

The 11th International Conference on the Integration of Science and Technology for Sustainable Development - 2024

Theme:

“Soil, water and environmental conservation, biological
diversity, food security/safety and sustainable agriculture”

1-3 February 2024

Abstract Book

Organized by

Centre for Drug Discovery and Development &
School of Bio & Chemical Engineering



SATHYABAMA

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



In association with
Association of Agricultural Technology in South
East Asia (AATSEA), Thailand

&



**11th International Conference on Integration of Science and
Technology for Sustainable Development 2024
(11th ICIST 2024)**

Theme:

**“Soil, water and environmental conservation, biological diversity, food
security/ safety and sustainable agriculture”**

**1-3, February 2024
TMT. Soudarabai Auditorium,
Sathyabama Centre for Advanced Studies (III Floor)**

ABSTRACT BOOK

Organized by

Centre for Drug Discovery and Development

&

Department of Biotechnology

Department of Chemical Engineering

Department of Biomedical Engineering

Department of Allied Health Sciences



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MESSAGE FROM THE CHANCELLOR



Dr. Mariazeena Johnson

I am delighted to know that the Centre for Drug Discovery and Development and School of Bio and Chemical Engineering in association with AATSEA, Thailand is organizing the 11th International Conference on the Integration of Science and Technology for Sustainable Development 2024 (11th ICIST 2024) between 1-3, February 2024. Science and technology must produce new knowledge in order to achieve development that is sustainable. In order to improve our capacity to address the challenge of sustainable development, research and innovation are crucial. A phenomenon must be understood along with its causes; its influence, magnitude, time scale, and likelihood must all be evaluated. We must forecast patterns and the results of certain decisions. We must create and evaluate solutions, forecast results and lessen harm, and decide on policies with knowledge. Acquiring technical knowledge is a continuous process that requires regular replenishment and renewal of the knowledge base. To quickly apply discoveries and insights to societal demands, the biological, physical, and engineering sciences must collaborate closely with the social and behavioral sciences.

I am confident that advances in S&T can enable countries to increase the efficiency of resource use and raise living standards necessary for global prosperity and long-term sustainability.

International Conference on the Integration of Science and Technology for Sustainable Development to bring professionals with various aspects of in-depth knowledge to suit today's global needs and share their experiences and knowledge about the current scenario, innovations and future in the field of science. Sustainable development seeks to reconcile environmental protection and development; it means nothing more than using resources no faster than they can regenerate themselves, and releasing pollutants to no greater extent than natural resources can assimilate them.

I congratulate Authorities of AATSEA, Thailand for the opportunity given to us to conduct this wonderful conference ICIST-2024 at our Institution. I honor the faculty members for organizing this International Conference that encourages the academicians to publish/collaborate their work in Sustainable development. With our Institute moving ahead globally to meet the challenges of the times, may the conference further fuel the drive of the professionals in the field to excel and offer proactive solutions to address the future challenges.

The International conference will make it possible to formulate new scientific directions and recommendations for ensuring sustainable development, which can be useful to state and regional authorities, international and supranational organizations, the scientific and professional community.

With warm wishes!

Dr. Mariazeena Johnson M.B.A., M.Phil., Ph.D.,

Chancellor

Sathyabama Institute of Science and Technology, India



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MESSAGE FROM THE PRESIDENT



Dr. Marie Johnson

On behalf of the Management of Sathyabama Institute of Science and Technology, we welcome you all to the 11th International Conference on the Integration of Science and Technology for Sustainable Development 2024 (11th ICIST 2024) organized by the Centre for Drug Discovery and Development and School of Bio and Chemical on 1-3, February 2024. The field of Sustainable Development is flourishing in the applied domain of life and Health sciences with dynamic career opportunities. Hence, we feel that this conference has been rightly planned at an appropriate time. As you all know, the reconciliation of society's development goals with the planet's environmental limits over the long term is the foundation of the idea known as sustainable development. This idea emerged in the early 1980s from scientific perspectives about the interdependence of society and environment, and has since evolved along with the significant advances in our understanding of this interdependence.

We are happy that students and professionals from different sectors are sharing the platform to discuss and deliberate on the issues of new innovations in medical fields and such efforts should culminate in deriving a strategy to sustainable development.

I congratulate the authorities of AATSEA, Thailand for the opportunity provided to us to conduct this wonderful conference ICIST-2024 in our Institution

We express our gratitude to all the distinguished speakers who will be delivering lectures in this international conference for their valuable time and suggestions. We also congratulate the organizers of this international conference.

I wish the conference is a grand success.

Dr. Marie Johnson, MBA, M. Phil., Ph.D

President

Sathyabama Institute of Science and Technology



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MESSAGE FROM VICE PRESIDENTS

		
Mr. J. Arul Selvan	Ms. Maria Bernadette Tamilarasi	Ms. Maria Catherin Jayapriya

It has been great pleasure to know that the 11th International Conference on the Integration of Science and Technology for Sustainable Development 2024 (11th ICIST 2024) on 1-3, February 2024 organized by Centre for Drug Discovery and Development and the school of bio and chemical engineering of our Institution.

The objective of this conference is to weave in an interface between the academic research and various facets of Integration of Science and Technology for Sustainable Development. It is important to bring in great minds working in the field of Sustainable Development to share and disseminate the acquired knowledge in the emerging area of science and technology. International Conferences of this kind will be very much helpful in bridging the gap between the eminent scientist and students.

We acknowledge the authorities of AATSEA, Thailand for the opportunity given to us to conduct this amazing conference ICIST-2024 at our Institute. We gratefully appreciate the entire organizing team for their efforts to organize this conference at our Institution. Hope this International conference will be an opener for the students who pursue their research in environmental sustainability.

We take this opportunity to wish you all in making this event very successful.

Mr. J. Arul Selvan	Ms. Maria Bernadette Tamilarasi	Ms. Maria Catherin Jayapriya
Vice Presidents		
Sathyabama Institute of Science and Technology		



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MESSAGE FROM THE VICE CHANCELLOR



Dr. T. Sasipraba

Association of Agricultural Technology in Southeast Asia (AATSEA), Thailand is a non-profitable organization which aims to support agricultural societies, general public, academics and research institutions to meet the sustainable development goals (SDGs). Since 2011, AATSEA has organizing Annual International Conference on Integration of Science and Technology for Sustainable Development (ICIST) at different countries such as Thailand, Laos, Vietnam, Myanmar, Philippines, Indonesia, China. and this time is being in India.

This time, we the Sathyabama Institute of Science and Technology is happy to organize the 11th Annual Conference of AATSEA on International Conference on Integration of Science and Technology for Sustainable Development (ICIST) in India during 1-3, February 2024 under the theme "Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture". This conference will witness by some leading research groups around the world actively working on Agricultural technology and Research. The theme of the conference is aptly chosen to address the current needs for academic, research and farm demands for further development and improvisation.

Totally 200 participants registered for this conference including 120 from 9 different countries across the globe. In addition to keynote lectures, 21 invited lectures and around 140 oral papers and 20 posters will be presented in this conference under 11 parallel sessions. Definitely, this conference will be a excellent platform for International networking and knowledge sharing among the senior Professors, Scientists, scholars and students.

Hereby I deeply appreciate and thank our entire Organizing team at Centre for Drug Discovery and Development and School of Bio and Chemical Engineering for their untiring efforts and team work for successfully organize this conference.

On behalf of Sathyabama Institute of Science and Technology I express my heartfelt thanks to the authorities of AATSEA, Thailand for the opportunity given to us to conduct this wonderful conference ICIST-2024 at our Institution. We also thank academicians, researchers, policy makers as well as extension experts who contributed their expertise, experiences and research results to this conference. May the book of abstracts and proceedings provide useful information and would serve to be references for those who are interested to pursue in the specific discipline.

I wish this Conference a grand success.

Dr. T. Sasipraba

Vice Chancellor

Sathyabama Institute of Science and Technology

Prof. Kasem Soyong

President

Association of Agricultural Technology in South East Asia (AATSEA)

MESSAGE



Chancellor Dr. Mariazeena Johnson, President Dr. Marie Johnson, Vice Presidents Mr. J. Arul Selvan, Mrs. Maria Bernadette Tamilarasi, Ms. Maria Catherine Jayapriya, Vice Chancellor Dr. T. Sasipraba, Sathyabama Institute of Science and Technology, Chennai, India , Prof. Dr. Hiroyuki Konuma, President of GIAPSA (Japan), Assoc. Prof. Dr. Komsan Maleesee (KMITL Rector), Distinguished guests, International and local organizing committees, Chairs of organizing committees, Keynote and invited speakers, AATSEA Awardees, All presenters and participants, AATSEA Committees and all Co-organizers, Ladies and Gentleman,

The 11th International Conference on Integration of Science and Technology for Sustainable Development 2022 with the theme “Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture” in 1-3, February 2024 held at Sathyabama Institute of Science and Technology, Chennai, India.

This year, we have our tentative programs as follows:- contribution research work from senior and young scientists as oral and poster presentation, meeting editorial board of International Journal of Agricultural Technology (IJAT) and training for AATSEA Organic Inspectors/Experts for the year of 2024.

I would like to give special thanks to all organizers; Sathyabama Institute of Science and Technology, Chennai, India, King Mongkut’s Institute of Technology Ladkrabang, KMITL (Thailand), Rajamangala University of Technology Tawan-ok, Chantaburi Campus (Thailand), Rambhai Barni Rajabhat University (Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), CAS Asian Agriculture Bio Engineering (China), Bio-Agritech Co Ltd (Vietnam), Shwe Kant Kaw, KKS (Myanmar), Bio Hi-tech (Cambodia), CGC organic coffee (Laos), GIAPSA for self-reliance Assoc. (Japan), National Research Center, Cairo, Egypt, Periyar University, Salem (India), Mahasarakam University (Thailand), and PADMAVANI Art and Science College for Woman (India).

Association of Agricultural Technology in Southeast Asia (AATSEA) is officially non-profitable organization which legally has been established and approved by Department of Administration Ministry of Interior , Thailand since 17 April 2012 (2555) 9.5080/2555 (8.A. 4). AATSEA has continued to support and accept the membership as life members or annual members, and especially the group of scientists from many countries e.g. Thailand, Vietnam, Indonesia, Philippines, Malaysia, Laos, Myanmar, Cambodia, India, Pakistan, Bangladesh, Sri Lanka, Finland, China, Russia, Egypt, Turkey, Iran, South Korea, UK, USA, Boswana, Nigeria etc. AATSEA activities have been performed as follows:-

1. International Journal of Agricultural Technology (IJAT) has started since 2005 which indexed in SJR-Scopus, CABI, CAS, ACI and TCI.
2. AATSEA is active in a variety of training programs for sustainable development in agriculture especially organic agriculture.
3. The International Conference on Integration of Science and Technology for Sustainable Development (I-C-I-S-T) since 2012; as said in Thailand (2012, 2013), in Laos(2014) , in Vietnam (2015), in Myanmar(2016), in the Philippines (2017), in Indonesia(2018), in China (2019), in Thailand (2020 and 2022) and India (2023).
4. AATSEA Leadership Awards in Agricultural Sciences.
5. AATSEA Scholarships (Masteral and Doctoral degrees)
6. AATSEA Research Laboratory
7. AATSEA Organic Farm Model and Training Center
8. AATSEA Organic Certification

AATSEA has signed agreement for research collaboration, contribution of research findings, visiting professors and scientists, and training program as follows:-

1. Egypt: National Research Center (NRC), Cairo, 27 November 2018
2. India: Periva University, Salem, 13 November 2019
3. India: Sathyabama Institute of Science and Technology, Ippiar Nagar, Chennai, 3 March 2021
4. Indonesia: Bengkulu University, Bengkulu, 5 April 2021.
5. Thailand: Rachmangala University of Technology Tawon-ok (MUTTO), 26 November 2020
6. Thailand: Northern Institute of Vocational Education in 29 January 2021
7. Japan: GIAPSA for self-reliance Assoc. (Japan), 2021
8. Thailand: Rambhai Barni Rajabhat University (Thailand), 2021
9. Thailand: Earthsafe Foundation for organic certification, 13 October 2022
10. PADMAVANI Art and Science College for Woman (India).
11. Zhejiang Academy of Agricultural Science (ZAAS), Hangzhou, Zhejiang province, PR China 2023
12. Catanduanes State University, Virac, Catanduanes (Philippines) 2023

Earthsafe Foundation in collaboration of AATSEA promote non-agrochemicals (NAP) in conversion period to Organic agriculture (OA) for organic certification from production to the markets all over the country in Thailand with follow the King's Concept of Sufficiency Economy toward sustainable development goals (SDGs).

I would be acknowledged and thanks to all committees, members, co-organizers and all participants to make our conference perfectly and special congratulates to all AATSEA Awardees to deserve individual who contribute their experience with sacrifice work to the society. I deserve to give special thanks the AATSEA committee and members, advisory committee, International and local organizing committee, to make this conference perfectly success.

If there is something wrong, anything inconveniences and doing mistake during the conference. I would like to apologize and I will be accepted to responsible to all mistake. I am very much appreciated to accept all comments, suggests and recommends for improving the next conference.

Wishing all of you will have a wonderful time in Chennai, India and safety back home after conference end. Hope to meet you again for our future activities, and the next conference of 12th ICIST 2024.

Thank you very much for your coming with sincerely heart and attention. I imagine our conference will completely success and hope you will continue to support AATSEA family.

Prof. Dr. Kasem Soyong
AATSEA President

Prof. Dr. Hiroyuki Konuma,
Executive Director
GIASPA, Japan
Former UN FAO Assistant Director-General and
Regional Representative for Asia and the Pacific

MESSAGE

First of all, I wish to express my heartfelt gratitude to the host of this important conference, Sathyabama Institute of Science and Technology, Chennai, India and the members of the Organizing Committee for the successful organization of this conference.

My special thanks to Prof. Dr. Kasem Soyong for his continued passion, strong leadership and tireless commitments, which enabled us gather today and work together as a team towards attainment of our common goal to promote sustainable agriculture by harnessing the integration of science and technology.

We expect that this international conference would pave the way for sharing and learning from the knowledge on agriculture research from different ecosystem in India, Asia and beyond, and identify the gaps for further research needs.

As you all know, the world is facing more and more difficulties in recent past in achieving food security and sustainable development, due to various external factors.

It was reported by UN (SOFI 2023) that about 122 million more people faced hunger in 2022 than that of 2019 (before the global COVID-19 pandemic started). More than 3.1 billion people in the world – or 42 percent of the total global population – were unable to afford a healthy diet in 2021. The situation was little improved in 2022. Yet, about 29.6 percent of the global population – 2.4 billion people – were moderately or severely food insecure in 2022, of which about 900 million (11.3 percent of people in the world) were severely food insecure.

It was also reported that food insecurity worldwide, disproportionately affected women and people living in rural areas. As a result, moderate or severe food insecurity affected 33.3 percent of adults (1 out of 3 people) living in rural areas in 2022. In overall, it is projected that almost 600 million people will be chronically undernourished in 2030. This means that our SDGs goal No.2 eradicating hunger by 2030 would not be achieved.

Covid-19 pandemics was one of the critical threats to our food security and sustainable development. However, we need to recognize that there might be more threats to come and might affect on our future, such as negative impacts of climate changes to agriculture, prolonged conflicts and wars at food producing and exporting countries, and newly emerging diseases and pandemics.

We need to prepare for such future challenges by harnessing the knowledge of science and technology, and by building the excellence of young researchers towards sustainable increase of food production and enhanced tolerance to external threats.

I believe that this conference is a very impotent step to such endeavours.

I wish a successful outcome of the 11th International Conference on Integration of Science and technology for Sustainable Development (11th ICIST 2024).

Thank you

11th International Conference on the “Integration of Science and Technology for Sustainable Development 2024” (11th ICIST 2024)

Date : 1-3, February 2024

Venue : Tmt. Soundrabai Auditorium, Centre for Advanced Studies
Sathyabama Institute of Science and Technology

CHIEF PATRONS

Dr. Mariazeena Johnson, Chancellor

Dr. Marie Johnson, President

Mr. J. Arul Selvan, Vice President

Mrs. Maria Bernadette Tamilarasi, Vice-President

Ms. Maria Catherine Jayapriya, Vice-President

PATRONS

Dr. T. Sasipraba

Vice Chancellor

Sathyabama Institute of Science and Technology

India

Prof. Dr. Kasem Soyong

President

Association of Agricultural Technology in Southeast Asia (AATSEA),

Thailand

ORGANIZING SECRETARIES

Dr. V. Gopikrishnan

Dr. M. Radhakrishnan

Dr. Krupakar Parthasarathy

Dr. Jiaojiao Song

CO-ORGANIZING SECRETARIES

Dr. T. Rajaesekar

Dr. K. Manigundan

Dr. Lalitha, Periyar University, Salem

List of Organizer and Co-Organizers

S. No	Name of the Institute	Country
1	Sathyabama Institute of Science and Technology	India
2	King Mongkut's Institute of Technology Ladkrabang (KMITL) Thailand	Thailand
3	Bengkulu University	Indonesia
4	General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA)	Japan
5	Bio-Agritech Co. Ltd	Vietnam
6	Bio-Hitech Co. Ltd	Cambodia
7	Rajamangala University of Technology Tawan-ok, Chantaburi Campus	Thailand
8	Society for Applied Biotechnology	India
9	Padmavani Art and Science College for Woman	India
10	National Research Center	Egypt
11	Mahasarakam University	Thailand
12	Rambhai Barni Rajabhat University	Thailand
13	CGC organic coffee	Lao PDR
14	Periyar University	India
15	Shwe Kant Kaw, KKS	Myanmar

International Advisory Committee

Chairmanship:

Excellency Prof. Dr, Hussein Darwish
President of National Research Center (NRC, Egypt)
Prof. Dr. Hiroyuki Konuma, President of GIAPSA, Japan
Prof. Dr. Kasem Soyong (AATSEA)
Prof. Teodoro Mendoza (Philippines)
Asst. Prof. Waigoon Thongaram (RBRU, Thailand)
Asst. Prof. Dr. Terdsak Puramongkon (RMUTTO, Thailand)
Prof. Dr. Dwi wahyuni (University of Bengkulu, Indonesia)
Prof. Dr. Mamdouh Moawad (Egypt)
Prof. Dr. Thangadurai Devarajan (SAB, India)
Mrs. Hai Hoang (BioAgritech, Vietnam)
Mr. Thet Lwin Htay (Shwe Kant Kaw, Myanmar)
Mr. Young Ah Choi (CGC organic coffee, Laos)
Prof. Dr. Lalitha S. (India)

International Committee Members

Prof. Dr. Mamdouh Moawad (Egypt)	Prof. Dr. Jin-Cheol Kim (Korea)
Prof. Dr. Bhat, Rajeev (Estonia, EU)	Prof. Dr. Nanik Setyowati (Indonesia)
Prof. Dr. Danesh, Y.R. (Iran)	Dr. Huyly Tann (Cambodia)
Prof. Dr. John C. Moreki (Botswana)	Dr. Md. Asaduzzaman Sarker (Bangladesh)
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Prof. Dr. Teodoro C. Mendoza (Philippines)	Prof. Dr. Vadim Fedorov (Russia)
Thet Lwin Htay (Myanmar)	Dr. Nguyen Van Thiep (Vietnam)
Dr. Hoang Pham (Vietnam)	Prof. Dr. Oksana Belous (Russia)
Prof. Dr. Wafaa Haggag (Egypt)	Prof. Dr. John Moreki (Botswana)
Prof. Dr. Moammar Dayoub (Finland)	Prof. Dr. Younes Rezaee Danesh (Iran)
Prof. Dr. Thangadurai Devarajan (India)	Prof. Dr. Okigbo, Raphael (Nigeria)
Prof. Dr. Lalitha S. (India)	Dr. Somlit Vilavong (Laos)
Prof. Dr. Dwiwahyuni Fanefianti (Indonesia)	Dr. Hoang Pham (Vietnam)
Jame Kernard Jacob (Philippines)	Dr. Jiaojiao Song (China)
Dr. Samantha Chadranath karunarathna (Sri Lanka)	Dr. Rujira Tongon (Thailand)
Dr. TSSK Patro (India).	Dr. Rungrat Vareeket(Thailand)
Prof. Dr. Moammar Dayoub (Finland)	Maxim Mitrokhin (Russia)

Organizing Committee members

I. Registration, reception, & Stage arrangement

Dr T. Sudhakar Assistant Professor
Dr. J. Premkumar, Associate Professor
Dr. S. Krishnakumar, Associate Professor
Dr. J. Bethanney Janney, Associate Professor
Ms. Sindu Divakaran, Assistant professor
Dr. P. Grace kanmani, Associate Professor
Dr. A. Sabarivani, Assistant Professor
Mr. Ashiq Sofi, Assistant Professor (research)
Dr. James John, Assistant Professor
Dr. P. Gayathri, Assistant Professor
Ms. Jasmine Priya, Assistant Professor
Ms. S. Priya, Assistant Professor
Ms. S. Kanya, Assistant Professor
Ms. M Roshni, Assistant Professor
Dr. V. Gopikrishnan
Dr. T. Rajasekar
Ms. Sudhanarayani Rao
Ms. Thangam
Ms. S. Ranjani
Ms. GS. Thenmozhi
Mr. A. Kishorekumar
Ms. M. Vaishnavi
Ms. Hemamalani

II. Scientific Committee

Technical session

Dr. P. Krupakar
Dr. M. Radhakrishnan
Dr. Sam Ebinezer
Dr. S. Vignesh

Oral/Poster Presentation

Dr. T. Rajasekar
Dr. V. Gopikrishnan
Ms. Sudhanarayani Rao
Ms. S. Ranjani
Ms. Thangam
Mr. Kishorekumar
Ms. GS. Thenmozhi

Abstract Book /Souvenir

Dr. Kasem Soyong & Dr. Song
Dr. P. Krupakar
Dr. V. Gopikrishnan
Dr. M. Radhakrishnan

III. Finance and Purchase Committee

Dr. M. Radhakrishnan
Dr. V. Gopikrishnan
Dr. K. Manigundan

IV. Accommodation and Transport

Dr. Sathish HOD – Chemical Engg
Dr. A. Annam Renita - Professor
Dr. D. Prabu - Associate professor
Dr. D. Venkatesan - Associate professor
Dr. M. Karthikeyan - Asst. Professor
Dr. Michael Rahul Soosai - Asst. Professor
Dr. V. Gopikrishnan
Dr. K. Manigundan
Dr. S. Vignesh
Mr. A. Kishorekumar
Ms. GS. Thenmozhi
Mr. Karthik Prakash MP
Mr. Sai maheshkumar
Mr. Sakthi D

V. Food and refreshments

Dr. V. Ramesh Kumar
Dr. T. Rajasekar
Dr. V. Gopikrishnan
Dr. K. Manigundan
Dr. S. Vignesh
Mr. A. Kishorekumar
Ms. GS. Thenmozhi
Ms. S. Ranjani
Mr. J. Sakthivel

List of Organizer and Co-Organizers Awardees

S. No	Name of the Institute	Representative	Affiliation	Country
1	Sathyabama Institute of Science and Technology	Dr. V. Gopikrishnan		India
2	King Mongkut's Institute of Technology Ladkrabang (KMITL) Thailand	Dr. Komsan Maleesee (KMITL President, Thailand)	King Mongkut's Institute of Technology Ladkrabang (KMITL)	Thailand
3	Bengkulu University	Prof. Dwi Wahyuni Ganefianti	Dean Faculty of Agriculture University of Bengkulu	Indonesia
4	General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA)	Prof. Hiroyuki Konuma	Executive Director, GIAPSA	Japan
5	Bio-Agritech Co. Ltd	Dr. Edison Chen	General Manager, Bio Agritech Co.,Ltd	Vietnam
6	Bio-Hitech Co. Ltd			Cambodia
7	Rajamangala University of Technology Tawan-ok, Chantaburi Campus			Thailand
8	Society for Applied Biotechnology	Prof. Dr. Thangadurai Devarajan	Professor, Karnatak University, Dharwad, Karnataka	India
9	Padmavani Art and Science College for Woman	Dr. Nithiya Priya	Assistant Professor, Dept of Botany, Padmavani Art and Science College for Woman	India
10	National Research Center	Dr. Mamdouh Moawad Ali	Vice President, National Research Centre	Egypt
11	Mahasarakam University			Thailand
12	Rambhai Barni Rajabhat University			Thailand
13	CGC organic coffee			Lao PDR
14	Periyar University	Dr.Lalitha	Assistant Professor, Dept of Botany, Periyar University, Salem, Tamilnadu	India
15	Shwe Kant Kaw, KKS			Myanmar

SCIENTIFIC SESSIONS – CHAIR AND CO-CHAIR PERSONS

Keynote Lecture Session

Chairs : Assoc. Prof. Dr. P. Krupakar (India)
Prof. Dr. SS. Dawn (India)
Prof. Dr. Kasem Soyong (Thailand)

Oral Presentation

Session 1 (Room No xx): Agricultural Extension, Education and Development

Chair : Prof. Dr. Wafaa Haggag (Egypt)
Co-chairs : Prof. Dr. Pakkapon Pongsuk (Thailand)

Session 2 (Room No xx): Animal, Fisheries Sciences and Entomology (Marine biotechnology)

Chair : Assoc. Prof. Dr. Rungtawan Yomma (Thailand),
Co-Chair : Assoc. Prof. Dr. Komkhae Pilasombut (Thailand)

Session 3 (Room No xx) : Biological Diversity and Microbiology

Chair : Dr. Y. Swarnalatha, (India)
Co-chair : Dr. Nithya, Periyar University (India)

Session 4 (Room No xx) : Food Security/Safety/Science and Postharvest Technology

Chair : Prof. Dr. Tapio Juokslahti (Finland)
Co-chair : Assoc. Prof. Dr. Anurug Poeaim (Thailand)

Session 5 (Room No XX): Plant Science and Pest Management

Chair : Asst. Prof. Dr. S. Lalitha (India)
Co-chairs : Dr. Sudhagar (India); Dr. Alex Anand (India)

Session 6 (Room No XX) : Soil and Environment, Water conservation

Chair : Dr. Sathishkumar (India)
Co-chair : Dr. Gobi Saravanan (India)

Session 7 (Room No. xx): Biotechnology and Innovation

Chair : Prof. R. Sarada Jayalakshmi (India)
Co-chairs : Assoc. Prof. Dr. Supattra Poeaim (Thailand); Dr. V. Rameshkumar (India)

Session 8 (Room No XX) : Organic Agriculture and Smart Farms

Chair : Prof. Dr. TSSK Patro (India)
Co-Chair : Dr. Premkumar (India)

Session 9 (Room No XX) : Agricultural Sciences

Chair : Dr. PR. Meganathan, CSIR-NEERI, India
Co-chair : Dr. D. Saravanan (India)

Session 10 (Room No XX) : Biological Sciences

Chair : Dr. Amitkumar (India)
Co-chairs : Dr. Prakash (India)

Poster Presentation

Chairpersons : Dr. T. Rajasekar (India)
Dr. A. Suresh (India)
Dr. S. Kumaran (India)
Dr. Gayathri (India)

