, India	
28	RTVBAH-PP 28	Development of bacterial-derived peptide vaccine against vibrio**:** A Novel Approach for Rohu **(***Labeo rohita***)** Protection Nagendran Balasaraswathi and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab,Department of Animal Health and Management, Science campus 6th Floor, Alagappa University, Karaikudu-630 003.	64
29	RTVBAH-PP 29	Effects of Red macroalgae against wound healing on *Cirrhinus mrigala* induced by wound associated bacteria. Thillaipandi Abitha and Baskaralingam Vaseeharan* Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus 6th Floor, Alagappa University, Karaikudi-630 004, Tamil Nadu, India	65
30	RTVBAH-PP 30	Preparation, antioxidant, antibacterial, anti-biofilm, hemocompatibility, and anticancer activities of Curcuma longa starch polysaccharide nanoparticles Siva Sankar Sana[a], Ramakrishna Vadde[b], Chaitanya Jayprakash Raorane[a], Pham Van Hung[c*], Tae Hwan OH[a*] [a]School of Chemical Engineering, Yeungnam University, 280 Daehak-Ro, Gyeongsan, Gyeongbuk, 38541, Republic of Korea [b]Department of Biotechnology & Bioinformatics, Yogi Vemana University, Kadapa 516005, India [c]Department of Food Technology, International University, Thu Duc District, Ho Chi Minh City, Vietnam	66
31	RTVBAH-PP 31	Vermicomposting of seaweed waste with cow dung: Glycolipid Extraction for Agriculture, Medicinal, and Cosmetic Applications Chandrasekaran Gogula lalitha and Muniyandi Biruntha* Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa University, Karaikudi -630 003, Tamil Nadu, India.	67

32	RTVBAH-PP 32	Bioactive Innovations from Vermicompost: Harnessing Aquatic Waste for Sustainable Cosmeceutical and Therapeutic Applications. Selvaraj Shanmuha priya, Muniyandi Biruntha* Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa University, Karaikudi -630 003, Tamil Nadu, India.	68
33	RTVBAH-PP 33	Assessment of gut –associated bacterial enzymes from the earthworm *Perionyx excavatus* for efficient microplastic depolymerization Thangaraj Sathishkumar and Muniyandi Biruntha* Vermiculture technology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 003, Tamil Nadu, India.	69
34	RTVBAH-PP 34	Vermistabilization of *Lantana camara* leaf biomass combined with cow dung using the earthworm *Eudrilus eugeniae*: Evaluation of Phytohormones through LC-MS Analysis Rajakkannu Aishwarya and Muniyandi Biruntha* Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa university, Karaikudi – 630 003, Tamil Nadu, India.	70
35	RTVBAH-PP 35	Studies on Metallothionein Protein – Mediated Detoxification of Heavy Metals in Sewage Sludge Using the Earthworm *Eudrilus eugeniae*: An Examination of Genotoxicity Ravichandran Vijayalakshmi and Muniyandi Biruntha* Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa university, Karaikudi – 630 003, Tamil Nadu, India.	71
36	RTVBAH-PP 36	Evaluation of the antibacterial and anticancer properties of coelomic fluid from the earthworm *Perionyx excavatus* against breast cancer Rajkumar Rathika and Muniyandi Biruntha* Vermiculture technology Lab, Department of Animal Health and Management, Science campus 6th floor, Alagappa University, Karaikudi-630 003, Tamil Nadu, India.	72
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The Role of Fish Vaccines in Combating Antimicrobial Resistance in Sustainable Aquaculture

Ina Salwany Md Yasin*

Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Aquatic Animal Health and Therapeutics Laboratory, Institute of Bioscience, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

***Corresponding author**: salwany@upm.edu.my

Abstract

Intensive aquaculture practices, such as high stocking densities and increased feeding, significantly elevate stress levels in fish, often leading to poor water quality and an increased risk of disease outbreaks. Bacterial diseases, including vibriosis, aeromoniasis, and streptococcosis, are particularly prevalent in tropical regions, causing substantial economic losses in farmed fish and shellfish. Fish vaccines have emerged as a crucial strategy for combating AMR by preventing bacterial infections and reducing antibiotic use in aquaculture systems. This study explores the role of fish vaccines in terms of their development, efficacy, and challenges, with a focus on vaccines targeting *Vibrio spp.*, *Aeromonas spp.*, and *Streptococcus spp.*, three of the most significant pathogens in aquaculture. The efficacy of these vaccines is demonstrated through improved immunological responses, enhanced protection rates, and favorable outcomes in field trials. In Malaysia, fish vaccine development is still in its early stages, with current efforts focused on antigen selection, vaccine formulation, and administration methods, particularly for bacterial infections. This study highlights the prevalence of bacterial pathogens, the progress made in vaccine development, and the immunological and practical outcomes of these efforts. It also identifies existing research gaps and emphasizes the crucial role of fish vaccines in reducing AMR and supporting the sustainability of global aquaculture practices.

***Keywords*:** Fish vaccine, AMR, Pathogens, Bacterial pathogens, shellfish

Application of Electron Beam for Animal Vaccine Preparation.

Dr. Palmy Jesudhasan*

United States Department of Agriculture (USDA-ARS)
Poultry Production and Product Safety Research Unit
O-306 POSC building, 1260 W Maple St
Fayetteville, AR 72701

***Corresponding author: Palmy.Jesudhasan@usda.gov**

Abstract

Vaccines stand as a cornerstone of modern medicine, offering robust protection against a wide array of infectious diseases. While effective vaccines exist for numerous pathogens, the quest for improved vaccine efficacy and broader coverage remains an ongoing endeavor. This presentation will delve into the critical role of electron beam (eBeam) technology in the development of inactivated vaccines. Inactivated vaccines, comprising killed or inactivated pathogens, offer several advantages, including a generally low risk of infection. However, traditional inactivation methods can sometimes compromise antigen integrity, potentially reducing vaccine efficacy. eBeam technology provides a compelling alternative, offering rapid, efficient, and consistent pathogen inactivation while preserving key antigenic properties. This presentation will explore the principles of eBeam technology, its applications in vaccine development, and its potential advantages over conventional inactivation methods. We will discuss the impact of eBeam technology on pathogen viability, antigenicity, and immunogenicity. Furthermore, we will examine the regulatory considerations and emerging trends in eBeam-based vaccine production, highlighting its potential to contribute significantly to advancements in vaccine development and global public health.

***Keywords*:** eBeam, Inactivation methods, infectious diseases, vaccine production, Public Health.

Vaccination strategies for disease management in aquaculture

Punnadath Preetham Elumalai*

Centre of Excellence for Aquatic Vaccine Development, Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin University of Science and Technology, Kochi, Kerala, India.

***Corresponding author**: preetham@cusat.ac.in

Abstract

Aquaculture is a fastest growing industry from national as well as global fronts on account of being a vital component in food production along with its pivotal role in contributing for livelihood especially in low to middle income countries (LMICs). As aquaculture continues to grow, fish diseases remain as major issue in industry resulting in major economic issue worldwide. Disease management practices started with use of antibiotics or antimicrobial agents, but drug resistance issues and accompanied safety concerns, alternative treatment strategy became a high matter of concern. Moreover, the dogma of One Health interconnecting animal, human and environment, fostered vaccination as a promising tool for disease management practice. Conventional vaccine development started from whole cell inactivated vaccine and over time novel approaches were implemented to progress the vaccine development to DNA and recombinant vaccines. Vaccines for many fish species have been identified and has been deployed by many countries, but aquaculture vaccines face frequent challenges in terms of administration and efficacy of vaccines. Efficacy of a vaccine is highly dependent on mode of administration of vaccine. Each mode of administration- intraperitoneal injection (i.p), immersion and oral- comes out with its own drawbacks. Innovative technologies like nanoparticle and lectin incorporated vaccine, molecular adjuvants, immunostimulants are found to boost the vaccine efficacy. Apart from these, acceptancy of the vaccine in countries to deploy and practice in fish farms are also heading with challenges. Apart from these advancements future research will focus on computational studies involving artificial intelligence to make key improvements in vaccine design. Vaccination is inevitable in health management in aquaculture and modern approaches in fish vaccine studies are essential to keep sustainable aquaculture so as to regain the livelihoods as well as economic stability across the world.

***Keywords*:** Aquaculture, vaccine development, disease management, fish immunity, lectin.

Marine finfish diseases and its health management through vaccination

Rameshkumar [a] *. P, K.K. Anikuttan [a], A. K. Abdul Nazar [b] M. Sakthivel [a], G. Tamilmani [a], M. Sankar [a], R. Bavithra [a] S. Abdul Majeed [c] and A.S. Sahul Hameed [c] and J. M. Rajwade [d]

[a] *Mandapam Regional Centre, Central Marine Fisheries Research Institute, Mandapam Camp, Tamil Nadu.*
[b] *Madras Regional Station, Central Marine Fisheries Research Institute, Chennai.*
[c] *Aquatic Animal Health Laboratory, C. Abdul Hakeem College Melvisharam, India.*
[d] Agharkar Research Institute, Pune, India.

***Corresponding author:** prkvet@gmail.com

Abstract

Sustainable aquaculture production can only occur when fish are healthy and free from disease. Fish disease management is a combination of preventing the onset of disease and measures to reduce losses from disease when it occurs. The major disease problems in mariculture are caused by a wide range of infectious organisms, including bacteria, viruses, fungi, protozoan and metazoan parasites. Among the bacterial diseases, vibriosis is one of the serious bacterial diseases in marine cultured finfish which is characterized by, exoptholmas, haemorrhagic gastritis, ascites, septicaemia and acute death. Fish cultured in floating cages become particularly susceptible to vibriosis caused by *V.alginolyticus, V.parahaemolyticus, and V.harveyi* when the juveniles are transferred to cages after the end of nursery phase. The polyvalent (*V.alginolyticus, V.parahaemolyticus* and *V.harveyi*) vaccine against vibriosis had been developed and standardized in laboratory as well as in cage culture fish. The main aim of this research output is to prevent the seasonal epizootics of vibriosis in cultured cobia. So, the incidence has been controlled by proper yearly vaccination schedule. Among the viral diseases, the betanoda viruses are an important, emerging group of viruses known to infect over 40 marine fish species worldwide. *Viral nervous necrosis* (VNN) can affect multiple fish species in all production phases broodstock and hatchery, but it is especially severe in larvae and juvenile stages, where can it cause up to 100% mortalities. Against the VNN, injectable (inactivated, recombinant and DNA vaccines) and oral vaccines (plain and ZnO nanoparticle-based Inactivated, Recombinant and DNA vaccines) have been developed and experimental studies were completed in pompano fingerlings. All three types of vaccines elicited good immune responses with high RPS as compared to the non-vaccinated fish. The growth metrics, as well as body weight and size, varied significantly ($p<0.05$) between the vaccinated and control groups.

***Keywords*:** Vibriosis, Cobia, Viral nervous necrosis, Pompano, Nano vaccine

Green Energy-A futuristic Energy

Ramasubramanian Venkatachalam*

Unit of Aquatic Biotechnology and Live Feed Culture, Department of Zoology, School of Life Science, Bharathiar University, Coimbatore, Tamil Nadu, India

***Corresponding author**: vramans68@buc.edu.in

Abstract

In this study, we propose green energy strategies for sustainable development. Green energy, derived from renewable and ecologically sustainable sources, is important in mitigating climate change and reducing dependence on fossil fuels. Green energy offers several benefits across environmental, economic, and social aspects. Environmentally, it reduces greenhouse gas emissions, lowers air and water pollution, and helps combat climate change. Economically, it creates jobs in renewable sectors, reduces dependency on imported fossil fuels, and lowers long-term energy costs. Socially, it enhances energy security, accelerates sustainable development, and promotes healthier communities. Sustainable green energy refers to renewable, low-impact energy sources that can meet current and future energy needs without harming the environment. Renewable energy sources such as solar, wind, hydro, bioenergy, and tidal power are sustainable in the long term. These energy sources offer significant benefits such as reducing pollution and carbon emissions, enhancing energy security, creating jobs, and providing long-term affordability due to low operating costs. Biomass and waste-derived fuels are also potential sources of energy since waste can be converted into useful forms of energy. These energy sources are sustainable, as they continuously produce new units. Smart grids, hydrogen fuel systems, and high-capacity energy storage improve the reliability and scalability of renewable energy. As the demand for global energy continues to increase, going green is the critical step toward carbon neutrality, energy security, and longer-term environmental sustainability. Additionally, nanotechnology and artificial intelligence improve energy management, ensuring maximum resource utilization and efficiency. In this way, green energy is a pathway to a more environmentally beneficial and sustainable future.

***Keywords*:** Green Energy, Renewable Energy, Sustainability, Energy Management Nanotechnology & AI

Role of Bioinformatics in Vaccine Design and Development for Cancer Prevention

Dr. A. Bharathi*

Associate Professor & Research Supervisor, PG & Research Department of Zoology, Sir Theagaraya College, Chennai – 600021, Tamil Nadu, India.

***Corresponding author: Professorbharathi.stc@gmail.com**

Abstract

Cancer is still one of the top threatening killers in the world, despite the improvements in cancer biology, prevention, and therapy over the past few decades. For this reason, new and creative ways to reduce its incidence are required. Applying vaccinations to encourage the immune system to react selectively against cancer cells and/or cancer-associated infections is known as cancer immunisation. Specific vaccines against infectious diseases caused by bacteria, viruses, and parasites are designed and developed using reverse vaccinology, immunoinformatics, and structural vaccinology. These include a number of newly or re-emerging infectious diseases, as well as therapeutic vaccines to combat cancer, allergies, and substance dependence that have been made possible or are being developed utilising bioinformatics strategies. The majority of cervical malignancies as well as anal, oropharyngeal, and vaginal cancers are caused by HPV strains. RNA and DNA Vaccines use the DNA or RNA code of the receiver to produce cancer-related antigens. The immune system can be categorised as humoral or cellular, and the predicted immune response can be triggered based on the condition. The program must look for antigens that the major histocompatibility complex (MHC) molecules found in T cells can recognise if a vaccination that triggers a cellular response is required, such as a vaccine against leishmaniasis or a vaccine against tuberculosis. The combination of immunomics and bioinformatics led to the development of a new field of study called immunoinformatics, which aims to anticipate immune responses against certain chemicals by analysing all of an organism's immunomic data. TEpredict, CTLPred, nHLAPred, ProPred-I, MAPPP, SVMHC, GPS-MBA, PREDIVAC, NetMHC, NetCTL, MHC2 Pred, IEDB, BIMAS, SVMHC, POPI, Epitopemap, iVAX, FRED2, Rankpep, BIMAS, PickPocket, KISS, and MHC2MIL are among the programs used for this purpose.

***Keywords*:** Immunoinformatics, Reverse vaccinology, Cancer prevention, HPV, DNA and RNA Vaccines.

Nano-Biomaterials in Vector Management: A Greener Approach for Dengue and Zika Control

Marimuthu Govindarajan [a, b]*

[a] *Unit of Natural Products and Nanotechnology, Department of Zoology, Government College for Women (Autonomous), Kumbakonam 612 001, Tamil Nadu, India.*
[b] *Unit of Vector Control, Phytochemistry and Nanotechnology, Department of Zoology, Annamalai University, Annamalainagar 608002, Tamil Nadu, India*.

***Corresponding author**: drgovind1979@gmail.com

Abstract

Particularly in tropical and subtropical areas, vector-borne illnesses like dengue and Zika pose serious threats to world health. Exploring environmentally acceptable alternatives is necessary because traditional vector control approaches that rely on chemical pesticides have caused problems such environmental contamination, resistance development, and harm to non-target creatures. A promising remedy that offers target-specific action, sustained efficacy, and less environmental impact is nano-biomaterials. These materials combine the benefits of nanotechnology and biomaterials to offer sustainable vector control alternatives. They are nanoscale-engineered materials that contain biological components like as plant extracts or bioactive chemicals. Effective larvicidal and mosquito-repelling properties are demonstrated by a variety of applications, including plant-based nanoparticles, nanoemulsions, biopolymeric nanoparticles, and nanoparticle-integrated mosquito nets. Nano-biomaterials reduce their environmental impact while addressing safety and resistance management issues. Despite challenges such as scalability, regulatory hurdles, and community acceptance, ongoing research, optimized formulations, and interdisciplinary collaboration have the potential to establish nano-biomaterials as a transformative approach for sustainable dengue and Zika control.

***Keywords*:** vector-borne illnesses, nano-biomaterials, nanoemulsions, dengue, Zika.

Influence of edible vaccine, IgY in cultivable shrimp species against bacterial and viral infection

T. Citarasu [a]*, G. Uma [a], J. R. Anusha [a], T. Kumaran [b] and R. Raja Jeya Sekar [c]

[a] *Aquatic Animal Health Laboratory, Centre for Marine Science and Technology, Manonmaniam Sundaranar University, Rajakkamangalam, Kanyakumari District, Tamilnadu 629502, India*
[b] *P. G & Research Department of Zoology, Muslim Arts College, Thiruvithancode, Kanyakumari District, Tamilnadu, 629174, India*
[c] *P. G. Department of Zoology, South Travancore Hindu College, Kanyakumari District, Tamil Nadu 629002, India*

***Corresponding author: citarasu@msuniv.ac.in**

Abstract

Chicken egg yolk antibodies (IgY) are the of immunoglobulin produced through egg yolk have so many therapeutic advantages. The present study inactivated White Spot Syndrome Virus (WSSV) and pathogenic vibrios such as *Vibrio harveyi* and *V. parahaemolyticus* along with herbal immunoadjuvants were separately immunized with *Gallus gallus domesticus* during the layoff period. Immunization was also repeated after 10 days (booster dose) with the same amount (600µg) of immunogens. After 5 weeks, eggs were collected from experimental and control chickens and purified the IgY. After purifying the IgY, stability studies were performed with temperature, pH, trypsin and chymotrypsin etc. Further the control and Anti-WSSV, anti-*V. harveyi* and anti-*V. parahaemolyticus* IgYs (5%) were coated with pellet diets and fed to the shrimp species such as *Fenneropenaeus indicus* and *Penaeus monodon* sub-adults for 25 days. After the vaccination trials, shrimps were challenged with virulent WSSV for *P. monodon* and pathogenic vibrio for *F. indicus* respectively and assessed the survival. Also, haematological and immunological parameters were assessed the vaccinated and non-vaccinated groups before challenging. The shrimp groups from control had succumbed to death 100 % within 5 days after challenge whereas the vaccinated groups had more than 60 % survival and significantly ($P< 0.01$) differed. The haematological parameters like coagulase activity, total haemocyte count and oxyhaemocyanin level also significantly ($P<0.05$) increased in vaccinated groups from non-vaccinated groups. The immunological parameters like prophenoloxidase, intracellular superoxide anion production, lysozyme, phagocytosis and bacterial agglutinin had significantly ($P< 0.001$) increased in the vaccinated groups in comparison with non-vaccinated shrimp groups. The finding revealed that, IgY is act as the alternative antimicrobial prophylactics for shrimp aquaculture industry especially the best alternatives for banned antibiotics.

***Keywords*:** Edible Vaccine, IgY., Vibrios, WSSV, Shrimps

Future of Biotechnological Business

Sivasanmugam Karthikeyan*

Vellore Institute of Technology, Vellore

***Corresponding author:** siva.karthikeyan@vit.ac.in

Abstract

The future of biotechnological business is poised for unprecedented growth, driven by advancements in genetic engineering, synthetic biology, and artificial intelligence. With the increasing demand for personalized medicine, sustainable agriculture, and bio-based industries, biotechnology is set to revolutionize healthcare, food production, and environmental management. Innovations in CRISPR technology, biopharmaceuticals, and bioinformatics are accelerating drug discovery and precision medicine, leading to more effective treatments with reduced side effects. Additionally, the rise of biofuels, biodegradable materials, and lab-grown food is fostering a shift toward a more sustainable and eco-friendly economy. The integration of AI and big data in biotechnology is enhancing research efficiency, reducing costs, and expediting product development. As governments and private investors recognize the potential of biotech, funding and regulatory support are expected to expand, further accelerating industry growth. However, ethical considerations, regulatory challenges, and intellectual property issues must be carefully navigated to ensure responsible development. The future of biotechnological business will be defined by interdisciplinary collaboration, technological convergence, and a commitment to ethical and sustainable innovations, paving the way for transformative global impact.

***Keywords*:** CRISPR, biopharmaceuticals, bioinformatics, IP, drug discovery.

Antibacterial Activity and Biochemical Characterization of an Ethanolic Crude from Ink and Mucus of Genus *Aplysia spp*.

S. Tamil selvi, Dr. K. Bhanumathi*

Department of Zoology, Kamaraj College (Autonomous), Thoothukudi.

***Corresponding author:** banumadhu1978@gmail.com

Abstract

To assess the antibacterial activity of ethanolic extract of ink and mucus from the marine gastropod genus *Aplysia* spp. against selected human pathogenic bacteria (HPB), *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus cereus*, and *Pseudomonas aeruginosa*. The antibacterial activity evaluated using disk diffusion method and Ciprofloxacin used as standard with the inhibition zones ranged from 28mm to 33mm. Regarding the antibacterial activity of *Aplysia*'s ink and mucus, inhibition zone of ink ranged from 5mm to 10mm, while mucus ranged from 6mm to 8mm against the tested bacteria. The highest antibacterial activity was detected against *Staphylococcus aureus* (10 mm), followed by *Escherichia coli* (7 mm) and then by *Pseudomonas aeruginosa* (7 mm). Thus, the antibacterial properties of *Aplysia*'s ink and mucus were less effective in comparison to ciprofloxacin. *Bacillus cereus* (5mm), showed high resistant towards ink and no inhibition towards mucus extract. The assay concentration ranged from 200 µg/ml to 1000 µg/ml. The alpha-amylase inhibition assay showed inhibition up to 50.41% for ink extract and 52.01% for mucus extract. Membrane stabilization assay indicated inhibition of 36.62% for ink extract and showed no inhibition for mucus extract. Additionally, the protein denaturation inhibition assay showed inhibition up to 86.46% for ink extract and 91.67% for mucus extract. Metal chelation activity showed inhibition of 83.94% for ink and 80.31% for mucus. The total antioxidant activity was evaluated by phosphomolybdenum showed 72.22% of inhibition for ink extract and 61.11% for mucus extract. The findings of the study revealed the potency of *Aplysia* spp. as good therapeutic source for infections and diseases. Further investigations needed to separate and elucidate the bioactive compounds and mechanism of actions for development of new pharmaceuticals.

***Keywords*:** *Aplysia spp*, ink and mucus, Ciprofloxacin, antibacterial activity, phosphomolybdenum

Recent Study of Heavy Metal Accumulation in *Nemipterus japonicus* from Thiruvanmiyur in Chennai, Tamilnadu.

Arokiya Doss S [a], Bharathi. A [a]*, Lakshmanan R [b], Safiq Rahman M [a]

[a]PG and Research Department of Zoology, Sir Theagaraya College, Chennai. - 600021, Tamilnadu, India.
[b]Assistant Professor, Department of Zoology, D.G.G. Arts College for Women, Mayiladuthurai, Tamilnadu, India.

***Corresponding author:** author-shanthigopalakrishnan29@gmail.com , sarokiadoss1978@gmail.com

Abstract

The amounts of heavy metals vary significantly among fish species and tissues. Mercury (Hg), Arsenic (As), Nickel (Ni), and Selenium (Se) were the heavy metals that were examined in water samples from the Thiruvanmiyur coastal region as well as in various sections of the edible fish *Nemipterus japonicus*. Between January 2023 and December 2024, the study was carried out in close to Thiruvanmiyur. To assess the following heavy metals, including mercury, arsenic, nickel, and selenium, tissues from the muscles and liver were taken. This study presents an analysis and presentation of the water quality parameters in the Thiruvanmiyur coastline area. The findings indicated that the water and fish sample were highly contaminated, making them unfit for human consumption. The recent study found that heavy metals are more prevalent in muscle tissue than liver tissue. The findings of this study can serve as a baseline for monitoring and risk assessment research in the future. Consequently, the heavy metal concentration is computed and tracked on a regular basis.

***Keywords*:** Heavy metals, *Nemipterus japonicus*, Thiruvanmiyur coastline, highly contaminated, Muscle and Liver.

Advances in Aptamer Technology- A Therapeutic Approach Towards Cancer

Solaimanikandan S [a] and Saraswathy SD [a]*

Department of Biomedical Science, Bharathidasan University, Tiruchirappalli-620024

***Corresponding author**: sdswathy@bdu.ac.in/sd.saraswathy@gmail.com

Abstract

Aptamers are short single-stranded oligonucleotides (ssDNA) or RNA (25–80 bases) with high affinity for specific target molecules and a potent alternative to monoclonal antibodies in many aspects like therapeutic and diagnostic approach of diseases. Currently, the use of aptamers has increased into several folds because of their role in detecting specific targets. Aptamer technology makes it feasible to screen protein or peptide ligands for unidentified targets. The development of aptamers specific to cell surface indicators, such as malignant biomarkers, has become feasible, accordance to the cell SELEX technology. As a result, numerous aptasensors have been developed to recognize various cancers. Cell SELEX also created selective aptamers against bladder and gastric carcinoma cells in this manner, and these agents demonstrated high effectiveness in cancer cell identification. Using drug loaded and aptamer-modified particles after incubation resulted in a significant reduction in cell survival, indicating effective in vitro targeting of cancer cells. Multidrug resistance (MDR) is a major problem in cancer treatment because it reduces the effectiveness of chemotherapy. One way to increase intracellular medication concentration among cancer cells while reducing cytotoxicity to healthy cells is to use nanoparticles modified with aptamers. Nanoparticles may pass through hyperpermeable and leaky tumour vasculature because of their tiny size. In order to defeat MDR, anticancer medications and extra chemosensitizers might be added to delivery systems. Gemcitabine (GEM) is one of the first-line chemotherapies for bladder cancer (BC), but the GEMs cannot recognize cancer cells and have a low long-term response rate and high recurrence rate with side effects during the treatment of BC. Targeted transport of GEMs to mediate cytotoxicity to tumour and avoid the systemic side effects remains a challenge in the treatment of BC. But with the help of advanced aptamer-based technology it was found that protein tyrosine kinase 7 (PTK7) was overexpressed on the cell membrane surface in BC cells. Through this protein tyrosine kinase 7 aptamer-Gemcitabine conjugate (PTK7-GEMs) was designed and synthesized using a specific PTK7 aptamer and GEM through auto-synthesis method to deliver GEM against BC. PTK7-GEMs can specifically bind and enter to BC cells via the macropinocytosis pathway, which induced cytotoxicity after GEM cleavage from PTK7-GEMs. PTK7-GEMs showed stronger anti-tumour efficacy and PTK7-GEMs is a successful targeted aptamer-drug conjugates strategy (APDCs) to treat BC, which will provide new directions for the precision treatment of BC in the field of biomarker-oriented tumour targeted therapy. This, review mainly focuses on the advances in aptamer technology and its role in cancer therapeutics.

***Keywords*:** Aptamer, Cell SELEX- Cell based Systematic Evolution of Ligands by Exponential Enrichment, PTK7- Protein tyrosine kinase 7, Targeted therapy, GEM- Gemcitabine.

Extracellular biosynthesis of ZnO nanoparticles using probiotic *Bacillus paramycoides* DRBV2: characterizations, antimicrobial, anticancer, and antioxidant efficiency

Dharmaraj Ramesh [a]*, Sounthirarajan Lakshmi Priya [b] and Baskaralingam Vaseeharan [a]*

[a]Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus 6th Floor, Alagappa University, Karaikudi, 630 004, Tamil Nadu, India.
[b]Department of Statistics, Pondicherry University, Kalapet – 605 014, Puducherry, India.

***Corresponding authors: drammicro@gmail.com, vaseeharanb@gmail.com**

Abstract

The current study focuses on the biosynthesis and characterization of zinc oxide nanoparticles (ZnO NPs) using an extracellular protein from *Bacillus paramycoides* DRBV2, as well as the assessment of their antibacterial, anticancer, and antioxidant characteristics. The zinc oxide was characterized by UV-visible absorption spectroscopy, X-ray Diffraction (XRD), and Fourier-transform infrared (FTIR) spectroscopy. ZnO NPs showed the highest absorption at 325 nm, which validates their properties. The ZnO NPs showed cytotoxicity on the A549 cancer cell line, with an effective half maximal inhibitory dose (IC_{50}) of 120 µg/ml. ZnO NPs demonstrated substantial antioxidant activity ($P < 0.05$) in DPPH assays. This study confirms that biologically generated ZnO nanoparticles may have much greater antibacterial activity against *A. hydrophila*, *V. parahaemolyticus*, *V. harveyi*, and *P. aeruginosa*. In addition to their strong lethal effect on epithelial cancer cells, the produced ZnO NPs exhibit antioxidant properties and may find application in the creation of cancer drugs. According to the study, extracellular proteins from the probiotic *B. paramycoides* have a great deal of therapeutic potential and can be utilized in the biosynthesis of zinc nanoparticles. The development of biosynthesized zinc nanoparticles as a potential antibacterial and anticancer medication candidate is possible with the right validation.

***Keywords*:** Zinc nanoparticles, *Bacillus paramycoides* DRBV2, biosynthesis, Antibacterial, Extracellular protein.

Metabolomics and Antibiofilm Insights of Fenugreek Microgreens as a Natural Antibacterial Agent against aquatic pathogens

Sudharshini Jayaraman[a], Thirumurugan Ramasamy[a, b]*

[a]Laboratory of Aquabiotics /Nanoscience, Department of Animal Science, School of Life Sciences, Bharathidasan University, Tiruchirappalli, 620024, Tamil Nadu, India
[b]Central University of Tamil Nadu, Thiruvarur, 610005, Tamil Nadu, India.

***Corresponding author**: ramthiru72@gmail.com

Abstract

Fenugreek microgreens (FGM) are flavored for their nutritional quality, palatability, and add on flavor to functional foods. The study investigated the metabolomic profile of FGM and evaluated their bioactive potential as antibacterial and antibiofilm agent combating bacterial biofilms. Phytochemical analysis revealed that ethanol extract exhibited the highest phenolic content (54.0 ± 2.4 mg GAE g^{-1}), while the methanol extract contained elevated levels of flavonoids and tannins (68.3 ± 1.4 mg QUE g^{-1} and 61.7 ± 1.1 mg TAE g^{-1}, respectively). The ethyl acetate extracts reportedly have potential antibacterial activity against *Aeromonas hydrophila*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*, with inhibition zones of 19.75 mm, 20.70 mm, and 24.4 mm, respectively. Furthermore, minimum inhibitory concentration (MIC) significant shows the antibiofilm activity, with percentage inhibitions of 62.3%, 63.5%, and 70.4% for the respective pathogens. Microscopic observations and quantitative assays further validated the antibiofilm efficacy of the ethyl acetate extract at MIC levels. The profiling bioactive compounds using GC-MS and FT-IR helps in the metabolomic exploration to identified key bioactive compounds in the extracts, including 1,2-benzene dicarboxylic acid, 2-hydroxy propanoic acid and 2-propenoic acid tridecyl ester. These compounds could be responsible for the possible antibacterial properties. *In silico* validation shows that 1, 2-benzene dicarboxylic acid as a critical bioactive compound in FGM, with favourable ADMET properties. This molecular docking approach demonstrated the strong binding affinity of the compound to biofilm-associated proteins, such as LecB (PDB ID: 1OXC) and PilA (PDB ID: 5VXY). The observed interaction efficiency empathises the potential of 1, 2-benzene dicarboxylic acid to disrupt biofilm formation by interfering with protein-mediated initial attachment mechanisms. This integrated experimental and computational investigation highlights the biological potential of FGM as a source of nutraceutical bioactive compounds. The study findings provide strong foundation for further research into their application as functional foods. The study also emphasizing the need for clinical trials to validate the promising *in vitro* and *in silico* results.

***Keywords*:** FGM, antibacterial activity, bioactive compounds, *in silico,* ADMET.

Development of Sustainable Silver Nanoparticles for Targeted Anticancer Activity against Gastric Cancer

R. Narmatha [a, b], M. Sundararajan [a] and P. Boomi [a, b]*

[a] *Department of Industrial Chemistry, School of Chemical Sciences, Alagappa University, Karaikudi, Tamil Nadu, India*
[b] *Department of Bioinformatics, Alagappa University, Karaikudi, Tamil Nadu, India,*

***Corresponding author**: pboomi1983@gmail.com

Abstract

Gastric cancer is the fifth prominent cause of cancer globally with significant rates of mortality and morbidity. Although various treatment modalities have been identified and developed for gastric cancer treatment, they are not effective due to have poor bioavailability nonspecific target and also exhibits serious side effects like gastrointestinal disturbances, bone marrow suppression, and organ damage. As a result, there is a pressing need to develop the novel with potential biomarkers is imperative. In the present study, silver nanoparticles (AgNPs) was synthesized by greener method using *Premna latifolia* leaf extract which has been used to study the Surface Plasmon Resonance (SPR), different functional group present in the plant extract, crystalline phases, oxidation state and morphology along with nanoparticle size which was characterized by UV-Vis, FT-IR, XRD, XPS and HR-TEM analyses respectively. All the studies have shown that the formation AgNPs has been successfully synthesized using natural plant extract. Furthermore, *in vitro* anticancer activity Roxb mediated AgNPs was explored on human gastric adenocarcinoma (AGS) cancer cell line using the MTT assay. The investigation of anticancer activity revealed that the AgNPs has significant activity against AGS cancer cell line. This study demonstrates that *Premna latifolia*-mediated AgNPs offer a low-cost, non-toxic, and eco-friendly alternative for the synthesis of alternative medicine. The promising anticancer activity against gastric cancer cells highlights their potential as novel therapeutic agents for future cancer treatments, contributing to the ongoing effort to develop safer, more effective cancer therapies.

***Keywords*:** Anticancer activity, AGS cancer cell line, Characterizing Techniques, *Premna latifolia*, silver nanoparticles

A critical review on pharmacological properties of polysaccharides from marine macroalgae

B. Jegadeshwari and R. Rajaram*

Department of Marine Science, Bharathidasan University, Tiruchirappalli – 620 024, Tamil Nadu, India.

Corresponding author: rajaramdms@bdu.ac.in

Abstract

Marine macroalgae represent a rich and diverse source of bioactive compounds, particularly polysaccharides, which have gained considerable attention for their pharmacological potential. These polysaccharides, such as agar, carrageenan, alginates, fucoidans, and ulvans, exhibit a wide array of biological activities that make them attractive candidates for therapeutic applications. Their structural diversity, along with the presence of unique functional groups, including sulfate esters, plays a critical role in their bioactivity, enhancing their therapeutic potential. Recent studies have highlighted the immunomodulatory, anti-inflammatory, antioxidant, antidiabetic, anticancer, antiviral, and antimicrobial properties of marine algal polysaccharides. They have demonstrated the ability to modulate immune responses through the activation of immune cells and cytokine production, positioning them as potential immunotherapeutic agents. Additionally, their capacity to mitigate oxidative stress and inflammation suggests their utility in managing chronic diseases, such as cancer, cardiovascular disorders, and neurodegenerative conditions. Marine algal polysaccharides also exhibit potent anticancer effects, including the inhibition of tumour cell proliferation, induction of apoptosis, and enhancement of chemotherapy efficacy. Their antiviral and antimicrobial activities provide promising avenues for combating infectious diseases, particularly in light of rising antibiotic resistance. Despite their promising pharmacological effects, the mechanisms underlying these actions remain under investigation. The low toxicity and high biocompatibility of marine algal polysaccharides further support their potential for therapeutic development. This review presents a comprehensive overview of the experimental evidence supporting the pharmacological roles of these polysaccharides and their significant promise in advancing disease management and promoting human health.

***Keywords*:** Marine macroalgae, bioactive polysaccharides, pharmacological properties, disease management, therapeutic uses.

Facile Fabrication, Structural characterization of hydrogel using fenugreek (*Trigonella foenu graecum*) / nickel oxide nanoparticles decorated hydrogel composite material and their efficient photocatalytic application

Vidya Prakash Annamalai[a], Hemanth Kumar Gautam Raj[a, b], Sudharshini Jayaraman[a], Manoj Kumar Peter Ignasis[a, b], Thirumurugan Ramasamy[a, c]*

[a]*Laboratory of Aquabiotics /Nanoscience, Department of Animal Science, School of Life Sciences, Bharathidasan University, Tiruchirappalli, 620024, Tamil Nadu, India.*
[b]*Department of Biotechnology & Bioinformatics, Bishop Heber College (Autonomous), Tiruchirappalli, 620017, Tamil Nadu, India.*
[c]*Central University of Tamil Nadu, Thiruvarur, 610005, Tamil Nadu,* India.