AATSEA AWARDEES

S. No	AATSEA Award	Name of the Awardee	Designation & Affiliation	Country
1	AATSEA Outstanding Leadership Award in Community Development	Dr. Mariazeena Johnson	Chancellor, Sathyabama Institute of Science and Technology	India
2	AATSEA Outstanding Leadership Award in Special Community Service	Dr. Marie Johnson	President, Sathyabama Institute of Science and Technology	India
3	AATSEA Outstanding Leadership Award in Policy Making and Governance	Dr.T. Sasipraba	Vice Chancellor, Sathyabama Institute of Science and Technology	India
4	Lifetime Achievement Award in Scientific Development	Prof. Hiroyuki Konuma	Executive Director, GIAPSA	Japan
5	Lifetime Achievement Award in Scientific Development	Prof. Dr. Tapio Juokslanti	Adjunct Professor in Helsinki University, Finland	Finland
6	Lifetime Achievement Award in Scientific Development	Prof. Dr. Wafaa Haggag	Head of Agricultural and Biological Research Division , National Research Centre	Egypt
7	Lifetime Achievement Award in Scientific Development	Dr. Kampon Sriwatanakul	Chairman of Thailand National Charter of Health	Thailand
8	AATSEA Outstanding Leadership Award in Education and Research	Prof. Dwi Wahyuni Ganefianti	Dean Faculty of Agriculture University of Bengkulu	Indonesia
9	AATSEA Outstanding Leadership Award in Education and Research	Dr. Reddypogu Sarada Jayalakshmi Devi	Vice Chancellor, Acharya N G Ranga Agricultural University, Guntur, AP	India
10	AATSEA Outstanding Leadership Award in Education and Research	Dr. Rajasri Mandali	Professor Acharya N.G.Ranga Agricultural University,Hyderabad	India
11	AATSEA Outstanding Leadership Award in Education and Research	Dr. Manigundan Kaari	Assistant Professor (Research), Sathyabama Institute of Science and Technology	India
12	AATSEA Outstanding Leadership Award in Community Development	Asst. Prof. Dr. Preeyanan Sittijinda	Assistant Professor, Department of Agriculture Rambhai Barni Rajabhat University	Thailand

11th International Conference on Integration of Science and Technology for Sustainable Development 2024 (11th ICIST 2024)

Theme:

“Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture”

1-3, Feb 2024

PROGRAM AGENDA

Thursday 1 February 2024:

Receiving participants from Abroad

2 - 4 PM Desk Registration @ Hotels

4 - 5 PM Workshop for Organic Inspector and Organic Expert of AATSEA
by Prof. Dr. Kasem Soyong – 10 Members

Venue: Seminar Hall, CDDD, Sathyabama Research Park (3rd Floor)

5 - 6 PM AATSEA committee and IJAT Editorial board Meeting 2024

Venue: Seminar Hall, CDDD, Sathyabama Research Park (3rd Floor)

Friday 2 February 2024, Conference Day

**Venue : TMT Soundrabai Auditorium,
Sathyabama Centre for Advanced Studies (3rd Floor)**

9.00 - 10.00 AM Guest Arrival

10.00 AM Welcoming of Guest with Chancellor, President and Vice Presidents

10.15 AM – 11.15 AM TMT. Soundrabai Auditorium

Thamizh Thaa Vaazhthu

Lighting of lamp

Welcome Address by the Vice Chancellor, Sathyabama

Honoring of Guest

Inaugural address: Hon. Chancellor, Sathyabama

Felicitation : Hon. President, Sathyabama

Special address : Vice Presidents, Sathyabama

MoU Signing : NRC, Egypt and KMITL, Thailand & Ishta Panchakavya

About ICIST : Prof. Kasem Soyong, President, AATSEA, Thailand

Motivational Song : Prof. Kasem Soyong and Team

AATSEA Awards : 12 Awards

11.15 AM – 11.30 AM Coffee Break and Photo session

11.30 AM Inaugurating New Centre -Centre for Modern organic Agriculture Research
(C -MOAR), **Venue: CDDD, Sathyabama Research Park (3rd Floor)**

11.30 AM – 1.30 PM Keynote Lectures (4)

1.30 PM – 2.30 PM Lunch

2.30 PM – 6.00 PM Invited talks, Oral and Poster Presentations (5 +1 Parallel Sessions)

4.00 PM – 6.00 PM International Institutes Meeting

Venue: Senate Hall, Sathyabama Centre for Advanced Studies,

6.00 PM – 6.30 PM **Concluding Remarks** - TMT. Soundrabai Auditorium

Sathyabama Centre for Advanced Studies

7.00 PM – 8.00 PM Cultural & Dinner - **Sathyabama Centre for Advanced Studies**

Saturday 3 February 2024: Cultural Tour for International Delegates

(Mahabalipuram Tourist Place, Chennai, Tamil Nadu)

11th International Conference on Integration of Science and Technology for Sustainable Development 2024

(11th ICIST 2024)

SCIENTIFIC SESSIONS

KEYNOTE LECTURES

Chairpersons

<p>Dr. P. Krupakar Associate Professor (Research) Sathyabama Institute of Science and Technology</p>	<p>Dr. S.S. Dawn Professor (Research) Sathyabama Institute of Science and Technology</p>	<p>Prof. Kasem Soyong Founder & President AATSEA, Thailand</p>
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List of Key note Lectures (Time: 11.30 AM – 1.10 PM)

	Time	Name of the Speaker	Title of the talk	Page No
L1	11.30- 12.00	<p>Dr. Zainal Muktamar Professor, Department of Soil Science, University of Bengkulu, INDONESIA</p>	Land Productivity under Long-Term Organic Farming in Humid Tropical Highland of Indonesia	3
L2	12.00- 12.30	<p>Dr. Tapio Juokslahti Professor Adjunct Professor in Helsinki University, FINLAND</p>	Kashgar food project post- Harvest management to improve rural income	4
L3	12.30- 1.00	<p>Dr. Kampon Sriwatanakul Chairman of Thailand National Charter of Health. Former Vice President for Research and Foreign Relations, Mahidol University, THAILAND</p>	Plant Chimera Agriculture	5
L4	1.00- 1.30	<p>Prof. TSSK Patro Principal Scientist and Head Agricultural Research Station ANGR Agricultural University Gajularega, Vizianagaram, INDIA</p>	Neutricereals: Magical grains for climate resilient Agriculture in present era	6

**11th International Conference on Integration of Science and Technology for Sustainable
Development 2024
(11th ICIST 2024)**

ORAL PRESENTATIONS – SESSION DETAILS

Session 1 (Room xx): Agricultural Extension, Education and Development

Time: 3.00 PM – 6.00 PM

S. No	Chair : Prof. Dr. Wafaa Haggag (Egypt) Co-chairs : Prof. Dr. Pakkapong Pongsuk (Thailand)
1	IL 1: Pakkapong Pongsuk (Thailand): Learning and practical networks for growing organic herbs: facilitating learning and innovation for sustainable agriculture
2	IL 2: Wafaa Haggag (Egypt): Geographic Information Systems and Remote Sensing: Innovative Tools for Plant Health
3	Ekkaphon Thongkaew: The community strength of Ban Klum Suai, Phawa Subdistrict, Kaeng Hang Maeo District, Chanthaburi Province
4	Pirachaya Chatanan: Behaviors and opinions of marketing ingredients on garden mix purchase decisions of urban Thai Consumers
5	Christopher Llonas: Does off-farm work participation mitigate production risks? A case of rural rice farms in Chiang Rai Province, Thailand
6	Jeeranun Khermkhan: Comparison of cost and return between double crop with one crop per year of Maize Community Enterprise in Hin Sorn Subdistrict, Saraburi Province
7	Jiraporn Phumthong: Knowledge and Opinions towards fertilizer application technology based on soil analysis and soil nutrient management of durian farmers in Rayong province, Thailand
8	Di Chen: Guidelines for the College of Agriculture and Technology's Competency Development of Agricultural Vocation in the Twenty-first Century
9	Christopher Llonas: Assessment of farmers' acceptance, satisfaction, and utilization of mobile application for rice production cost and return in Chachoengsao Province, Thailand (Online)
10	Kantinan Thongtem: Comparison of cost and return of durian cultivation based on the orchard management techniques of farmers in Rayong Province, Thailand
11	Surapa Lertpairat: Supply chain management efficiency for <i>Andrographis paniculate</i> (Burm. f.) Wall. ex Nees of Bandongbang community enterprises in Prachinburi province, Thailand
12	Chanhathai Kerdsriserm: Cost-return and technical efficiency of rice production of Ban Nong Saeng rice mill community enterprise in Chachoengsao Province, Thailand

13	Sujanya Charoenpituk: Community enterprise quality management of durian exports in Ban Khao Hin Thaen, Wang Chan District, Rayong Province Thailand
14	Warisa Orsuwan: Comparison of cost and return for rubber farmers on innovations to increase latex production in Ban Khai District, Rayong Province, Thailand

Session 2 (Room xx): Animal, Fisheries Sciences and Entomology (Marine biotechnology)

Time: 3.00 PM – 6.00 PM

S. No	Chair : Assoc. Prof. Dr. Rungtawan Yomma (Thailand) Co-chairs : Assoc. Prof. Dr. Komkhae Pilasombut (Thailand)
1	IL 3: Dwatmadji (Indonesia): Herbs supplementation with the inclusion of piper sp on nutrient intake and digestibility for local goats (online)
2	IL 4: Tatik Suteky (Indonesia): The use of non-invasive methods to measure the physiological state of bali cattle supplemented with herbs and humic acid (online)
3	Komkhae Pilasombut: A Nonintrusive Beef Grading Evaluation Based on Marbling Fat Imaging by using K-Means Clustering Technique
4	Ampon Klompanya: Amla Extract's Impact on Pre-Weaning Piglet Diarrhea: An Investigation into the Therapeutic Potential of Indian Gooseberry (<i>Phyllanthus emblica</i> L.) (online)
5	Thanachat Chatchana: Effect of Different Fermented Bag on Silage Quality for Livestock Feed (online)
6	Sirithat Thiankham: Efficacy of mangosteen (<i>Garcinia mangostana</i>) peel hot water extract against <i>Aeromonas hydrophila</i> infection of seabass fingerling (<i>Lates calcarifer</i>)
7	Hataichanok Passara: The effectiveness of star anise nanoemulsion and chemical insecticide for controlling of beet armyworm (online)
	COFFEE BREAK
8	Sineenart Polyorach: Ruminal fermentation, microbial populations, and methane production affected by using Seaweed (<i>Ulva rigidain</i>) as a protein source in concentrate for ruminants
9	Chirasak Phoemchalard: Chemometric approach to characterizing and comparing the quality of buffalo meat from Nakhon Phanom and Khammouane provinces (online)
10	Chanathip Thammakarn: Coexistent infection event of porcine reproductive and respiratory syndrome virus, porcine circovirus type 2 and <i>Pasteurella multocida</i> in swine (online)

11	Ampon Klompunya: Effects of partial substitution of feed with spent coffee grounds on growth performance and carcass quality in broilers (online)
12	Lestari Pakpahan: Consumer Satisfaction Analysis of Dried Mackerel (<i>Scomberomorus commersoni</i>) in Bengkulu City, Indonesia
13	Hataichanok Passara: Insecticidal efficiency of plant essential oil nanoemulsion formulas against <i>Spodoptera exigua</i> (online)
14	Anusart Ruddit: Effectiveness of Kratom (<i>Mitragyna speciosa</i> Korth) Leaf Extracts against Adult of Sweet Potato Weevil (<i>Cylas formicarius</i> Fabricius) in Laboratory Conditions
15	Thanaporn Doungnapa: Acaricidal activities of essential oil emulsions in controlling different mite pests (online)

Session 3 (Room Noxx) : Biological Diversity and Microbiology

Time: 3.00 PM – 6.00 PM

S. No	Chairpersons : Chair : Dr. Y. Swarnalatha, (India) Co-chairs : Ali. N.F., (Egypt); Dr. Nithya, Periyar University (India)
1	IL 5: Nithya, Priya (India): Studies on siderophore producing rhizobacteria enhancement on <i>Arachis hypogaea</i> L
2	IL 6: Ali, N.F. (Egypt): Sustainable application of natural dye from clitoria plant for dyeing and surface finishing of textile fibers and its characteristic bacterial effect to overcome environmental pollution
3	Naruemon Mongkontanawat: β -Glucan production of <i>Saccharomyces cerevisiae</i> by using mango fermented wastewater
4	Dang Tam Thi Thanh: <i>Streptomyces corchorusii</i> L72 as a potential biocontrol agent against soil born fungi <i>Sclerotium rolfsii</i> causing stem rot on peanut
5	Ngoc An Nguyen: Antagonistic effect of Actinomycete CNXK2 against <i>Pilidium concavum</i> SFF1 causing strawberry fruit rot (online)
6	Patcharaporn Wongpracha: Effects of <i>Bacillus</i> probiotics, <i>Bacillus subtilis</i> and <i>Bacillus cereus</i> dietary additional to controlling Vibriosis infected of white shrimp, <i>Litopenaeus vannamei</i>
7	Racha Tepsorn: Antimicrobial Potential of Ozone in Vapour Phase against <i>Salmonella</i> Thyphimurium and <i>Escherichia coli</i> O157:H7 Contaminated on Bird eye Chili (<i>Capsicum frutescens</i> L.)
	COFFEE BREAK
8	Palanivishwanath: Microbial community structure associated with micro plastics and bioplastics in coastal marine sediments

9	G. Dharshan priya: Isolation and identification of endophytic fungi from <i>avicennia officinalis</i> collected from mangrove forest of pichavaram.
10	Dr.C.Mabel Joshaline: Multidrug resistant bacterial pathogens in mastitis milk
11	Sri Raja Lakshmi: Post COVID19 impact on bacterial diversity of pulmonary infections
12	Shyla Nancy J: <i>In-silico</i> Studies on Anti-Tuberculosis Potential of Bioactive Compounds in Karpooora Valli: Targeting <i>Mycobacterium tuberculosis</i> Cell Wall and Protein Synthesis
13	Lavanya D: Invitro Cytotoxicity, Metabolites Profiling and Insilico Studies on Dengue Envelope and Capsid Protein Inhibition by Nilavembu Kudineer components - <i>Zingiber officinale</i> , <i>Vettiveria zizanioides</i> and <i>Piper nigrum</i>
14	Prisho Mariam Paul: Computational Structural And Compositional Analysis of SARS CoV-2 Omicron Variant Envelope Protein For Its Stability And Transmissibility Characteristics

Session 4 (Room No xx) : Food Security/Safety/Science and Postharvest Technology

Time: 3.00 PM – 6.00 PM

S. No	Chair : Prof. Dr. Tapio Juokslahti (Finland) Co-chairs : Assoc. Prof. Dr. Anurug Poeaim (Thailand)
1	IL 7: Zainal Mukhtar (Indonesia): The Quality of Vermicast from Biotransformation of Different Organic Substrates using <i>Lumbricus rubellus</i> and <i>Perionyx excavates</i>
2	IL 8: Kasem Soyong: Food Security/ Safety through Organic Agriculture
3	Jovita Soans: Nutritional evaluation of banana inflorescence and development of food products
4	Ngo Van Tai: Multivariable analysis of physicochemical and functional characterization of four Thai pigmented rice varieties
5	Saisuree Wongwichaiwat: Influence of seed moisture content on seed storage of Bambara groundnut (<i>Vigna subterranean</i> L.)
6	Natthalika Multha: Influence of Vacuum Packaging Combined with Storage Condition on Biochemical Activities and Quality of Groundnut Seed (<i>Arachis hypogaea</i> L.)
7	Thararat Pongcha-Umdee: Effect of Difference Plastic Bags on Corn Silage Quality for Animal Feed
8	Tonrak Touyjaroon: The Analysis of Total Flavonoid Contents in Thai White Rice Landrace

9	Komkhae Pilasombut: Application of microcrystalline cellulose gel as a fat reduction strategy in phosphate-free emulsified sausage
10	Nipaporn Yonsawad: Evaluation of drying temperature and storage time on antioxidant capacity of dried kaffir lime (<i>Citrus hystrix</i> D.C.) leaf
11	Sarocho Phopaijit: Possibility of predicting indirectly the glycemic index of rice using a crop model
12	Nutwasa Jaroenjun: Quality Improvement of Boba from Sago Flour Supplemented with Inulin Using Electron Beam
13	Sandra Kusumawardani: Investigating phytochemical and antioxidant activity of free and bound phenolics from brown rice bran and their correlation with enzymatic inhibitory and in vitro starch digestibility
14	J Jayanthi: Enhancing Hydroponics with IoT: An Automated Smart System for Optimal Cultivation

Session 5 (Room No XX): Plant Science and Pest Management

Time: 3.00 PM – 6.00 PM

S. No	Chair : Asst. Prof. Dr. S. Lalitha (India) Co-chairs : Dr. Sudhagar (India) Dr. Alex Anand (India)
1	IL 9: Dr. S. Lalitha (India): Encapsulation of plant growth promoting rhizobacteria in alginate matrix and its interaction with <i>Arachis hypogaea</i> L.”
2	IL 10: Prof. Dr.Mandali Rajasri (India): Drone Technology: A sustainable tool for pest management in Precision Agriculture.
3	Naphat Somala: The effect of microfluidization on characteristics and herbicidal potential of peppermint nanoemulsion on <i>Amaranthus tricolor</i> (online)
4	Nattaya Montri: Paclobutazol enhances yield and secondary compounds accumulation in <i>Curcuma longa</i> L.
5	Bodin Phadungsawat: Effects of Distance from Coastal Shoreline on Survival and Adaptation of Eastern Native Orchids, Thailand
6	Areeya Suraphonphinit: Rate of <i>Azolla microphylla</i> dry matter on nitrogen use efficiency and yield of Japonica rice
7	Theerapat Hongyotee: Influence of calcium from different seashells on growth and yield of Khon Kaen 6 peanut cultivar (online)
8	Thanakorn Boonkamjat: Influence of Plant Growth Regulators on Shoot Development of In vitro Chrysanthemums (online)
9	Phatchayamon Piphawatthanakul: Effects of Paclobutrazol on Growth Retarding in Potted Plant Chrysanthemums (<i>Dendranthema grandiflora</i>)
10	Manthana Mueangkhong: Response to selection for resistance to pepper yellow leaf curl Thailand virus of chili pepper populations (<i>Capsicum annuum</i> L.)

11	Thanaprasong Oiuphisittraiwat: The total phenolic responses of both resistant and susceptible chili pepper to Anthracnose disease (<i>Collectotrichum acutatum</i>)
12	Siripat Baikaden: The Determine of Mechanical Damage on Soybean Seed by Clorox Soak Test
13	Pattarapon Saelao: In vitro biocontrol potential of natural substance combination to against microbial plant diseases
14	Chachpon Tebdoie: Influence of exogenous salicylic acid on phytochemical improvement and antioxidant activity in <i>Cannabis sativa</i> L. (online)

Session 6 (Room No XX) : Soil and Environment, Water conservation

Time: 3.00 PM – 6.00 PM

S. No	Chair : Dr. Sathishkumar (India) Co-chairs : Dr. Gobi Saravanan (India)
1	IL 11: Dwi Wahyuni Ganefianti (Indonesia): Variability, heritability and genetic advance of chili pepper agronomic characters cultivated in peat land (online)
2	IL 12: Nanik Setyowati, (Indonesia): Growth and Yield Response of Green Mustard Under the Combination of Nitrogen Fertilizer and Organic Amendment in Acid Soil
3	Patticha Kulsuwan: The carbon footprint assessment from Electricity in Ubon Ratchathani Zoo In Ubon Ratchathani province, Thailand (online)
4	Pichailuk Thaikeaw: Growth and Yield of Cassava Cultivar KU-80 by using Biofertilizer
5	Lotis M. Balala: Assessment of heavy metal concentration in feeds and soil from selected poultry farms in Leyte Province, Philippines
6	Bancha Wiangsamut: Influence of Irrigation Water Quantity and Fertilizer Applied Together with Mulch on the Growth and Yield of Oil Palm cv. Deli x Nigeria (<i>Elaeis guineensis</i> Jacq.)
7	Anil P.: Seasonal responses of phytoplankton community in the heterogeneous coastal water regimes of southwestern India: microscopy/HPLC-CHEMTAX approaches
8	Thanakit Saifa: Effect of Combination Fertilizer on Growth and Yield of Cassava cv. Rayong9 in Thailand
9	Uthaiwan Phewphan: Estimation of aboveground carbon stock in service area of Ubon Ratchathani Zoo, Ubon Ratchathani province, Northeastern Thailand
10	Kishore: Production and characterisation of biosurfactant from indian himalayan region
11	D. Sridhar: Role of PGPR on the stimulation of growth Sesame (<i>Sesamum indicum</i> L.) in salt stress.

12	Karthik Prakash: Exploring fish gut associated bacteria for aquaculture probiotic properties
13	Ramu Mithran: Isolation and Characterization of Microplastics from Different Milk Sources.
14	Mahavishnou R: Isolation and Characterization of Microplastics from Different Sources of Water

Session 7 (Room No. xx): Biotechnology and Innovation

Time: 3.00 PM – 6.00 PM

S. No	Chair : Prof. R. Sarada Jayalakshmi (India) Co-chairs : Assoc. Prof. Dr. Supattra Poeaim (Thailand) Dr. V. Rameshkumar (India)
2	IL 13: Dr. Devarajan Thangadurai: Bioprospecting Soil Microbes for Sustainable Agricultural Development
3	IL 14: Prof. R. Sarada Jayalakshmi (India): Harnessing the potential of Bioagents for Sustainable Disease Management in 21st Century
4	Nawapon Sodakul: A study of polymer for delay germination in hybrid sweet corn seed production
5	Pramote Pornsuriya: GGE biplot analysis of genotype by environment interaction and yield stability of yardlong bean lines under nine environments
6	Somchai Yodsanga: Effects of NaOH/urea solution as a solvent and salt crystals as a porogen on the fabrication of porous composite scaffold of bacterial cellulose-chitosan for tissue engineering
7	Siriwan Nonthasila: Study on optimization for in vitro propagation of <i>Dalbergia oliveri</i> by plant tissue culture
8	Wirunwith Boonmuang: Effect of Stabizers and Surface Materials on Anti-listeria Efficiency of Hydrogen peroxide
9	Nattika Rungprateepaiboon: Effects of growth regulators on in vitro propagation of <i>Sophora tomentosa</i> (Necklace pod)
10	Sasiwimon Panudom: Micropropagation of Ironwood (<i>Xylia xylocarpa</i> (Roxb.) Taub.) by Tissue Culture
11	Naruporn Pedklang: The biological activities of the methanolic extract of Santol (<i>Sandoricum koetjape</i>) fruits (online)
12	Wiphada Saparam: Plant regeneration of <i>Bauhinia purpurea</i> by tissue culture technique
13	Supattra Poeaim: Genetic characterization of cassava (<i>Manihot esculenta</i> Crantz) cultivars using ISSR molecular marker

14	Natnicha Chiewchan: Effect of BA on Inducing Shoots of Philodendron erubescens 'Pink Princes' In Vitro
15	Putri Mian Hairani: Seed physio-biochemical quality of chili (<i>capsicum frutescens</i>) in different seed maturity (online)

Session 8 (Room No XX) : Organic Agriculture and Smart Farms

Time: 3.00 PM – 6.00 PM

S. No	Chair : Prof. Dr. TSSK Patro (India) Co-chairs : Dr. Premkumar (India)
1	IL 15: Fahrurrozi Fahrurrozi (Indonesia): Weed-based Liquid Organic Fertilizer Increased Growth and Yield of Organically Grown Leaf Celery (<i>Apium graveolens</i> var. secalinum Alef.)
2	IL 16: Sigit Sudjatmiko (Indonesia): The application of locally sourced liquid organic fertilizer on sweet corn growth and productivity
3	IL 17: Pakkapong Pongsuk (Thailand): Growing organic herbs to support local businesses and promote sustainability under the Plant Genetic Conservation project, suratthani, Thailand
4	Anuwat Lakyat: Study of Insect Pests and Natural Enemies on Sticky Traps in Organic Lettuce Fields
5	Arak Tira-Umphon: Light-emitting diodes and temperature effects on lettuce growth and its yield in plant factory
6	Natthamon Pradabkun: Lotus Flower Extract as a Natural Anti-browning Agent for Fresh Romaine Lettuce (<i>Lactuca sativa</i> L. var. longifolia)
7	Thanakorn Charoensuk: Young consumers' perceptions and willingness to pay for organic rice: a case study in Kochi, Japan
8	Phissanu Kaewtaphan: Effect of Organic Fertilizer Quantity on Yield and Seed Qualities of Rice (online)
9	Chutikarn Saengnang: Factors Affecting Purchase Decisions for Organic Dried Noodles of the Community Enterprise in Chachoengsao Province, Thailand
10	Sornphakdee Napassakorn: Factors affecting the adoption of smart root vegetable washing innovation of commercial vegetable growers in the Eastern Suburbs of Bangkok, Thailand
11	Nattaya Montri: Non-destructive measurement of Tetrahydrocannabinol (THC) and Cannabidiol (CBD) using near-infrared spectroscopy
12	Naruporn Pedklang: Identification of SRAP and AFLP molecular markers associated with fruit traits in Santol (<i>Sandoricum koetjape</i>)
13	Kittiya Yeamsuriyotai: Inhibitory effects of gardenia flower essential oil emulsion on browning appearance in jasmine (<i>Jasminum sambac</i> Ait.)