***Corresponding author**: ramthiru72@gmail.com

Abstract

The composite hydrogel decorated with nickel oxide nanoparticles (NiO_2NPs) was synthesized using grafting of fenugreek seed gum. Initially, the green synthesized NiO_2NPs were synthesized using nickel oxide and loaded after the preparation of hydrogel. The functionalized composite hydrogel, physico-chemical characteristics nature was characterized by FT-IR, SEM, XRD, XPS, DLS and Zeta potential. The combination of broadband hydrogel and sharp peaks of nanoparticles in XRD indicated the successful synthesis of composite hydrogel. The FT-IR spectrum of hydrogel represented the characteristics of its main components with major and minor shifts in the vibrational frequencies. The SEM images revealed the cross-linked network of hydrogel with a uniform distribution of nanoparticles and elemental analysis detects the composition of elements in a hydrogel. The composite and hydrogel were utilized for photocatalytic dye degradation. Photocatalytic dye degradation efficiency of naturally prepared hydrogel showed methylene blue (82%) and malachite green (64%), and hydrogel decorated NiO_2NPs showed methylene blue (90.95%) and malachite green (68.92%). All the results of dye degradation were evaluated as potential catalytic activity, the hydrogel and NiO_2NPs decorated hydrogel composite holds prominent for real-time photocatalytic degradation applications.

***Keywords*:** NiO_2 NPs, Fenugreek seed gum Composite, Dye degradation, Hydrogel, Physio-chemical characterization.

Evaluation of Phytochemical Screening, Antioxidant and Bioactive Compounds from *Trigonella foenum-graecum* (Fenugreek) Leaf Extracts

B. Aarthy[a], P. Manoj Kumar[b], J. Sudharshini[a], R. Hemanth Kumar Gautam[b], R. Thirumurugan[a, c. *]

[a]Department of Animal Science, Bharathidasan University, Tiruchirappalli-620024
[b]Department of Biotechnology & Bioinformatics, Bishop Heber College, Tiruchirappalli-620017
[c]Central University of Tamil Nadu, Thiruvarur-610005, Tamil Nadu, India

***Corresponding author**: *ramthiru72@gmail.com*

Abstract

Phytochemicals are bioactive substances found in various herbs, fruits, vegetables, oil, seeds, and other foods that have been demonstrated to exhibit health benefits, such as antioxidant, antimicrobial, anti-inflammatory, and anticancer effects. Studying of Plant chemistry is known as Phytochemistry. *Trigonella foenum-graecum* (Fenugreek) is a medicinal herb belonging to the family Fabaceae. Phytochemical screening of *Trigonella foenum-graecum* leaf was extracted with three solvents ethanol, ethyl acetate, and petroleum either. Based on the extracts show the presence of phytochemicals such as alkaloids, flavonoids, phenols, tannins, and saponins. Quantitative analysis of ethanol extract (R^2=0.911). Flavonoid (R^2=0.956), and tannin (R^2=0.939) content were interpolated with the absorbance of the prepared samples. FT-IR spectra confirmed the presence of functional groups in ethanol, ethyl acetate, and petroleum ether were identified such as C-H stretch. C=O stretch. C-H bending. O-H bending. C-N stretching, S=O stretching. O=C=O stretch, and C=C bending. GC-MS method is used to analyze the phytochemical markers in the plant material. GC-MS also identified and confirmed the functional groups and bioactive metabolites. Antioxidant activity (DPPH (45.12±0.6), ABTS (52.4±0.06), and TAC (52±0.054)) of ethyl acetate extracts showed potential antioxidant capacity. The presence of key components such as octadecane, oleic acid, and palmitic acid in the prepared solvent extracts suggests that it has a higher antioxidant potential. Furthermore, this study encourages work in antibacterial activity and biofilm inhibition assay in future reports. These medicinal plants as a potential source in the pharmaceutical and healthcare industries.

***Keywords*:** *Trigonella foenum-graecum,* phytochemical analysis, GC-MS, FT-IR, Antioxidant.

Computational and structural investigation of β-cyclodextrin/ curcumin (β -CD/CRCM) inclusion complex and their biological applications

Ravi Kumar VV[a], Ashokkumar Sibiya[b] , Vaseeharan Baskaralingam[b] , Stalin Thambusamy[a]*

[a] *Department of Industrial Chemistry, Alagappa University, Karaikudi - 630 003, Tamil Nadu, India.*
[b] *Department of Animal Health and Management, Alagappa University, Science campus 6th floor, Karaikudi – 630 003, Tamil Nadu, India.*

***Corresponding author**: stalin.t@alagappauniversity.ac.in

Abstract

Curcumin (CRCM) is a polyphenolic compound that has diverse pharmacological properties so it possesses more attention in biological application. However, the poor solubility isa major drawback of the curcumin for large-scale production in the pharmaceutical industries. To overcome this solubility issue, the curcumin involves the supramolecular inclusion process. In this work, the β-cyclodextrin is a host compound with a hydrophobic inner cavity and hydrophilic outer cavity, is used to encapsulate the curcumin guest and forms β-cyclodextrin/ curcumin (β -CD/CRCM) to enhance the solubility of the curcumin. The inclusion complex is prepared by kneading, co-precipitation, and solvent evaporation methods and the inclusion complexes were characterized by FT-IR, NMR, and 2D-ROSEY for the successful preparation of inclusion complexes. For the theoretical evidence, the DFT calculation was performed to study the molecular interaction, energy level, electronic behaviour, and properties at the atomic level. The optical studies were performed through the UV-visible spectrometer and fluorescent spectrophotometer. Scanning electron microscopy and thermogravimetry analysis were performed to study the surface morphology and thermal behaviour of compounds and complexes respectively. Moreover, the cyclic voltammetry was performed to analyse the electrochemical behaviour of the inclusion complex at various concentrations of β-CD. The prepared complex β- CD/CRCM antibacterial behaviour was analysed using *Enterococcus faecalis* bacteria and *Staphylococcus aureus* and the antioxidant studies are performed by DPPH assay and the antibiofilm study of the colony formation of the bacterial.
***Keywords*:** β-Cyclodextrin, Curcumin, Inclusion complex, cyclic voltammetry, Antibacterial activity.

Characterization of a novel C-type lectin from *Scylla serrata* and bio potentiality as vaccine adjuvant for fish.

Ritam Guha[a], Ishwarya Ramachandran[a], Sivashanmugam Karthikeyan[b], Baskaralingam Vaseeharan[c], Preetham Elumalai[a]*.

[a] *Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin University of Science and Technology, Kochi -682016, Kerala, India*
[b] *School of Bioscience & Technology, VIT University, Vellore, 632014, Tamil Nadu, India.*
[c] *Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Science Block 4th Floor, Burma Colony, Karaikudi, 630004, Tamil Nadu, India.*

***Corresponding author**: preetham@cusat.ac.in

Abstract

Marine lectins are unique glycoproteins that induce non-specific immunity in fishes and crustaceans. Mud crab *Scylla serrata* is highly abundant globally and reared especially in Southeast Asia for its economic value. However, the characterization of the specific lectins is still not explored properly. This current study depicts the isolation of a novel C-type mannose-binding lectin (MBL) from the marine crab *Scylla serrata* haemolymph using Affinity chromatography. The purified lectin (*Ss*-Lec) of approximately 71kDa showed haemagglutination activity at the lowest concentration. The HPLC, XRD, FTIR, and MalDi-TOF analysis evaluated the homogenous and crystalline nature of the protein. The purified *Ss*-Lec showed extensive antimicrobial properties against the important pathogenic aquatic bacteria *Streptococcus iniae, Streptococcus agalactiae, Edwardsiella tarda, and, Aeromonas veronii* at a concentration of 25-100µg/ml. Lectin has been used as an immunostimulant in Nile tilapia via intraperitoneal injection. The IgM titer and innate immune parameters such as lysozyme, myeloperoxidase, SOD, and catalase have been evoked. The lectin has high potential uses in vaccine development for fish and can be used as a vaccine adjuvant to improve vaccine efficacy.

***Keywords*:** Mannose-binding lectin, Anti-biofilm activity, Antibacterial activity, *Scylla serrata*, Vaccine adjuvant.

Expression of *Mycoplasma gallisepticum* Multi-epitopic Vaccine construct in a Plant system against Chronic Respiratory Disease affecting Poultry Chickens

M. Susithra Priyadarshni, V. Divyadharshini, L. Nivetha, M. C. Harish*

Plant Genetic Engineering and Molecular Farming Lab, Department of Biotechnology, Thiruvalluvar University, Vellore, India.

***Corresponding author:** mc.harishin@gmail.com

Abstract

Mycoplasma gallisepticum mediated chronic respiratory disease causes respiratory rales, coughing in avian species. Currently available vaccines against *M. gallisepticum* infection are limited due to their low effectiveness and requirement of multiple dosages. *M. gallisepticum* cytoadherence proteins - GapA, CrmA, PlpA and Hlp3 are involved in adhesion of the pathogen into the respiratory tract for colonization causing infection. As plant made proteins and therapeutics are gaining attention due to their safety and efficiency, here we constructed a 21.4 kDa multi-epitope peptide vaccine (MEPV) candidate with immunogenic domains from cytoadherence proteins and validated. MEPV was cloned, transformed in plant expression vector and expressed in *Nicotiana tabacum* leaves. The plant expressed MEPV protein is/was found to be immunogenic when administered to chickens intramuscularly. The plant made MEPV antigen induced IgY neutralizing antibodies against cytoadherence protein epitopes significantly in immunized chickens compared with control chickens. This preliminary study proves the plant produced MEPV was functionally proficient in triggering immune response against *M. gallisepticum* in chickens. The development of poultry vaccines in non-food crops for immunization offers a wide range of possible applications. For the development of an efficient poultry health management system and a sustainable poultry industry, more study is required on the creation of an avian vaccine using plant biotechnology.

***Keywords*:** *M. gallisepticum*, chronic respiratory disease, multi-epitope peptide vaccine (MEPV), Plant-made vaccines, Poultry vaccine development

Preliminary investigation of the immunogenic potential virulent proteins in *Mycoplasma capricolum* sub sp. *capripneumoniae* for a multi-epitope vaccine construct against contagious Caprine Pleuropneumonia in Goats

V. Divyadharshini and M. C. Harish*

Plant Genetic Engineering and Molecular Farming Lab, Department of Biotechnology, Thiruvalluvar University, Vellore, India.

***Corresponding author:** mc.harishin@tvu.edu.in

Abstract

Contagious caprine pleuropneumonia (CCPP) is a severe respiratory disease in goats caused by *Mycoplasma capricolum* subsp. capripneumoniae (Mccp). Epidemiological studies have identified Mccp as the sole causative agent of CCPP. Over the past two decades, there has been an increase in the emergence and spread of Mccp-associated diseases globally. This disease is characterized by severe pleuritis, necrotizing pneumonia, and significant mortality, leading to substantial economic losses in the goat-rearing industry. Future prevention methods should include effective vaccination strategies and improved biosecurity measures. The surface proteins of Mccp, such as lipoproteins and adhesion-related proteins, are promising candidates for the development of a multi-epitope vaccine against this pathogen. In this study, we utilized an in-silico approach to design a multi-epitope vaccine. Nearly 878 epitopes of T-cell and B-cell-specific epitopes were identified by predicting MHC-I and MHC-II binding affinities. The multi-epitope construct was designed at the size of 0.7 kb which are antigenic and non-allergen in nature. The structure was refined and validated by using Ramachandran plot scores 80%. Molecular docking studies were conducted to evaluate the interaction between the designed multi-epitope vaccine and goat Toll-like receptors (TLRs), particularly TLR2 and TLR6. The results demonstrated strong binding and structural stability of the vaccine candidate, indicating its potential to elicit a robust immune response against Mccp. These findings suggest that the designed vaccine holds significant promise for the prevention and control of contagious caprine pleuropneumonia (CCPP) in goats. To further enhance its applicability, the vaccine construct will be expressed using a plant-based expression system, offering a cost-effective and scalable production approach. This strategy could facilitate large-scale vaccine manufacturing, ensuring broader accessibility and improved disease management in goat populations.

***Keywords*:** Mccp, Insilco, Vaccine construct, Computational studies, Plant expression.

Larvicidal efficacy of *Glinus oppositifolius* against dengue vector *Aedes aegypti*: Biomaterial innovations in mosquito control

M.R. Kavipriya and Azhagiya manavalan Lakshmi Prabha*

Department of Botany, School of Life Science, Bharathidasan University, Tiruchirappalli 620024, Tamil Nadu, India

***Corresponding author: dralprabha@bdu.ac.in**

Abstract

Mosquito-borne diseases, particularly dengue fever, pose a significant global health threat. *Aedes aegypti*, the primary vector of the dengue virus, has developed resistance to conventional insecticides, necessitating alternative eco-friendly control strategies. In this study, the larvicidal potential of *Glinus oppositifolius* hexane extract was evaluated against *A. aegypti* larvae to explore a sustainable mosquito control approach. Larvicidal bioassays were conducted following WHO guidelines, with mortality rates recorded after 24 hours of exposure. The results demonstrated significant larvicidal activity, with the LC_{50} and LC_{90} values of 90.47 and 176.89 µg/ml, respectively. The observed toxicity suggests that the bioactive compounds present in the hexane extract effectively disrupt larval physiology, leading to mortality. This study highlights the potential of *G. oppositifolius* as a natural mosquito control agent. Compared to synthetic insecticides, plant-based larvicides like *G. oppositifolius* offer an environmentally friendly alternative with reduced toxicity to non-target organisms and minimal ecological impact. Integrating plant-derived larvicides into vector management programs could be a promising step toward sustainable and eco-friendly mosquito control strategies.

Keywords: *Glinus oppositifolius*, *Aedes aegypti*, larvicidal activity, hexane extract, dengue vector control.

Potential application of *Physalis philadelphica*-mediated silver nanoparticles against *Aedes albopictus* (Diptera: *Culicidae)*

Kalyanasuntharam Elakkiya[a] and Marimuthu Govindarajan[a, b]*

[a]*Unit of Natural Products and Nanotechnology, Department of Zoology, Government College for Women (Autonomous), Kumbakonam 612 001, Tamil Nadu, India.*
[b]*Unit of Vector Control, Phytochemistry and Nanotechnology, Department of Zoology, Annamalai University, Annamalainagar 608002, Tamil Nadu, India*.

***Corresponding author**: drgovind1979@gmail.com

Abstract

The incidence of dengue, Zika virus, chikungunya and encephalitis cases has increased significantly in the world. The Asian tiger mosquito *Aedes albopictus* is the main vector of these dreadful diseases. Biosynthesis and the use of green silver nanoparticles (Ag NPs) is a vital step to identifying reliable and eco-friendly controls of mosquito vector populations and their transmitting lethal diseases. The current study reported the biosynthesis of mosquitocidal Ag NPs using aqueous extracts of *Physalis philadelphica*. Furtherly, synthesized Ag NPs were characterized by using UV–vis spectrophotometer, Fourier transform infrared spectroscopy, X-ray diffraction analysis, Scanning Electron Microscopy, and High-Resolution Transmission Electron Microscopy. The acute toxicity of *P. philadelphica* leaf extract and green-synthesized Ag NPs with various concentrations was evaluated against third-instar larvae of the *A. albopictus*. Compared to the leaf aqueous extract, biosynthesized Ag NPs showed a higher toxicity effect on mosquito larvae with the LC_{50} value of 20.23 µg/mL. Overall, the result suggests that Ag NPs had significant larvicidal ability and were valuable for bio-larvicides to be integrated with the vector control program.

***Keywords*:** Zika virus vector, *Physalis philadelphica*, silver nanoparticles, Bio-larvicide, Mosquito management.

Engineered Probiotics for Sustainable Aquaculture: Enhancing Disease Management, Immune Health, and Oral Vaccine Delivery

Siva Bharathi Ulaganathan, Karthikeyan Sivashanmugam*

School of Bio-Sciences and Technology, Vellore Institute of Technology, Vellore – 632014, Tamil Nadu, India

***Corresponding Author:** siva.karthikeyan@vit.ac.in

Abstract

Aquaculture is highly crucial for ensuring the global food security, though aquaculture is highly indispensable it is not without its significantly impacting barriers which includes recurrent disease outbreaks, overuse of antibiotics, and environmental challenges. The common practice of over reliance on antibiotics and chemical treatments in the disease management has not only intensified the antimicrobial resistance but also compromised the ecological integrity. This study investigates the development of bioengineered probiotics as an innovative and sustainable alternative to enhance fish health, reduce antibiotic dependence, and promote environmentally responsible practices in aquaculture. The engineered probiotics are designed to perform three crucial functions which are pathogen inhibition, immune modulation, and oral vaccine delivery. With the approach of targeted pathogen suppression, these probiotics will suppress the disease and reduce the need of reliance on using antibiotics. The ability of these probiotics to enhance the immune responses in fish aids in resilience against various environmental stressors. The capacity for oral vaccine delivery further contributes to disease management, offering an efficient, non-invasive method for immunization that is especially advantageous in large-scale aquaculture systems. The combination of these multiple functionalities of the probiotics offers a valuable strategy for disease prevention and health management in aquaculture. Reducing reliance on antibiotics through the application of multifunctional probiotics could significantly curb the emergence of drug-resistant bacteria, addressing a major public health concern linked to aquaculture. Decreased chemical usage aligns with sustainable aquaculture practices, reducing environmental contamination and supporting healthier aquatic ecosystems. The adaptability of these probiotics to specific fish species enhances their practical applicability, ensuring effective integration across diverse aquaculture systems. This work underscores the potential of advanced probiotics as pivotal tools for sustainable aquaculture. By integrating disease control, immune support, and environmental stewardship, engineered probiotics represent a transformative approach to aquaculture, offering a promising pathway toward resilient and eco-friendly fish farming practices.

***Keywords*:** Engineered Probiotics, Sustainable Aquaculture, Disease Management, Oral Vaccine Delivery, Antibiotic Dependence

Adulicidal potential of *Peltophorum africanum* leaf extracts against *Aedes aegypti*: Eco-friendly biomaterials for mosquito control

Duraisami Akilandeshwari[a] and Marimuthu Govindarajan[a, b]*

[a]*Unit of Natural Products and Nanotechnology, Department of Zoology, Government College for Women (Autonomous), Kumbakonam 612 001, Tamil Nadu, India.*
[b]*Unit of Vector Control, Phytochemistry and Nanotechnology, Department of Zoology, Annamalai University, Annamalainagar 608002, Tamil Nadu, India.*

***Corresponding author**: drgovind1979@gmail.com

Abstract

Diseases spread by mosquitoes, including dengue, chikungunya, filariasis, and malaria, continue to pose a serious threat to world health. Traditional methods of controlling mosquito populations often involve the use of insecticides, leading to issues such as resistance development and environmental harm. Seeking alternative, eco-friendly measures, this study explored the potential of *Peltophorum africanum* extracts against *Aedes aegypti* mosquitoes. Crude leaf extracts of *P. africanum* were obtained using different solvents: methanol, ethyl acetate, chloroform and hexane. These extracts were tested for their effectiveness against *A. aegypti* mosquitoes. After 24h post treatment, among the various solvent extracts examined, methanol displayed the greatest efficacy, showing LD_{50} and LD_{90} values of 220.09 and 442.44 µg/ml, respectively. Control groups showed no mortality, confirming the specificity of the extracts. In conclusion, the methanol extract derived from *P. africanum* demonstrated substantial adulicidal activity against *A.aegypti* mosquitoes. These findings underscore the potential application of these plant-derived extracts as a promising eco-friendly alternative for mosquito control strategies, emphasizing their role in combating mosquito-borne diseases while minimizing environmental impact.

***Keywords*:** *Peltophorum africanum*, leaf extract, dengue vector, adulticidal activity, mortality.

Development and Evaluation of a Nanoparticle-Based Vaccine against *Vibrio harveyi* for Sustainable Aquaculture

Joseph William Jenifer, Jagatheeswari*

Limnology Laboratory, Department of Zoology, Chikkanna Government Arts College, Tiruppur

***Corresponding author**: drjaga27@gmail.com

Abstract

Vibrio harveyi is a significant bacterial pathogen affecting aquaculture worldwide, causing substantial economic losses. This study reports the development and evaluation of a nanoparticle-based vaccine (NPV) against *Vibrio harveyi*. The nanoparticle-based vaccine was formulated by encapsulating *Vibrio harveyi* outer membrane proteins (OMPs) within chitosan nanoparticles. The vaccine was administered to seabass through immersion and intraperitoneal injection. The results showed that the NPV induced significant antibody responses and provided protection against the Vibrio harveyi challenge, with relative percent survival (RPS) values ranging from 90% to 95%. The NPV was also found to be safe, stable, and environmentally friendly, with no adverse effects observed in the vaccinated fish. These findings suggest that the NPV is a promising vaccine candidate against *Vibrio harveyi*, offering improved protection, reduced antibiotic usage, and enhanced sustainability in aquaculture.

***Keywords*:** *Vibrio harveyi*, nanoparticle-based vaccine, aquaculture, sustainability, outer membrane proteins.

Assessment of Antibacterial Antioxidant and Antibiofilm activity of *Pleurotus ostreatus*

Kaviya C[a], Aishwarya T[a], Keerthana Shrri G[b], Nithya V[a]*

[a]Pharmacognosy Lab, Department of Animal Health and Management, Alagappa University, Karaikudi - 630 002, Tamil Nadu, India.
[b]PG & Research Department of Zoology, National College, Trichy -620 001, Tamil Nadu, India.

***Corresponding author**: nithyav@algappauniversity.ac.in

Abstract

White-oyster mushroom (*Pleurotus ostreatus*) is a preferred food in Indonesia. Previously this fungus was known as a useless plant, but after the nutrition is known, everything changes. People tried to cultivate it because the nutrients contents are very good for body health. Therefore, to support this added value in the field of health, especially antimicrobials and antioxidants, this research needs to be done. This research used successive extraction with hexane solvent, acetate ethyl, ethanol, water, and crude ethanol by antimicrobial assay, antioxidants assay (DPPH), total antioxidant content, total phenolic content. The highest results on barrier antimicrobial test which occurred against *Candida albicans* bacteria was 47.60 % with 100 ppm concentration. Regarding the antioxidant test against DPPH, the result showed the occurrence of free radical by 25 % on water extraction at the concentration of 100 ppm. Continuously, the total antioxidant content assay showed the ethyl acetate had the highest value of 368.708 mg gae/g. The results of the total content phenolic assay showed the solvent hexane had the value of 78.495 mg gae/g. The antibiofilm activity of *Pleurotus ostreatus* susceptibility was tested using confocal laser scanning microscopy (CLSM) ranged from 6 to 60%. Therefore, the present study showed the antioxidant, antibacterial, and antibiofilm properties of *Pleurotus ostreatus* and it can be used to formulate a new chemotherapeutic drug to treat several diseases.

***Keywords*:** Antimicrobial, *Candida albicans,* total antioxidant, total phenol, white-oyster mushroom.

Antioxidant, Antibacterial and Antibiofilm Potentials of Biosynthesized Silver nanoparticles using *Cantharanthus roseus*

Keerthana Shrri G[a], Aishwarya T[b], Kavya C[b], Nithya V[b]*

[a]PG & Research Department of Zoology, National College, Trichy -620 001, Tamil Nadu, India.
[b]Pharmacognosy Lab, Department of Animal Health and Management, Alagappa University, Karaikudi 630 002, Tamil Nadu, India.

***Corresponding author**: nithyav@algappauniversity.ac.in

Abstract

In the present study examined that the antibacterial and antibiofilm activity of silver nanoparticles were green-synthesized using the ethanolic extract of *Cantharanthus roseus*. A sustainable approach to medical advances not only reduces the environmental impact of conventional manufacturing methods, but also paves the way for new research into new cancer treatments. The synthesized Ag NPs were characterized using bioanalytical techniques including UV- Vis, FTIR, SEM, and XRD. Biosynthesis of Ag NPs was firstly indicated by the colour alteration of reaction mixture from yellow to reddish brown. In the antioxidant activity, the silver nanoparticles (Ag NPs) nanoparticles using *Cantharanthus roseus* extract DPPH free radicals were 107 mg/mL. The antimicrobial activity Silver (Ag NPs) nanoparticles using *Cantharanthus roseus* against the human pathogenic bacteria were tested by using agar well diffusion technique. The antibiofilm activity of *C.roseus* (L.) susceptibility was tested using confocal laser scanning microscopy (CLSM) ranged from 6 to 60%. Therefore, the present study showed the antioxidant, antibacterial, and antibiofilm properties of Ag NPs nanoparticles and it can be used to formulate a new chemotherapeutic drug to treat several diseases.

***Keywords*:** *Cantharanthus roseus*, confocal laser scanning microscopy (CLSM), Ag NPs, Antimicrobial, Antibiofilm.

Assessment of antibacterial antioxidant and anticancer activity of bioactive compound Silymarin from *Silybum marianum*.

Aishwarya T[a], Kaviya C[a], Keerthana Shrri G[b], Nithya V[a]*

[a]*Pharmacognosy Lab, Department of Animal Health and Management, Alagappa University, Karaikudi - 630 002, Tamil Nadu, India.*
[b]*PG & Research Department of Zoology, National College, Trichy -620 001, Tamil Nadu, India.*

***Corresponding author:** nithyav@algappauniversity.ac.in

Abstract

Silymarin is a flavonoid complex extracted from the *Silybum marianum* plant which is believed to be responsible for the plant's hepatoprotective action. Silymarin is hepatoprotective flavonoid drug available as bio marker in *Silybum marianum* (milk thistle). Phytochemicals are playing a vital role for the treatment of different types of diseases and still used in both traditional and modern medication system. The phytochemical analysis of milk thistle seeds extract indicated that the plant is rich in secondary compounds. The results revealed that milk thistle seeds contain high amount of total phenolic, flavonoid and antioxidant compounds. The antibacterial activities of the ethanol seeds extract of milk thistle was tested against Gram-positive bacteria (*Staphylococcus aures*) and Gram-negative bacteria (*Salmonella entirica*). Antibacterial effects of crude extract were performed using modified agar well diffusion to determine the zone of inhibition. The results demonstrated that ethanol seeds extract of milk thistle is shown strong inhibition zone against *Staphylococcus aures* and *Salmonella entirica* compared to the control. Also, milk thistle seeds extract showed highly anticancer activity. Further, the protective effects of silymarin and its major active constituent, silibinin, studied in various tissues, suggest a clinical application in cancer patients as an adjunct to established therapies, to prevent or reduce chemotherapy as well as radiotherapy-induced toxicity.

***Key words*:** Silymarin, milk thistle, *Staphylococcus aures*, flavonoid, silibinin.

Tilapia Epidermal Mucus: A Sustainable source for Future Antimicrobial agents

R. Thivakaran[a], G. Roseline Jebapriya[b], M. Saranya[b], K. Premkumar[a], P. Santhanam[b]* and P. Perumal[b]

[a]Department of Biomedical Science, School of Life Sciences, Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu.
[b]Marine Planktonology & Aquaculture Laboratory, Department of Marine Science, School of Marine Sciences, Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu

***Corresponding author**: santhanamcopepod@gmail.com

Abstract

This study systematically investigated the biochemical, enzymatic, and antimicrobial properties of epidermal mucus from Tilapia (*Oreochromis niloticus*) reared in a media bed aquaponics system, with an emphasis on optimizing extraction methods and evaluating environmental influences. Mucus was extracted using crude, acidic, and aqueous methods. Biochemical profiling revealed that crude extracts contained the highest concentrations of proteins, carbohydrates, and lipids. However, acidic extraction significantly enhanced innate immune enzyme activities, particularly alkaline phosphatase and protease, indicating its superior bioactive potential. The antimicrobial efficacy of mucus extracts was assessed against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Vibrio parahaemolyticus* using agar well diffusion assays. Acidic extracts exhibited the highest antimicrobial activity, consistently producing the largest zones of inhibition across all pathogens. Environmental stability tests revealed that acidic extracts retained optimal antimicrobial activity under freezing (-20°C) and refrigeration (4°C) conditions, with a marked decline at room temperature (25–30°C). pH sensitivity tests showed maximum activity at slightly alkaline pH (7–8), with reduced efficacy at highly acidic (pH 4) and alkaline (pH 10) conditions. Long-term storage studies demonstrated that freezing preserved both antimicrobial efficacy and biochemical integrity most effectively, followed by refrigeration, while room temperature storage led to rapid degradation. These findings underscore the effectiveness of acidic extraction in isolating novel bioactive compounds from fish mucus. This study highlights fish mucus as a promising natural resource for developing sustainable antimicrobial agents and advancing fish health management, with significant implications for aquaculture and eco-friendly therapeutics.

***Keywords*:** Aquaponics, Fish Mucus, Biochemical Profiling, Innate Immunity, Antibacterial activity.

Isolation and Characterization of Virulent Phage to Control *Enterobacter* spp. Isolated from Sewage in Karaikudi, India

Muthumari Subramaniyan and Srinivasan Pappu*

Department of Animal Health and Management, Science Campus, Alagappa University, Karaikudi - 630003, Tamil Nadu, India

***Corresponding author**: srinivasanp@alagappauniversity.ac.in

Abstract

The Gram-negative bacteria *Enterobacter* spp. cause a variety of illnesses in humans and animals, such as respiratory tract infections, endocarditis, urinary tract infections (UTIs), and infections of the skin, soft tissues, and wounds. An antibiotic susceptibility test was conducted for the host bacterial strain using the disk diffusion method, and the results showed that *Enterobacter* spp. were resistant to six out of 14 antibiotics. Phage therapy is being explored as an alternative antimicrobial approach to combat multidrug-resistant (MDR) *Enterobacter* spp. bacterial infections. In this study, an *Enterobacter* virulent phage was isolated from sewage in Karaikudi, India. The isolated phage was evaluated for its potential for therapeutic use through in vitro assessments. TEM revealed that the phage belonged to the *Myoviridae* family based on its morphology. Further studies showed that the phage had highly lytic activity against *Enterobacter* spp., partial lytic activity against *Enterobacter bugandensis*, and *Enterobacter cloacae*. The phage was able to survive at different pH levels, had high thermal stability, a short latent period of 20 minutes, and a burst size of 5.7 PFU/mL. The phage had a double-stranded DNA with a genome length of 15040 bp. Antimicrobial and anti-biofilm activity of the phage at a multiplicity of infection (MOI) of 10 showed high lytic activities. These results suggest that the phage could be a promising candidate for controlling *Enterobacter* spp. infections in animals and humans.

***Keywords*:** *Enterobacter* spp., antibiotic resistance, phage therapy, TEM analysis, anti-biofilm activity.

Impact of audible sound on the enhanced growth, pigmentation, and biochemical profiling of *Isochrysis galbana* - a new approach for the sustainable aquaculture and biopharming industries

Hema Muruganantham, Santhanam Perumal*, Gowthami Ayyasamy and Perumal Pachiappan

Marine Planktonology & Aquaculture Laboratory
Department of Marine Science, School of Marine Sciences
Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu, India.

*** Corresponding author**: santhanamcopepod@gmail.com

Abstract

One of the newest and most promising techniques for stimulating the growth of microalgae is the use of physical stimulants, such as audible sound. The microalga *Isochrysis galbana* was cultivated in this study by integrating several musical genres, such as "Classical," "Rock," and "Nature" music. The aim of this research was to ascertain how audible sound affect the biochemical productivity and growth development of microalgae. The experiment was carried out by growing microalgae, while the audible sound was exposed for 3 hours per day throughout the course of 15 days. The present research emphasis that *I. galbana* treated with "Classical music" exhibit the highest growth rate (0.104/day), which was 38.6% greater than that of the control (microalga without sound). There were significant differences ($p > 0.05$) found among the dry biomass content of the cultures treated at different music. The highest dry biomass concentration (1.48 ± 0.02 g/ L) was achieved at Classical music followed by rock music. Total carotenoid, Chlorophyll 'a' and 'b', protein, carbohydrate and lipid content of *I. galbana* increased in both Classical and Rock music treated group than the control group. On the other hand, the metabolic profile, growth and pigment of *I. galbana* were found to be reduced by listening to nature music. In conclusion, audible music significantly increases the biomass of microalgae, which can be effectively explored for vast industrial applications. Live microalgae play a key role in aquaculture, being the feed source for the larvae of mollusks, crustaceans, fish hatchings, or rotifers and copepods, which are used as fish feed. Especially, *I. galbana* has been considered as the key diet of many bivalve mollusks when they are just hatched during artificial rearing. An ample amount of attention has been paid to *I. galbana* due to its vital nutritional value and potential application in aquaculture. Fucoxanthin, a xanthophyll with antioxidant properties, exists in *Isochrysis galbana.* The omega-3 polyunsaturated fatty acid especially DHA is predominant in *Isochrysis* strains, and they also generate alkenones, which are long-chain lipids that may find application in the pharmaceutical delivery. The synergistic impacts of auditory music on microalgal growth rate not only open new avenues for aquaculture research but also emphasize the applications in the biopharming industries.

***Keywords*:** Microalgae, *Isochrysis galbana*, Music, Growth, Pigments.

Safeguarding livestock and human beings from mosquito-borne diseases through *in silico* molecular docking and pharmacokinetic studies of the marine algal compound stigmasterol

S. Dhanasundaram, P. Santhanam* and P. Perumal

Marine Planktonology & Aquaculture Lab., Department of Marine Science,
School of Marine Sciences, Bharathidasan University,
Tiruchirappalli- 620 024, Tamil Nadu, India.

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

Abstract

Livestock plays a pivotal role in agricultural productivity and the economic growth of dairy-based industries. However, climate change has led to a rise in mosquito populations, increasing mortality rates in both livestock and human beings due to mosquito-borne diseases. Rift Valley Fever (RVF), an emerging zoonotic viral disease, is transmitted by *Aedes* and *Culex* mosquitoes. Similarly, Japanese encephalitis and dengue are caused by *Aedes* mosquitoes, while malaria is transmitted by *Anopheles* mosquitoes. This study investigates the molecular docking potential of stigmasterol, a marine algal compound, against vector proteins of these diseases. Stigmasterol demonstrated a high binding affinity towards Japanese encephalitis virus capsid protein (-7.5 kcal/mol) and RVF virus glycoprotein C (-7.2 kcal/mol) in livestock. Among all targets, the *Plasmodium falciparum* dihydrofolate reductase-thymidylate synthase (*Pf*DHFR-TS) exhibited the highest binding affinity (-9.8 kcal/mol), followed by the dengue NS3 helicase protein (-9.2 kcal/mol). Stigmasterol's pharmacokinetic profile indicates poor water solubility but favorable lipophilicity (LogP: 5.08), supporting good membrane permeability. While its drug-likeness assessment shows one Lipinski violation (high LogP) and moderate oral bioavailability (0.55), ProTox-3 predicts stigmasterol to be inactive for major organ toxicities, including hepatotoxicity and nephrotoxicity, but active for neurotoxicity (0.54), respiratory toxicity (0.82), immunotoxicity (0.99), and BBB permeability (0.91). Additionally, it inhibits CYP2C9 (0.64), suggesting metabolic implications. These findings highlight stigmasterol's potential for inclusion in targeted drug delivery systems to combat mosquito-borne diseases in livestock and human beings. Further *in vitro* and *in vivo* studies are warranted to evaluate this compound's potential as both a vaccine candidate and therapeutic agent against these mosquito-transmitted diseases, with the aim of safeguarding livestock health.

***Keywords*:** Pharmacokinetics**,** Stigmasterol, Molecular docking, Rift Valley Fever, Dengue viral protein

Integrating nano-bubble Technology to enhance Aquaponics systems: A Synergistic approach to Fish health and Sustainable food production

Saranya. M, G. Roseline Jebapriya, P. Raju, N. Manoharan, P. Santhanam*

Department of Marine Science, School of Marine Sciences,
Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu, India.

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

Abstract

Aquaponics is integrating aquaculture and hydroponics, offers a sustainable approach to food production by promoting nutrient cycling, optimizing water use, and enhancing system productivity. However, critical challenges persist, including maintaining optimal water quality and dissolved oxygen levels. Previous studies demonstrated improved fish health and system performance in aquaponics, as evidenced by increased growth rates, reduced stress, and decreased disease incidence in tilapia (*Oreochromis niloticus*). These improvements were primarily attributed to the effective integration of hydroponic plants like tomato (*Solanum lycopersicum*), which facilitated nutrient cycling and water quality management. Building on these advancements, nano-bubble technology provides a promising solution to enhance aquaponics systems further. Nano-bubbles, characterized by their nanoscale size and high surface area-to-volume ratio, significantly enhance oxygen transfer efficiency while reducing energy consumption. Their antimicrobial properties further mitigate pathogen prevalence, reducing disease risks and minimizing the need for antibiotics. This integration addresses persistent challenges in aquaponics, fostering healthier aquatic environments and promoting sustainable fish production. This approach advances system resilience and productivity by combining established aquaponics practices with innovative nano-bubble technology. It promotes biodiversity, reduces resource waste, and supports climate-smart agricultural practices. As the global demand for sustainable food systems grows, refining nano-bubble applications within aquaponics systems represents a transformative step toward eco-friendly, high-efficiency production systems. Future research should focus on optimizing nano-bubble generation and its long-term effects on system dynamics, paving the way for scalable and adaptive aquaponics technologies.