14	Anurug Poeaim: Effects of Plant Growth regulators on nodal regeneration of <i>Rhynchostylis orchid</i> by plant tissue culture
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Session 9 (Room No. xx): Agricultural Sciences

Time: 3.00 PM – 6.00 PM

S. No	Chair : Dr. PR Meganathan (CSIR-NEERI), India Co-chairs : Dr. D. Saravanan (India)
1	IL 18: Dr. PR. Meganathan Microplastics: an evolving ecosphere for microbial life
2	JOHN IRUDAYA RAJ J : Assessment of drought in Tamil Nadu based on the Standard Precipitation Evapotranspiration Index
3	E. Sakthi Uma Devi: Osmoadaptation and plant growth promotion by osmolyte - producing rhizobacteria under drought in <i>Arachis hypogaea</i> L.
4	Julie Rebecca Joseph Mathari: differential gene expression analysis reveals genes commonly expressed between different insect orders
5	Rositta Varghese: Seasonal Dynamics of Soil Fertility and Arbuscular Mycorrhizal Associations in Kerala's Black Pepper (<i>Piper nigrum</i> L.) Fields: A Comprehensive Investigation for Sustainable Cultivation Practices
6	Sreejamol T N: Arbuscular mycorrhizae as an ecotechnological tool for sustainable cultivation of Coconut palms
7	Balu M Nair: A study on the biodiversity and effect of environmental parameters on calliphoridae flies of forensic importance
8	Monica Suresh: Elemental composition, nutritional, and anti-nutritional content of <i>Saraca asoca</i> , a sacred tree
9	Dr.T.Sivakumar : Invitro studies and bioactive compounds analysis of leaf and stem extract of <i>Tridax procumbens</i> l
10	Shashank A S: Assessment of Heavy Metals in Tilapia Fish from Ulsoor and Agara Lakes in Bengaluru, Karnataka, India: An ecotoxicological impact of a metropolitan city.
11	Grace Regina E: Utilisation of <i>Anacardium occidentale</i> leaf to extract protein as a Cleansing Agent for Water Purification
12	Kowsalya: A study on development of composite flour with lotus seed flour incorporated product
13	N.Lalitha: Impact of dietary <i>Lactiplantibacillus plantarum</i> feed additive on intestinal histology, digestive enzyme and microbial profile in Pacific white shrimp, <i>Penaeus vannamei</i>
14	Jayanthi Murugan: Utilization of <i>Anacardium occidentale</i> leaf to extract protein as a Cleansing Agent for Water Purification
15	Rekha.A: Preparation and characterization of <i>sargassum wightii</i> and its biochar
16	Soundariya sri.T: Supplementary rice manufacturing from greens for diabetes sufferers

Session 10 (Room No.xx): Biological Sciences (India)**Time: 3.00 PM – 6.00 PM**

S. No	Chair : Dr. Amitkumar (India) Co-chairs : Dr. Prakash (India)
1	IL 19: Mrs. Preetha Manikandhan: Transformation of Waste to Wealth from Cow Dung
2	IL 20: Dr. G. Rajalakshmi: Marine Derived Chitin as a Promising Biostimulant for Sustainable Agriculture
3	C. Sathya: Heavy metal degradation of <i>Cajanus cajan</i> L. by PlantGrowth-Promoting Rhizobacteria
4	Anil P: Seasonal responses of phytoplankton community in the heterogeneous coastal water regimes of southwestern India: microscopy/HPLC-CHEMTAX approaches
5	Sayona Anna John: Ecology of Endomycorrhiza in Rice (<i>Oryza sativa</i> L.) of South India
6	Granap blessy R: Innovation technology for microbes in agriculture and sustainable development
7	Sakthivel: Enhancing the Utilization of Textile Sludge as Sustainable Construction Materials
8	Southamirajan: Studies on Reinforcing Scorched Concrete through Self-Repair Mechanisms
9	Grace charls: Biodiversity of epiphytes in and around Yercaud hills
10	Dr. S. Kavipriya: Strength analysis of geopolymer concrete with optimal fiber fraction
11	Sasivarman: Experimental study on replacement of ceramic waste for fine aggregate in concrete
12	Thenmozhi S: Screening of Bacterial Pathogens for Biofilm Formation and its inhibition using Actinobacterial Extract
13	Vinanthi Rajalakshmi K S: Assessment of Phytochemical-Bioactive Properties of <i>Azolla pinnata</i> and its Efficiency in Cadmium Chelation from Wastewater system.
14	Rameshwar Chandran R and Muthu Bharath T: Fabrication of nano selenium incorporated biodegradable food packaging film
15	Sugesh Kumar S and G. Rajalakshmi: Marine Derived Chitin as a Promising Biostimulant for Sustainable Agriculture
	Kirithiga A, Sivabalan M K and Rajalakshmi G: Exploring marine microbes as nanoengineers and their contributions to one health

Poster presentation [Time: 3.00 PM – 6.00 PM]

S. No	Chairpersons : Dr. T. Rajasekar (India) Dr. A. Suresh (India) Dr. S. Kumaran (India) Dr. Gayathri (India)
1	Havinesh Kumar U: Designing and operation of photo-bioreactor for Microalgae cultivation
2	A. Mary Deva Prasanna: Biological transformation of iron in soil through different column treatments using potential iron solubilizer
3	Diya Chatterjee: Smart pesticide sprinkler designing an iot-enabled arduino-based prototype
4	Hemasri D: Exploring actinobacteria from less explored manipur forest soil samples against non-tuberculosis mycobacterium species
5	Rejith R.S: A systemic study on antifungal properties of actinobacteria obtained from coal mines
6	Siva Sankar: Treatment of sago mill effluent through a bioreactor approach using aerobic bacterial consortium
7	Sriman K R: Azo dye degradation by Actinobacteria
8	Suvidha Laharika.P: Screening of polyhydroxyalkonate (pha) producing bacteria from insect nests
9	Yuvaraja T: Designing a fully automated bioreactor
10	Beula Christina.W: Development of groundnut de-oiled cake incorporated in recipes for - an alternative potential resource for food formula
11	Monisha Vijayan, Boomika Venkatesan: Bioprospecting of fish gut microbes
12	Ebshiba. N: Studies on enzymatic properties of southern ocean bacteria
13	Nidhin I K: Unravelling the soil metabolites and pollutants in degraded agricultural lands using GC-MS analysis
14	Janani T: An investigation into cell suspension parameters of moringa
15	Keerthana Rajeshkanna: Potential secondary metabolite from himalayan soil actinobacteria against <i>mycobacterium tuberculosis</i> [H37Ra and Rv strain]
16	Sobana Lakshmi KV, Roja G: Evaluation of bacterial resources for biosurfactant production
17	V. Suruthi: Production and characterization of a bioflocculant produced by <i>bacillus cereus</i> and its applications in removal of chromium (Cr ⁶⁺)
18	Pontiana Ritika Clement: A review on the bioprospecting potential of actinobacteria associated with earthworm cast, focusing on their novel antimicrobial properties
19	Lavanya D: Therapeutic intervention for dengue infection -present scenario

ABSTRACTS

Keynote Lectures

Keynote Lecture - 1

"Land productivity under long term organic farming in humid tropical highland of Indonesia."

Zainal Muktamar*

*Department of Soil Science, The University of Bengkulu, Indonesia

Email: muktamar@unib.ac.id

For decades, conventional agriculture systems using high agricultural inputs convincingly increased crop productivity. However, excessive and long-term use of these synthetic chemicals has caused soil degradation and environmental pollution. The organic farming system is an alternative to restore soil quality and crop productivity. The objective of the presentation is to elaborate on the improvement of soil quality under long-term organic farming practices for horticultural production in humid tropical highlands. We have developed a field station for long-term organic farming system so called "Closed Agricultural Production System" in Air Duku, a small village in Selupu Rejang SubDistrict, Rejang Lebong District, Bengkulu Province, Indonesia. The village is located at 102° 36' 54.96" - 102° 36' 56.82" E and 3° 27' 34.26" - 3° 27' 37.02" S, 1054 meters above sea level. The long-term organic farming practice started in 2013 with a crop rotation of horticultural commodities. Every cropping season, the land was consistently fertilized with 15 tons of vermicompost per ha. The crop rotation included sweet corn, carrots, potatoes, and peanuts. Every year, selected soil characteristics are evaluated to examine the improvement the soil productivity. The evaluation result showed that soil pH slightly rises from year to year. The total soil organic carbon steadily increased from 2015 to 2021. So does the total soil nitrogen, available P, and exchangeable K. On the contrary, exchangeable Al significantly decreases every year, even if the cation was not detected in 2018 and after. A similar trend was observed in the bulk density and porosity of the soil. In general, soil productivity increases with long-term organic agriculture using 15 tons/ha, consequently the improvement of horticultural crop yield.

Keynote Lecture - 2

Kashgar food project post-harvest management to improve rural income

Prof. Dr. Tapio Juokslahti

Adjunct Professor in Helsinki University, Finland

The ancient Uygur Farming System is deeply rooted in the tradition and culture in the habitat oases and irrigated valleys of Kashgar, Xinjiang Uygur Autonomous Region, P.R. China. Kashgar Food Project was conducted as a Finland governmental Finnfund funded Finnpartnership project by Finnish companies and local farmers and stakeholders. Finnfund has 217 million project investments in Asia. The aim of Kashgar Food Project was to identify local agricultural products potentially suitable for value-added post-harvest processing and for export. The project made five project missions in rural areas of Kashgar, Jiashi, Sache, and Aksu, as well as in the regional capital town of Urumqi. The Uygurs, the indigenous peoples of Xinjiang are sedentary farmers whose social organization is centred upon the village. Their farming system is a result of hundreds of years of experience. They grow several crops on the same fields, one or two fruit or nut tree varieties, some cover bushes, and one or three field crops, like corn, wheat, cotton, and vegetables. They use neither chemical insecticides nor fertilizers. Uygur Farming System can be regarded as regenerative agriculture that prioritizes conserving and rehabilitating the land tailoring specific practices to local ecosystems and climates. The principles of regenerative farming include: minimal tilling of the soil, using cover crops, planting polycultural crops, and using organic fertilizers and organic methods of pest control. Post-harvest management (PHM) is an important process that can help increase farm income, including; proper storage, value addition, improved marketing, diversification, and efficient transportation. The Kashgar Food Project in its analysis divided the agricultural products into perishable (fruits and vegetables) and non-perishable (honey, nuts and almonds). Fruits and vegetables can be further divided into non-climacteric (ripening on the plants) like; citrus, grape, pomegranate and strawberries and into climacteric (mature fruit require period before attaining a desirable stage of edibility) like; apple, apricot, melons, pear, peach, plum and tomato. Each product group and individual products pose different challenges in post-harvest management interventions and in market potential. With a short harvesting season the products fetch low market prices due to high volume meeting low demand. On the other hand this kind of market gap gives opportunity for business reward with effective post-harvest management intervention. The Project made mark-up price analysis of selected local products to identify products with interesting potential for post-harvest management and export marketing opportunities. The mark-up percentages were between 160-5600 percent depending on products and post harvest management intervention. The outcome of the Kashgar Food Project was the knowledge of the potential agriculture crops for post-harvest management interventions and potential export marketing and sales and the cooperation between local farmers and the industry.

Keynote Lecture - 3

Plant Chimera Agriculture

Assoc. Prof. Dr. Kampon Sriwatanakul, M.D. Ph.D. (Pharmacology).

Chairman of Thailand National Charter of Health.

Former Vice President for Research and Foreign Relations, Mahidol University.

Chimeras are organisms that are composed of cells of more than one genotype. These organisms have their name from Greek mythology that has the head of a lion, the body of a goat, and the tail of a serpent. In the seventeenth century, Pietro Nati discovered an adventitious shoot growing from the graft junction between sour orange (*Citrus aurantium*) and citron (*Citrus medica*). At the turn of the twentieth century, chimeras have served both as tools and as unique biological phenomena that have contributed to our understanding of plant development at the cellular, tissue, and organismal level. A chimera is a meristem with different genetics in one or more of the layers of the meristem. A plant chimera is a specific type of genetic mosaic in which the genetically dissimilar cells are present in the shoot apical meristem, where they continue to give rise to the cells that form the body of the plant. Types of chimeras include: periclinal, mericlinal, and sectorial. Science must protect the natural condition in their creation without manipulation. In the purpose of product developments science can use the support of nature to use the component for health protection in any form without misusing nature in disrespect. Wellness & spa, and rehabilitation as services need great natural based medicine, supplements and cosmetics. The markets for this kind of treatment centers are booming worldwide. Many science and research centers and laboratories try to create products to support a much better quality of human life. In this presentation, examples of Plant Chimeras to be used for natural based science product development in wellness & spa industries derived from Aloe vera, different roses and dark colored roses will be presented.

Keyword: Plant Chimeras, Heterogenomic Organism, Cellular Plant Development.

Keynote Lecture - 4

Neutricereals: Magic grains for climate resilient Agriculture in present era

Prof. TSSK Patro

Principal Scientist and Head

Agricultural Research Station, ANGR Agricultural University, Gajularega, Vizianagaram, India

Most of millet crops are native of India and are popularly known as Nutri-cereals due to their nutritional values in terms of carbohydrates, crude fibers, antioxidants, minerals and vitamins and provides most of the nutrients required for normal functioning of human body. They are the oldest food crops known to humans and possibly the first cereal grains to be used for domestic purpose. Millets are termed as “yesterday’s coarse grains and today’s nutri-cereals.” Millets are the group of small-seeded annual grasses that are grown as grain crops primarily on marginal lands in dry areas and belong to the Poaceae family. Millets are undoubtedly “climate smart crops” because they are extraordinarily tolerant to drought, high temperatures, demanding less water and fit well even in the low fertile soils. Millets are considered to be “future crops” as they are resistant to most of the pests and diseases and adapt well to the harsh environment of the arid and semi-arid regions of Asia and Africa. It is adapted to wide range of temperatures, moisture-regimes and input conditions supplying food and feed to millions of dry land farmers. Millets have nutraceutical properties in the form of antioxidants which prevent deterioration of human health such as lowering blood pressure, protects from diabetes, improves digestive system, lowers the risk of cancer, detoxifies the body, increases immunity in respiratory health, increases energy levels and improves muscular and neural systems and are protective against several degenerative diseases such as metabolic syndrome and Parkinson’s disease. Recognizing their unique potential, the United Nations-Food and Agriculture Organization has announced the year 2023 as the “International Year of Millets”.

ABSTRACTS

Invited Lectures

IL - 1

Learning and practical networks for growing organic herbs: facilitating learning and innovation for sustainable agriculture

Poungsuk, P.¹, Suriyawittayawate, C.¹ and Junlex, P.¹

¹Department of Agricultural Education, King Mongkut's Institute of Technology Ladkraband, Thailand

Corresponding Email: ppoungsuk@gmail.com

The Agricultural Learning Center was used in this study to develop a network of learning management and practice of organic herb growing with a learning management approach. The results were found that the sample group had higher learning achievement after learning than before the training and there was a statistically significant difference at the 0.01 level. The subjects were satisfied with the overall learning activity package at a highest level (\bar{x} =4.68; S.D.=0.65) and when doing the practice of growing organic medicinal plants with organic farmers through the network via online media. In addition, it was found that: there are key elements of learning and practice of growing organic herbs plants for sustainability from the creation of a learning network, as follows: the creation of a group of young farmers, youth in the community, generate knowledge, stimulating and encouraging experiments and practice build management skills, apply appropriate technology in the production process, establishing the habit of discipline build pride in local values cooperative learning, building a learning society through social media, and increasing the value of output and social and economic exchanges.

Keywords: Organic herbs, learning and practical networks, sustainable agriculture

IL - 2

Geographic Information Systems and Remote Sensing: Innovative Tools for Plant Health

Haggag, W. M. ¹, Ali R. R. ² and Al-Ansary, N. A.¹

¹Plant Pathology Department, National Research Centre, Cairo, Egypt; ²Soils and Water Use Department, National Research Centre, Dokki, Cairo, Egypt

Corresponding Email: wafaa_haggag@yahoo.com

Agriculture research has a strong emphasis on biotic and abiotic stresses because of the significant economic losses to cash crops. Since plant stress has an impact on crop quality and yield, every effort must be made to identify and treat the problem of plant stress. Geographic Information Systems (GIS) and remote sensing are a new innovative alternative to the conventional diagnosis, detection and management of diseases by spectral symptoms. The production of crops, including crop protection, can benefit greatly from this contemporary technology. Utilizing data from GIS and remote sensing, disease-affected plants may be identified by the variation in their reflectance spectra when compared to healthy plants. GIS has been widely utilized as a significant instrument for epidemiological research. Remote sensing is a rapid and effective technology that may gather information on the spectral characteristics of earth surfaces from a variety of locations, including satellites and other platforms. The most recent studies are based on the information from spectral, multispectral, and hyperspectral sensors that measure reflectance, fluorescence, and radiation emission, or from electronic noses that detect

volatile organic compounds released from plants or pathogens. These sensors may also have the ability to characterize the health status of crops. Agriculture will become more sustainable and safe using GIS and remote sensing technologies, which will also considerably aid to greatly specialize diagnostic and management outcomes. These technologies will eventually become a key piece of a farmer's precision equipment mix, working in tandem with advancements in digitalization and artificial intelligence for precision application across pathogens and crop management demands.

Keywords: GIS, remote sensing, plant disease detection, crop management

IL - 3

Herbs supplementation with the inclusion of piper sp on nutrient intake and digestibility for local goats

Dwatmadji, T. Suteky, E. Soetrisno, K. Simanjuntak K, R. Anggita and M. H. Rizki

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia.
Corresponding Email: dwatmadji.2008@gmail.com

During the experiment, the average daily gain (ADG) for the control group (CTR) was 54.25 g/day. The group that received Herb's supplementation (HS) had an ADG of 61.81 g/day, while the HS group with Black Pepper (HS-BP) had an ADG of 67.44 g/day. The HS group with White Pepper (HS-WP) had an ADG of 66.40 g/day, and the HS group with a combination of Black and White Pepper (HS-BWP) had the highest ADG of 78.25 g/day. The HS-BWP group had a significantly higher ADG ($P < 0.01$) than the CTR group, except for crude protein and feed intake (g/day), which were considerably higher in a supplementation group based on orthogonal contrast. All treatment groups had greater feed consumption (per metabolic BW and % BW) than the CTR group. The dietary treatments did not affect the digestibility of dry matter, organic matter, crude protein, crude fiber, Ether Extract, and energy. The addition of herbs and Piper sp did not affect the Feed Conversion Ratio (FCR) either. The ADG was linearly and quadratically affected by FCR ($r = 0.618$; $L: P < 0.01$ and $r = 0.739$; $Q: P < 0.01$). The experiment suggests that herbs and Piper sp supplementation can improve feed intake and ADG, while not influencing nutrient digestibility and FCR.

Keywords:

IL - 4

The use of non-invasive methods to measure the physiological state of bali cattle supplemented with herbs and humic acid

Suteky, T., Dwatmadji. and Soetrisno, E.

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia.
Corresponding Email: dwatmadji.2008@gmail.com

Morning measurement showed no significant difference in rectal, pulse and respiration rate, among Bali cattle with no supplementation (T-0 or Control), or with herbs supplementation (T-1), T-2: with herbs supplementation and humic acid 20 g/head and T-3: with herbs supplementation

and humic acid 40 g per head. Rectal temperature (RT) was correlated with forehead infrared temperature (FIT) (r: 0.515). Noon observation indicates the respiration rate was significantly higher ($P < 0.05$) with RT lower in control animals. Pearson correlation indicated that RT significantly ($P < 0.01$) correlated with FIT (r: 0.690); and the correlation with tail base infrared temperature (TBIT) r:0.443. During afternoon measurement, the respiration rate was 26-27.6 x/minutes, the pulse rate was 74.9 – 76.88, and the rectal temperature was around $37.77 \pm 0.21^\circ\text{C}$ with no significant difference among the treatments. The Thermal Humidity Index (THI) during the experimental periods for all treatments was 78.4-86.87 while the HTC (was 2.14-2.30. Supplementation increases the adaptability of experimental animals in this study. In addition, non-invasive urinalysis using a strip (URS-10T) found the absence of blood, protein, ketone and glucose in either control (T-0) group of Bali cattle with herbs supplementation (T-1) in Bali cattle supplemented with a combination of herbs and humic acid (T-2 and T-3). While positive leucocyte was found in control groups, a small amount of bilirubin and urobilinogen was found in all the treatments. For all the treatments, it was found that specific gravity was 1.015-1.020 whereas, the humic acid supplementation (T-2) had lower urine pH. In conclusion, the addition of herbs and humic acid did not affect the physiological state and the increased adaptability of Bali cattle in humid conditions. Infrared temperature (FIT) can be used to predict the rectal temperature. Test strips can be used to analyze the urine of cattle, however, additional testing is required for clinical diagnosis to reach a more conclusive diagnosis.

Keywords: oil palm sludge, Infrared temperature, HTC, dipstic, urinalysis

IL - 5

Isolation and characterization of Siderophore producing Plant Growth Promoting Rhizobacteria (PGPR) enhancement of *Arachis hypogaea* L.

Nithyapriya. S, Lalitha. S

^a PG and Research Department of Botany, Padmavani Arts and Science College for women, Salem 636011, Tamil Nadu, India.

^b Department of Botany, Periyar University, Salem 636011. Tamil Nadu, India.

Email: nithyapriyamuthu@gmail.com

Two siderophore producing bacteria were isolated from rhizospheres of agriculture soil Salem district, Tamil Nadu, India. These isolates were identified as *Pseudomonas fluorescens* (LNPF1) and *Bacillus subtilis* (LSBS2) based on biochemical characteristics and conformed by 16S rRNA gene sequences analysis. Both the isolates carried out by Characterization of PGP activity was produced by copious amount of solubilized phosphate, IAA production, HCN production and Ammonium production. The siderophores production ability of the strain was evaluated qualitatively and quantitatively through Chrome Azural S assay maximum amount of siderophore production LNPF1. Types of siderophore production was tested LNP1 was hydroxamate type and LSBS2 was catechol type of siderophore. Purification of siderophore production the strain LNPF1 and LSBS2 was ability to produce 20 mg L^{-1} of siderophores purification. Further, the siderophores was partially purified LNPF1 and LSBS2 is identified as Desferrioxamine B type using HPLC and FTIR and the Desferal structure was confirmed by ^{13}C NMR analysis. Desferrioxamine structure plays a key role in iron chelator, LSBS2 was identified as 2-3 dihydroxy benzoic acid and (-OH), aromatic (-CH), (-C=O), (-CH₂) and (C-O-C) linkage these functional groups are present in

the chemical hydrolysis in the 2D NMR is considered as the most authentic evidence for the bacillibactin structure are present in LSBS2. The present results suggested that the occurrence of Desferrioxamine B type in LNPF1 and Bacillibactin are present in LSBS2 play a key role in iron chelation. So that LNPF1 and LSBS2 favors the healthy growth of *Arachis hypogaea* L and increase in plant nutrients and also increase in oil yielding content, number of capsules per plant and number of pods per plant also increased.

Keywords: Siderophores; *Arachis hypogaea*; Desferrioxamine; Hydroxamate; Plant Growth

IL - 6

Sustainable application of natural dye from clitoria plant for dyeing and surface finishing of textile fibers and its characteristic bacterial effect to overcome environmental pollution

Ali, N. F.¹ and Abd-El salam, I. S.²

¹Chemistry of natural and microbial products department. Institute of Pharmaceutical industries and Drug Research National Research Centre; ²Dyeing and printing Department, Textile research and technology institute, National research centre.

Corresponding Email: aali_04@hotmail.com

Compared to similar plant-based colourants, natural blue colourant from the blooms of the butterfly pea (*Clitoria ternatea*) has a longer shelf life.

The butterfly pea is a herbaceous twining vine with deep blue to purple flowers that can bloom almost the entire year. This common ornamental is frequently discovered growing wild in its natural habitat in Asia or planted in gardens and landscapes due to its drought tolerance and rapid growth rate. As a medicinal herb, it has a long history

Delphinidin is the primary anthocyanin responsible for the deep blue to purple colour of butterfly pea blossoms.

The ability of BPFE's extract to change colour is another distinguishing feature. There are four different coloured anthocyanin forms that can alternately change colour based solely on pH. by adding a weak acid like lemon or lime juice. Due to the danger and negative consequences of synthetic dyes as well as the increased awareness of the environment raised by researchers, natural dyes derived from plants have received a lot of attention in recent years. Our study aims to application of natural dye produced from clitoria plant for dyeing wool and silk fibers treated with neem oil extract for studying its effects on the fibers character and antibacterial characteristics using gram positive and gram negative bacteria The optimum conditions as concentration, temperate, pH and the time of dyeing were studied. The fastness properties were also investigated. The wool and silk fibers showed antimicrobial effects by killing and/or suppressing growth of a broad spectrum of microbes The results exhibited excellent color strength (K/S) and fastness properties. Application was reflected positively on the zones of growth inhibition.

Keywords: Clitoria, natural dye, neem, antibacterial, dyeing

IL – 7

The Quality of Vermicast from Biotransformation of Different Organic Substrates using *Lumbricus rubellus* and *Perionyx excavatus*

Muktamar, Z.^{1*}, Setyowati, N.², Anandyawati, A.¹, Utami, K.², Fahrurrozi, F.², Sudjatmiko, S.², Chozin, M.²

¹Department of Soil Science, University of Bengkulu, Bengkulu, Indonesia; ²Department of Crop Production, University of Bengkulu, Indonesia.

Corresponding Email: muktamar@unib.ac.id

The study discovered that substrates from farming activities and weeds offered a different quality of vermicast produced using *Lumbricus rubellus* and *Perionyx excavatus*. All substrates in the bio-convertor bin had similar temperatures and humidity; however, the pH was significantly different, where goat substrate exhibited the highest pH during eight weeks of vermicomposting. Substrate from cattle waste, fermented Melastoma, and rice straw yielded comparable vermicast production, but that from goats had lower production. The production of vermicast using *Perionyx* was greater than *Lumbricus*. Even though the yield of vermicast from goat substrate was the lowest, it had the highest P, K, Mg, and Fe contents. The contents of N and Ca were comparable in vermicast produced from goat and Melastoma substrates. Besides, Cu and Zn were higher in vermicast from animal substrate than plant residues. The contents of organic C and Pb were similar among all substrates. Both *Lumbricus* and *Perionyx* produced similar quality of vermicast. Melastoma weed is a prospective substrate for earthworm biotransformation to produce nutrient-rich organic fertilizer. The study further reveals that epigeic species worms, *Lumbricus rubellus* and *Perionyx excavatus* are equally suitable for the biotransformation of agricultural wastes and weeds.

Keywords: Vermicast; biotransformation; vermicomposting; *Lumbricus rubellus*; *Perionyx excavatus*

IL - 8

Food Security/ Safety through Organic Agriculture

Kasem Soyong

President, Association of Agricultural Technology in Southeast Asia (AATSEA)
Director, Research Institute of Modern Organic Agriculture (RIMOA),
King Mongkut's Institute of Technology Ladkrabang) (KMITL), Bangkok, Thailand

Association of Agricultural Technology in Southeast Asia (AATSEA) is officially non profitable organization which established in 2011. We have members mostly scientists from many country Thailand, Sri Lanka, Philippines, India, Vietnam, Indonesia, Finland, Nigeria, Turkey, PR China, Cambodia, Estonia EU, Bangladesh, Laos, Myanmar. Organic certification is one activity we have started in 2016 to accredited the organic farmers without charge for organic certified eg Organic coffee in Laos, Organic rice in Cambodia, Organic tea in Vietnam, Organic Vegetables in Myanmar, Organic tea in China, Organic Vegetables, Fruits, Eggs, Shrimps, Fishes etc. and organic golf course as well in Thailand. In 2022, AATSEA has collaboration with Earthsafe foundation which established by Central TOPS Supermarkets in Thailand for organic certify by Earthsafe powered by AATSEA and certified organic farmers can directly deliver to TOPS supermarkets. We have started to evaluate from

non-agrochemical production (NAP) in conversion period to Organic Agriculture(OA). **Non-agrochemical production (NAP)** is defined as the growers stop the using synthetic agrochemicals, including chemical fertilizers and chemical pesticides (fungicides, insecticides, herbicides, etc.) for their productions, including crop and animal production. It is to revitalize the surrounding agroecosystem and surrounding environment, improve soil biodiversity, soil fertility with high organic matter, and proper soil pH for plant growth. NAP products leave low concentrations of toxic chemical residue in the soil, water, and agricultural products at a minimum standard for hazardous to consumers and living organisms in surrounding environments. The growers combine conventional methods to maintain and improve soil fertility, biological activities, biodiversity, soil revitalization and remediation with beneficial microorganisms and apply biological products and natural products as agricultural inputs for their production to maintain the quantity and quality of agricultural products with food security and safety. NAP can be transferred for organic agriculture certification when no toxic agrochemical residues are detected in the soil, water, and agricultural products. **Organic agriculture (OA)** is defined as a system that relies on the ecosystem and environmental and social impacts by stopping synthetic agrochemical inputs, such as synthetic fertilizers and pesticides, veterinary drugs, and genetically modified seeds/organisms. Synthetic chemicals are replaced in organic agriculture with innovative products, natural products, beneficial microorganisms, biological products, natural substances, and management practices to maintain and increase long-term soil fertility. Organic agriculture promotes and enhances agroecosystem health, biodiversity, biological cycles, soil fertility, and activities. Organic agriculture products don't contain toxic synthetic agrochemical residues and are called safety food. Finally, the certified organic products must not detected toxic agrochemicals, nitrate (NO₃), Formalin, Salmonella sp, E.coli and low concentration of heavy metals etc.

IL - 9

Encapsulation of plant growth promoting rhizobacteria in alginate matrix and its interaction with *Arachis hypogaea* L."

S. Lalitha

Assistant Professor, Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India

Rhizosphere encourages the survival and functioning of diverse microbial communities through the influence of plant roots. Likewise, the functioning Plant Growth Promoting Rhizobacteria (PGPR) contributes to the growth and productivity of crop plants significantly. Immobilization of PGPR for agricultural applications aims to provide temporary physical protection from stressful environmental conditions and the gradual release of cells for successful root colonization gradually. In this work, we immobilized *Acinetobacter calcoaceticus* and *Bacillus amyloliquefaciens* cells in 2% alginate beads prepared by ionic gelation process, and then stored up at 4 °C. The rhizobacteria was initially characterized for indole-3-acetic acid (IAA) production, phosphate solubilization, siderophore, ammonia and HCN production. Alginate matrix showed interaction with the immobilized bacteria, allowed a constant release of cells, and improved their viability and capability to interact with *Arachis hypogaea* L. The spherical microcapsules were monodisperse with a mean diameter of 25 µm to 100 µm and wrinkled surfaces. Cell number into beads reached 10⁷ CFU.bead⁻¹. In vitro release experiments demonstrated that 60% of the bacteria were released from the sodium alginate

microcapsules within three days. In addition to this, the plant growth promoting properties of the encapsulated PGPR were also evaluated using *Arachis hypogaea* L. Peanut inoculation with rhizobacterial beads were found to have maximum growth enhancement with significantly increased root length and biomass at 30 days of growth, and under restrictive water condition (RWC), redox status and photosynthetic pigments increased compared with non-encapsulated bacteria. Our results demonstrate that immobilization of *Acinetobacter calcoaceticus* and *Bacillus amyloliquefaciens* in alginate matrix is a potential alternative to enhance peanut growth even under RWC and as a promising delivery system for agricultural applications.

Keywords: PGPR, encapsulation, peanut, sustainable agriculture.

IL - 10

Drone Technology: A sustainable tool for pest management in Precision Agriculture

Rajasri Mandali,

S.V. Agricultural College, Acharya NG Ranga Agricultural University, Andhra Pradesh, India.
Email : m.rajasri@angrau.ac.in

India's agriculture plays a significant role in economic growth of the country with around 54.6% of the total workforce involved in agriculture and allied sectors and contributes 17.8% to the country's Gross Value Added (GVA) especially the exports of agri based commodities contributed to the tune of US \$ 50.2 billion during 2022-23. Agriculture stands as the cornerstone of the Indian economy, with the success of crop production hinging on various factors, among which mechanization and technological advancements play pivotal roles. India's agricultural sector today is said to be on the verge of a **breakthrough technological transformation**. The recent integration of artificial intelligence and machine learning in the field of Agriculture has given rise to the concept of '**Precision Farming**' or '**Smart Agriculture**.' As labor availability and technical manpower are extremely limited, particularly in India, unmanned Aerial vehicles, the drones are gaining popularity in the context of smart farming. Notably, the flying Robot, DRONES utilization is rapidly advancing to optimize resource usage and boost farmers' income. In particular, drone technology for pesticide application is gaining traction, facilitating informed decisions for precise pest management in agriculture. The design of Unmanned Aerial Vehicles (UAVs Drones) should consider various parameters such as droplet size, wind speed, flight speed and flight height above the canopy and buffer zone (Zhang *et al.*, 2012). Smart farmers adopting Agricultural (Kisan) drones for timely spraying operations to save time, labour and expenses which is also user friendly that can reduce the contact of humans with fertilizers, pesticides and other harmful chemicals which otherwise cause serious health issues in operators. To harness the full potential of drones, it is crucial to be well-versed in the regulations governing their use in agricultural operations. The Directorate General of Civil Aviation (DGCA), under the Government of India, has established clear guidelines for drone usage in agriculture and is actively promoting the adoption of drone technology. The operation of drones in India is governed by the Unmanned Aircraft System (UAS) Rules 18 - Part VI, published on June 2, 2020 in the gazette of India which requires obtaining unmanned aircraft operator's permit (UAOP) for piloting. Various research institutes under the Indian Council of Agricultural Research (ICAR) and State

Agricultural Universities are actively engaged in formulating crop specific Standard Operating Procedures (SOPs) for drone based pesticide application across diverse crop ecosystems. In this context the miniaturized drones (ANGRAU-PUSPAK) possess a wide range of benefits that include high efficiency, reduced labor requirement, saving of time and energy, quick response time, and vast area coverage, as well as environmental safety. The crop specific Standard Operated Protocol (SOPs) were developed for application of different pesticides/ fungicides through use of drones for nine major crops *i.e.* rice, maize, cotton, groundnut, pigeon pea, safflower, sesame, soybean and sugarcane in India (Ministry of Agriculture and Farmer welfare, 2022). Acharya NG Ranga Agricultural University initiated a dedicated project during 2020-21 *i.e.* Centre for **APSARA** (A.P. Smart Applications and Research in Agriculture) for drone and Artificial Intelligence applications in agriculture. The enhanced awareness about drones in farmers and the support and encouragement of Indian government through subsidy schemes on drones, there is a significant growth in drone industry through start ups and will become stronger by providing a lot of job opportunities in the agricultural sector especially for rural youth. Thus, in near future the drone technology has much potential to lower the costs and risks in agriculture and making a profitable agricultural scenario with significant contribution to sustainability goals of the Indian farmer through smart farming techniques.

IL - 11

Variability, heritability and genetic advance of chili pepper agronomic characters cultivated on histisols

Ganefianti, D. W., Gusmara, H., Nurhames, M. E. and Armadi, Y.

University of Bengkulu

Corresponding Email: dw_ganefianti@unib.ac.id

Peat soils (Histisols) can be developed for plant cultivation, including chili pepper. However, not all chili varieties are able to adapt well to peat lands. Therefore, it is necessary to carry out a series of studies to produce chili varieties for peat lands. Collection is the first step in a plant breeding program to produce new varieties. Evaluation of genetic diversity, heritability and genetic progress are important parameters for selection efficiency. This research aims to estimate the variability value, heritability prediction value and genetic progress of agronomic characters in 14 chili genotypes on peatlands. This research was carried out in June-October 2022 on the Integrated Agricultural Zone land of the Faculty of Agriculture, University of Bengkulu. This study used a randomized completely block design (RCBD) with one factor consisting of 14 chili genotypes. Each treatment was repeated 3 times, so there were 42 experimental units. Each experimental unit contained 20 plants and 5 plants as sample plants. The results of this study indicate that the chili characters that have a wide genetic diversity are the number of branches, dichotomous height, leaf width, and fruit length. Plant height, canopy width, flowering time, number of stomata, number of trichomes, number of fruit per plant, and fruit weight per plant showed narrow variation values. High heritability predictive values were found in the number of branches, dichotomous height, leaf width, and fruit length. Selection of chilies can be done based on characters that have a wide genetic diversity and high heritability. Genetic progress on these characters if 5% selection is carried out is dichotomous height (20%), number of branches (32%),

leaf width (18%), and fruit length (50%). Potential genotypes that can be used as a source of parents for assembling high-yielding varieties on peat lands are CR 04 and CK 03.

IL - 12

Growth and Yield Response of Green Mustard Under the Combination of Nitrogen Fertilizer and Organic Amendment in Acid Soil

Setyowati, N.¹, Muktamar, Z.² and Sentosa, P.³

¹Department of Crop Production, Faculty of Agriculture, University of Bengkulu, Indonesia.

²Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia.

³Agroecotechnology Study Program, Faculty of Agriculture, University of Bengkulu, Indonesia.

Corresponding Author: Email: nsetyowati@unib.ac.id

The study indicated that the combination of 25% recommended nitrogen synthetic fertilizer and 75% N from chicken manure provided the highest growth and yield of green mustard represented by the shoot height, leaf area, root length, shoot and root weight, and nitrogen uptake. The substitution of 75% N synthetic fertilizer by chicken manure can improve N uptake by green mustard as much as four times higher, and N absorption efficiency increased by almost 1.5 folds. The yield of the fertilizer combination can increase more than 5-fold compared to the recommended N fertilizer and is approximately 80% higher than chicken manure alone. Also, the combination had the highest nitrogen absorption efficiency. The study is significant for sustainable agriculture implementation by reducing up to 75% of nitrogen synthetic fertilizer.

Keywords: fertilizer combination, fertilizer substitution, organic farming, sustainable agriculture

IL 13

Bioprospecting Soil Microbes for Sustainable Agricultural Development

Devarajan Thangadurai

Department of Botany, Karnatak University, Dharwad, Karnataka, India

Email: drthanga.kud@gmail.com

One basic necessity, which will be at the first priority for human being is the food. Feeding the growing population has pressurized the agriculture to adopt unsustainable ways till, but the awareness among consumers for safe and healthy food, grown in tandem with nature has triggered the growth of sustainable agriculture. Diseases are the major constraints in agriculture and it could be compromised due to a suite of perennial abiotic and biotic problems that causes major losses in terms of production, economy, quality and quantity of products. Demands have shifted from the "resource degrading" chemical agriculture to a "resource protective" biological agriculture. Soil microbes are the one which play major role in sustainable agriculture as they are the key components of biofertilizers, biopesticides, biocontrol agents and many other agricultural supplements, because of their fundamental functions such as nutrient cycling, breaking down crop residues, stimulating plant growth and yield by their metabolic activities. They also play equal important role in food processing industries like dairy, beverage, brewery and health cum growth supplements. These soil microbial communities are dynamic, complex and not easily interpreted for field practices. But the research field have made the way easy to understand them and engineering them to product. Thus, the present talk identifies major role of soil microbes in sustainable agricultural development, addresses current scenario of agriculture to future prospects. Also, it encourages and creates awareness among people to practice this sustainable agricultural method by adopting soil microbial products.

IL - 14

Harnessing the potential of Bioagents for Sustainable Disease Management in 21st Century

R. Sarada Jayalaxmi Devi

Vice Chancellor ANGRAU Guntur Andhra Pradesh India Pincode 522001

*Corresponding author E-mail: r.saradajayalakshmi@angrau.ac.in

Enhancing agricultural output through improved farmed environments is a crucial step in feeding the world's constantly expanding population. The focus of agricultural techniques has shifted towards maximizing crop yields in a sustainable manner reducing the usage of chemical pesticides and fertilizers. Reducing crop losses from epidemic plant diseases and promoting plant growth are two ways to increase crop yields. In the present century, there is a need to reduce use of chemical fertilizers and pesticides to reduce ill effects on human health and environment which is of high priority. In light of this the biological methods of disease management has gained momentum utilizing several biopesticides of microbial origin and their metabolites. Agroecological management makes use of various fungi, bacteria and viruses for sustainable management of plant diseases. However, in depth field studies are required for utilization of microbes for protecting the crops from diseases in this climate changing scenario as their biological

efficiency is highly dependent on weather conditions, especially, temperature and relative humidity. Further, the full potential of biocontrol agents couldn't be harnessed by the farmer's and researchers worldwide due to strict regulatory measures imposed for their utilization in natural habitats or agroecosystems. The scope of utilization of these biological arsenals in sustainable cultivated ecosystems for disease management, mass production challenges, and future strategies has to be studied in detail.

IL - 15

Weed-based Liquid Organic Fertilizer Increased Growth and Yield of Organically Grown Leaf Celery (*Apium graveolens* var. *secalinum* Alef.)

Fahrurrozi, F.¹, Setyowati, N.¹, Sudjatmiko, S.¹, Muktamar, Z.,² and Chozin, M.¹

¹Crop Production Department, Faculty of Agriculture, Universitas Bengkulu, Bengkulu 38121, Indonesia; ²Soil Science Department, Faculty of Agriculture, Universitas Bengkulu, Bengkulu 38121, Indonesia;

Corresponding Email: fahrurrozi@unib.ac.id

Liquid organic fertilizer (LOF) is generally used to increase the efficacy of solid organic fertilizer under organic agriculture production systems. This experiment compared how leaf celery responded to the application of weed-based LOF. Results showed that weed-based LOF increased leaf greenness, plant height, sucker number, shoot fresh weight plot⁻¹, and root to shoot ratio of leaf celery. However, it did not increase leaf number, shoot fresh weight plant⁻¹. Weed-based LOF with concentration of 25 % produced the best leaf greenness, plant height, sucker number, shoot fresh weight plot⁻¹, and root to shoot ratio of leaf celery. Nevertheless, the use of weed-based LOF did not increase nutrient uptakes (N, P, and K) of leaf celery. It is concluded that the use of 25 % concentration of weed-based LOF increased leaf celery production under organic farming systems

Keywords: Leaf Celery; Liquid Organic Fertilizer; Nutrient Uptakes; Organic Vegetables

The application of locally sourced liquid organic fertilizer on sweet corn growth and productivity

Sudjatmiko, S.¹, Fahrurrozi, F.¹, Muktamar, Z.², Setyowati, N.¹, Chozin, M.¹

¹University of Bengkulu, Faculty of Agriculture, Department of Crop Production, Bengkulu - 38121, Indonesia; ²University of Bengkulu, Faculty of Agriculture, Department of Soil Science, Bengkulu - 38121, Indonesia

Corresponding Email: sigitsudjatmiko@unib.ac.id

This study examined how a local liquid organic fertilizer affected sweet corn growth and yields in an organic system. A study using a complete randomized block design was conducted, consisting of three replications. The experiment was carried out in Inceptisol soil that had been subjected to organic cultivation for a period of 10 years. The treatments included 0, 25, 50, 75, and 100% local-based liquid organic fertilizer. The optimal concentrations of LOF for enhancing the plant height, the fresh weight of unhusked ears, the length of unhusked ears, and the sweetness level were determined to be 57%, 68%, 72%, and 76%, respectively. Further investigation on the nutrient utilization efficiency of sweet corn within organic agricultural systems is required.

Keywords: Growth and Yield; Liquid Organic Fertilizer; Plant Based Fertilizer; Organic Vegetable.

Growing organic herbs to support local businesses and promote sustainability under the Plant Genetic Conservation project, Surat Thani, Thailand

Suriyawittayawate, C., Pongsuk, P. and Junlex, P.

¹Department of Agricultural Education, King Mongkut's Institute of Technology Ladkraband, Thailand

Corresponding Author Email: ppongsuk@gmail.com

The main focus of this study's goals was about cultivating organic herbs in order to support local businesses that are part of a project to conserve plant genetic diversity. The results found that 67.65% of members were continually growing organic herbs with 5 organic herb types and processing for local enterprises. All of them gain knowledge from the program in terms of planting, management, processing, and marketing. Most of them applied their own organic fertilizer for planting (87.50%). In term of herb types were followed by customers order and most of them increased their income. The social impacts found that community more improve co-operated together with a local organization to develop activities contributed to improving quality of life for the community members, health care, mental health, social and environmental relationships. Moreover, the members and community involvement approach of the related local organization was encouraged by promoting the awareness of the public, creating a cultural awareness in the community of using organic products for more sustainable living. Finally, the processing technique, production tools, standards and product quality certificate were the need and improve of the project.

Keywords: Growing organic herbs, local enterprises, sustainability

IL – 18

Microplastics: an evolving ecosphere for microbial life

Meganathan P. Ramakodi

CSIR-National Environmental Engineering Research Institute (NEERI), Hyderabad Zonal Centre, IICT Campus, Tarnaka, Hyderabad, Telangana- 500007, India.

E.mail: meganathan.pr@gmail.com; pr.meganathan@neeri.res.in, Phone: +91-40-27160441

ABSTRACT

Microplastics (MPs) are tiny plastic debris that have irregular shapes with sizes ranging from 1 µm to 5mm, and these particles are a potential threat to the environment and its associated ecosystem functions. Apart from the particles themselves, the chemical properties of MPs pose additional environmental issues. In general, the MPs are hydrophobic in nature. Hence, other organic pollutants settle on MPs and accumulate in the environment. Thus, MPs favour the accumulation and long-term persistence of pollutants in the environment. MPs also act as suitable substrates for organisms including microbes to colonize and form an ecosphere, which is referred to as plastisphere. The nature of MPs to support microbial growth poses a challenge to aquatic and human health. Several researchers showed that MPs could transport pathogens and antibiotic-resistant strains from one part of the geographic region to another. Thus, MPs are a serious concern from the perspective of the One Health concept. Due to the severe impacts of MPs on the environment and life forms, the plastisphere microbiome has been investigated. Analyses of the microbial community on MPs showed that the polymer types influence the MPs-associated microbiome structure. For instance, the analyses of microbial diversity associated with Polyethylene (PE) and Polystyrene (PS) in the marine sediment revealed distinct microbial structures in PE/ PS compared to the control samples. Further analyses revealed that environmental parameters are also associated with microbial diversity. Nonetheless, the role of the environment in shaping MPs-associated microbial structure is greater than that of polymer types. In summary, the plastisphere research supports that the MPs are an evolving ecosystem, and the environment plays an important role in defining microbial diversity. Especially, the interaction between the environment and polymer types makes the MPs an evolving ecosphere for microbial life.

IL – 19

Transformation of Waste to Wealth from Cow Dung

Mrs. Preetha Manikandhan

ISHTA – Panchagavya Products, Chennai, Tamil Nadu, India

Email: ishtapanchagavya@gmail.com

Ishta Panchagavya heralds a transformative era in sustainable agriculture, harnessing the wealth of cow dung and cow urine derived from indigenous cow breeds to create a trifecta of invaluable products: Panchagavyam, Jeevamrutham, and Amirtha Karaisal. Panchagavyam, a natural

fertilizer, is crafted from cow products, offering plants essential nutrients, improving soil health, enhancing disease resistance, and fortifying stress tolerance. This organic marvel also stimulates flowering and fruit setting, presenting a sustainable and eco-friendly option for plant nutrition. Furthermore, Ishta Panchagavya empowers non-milking cow breed farmers by exploring the potential of cow urine as an organic pest repellent. Traditionally recognized for medicinal purposes, cow urine, when combined with cow dung or plant-based ingredients, proves to be a cost-effective and efficient alternative to synthetic pesticides. Ongoing research seeks to maximize its efficacy against major crop pests, paving the way for an eco-friendly solution that not only safeguards crops but also promises a sustainable income source for farmers. In embracing Ishta Panchagavya, farmers find not only a path to healthier crops but also a transformative means to cultivate a sustainable and prosperous future.

IL 20

Marine Derived Chitin as a Promising Biostimulant for Sustainable Agriculture

Sugesh Kumar S¹ and G. Rajalakshmi*

¹M. Sc Marine Biotechnology, Academy of Maritime Education and Training (AMET) Deemed to be University, Kanathur, Chennai

*Professor, Department of Marine Biotechnology, Academy of Maritime Education and Training (AMET) Deemed to be University, Kanathur, Chennai

grajalakshmi@ametuniv.ac.in

As sustainable agriculture becomes more imperative, biocontrol using natural compounds such as chitin, a carbohydrate chain polymer, and its derivatives, is a promising strategy. Chitin and its derivatives induce or enhance natural defensive mechanisms in plants. They are recognized as plant growth regulators, growth stimulants, and elicitors for the production of secondary metabolites. They have beneficial effects as fertilizers, soil conditioning agents, plant disease control agents, antitranspirants, ripening retardants, and seed and fruit coatings. Chitinous materials (chitin and its derivatives) are obtained from renewable sources, mainly shellfish waste, having a great potential for the development of bioproducts as alternatives to synthetic agrochemicals. Recent studies have provided evidence that the use of these biopolymers can help control postharvest diseases, increase the content of nutrients available to plants, and elicit positive metabolic changes that lead to higher plant resistance against pathogens (Juan D. Giraldo et al., 2023). Hence, the present study was aimed to collect crustaceans from coastal region and chitin extraction. The extracted chitin is fortified with soil mixture as manure and subjected to detect the growth of plants such as okra and tomato. The formulation and application of Chitin manure to soil and Analysis of Plant Growth Parameters at different time intervals is recorded and the data interpretation carried out.

ORAL PRESENTATION

ABSTRACTS

Session 1

Agricultural Extension, Education and Development

The community strength of Ban Klum Suai, Phawa Subdistrict, Kaeng Hang Maeo District, Chanthaburi Province

Khermkhan, J., Thongkaew, E. and Chatanan, P.

¹Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Thailand.

Corresponding Email: ekkaphon.th@kmitl.ac.th

The assessment of community strengths in Ban Klum Suai revealed the following key dimensions: Economic Production and Consumption Indicators: The community demonstrated strength in basic production factors (86.2%) and activities promoting livelihoods aligned with community interests (65.5%). Economic Activities in the Community: The community established groups for income-generating activities (62.1%) and resource pooling and borrowing (65.5%). Allocation of Economic Resources: Community members had widespread access to production resources (68.9%) and managed resources to meet community needs (62.1%). Internal Relationships within Community Organizations: Community members actively participated in traditional activities (93.1%) and supported each other (82.7%). Social Network of Community Organizations: Continuous communication within the community (86.2%) and exchanges of learning and experiences with other communities (72.4%) were evident. Preservation and Transmission of Local Culture and Learning: Local traditions were preserved through regular activities (96.6%), and cultural activities contributed to community development (86.2%). Learning and Exchange in Cultural and Learning Dimensions: Community members played a role in conserving local traditions (72.4%). Management of Natural Resources: The community designated public spaces for conservation (75.9%). Therefore, community leaders or relevant organizations should encourage community participation to enhance strengths in various dimensions and promote the overall resilience of Ban Klum Suai in the future.

Keywords: Community strength, Kaeng Hang Maeo, Chanthaburi

Behaviors and opinions of marketing ingredients on garden soil purchase decisions of urban Thai Consumers

Poythaisong, P., Chatanan, P., and Khermkhan, J.

¹Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Thailand.

Corresponding Email: pirachaya.ch@kmitl.ac.th

The results of the study indicated the behavior of consumers regarding garden soil on Facebook. Most people who used garden soil had bought it before. These buyers included family members, the buyers themselves, and supervisors. The reasons for buying were to improve the soil, provide soil for crops, and speed up production. In a month, these consumers bought garden soil 2-3 times, once, and 4-5 times, respectively. They bought it from local stores, directly from manufacturers, and from plant stores, respectively. The budget for each purchase was around 101-300 baht, 301-500 baht, or less than 100 baht, respectively. Most consumers chose the 5 kg size. The decision-makers for these purchases were friends, the buyers themselves, and family members, respectively. the marketing mix, it was found that consumers focused more on

distribution channels, marketing promotions, price, and product features, respectively. When we look at the product side in more detail, consumers paid more attention to raw materials with nutrients suitable for plants, clear labels on soil components, and the amount of soil included, respectively. Regarding price, consumers cared more about a good price for the quality, a fair price for the quantity, and comparing prices with other brands before buying, respectively. Concerning distribution channels, consumers were more interested in having easy ways to buy, a variety of places to get the product, and clear signs indicating where it's sold respectively. In terms of marketing promotions, consumers put more importance on getting freebies when buying in larger quantities, having a delivery service, and receiving advice on how to use garden soil respectively.

Keywords: Behaviors, Opinions, Marketing Mix, Garden soil

Does off-farm work participation mitigate production risks? A case of rural rice farms in Chiang Rai Province, Thailand.

Suneeporn, S., Llonas, C. and Wongtragoon, U.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand; ²Rajamangala University of Technology Lanna, Sai Khao, Phan District
Corresponding Email: christopher.allones@gmail.com

Rural livelihoods are no longer confined solely to agriculture but rather a combination of off-farm and on-farm activities. However, this diversification can introduce potential tradeoffs, such as the balance between enhancing risk management and maintaining optimal production efficiency. Using cross-sectional farm production data from Chiang Rai province, Thailand, this study examines farmers engaged in off-farm work against those without off-farm work participation. Results from the production function with risk specification reveal that certain inputs, such as seeds and fertilizer, contribute to increased risk exposure for both farmer groups, irrespective of their off-farm engagement. Interestingly, while family labor heightens risk, the involvement of hired labor acts as a mitigating factor for farmers engaged in off-farm work. Moreover, market and environmental shocks emerge as risk-increasing factors for both cohorts, yet their impact is more pronounced among farmers participating in off-farm activities. The results underline the significance of considering the intricate interplay between mobility and livelihood diversity among rural populations. Addressing rural poverty necessitates government interventions that acknowledge the multifaceted nature of rural-urban lifestyles and the combination of agricultural and industrial employment.

Keywords: production, efficiency, risk, rural

Comparison of cost and return between double crop with one crop per year of Maize Community Enterprise in Hin Sorn Subdistrict, Saraburi Province

Khernkhan, J. and Polyorach, S.

¹Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Thailand.

Corresponding Email: jeeranan.kh@kmitl.ac.th

The Hin Son Sub-district Maize Community Enterprise employs two distinct planting systems. These systems encompass double cropping and single-crop cultivation per year. The findings indicate that for the single-crop approach, the average production cost amounts to 3,630 baht per rai, yielding returns of 7,400 baht per rai annually, resulting in a profit of 3,770 baht per rai per year. On the other hand, the double crop method incurs costs of 3,130 baht per rai, with a yield worth 19,240 baht per rai. Consequently, this approach generates profits of 12,980 baht per rai annually, or 6,490 baht per rai per crop for each cycle of planting.

Keywords: Double Crop, Maize, Cost and Return

Knowledge and Opinions towards fertilizer application technology based on soil analysis and soil nutrient management of durian farmers in Rayong province, Thailand

Phumthong, J., Suwanmaneepong, S., Khurnpoon, L. and Kerdsriserm, C.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok Thailand

Corresponding Email: ksuneeporn@gmail.com

This study aims to examine soil management knowledge and understand farmers' perspectives on adopting fertilizer application technology. Using a survey questionnaire, 92 durian farmers were interviewed in Rayong Province. Results of the descriptive analysis show that soil management knowledge indicated that farmers demonstrated a commendable grasp of the fundamental principles. Regarding the essential plant nutrients—Nitrogen, Phosphorus, and Potassium (NPK)— 98.91% of respondents provided accurate responses. Similarly, awareness regarding the significance of soil pH in plant growth was substantial, with 97.83% accuracy. However, the area where respondents displayed a lower level of perceived know-how is related to alkaline soil management, with only 28.26% answering correctly. Different cement types, such as lime, marl, and dolomite, were recommended as a response. Moreover, a thorough evaluation of fertilizer application technology based on soil analysis and nutrient management was conducted across eight key dimensions. The outcomes revealed that participants held particularly positive opinions in three prominent areas. Foremost, farmers exhibited a strong inclination (average score of 4.18) toward the sustained utilization of this technology. Subsequently, a notable belief emerged (average score of 4.12) regarding the potential cost-reducing effects attributed to its adoption. In addition, respondents perceived that implementing this technology correlated with greater yields, expressing an average sentiment score of 4.11.

Keywords: soil analysis, soil nutrient, durian farmer, fertilizer applicati

Guidelines for the College of Agriculture and Technology's Competency Development of Agricultural Vocation in the Twenty-first Century

Chen, D., Pongsuk, P. and Junlex, P.

¹Department of Agricultural Education, King Mongkut's Institute of Technology Ladkraband, Thailand.

Corresponding Email: di.ch@kmitl.ac.th

The study's findings showed that the emphasis in teaching and learning was on integration, systematic thinking, real-world connections, learning by doing, digital agriculture, internet marketing, business plan presentations, and agricultural goods for health. Overall, the teacher informants had strong judgments on the value of developing human capital's competencies for the agricultural profession of the twenty-first century ($\bar{x}=4.45$, S.D.=0.42). The teacher informants emphasized quality task control and development in terms of knowledge development ($\bar{x}=4.55$, S.D. =0.60). The development of farming expertise and experience was agreed upon ($\bar{x}=4.73$, S.D.=0.45, $\bar{x}=4.41$, S.D.=0.74). Additionally, they concurred that it should foster individual, organizational, and social responsibility ($\bar{x}=4.78$, S.D.=0.41, $\bar{x}=4.47$ S.D.=0.73).

Keywords: Competency of agricultural career, 21st century, agricultural career, guidelines on development

Assessment of farmers' acceptance, satisfaction, and utilization of mobile application for rice production cost and return in Chachoengsao Province, Thailand.

Kerdsriserm, C. Suwanmaneepong, S., and Llonas, C.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok Thailand

Corresponding Email: ksuneepon@gmail.com

Agricultural innovation requires easily accessible and accurate information for effective decision-making and practical farm application. This study aims to establish a comprehensive rice production cost and return database for farmers utilizing a mobile application. Second, to evaluate the acceptance and satisfaction levels regarding the cost and return mobile application. A total of 30 farmers of a community rice enterprise were interviewed who are actively engaged in the potential development and value chain enhancement of high-valued products in Chachoengsao Province, Thailand. Using descriptive analysis, the results reveal that the rice production database, accessible through the mobile application, incorporates critical variables encompassing plantation areas, variable and fixed costs, total costs, yields, selling prices, income, profitability or loss, and breakeven points. In the assessment of acceptance across three dimensions—content, technical and physical attributes, and perceived ease of use—farmers consistently demonstrated the highest level of acceptance for the mobile application. In terms of satisfaction assessment, encompassing design, content, performance, and utility, the findings uniformly indicate that farmers expressed substantial satisfaction with the rice production database accessible via the mobile application. Farmers' feedback underscores the application's user-friendliness and its potential for aiding production planning in subsequent seasons. Moreover, by facilitating the adoption of innovative platforms, policymakers can empower

farmers with tools that enhance productivity and induce satisfaction and confidence in modern agricultural practices.