***Keywords*:** Aquaponics Systems, Nano-Bubble Technology, Fish Health, Agriculture, Antimicrobial Properties.

A Synchronous approach towards the sustainable production of *Oreochromis niloticus* and *Allium cepa* using a novel integrated recirculating aquaponics system

S. Sinduja[a*], G. Roseline Jebapriya[a], K. P. Aishwarya [b], M. Saranya[a], K. Rajagopal[a], A. R. Logeshwaran[a], S. Rajakumar[b], P. Santhanam[a*]and P. Perumal

[a] *Marine Planktonology & Aquaculture Laboratory, Department of Marine Science, School of Marine Sciences, Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu.*
[b]*Department of Marine Biotechnology, School of Marine Sciences, Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu.*

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

Abstract

The present study dealt the culturing of *Allium cepa* in a Nutrient Film Technique (NFT) with *Oreochromis niloticus* using a Recirculating Aquaponics System (RAS). The integrated system leverages fish effluent to enhance nutrient availability, fostering beneficial compounds in *A. cepa* and growth indices and feeding regime of *O. niloticus*. The study investigates the synergistic effects on plant health and metabolite production by optimizing the RAS conditions, including nutrient balance and water flow. The results revealed significant increases in key phytochemicals, proximate composition, and secondary metabolites in *A. cepa* besides the enhanced growth, proximate composition, and invitro antioxidant properties and survival of commercially important fish *O. niloticus*. This research inferred the potential of Integrated Recirculating Aquaponics System ensures the efficient approach to boost the crops yield, nutritional and economic value providing a viable path towards sustainable aqua-agriculture and functional food production.

***Keywords*:** *Allium cepa, Oreochromis niloticus,* Recirculating Aquaponics System, NFT, Aqua-Agriculture.

Novel Anti-microbial peptides to combat AMR associated with *Pseudomonas aeruginosa*

Debolina Chatterjee and Karthikeyan Sivashanmugam*

School of Biosciences and Technology, VIT, Vellore.

***Corresponding Author**: siva.karthikeyan@vit.ac.in

Abstract

Antimicrobial peptides (AMPs) offer an alternative treatment for drug-resistant microbes due to their antimicrobial and immunomodulatory effect. A virtual screening of AMPs obtained from public databases, against the MexB efflux pump of *Pseudomonas aeruginosa*. Six AMPs were selected based on molecular docking and simulation and then synthesized with 90% purity. The peptides were tested on *Pseudomonas aeruginosa* and other Gram-negative ESKAPE pathogens, assessing biofilm inhibition, MIC, and sub-MIC effects on bacterial motility. The peptides were also tested in combination with antibiotics on various clinical strains. A pilot scale transcriptomics study was also carried out on two shortlisted peptides treated with MDR bacterial strain to understand the differential expression of the efflux pump expressing mRNA when compared with the traditional antibiotic ciprofloxacin. Safety evaluation was understood through hemolysis inhibition assays and cytotoxicity tests which showed all 6 synthesized peptides prevented hemolysis and were tolerated in the hepatic and renal cells up to 50-60 micrograms/ml.

***Keywords*:** Antimicrobial peptides, MexB, *Pseudomonas aeruginosa*, MDR, mRNA.

Algal-Marine Nanoparticle Hybrid, an Alternative for Sustainable Aquaculture

Noiranjana Dasgupta [a], Karthikeyan Sivashanmugam [a*]

School of Bio-Sciences and Technology, Vellore Institute of Technology, Vellore – 632014, Tamil Nadu, India

***Corresponding Author:** siva.karthikeyan@vit.ac.in

Abstract

Aquaculture has become a vital part of the world's food security. The overuse of antibiotics is posing a growing threat to its sustainability by causing environmental contamination and antimicrobial resistance (AMR). In order to improve animal health, production, and environmental sustainability, this study investigates novel antibiotic substitutes for aquaculture disease management. With nanoparticles that target pathogenic biofilms and quorum sensing pathways to interfere with bacterial communication and pathogenicity, nanotechnology provides a state-of-the-art remedy. Long-term protection against common diseases is also offered by developments in immunostimulants and vaccinations. Precision farming technology and integrated aquaculture systems are used in conjunction with these tactics to maximize water quality and reduce disease outbreaks. Aquaculture can improve resilience against AMR, protect human health, and lessen its environmental impact by substituting sustainable alternatives for antibiotics. An important way to satisfy the rising demand for fish worldwide while addressing environmental issues is through sustainable aquaculture. A novel algae-marine nanoparticle hybrid enhances aquaculture sustainability by delivering antimicrobials, suppressing biofilms, improving water quality, and serving as a nutrient carrier, offering a sustainable alternative to antibiotics and chemical treatments. This innovative method opens the door for environmentally friendly advancements in aquaculture, leading to better fish health, fewer disease outbreaks, and increased yield with less harm to the environment.

***Keywords*:** Aquaculture, Sustainability, Nanoparticles, Bioactive compounds, Biofilm inhibition.

Therapeutic application of marine compound-based hydrogels in treating diabetic wounds

Ishwarya Ramachandran, Preetham Elumalai *

Centre of excellence for Aquatic Vaccine Development, Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin, University of Science and Technology, Kochi – 682016, Kerala, India.

***Corresponding author**: preetham@cusat.ac.in

Abstract

Management of the infectious diabetic foot ulcer remains a global health issue. In 2021, 10% of the populations worldwide have diabetes, according to the latest report of the International Diabetes Federation (IDF), by 2030 and 2045, this number is expected to climb to 643 million and 783 million, respectively (IDF, Atlas,2021). Currently, the treatment and care of diabetic wounds, which generally possess the characteristics of a high amputation rate, high recurrence rate and high mortality, has developed into a worldwide challenge. To address these issues, researchers have explored new therapeutic approaches. Hydrogel, as one of the representatives of wet therapies, has a three-dimensional porous structure similar to that of extracellular matrix (ECM), which could maintain moist environment of the wound, isolate the invasion of external bacterial and promote wound healing. Hence this research aimed to developed the *Channa striata* mucus and seaweed *Kappaphycus alvarezii* Carrageenan based hydrogel (KCM-Hydrogel), natural and multifunctional medical patches for diabetic wound management. In this study, carrageenan was extracted from the red seaweed *Kappaphycus alvarezii* using the traditional method of carrageenan extraction with NaOH. The carrageenan was characterized by FTIR analysis and the yield, gel strength and ash content were evaluated. The FTIR analysis confirmed that the type of carrageenan was kappa-carrageenan. The carrageenan had a yield of 55.47 %, gel strength of 55.58 g/cm^2, gelling point of 25.35 °C, the melting point of 40.72 °C, the water content of 5.75 %, ash content of 26.54 %, pH of 8.25, and purity of 50.67 %. The antimicrobial activity of these mats against MDR clinical isolates of common wound bacteria including *Pseudomonas aeruginosa, Staphylococcus aureus* and *Escherichia coli* were investigated. According to in-vitro study, Kappa carrageenan demonstrated antimicrobial activity against certain isolates of *P. aeruginosa, S. aureus,* and *E. coli.* This proposed research will be facilitated in determining the healing impact of this natural product in treatment of diabetic wounds and it may also help in developing alternative cost-effective therapeutic modality.

***Keywords*:** Hydrogels, Diabetic wounds, Mucus, Wound healing, Carrageenan.

Smart Wound Healing: A pH-Responsive Transdermal Patch for Targeted Drug Delivery and Infection Control

Ajay Athis, Aishwarya Jayakumar, Suganthy Natarajan*

Bionanomaterials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi, Tamil Nadu

***Corresponding Author**: suganthyn@alagappauniversity.ac.in

Abstract

Wound healing is a complex process that requires a conducive environment for tissue repair and protection against infections. This study focuses on the development and characterization of a pH-sensitive transdermal patch designed for wound healing. The patch is composed of biocompatible natural polymers and natural drug incorporated with antimicrobial agents to prevent bacterial growth at the wound site. The pH-sensitive film is designed to selectively release therapeutic agents in response to the pH changes that are associated with infections and inflammation of wounds, thereby facilitating targeted drug delivery. Extensive characterization of the patch was carried out including mechanical strength, swelling behaviour, and drug release kinetics, antimicrobial and antioxidant assay. Results revealed excellent mechanical stability, pH sensitive colour change, and remarkable microbial growth inhibition in a controlled manner supporting wound healing. *In vitro* haemolysis studies revealed non-haemolytic nature revealing its biocompatibility. Overall results shows that the fabricated transdermal patch can serve as an ideal cost effective and biocompatible candidate for managing and healing wounds.

***Keywords*:** Wound Healing, Natural polymer, pH sensitive, Haemolysis, Antimicrobial.

Chitosan-encapsulated 7-Methoxycoumarin Conjugated with Folic Acid: A Novel Glioblastoma Therapy

Aarifa Mohamed Asik, Suganthy Natarajan*

Bionanomaterials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi

***Corresponding Author: suganthyn@alagappauniversity.ac.in**

Abstract

Glioblastoma multiforme (GBM) is a highly aggressive, WHO grade IV brain tumor with poor prognosis and a median survival of 15 months. Despite standard treatments, therapy resistance remains a challenge due to its invasive nature and the blood-brain barrier (BBB). Nanoparticle-based drug delivery offers a promising solution. This study develops chitosan nanoparticles encapsulating the phytocompound 7-methoxycoumarin (CS@7MC) and conjugated with folic acid receptors (CS@7MC@FA) for targeted GBM therapy. Characterization confirms successful formulation, with a 90.4 nm particle size, 92% drug loading efficiency, and pH-responsive release. Cytotoxicity assays reveal enhanced anticancer activity, with CS@7MC@FA exhibiting a lower IC50 (95 µg/mL) than CS@7MC. Apoptosis assays confirm programmed cell death in U87 cells. The development of 7MC-encapsulated chitosan nanoparticles conjugated with folic acid receptors presents a novel strategy for GBM treatment. Targeted delivery via folic acid receptor conjugation enables selective tumor cell accumulation, reducing off-target effects. This multifunctional approach offers a promising avenue for enhanced GBM treatment, integrating therapeutic efficacy paving the way for improved patient outcomes.

***Keywords*:** Glioblastoma, chitosan nanoparticles, 7-methoxycoumarin, folic acid receptor, Cytotoxicity.

Antibacterial, antioxidant, cytotoxicity, and phytochemical screening of *Moringa oleifera* leaves

Muthulakshmi Muthumanickam[a], Rameshthangam Palanivel[b]*, Sindhamani Subbiah[a]

[a] *Research Scholar, Department of Biotechnology, Alagappa University, Karaikudi – 630003, Tamilnadu, India.*
[b]**Associate Professor & Head i/c, Department of Nutrition and Dietetics, Alagappa University, Karaikudi – 630003, Tamilnadu, India.*

***Corresponding author: rameshthangam@alagappauniversity.ac.in**

Abstract

Bacterial resistance to antibiotics remains a significant clinical challenge, contributing to persistently high rates of morbidity and mortality. Achieving treatment success is increasingly difficult, necessitating the evaluation of new antibiotics and complementary approaches, including source control and alternative therapies. This study aimed to investigate the antibacterial, antioxidant, cytotoxic, and phytochemical properties of *Moringa oleifera* leaf extract, and to evaluate the pharmacokinetic properties of its major compounds. The extract demonstrated strong antibacterial activity against bacterial species such as *E. coli*, *P. aeruginosa*, *K. pneumoniae* and gram-positive *E. faecalis*. It also showed significant antioxidant potential, supported by the presence of high concentrations of phenolic and flavonoid compounds. GC-MS analysis identified multiple bioactive compounds, with gossypetin as the predominant component. The isolated compound was then characterized by UV, FTIR, TGA, and XRD. The cytotoxicity effects of GTIN were tested on HCT-116 cells by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay. In conclusion, gossypetin was isolated from *Moringa oleifera* exhibits promising potential for medical applications due to its significant antibacterial, antioxidant and anticancer activities with a strong safety profile and rich phytochemical content.

***Keywords*:** Antibacterial, Antioxidant, Cytotoxicity, *Moringa oleifera*, Phytochemical compositions.

Antimicrobial activity and GC-MS Analysis of *Tribulus terrestris L.*

Ambiga Chinnathambi [a], Rameshthangam Palanivel [b]*, Dharani Karthikeyan [c]

[a] Research Scholar, Department of Biotechnology Alagappa University,
[b] Associate Professor & Head i/c Department of Nutrition and Dietetics, Alagappa University, Karaikudi, Tamilnadu, India.
[c] Department of Biotechnology, Umayal Ramanathan college for women, Karaikudi Tamilnadu, India.

***Corresponding author: rameshthangam@alagappauniversity.ac.in**

Abstract

Tribulus terrestris is used as an aphrodisiac, anti-inflammatory, antihypertensive, Ayurvedic medicine, and sports nutrition to improve health and performance. In the present study, the ethyl acetate extracts of T. terrestris were subjected to phytochemical screening and GC-MS analysis. Eighty compounds were identified from GS-MS analysis. The major compounds Oleic Acid (14.77%) Benzo[h]quinoline, 2,4-dimethyl- (2.17%), Trimethyl [4-(2-methyl-4-oxo-2-pe, 1H-Indole-2-carboxylic acid, 6- (2.88%) were present in the *Tribulus terrestris L*. Further, the leaf extract was evaluated for antibacterial activity against S. *aureus* (17 mm) and *E. coli* (15 mm) at 100µg/ml. The leaf extract also showed better antifungal activity for *A. flavus* (12 mm) when compared to *C. albicans* (11 mm). In conclusion, the present study has exhibited better antibacterial and antifungal activity in the leaf of *Tribulus terrestris*. The compound identified from *T. terrestris* can be used as an alternative medicine as it has shown vital bioactive secondary metabolites.

***Keywords*:** Anti-microbial, bioactive compounds, GC-MS, *Tribulus terrestris*, medicinal plant.

Antibacterial activity and GC-MS analysis of *Pedalium murex* leaf extracts

Ambiga Chinnathamb i[a], Rameshthangam Palanivel [b]*, Shri Kaleeswari Sivachandran [c]

[a]Research Scholar, Department of Biotechnology, Alagappa University,
[b] Associate Professor & Head i/c Department of Nutrition and Dietetics, Alagappa University, Karaikudi, Tamilnadu, India.
[c] Department of Biotechnology, Umayal Ramanathan college for women, Karaikudi Tamilnadu, India.

***Corresponding author: rameshthangam@alagappauniversity.ac.in**

Abstract

Pedalium murex, commonly called Large Caltrops, is known for its pharmacological uses in traditional medicine systems. It is reported to have excellent medicinal properties that help to cure reproductive disorders, mainly impotency in men, nocturnal emissions, gonorrhoea as well as leucorrhoea in women. This study is aimed to identify bioactive compounds and assessing the antibacterial activity of *P. murex*. To determine the major bioactive chemicals in the methanol leaf extract of *P. murex*, we used gas chromatography–mass spectrometry. The presence of 80 distinct phytoconstituents was identified by GC-MS, which could act as the therapeutic agent. The most predominant compound, cyclotrisiloxane hexamethyl (3.12%), RT-17.741, was identified from the plant. Further, the leaf extract was evaluated for antibacterial activity against *Bacillus subtilis* (19 mm), *Klebsiella pneumonia* (17 mm) at 100µg/ml. The MIC of the extract has also shown better activity at 50 µg/ml. The findings of the present study highlighted the potential of *P. murex* for the development of herbal medicines for the treatment of various pathogens.

Keywords: Phytochemical analysis, antibacterial activity, bioactive compounds, GC-MS, *Pedalium murex*

Phytochemical profiling, GC-MS analysis and antibacterial activity of aqueous methanol fraction of *Terminalia bellirica*

AmbigaChinnathambi [a], Rameshthangam Palanivel [b*], Pavithra Karuppaiya [c]

[a] Research Scholar, Department of Biotechnology Alagappa University,
[b] Associate Professor & Head i/c Department of Nutrition and Dietetics, Alagappa University, Karaikudi, Tamilnadu, India.
[c] Department of Biotechnology, Umayal Ramanathan college for women, Karaikudi Tamilnadu, India.
***Corresponding author: rameshthangam@alagappauniversity.ac.in**

Abstract

Plants have been a vital source of medicine for human beings from ancient times. Various plant parts are highly medicinal due to the presence of different bioactive compounds and primary and secondary metabolites. Many of these compounds present in medicinal plants are unknown to the scientific community. *T. bellirica* is distributed in tropical parts of the world and is a known ethnomedicinal plant that is the reservoir of various bioactive compounds. The present study investigated the bioactive and secondary metabolites present in the seed of *T. bellirica* collected from the Sivagangai district and has been analysed using gas chromatography-mass spectrometry analysis. The GC-MS analysis has shown 80 bioactive compounds from the methanol extract of *T. bellirica*. Among the identified compounds, the highest peak with a retention time of 11.09 for methyl 4-O-methyl-d-arabinopyran is the major constituent (23.52%). The antibacterial efficacy of seed extracts of *T. bellirica* has shown 19mm and 14 mm for *Pseudomonas aeruginosa* and *Bacillus subtilis*. The MIC of the extract has also shown better activity at 50 µg /ml. In conclusion, the present study recorded and highlighted bioactive compounds from the seed extract of *T. bellirica* and also exhibited better antibacterial activity. The isolated compounds will be used for further biological activities.

***Keywords*:** Phytochemical, bioactive compounds, GC-MS analysis, Antibacterial activity, *Terminalia bellirica* seed

Role of Pollinators in the Reproductive Success of *Theriophonum sivaganganum* (Ramam. & Sebastine) Bogner, endemic species in Tamil Nadu, India

Dineshkumar. V [a]., Muthukumar. M [b]., and Rajasekar C[a]*.

[a] Department of Botany, Alagappa University, Karaikudi – 630 003, Tamil Nadu, India.
[b] Department of Plant Science, Bharathidasan University, Tiruchirappalli – 620 024, Tamil Nadu, India.

***Corresponding author**: raraja2@gmail.com

Abstract

Pollination is a crucial ecological interaction, with most flowering plants depending on biotic vectors for out-crossing and reproduction. The species-rich family *Araceae* is used worldwide as a model to investigate the ecology and evolution of plant-pollinator interactions. Hence, detailed studies of pollinator frequency of *Theriophonum sivaganganum* (Ramam. & Sebastine) Bogner, endemic species of Tamil Nadu, India. We conducted sampling, observations, and field pollination experiments. Floral chambers from distinct plants have been experimented with for trapped insects in the field during the late pistillate or early staminate stages of anthesis. During the early morning on the first day of anthesis, the odor emitted from female phase inflorescences attracted the insects. Two insects, the Rove beetle (*Coleoptera*) and Scavenger fly (*Sepsidae*), were observed and collected from the inflorescences. Our comparative study also demonstrates that in the *Araceae* family, the change from bisexual to unisexual flowers, their separation along a long spadix, and the spathe constriction were the fundamental morphological changes that facilitated the evolution of trap-based interactions mating-site mutualism, ovipositing mutualism and deception.