Keywords: innovation, satisfaction, cost and return, rice

Comparison of cost and return of durian cultivation based on the orchard management techniques of farmers in Rayong Province, Thailand

Thongtem, K., Suwanmaneepong, S. and Kerdsriserm, C.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok Thailand.

Corresponding Email: ksuneeporn@gmail.com

This study aims to compare the costs and returns associated with durian cultivation using single and double orchard management techniques among farmers in Rayong province. Through in-depth interviews with community innovators, data was gathered and analyzed using the cost and return analysis and t-test for statistical comparison. The findings reveal that under total cost of 50,871.18 THB per rai, generating 2,000 kg. per rai and a net profit of 149,128.82 THB per rai incurs a higher single durian tree cultivation, the total cost per rai amounts to 42,719.50 Thai baht (THB), yielding 1,600.00 kg. per rai and a net profit of 149,280.50 THB per rai. In contrast, double durian orchard management. Notably, there is a statistically significant distinction between the fixed costs associated with durian cultivation at the 0.05 significance level in the two cases. However, regarding variable costs, total costs, total average yield, and net profit, the durian orchard management techniques in both scenarios do not demonstrate statistically significant differentiation. The implications arising from these findings hold significance for agricultural practitioners and policymakers, underlining the importance of tailored management strategies that account for the intricate interplay of costs, yields, and net profits. These insights provide valuable guidance for farm management decisions and policy considerations in developing better durian cultivation.

Keywords: cost and return, durian, farm management, orchard management techniques

Supply chain management efficiency for *Andrographis paniculata* (Burm. f.) Wall. ex Nees of Bandongbang community enterprises in Prachinburi province, Thailand.

Lertpairat, S., Suwanmaneepong, S. and Mankeb, P.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand.

Corresponding Email: ksuneeporn@gmail.com

This study investigates the supply chain management of *Andrographis paniculata* within the Bandongbang Organic Community Enterprise (BOCE) in Prachinburi province. Using the Supply Chain Operations Reference (SCOR) model as a conceptual framework, the study conducted in-depth interviews with key informants representing various supply chain stages, encompassing the upstream, midstream, and downstream segments. Key informants consist of seven individuals: representatives from the Bandongbang Organic Community Enterprise,

Chaopraya Abhayabhuesorn Hospital Foundation, and representatives from an agency supporting community enterprises. The study combines descriptive data analysis and content analysis. As primary producers in the upstream supply chain, results show that farmers engage in systematic cultivation and collaborative planning with the Chaopraya Abhayabhuesorn Hospital Foundation. A two-year MOU instills farmers' confidence in *Andrographis paniculata* cultivation. SCOR-based supply chain practices exhibit a moderate level of implementation, reflecting a balanced approach. In the midstream supply chain, production planning aligns production capacity with customer demand, ensuring the availability of quality inputs at fair prices. The midstream excels in product collection, on-time delivery, and structured damage control protocols. The Chaopraya Abhayabhuesorn Hospital Foundation plays a crucial role in the downstream supply chain. Their strategy balances production resources to meet market demand effectively. MOUs with various members, stringent quality checks, and defined return protocols ensure product quality. In conclusion, the study sheds light on effective supply chain practices and underscores the importance of stakeholder collaboration in optimizing *Andrographis paniculata* production and distribution. Relevant government agencies support in the SCOR-based supply chain management practices could help enhance the overall sustainability and efficiency of *Andrographis paniculata* among community enterprises.

Keywords: supply chain, community enterprise, production, efficiency

Cost-return and technical efficiency of rice production of Ban Nong Saeng rice mill community enterprise in Chachoengsao Province, Thailand

Kerdsriserm, C. and Suwanmaneepong, S.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand

Corresponding Email: ksuneeporn@gmail.com

This study aimed to achieve two primary research objectives: first, to analyze production cost and return, and second, to evaluate the technical efficiency of rice production within the context of community enterprises. A total of 46 members of the Ban Nong Saeng Rice Mill Community Enterprise in the Chachoengsao province of Thailand were interviewed in the study using a structured survey questionnaire. The data collected were analyzed using a cost-return analysis and a Cobb-Douglas production specification using Stochastic Frontier Analysis (SFA). The study's findings showed that for farmers to attain a break-even point, farmers need to consider strategies to augment yield by approximately 70 kilograms per rai. Evaluation of technical efficiency, the study revealed a varied range of production efficiency levels amongst farmers, spanning from 0.28 to 0.99, with an average of 0.32. These values indicate that farmers are only partially harnessing the potential of their production factors and have the opportunity to enhance their overall production efficiency. In conclusion, this study advances our understanding of rice production economics within the context of community enterprises. The insights gained from the analyses contribute to discussions surrounding optimal resource allocation, enhancing production efficiency, and identifying strategic interventions to improve rice cultivation's profitability and sustainability.

Keywords: cost-return, technical efficiency, rice, community enterprise

Community enterprise quality management of durian exports in Ban Khao Hin Thaen, Wang Chan District, Rayong Province, Thailand.

Charoenpituk, S., Suwanmaneepong, S. and Kerdsriserm, C.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand

Corresponding Author: Suwanmaneepong, Suneeporn; Email: suneeporn.su@kmitl.ac.th

This study examined the durian quality management of the Ban Khao Hin Thaen, Wang Chan District, and Rayong Province community enterprises. It aimed to evaluate knowledge of durian quality management for export, assess durian marketing management, and identify influencing factors. Data from 57 community enterprise member farmers were analyzed descriptively. Results showed that most farmers (40.40 %) were aged 51-60, and 43.90 % had 1-10 years of durian cultivation experience. Around 82.50 % of farmers received GAP standard certificates, indicating high compliance. Regarding knowledge of durian quality management aligned with GAP standards across eight factors, the study revealed the highest correct answer rates for managing the production process (88.89 %) and data recording (84.80 %). Other factors received correct answer scores ranging from 60.23 to 75.44 %. Regarding levels of operation in managing durian markets across the 8Ps framework to product, personnel, process, physical characteristics, efficiency, and quality is relatively high, with an average score ranging from 3.57 to 4.39. On the other hand, the factors related to price, distribution, and marketing promotion are relatively low, with an average score ranging from 2.87 to 3.39. Regarding factors relating to durian quality management for export, planning (94.04%), production operation (94.74 %), and resource management (90.35 %) were notable. In conclusion, this study offers insights into durian quality management, marketing, and key influencing factors in the studied community enterprise. These findings can guide strategies to improve durian cultivation and marketing, ensuring high-quality products that meet export standards. To enhance durian exports further, policymakers and practitioners should consider providing support and training in areas where farmers face challenges. This includes marketing promotion, price management, and distribution, identified as areas with lower operational levels.

Keywords: GAP, durian, quality management, knowledge

Comparison of cost and return for rubber farmers on innovations to increase latex production in Ban Khai District, Rayong Province, Thailand

Orsuwan, W. and Suwanmaneepong, S.

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok Thailand

Corresponding Email: ksuneepon@gmail.com

This study aims to compare the cost-return of growing rubber with and without using the innovation of increasing latex yield with ethylene gas. Data was collected using questionnaires from 25 rubber farmers in Ban Khai District, Rayong Province, consisting of 13 farmers who used ethylene gas and 12 who did not. Statistical data were analyzed using a t-test to calculate statistical differences. The study's findings revealed essential distinctions between the two groups. Rubber farmers who opted for ethylene gas incurred a total cost of 13,973.50 baht, comprising a total fixed cost of 1,202.02 baht and a total variable cost of 12,771.48 baht. These farmers achieved a total return of 17,955 baht per rai. On the other hand, rubber farmers who refrained from using ethylene gas reported different financial metrics. They accrued a total cost of 9,813.49 baht, consisting of a total fixed cost of 1,202.02 baht and a total variable cost of 8,611.48 baht. Their total return per rai amounted to 10,299.57 baht. Statistical analysis indicated that the total variable costs and returns for rubber cultivation significantly differed between the two methods at a significance level of .05. However, there was no statistically significant difference in total fixed costs. Extension services and training programs should be provided to educate farmers about the proper and safe use of ethylene gas to maximize its benefits and minimize potential risks. Furthermore, further research could explore the long-term sustainability and environmental impact of using ethylene gas in rubber cultivation, providing a more comprehensive understanding of its overall implications for the industry.

Keywords: rubber, innovation, latex, cost, return

Session 2:

Animal, Fisheries Sciences and Entomology (Marine biotechnology)

A Nonintrusive Beef Grading Evaluation Based on Marbling Fat Imaging by using K-Means Clustering Technique

Pilasombut, K.¹, Tavitchasri, P.², Manop, C.³ and Jirasuwankul, N.³

¹Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ²Department of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus, Chumphon, 86160, Thailand; ³Department of Electrical Engineering, School of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand.

Corresponding Email: komkhae.pi@kmitl.ac.th

An alternative technique of beef quality assessment and grading was proposed using image analysis based on the K-means clustering algorithm as a semi-automated and nonintrusive approach. An input image of the rib-eye meat area was converted into L*a*b* color space, followed by classifying groups of features over the spatial domain. By performing a search and cluster, iterating the features of the target image in a*b* axes resulted in several distinct image zones categorized by different K-groups of features. Marbling fat was estimated in conjunction with quality assessment as an arbitrary grading system. Experimental testing on both synthetic and real image data suggested accuracy better than 95% of averaged. Compared to conventional methods, this technique is nonintrusive, nondestructive, fast and economic for application and implementation as a measuring tool in the meat research industry.

Keywords: Nonintrusive, Beef Grading, Marbling Fat, Imaging, K-Means Clustering

Amla extract's impact on pre-weaning piglet diarrhea: An investigation into the therapeutic potential of Indian Gooseberry (*Phyllanthus emblica* L.)

Thammakarn, C.¹, Kaewhom, P.², Klompanya, A.¹ and Srikijkasemwat, K.¹

¹Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand.; ²Faculty of Agricultural Technology, Burapha University, Sakaeo Campus, Thailand.

Corresponding Email: kanokrat.sr@kmitl.ac.th

Assessing the efficacy of varying concentrations of Amla crude extract versus antibiotics for treating pre-weaning piglet diarrhea, with an emphasis on curtailing antimicrobial resistance, was the core objective of this investigation. A total of 150 female piglets, aged 7 days and weighing 2.10-2.20 kg, were allocated to five groups through randomization. Each group, featuring three replications of 10 piglets each, comprised an antibiotic control group receiving daily colistin doses, and four groups receiving Amla crude extract at concentrations of 0.67%, 0.5%, 0.33%, and 0.25% in normal saline. Administration of Amla crude extract, twice daily via syringe, commenced upon manifestation of diarrhea symptoms. Outcomes unveiled markedly accelerated diarrhea recovery among Amla crude extract-treated piglets compared to the antibiotic control group ($p < 0.05$). Particularly noteworthy was the 0.25% concentration group, showcasing the most rapid

recovery (4.80 ± 0.57 days) and the highest body weight gain (3240.00 ± 45.83 g/piglet) over a 15-day period, outperforming the control group (8.74 ± 2.50 days and 1953.33 ± 775.91 g/piglet, respectively). Significantly reduced treatment costs until recovery were evident in the 0.25% Amla crude extract group (0.039 USD per piglet) as opposed to the control group (0.052 USD per piglet). These findings underscore the potential efficacy and cost-efficiency of Amla crude extract, particularly at a 0.25% concentration, as an alternative approach for managing pre-weaning piglet diarrhea. Simultaneously, it addresses treatment expenses and the challenges of antimicrobial resistance.

Keywords: *Embllica officinalis*, diarrhea treatment, antimicrobial resistance, antibiotic, antimicrobial resistance risk reduction

Effect of Different Fermented Bag on Silage Quality for Livestock Feed

Chatchana, T.¹ and Nitthaisong, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: pattama.ni@kmitl.ac.th

The results of the study showed that corn silage packed in HDPE (high-density polyethylene) type 1 (control) bags and HDPE type 2, HDPE type 3, and HDPE type 4 Data collection at 30 and 60 days. After fermentation of HDPE type 1 (control), HDPE type 2, HDPE type 3, and HDPE type 4, it had very good physical properties such as aroma, fermented plant texture, color, and pH. The average scores for each sample were 24.25, 22.58, 23.75, and 23.41, respectively. The lactic acid content did not show statistically significant differences after being stored for 30 days. After stored for 60 days, the HDPE type 1 (control) bags had the lowest lactic acid content (4.78%). It was concluded that the use of a fermented bag of HDPE type 2, HDPE type 3, and HDPE type 4 was the most effective method for preserving corn silage for the longest period of 60 days while maintaining the highest physical qualities and lactic acid content.

Keywords: fermentation bag, corn silage, corn silage package, HDPE, High density polyethylene

Efficacy of mangosteen (*Garcinia mangostana*) peel hot water extract against *Aeromonas hydrophila* infection of seabass fingerling (*Lates calcarifer*)

Thiankham S.¹, Thonghuatoei, W.¹, Kantha, P.², Yomla, R.¹ and Kitikiew, S.¹

¹Department of Animal Production Technology and Fisheries, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand.;²Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok, 10900, Thailand.

Corresponding Email: suwaree.ki@kmitl.ac.th

The present study objective to use mangosteen (*Garcinia mangostana* Linn.) peel hot-water extract (MPE) to improve the antibacterial potential of seabass fingerling (*Lates calcarifer*) rearing in freshwater which infected by *Aeromonas hydrophila*. *In Vitro* study, Minimal Inhibitory Concentration (MIC) of MPE was 25 ppm and the Minimal Bactericidal Concentration (MBC) was 25 ppm. For *In Vivo*, fingerlings were immersed in different concentrations of MPE by 0 ppm (Control), 20 ppm, 40 ppm, and 60 ppm respectively for 7 days with *A. hydrophila* concentration

of 10^8 CFU mL⁻¹. The results showed that the group which received MPE were higher survival rate compare with control group. Hematological parameters revealed that the group that received MPE had significantly increased levels of red blood cells (RBC), white blood cells (WBC), and hemoglobin concentration (Hb) than control group. Moreover, the water quality parameters were not significantly different except ammonia concentration, at 60 ppm MPE concentration of ammonia was the lowest. All of the result can imply that the MPE was able to improve the antibacterial potential and culture potential for seabass fingerlings.

Keywords: mangosteen peel extract, *Aeromonas hydrophila*, antimicrobial, seabass

The effectiveness of star anise nanoemulsion and chemical insecticide for controlling of beet armyworm

Passara, H., Pumnuan, J. and Thipmanee, K.

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok, 10520, Thailand

Corresponding Email: HataichanokP12@gmail.com

The effectiveness of star anise (*Illicium verum*) nanoemulsion and deltamethrin (chemical insecticide) was tested with beet armyworm (*Spodoptera exigua*) to evaluate their mortality, antifeedant, and growth inhibition effects at proper concentrations. As a result, at the obtained highest effectiveness, star anise nanoemulsion required 0.35% concentration for the maximum effectiveness with 100% mortality, antifeedant and growth inhibition effects against beet armyworm, when compared with the control (Tween20 and water), while deltamethrin exhibited a lower rate. Therefore, star anise nanoemulsion seem to be utilized as a highly effective and environmentally friendly insecticide to control beet armyworm.

Keywords: mortality, antifeedant, growth inhibition, nanoemulsion, beet armyworm

Ruminal fermentation, microbial populations, and methane production affected by using Seaweed (*Ulva rigidain*) as a protein source in concentrate for ruminants

Prachom, N.¹, Wanapat, M.³, Cherdthong, A.³, Kang, S.⁴, Gunun, P.⁵, Gunun, N.⁶, Foirklang, S.⁷, Lukkananukool, A.², Chanthakhoun, V.⁸ and Polyorach, S.²

¹Department of Aquaculture, Faculty of Fisheries, Kasetsart University, 50 Ngamwongwan Rd., Chatuchak, Bangkok 10900, Thailand.; ²Tropical Feed Resources Research and Development Center (TROFREC), Department of Animal Science, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand.; ³Agricultural Unit, Department of Education, National Institute of Education, Phnom Penh, Cambodia.; ⁴Department of Animal Science, Faculty of Natural Resources, Rajamangala University of Technology Isan, Sakon Nakhon Campus, Phangkhon, Sakon Nakhon 47160, Thailand.; ⁵Department of Animal Science, Faculty of Technology, Udon Thani Rajabhat University, Udon Thani 41000, Thailand. ⁶Faculty of Animal Science and Technology, Maejo University, Chiang Mai 50290, Thailand.; ⁷Department of Animal Production Technology and Fisheries, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand.; ⁸Department of Animal Science, Faculty of Agriculture and Forest Resource, Souphanouvong University, Laos.

Corresponding Email: sineenart.po@kmitl.ac.th

This experiment was conducted in order to investigate the effect of using *Ulva rigidain* as a protein source in concentrate on Ruminal fermentation, microbial populations, and methane production. The experimental design was a completely randomized design (CRD) devised in order to study the result of using *U. rigida* as a protein source replacement for soybean meal in concentrate at 0, 33, 67, and 100%. The results proved that when increasing levels of *Ulva rigidain*, as a protein source in concentrate, TVFA and propionate (C3) molarity and bacteria/fungal zoospore populations were linearly increased, with the highest at 67% replacement soybean meal, whereas acetate (C2), methane (CH₄) production, and protozoal population were decreased ($p < 0.05$). In conclusion, *Ulva rigidain* can be used as a protein source in concentrate. However, the effect of using *Ulva rigidain* as a protein source on production performance still needs to be investigated.

Keywords: Seaweed, protein source, *Ulva rigida*, ruminal fermentation, rumen microbes, methane production, ruminants.

Chemometric approach to characterizing and comparing the quality of buffalo meat from Nakhon Phanom and Khammouane provinces

Phoemchalard, C.¹ and Tathong, T.²

¹Department of Agriculture, Mahidol University, Amnatcharoen Campus, Amnatcharoen 37000, Thailand; ²Department of Food Technology, Faculty of Agriculture and Technology, Nakhon Phanom University, Nakhon Phanom 48000, Thailand
Corresponding Email: chirasak.pho@mahidol.edu

The results indicated that a chemometric approach could effectively characterize differences in quality attributes between buffalo meat from Nakhon Phanom (NP) province, Thailand and Khammouane (KM) province, Laos. Neither the unsupervised principal component analysis (PCA) model nor the supervised partial least squares-discriminant analysis (PLS-DA) model completely separated the NP and KM groups. On the contrary, the sparse PLS-DA distinguished successfully between the meat samples originating from KM versus NP. Interestingly, orthogonal projections to latent structures discriminant analysis (OPLS-DA) exhibited superior discriminatory performance between regional meat samples. The robust OPLS-DA model used an orthogonal and a predictive factor, demonstrating a strong fit with $R^2X = 0.715$, $R^2Y = 0.877$ ($P < 0.001$), and $Q^2Y = 0.803$ ($P < 0.001$). Consequently, two critical variables were identified based on the selection criteria ($VIP > 2$, $P < 0.05$, $FDR < 0.05$) that could effectively distinguish between the NP and KM meats - meat odor from sensors 1 (AUC=0.936, 95% CI: 0.841-0.989) and 4 (AUC=0.948, 95% CI: 0.843-1.000). In conclusion, the chemometric analysis successfully discerned regional quality differences and identified key discriminatory variables.

Keywords: Buffalo, Meat quality, Odor, Chemometric, Sustainability

Coexistent infection event of porcine reproductive and respiratory syndrome virus, porcine circovirus type 2 and *Pasteurella multocida* in swine

Thammakarn, C.¹, Pham, H. S. H.², Kaewhom, P.³, Klompanya, A.⁴ and Srikijkasemwat, K.¹

¹Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand; ²Faculty of Animal Science and Veterinary medicine, Hue University of Agriculture and Forestry-Hue University, Thua Thien Hue 0234, Vietnam; ³Faculty of Agricultural Technology, Burapha University, Sakaeo Campus, Sa Kaeo 27160, Thailand; ⁴Public-Private Collaborative Research Center, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: chanathip.th@kmitl.ac.th

This report elucidates instances of concurrent infections by crucial pathogens in pigs, which have adversely impacted the herd's health status on a farm located in the Rachaburi province of Thailand. The farm, which accommodates a population of 700 sows, has seen its fattening pig units exhibit unsatisfactory growth performance and an inconsistent size appearance. The serum samples underwent testing via enzyme linked immunosorbent assay, unveiled a substantial antibody response to the porcine reproductive and respiratory syndrome virus (PRRSV). This finding strongly indicates the prevalence of PRRSV infection within the farm. Furthermore, analysis of lymph node samples confirmed the presence of porcine circovirus type 2 (PCV2) through conventional polymerase chain reaction. The bacterial culture carried out on lung samples detected an infection caused by *Pasteurella multocida*. In summary, the investigation conclusively established the occurrence of a mixed infection involving both viruses and bacteria on this farm, specifically PRRSV, PCV2, and *P. multocida*. This report underscores the significance of understanding the interplay of infections, which can potentially undermine the efficacy of vaccinations, ultimately influencing the health status and productivity of the farm.

Keywords: *Pasteurella multocida*, PCV2, Pig, PRRSV

Effects of partial substitution of feed with spent coffee grounds on growth performance and carcass quality in broilers

Klompanya A.¹, Mitchaothai, J.² and Thammakarn, C.¹

¹Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand; ²Office of Administrative Interdisciplinary Programs on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: chanathip.th@kmitl.ac.th

This experiment elucidates the effects of spent coffee grounds (SCG) as a partially substituted material in diets on the growth efficiency and carcass quality of broilers. The research involved a control group fed a basal diet (SCG-0), and two experimental groups: one with 5% SCG substitution (SCG-5), and another with 10% SCG substitution (SCG-10). Noteworthy findings

emerged from the study; the SCG-0 group exhibited a significantly higher average daily gain (ADG) of 88.62 g/day ($P<0.01$) compared to SCG-5 (80.82 g/day) and SCG-10 (66.84 g/day). The feed conversion ratio (FCR) also varied significantly ($P<0.01$) among the groups, with SCG-10 (2.05) displaying a less favorable FCR than SCG-0 (1.73) and SCG-5 (1.78). Carcass quality evaluation highlighted differences among the groups. The de-feathered weight was notably higher in both SCG-0 (2,565.67 g) and SCG-5 (2,570.70 g) compared to SCG-10 (2,290.27 g) ($P<0.01$). The addition of SCG to the feed had no effect on major muscles, such as breast and thigh muscle weight. SCG-5 and SCG-10 resulted in a significant increase in liver weight ($P<0.05$). However, only a high substitution rate of 10% SCG led to a significant decrease in abdominal fat ($P<0.0001$), which was comparable to the inclusion levels of 0% and 5% in the feed. In conclusion, incorporating 5% SCG into the feed had a marginal impact on production efficiency, while a 10% SCG substitution rate distinctly influenced both production efficiency and carcass quality.

Keywords: Broiler, Carcass, Coffee grounds, Feed, Growth performance

Consumer Satisfaction Analysis of Dried Mackerel (*Scomberomorus Commersoni*) in Bengkulu City, Indonesia

Cahyadinata, I., Pakpahan, L. and Irnad, I.

University of Bengkulu

Corresponding Email: cahyadinata@unib.ac.id

There are various kinds of fishery products that are processed and preserved into salted fish or dried fish, one of that is mackerel fish (*Scomberomorus commerson*). Processed mackerel products in the form of dried fish have a high enough demand that encourages the growth of mackerel drying business. Dried mackerel has a crunchy and savory taste, easy to obtain, thick flesh, available all year round and can be stored longer, thereby affecting consumer satisfaction. Consumer satisfaction is an expression of disappointment and happiness that a person feels after being impressed after consuming a product. This study aims to (1) examine the level of consumer satisfaction and (2) analyze the factors that influence the level of consumer satisfaction of dried mackerel in Bengkulu City. To achieve the research objectives, 96 consumers were selected as respondents who were selected using the purposive sampling method. Data analysis used the CSI (customer satisfaction index) method and structural equation modeling (SEM) analysis with partial least square (PLS). The CSI calculation result for dried mackerel fish products is 79.59%, which means that the level of consumer satisfaction is satisfied. The dry fish attributes that determine the level of satisfaction are the cleanliness, the taste, the smell or aroma, the accuracy of weighing and the cleanliness of the sales area. Factors that significantly affect consumer satisfaction of dried mackerel are product quality, price and place of sale.

Keywords:

Insecticidal efficiency of plant essential oil nanoemulsion formulas against *Spodoptera exigua*

Passara, H., Pumnuan, J. and Thipmanee, K.

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok, 10520, Thailand;
Corresponding Email: HataichanokP12@gmail.com

Essential oil nanoemulsion (nEOs) from *Illicium verum*, *Curcuma longa*, *Syzygium aromaticum* and their main chemical compounds were chosen for the test against *Spodoptera exigua* by assessing the mortality effect as well as, antifeedant and growth inhibition activities through leaf dipping method with the observation at 24 hours. The results showed that nEO formula of *I. verum* and *C. longa* would achieve its highest effectiveness. A concentration of 0.35 led to the highest mortality of 43.3%, the highest antifeedant of 100%, growth inhibition activities in the pupae of 85.0%, and a concentration of 0.25% led to growth inhibition activities in the adults of 100%. Therefore, nEO formulas of *I. verum* and *C. longa* are promising for the development of botanical insecticide to control *S. exigua* in the future.

Keywords: antifeedant, growth inhibition, mortality, nanoemulsion, *Spodoptera exigua*

Effectiveness of Kratom (*Mitragyna speciosa* Korth) Leaf Extracts against Adult of Sweet Potato Weevil (*Cylas formicarius* Fabricius) in Laboratory Conditions

Ruddit, A., Pumnuan, J., Lakyat, A., Doungnapa, T. and Thipmanee, K.

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.
Corresponding E-mail: jarongsak.pu@kmitl.ac.th

The sweet potato weevil (*Cylas formicarius* Fabricius) is one of the most destructive pests of sweet potato in Thailand. Normally, the farmers apply chemical insecticides to control this insect. Clearly evident it is resulting in deteriorating human health, insecticide resistance of insect pests, as well as pesticide residues in agricultural produce and environment. Using the green insecticides is interestingly alternative, especially the leaf crude extracts of Kratom (*Mitragyna speciosa* Korth). The objective of this study was to determine the insecticidal properties of Kratom leaf extracts against adult of sweet potato weevil in laboratory conditions. The insecticidal properties, killing and repellency activities on the insect were evaluated by filter residue contact method with various concentrations of ethanol, acetone, and hexane leaf extracts of Kratom. In addition, inhibited oviposition of this weevil was observed on sweet potato tuber by dipping method. The result of this study showed that the hexanolic leaf extract of Kratom presented rather high effect to this weevil with >70% mortality at 24 h after treatment. Besides, Kratom leaf extracted by using ethanol and acetone showed lower effect against this weevil. The hexanolic extract presented extreme toxicity to weevil with LC₅₀ values of 3.50, 2.88 and 2.27% at 24, 48 and 72 h after treatment, respectively. This extract at 4% concentration exhibited repellency effect with > 77% significant difference compared with the control group. In addition, this extract showed high efficiency on oviposition inhibition for weevil (>89%) at 5% concentration, significantly different compared with the control group.

Keywords: insecticidal properties, inhibited oviposition, repellency effect, crude extracts

Acaricidal Activities of Essential Oil Emulsions in Controlling Different Mite Pests

Doungnapa, T., Pumnuan, J., Lakyat, A. and Thipmanee, K.

School of Agricultural Technology, King Mongkut's Institute of Technology Lakrabang, Bangkok 10520, Thailand.

Corresponding E-mail: jarongsak.pu@kmitl.ac.th

The African red mite (*Eutetranychus africanus* (Tucker)) is relatively the most important mite pest. Whereas, other mite pests as orchid flat mite (*Tenuipalpus pacificus*) and the broad mite (*Polyphagotarsonemus latus* (Banks)) are resemble importance that caused great damage to crops. Farmers often use chemicals to control insect or mite pests. But the use of chemicals directly affects the farmers, consumers and the environment. Therefore, the search for displacement the use of synthetic chemicals by other control methods is increasing nowadays, especially application of natural products. The study aimed to verify the toxicity property of essential oil emulsions from citronella grass (*Cymbopogon nardus* Rendle), lemon grass (*Cymbopogon citratus* (Dc.exNees)), clove (*Syzygium aromaticum* (L.) Merr.&L.M.Perry) and cinnamon (*Cinnamomum bejolghohta* (Buch-Ham.)Sweet) against the African red mite, the orchid flat mite and the broad mite. The essential oil emulsions were prepared by using distilled water and different surfactants. Where the essential oil particles were measured by using Nano plus Zeta / Nano Particle Analyzer. The acaricidal property against the African red mite was evaluated by leaf dipping method with various concentrations of essential oil emulsions in laboratory. In addition, the most effective essential oil emulsions then were tested to the African red mite, the orchid flat mite and the broad mite by direct spray method under greenhouse or field conditions. The result revealed the citronella grass emulsions had a highly toxic effect to the African red mite that showed LC₅₀ and LC₉₀ with 0.146 and 0.303%, respectively. While citronella grass emulsion at concentration 0.4% was able to control those 3 mite pest species in greenhouse or field conditions, when it presented the mite mortality with >80% compared with control group.

Keywords: essential oil emulsion, African red mite, orchid flat mite, broad mite, toxicity

Session 3:

Biological Diversity and Microbiology

 β -Glucan production of *Saccharomyces cerevisiae* by using mango-fermented wastewater

Mongkontanawat, N.¹, Phuangborisut, S.¹, Boonna, S.¹ and Nitteranon, V.²

¹Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi Campus, Chanthaburi, Thailand 22210.;²Department of Food Technology, Faculty of Science and Technology, Rajamangala University of Technology Tawan-Ok, Chonburi, Thailand 10210.

Corresponding Email: naruemon_mo@rmutto.ac.th

Three types of fermented mango wastewater, including salted fermented, sweet fermented, and dried pickled, were used in this study. The result revealed that salted-fermented showed significantly the highest lightness (L*), while greenness (a*) and yellowness (b*) were found in sweet fermented. For chemical properties, all fermented wastewater showed acidity properties and significantly highest total soluble solids found in sweet-fermented. For microbiological properties, significantly the highest was exhibited in salted fermented. For the optimum condition formula for the growth of *Saccharomyces cerevisiae* and β -glucan production, the ratio of wastewater to distilled water 1:4 showed the highest yield and β -glucan production. Then, this condition was selected to study the optimum time on yield and β -glucan production. Results exhibited that the significantly highest yield was in sweet fermented for yeast cultivation at 72 h. The significantly highest β -glucan production was also found in sweet fermented for yeast cultivation at 24 h. Overall, the obtained results implied that the wastewater from fermented mango could be used as the media for yeast cultivation and recycling of agro-industrial wastewater.

Keywords: *Saccharomyces cerevisiae*, fermented mango wastewater, polysaccharide, β -glucan.

***Streptomyces corchorusii* L72 as a potential biocontrol agent against soil born fungi *Sclerotium rolfsii* causing stem rot on peanut**

Nguyen¹, H. T., Dang, T. T. T.¹, Ta, T. H.¹, Tran, D. T.¹, Pham, H. H.² and Nguyen, C. X.¹

¹Faculty of Biotechnology, Vietnam National University of Agriculture, Hanoi, Vietnam.;
²Department of Science and International Cooperation, Vietnam Academy of Agricultural Sciences, Hanoi, Vietnam.

Corresponding Email: nxcanh@vnu.edu.vn

Streptomyces is a unique genus with a diverse natural source of antibiotics and active secondary compounds. From 37 actinomycetes isolates, isolate L72 was selected because of its highest ability to inhibit *Sclerotium rolfsii* (63.59% inhibition). The antagonistic activity and growth-promoting properties of strain L72 were investigated. This isolate was identified as *Streptomyces corchorusii* L72 based on morphological and physiological properties and analysis of the 16S rRNA gene sequence. Culture filtrate of strain L72 exhibited antagonism activities on mycelial growth and sclerotial germination rates of *S. rolfsii* at various diluted concentrations. Interestingly, sclerotial germination of *S. rolfsii* was inhibited on the medium with only 2% (50X dilution) of L72's culture filtrate. Biochemical assays revealed that strain L72 produced indole acetic acid, siderophore, and chitinase. The strain also exhibited the ability to solubilize phosphate. Moreover,

cell-free culture of this strain promoted peanut fresh weight, root length, and seedling vigor. The data from the pot assay showed that the treatment with *Streptomyces corhorsii* L72 reduced disease incidences when compared with the inoculated control. In conclusion, our results indicated that *Streptomyces corhorsii* L72 was a promising biocontrol agent for controlling stem rot disease.

Keywords: Antifungal activity, peanut, sclerotial germination, white stem rot.

Antagonistic effect of Actinomycete CNXK2 against *Pilidium concavum* SFF1 causing strawberry fruit rot

Pham, T-V.¹, Hua, M. T. H.¹, Nguyen, T. K.¹, Hua, T. C.², Nguyen, N. A.¹ and Nguyen, H. T. D.¹

¹Institute of Biotechnology and Food-technology, Industrial University of Ho Chi Minh City, Vietnam.; ²Department of Biology and Biotechnology, University of Science, Vietnam National University HCMC, Vietnam.

Corresponding Email: phamtanviet@iuh.edu.vn

In this study, the phytopathogenic mold SFF1 was successfully isolated from rotten strawberry fruits in Da Lat city, Lam Dong province, Vietnam, and was proved to be the responsible pathogen. Sequence analysis of the ITS region indicated that this fungus belongs to the *Pilidium* genus and was 99% identical to *Pilidium concavum*. In screening test for antifungal effect against *Pilidium concavum* SFF1, the actinomycetes strain CNXK2 showed the highest activity with 36.8% inhibition of fungal mycelial growth. Based on macroscopic, microscopic characteristics, and 16S rRNA sequence, the actinomycetes strain CNXK2 was found to be 99.44% identical to *Streptomyces vinaceusdrappus*. The strain *Streptomyces* sp. CNXK2 possessed the ability to biosynthesize hydrolytic enzymes related to fungal cell-wall degradation such as chitinases, proteases. Culture supernatant of *Streptomyces* sp. CNXK2 was found to cause irregularities in the fungal mycelia such as swelling and breaking. The culture supernatant also displayed antifungal activity up to 66.34-96.15% at high temperature ranging from 50 to 80°C and over 80% in wide range of pH 6.0-10.0. In situ tests on young strawberry fruits showed effective control of *Streptomyces* sp. CNXK2 against fruit rot caused by *P. concavum* SFF1. The achieved results will contribute to the demonstration of biological control of *Streptomyces* sp. CNXK2 and provide the basis for application of this actinomycetes strain in the development of sustainable agriculture.

Keywords:

Effects of *Bacillus* probiotics, *Bacillus subtilis* and *B. cereus* dietary additional to controlling Vibriosis infection of white shrimp (*Litopenaeus vannamei*)

Wongpracha, P., Kanthawong, P., Jongput, B., Srijad, S. and Kitikiew, S.

¹Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

Corresponding Email: suwaree.ki@kmitl.ac.th

The objective of this study was evaluating the efficacy of the *Bacillus* probiotics powder, *Bacillus subtilis* 7×10^6 cfu g⁻¹ and *B. cereus* 2.5×10^7 cfu g⁻¹ via dietary additional. To controlling

vibriosis disease white shrimp culture. This study conducted experiments for fifteen days and consisted of four treatment groups, without use of probiotic and without pathogen control (C), with probiotic and without pathogen (T1), without probiotic and with pathogen, *Vibrio* spp. (T2) with probiotic and with pathogen, *Vibrio* spp. (T3). The water quality, survival rate, hemocytes count, and clearance efficiency of white shrimp were evaluated after administration. The results of the experiment indicate that shrimp incorporating probiotic (T3) was recovered and gradually reduced mortality. There were no significant difference shrimps fed with the probiotic. An additional presented lower counts of *Vibrio* spp. than group fed without the probiotic causing a significant reduction of pathogens. Therefore, administration of *B. subtilis* and *B. cereus* has considerably improved the recovery of the shrimps with *Vibrio* spp. infection and improve culture quality.

Keywords: *Bacillus subtilis*, *Bacillus cereus*, *Vibrio* spp., White Shrimp

Antimicrobial Potential of Gaseous Ozone against *Salmonella* Typhimurium and *Escherichia coli* O157:H7 Contaminated on Bird eye Chili (*Capsicum frutescens* L.)

Phakawan J¹. and Tepsorn R.^{2,3}

¹Division of Food Science and Technology Management, Faculty of Science and Technology, Rajamangala University of Technology Thanyaburi, Pathum Thani 12110, Thailand

²Department of Food Science and Technology, Thammasat University, Pathum Thani, Thailand.

³Thammasat University Center of Excellence in Food Science and Innovation, Pathum Thani, Thailand.

Corresponding Email: rtepsorn@tu.ac.th

Bird Eye chili (*Capsicum frutescens* L.) is a plant that can be contaminated with pathogenic microorganisms which causes food poisoning and possibly death. In currently, there are many ways to decontaminated by using various technologies include ozone gas fumigation. Ozone is a strong oxidizing gas thus making it more effective in decontaminated microorganisms. This study aims to evaluate the optimum conditions of using ozone gas to decontaminated *S. Typhimurium* and *E. coli* O157:H7 on Bird Eye chili and to study the physical change of those after ozone gas fumigation. In study of the optimum conditions of using ozone gas to decontaminated *S. Typhimurium* and *E. coli* O157:H7 on microbiological agar (Tryptic Soy agar) presented at 5 °C after ozone gas fumigation inhibited *S. Typhimurium* and *E. coli* O157:H7 ca. 4.0 Log₁₀ reductions within 15 and 30 min respectively. In study of time-kill curve assay affected the reduction of *S. Typhimurium* and *E. coli* O157:H7. The result indicated that at 5 °C after ozone gas fumigation inhibited *S. Typhimurium* and *E. coli* O157:H7 ca. 3.0 Log₁₀ reductions within 2 and 4 min respectively. The efficiency of ozone gas affected the reduction of *S. Typhimurium* and *E. coli* O157:H7 contaminated on Bird Eye chili in both ca. 6.0 Log₁₀ reductions and ca. 3.0 Log₁₀ reductions was observed within 10, 15 and 20 min at 5, 27 and 55°C after ozone gas fumigation respectively and the study of physical changes of Bird Eye chili after ozone gas fumigation was observed that L*, a* and b* increased slightly when the fumigation time increased and temperature decreased and the most color difference was found at 5 °C.

Keywords: Ozone, Vapour, *Salmonella* Thyphimurium, *Escherichia coli* O157:H7, Bird eye Chili

Microbial community structure associated with microplastics and bioplastics in coastal marine sediments

Palanivishwanath Saravanan¹, Meganathan P. Ramakodi^{1*}

¹ CSIR-National Environmental Engineering Research Institute (NEERI), Hyderabad Zonal Centre, IICT Campus, Tarnaka, Hyderabad, Telangana- 500007

*Correspondence: Meganathan P. Ramakodi, Senior Scientist, CSIR-NEERI, Hyderabad Zonal Centre, IICT Campus, Tarnaka, Hyderabad, Telangana- 500007.
E.mail: pr.meganathan@neeri.res.in; meganathan.pr@gmail.com

Plastics threaten the life on earth. Plastics are broken down into microplastics and further enhances the problem. Bioplastics, which are biodegradable, were introduced as an alternative to synthetic polymers. However, the rate of biodegradation of bioplastics is slower in their in-situ environment. In addition, the bioplastics also end up in marine environment and cause severe problems. Thus, it is important to study the microbial composition on bioplastics as compared to microplastics. This study attempted to analyze microbial composition of a microplastic material Polyethylene terephthalate (PET) and a bioplastic material Polyhydroxyalkonate (PHA) using publically available metagenomic data. The phyla level analysis showed PET contains Actinobacteria, Bacteroidetes, Cyanobacteria, Planctomycetes and Proteobacteria whereas PHA and ceramic samples were colonized by Actinobacteria, Bacteroidetes, Firmicutes, Planctomycetes, Proteobacteria. The control samples have Actinobacteria, Bacteroidetes, Cyanobacteria, Planctomycetes and Proteobacteria. The species such as *Chromatiaceae* bacterium *2141T.STBD.0c.01a.*, Endosymbiont of unidentified scaly snail isolate Monju, *Halioglobus pacificus*, *Thioflavococcus mobilis*, *Woeseia oceani* were found to be unique in PET. In comparison, PHA samples had *Desulfatibacillum aliphaticivorans*, *Desulfobacula toluolica*, *Desulfocapsa sulfexigens*, *Desulfococcus oleovorans*, *Desulfotalea psychrophila* as unique species. Thus, this study conclude that the microbial community structure is different between PET and PHA. Further exploration of PHA-associated microbes could help us in identifying novel/potential microbes for bioplastics management.

Isolation and identification of endophytic fungi from *Avicennia officinalis* collected from mangrove forest of pitchavaram

G.Dharshan Priya^{*1}, T K .Alna^{*1}and D. Arvind Prasanth^{*2}

1. Research Scholar, Medical Microbiology Laboratory, Department of Microbiology, Periyar University, Salem.

2. Associate Professor, Medical Microbiology Laboratory, Department of Microbiology, Periyar University, Salem.

Corresponding Author: Email: prasanthviji@gmail.com

In the current scenario the world is being challenged by newly emerging infectious disease due to rehabilitated environment and change in life style. Hence several researchers are working on understanding the nature of these infections and devising various methods to cure these

diseases by natural and chemical formulations. Mangrove forests are among the world's most exclusive ecosystems of the world with plants with such highly developed morphological, biological, ecological and physiological adaptation to extreme conditions. These plants are being exploited for novel bioactive compounds that can be a wonder drug for the treatment of these emerging diseases. In this study an attempt has been made to isolate and identify the endophytic fungi from *Avicennia officinalis* of Mangrove Forest of Pitchavaram. The leaf, stem and root portions of the plant were surface sterilised and placed on to the Sabouraud Dextrose agar (SDA) and incubated at 28-30°C. A total of 14 endophytic fungi were isolated from the leaf, stem and root portions of the plant. Most of the fungi were slow growers and their sporulation efficiency was low. Among 14 endophytic fungi 7 endophytic fungi isolated were subjected to preliminary screening for selection of potential endophytic fungal strain producing bioactive compounds. *Mycelia sterilia* (Strain AOSL1) showed significant activity against *Staphylococcus aureus* (ATCC-25923), *Escherichia coli* (ATCC – 25922) and *Pseudomonas aeruginosa* by producing larger zones and was selected for the further study. This strain was confirmed as *Pseudopestalotiopsis avicenniae* (Strain AOSL1) by the molecular identification. This endophytic strain was subjected to extraction of bioactive compounds by fermentation. The ethyl acetate fractionation of the *Pseudopestalotiopsis avicenniae* did not show any appreciable activity against the test strains tested at different concentrations (20 µl, 40 µl and 60 µl) indicating that higher concentrations of the fungal extracts need to be checked for activity. As the medicinal metabolites from the diverse endophytes are explored and exploited there will be no need for the destruction of medicinal plants which comprises a blustering part of global ecology.

Keywords: *Avicennia officinalis*, Bioactive compounds, Mangrove plant, Antimicrobial activity.

Multidrug resistant bacterial pathogens in mastitis milk

Dr.C.Mabel Joshaline¹, P.Muthiahmuralitharan², Peter Delaxan³

1. Assistant Professor, Department of Rural Development Science, Arul Anandar College, Madurai.

2. Student, Department of Rural Development Science, Arul Anandar College, Madurai.

This study revealed a significant antibiotic resistant profile of six different bacterial mastitis pathogen which were isolated from mastitis milk and characterised through routine morphological and biochemical tests followed by confirmatory tests. Genus level identification of these bacteria revealed then as *Staphylococcus sp*, *Streptococcus sp*, *E.coli*, *Proteus sp*, *Pseudomonas sp* and *Bacillus sp*. The antibiogram of these six bacterial species reveal that they are susceptible to nearly 60% of the antibiotics used. All the six bacterial pathogens revealed complete resistance to 20-30 % of the antibiotics. The minimum inhibitory concentration values of the antibiotics revealed that 300-400mg of the antibiotics showed similar effects. Ciprofloxacin was the most effective antibiotic against all six pathogens. The effect of antibiotics at 100mg concentration is very minimal. MAR index of all the six mastitis bacteria revealed a significant pattern of antibiotic resistance pattern. MAR index was 0.33 for *Staphylococcus sp* and 0.17 for *Bacillus sp*. Effective mastitis control programs rely more on prevention rather than treatment. Careful use of antibiotics can avoid the increase and dissemination in antimicrobial resistance arising from the use of antimicrobial drugs in animals. Appearance of resistance against a particular antibiotic in a specific region may be due to its frequent and long-term use. Therefore, searching for new therapeutic alternatives is necessary. A wide variety of natural

products derived from plants, animals, and bacteria were investigated and reported to have potential in controlling bovine mastitis. Field studies should be considered to reassure the outcome of the alternative therapies before commercial applications

Keywords: Mastitis milk-Antibacterial resistance-Multidrug resistance-MAR Index

Post covid19 impact on bacterial diversity of pulmonary infections

R. Sri Rajalakshmi¹, K. Panneer Selvam R. Vijayakumar², A. Malarvizhi. Mabel Joshaline S.

PG & Research Department of Microbiology, M.R Government Arts College, Mannargudi- 614001, Tamil Nadu, India.

²Department of Microbiology, Bharathidasan University, Tiruchirappalli - 620024, TamilNadu, India.

PG & Research Department of Biochemistry, D.G. Government Arts College for Women,³ Mayiladuthurai-609001, Tamil Nadu, India

⁴ Assistant Professor, Department of Rural Development Science, Arul Anandar College, Karumahur, Madurai.

Corresponding author: sri.microbiologist@yahoo.com

The present study has revealed the diversity of bacterial pathogens from post Covid 19 recovered cases of pulmonary infected patients during the study period Of July'22 –December'23 and the pathogens were identified, isolated and characterized by standard microbiological procedures. During the period of 6 months, total number of specimens collected is 66 especially from Covid19 recovered cases and the specimens were collected from the districts of Madurai, Dindigul and Sivagangai. Among 66 cases, 27% (18/66) was recorded during the month of September 2022 and 0.3% (2/66) was recorded in the month of December 2022. According to age wise distribution,(27.2%) 18 /66 most number of pulmonary infected cases were from the age group of 51-60 and least number of cases from the age group of 1-10 years old. Based on sex wise distribution, female were observed to be highly infected 54% (36/66). Based on District wise distribution, among 66 cases, 77.2% (51/66) was higher from the Madurai district and least from Sivagangai. Based on Bacterial diversity of pulmonary infected cases, higher number isolates were Klebsiella pneumoniae 22.7% (15/66) next to Klebsiella pneumoniae, 19.6% (13/66) were Enterobacter species. 16.6 % (11/66) was Escherichia coli, 13.6%(9/66) was Pseudomonas aeruginosa 12.1%(8/66) was Proteus mirabilis, 12.2%(8/66) was Staphylococcus aureus .

In-silico Studies on Anti-Tuberculosis Potential of Bioactive Compounds in Karpoora Valli: Targeting *Mycobacterium tuberculosis* Cell Wall and Protein Synthesis

Shyla Nancy J¹, Arun P¹, Roopini KS², Ilhan Shamir Ali M², Daniel Alex Anand¹, Prakash P², Sam Ebenzer Rajadas³ and Krupakar Parthasarathy^{3*}

¹Department of Bioinformatics And Data Science, Sathyabama Institute for Science and Technology

²Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama Institute for Science and Technology

³Centre for Drug Discovery and Development, Sathyabama Institute for Science and Technology
*Corresponding Author Mail ID: pkrupakar.cddd@sathyabama.ac.in

Tuberculosis (TB) is a major disease of concern across the globe due to its endogenous nature and alarming increase in drug resistance. Unlike many bacterial diseases, TB treatment requires multiple drugs that increase the pill load to the patients. The pill load increases further in the case of drug-resistant TB. Hence, there is a continuous demand for novel anti-TB drugs among the scientific community. This *in-silico* study is an attempt to fetch out active anti-TB biomolecules from *Coleus amboinicus* commonly called Indian mint. These biomolecules were docked using AutoDock Vina against various targets present in *Mycobacterium tuberculosis* (Mtb) and screened for pharmacokinetics and drug-likeness using Swiss ADME and Osiris tools, respectively. Out of many molecules tested, two molecules namely Curan-17-oic acid, 19,20-dihydroxy-methyl ester, and 9-octadecenoic acid were found to strongly interact with UDP galactopyranose mutase of Mtb. UDP galactopyranose mutase is a vital component in the Mtb cell wall synthesis. Similarly, Cyclo dodecane carboxylic acid, 2-oxo-, methyl ester & 9,12,15-octadecatrienoic acid, methyl ester interacted with the target Cyclopropane Mycolic acid synthase-1 leading to interruption in the protein synthesis. These molecules exhibited significant drug-likeness properties while being non-toxic. Hence, these four biomolecules could be considered as potential therapeutic anti-TB agents with further studies using *in-vitro* methods and *in-vivo* models.

Keywords: Tuberculosis, Indian Mint, Drug targets, Cell wall, Protein synthesis

Invitro Cytotoxicity, Metabolites Profiling and Insilico Studies on Dengue Envelope and Capsid Protein Inhibition by Nilavembu Kudineer components - Zingiber officinale, Vettiveria zizanioides and Piper nigrum.

Lavanya D¹, Krupakar Parthasarathy^{1*}, Haritha S¹, Radhakrishnan Manikkam¹,

Vignesh Sounderrajan¹, Inbanathan A¹, Hemamalani AU¹

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

* Corresponding Author Mail ID: pkrupakar.cddd@sathyabama.ac.in

Nilavembu kudineer, a siddha poly-herbal formulation, widely used for the treatment of dengue viral fever in the state of Tamil Nadu, India. It is very effective and found to provide protection against dengue virus invitro. However, studies on phytochemical constituents of Nilavembu kudineer are limited. Hence the present study is attempted to determine the phytocompounds present in the major three components of Nilavembu kudineer such as Zingiber officinale, Vettiveria zizanioides and Piper nigrum and to evaluate their potential inhibition of dengue envelope and capsid protein by *in-silico* analysis. The ethanolic and aqueous extract of the Z. officinale, V. zizanioides and P. nigrum were studied, off these ethanolic extracts showed less toxicity in Vero cell line and higher inhibition of Dengue virus at lower concentration in *in-vitro* study. GC-MS analysis revealed the presence of forty four, fourteen and eight phytocompounds in ethanolic extract of Z. officinale, V. zizanioides and P. nigrum, respectively. Based on Lipinski rule, 16 out of 66 compounds were selected as less toxic and best fit compounds. The selected 16 compounds were docked with capsid and envelope proteins of dengue virus and results were interpreted based on docking score. Based on this analysis and leveraging their properties, the

selected 16 compounds can be explored for the therapeutic molecules against dengue infections through *in vitro* and *in vivo* studies.

Keywords: Nilavembu kudineer, Dengue, *Zingiber officinale*, *Vetiveria zizanioides*, *Piper nigrum*.

Computational Structural And Compositional Analysis of SARS CoV-2 Omicron Variant Envelope Protein For Its Stability And Transmissibility Characteristics

Prisho Mariam Paul^{1,2}, Krupakar Parthasarathy^{1*}, Sudhanarayani S Rao¹, Thangam T¹, Vignesh Sounderrajan¹, Sakthivel Jayaraj¹ and Sam Ebenezer Rajadas¹

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

²Biotechnology Department, CMS College Kottayam, 686001

*Corresponding Author Mail ID: pkrupakar.cddd@sathyabama.ac.in

Continued viral infections pose substantial challenges to global public health, underscoring the need for a thorough comprehension of viral proteins to develop effective therapeutic approaches. Examining viral proteins provides valuable insights crucial for advancing therapeutic drugs and vaccines. This study delves into the sequence and structure of envelope proteins in both the Omicron variant and the SARS-CoV-2 variants, aiming to unveil insights into their stability and transmission rates. Hydrophobicity calculations were conducted using the Kyte–Doolittle hydrophobicity method, while amino acid compositions were determined via the ProtParam server. The DisEMBL server identified intrinsically disordered regions, and the CFSSP server analyzed secondary structures. Intra-protein interactions were revealed through the Arpeggio server. This investigation highlights the impact of mutations on proteins and their significance in evolution, offering a pathway to a deeper understanding of variations and diversification in SARS-CoV-2. These findings contribute to future therapeutic studies, facilitating the design of therapeutic agents with a focus on highly variable regions.

Keywords: SARS-CoV-2, Envelope Proteins, Transmissibility, *Insilico* Studies

Session 4:

Food Security, Food Safety, Science and Postharvest Technology

Nutritional evaluation of banana inflorescence and development of food products

Soans, J.C.¹, Pavithra, M.² and Sridhar, K.R.²

¹Department of Food Science, St. Aloysius Autonomous College, Mangalore, Karnataka, India;

²Department of Biosciences, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India
Corresponding Email: kandikeremanasa@gmail.com

Bananas, being versatile herbaceous plants, are valuable for their fruit, fruit peel, inflorescence, pseudostem and fibre, which are nutritionally, medicinally and industrially valuable. This study ventures to report nutritional, functional and food products (pickles and cookies) using the inflorescence of a native variety of bananas in southwest India. Uncooked and cooked inflorescence flours did not show notable changes in moisture or total lipid contents. Protein, crude fibre and ash contents were significantly higher in uncooked compared to cooked flours, whereas the opposite was true for carbohydrates and calorific value. Cooked flours had significantly higher bulk density, swelling power, percent solubility, and water-absorption capacity, whereas uncooked flours had significantly lower gelation concentration, emulsion activity and foam properties. Oil-absorption capacity and emulsion stability did not show any difference between uncooked and cooked flours. Pickles (uncooked and cooked chops) and cookies (uncooked and cooked flours) offered good sensory scores, indicating their acceptability as food products. This study suggests that the inflorescence of bananas could be a valuable source of dietary supplements and food products owing to its superior nutritional properties, functional attributes and sensory values.

Keywords: Cookies, Functional profile, Pickles, Proximal qualities, Sensory evaluation

Multivariable analysis of physicochemical and functional characterization of four Thai pigmented rice varieties

Tai, V. N.¹, Kunyane, K.¹ and Luangsakul, N.¹

¹School of Food Industry, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: naphatrapi.lu@kmitl.ac.th

Four Thai pigmented rice varieties as know as colored rice – two sources of Manpo red rice [Manpo A (Ounjai company), Manpo B (Thongmanee comapny)], Hommali (red), and Riceberry (purple)—were analyzed, and the color, proximate composition, amylose content, swelling power, solubility, water absorption index (WAI), oil absorption index (OAI), and antioxidant and pasting properties were compared. Pearson's correlation was applied to elucidate the relationships among the characteristics of rice. In addition, the similarities and differences between the rice varieties were identified using principal component analysis (PCA) and hierarchical cluster analysis (HCA). The moisture, protein, fat, ash, carbohydrate, and amylose contents of the four types of varieties ranged from 8.62-10.39%, 7.88-9.05%, 1.87-2.90%, 1.67-1.78%, 76.32-79.52%, and 14.17-26.67%, respectively. Abundant fat and protein contents were found in Manpo A, while Manpo B had the highest amylose content. Riceberry and Manpo A varieties were found to have low amylose content. Therefore, the functional properties of the rice varieties were also different. Among the different varieties, Riceberry possessed low swelling

power, OAI, and pasting properties; it also exhibited high levels of solubility, WAI, and antioxidant properties. Pearson's correlation illustrated the relationships among the properties of the rice varieties, which revealed that antioxidant compounds could prohibit the gelatinization process. PCA and HCA separated the cultivars into two groups and showed that Riceberry demonstrated significant differences in characteristics from other varieties, which confirmed that the high content of antioxidants could remarkably lower the value of pasting parameters of rice paste. Finally, this study found that colored rice varieties have a high level of antioxidants, which indicates their potential use as nutraceutical foods. The unique characteristics of colored rice warrants further research to facilitate their utilization in appropriate food products to enhance health benefits.