***Keywords*:** *Theriophonum sivaganganum*, Endemic, Pollinators, Scavenger fly, Rove beetle.

Evaluation of Hesperidin Methyl Chalcone as a potential drug candidate against Alzheimer's Disease

S. Jafni, M. Nagakanni, B. Indhirakumar, R. Soundharya Rani and K. Pandima Devi*

Department of Biotechnology, Alagappa University, Karaikudi - 630003, Tamil Nadu, India.

***Correspondence author: devikasi@yahoo.com**

Abstract

Alzheimer's Disease (AD) a major form of dementia is characterized by the formation of Amyloid beta plaques and neurofibrillary tangles. The oligomeric form of amyloid beta is the toxic form inducing oxidative stress and subsequently leading to tau hyperphosphorylation and aggravate AD conditions. So, the present study is focused on screening the neuroprotectant efficacy of Hesperidin Methyl Chalcone (HMC) against $A\beta_{(25-35)}$ in neuronal cells. Neuro 2a cells were pre-treated with HMC for 2 hours followed by $A\beta_{(25-35)}$ treatment. In addition to the cell viability assessment; anti-oxidant property, macromolecular damage, anti-apoptotic property of the control, toxin treated and drug with toxin treated groups were analyzed and compared. In addition, the anti-aggregation property of HMC was evaluated by *in silico* molecular dynamics studies using desmond module of Schrodinger software and *in vitro* anti-aggregation was evaluated by thioflavin T assay. *In vivo A. salina* mediated toxicity studies were performed for 24 hours and the toxicity of HMC was determined by the morphology and mortality rates. The results showed that HMC have prevented the neuronal loss by mitigating the ROS and RNS levels, macromolecular damage, mitochondrial damage and inhibited acetylcholinesterase activity. Moreover, HMC prevents oligomer formation and prevented the formation of mature fibrils. The *in vivo* toxicity studies revealed that HMC exerted least toxic effects in *A. salina*. These results indicate that HMC might be a potent anti- Alzheimer's candidate targeting the amyloid beta oligomers thus be an alternative for existing AD drugs.

***Keywords*:** Alzheimer's disease, Amyloid beta, Neuroprotection, Anti-aggregation, Toxicity

Molecular Docking and Pharmokinetic Analysis of Phytocompounds Targeting tau Hyperphosphorylation in Alzheimer's Disease

Indhirakumar Balakrishnan, Jafni Sakthivel, Nagakanni Muthuvenugopal, Soundarya Rajendran, Pandima Devi Kasi*

Department of Biotechnology, Alagappa University, Karaikudi 630003, Tamil Nadu, India

***Corresponding Author**: devikasi@yahoo.com

Abstract

Alzheimer's Disease (AD) is a progressive neurodegenerative disease that is characterized by cognitive functional decline, and behavioral changes that affects millions worldwide with substantial socioeconomic complications. In this study, anti tau hyperphosphorylating property of Phytocompound A and Phytocompound B were evaluated through molecular docking with PyRx software version 0.8, which is incorporated with the AutoDock Vina 0.3 program. Both the phytocompounds exhibited efficient binding interactions with the potential protein targets GSK3β, CDK5, CAMK II, JNK, ERK1,2, MEK1,2, MAPK, MARK, P70S6 Kinase which were responsible for tau pathology in AD. Among which Phytocompound A showed efficient binding score with ERK2 (-10.2 kcal/mol), MARK (-9.3 kcal/mol) and COX2 (-8.9 kcal/mol). Similarly, Phytocompound B exhibited notable binding affinities with ERK1 (-9.7 kcal/mol), TNF-α (-9.3 kcal/mol) and MAPK (-9.3 kcal/mol) protein kinase. The property of the drugs to bind with these target proteins indicate that combination might inhibit the kinase activity, thus prevents tau hyperphosphorylation. Drug-likeness and ADMET properties were analyzed using the SwissADME and admetSAR revealed favorable toxicity profiles for both compounds, with bioavailability scores of 0.55. Swiss Target Prediction revealed the kinases as primary targets for Phytocompound A and ion channels for Phytocompound B, proving the targeting potential of the drug combination against hyperphosphorylation of tau. The binding poses interactions and docking scores provides the preliminary evidence that supports the inhibitory potential of tau hyperphosphorylation in AD.

***Keywords*:** Phytocompounds, Alzheimer's Disease, Molecular docking, PyRx, ADMET.

Unveiling the Therapeutic Effect of Essential oil (A) Through *in vitro* LC-MS/MS analysis Against non-small cell Lung Cancer

Nagakanni Muthuvenugopal, Jafni Sakthivel, Indhirakumar Balakrishnan, Soundarya Rani Rajendran, Pandima Devi Kasi*

Department of Biotechnology, Alagappa University, Karaikudi – 630 003, Tamil Nadu, India

***Corresponding author**: devikasi@yahoo.com

Abstract

Non-small cell lung cancer (NSCLC) is an alarming disease with increasing mortality. Chemotherapeutics that are widely used in the treatment of cancer are well known to cause deleterious effects since they affect normal cells to a large extent. Apoptosis is a crucial mechanism in inhibiting the proliferation and invasion of cancer cells. Essential Oil A has shown remarkable effects in inducing apoptosis and inhibiting its associated mechanisms in A549 cells. The present study was designed to elucidate the differentially regulated proteins, especially in apoptosis and its associated molecular mechanisms, by the influence of Essential Oil A on A549 NSCLC through LC-MS/MS analysis. Lung adenocarcinoma cells(A549) were treated with Essential Oil A and evaluated for its cytotoxic effects. LC-MS/MS analysis was performed to identify the mechanism of action of Essential Oil A. Transwell invasion assay, live-dead staining, and LDH assay were performed to revalidate the LC-MS/MS results. Essential Oil A was found to inhibit half of the cell viability at 21.5 µg/mL. The live-dead staining revealed that at 21.5 µg/mL, A549 cells entered into a late apoptotic phase. Further, DNA damage was observed through DAPI staining. Thus, indicating Essential Oil A's apoptotic activity. LC-MS/MS analysis also proved the anti-lung cancer effects of Essential Oil A in apoptosis and its associated pathways. Essential Oil A has significantly reduced cell proliferation, invasion, and migration. These effects were evident through morphological and molecular experiments.

***Keywords*:** Apoptosis, NSCLC, LC-MS/MS, Invasion, Migration.

Luminescent silica nanoparticles targeting breast cancer cell lines

Selvaraj Anitha, Ponnuchamy Kumar*

Food Chemistry and Molecular Cancer Biology Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 003.

***Corresponding author**: kumarp@alagappauniversity.ac.in

Abstract

The present study reports the synthesis of luminescent silica nanoparticles using tetraethyl orthosilicate via microwave irradiation. The subsequent attributes were observed: (i) the synthesized luminescent nanoparticles emit blue light when exposed to UV irradiation; (ii) high-throughput characterization methods effectively validated the formation of luminescent silica nanoparticles; (iii) luminescent silica nanoparticles demonstrated substantial inhibitory effects on breast cancer cells (MCF-7 and MDA-MB-231); (iv) morphological assessments confirmed the induction of apoptosis in breast cancer cells; (v) cell migration and cell cycle analysis corroborate that the luminescent silica nanoparticles compellingly induce apoptosis in breast cancer cells. The findings highlight the potential of luminescent silica nanoparticles as targeted anticancer medicines capable of reducing the side effects linked to conventional chemotherapy.

***Keywords*:** Luminescent silica nanoparticles, breast cancer, apoptosis, cell migration, cell cycle analysis.

Strategic Targeting of MDR *Mycobacterium tuberculosis* HtrA2 Using Fluoroquinolones Mimetic Compounds

Harsini Poornima. M, Preethi. C, Ramya. B, Vijayalakshmi. P*

PG and Research Department of Biotechnology and Bioinformatics, Holy Cross College (Autonomous), Tiruchirappalli-620 002, Tamilnadu, India.

***Corresponding author**: vijayalakshmi01@hcctrichy.ac.in

Abstract

Tuberculosis is a highly communicable and chronic respiratory disease caused by pathogenic bacterium *Mycobacterium tuberculosis*. The drug - resistant species of *Mycobacterium tuberculosis* is tough to cure due to its resistant activity toward potential drugs. Available inhibitors of tuberculosis include few antimicrobial fluoroquinolone agents like ciprofloxacin, ofloxacin, and moxifloxacin to treat resistant Mycobacterium strains. Literature study elucidates that macromolecular target namely, HtrA2 of *Mycobacterium tuberculosis* play a dual role of protease and chaperone. These two activities are dependent on temperature, with low temperatures promoting the chaperone function and high temperatures promoting serine protease activity. Under normal physiological conditions HtrA2 acts as a quality control factor and promotes cell survival. In the present investigation, we screened fluoroquinolone such as ciprofloxacin, moxifloxacin and ofloxacin and their analogues based on better Docking score, absorption, distribution, metabolism and excretion screening and Lipinski's rule of 5, to find out their efficiency on resistant strain through in silico study. From the results observed, the analogues are suggested to be potent inhibitors of HtrA2 with sufficient scope for further exploration.

***Keywords*:** Ciprofloxacin, HtrA2, moxifloxacin, *Mycobacterium tuberculosis*, ofloxacin

Development of Chitosan-Based Polymeric Nanoparticles Encapsulating Marine Bacterial Biomolecules with Potent Antibacterial Activity Against *Staphylococcus aureus* and *Escherichia coli*.

Sunandha Jeeva Bharathi G, Rajapriya R, Balasubramanian Vellaisamy*

Department of Microbiology, Alagappa University, Science Block, Karaikudi – 630003.

***Corresponding Author**: balasubramanianv@alagappauniversity.ac.in

Abstract

The rise of antibiotic-resistant pathogens necessitates innovative antimicrobial strategies. This study introduces chitosan-based polymeric nanoparticles encapsulating bioactive biomolecules extracted from marine bacteria known for their antibacterial potential. Chitosan nanoparticles were synthesized via ionic gelation, achieving efficient encapsulation of the marine bacterial extracts. Characterization of the nanoparticles revealed a uniform size and a positive zeta potential, which enhances interaction with bacterial cell membranes. The encapsulation efficiency was noteworthy, indicating the successful loading of the bioactive compounds. Antibacterial efficacy was assessed against Gram-positive *Staphylococcus aureus* and Gram-negative *Escherichia coli* using the broth microdilution to determine minimum inhibitory concentrations (MICs). The nanoparticles exhibited significant antibacterial activity against *S. aureus* and *E. coli*, surpassing the efficacy of free biomolecules and blank nanoparticles. Time-kill assays demonstrated a 3-log reduction in bacterial counts within 6 hours, confirming potent bactericidal effects. The enhanced antibacterial performance is attributed to the synergistic action of chitosan's intrinsic antimicrobial properties and the sustained release of bioactive compounds from the nanoparticles. These findings highlight the potential of chitosan-based nanoparticles as a promising delivery system for marine-derived antibacterial agents. This novel nanotechnological approach offers a viable strategy to combat resistant bacterial infections. Further in vivo studies and toxicity assessments are recommended to advance clinical applications.

***Keywords*:** Chitosan nanoparticles, antibacterial activity, zeta potential, *Staphylococcus aureus, Escherichia coli.*

Interactive effects of freshwater acidification and anti-epileptic drug depakote on biochemical changes and neurotoxicity in freshwater fish *Labeo rohita*

Ashokkumar Sibiya, Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus 6th Floor, Alagappa University, Karaikudi-630004, Tamil Nadu, India.

***Corresponding author:** vaseeharanb@gmail.com

Abstract

Freshwater acidification and increasing discharge of toxic pollutants including pharmaceutical compounds into the aquatic ecosystem are emerging motorists of environmental change affecting aquatic ecosystems. Widespread research demonstrates that freshwater acidification has direct and indirect impacts on aquatic organisms in combination with other stressors mainly pharmaceuticals, have received insufficient attention to date. Among various aquatic organisms, fishes are a vital bioindicator among various aquatic organism which was badly affected by gabapentin. The research presented here was designed to evaluate the influences of anti-epileptic drug depakote on biochemical changes and neurotoxicity in freshwater fish *Labeo rohita* when exposed to different concentrations (0.1 µg/L and 10 µg/L) of depakote and pH-7.1 for chronic (28 days) toxicity. At all concentrations, stress related biomarker including increased reactive oxygen species level (ROS), biochemical parameters Glutathione -S- transferase (GST), Glutathione peroxidase (GPx), Superoxide dismutase (SOD), Catalase activity (CAT), enzymes for biotransformation lipid peroxidation (LPO) and protein carbonyl activity (PCO), cellular damage Metallothionein (MT) and Reduced glutathione (GSH) were significantly ($P \leq 0.05$) altered in *Labeo rohita*. Hence, obtained results confirmed severe damages with increase in metabolic depression and oxidative stress treated with depakote. Overall, the present results highlighted that chronic exposure to gabapentin may exert a strong effect on the antioxidant enzymes, oxidative stress and increased neurotoxic effects in *Labeo rohita*.

***Keywords*:** Depakote, *Labeo rohita*, Oxidative stress, Neurotoxicity, Cellular damage.

Synthesis of chlorophyll-based zinc oxide nanoparticles from *Ulva rigida* extract and their biomedical applications

Balu Jeyalakshmi and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630004, Tamil Nadu, India

.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

In this work, chlorophyll-based zinc oxide nanoparticles were synthesized using green macroalgae *Ulva rigida* extract by precipitation method and it was confirmed by UV, FTIR, XRD, TEM and Zeta potential. UV absorbance peak was observed at 378 nm, TEM revealed the synthesized *Uv*-Ch-ZnO NPs was hexagonal in shape and the average size ranges between 40 to 70 nm. Comparably, the synthesized *Uv*-Ch-ZnO NPs was tested for its antioxidant, MIC, antibacterial, and antibiofilm activities against two-gram negative (*Escherichia coli* & *Pseudomonas aeruginos*a) and two-gram positive (*Staphylococcus aureus* & *Enterococcus faecalis*) bacteria to determine the inhibitory impact. The results indicate increased activity against these bacteria due to the establishment of antibacterial zones. On exposure, microscopic images revealed the untreated (control) sample had a dense biofilm structure and the synthesized ZnO NPs treated groups (25, 50, 75, 100 µg/mL) minimize the biofilm formation. Light microscopy images reveal that *Uv*-Ch-ZnO NPs loosen microcolonies in the treated sample, dispersing the biofilm architecture completely. FRAP activity represented the highest antioxidant power with increasing concentration of the synthesized *Uv*-Ch-ZnO NPs. In addition, the toxicity of *Uv*-Ch-ZnO NPs was tested against microcrustacean brine shrimp *Artemia salina* and revealed that it is less toxic.

***Keywords*:** *Ulva rigida*, ZnO NPs, Antioxidant, Antibacterial, Toxicity.

Enhanced diabetic wound healing with hyaluronic acid-coated ZnO nanoparticles synthesized from *Mimosa pudica*

Chandran Sandhiya and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

Diabetic wounds are indeed a significant global health concern, characterized by chronic infection and delayed healing. These wounds are challenging to treat and can lead to severe complications such as infections and amputations, placing a substantial burden on healthcare systems globally. This study aims to determine the wound-healing effect of *Mimosa pudica* flower extract-based ZnO NPs. *Mimosa pudica* flower-based NPs are synthesized using the co-precipitation method. Further, it was confirmed through the characterization using UV, FTIR, XRD, Zeta potential, and TEM. MP-ZnO NPs were authenticated by UV-Vis peak range at 342 nm. The XRD spectra proved the crystalline nature of the MP-ZnO NPs. The FTIR spectrum illustrated the presence of functional groups in the MP-ZnO NPs. The TEM micrograph showed that the size of NPs ranges from 40-60 nm with a rod structure. Further, the synthesized MP-ZnO NPs were coated with hyaluronic. Results demonstrated the DPPH [2,2-diphenyl-1-picrylhydrazyl hydrate] antioxidant activity of nanoparticles (81%) at a concentration of 100 µg/ml. The antibacterial property of MP-ZnO NPs was evaluated against wound associated bacteria (*P. aeruginosa*, *S.aureus*, *B.licheniformis*, *E. faecalis*, *B.hornakiae*, and *E.coli*) by agar well diffusion method and highest zone of inhibition were observed at *E.coli* (9 mm). Additionally, MP-ZnO NPs promote tissue regeneration in in-vivo animal it revealed 92% healing in 21 days. Plant-based nanoparticles synthesized in this study have shown effective antioxidant, antibacterial and wound healing properties that can be prove that MP-ZnO NPs alternative for clinical management of wounds.

***Keywords*:** *Mimosa pudica,* ZnO, antioxidant, antibacterial, wound healing

Green synthesis and characterization of Zinc oxide nanoparticles from *Annona squamosa* leaf against wound healing activity

Priyadharshini Suresh, Vaseeharan Baskarlingam*

Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus 6th Floor, Alagappa University, Karaikudi 630004, Tamil Nadu, India

***Corresponding author**: vaseeharanb@gmail.com

Abstract

In the present study *Annona squamosa* (As) leaf extract based ZnO NPs were synthesized and characterized by UV–Visible spectroscopy techniques (UV), Fourier-transform Infrared spectroscopy (FTIR), X-ray Diffraction (XRD), Energy-dispersive X-ray spectroscopy (EDAX) and Transmission Electron Microscopy (TEM). The wound healing efficiency of As-ZnO NPs were studied in *Labeo rohita*. 7 days experimentation was done in five tanks and in each tank six fishes are used for the experiment. As ZnO NPs at various concentration (25%, 50%, 75%, 100%) and control with commercial drug were induced in the wound affected areas of *Labeo rohita.* Results shows that UV-Vis spectroscopy at 375nm denotes the synthesis of Zinc oxide nanoparticle. The functional group at 3814.7–420 cm−1 peak shows the absorption peak in FTIR spectrum. The crystalline nature of As- ZnO NPs was confirmed by XRD. TEM shows the spherical structure of ZnO NPs. EDX analysis confirm the presence of Zinc in the As-ZnO NPs. After the 7 days of experiment, the Zinc coated *Annona squamosa* (As-ZnO NPs) at 75% and 100% doses shows high wound healing capacity compared to commercial drug. Based on these aspects As ZnO NPs can be further used in aquaculture to prevent various wound associated infections.