Keywords: rice, physicochemical, functional, colored variety, multivariable analysis

Influence of seed moisture content on seed quality of Bambara groundnut (*Vigna subterranean* L. Verdc)

Wongwichaiwat, S.¹, Chotechung, S.², Kinnaret, P.³, Kaewtaphan, P.¹, Anothai, J.⁴ and Phakamas, N.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Suphunburi field crop research center, Suphunburi, 72160, Thailand, ³Songkhla field crop research center, Songkhla, 90110, Thailand; ⁴Agricultural Innovation and Management Division (Plant Science), Faculty of Natural Resources, Prince of Songkhla University, Songkhla, 90110, Thailand.
Corresponding Email: phissanu.ka@kmitl.ac.th

Two varieties of bambara groundnut (*Vigna subterranean* L. Verdc) were evaluated for seed quality under different seed moisture contents between 8, 10 and 12%, and the seeds were stored under ambient condition for six months. Songkhla 1 could maintain high germination percentage (91.11%) and high germination index (24.43) after storage for six months, whereas TVsu 1221 had low germination percentage (54.67%) and germination index (14.83) as early as two months after storage. Differences among seed moisture contents were low, and seed moisture content of 12% was better than seed moisture content of 8% for germination percentage and germination index. Variations between bambara groundnut varieties and among seed moisture contents were low for shoot length and seedling dry weight. These parameters seemed to be not suitable for evaluation of seed quality of bambara groundnut.

Keywords: Bambara groundnut, Seed moisture content, Seed quality, Seed storage

Influence of vacuum packaging combined with storage condition on biochemical activities and quality of groundnut seed (*Arachis hypogaea* L.)

Multha, N.¹ and Sikhao, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.
Corresponding Email: potjana.si@kmitl.ac.th

The study aimed to investigate the effect of vacuum packaging on the biochemical activities and storage quality of peanut seeds. The peanut seeds were packed in two different packaging materials: woven plastic bags and polypropylene (PP) with a gauge of 760. Woven plastic bags served as the control packaging material, while vacuum packaging was applied at degrees of -0.02 MPa, -0.04 MPa, -0.06 MPa, and -0.08 MPa for polypropylene (PP). All packages were stored under two different conditions: ambient conditions (approximately 35.5°C) and controlled conditions (13±2°C and 19±11% relative humidity) for a period of 6 months. Quality parameters, including free fatty acid content, dehydrogenase enzyme activity, moisture content, water activity, germination percentage, and germination index, were analyzed at two-month intervals during storage. The results indicated that seeds stored in polypropylene with a gauge of 760 at vacuum degrees of -0.04 MPa and -0.06 MPa, combined with controlled conditions, showed the highest dehydrogenase enzyme activity, germination percentage, and germination index, while exhibiting the lowest free fatty acid content. Additionally, it was observed that the moisture content and water activity of all packaging materials remained consistent from the beginning to the end of the storage period.

Keywords: Free fatty acid, Dehydrogenase activity, Woven plastic bag, Polypropylene, Peanut

Effect of Difference Plastic Bags on Corn Silage Quality for Animal Feed

Pongcha-umdee, T.¹, Chotchutima, S.², Nitthaisong, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Department of Agronomy, Faculty of Agriculture, Kasetsart University, Chatuchak, Bangkok 10900, Thailand.
Corresponding Email: pattama.ni@kmitl.ac.th

The effect of packaging on the quality of corn silage to maintain the quality of a corn silage due to limited supplies over the dry season. The results of this study revealed that, the corn silage of all packages with the difference type of plastic bag type 1, type 2, type 3 and type 4, store under the shelf life of 30 and 60 days show a very good range of physical characteristic including odor, texture, color, and pH. The flavor of fermented plants is similar to the smell of pickled fruit or vinegar. The leaves and stems are intact, and the texture is firm. The fermented plants had a pH between 3.8 - 4.2, and the color of all treatment was greenish yellow. In packages of each plastic bag had moisture contents of type 1 (69.24%), type 2 (71.29%), type 3 (68.93%), and type 4 (70%). Lactic acid content was found in package of plastic bag type 2 at 5.07% for 60 days of shelf life but not difference significant.

Keywords: Corn silage, Packaging, Plastic bag, Lactic acid

The Analysis of Total Flavonoid Contents in Thai White Rice Landrace

Touyjaran T.¹, Hashiguchi, T.², Jiamtae, P.², Yuttavanichakul W.³ and Nitthaisong, P.

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Faculty of Regional Innovation, University of Miyazaki, Miyazaki, Japan; ³Department of Biotechnology, Faculty of Science and

Technology, Rajamangala University of Technology Tawan-ok, Sriracha, Chonburi, 20110, Thailand.

Corresponding Email: pattama.ni@kmitl.ac.th

Total flavonoid was analyzed in ten germplasm of Thai white rice landrace consisting of G. S. No. 528, G. S. No. 1531, G. S. No. 18018, Jasmine rice, G. S. No. 21717, G. S. No. 22208, G. S. No. 22211, G. S. No. 22212, G. S. No. 23207, and G. S. No. 23208. According to the analysis the total flavonoid contents were in the range of 252.44 to 514.67 mg QE 100 g⁻¹ with significantly difference ($p \leq 0.05$) and the highest flavonoid content was found in G.S. NO 21717 (514.67 mg QE 100 g⁻¹). This could be used as information for breeding programs to enhance flavonoid content.

Keywords: Total flavonoid, Thai white rice landrace, Phytochemical

Application of microcrystalline cellulose gel as a fat reduction strategy in phosphate-free emulsified sausage

Sorapukdee, S. Phengmanee, N.², Mongput, W.², Pilasombut, K.¹ and Tangwatcharin, P.²

¹Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand
Corresponding Email: supaluk.so@kmitl.ac.th

Three treatments of phosphate-free pork sausages were formulated by replacing pork backfat with 0% (control), 5%, and 10% microcrystalline cellulose (MCC) gel. MCC gel was prepared by chopping MCC powder with cold water in the ratio of 1:9 prior to use as a fat replacer. The addition of 5% MCC gel showed the similar product textural characteristics and color when compared with control ($p > 0.05$). The 10% MCC gel caused the increase in grilling loss with decrease lightness and yellowness of tested sausages ($p < 0.05$), but could improve firmness with higher hardness, gumminess, and chewiness than control ($p < 0.05$). However, after 4-weeks storage at 4°C, the 10% MCC gel showed the lower lipid oxidation as indicated by thiobarbituric acid reactive substance (TBARS) value than other sausages ($p < 0.05$). Comparing with the control sample, the detrimental impact of MCC gel both 5% and 10% on sensorial characteristics tested by sensory panelist in terms of color, flavor, texture, taste, and overall acceptability were not found ($p < 0.05$). The 10% MCC gel added product had the lowest fat content and total energy value (1.80% and 128.79 kcal/100 g, respectively) together with the highest crude fiber content (4.27%) ($p < 0.05$). While the control sample, high-fat content formulation without added MCC gel, exhibited the highest fat content and total energy value (8.18% and 200.08 kcal/100 g, respectively) with the lowest crude fiber content (0.70%) ($p < 0.05$). These compositions revealed that the 10% MCC gel added sausage could categorize as reduced-fat, reduced-calories, and good source of fiber when compared to the same regular products. The findings point out that MCC gel as a fat replacer offered potential advantages in upscaling phosphate-free and reduced-fat sausage.

Keywords: Fat substitution, Healthy sausage, Hydrocolloid, Low-fat sausage, Pork sausage

Evaluation of drying temperature and storage time on antioxidant capacity of dried kaffir lime (*Citrus hystrix* D.C.) leaf

Yonsawad, N., Teerarak, M. and Saetiew, K.

¹School of Agricultural Technology, King Mongkut' Institute of Technology Ladkrabang.
Corresponding Email: montinee.te@kmitl.ac.th

Application for drying technology is used to extend the shelf life and preserve the product quality of wide ranges of agricultural produce. The fresh Kaffir lime (*Citrus hystrix* D.C.) leaves were dried by hot air oven under three drying temperatures at 50, 60 and 70°C for 5 h and loading capacity (0.054 – 0.072 g/cm²). Desirable dried kaffir lime leaves were achieved when the loading capacity was 0.072 g/cm². This study was also done to determine the effects of different drying temperatures on DPPH radical scavenging activity and metal chelator of dried kaffir lime leaves after storage of 90 days. The results indicated that drying temperatures at 60 and 70°C led to loss of DPPH radical scavenging activity and metal chelating ability, compared with the fresh samples. During storage both antioxidant activities did not show significant differences among drying temperature.

Keywords:

Possibility to use crop models for indirect prediction of glycemic index in rice

Phopaijit, S.,¹ Somchit, P.² and Phakamas, N.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Chachoengsao Provincial Agricultural Extension Office, 65 Yutdamnoen Rd., Na Muang, Mueang Chachoengsao, Chachoengsao, 24000. Thailand.
Corresponding Email: nittaya.ph@kmitl.ac.th

A process for constructing the prediction equations was developed by using simulated biomass and simulated grain yield to estimating the glycemic index (GI) of two rice varieties, and reference GI was used as a basis for calculation of predicted GI. The CSM-CERES-Rice model was able to construct the best prediction equations, and the equation developed by using simulated biomass and simulated yield were $y = 0.0003x + 59.099$ and $y = 0.0008x + 59.213$, respectively. The equations were also used for prediction of GI values of two rice varieties applied with different methods of nitrogen application. The difference of the equations was 0.0% for both simulated biomass and simulated grain yield. The process for indirect prediction of GI using available simulated data of biomass and grain yield to improve prediction accuracy was discussed.

Keywords: Glycemic index (GI), Simple regression, CSM-CERES-Rice model

Quality Improvement of Boba from Sago Flour Supplemented with Inulin Using Electron Beam

Leelawat, B., Thongwattananun, S.¹, Jaroenjun, N.¹ and Sajjabut, S.²

¹Division of Food Science and Technology, Faculty of Science and Technology, Thammasat University, Center of Excellence in Food Science and Innovation, Pathumthani 12121, Thailand.

²Nuclear Technology Research and Development Center, Thailand Institute of Nuclear Technology, Nakhon Nayok, Thailand.

Corresponding Email: jaflood@hotmail.com

Boba is an important component of bubble milk tea. Both cassava and sago flour can be used to make Boba. However, raw sago flour contains a substantial number of microorganisms. The purpose of this study is using electron beam irradiation to increase the shelf life of precooked Boba and inulin supplementation to enhance its nutritional value. The optimum weight ratios of 100:0 (control), 70:30, 60:40, 50:50, and 0:100 for cassava-sago flour were investigated. The results indicated that increasing the proportion of sago flour led to an increase in hardness and gumminess, as well as an increase in redness (a^*) and yellowness (b^*). In terms of sensory evaluation, the 70:30 formula showed no significant differences from the control formula in all attributes. The addition of inulin at various levels was then studied, including 2.5%, 5%, 7.5%, and 10% by flour weight. The higher ratios of inulin addition resulted in increased hardness, lightness, (L^*), and water activity. The 7.5% inulin addition received the highest overall liking score from the sensory test. Afterward, the 70:30 formula with 7.5% inulin was subjected to electron beam irradiation at doses of 2, 4, 6, 8, and 10 kGy. As the dose increased, it caused an increase in both hardness and gumminess. The doses at 6 kGy exhibited a startling decrease in the total plate count (TPC) of untreated Boba. The Boba texture was improved by investigating the incorporation of modified starch (MS) at 5%, 10%, 15%, and 20% by flour weight along with the 6 and 8 kGy irradiation. The hardness and gumminess of Boba with 10% and 20% MS at 6 kGy and 20% MS at 8 kGy were not significantly different from the control ($p > 0.05$) and the Boba with 20% MS at 8 kGy received the highest liking score.

Keywords: Milk tea, Boba, Sago, Electron beam, Irradiation, Inulin

Investigating phytochemical and antioxidant activity of free and bound phenolics from brown rice bran and their correlation with enzymatic inhibitory and *in vitro* starch digestibility

Kusumawardani, S. ¹, Kunyane, K. ¹, and Luangsakul, N. ¹

¹School of Food Industry, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand.

Corresponding Email: naphatrapi.lu@kmitl.ac.th

Inhibiting the activity of digestive enzymes is a highly effective approach to controlling glucose absorption and, consequently, aiding in controlling type-2 diabetes mellitus. Brown rice bran, a by-product of the rice grain polishing process, represents a natural source rich in bioactive compounds that could be explored as a potential solution to reduce postprandial hyperglycemia. The study focused on evaluating the inhibitory effects of free and bound phenolic compounds on α -amylase and α -glucosidase enzymes, which play significant roles in carbohydrate metabolism. The IC_{50} values were found to be 0.947 ± 0.05 mg/mL for α -amylase inhibition and 2.188 ± 0.69 mg/mL for α -glucosidase inhibition in the free phenolic compound extract. In contrast, the bound phenolic compound extract displayed higher IC_{50} values of 13.861 ± 0.03 mg/mL and 16.883 ± 0.15

mg/mL for α -amylase and α -glucosidase inhibition, respectively. These differences in inhibitory potential between the free and bound phenolic compounds were statistically significant ($p < 0.005$). The superior inhibition observed in the free phenolic extract can be attributed to its higher levels of phenolic, flavonoid, and anthocyanin compounds compared to the bound form. Additionally, the antioxidant content analysis using the DPPH and FRAP methods revealed that the bound phenolic compounds exhibited lower antioxidant levels compared to the free form. Furthermore, the study investigated the impact of these bioactive compounds on starch digestibility by adding 10% sample extracts, both in free and bound forms, to high amylose rice starch. The results showed that the rate of starch digestibility was reduced to 54.04% and 58.2%, respectively, compared to the control (60.52%). Phytochemical content exhibited highly positive correlations with antioxidant activity leading to stronger enzymatic inhibition and slower the digestion rate. These findings suggest that the free phenolic extract from brown rice bran holds promise as a potential antidiabetic agent due to its ability to inhibit enzymatic digestion, leading to reduced postprandial glucose levels.

Keywords: α -amylase inhibitory, α -glucosidase inhibitory, brown rice bran, free phenolic

Enhancing Hydroponics with IoT: An Automated Smart System for Optimal Cultivation

Jayanthi, J.¹ and Kumar, A.²

¹School of Computing Science and Engineering, VIT Bhopal, Madhya Pradesh; ²School of Biosciences Engineering and Technology, VIT Bhopal, Madhya Pradesh
Corresponding Email: Jayanthi@vitbhopal.ac.in and arunkumar.k@vitbhopal.ac.in

This paper presents an automated smart system based on IoT technology to enhance hydroponics and optimize cultivation practices. By integrating sensors, actuators, and interconnected devices, the system enables real-time monitoring and regulation of essential parameters. Utilizing advanced analytics and machine learning algorithms, the system analyzes data to gain insights into crop growth patterns and resource utilization. Through automated control mechanisms, the system ensures precise regulation of water, nutrients, and lighting. With remote accessibility, farmers can efficiently manage their hydroponic setups from any location, leading to improved scalability and reduced labor requirements. The integration of IoT technology in hydroponics enhances crop yield, resource efficiency, and facilitates data-driven decision-making.

Keywords: Hydroponics system, IoT sensor

Session 5 :

Plant Science and Pest Management

The effect of microfluidization on characteristics and herbicidal potential of peppermint nanoemulsion on *Amaranthus tricolor*

Dimak, J.¹, Somala, N.¹, Laosinwattana, C.¹ and Teerarak, M.¹

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: naphat.so@kmitl.ac.th

The natural herbicides are friendly environment and human health. Peppermint essential oil nanoemulsion was prepared by a high-energy emulsification method using microfluidization with a non-ionic surfactant Tween 60 and was used for germination inhibition on *Amaranthus tricolor* seeds. Droplet size of the nanoemulsion was reduced by increasing the pressure of microfluidization from 5000 to 20000 psi (from 130.2 to 69.8 nm). The highest pressure (20000 psi) found the smallest droplet size of the nanoemulsion that droplet size, PI value, and zeta potential were 69.8 nm, 0.277, and -44.17 mV, respectively. Also, each pressure formulation (5000, 10000, 15000, and 20000 psi) was evaluated for the pre-emergence herbicidal activities namely inhibition of seed germination and seedling growth, seed imbibition, and α -amylase of *Amaranthus tricolor* seed. Obtained results of herbicidal activities correlated with droplet size that the herbicidal activities showed increased when increasing the pressure of microfluidization. The nanoemulsion formulation of pressure at 20000 psi treatment solution showed the highest herbicidal activities. Thus, these results may promote the optimized nanoemulsion from peppermint essential oil using a microfluidization method as a natural pre-emergence herbicide to inhibit seed germination and seedling growth of *A. tricolor*.

Keywords: high-energy emulsification, natural herbicide, pre-emergence herbicide, essential oil, nanotechnology.

Paclobutrazol enhances yield and secondary compound accumulation in *Curcuma longa* L.

Montri, N.¹, Chauytam, S.², Dewatthanawong, R.³ and Bunya-atichart, K.²

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²Department of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Chumphon Campus, Chumphon, Thailand;

³Expert Center of Innovative Agriculture, Thailand Institute of Scientific and Technological Research, Pathum Thani, Thailand

Corresponding Email: nattaya.mo@kmitl.ac.th

The rhizome of turmeric is rich in bioactive compounds. Among them, curcumin, a type of curcuminoid, showed significant biological activities, including antibacterial effects, antioxidant properties, antitumor and anti-inflammatory actions, and anti-cancer potential. The global recognition of turmeric and the quality of raw materials was increased to meet the buyer's standard. The present study investigated the effect of paclobutrazol (PBZ) on the yield and quality of turmeric (*Curcuma longa* L.), particularly in important compounds such as curcumin, total phenolics, and total flavonoids. Various concentrations of PBZ, including 0, 600, 800, and 1,200 mg/l were soil-drenched and applied 30 days before harvest. After 9 months, rhizomes were

harvested, and finger rhizomes were extracted in 95 % ethanol. The curcumin, total phenolics, and total flavonoids in ethanolic extract were quantitatively analyzed using a UV-Vis spectrophotometer. The results indicated that the application of different concentrations of PBZ 30 days before harvest had an impact on yield, while the color of turmeric remained relatively consistent. In all treatments, the rhizome color was yellow to orange. The fresh weight of the rhizome showed no significant differences within the range of 0-800 mg/l PBZ treatments, with the lowest yield observed in 1,200 mg/l PBZ treatment. The dry weight percentage of the mother rhizome was highest when treated with 800 mg/l PBZ. Regarding the accumulation of secondary compounds, highly significant differences among the treatments were found for the content of total flavonoids while curcumin and total phenolics showed significant differences as well. The treatment with 1,200 mg/l PBZ had the highest content of total phenolics at 78.18 mg GAE/gDW and total flavonoids at 295.54 mg QUE/gDW. PBZ-treated plants also showed higher curcumin content and percentage than the non-treated plants. These findings indicate that the application of PBZ has the potential to improve both the yield and quality of turmeric, which is advantageous for the cultivation of this valuable medicinal plant.

Keywords: turmeric, plant growth regulator, curcumin, phenolics, flavonoids

Effects of Distance from Coastal Shoreline on Survival and Adaptation of Eastern Native Orchids, Thailand

Sasivatchutikool, P.¹, Phadungsawat, B.¹, Tilarux, P.¹, Chaichuay, R.¹ and Chaichuay, C.¹

¹Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi Campus, Thailand
Corresponding Email: pronpanit_sa@rmutto.ac.th

The current study was carried out to investigate impacts of distance from shoreline on survival and adaptation of Eastern Native Orchids. Two factors, 3 planting zones and 9 species of eastern native orchids were tested. The study was done based on factorials design in CRD with five replicates. Results obtained during 5 months of observation, showed that only one species of *Cymbidium aloifolium*, had the lowest survival percentage; significantly lower than the other species ($p \leq 0.05$). Survival percentages of the other 8 eastern native orchids were not significantly different ($p > 0.05$). However, survival of almost all orchids in zone 1, (5 meters from the coastline) tended to be lower than in other zones. Eastern Native Orchids grown in zone 1 adapted by dropping more leaves than in other zones. Meanwhile, orchids grown in zones 2 (100 meters from Zone 1) and 3 (100 meters from Zone 2) adapted, by downsizing of their leaves more than in zone 1. The study also found that all 9 eastern native orchids planted in zone 3 have new root numbers, greater than in zone 1 and zone 2. Orchids named *D. fredericksianum*, and *D. farmer* had highest new root numbers; while *R. retusa* had least new root numbers. There was interaction between the factor of different species and distance from the coastline on new root number, indicating that new roots number of *A. falcata*, *S. mirabilis*, *D. fredericksianum*, *D. crumenatum*, *M. pallida*, *D. farmer* and *C. aloifolium* trend to more likely to form when is grown in zone 3. Whereas new roots number of *R. retusa* tend to lower likely to form when is grown in every zone.

Keywords: Eastern Native Orchids, Coastal zone, Adaptation

Rate of *Azolla microphylla* dry matter on nitrogen use efficiency and yield of Japonica rice

Suraphonphinit, A.¹, Phakamas, N.¹ and Samart, S.²

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²College of Materials Innovation and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.
Corresponding Email: nittaya.ph@kmitl.ac.th

The responses to the application of *Azolla microphylla* dry matter for nitrogen use efficiency for biomass (NUE) and nitrogen use efficiency for grain yield (NUEg) were investigated in two Japonica rice varieties. NUE and NUEg reduced with higher rated of Azolla application. The highest values were recorded at the rate of 37.5 kg N ha⁻¹, and the lowest values were recorded at 187.5 kg N ha⁻¹. DOA1 was higher than DOA2 for NUE, but they were seminar for NUEg. Grain yields increased with higher rates of Azolla application. Grain yield was lowest at the rate of 37.5 kg N ha⁻¹ and highest at the rate of 187.5 kg N ha⁻¹. DOA1 and DOA2 were similar for grain yield.

Keywords: Azolla, Nitrogen use efficiency, Grain yield, Japonica rice

Influence of calcium from different seashells on growth and yield of Khon Kaen 6 peanut cultivar

Hongyotee, T.¹, Somchit, P.² and Phakamas, N.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand. ²Chachoengsao Provincial Agricultural Extension Office, 65 Yutdamnoen Rd., Na Muang, Mueang Chachoengsao, Chachoengsao, 24000. Thailand.
Corresponding Email: nittaya.ph@kmitl.ac.th

This study compared un-treated control, eggshell, gypsum, mussel, oyster, clam and scallop in a randomized complete block design with four replications. All calcium sources were applied to peanut (Khon Kaen 6) at the rate of 312.5 kg ha⁻¹ at flowering. Application of all calcium sources increased biomass and crop growth rate of peanut, Significant increase in biomass was found in the crop threated with gypsum, and significant increases in crop growth rate were observed in the crop threated with gypsum, mussel and clams. Application of calcium sources did not have significant effects on yield and yield components of peanut. The possibility to used seashells as an alternative calcium source for peanut production is discussed.

Keywords: *Arachis hypogea*, pod yield, Mussel, Eggshells

Influence of Plant Growth Regulators on Shoot Development of *In vitro* Chrysanthemums

Boonkamjat, T.¹, Saetiew, K.¹ and Teerarak, M.¹

¹Department of of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.
Corresponding Email: kanjana.sa@kmitl.ac.th

Influence of plant growth regulators on shoot development of plant can be investigated via node tissue culture. Three varieties of chrysanthemum i.e., “Canter”, “Chompoo Phan” and “Sunny Snow” were studied as such. Node of tested plants were cultured on MS medium containing different formulas of plant growth regulators, i.e., MS, MS + 3 mg/l BA and 1 mg/l BA + 0.1 mg/l IAA, as treatment 1-3, respectively. The cultures were placed under white LED light (PPFD 40 $\mu\text{mol m}^{-2} \text{s}^{-1}$) 16 hr/day at 25±3°C for 20 weeks. Records of results were made on 8th week of culturing and tested chrysanthemum varieties responded to the treatments differently. Sunny Snow produced the largest callus, 1.19×1.19 cm, obtained 93.33% of new shoots with 1_{0.00} shoots per callus and 0.84 g fresh weight, in average, when grew in MS medium supplemented with 1 mg/l BA + 0.1 mg/l IAA, comparing to the control of no callus was produced. After 20 weeks of culturing, the second set of records were gathered. It happened that the control treatment of Sunny Snow gave the highest stem growth and the best bush diameter of 9.00 and 5.60 cm respectively. Chompoo Phan gave the biggest scores of chlorophyll content, i.e., chl a 652.14 $\mu\text{g/g}$ FW, chl b 332.47 $\mu\text{g/g}$ FW and carotenoid 165.92 $\mu\text{g/g}$ FW. Besides, MDA appeared to be highest, 17.37 nmol/g FW when cultured on MS medium supplemented with 1 mg/l BA + 0.1 mg/l IAA.

Keywords: Shoot regeneration, Callus induction, Plant growth regulator

Effect of paclobutrazol on growth retarding in potted chrysanthemum (*Dendranthema grandiflora*)

Piphatwatthanakul, P¹., Boonkamjat, T¹. and Saetiew, K.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: kanjana.sa@kmitl.ac.th

Chrysanthemums, renowned for their substantial commercial worth as cut flowers, exhibit the potential of being transformed into potted plants by means of controlling growth parameters of developing plants, covering height reduction, and canopy compacting. Paclobutrazol is a plant growth regulators used to retard the growth of plants. It inhibits gibberellin biosynthesis in plants, thus, resulting in retardation of cell elongation and internode extension. This study aimed at morphological variation analysis of potted chrysanthemum treated with the growth retardant paclobutrazol in various concentrations by different methods of application. The varieties of chrysanthemum being tested were Prakaimat and Fiona. In the first experiment, paclobutrazol at concentrations of 0, 400, 800, 1200, and 1600 ppm were applied to testing plants into two manners, i.e., foliar spraying twice or soil drenching twice, throughout the whole experiment. It turned out that paclobutrazol applications, comparing to the control, showed a positive influence in reducing stem height, canopy width, internode length, node number, and flower size. Besides, methods of application were insignificant. As for the second experiment, 0, 100, 200, 300, and 400 ppm of paclobutrazol were tested, using the same manner of application as in the first experiment. It appeared that all concentrations of paclobutrazol decreased canopy width, stem length, internode length, and node number when compared with the control treatment, similar to results of the experiment 1. Nevertheless, it occurred in Prakaimat variety that both foliar spraying and soil drenching of paclobutrazol led to increasing chlorophyll content and carotenoid level. Meanwhile, Fiona chrysanthemum responded better to foliar spraying method than of soil drenching.

Keywords: Chlorophyll, Foliar spraying, Morphology, Plant growth regulator, Soil drenching

Response to selection for resistance to pepper yellow leaf curl Thailand virus of chili pepper populations (*Capsicum annuum* L.)

Mueangkhong, M¹., Pawaputanon, S¹., Suwor, P^{1*}., Pawaputanon, S¹., Techwongstien, S²., Tsai W.S³. and Kramchote, S¹.