***Keywords*:** Zinc oxide nanoparticles, *Annona squamosa*, UV–Visible spectroscopy, Wound healing, *Labeo rohita*

Biomaterials and Host Response of Medicinal Plant derived Compounds as Feed Additives for Growth Enhancement and Disease Resistance in Indian major carps

Manikandan Ramesh Kavitha[a] , Collince Omondi Awere [b], Baskaralingam Vaseeharan[a]

[a] *Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi, 630003, Tamil Nadu, India*
[b] *The plant biotechnology lab, Department of Biotechnology Alagappa University, Karaikudi, 630003, Tamil Nadu, India*

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

Abstract

Aquaculture, a rapidly expanding sector, faces extensive tasks due to variety of infectious diseases that loom fish health and eventual productivity. Traditional methods of disease control, such as antibiotics and vaccines, have many limitations including resistance development and variety of environmental impacts. Thus, alternate strategies are needed to facilitate growth enhancement and enhance disease resistance. Exploitation of medicinal plant derived feed additives to achieve this goal is one such promising approach. Medicinal plant derived composites with wide range of dietary and bioactive compounds can be successfully used as feed additives in aquaculture industry to improve growth performance, strengthen the immunity, and disease resistance of fish. These additives offer minimal or non-existent negative side effects and have a low environmental impact compared to synthetic antibiotics and growth promoters. In recent years, aquaculture industry exploited these dietary and bioactive compounds because of their growth enhancing and other pharmacological activities like anti-bacterial, anti-viral, anti-inflammatory, anti-stress, immunomodulatory and anti-oxidant properties. Previous studies showed that the use of medicinal plants such as *Azadirachta indica* (neem), *Withania somnifera* (ashwagandha) and *Ocimum sanctum* (holy basil) in fish diets can be beneficial for growth performance. Work is currently in progress to assess the growth stimulating and disease resistance properties of six different Indian medicinal plants. Identification of medicinal plants with anti-bacterial, immunomodulatory and growth stimulating properties and development of feed additives using the standard method can considerably reduce the current practice of using antibiotics in aquaculture industry. The outcome of the research will optimize dosages, identify synergistic effects among different phytochemicals, and evaluate long-standing impacts on fish health and growth.

***Keywords*:** Aquaculture, Infectious diseases, Fish health, Productivity, Antibiotics

Unveiling the multifunctional bioactivities of coral proteins against inflammation, bacterial infections and cancer

Muthukaruppan Kabila and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Science Campus, 6th Floor, Alagappa University, Karaikudi-630 004, Tamil Nadu, India.

***Corresponding author:** vaseeharanb@alagappauniversity.ac.in*

Abstract

Coral derived proteins are bioactive compounds with immense potential for therapeutic applications. In this study, coral proteins are explored for its property against inflammation, infections caused by pathogenic bacteria and cancer. Coral specimens like *Montipora monasteriata* and *Porites exserta* were collected from Gulf of Mannar Marine Biosphere Reserve. The proteins are extracted from corals and characterized using FTIR, SDS-PAGE, and GC-MS. Nitric oxide (NO) inhibition, reactive oxygen species (ROS) scavenging assays and cytokine profiling were performed to demonstrate the anti-inflammatory effect of coral proteins. Anti-biofilm activity was exhibited by coral proteins against clinically significant bacteria like *Staphylococcus*, *Escherichia* and *Pseudomonas* species. Moreover, gene expression studies show the ability of coral proteins to modulate key regulator genes of pathogenic bacteria. Furthermore, the coral protein exhibited anti-cancer activity which is confirmed using MTT assay, cell cycle analysis and apoptosis assays. In conclusion, coral proteins from *Montipora monasteriata* exhibits higher multifunctional bioactivities, including anti-inflammatory, anti-biofilm, antibacterial and anti-cancer properties. These findings suggest the potential application of coral proteins in pharmaceutical and nutraceutical fields.

***Keywords*:** Coral protein, *Montipora monasteriata*, Inflammation, Bacteria, Cancer.

Development of vaccine using inactivated *Vibrio alginolyticus* against fish pathogens

Thangavel Gobika, Baskaralingam Vaseekaran*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author**: vaseeharanb@alagappauniversity.ac.in

Abstract

Vibrio alginolyticus, a highly virulent bacterial pathogen, poses a significant threat to the aquaculture industry, causing substantial economic losses due to high mortality rates and decreased fish production. In this study, vaccine was prepared using inactivated *Vibrio alginolyticus* to protect *Oreochromis mosambicus* against this fish pathogen, which was administered to fish through oral, immersion, and injection modes at different doses. The *Oreochromis mosambicus* were challenged with the bacteria, and histological analysis of liver and gill samples, 96 hours post-challenge revealed significant protection in vaccinated fish, with no damage observed in gills and liver. Some non-specific immune responses like nitroblue tetrazolium assay, myeloperoxidase activity, and serum haemagglutination titre were studied. The enhancement in immune response, resulted in a 90% survival rate in vaccinated *Oreochromis mosambicus*, indicating a promising solution for mitigating the economic impact of *Vibrio alginolyticus* infections in the aquaculture industry.

***Keywords*:** *Aeromonas sobria,* inactivated vaccine, Immersion, oral, Injection administration and Survival rate.

Development of a novel vaccine formulation using *Solanum torvum* and *Terminalia catappa* fruit extracts with chitosan adjuvant against fish pathogens

Joseph William Jayaseeli, Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

Fish diseases caused by bacterial pathogens result in significant economic losses in aquaculture. This study developed a vaccine formulated using bioactive compounds from *Solanum torvum* and *Terminalia catappa* fruit extracts, combined with chitosan as an adjuvant, to resist pathogens in fishes. The extracts were characterized for their phytochemical composition and antibacterial activity. Chitosan, a biocompatible and biodegradable polysaccharide, was used as an adjuvant to enhance the immune response. The vaccine formulation was prepared by combining the extracts with chitosan and administered to *Oreochromis mossambicus* viva oral, immersion, and injection administration routes with 1mg, 1.5mg, and 2.5mg concentrations. The vaccine efficacy was evaluated by challenging the fish with *Aeromonas hydrophila* and *Streptococcus iniae*. The results showed that the vaccine formulation significantly enhanced the immune response, reduced mortality, and prevented disease symptoms in vaccinated fish. The vaccine formulated using *Solanum torvum* and *Terminalia catappa* fruit extracts with chitosan as an adjuvant was a natural and sustainable vaccine formulation against fish pathogens, offering a promising alternative to conventional antibiotics and vaccines.

***Keywords*:** *Oreochromis mossambicus*, immersion, phytochemical composition, antibacterial activity, oral and injection administration.

Therapeutic Potential of *Tridax procumbens* Flower Extracts in Wound Healing: A Natural Approach to Tissue Regeneration

Nachiyappan Shanmuga Priya and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630004, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

Wound healing is a multifaceted biological process comprising haemostasis, inflammation, proliferation, and remodelling phases. Conventional wound care methods often depend on chemical agents, which may cause adverse effects or complications, limiting their suitability for all patients. This study explores the efficacy of natural approaches to wound healing, emphasizing the therapeutic potential of *Tridax procumbens* (Coat buttons), a tropical plant with traditional medicinal applications. Phytochemical analysis of *Tridax procumbens* flower extracts (*Tp*-flo-ext) identified flavonoids, tannins, and phenolic compounds, known for their potent antioxidant and anti-inflammatory activities. The in vitro and in vivo evaluations demonstrated that coat buttons flower extracts significantly enhanced wound closure and tissue regeneration in an animal model of cutaneous wounds compared to untreated controls. These findings underscore the potential of coat buttons as a safe and effective alternative or complementary therapy for wound healing. By harnessing its antioxidant, anti-inflammatory, and antibacterial properties, *Tp*-flo-ext support the natural wound healing process and offer a promising strategy for advancing wound care practices.

***Keywords*:** Coat buttons, Wound healing, Phytochemicals, coat buttons, Tissue regeneration.

Development of a papaya seed oil-Infused chitosan edible coating for shelf-life extension of grapes

Azhagappan Arasappan and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

The perishability of grapes, edible coating will enhance their shelf life and maintain their marketability. The edible coating was prepared using 1% (w/v) soluble part of chitosan at different concentrations (0.25%, 0.50%, and 0.75% (v/v)) of *Carica papaya* oil (CPO) to extend the shelf life of grapes. Microbiological, chemical, physical, and sensorial characteristics of coated and uncoated samples were evaluated at 21-day intervals. Titratable acidity (TA), and ascorbic acid showed a decreasing trend, during the whole period of the storage. Firmness increased during the storage time, while total soluble solids. Coatings containing 0.5% and 0.75% CPO significantly prevented microbial growth on the samples at least for 3 weeks, respectively. Optimization proved that 1-week cold storage and 0.43% CPO could dramatically meet 80% of the research targets including maximum nutritional quality and freshness, as well preventing microbial spoilage. It was concluded that coating the grape by selecting an appropriate concentration of the CPO could considerably increase shelf life, marketability, and nutritional quality of grape at a suitable and acceptable level.

***Keywords*:** Papaya seed oil, edible coating, chitosan, preservation, self-life extension

Exploring the effects of squid collagen and its hydrolysate on mice photoaging

Murugesan Priyadarshini and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

Corresponding author*: *vaseeharanb@alagappauniversity.ac.in

Abstract

Collagen was isolated from squid skin, a processing waste product. The bio functional activities of enzymatic squid skin collagen hydrolysate were determined to produce a value-added material. Marine collagen has anti-oxidant, anti-aging, moisturizing, and reparative properties. Squid collagen (SC) was extracted from *Uroteuthis duvaucelii* skin, cranial cartilage and fluid filled buoyancy chamber. SC is further hydrolysed for squid collagen hydrolysate (SCH). The properties of SC and SCH were thoroughly assessed for their potential to improve skin health in mice with mechanically induced skin damage. This assessment involved a combination of skin moisture measurements, microscopic skin analysis, and evaluations of immunity indexes. SC and SCH were found to increase the moisture retention capacity of mice skin with mechanical induction. The analysis showed that SC and SCH could effectively repair elastin protein fibres while maintaining the natural ratio of type I collagen. In addition, the immunity indexes showed that SC and SCH play a role in enhancing immunity of photoaging mice in vivo. The resulting data implies that squid collagen hydrolysate could be an innovative anti-photoaging agent from natural sources.

***Keywords*:** Squid, Collagen, Photoaging, Immunity, Skin damage.

Development of bacterial-derived peptide vaccine against vibrio: A Novel Approach for Rohu (*Labeo rohita*) Protection

Nagendran Balasaraswathi and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author**: vaseeharan@alagappauniversity.ac.in

Abstract

Vibrio-strain fish pathogens significantly threaten the aquaculture industry, particularly for *Labeo rohita* farming. This study reports the development of bacterial-derived peptide vaccine using *Vibrio anguillarum* against vibrio infection in fish. The antibacterial efficacy of *Vibrio anguillarum* peptides was investigated by well diffusion method for this study, and then the bacterial-derived peptide vaccine was formulated with adjuvant, which exhibited potent inhibitory activity against vibrio strains. Vaccination trials (control, 1mg, 3mg 5mg per ml) in rohu fish demonstrated significant protection against vibrio infection, with a relative percent survival of 85% compared to unvaccinated controls. The vaccine-induced immune response was characterized by increased production of specific antibodies and activation of immune-related genes. This study provides a novel and sustainable approach for developing bacterial-derived peptide vaccines against fish pathogens, offering a promising solution for the aquaculture industry.

***Keywords*:** Aquaculture, *Labeo rohita*, Fish Vaccines, Bacterial-derived peptides, Vibrio strain pathogens.

Effects of Red macroalgae against wound healing on *Cirrhinus mrigala* induced by wound associated bacteria.

Thillaipandi Abitha and Baskaralingam Vaseeharan*

Biomaterials and Biotechnology in Animal Health lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 004, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

The rising prevalence of bacterial infections in aquaculture has led to significant challenges. Red macroalgae have a potential for controlling antibiotic resistance to bacterial infection and it also had a potential use in wound healing and drug delivery system. In the present study red seaweed extract is used as a natural treatment for wound healing and bacterial infections in *Cirrhinus mrigala*. The experiment was conducted in six groups with different concentrations of seaweed extract; 25%, 50%, 75% and 100%, and group 1 to 6 induced by *S. aureus*, *Pseudomonas anguilliseptica* group 1 was devoid of extract and acted as a control, and group 6 was treated with tetracycline as a positive control. Healing progress was monitored over a specific time by analyzing tissue regeneration and macroscopic parameters on days 3, 6, 9, 12, and 15 to evaluate the wound closure using descriptive statistics and ANOVA at α0.05. The result demonstrated that fish treated with red seaweed extract exhibited significantly faster wound healing and reduced inflammation compared to untreated control. The use of red macroalgae reduces the dependency on antibiotics.

***Keywords*:** Red macroalgae, bacterial infections, wound healing, *Cirrhinus mrigala*, ANOVA.

Preparation, antioxidant, antibacterial, anti-biofilm, hemocompatibility, and anticancer activities of *Curcuma longa* starch polysaccharide nanoparticles

Siva Sankar Sana [a], Ramakrishna Vadde [b], Chaitanya Jayprakash Raorane [a], Pham Van Hung [c]*, Tae Hwan OH [a]

[a] *School of Chemical Engineering, Yeungnam University, 280 Daehak-Ro, Gyeongsan, Gyeongbuk, 38541, Republic of Korea*
[b] *Department of Biotechnology & Bioinformatics, Yogi Vemana University, Kadapa 516005, India*
[c] *Department of Food Technology, International University, Thu Duc District, Ho Chi Minh City, Vietnam*
***Corresponding authors:** Pham Van Hung (pvhung@hcmiu.edu.vn), Oh Tae Hwan (taehwanoh@ynu.ac.kr)

Abstract

Developing plant-derived polysaccharide nanoparticles represents a transformative approach to advancing sustainable materials for biomedical and environmental applications. In this study, starch nanoparticles (STNPs) were synthesized from *Curcuma longa* starch using a nanoprecipitation method, yielding well-dispersed spherical particles with a 20–50 nm size range. The physiological characteristics of the synthesized STNPs were investigated employing different tools, including zeta potential (ζ), transmission electron microscopy (TEM), field emission scanning electron microscopy (FESEM), and Fourier transform infrared spectroscopy (FT-IR). FESEM and TEM results revealed the spherical shape of STNPs with a smooth surface with 20-50 nm in range. These nanoparticles demonstrated excellent antioxidant properties by showing IC_{50} values of 2.98 µg/mL and 3.32 µg/mL in DPPH and ABTS assays, respectively. Anticancer activity was proved in HepG2 liver cancer cells, where the dose-dependent cytotoxicity was observed with IC_{50} = 304.9 µg/mL. STNPs also displayed potent antibacterial effects against multi-drug-resistant *Corynebacterium diphtheriae*, *Salmonella typhi*, and *Escherichia coli*, alongside remarkable anti-biofilm efficacy. The morphology of bacterial cell membrane damage was determined through the SEM study. Hemocompatibility of STNPs showed less hemolysis activity. In summary, the prepared STNPs substantially enhanced their antibacterial, antibiofilm efficacy, and anticancer activity, and this material could be useful in biomedical applications.

***Keywords*:** Starch, nanoparticles, anti-oxidant activity, antibiofilm, anti-cancer activity

Vermicomposting of seaweed waste with cow dung: Glycolipid Extraction for Agriculture, Medicinal, and Cosmetic Applications

Chandrasekaran Gogula lalitha and Muniyandi Biruntha*

Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa University, Karaikudi -630 003, Tamil Nadu, India.

***Corresponding author:** biruntham@alagappauniversity.ac.in*

Abstract

Seaweed waste is an abundant yet underutilized resource that holds significant potential for sustainable bioproduct development. This study explores the vermicomposting of seaweed waste combined with cow dung to enhance the breakdown of organic matter and facilitate glycolipid extraction for agricultural, medicinal, and cosmetic applications. Earthworm activity accelerates the decomposition process, enriching the compost with bioactive compounds and fostering microbial interactions that enhance glycolipid synthesis. The resulting compost is hypothesized to improve soil fertility, plant growth, and disease resistance due to the presence of bioavailable glycolipids. Medicinal applications include antimicrobial and anti-inflammatory properties, making these compounds valuable for pharmaceutical formulations. In cosmetics, glycolipids serve as natural surfactants with skin-conditioning and emulsifying properties, offering sustainable alternatives to synthetic ingredients. This study evaluates physicochemical changes during vermicomposting, glycolipid yield, and potential bioactivities. The findings could contribute to eco-friendly waste management while promoting value-added bioproducts from seaweed and livestock waste.

***Keywords*:** Vermicomposting, seaweed waste, glycolipids, biofertilizer, bioactive compounds.

Bioactive Innovations from Vermicompost: Harnessing Aquatic Waste for Sustainable Cosmeceutical and Therapeutic Applications.

Selvaraj Shanmuha priya, Muniyandi Biruntha*

Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa University, Karaikudi -630 003, Tamil Nadu, India.

***Corresponding author:** biruntham@alagappauniversity.ac.in

Abstract

Vermicomposting, a sustainable waste management technology, offers immense potential for deriving bioactive compounds with anti-inflammatory, antibacterial, and antioxidant properties. This study investigates the efficacy of vermicompost derived from cow dung, fish scales, and shrimp shells in producing bioactive compounds for cosmeceutical and therapeutic applications. Our research evaluates the growth, reproduction, and adaptability of earthworms fed with aquatic waste, and analyzes the physicochemical, enzymatic, and microbiological properties of vermicompost. In vitro assays demonstrate the anti-inflammatory, antibacterial, and antioxidant activities of bioactive compound extracts. Furthermore, we formulate and assess the efficacy of cosmetic products incorporating these extracts, showcasing their potential for anti-aging and wound healing applications. This study highlights the environmental benefits and scalability of vermicomposting, paving the way for sustainable innovations in the cosmeceutical and therapeutic industries.

***Keywords*:** Vermicomposting, Bioactive Compounds, Aquatic Waste, Cosmeceuticals, Therapeutics.

Assessment of gut –associated bacterial enzymes from the earthworm *Perionyx excavatus* for efficient microplastic depolymerization

Thangaraj Sathishkumar and Muniyandi Biruntha*

Vermiculture technology in Animal Health Lab, Department of Animal Health and Management, Alagappa University, Karaikudi – 630 003, Tamil Nadu, India.

***Corresponding author**: biruntham@alagappauniversity.ac.in

Abstract

Microplastic pollution has become a major environmental concern, posing significant threats to ecosystems and human health. Conventional methods for plastic degradation are often inefficient and environmentally unsustainable. Recent studies have highlighted the potential of biological degradation through gut microbiota of various soil-dwelling organisms, such as earthworms. This study aims to explore and characterize gut-associated bacterial enzymes from the earthworm *Perionyx excavatus*, with a focus on their efficiency in depolymerizing microplastics. By isolating and analyzing these enzymes, we seek to understand their degradation mechanisms, optimize conditions for enhanced activity, and enzymes, depolymerizing microplastics.

***Keywords*:** *Perionyx excavates*, Microplastic, pollution, degradation, enzymes.

Vermistabilization of *Lantana camara* leaf biomass combined with cow dung using the earthworm *Eudrilus eugeniae*: Evaluation of Phytohormones through LC-MS Analysis

Rajakkannu Aishwarya and Muniyandi Biruntha*

Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa university, Karaikudi – 630 003, Tamil Nadu, India.

***Corresponding author: biruntham@alagappauniversity.ac.in**

Abstract

Lantana camara, an invasive weed, was subjected to vermicomposting using cow dung and *Eudrilus eugeniae* earthworms. The physiochemical properties, enzyme activities, and microbial communities of the vermicompost were analyzed. The results showed significant improvements in pH, electrical conductivity, and nutrient content. Enzyme activities such as protease, cellulase, and phosphatase, increased substantially, indicating enhanced microbial activity. LC-MS analysis revealed the presence of phytohormones, including auxins, gibberellins, and cytokinin, which can promote the plant growth. The vermicompost exhibited a rich microbial diversity, with bacteria and fungi contributing to the degradation of organic matter. This study demonstrates the potential of vermicomposting *Lantana camara* with cow dung using *Eudrilus eugeniae* for producing a nutrient-rich, phytohormone-containing organic amendment for sustainable agriculture.

***Keywords*:** Vermicomposting, *Lantana camara*, *Eudrilus eugeniae*, Cow dung, physicochemical properties.

Studies on Metallothionein Protein – Mediated Detoxification of Heavy Metals in Sewage Sludge Using the Earthworm *Eudrilus eugeniae*: An Examination of Genotoxicity

Ravichandran Vijayalakshmi and Muniyandi Biruntha*

Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa university, Karaikudi – 630 003, Tamil Nadu, India.

***Corresponding author:** biruntham@alagappauniversity.ac.in

Abstract

This study explores the detoxification of heavy metals in sewage sludge through metallothionein proteins and assesses microbial colony count and enzyme activity mediated by the earthworm *Eudrilus eugeniae*. Metallothionein, metal-binding proteins, play a crucial role in reducing heavy metal toxicity by chelation, thus aiding in bioremediation. The earthworm *E. eugeniae* enhances microbial activity and organic matter degradation in sludge, facilitating detoxification and nutrient cycling. Key enzymatic activities, including dehydrogenase, cellulase, and phosphatase, were analyzed alongside microbial colony counts to evaluate the bioremediation efficiency. Results demonstrated a notable reduction in heavy metal bioavailability, increased microbial populations and elevated enzyme activities, highlighting the potential of integrating earthworms and metallothionein in sustainable waste management. This study underscores a promising eco-friendly approach to mitigate heavy metal contamination while improving soil health.

***Keywords*:** Metallothionein proteins, heavy metals, sewage sludge, *Eudrilus eugeniae*, bioremediation.

Evaluation of the antibacterial and anticancer properties of coelomic fluid from the earthworm *Perionyx excavatus* against breast cancer

Rajkumar Rathika and Muniyandi Biruntha*

Vermiculture technology Lab, Department of Animal Health and Management, Science campus 6th floor, Alagappa University, Karaikudi-630 003, Tamil Nadu, India.

***Corresponding author:** biruntham@alagappauniversity.ac.in

Abstract

This study evaluates the antibacterial and anticancer properties of coelomic fluid extracted from the earthworm *Perionyx excavatus*. The coelomic fluid demonstrated significant antibacterial activity against clinical pathogens, including *Escherichia coli* and *Staphylococcus aureus*. Furthermore, the coelomic fluid exhibited selective cytotoxicity towards breast cancer cells (MDA-MB-231), inducing apoptosis and inhibiting cell proliferation. These findings suggest that the coelomic fluid of *Perionyx excavatus* may be a valuable source of natural antimicrobial and anticancer agents, warranting further investigation for its potential therapeutic applications.

***Keywords*:** *Perionyx excavates*, Coelomic fluid, antibacterial activity, anticancer properties, breast cancer.

Nutrient composition, fatty acid profiles of oven dried and freeze-dried earthworm, *Perionyx excavatus* and *Eudrilus eugeniae* and earthworm powder pellet as a replacement for fish meal

Senthil kumaran Alice Jeba Angelin and Muniyandi Biruntha*

Vermiculture Technology Lab, Department of Animal Health and Management, Alagappa university, Karaikudi – 630 003, Tamil Nadu, India.

***Corresponding author: biruntham@alagappauniversity.ac.in**

Abstract

This study aims to determine the nutritional composition and fatty acid profiles of earthworms (*Perionyx excavatus* and *Eudrilus eugeniae*) procured from the vermiculture unit at Alagappa University. The earthworms will undergo two drying methods: freeze drying and oven drying. The resultant powders will be formed into pellets and fed to edible fish tilapia to evaluate the impact on their growth. The study also focuses on the nutrient composition and fatty acid profiles of *Perionyx excavatus* and *Eudrilus eugeniae*, Freeze-dried *Perionyx excavatus* and *Eudrilus eugeniae* showed higher protein content, while most minerals were significantly different, with calcium being an exception. Oven-dried *Perionyx excavatus* and *Eudrilus eugeniae* had higher essential fatty acids. The study highlights the potential of freeze-dried *Perionyx excavatus* and *Eudrilus eugeniae* as a better nutrient source compared to oven-dried earthworms and discusses the benefits of using earthworm meal in aquaculture to reduce fish meal dependency due to its high nutrients and lipid content.

***Keywords*:** *Eudrilus eugeniae*, *Perionyx excavates*, Freeze dried, oven dried, nutritional composition.

Assessing the Effects of Silver Nanoparticles on Nile Tilapia: Toxicity, Immunity, and Bio-Indicator Potential

Selvaraj Yuvathi

I-MSc., Department of Animal Health and Management, Science Campus 6th floor, Alagappa University, Karaikudi-630 003,
Tamil Nadu, India.

Abstract

Aquaculture plays a critical role in global food security, providing high-nutritional food and contributing significantly to the economy. However, the industry faces multiple challenges, including disease outbreaks, nutritional imbalances, and water pollution, which impact both cultured species and the surrounding environment. In this context, silver nanoparticles (Ag NPs) have emerged as a promising tool in aquaculture, offering antimicrobial properties that can enhance disease control. This review provides a comprehensive analysis of Ag NPs applications in aquaculture, evaluating their benefits, potential risks, and future research directions**.** While Ag NPs have shown promise in improving disease resistance, concerns remain regarding their long-term environmental and physiological effects. A key focus of this study is the impact of Ag NPs exposure on Nile tilapia **(***Oreochromis niloticus***)** fingerlings, particularly in relation to acute and chronic toxicity, metallothionein gene expression, immune responses, and hematological parameters. The findings revealed that exposure to Ag NPs led to significant alterations in metallothionein expression**,** with decreased levels in the liver and spleen but an increase in the head and kidney. Additionally, immune function was compromised, as indicated by reduced phagocytic activity and lower red blood cell counts one week after exposure, particularly at higher Ag NPs concentrations. Despite these negative effects, vaccinated fish exposed to Ag NPs showed partial protection against *Streptococcus agalactiae* infection, highlighting a potential role of nanoparticles in disease management. Moreover, these findings suggest that Nile tilapia could serve as a bio-indicator for assessing Ag NPs contamination in aquatic environments. Given the growing use of Ag NPs in aquaculture, this study underscores the urgent need for further research to fully understand their implications, particularly in natural aquatic ecosystems. While Ag NPs offer potential benefits, a balanced approach is essential to maximize their advantages while minimizing ecological and physiological risks**.**

***Keywords*:** Ag NPs, Nile Tilapia, Metallothionein, *S.agalactiae*, Chronic Toxicity.

Development of Multi-approach Vaccine against "*Vibrio harveyi*" for Aqua culture Disease Management

Balu Keerthana
I-MSc., Department of Animal Health and Management, Science Campus 6th floor, Alagappa University, Karaikudi-630003, Tamil Nadu, India.

***Corresponding author: vaseeharanb@alagappauniversity.ac.in**

Abstract

Vibrio harveyi is a significant pathogen in aquaculture, responsible for severe economic losses. To develop effective control strategies, the researchers study integrates multiple vaccine approaches, including immunoinformatics, DNA, subunit, and recombinant protein vaccines**.** The development of a multi-epitope peptide vaccine targeting the *haemolysin* gene. Using immunoinformatics tools, the vaccine was optimized for antigenicity**,** immunogenicity, and non-allergenicity, ensuring its safety and efficacy. Further validation through codon optimization and molecular dynamics simulations confirmed its stability and suitability for large-scale production in *E. coli* K12 expression systems. Additionally, key components of the type VI secretion system, including outer membrane proteins VhhP2, TssJ, and VgrG, were evaluated as potential vaccine candidates. These proteins exhibited moderate to high protective efficacy in fish models**,** with a relative percent survival (RPS). Among them, VhhP2 demonstrated strong immunoprotection when administered both orally and via injection, eliciting a robust immune response in Japanese flounder. Beyond protein-based vaccines, DNA vaccines targeting DegQ and Vhp1 were also assessed. Notably, a bivalent formulation (pDV) provided enhanced efficacy and cross-protection against Vibrio parahaemolyticus, further expanding its potential application in aquaculture. Finally, the recombinant protein K (r-OmpK) was tested in Asian seabass, where it induced strong immune responses and significantly activated key immunological pathways, further reinforcing its potential as a vaccine candidate. Overall, these findings shows the effectiveness of diverse vaccine strategies, demonstrating that immunoinformatics-based peptide vaccines, DNA vaccines, subunit vaccines, and recombinant protein formulations can collectively contribute to the control of *V. harveyi* infections in aquaculture. This multi-faceted approach paves the way for safer and more efficient vaccination strategies to mitigate economic losses and enhance fish health in the industry.

Keywords**:** *Vibrio harveyi*, multi-epitope peptide vaccine, Haemolysis gene, Type VI secretion system, DNA vaccine.

Anticancer potential of plant extract on Human breast cancer cell lines MDA-MB-231

B.H. Mohamed Sahel, Dr. B. David jayaseelan*

Nehru Arts and Science College, India

***Corresponding author: nascdavidjayaseelan@nehrucolleges.com**

Abstract

Breast cancer remains one of the most prevalent malignancies worldwide, necessitating the exploration of novel therapeutic agents with minimal side effects. *Solanum trilobatum*, a traditional medicinal plant, has gained attention for its potential anticancer properties. This study investigates the cytotoxic effects of *Solanum trilobatum* extracts on human breast cancer cell lines, particularly MCF-7 and MDA-MB-231. Phytochemical analysis reveals the presence of bioactive compounds such as alkaloids, flavonoids, saponins, and phenolic compounds, which may contribute to its anticancer activity. In vitro assays, including MTT, apoptosis induction, and gene expression analysis, demonstrate dose-dependent cytotoxicity, apoptosis induction, and modulation of key cancer-related pathways. These findings suggest that *Solanum trilobatum* extracts could serve as a promising natural alternative for breast cancer treatment. However, further in vivo studies and clinical trials are required to validate its therapeutic potential and elucidate the underlying mechanisms.

***Keywords*:** *Solanum trilobatum*, breast cancer, MCF-7, MDA-MB-231, phytochemicals.

Green synthesis of Silver Nanoparticles using "*Bauhinia tomentosa*" their invitro antioxidant assay and Larvicidal activity

U. Athira, Dr. R. Kashimani

Department of microbiology, Nehru Arts and Science College, TamilNadu, India

***Corresponding author: nasckasimani@nehrucolleges.com**

Abstract

Metal nanoparticles have numerous applications such as optics, biomedical sciences, drug delivery, catalysis and electronics. The present work deals with the green synthesis of silver nanoparticles (AgNPs) using leaves extract of *Bauhinia tomentosa Linn* and its invitro antioxidant assay and larvicidal activity. The bioreduced silver nanoparticles were characterised by UV-visible spectrophotometry, Fourier transform infrared (FTIR) spectroscopy, Field emission scanning electron microscope (FESEM) and X-ray diffraction (XRD). The AgNP was found to have effective antibacterial activity against Streptococcus. The leaves of Bauhinia tomentosa were used to react on larvicidal activity and were also observed as highly effective to mosquito larvae

***Keywords*:** Silver Nanoparticles, green Synthesis, *Bauhinia tomentosa*, antioxidant activity, larvicidal Activity.

Biogenic Synthesis of Zinc Oxide Nanoparticles against Multidrug-Resistant *E. coli* and Their Anti-Biofilm Activity

Jershin O M, B David jayaseelan*

Department of microbiology, Nehru Arts and Science college,Tamil Nadu, India

***Corresponding author: nascdavidjayaseelan@nehrucolleges.com**

Abstract

Urinary tract infections (UTIs) caused by *Escherichia coli* (E. coli) are increasingly difficult to treat due to rising antibiotic resistance, especially in hospital settings. A key factor contributing to persistent infections is the formation of biofilms, which protect bacteria from both antibiotics and immune responses. This study explores the biogenic synthesis of zinc oxide (ZnO) nanoparticles from *Lemna minor* (duckweed), an eco-friendly method that offers reduced toxicity compared to traditional chemical synthesis. The research focuses on synthesizing and characterizing ZnO nanoparticles, followed by testing their anti-biofilm activity against multidrug-resistant *E. coli* strains. The findings suggest that these biogenic ZnO nanoparticles could serve as a promising, sustainable alternative for preventing and treating biofilm-associated UTIs, providing a new approach to combat antibiotic resistance in clinical settings.

***Keywords*:** Urinary Tract Infection, *Escherichia coli*, Antibiotic resistance, Zinc oxide nanoparticles, *Lemna minor*.

Effect of Phytocompound on Human Colon cancer cells (HCT116): an *in vitro* Approach

Navya Ratheesh, Dr. B. David Jayaseelan*

Department of microbiology, Nehru Arts and Science College, Tamilnadu, India

***Corresponding author**: nascdavidjayaseelan@nehrucolleges.com

Abstract

Colon cancer is one of the most common malignancies worldwide, and finding effective treatments is crucial for improving patient outcomes. This study aimed to evaluate the antiproliferative potential of *Biophytum sensitivum*, a medicinal plant, on colon cancer (HCT116) cells using the MIT assay and gene expression analysis. In this study, HCT116 colon cancer cells were treated with different concentrations of *B. sensitivum* extract. The viability of the treated cells was assessed using the MTT assay, which measures mitochondrial activity as an indicator of cell viability. The results revealed a dose-dependent decrease in cell viability upon treatment with *B. sensitivum*, indicating its potential antiproliferative effect against HCT116 colon cancer cells. To gain insights into the molecular mechanisms underlying the antiproliferative effects of *B. sensitivum*, gene expression analysis was performed. The expression levels of key genes involved in cell cycle regulation, apoptosis, and metastasis were evaluated using quantitative real-time polymerase chain reaction (qRT-PCR). The analysis revealed significant alterations in the expression of several genes, including downregulation of cell cycle regulators and upregulation of pro-apoptotic genes. These findings suggest that *B. sensitivum* may induce cell cycle arrest and apoptosis, contributing to its antiproliferative effects in HCT116 colon cancer cells. Overall, our study demonstrates the potential of *B. sensitivum* as a natural compound with antiproliferative activity against colon cancer cells. The findings highlight its ability to inhibit cell growth, induce cell cycle arrest, and promote apoptosis. Further investigation into the underlying molecular mechanisms and identification of active compounds within *B. sensitivum* extract may provide valuable insights for the development of novel therapeutic strategies against colon cancer**.**

***Keywords*:** *Biophytum sensitivum*, colon cancer, HCT116 cells, apoptosis, cell cycle arrest.

Extraction of Chitosan from *Scylla serata* (Indian Crab) and its Application in Dentistry, textiles, and Wound Healing

T. Marbin Raj, Dr. Sheeba

Nehru Arts and Science College, India

***Corresponding author:** nascdrsheeba@nehrucolleges.com

Abstract

Chitosan is a polysaccharide derived from Chitin. Chitin is the second most abundant polysaccharide in the world, after cellulose. It has a broad antimicrobial spectrum to which Gram-Negative, and Gram-Positive bacteria and fungi are highly susceptible. The activity dependence on polymeric molecular weight (Mw) and degree of acetylation. Chitosan is biocompatible, biodegradable, and non-toxic so it can be used in medical applications such as antimicrobial and wound-healing biomaterials. The medical applications of chitosan and some of its derivatives are readily understood. Chitosan is used to prepare hydrogels, films, fibres, or sponges, most of the materials are used in the biomedical domain, for which biocompatibility is essential. Chitosan has a variety of promising pharmaceutical uses. It is presently considered a novel carrier material in drug delivery systems, wound healing, antibacterial, fat binder, hemostatic agent, and hypocholesterolemic effect. The present study aimed to summarize the most important information on chitosan from its bioactivity point of view and highlight various biomedical applications.

***Keywords*:** Chitosan, Polysaccharide, Antimicrobial, Wound healing, Drug delivery,

Estimation of Protein by Lowry's Method using coelomic fluid

Kannusamy Lathika, Murugan Pavithra, Arumugam Saranya, Arumugam Sakthi sri and Dr Muniyandi Biruntha*

***Corresponding author**: briuntham@alagappauniversity.ac.in

Abstract

Protein quantification is a crucial step in various biochemical assays. Lowry's method is a widely used technique for estimating protein concentrations. This presentation outlines the protocol, results, and applications of protein estimation using Lowry's method. Lowry's method is based on the reduction of Cu2+ to Cu+ by protein. The resulting Cu+ ions react with Folin-Ciocalteus reagent. The method is reliable, sensitive, and accurate for estimating protein concentrations. The protocol involves preparation of BSA standards, sample preparation, addition of Lowry's reagent, incubation, and measurement of absorbance. A standard curve is generated using BSA standards, and protein concentrations are estimated in unknown samples. The results demonstrate the accuracy and sensitivity of the method. The applications of Lowry's method include biochemical assays, molecular biology research, and pharmaceutical applications. Overall, Lowry's method is a reliable technique for protein estimation. The method is widely used and has several advantages over other protein estimation methods.

***Keywords*:** Protein quantification and concentration, Cu+ ions, Absorbance measurements, BSA standard curve, colorimeter assay.