¹Department of Plant Production of Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand. ²Department of Plant Science and Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Khon Kaen, Thailand. ³Department of Plant Medicine, National Chiayi University, Chiayi City 600355, Taiwan.
Corresponding Email: patcharaporn.su@kmitl.ac.th

This study aimed to explore the response to selection for resistance against Pepper Yellow Leaf Curl Thailand Virus (PepYLCTHV) within chili pepper populations F₂: F₃. Additionally, it aimed to analyze peroxidase activities (POD) and phenolic compounds (PH) levels within these populations, comparing them with susceptible and resistant checks. All chili genotypes were sown, and 30 days after sowing, the seedlings were inoculated with PepYLCTHV via whitefly transmission. Disease symptoms were evaluated over four intervals from the 1st to the 4th week after inoculation, with a one-week interval between each assessment. Scores ranging from 0 to 5 were assigned, where levels 0 and 1 represented a resistant response, and levels 2 to 5 indicated susceptibility. To assess POD and PH, samples were gathered from each disease reaction (resistant and susceptible levels) within F₃ population and resistant parent. The findings revealed varying disease reactions, with the response to selection in resistant traits within the F₃ population (Jindanil80 x PSP11-4, Numkiew x PSP11-4, Yodsonkhem80 x PSP11-4, and PSP11-4 x 9835-123 populations) exhibiting lower disease incidence compared to the F₂ population, at percentages of -3, -23.94, -23.77, and -16.43, respectively. This suggests the potential to enhance disease resistance in advance generations. Furthermore, the susceptible plants exhibited generally higher PH contents and activity of POD compared to resistant plants in both the F₃ population and resistant check. This reaction may point to the underlying resistant mechanism of chili peppers against PepYLCTHV.

Keyword: *Begomovirus*; PepYLCV; resistant varieties; Breeding, resistant mechanism

The total phenolic responses of both resistant and susceptible chili pepper to Anthracnose disease (*Collectotrichum acutatum*)

Oiuphisittraiwat, T.^{1,2}, Suwor, P.¹, Dimuk, J.³, Techawongstien, S.⁴, Tsai, W-S.⁵ and Kramchote, S.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²College of Creative Agriculture for Society, Srinakharinwirot University, Ongkharak, Nakhon Nayok 26120, Thailand; ³Public-Private Collaborative Research Center, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ⁴Department of Plant Science and Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Khon Kaen, Thailand; ⁵Department of Plant Medicine, National Chiayi University, Chiayi City 600355, Taiwan.

Corresponding Email: patcharaporn.su@kmitl.ac.th

Chili Anthracnose, caused by *Collectrothricum acutatum*, has been reported as the virulent pathogen affecting chili fruits in Thailand. To comprehend their incompatibility and compatible responses, the resistant mechanism involving the level of total phenolic compounds (TPC) was investigated in both resistant (ANT4) and susceptible (KKU-P21052) varieties. The plants were grown in the greenhouse at School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, during November 2022 to March 2023. A factorial experiment in Randomized Complete Block Design (RCBD) with 4 replications was designed, the chili pepper varieties as factor A and inoculation methods as factor B (inoculation on the plant (IP) and inoculation after harvesting (IH)). The inoculation methods utilized the same spore suspension concentration through microinjection technique. The mature green and ripened fruit stages were tested. The disease lesions size and levels TPC were observed after inoculated at 1, 3, 5, and 7 days. At green fruit stage of ANT4, the disease lesions exhibited smaller sizes compared to KKU-P21052 for in both IP and IH methods, However, at the ripened stage, similar disease lesion size were observed. The change of levels TPC after inoculation at mature green stage of IP method in both chili varieties was increased during day after inoculation, nevertheless, these levels remained lower than those observed in uninoculated fruits (control fruits). Therefore, the TPC levels of chili fruit decrease when affected by *C. acutatum* in both resistant and susceptible varieties.

Keywords: genetic resistance source, chili fruit rot, *Capsicum annuum* L.

The Determine of Mechanical Damage on Soybean Seed by Clorox Soak Test

Baikaden, S.¹, Thepchit, K.¹, Buaket, T.¹ and Sikhao, P.¹

Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: potjana.si@kmitl.ac.th

The Clorox soak test was employed to assess soybean seed damage, proving to be a comfortable and effective method for detection. Among different seed lots, the third lot exhibited the lowest percentage of damaged seeds. Notably, these seeds yielded seedlings with the highest root length, shoot length, and dry weight. Regarding damage levels, both undropped seeds and those dropped two times displayed the highest shoot length and seedling dry weight. Seed vigor, assessed through accelerated aging, consistently showed that Lot 2 of soybean seeds had the highest vigor across all damage levels.

Keywords: *Glycine max* L., damage seed, physiological quality, seed germination, seed vigor

***In vitro* biocontrol potential of natural substance combination against microbial plant diseases**

Somsri, A.¹, Thongsen, N.², Saelao, P.², Lodthonglang, K.², Kenkhunthot, T.², Pilasomput, K.³, Uairong, H.⁴ and Rumjuankiat, K.⁴

¹Department of Plant Resources, College of Industrial Sciences, Kongju National University, Yesan 32439, Republic of Korea; ²Faculty of Agricultural Innovation, College of Agricultural Innovation

and Food Technology, Rangsit University, Pathum Thani 12000, Thailand; ³Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ⁴College of Agricultural Innovation and Food Technology, Rangsit University, Pathum Thani 12000, Thailand.
Corresponding Email: kittaporn.r@rsu.ac.th

Applying biocontrol agents for plant disease management has recently attracted increased attention. This paper investigated the antimicrobial activity of natural substances from banana peel vinegar (BPV), chitosan (CHT) and three plant extracts; basil leaves (BE), fingerroot (FRE) and mangosteen peel (MSE) for controlling plant pathogens including *Colletotrichum gloeosporioides*, *Curvularia* sp., *Diaporthe phaseolorum*, *Fusarium oxysporum*, and *Xanthomonas campestris* pv. *campestris* (Xcc). MSE and FRE treatments were the most effective with minimum inhibitory concentration (MIC) of 0.006 mg/ml and 0.048 mg/ml, respectively while both extracts inhibited Xcc, indicating partial synergism with Fractional Inhibitory Concentration Index (FICI) of 0.625. Our findings indicated that natural substances had promising antimicrobial activities against plant pathogens, providing beneficial information for future disease control and biopesticide development.

Keywords: biocontrol, natural substance, plant diseases

Influence of foliar spraying of salicylic acid on phytochemical improvement and antioxidant activity in *Cannabis sativa* L.

Tebdoie, C.¹, Dewatthanawong, R.², Kongjinda, P.² and Montri, N.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

²Expert Center of Innovative Agriculture, Thailand Institute of Scientific and Technological Research, Pathum Thani, Thailand.

Corresponding Email: nattaya.mo@kmitl.ac.th

Salicylic acid (SA) is a plant hormone that affects growth and development and plays an important role in secondary metabolite synthesis and accumulation. The application of SA enhances and promotes the biosynthesis of secondary metabolites and improves the content of secondary compounds in many plant species. However, few reports have been conducted on cannabis, which has now become a valuable cash crop. Pricing depends on the number of secondary compounds in the inflorescence. This study evaluated the preharvest spraying of SA at different concentrations and periods and evaluated secondary compound improvement in cannabis plants. Rooted cannabis seedling cuttings were grown in the greenhouse. SA was sprayed at different concentrations of 0 and 1 M and various preharvest stages at 24, 36, and 42 hours. The cured inflorescences were dried in a hot air oven at 40°C for 3 hours and extracted with 95 % ethanol with low frequency ultrasonic at 40°C for 30 minutes (X3). The ethanol crude extract was monitored for chlorophyll a, chlorophyll b, total chlorophyll, carotenoids, total pigments, total phenolics, total flavonoids, and antioxidant activities. Results indicated that differences in secondary compounds and antioxidant activities were highly significant among SA treatments. Highest total phenolics as chlorophyll a, chlorophyll b, total chlorophyll, carotenoids, total pigments, and percentage of antioxidant activity were achieved in 1 M SA at 24 hours preharvest treatments.

Keywords: cannabis, salicylic acid, secondary compound, plant hormone

Session 6:

Soil and Environment, Water conservation

The carbon footprint assessment from Electricity in Ubon Ratchathani Zoo in Ubon Ratchathani province, Thailand

Kulsuwan, P.¹, Binhad, I.¹, Thongdeephan, T.², Chanhom, D.², Naipreede, K.², Khambai, N.², Pontham, J.²

¹Innovation for Social and Environmental Management Program, Mahidol University Amnatcharoen campus, Thailand; ²Ubon Ratchathani Zoo, the Zoological Park Organization of Thailand under the Royal Patronage H.M the King, Thailand.
Corresponding Author: Email: Patticha.kul@mahidol.ac.th

The carbon footprint assessment from Electricity in Ubon Ratchathani Zoo in 2020 with the highest carbon footprint at 312.10 tonnes of carbon dioxide equivalent. accounted for 36.24 percent, followed by the year 2022, accounting for 33.56 percent, and the year 2021 accounting for 30.20 percent, respectively. The total carbon footprint was 861.23 tons of carbon dioxide equivalent.

Attitudes towards the economical use of electrical energy of Ubon Ratchathani Zoo personnel. In the sampling group of 62 people, it was found that the attitude towards electricity consumption of personnel staff in Ubon Ratchathani Zoo have an attitude towards economical use of electricity. at the level strongly agree. With an average of 4.58 when separated by item, it was found that he agreed that saving electricity was the duty of all staff with an average of 4.81 the most followed by that he agreed if the Ubon Ratchathani Zoo There is a campaign about electrification. and the lowest mean is do you think the officer employees who are conscious of saving electricity for the public have an average of 3.81 with an agreeing attitude.

Electricity usage behavior and participation in economical use of electricity They had regular behaviors. If they were separated by items, it was found that they opened windows on days when the weather was not sweltering. The average was the highest, followed by doors. The room window is open, you will immediately close it to reduce the workload of the air conditioner. and the lowest mean is You put hot or reheated food in the refrigerator immediately. with the same mean of 2.36, having practiced behavior infrequently

Keywords: Carbon footprint, Electrical energy usage behavior, Greenhouse gas, Climate change, CO₂ emission

Growth and Yield of Cassava Cultivar KU-80 by using Biofertilizer

Thaieaw, P.¹, Panitnok, K.², Somwang, T.² and Nitthaisong, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Kaohinson Research Station, Agricultural Research and Technology, Kasetsart University, Bangkok, 10900, Thailand.
Corresponding Email: pattama.ni@kmitl.ac.th

Cultivation of cassava cultivar KU-80 with fertilizer management. In terms of growth, the results showed that cultivation of cassava by using treatment 3 chemical fertilizer (15-15-15) at a rate of 437.5 kg⁻¹ ha⁻¹ gave the highest cassava height, stem girth, canopy diameter and SPAD value. In terms of yield, cultivation of cassava by using treatment 3 chemical fertilizer (15-15-15) at a rate of 437.5 kg⁻¹ ha⁻¹ gave the higher fresh weight and dry weight of cassava yield but not

different significant with all treatment by the reason of the harvest period is 180 days cassava is still in the stage of developing leaves and stem.

Keywords: Cassava cultivar KU-80, Fertilizer management, Bio-fertilizer

Assessment of heavy metal concentration in feeds and soil from selected poultry farms in Leyte Province, Philippines

Balala, L. M., Daquiado, M. M. E. and Gelaga, D. G. A.

Visayas State University

Corresponding Email: balalalotis@vsu.edu.ph

Excessive heavy metals in poultry feeds are excreted in manure, contaminating the environment through leaching and runoff. The study aims to assess heavy metal concentration in poultry feeds and soil samples collected from six poultry farms over four months. Samples were analyzed for Fe, Cu, Zn, Cd, and Pb concentration using microwave plasma-atomic emission spectroscopy. In feeds, Fe content in all brands (n=9) exceeded the NRC and Philippine standards, with the highest concentration observed in layer feeds (965.83ppm). Cu content in most brands also exceeded recommended level, with the highest concentration in booster feeds (164.26ppm). Zn content was variable but exceeded the recommended level in most booster, grower, layer, and finisher feed brands. A detectable amount of Cd was traced in booster (0.2-0.16 ppm), starter (0.10 ppm), grower (0.06-0.13 ppm), and finisher (0.02-0.12 ppm) feeds. Pb was detectable only in some brands of booster feeds (0.39 ppm). The heavy metal concentration ascending trend in the soil is Cd<Cu<Zn<Pb<Fe. Cu concentration ranged from 2.215-8.698 ppm, Fe 57.069-132.838 ppm, Zn 2.844-17.558 ppm, Cd 0.015-0.049 ppm, and Pb 5.096-15.432 ppm. The temporal and spatial concentration of the metals was variable. However, their level at present is within the WHO permissible limits. Since the level of heavy metals in feeds was above recommended standards, their concentration in the manure should be closely monitored to avoid consequent contamination of the environment.

Keywords:

Influence of irrigation water quantity and fertilizer applied together with mulch on the growth and yield of oil palm cv. Deli x Nigeria (*Elaeis guineensis* Jacq.)

Wiangsamut, B.¹

¹Department of Agricultural Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok at Chanthaburi Campus, Chanthaburi, Thailand.

Corresponding Email: timbancha@yahoo.com and bancha_wi@rmutto.ac.th

The result showed that only the irrigation water quantity of 200 L palm/day (IQ200) promoted better growth and quality of oil palm cv. Deli x Nigeria as compared with those of irrigation water quantity of 100 L/palm/day (IQ100) and no irrigation (IQ0). IQ200 helped in increasing significant fruit pulp thickness by 32.79% as well as reduced the palm kernel diameter by 4.76% as compared with IQ0. Through correlation analysis, pulp thickness was negatively associated with palm kernel diameter (r= - 0.74). Nevertheless, a sufficient irrigation of IQ200 led

to obtain high values of the fruit diameter, fruit height, twenty-five fruits weight, number of bunch per palm, and fresh weight of bunch per palm, as compared with those under IQ100 and IQ0. The application of fertilizer together with mulch derived from byproducts of oil palm (FM) contributed to significant values of fruit diameter (14.36%), pulp thickness (17.91%), twenty-five fruits weight (20.28%), and yield (71.49%; fresh weight of bunch per palm) higher than those of no application of fertilizer and mulch (NFM). Therefore, the irrigation water quantity of 200 L/palm/day and application of fertilizer together with mulch derived from byproducts of oil palm could better determine the growth and yield of oil palm cv. Deli x Nigeria during the dry season period, than the other irrigation methods of water quantity of 100 L/palm/day, no irrigation, and no application of fertilizer and mulch.

Keywords: Irrigation, Oil palm, Pulp thickness, Yield, Fertilizer

Seasonal responses of phytoplankton community in the heterogeneous coastal water regimes of southwestern India: microscopy/HPLC-CHEMTAX approaches

Anil P., Madhu N. V., Vishal C. R., Gopika P., Jyothi S., Praveena Sudheesh, Arya K. S. and Gireesh Kumar T R

CSIR-National Institute of Oceanography, RC-Kochi 682018; Cochin University of Science and Technology, Kochi 682022

Corresponding Email: anilnassa@gmail.com

The present study elucidates the ecological characteristics of phytoplankton communities in the Chandragiri estuary (CE) and adjacent nearshore waters (<20m depth), southwest coast of India. Seasonal (spring intermonsoon-SIM, summer monsoon-SM, fall intermonsoon-FIM and winter monsoon-WM) sampling was carried out in 7 prefixed stations covering the nearshore and estuarine waters during 2018-2019. The study found that the water column was warm (>29°C), high saline (28-35) and well mixed during the non-monsoon seasons (SIM and WM) with moderate levels of inorganic nutrients. However, the CE appeared to be freshwater dominated with elevated nutrient levels and turbidity during the SM. Phytoplankton biomass (chl a) exhibited distinct seasonality but remained generally low (<5 mg m⁻³) especially during the SM (<1 mg m⁻³). Microscopic analysis revealed the dominance of diatoms (*Chaetoceros* sp., *Cyclotella* sp., *Trieres* sp. etc) followed by dinoflagellates, cyanobacteria and green algae in the CE. The HPLC-CHEMTAX analysis complemented the dominance of diatoms in the CE by a relative increase in fucoxanthin and its substantial contribution to total chl a (SIM: 29-95%, SM: 66-89% and WM: 68-88%). By contrast, the increase in zeaxanthin and alloxanthin in the CE during the FIM signifies the dominance of small-sized PFGs (cyanobacteria and cryptophytes). Conversely, the near-shore waters showed the consistent dominance of diatoms, though their numerical abundance and chl a contribution was relatively less compared to the estuarine stations. The results revealed significant spatio-temporal variations in phytoplankton composition and chl a contributions of each PFGs to the total biomass pool in the CE with respect to the seasonally variable hydrographic properties. By contrast, such variability was less noticeable in the nearshore waters owing to the prevalence of small-scale seasonal hydrographic changes. This study provides information on current biological productivity and pollution status, vital for assessing the prevailing trophic status of the CE and adjacent nearshore waters.

Keywords:

Effect of Combination Fertilizer on Growth and Yield of Cassava cv. Rayong9 in Thailand

Srifa, T.¹, Somwang, T.², Panitnok, K.², Yusuk, P.³, Nitthaisong, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Khao Hin Son Research Station, Kho Hin Son Subdistrict, Phanom Sarakham District, Chachoengsao Province. ³Khao Hin Sorn Royal Development Study Center, Kho Hin Son Subdistrict, Phanom Sarakham District, Chachoengsao Province. Corresponding author: Nitthaisong, P.; Corresponding Email: pattama.ni@kmitl.ac.th

The result of the study showed that cultivation of cassava rayong9 cultivar by using NPK 15-15-15 + Bio-fertilizer showed the cassava height of significant different compared to Bio-fertilizer only at 90 and 150 days, while used of NPK 15-15-15 + Bio-fertilizer showed that highest SPAD value significant different ($p < 0.05$) with treatment of non-fertilizer application (control) and Bio-fertilizer at 90, 120 and 150 days after planting. In contrast, 6 months after planting, the cassava yield non-significantly different, but using NPK 15-15-15 + Bio-fertilizer gave the highest fresh weight yield of 12,238 kg⁻¹ha⁻¹ and in dry weight yield 5,260 kg⁻¹ha⁻¹.

Keywords: Rayong 9 Cassava, Bio-fertilizer, Chemical fertilizer, Fertilizer

Estimation of aboveground carbon stock in service area of Ubon Ratchathani Zoo, Ubon Ratchathani province, Northeastern Thailand

Muangsong, C.¹, Phewphan, U.¹, Kongsombat, P.¹, Meengoen, N.¹, Thongdeephan, T.², Chanhom, D.², Naipreedee, K.², Khambai, N.², Pontham, J.², Pumijumnong, N.³

¹Innovation for Social and Environmental Management, Mahidol University, Amnatcharoen campus, Amnatcharoen, Thailand; ²Ubon Ratchathani Zoo, The Zoological Park Organization of Thailand under the Royal Patronage H.M the King, Ubon Ratchathani, Thailand; ³Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom, Thailand
Corresponding Email: uthaiwan.phe@mahidol.edu

Ubon Ratchathani Zoo is situated in the area of Dong Fa Huan national reserved forest and comprises of a wide variety of tree species with various shapes and sizes. The zoo locates in the capital city of Ubon Ratchathani province, which is known as one of the biggest provinces in Northeastern Thailand, and plays pivotal role in conserving of local ecosystems and biodiversity of the natural areas in the city that having rapid expansion of infrastructure. This study is the first estimate of carbon storage by trees growing in the service area of National zoo in Northeastern Thailand.

The objective of this study was to assess aboveground biomass and carbon storage of trees growing in service area of Ubon Ratchathani Zoo. A total of 1.90 ha (11.89 rai) of the service area within the zoo was studied. The majority of trees in the service area were selected and identified their species. In-the-field data collection of individual tree characteristics such as diameter at breast height (DBH), tree height (H), and tree position were performed between

January and May 2023. The aboveground biomass and carbon stock were calculated using allometric equation.

Our results indicated a total of 200 trees of 22 species from 16 families. The most common family was Dipterocarpaceae with 129 trees, including *Shorea roxburghii* G. Don (40% of total trees), *Dipterocarpus alatus* Roxb. (17% of total trees), and *Dipterocarpus intricatus* Dyer (7% of total trees). The total aboveground biomass and total carbon storage for all trees were 52,337.3 kg (200.1 kg rai⁻¹) and 24,598.5 kg (24.6 ton), respectively. A total of carbon dioxide absorption for the study site was 85.4 t-CO₂ or 60.6 t-CO₂ ha⁻¹ (9.7 t-CO₂ rai⁻¹). Our results provide an important data for climate mitigation policy (i.e., carbon credit policy) and carbon credit trading in the future.

Keywords: Climate change; Biomass; Carbon storage; Ubon Ratchathani Zoo; Carbon credit

Production and characterisation of Biosurfactant from Indian Himalayan region

Kishore Kumar A¹., Manigundan K¹., Gopikrishnan V¹., Thenmozhi. G. S¹., Ranjani S¹., Anita Pandey²., Radhakrishnan M^{1*}.

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

²Department of Biotechnology, Graphic Era Deemed to be University, Dehradun, India.

*Corresponding Author: mrkactinos@gmail.com

This study aims to explore the production and characterization of biosurfactants derived from microbial sources indigenous to the Indian Himalayan region. Soil samples collected from high altitude region of Himalaya's. Totally 58 morphologically different bacterial cultures were isolated using Actinomycetes Isolation Agar (AIA), Starch Casein Agar (SCA) and Nutrient Agar (NA) and screened for biosurfactant production. Strain HUS-20 showed promising activity in hemolytic, drop collapse and emulsification assay which confirms biosurfactant production with surface-active properties. Based on the 16s rRNA sequencing analysis and phenotypic characterization, strain HUS - 20 was tentatively identified as *Streptomyces zaomyceticus*. Characterization of partially purified biosurfactant by LC-MS/MS analysis revealed the presence of different bioactive molecules. Furthermore, the study investigates the potential applications of these biosurfactants in diverse industries, the crude biosurfactant showed good action as antimicrobial activity against different bacterial and fungal species.

Keywords: Actinomycetes, Himalayan, Metabolite Profiling, Biosurfactant, Streptomyces zaomyceticus, LCMS

Role of PGPR on the stimulation of growth Sesame (*Sesamum indicum* L.) in salt stress

D. Sridhar¹, and Dr. S. Lalitha

¹Research Scholar, Soil Microbiology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India

²Assistant Professor, Soil Microbiology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India.

Due to constraints imposed by nature and human activity resulting in soil quality being less or unproductive, a significant portion is not suitable from an agricultural perspective for agricultural land. Around the world, soil salinity is a significant abiotic stressor. When it comes to sustainable agriculture, the development of salt-tolerant crops is not always the most cost-effective strategy. Instead, microbial inoculation to relieve salt stress is a superior choice because it reduces production costs and environmental risks. Plant Growth Promoting Rhizobacteria (PGPR) have been shown to be effective agricultural plant growth promoters, and the growth-promoting action under stress conditions has also been reported to be advantageous for crop production. In this study, SVPR-1 (*Sesamum indicum* L.) and PGPR (*Bacillus subtilis* BSS1 and *Pseudomonas toytomiensis* PTS2) were co-cultured with 200 mM NaCl in a lab environment. Salt stress resulted in reduced yield, stunted growth, poor root development, and whitened leaves at the tip of the plant. In contrast to plants cultivated without any treatment, the experiment's results showed that *Pseudomonas toytomiensis* treatment greatly enhanced plant height, root length, and dry weight of shoot and root even under salt stress. Under salt stress, the Sesame SVPR-1 cultivar showed improved plant growth when treated with *Pseudomonas toytomiensis* PTS2.

Keywords: -Salinity stress; Sesame; *Bacillus subtilis*; *Pseudomonas toytomiensis*; PGPR; Growth.

Exploring fish gut associated bacteria for aquaculture probiotic properties

Karthik Prakash¹, Gopikrishnan V¹*, Radhakrishnan M¹.

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

*Corresponding Author: gopivkkt@gmail.com

Similar to human beings, fish harbour microorganisms in their gastrointestinal tract (GIT). Fishes are diverse groups of gut microbiota, including protists, fungi, yeasts, viruses, bacteria, and archaea. In addition to serving as a barrier against infections, these microbes that inhabit the gastrointestinal tract of fish play a role in nutrition, physiology, immunity, and lifespan. The idea of this research is to comprehensively explore the culturable distribution of bacteria within the gut of economically significant fishes along the West Coast of India. The study involves the collection, isolation and screening approaches such as antimicrobial activity, anti-TB and anti-biofilm activities. The taxonomic identification of the selected bacterial cultures will be conducted employing a dual approach, encompassing both phenotypic and molecular methodologies. This includes an investigation into micromorphology, cultural characteristics and biochemical traits to identify the genera of the chosen bacterial strains. The natural products obtained from fish gut can potentially be an important source of novel and promising bioactive metabolites with significant biological activity.

Keywords: Fish gut, Probiotics, Aquaculture

Isolation and Characterization of Microplastics from Different Milk Sources

RamuMithran¹, Sakthivel Jayaraj², Saqib¹, Radhakrishnan Manikkam², Gopikrishnan Venugopal², Kasem Soyong³, Krupakar Parthasarathy^{2*}

¹Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai – 600 119.

²Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai – 600 119.

³Department of Plant Production Technology, King Mongkut's Institute of Technology, Bangkok, Thailand.

*Corresponding Author Mail ID: pkrupakar.cddd@sathyabama.ac.in

The ubiquitous presence of microplastics (MPs) in various environmental compartments has emerged as a significant environmental and toxicological challenge in the 21st century. These minute particles are now detectable in diverse settings, ranging from food products such as seafood, milk, beer, honey, bottles, tap water, salts, tea, and beverages. Notably, their presence extends to human biological samples, including feces, blood, breast milk, and even the placenta. Despite their pervasive distribution, the comprehensive understanding of the potential health implications for both animals and humans remains incomplete. This study was carried out to analyze the risk factors of carcinogenicity of the microplastic sedimentation in the human body caused by consuming commercially packed milk. The milk samples were collected from different regions of the Tamilnadu. Microplastic extraction and filtration were performed using the Whatman filter grade 1. Identification and characterization of microplastics will be performed using FTIR. The material composition of microplastics will be identified using Micro-Raman spectroscopy. Further studies are being carried out and the findings will be discussed in detail during the presentation.

Keywords: Microplastics, Milk, FTIR, Micro-Raman spectroscopy

Isolation and Characterization of Microplastics from Different Sources of Water

Mahavishnou R¹, Sakthivel Jayaraj², Radhakrishnan Manikkam², Gopikrishnan Venugopal², Kasem Soyong³, Jayashree Shanmugam¹, Krupakar Parthasarathy^{2*}

¹Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai.

²Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai.

³Department of Plant Production Technology, King Mongkut's Institute of Technology, Bangkok, Thailand.

*Corresponding Author Mail ID: pkrupakar.cddd@sathyabama.ac.in.

Microplastics refer to plastic particles that are smaller than 1mm and are now a global concern due to their presence in various ecosystems. While their impact on marine life and the environment is widely documented, their potential effects on human health are still being explored. In this study, we analyzed the presence of microplastics in water sources and their impact on human health due to accumulation in the body. Water samples from different sources were collected. Microplastic extraction was carried out by filtration method. The identification of microplastics was done using fluorescence microscopy. Identification and characterization of microplastics will be performed using FTIR. The material composition of microplastics will be identified using Micro-Raman spectroscopy. Further studies are being carried out and the findings will be discussed in detail during the presentation.

Keywords: Microplastics, Water sources, FTIR, Micro-Raman spectroscopy

Session 7:
Biotechnology and Innovation

A Study of Polymer for Delay Germination in Hybrid Sweet Corn Seed Production

Sodakul, N.¹ and Sikhao, P.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.
Corresponding Email: potjana.si@kmitl.ac.th

In general process of producing sweet corn seed. The male flowers typically bloom before the female flowers. It is necessary to plan and establish the planting schedule for the parent varieties in advance. For example, in hybrid sweet corn variety Songkhla 84-1 it is recommended to plant the female parent line before the male parent line for 3 days. This increased costs and labor in managing the seed production field. Therefore, there is an interest in utilizing polymers to coating the seeds, extending the germination period. The study involved formulations of coating substances using different types of polymers including non-coated seeds, coated with a commercial coating substance, coated with Hydroxypropyl Methylcellulose (HPMC), coated with Sodium Alginate (NaAlg), coated with Carboxymethyl Cellulose (CMC) and coated with Polyvinylpyrrolidone K₃₀ (PVP-K₃₀). There were to study the appropriate coating formula on germination tests were conducted to evaluate germination rates and germination index of seeds that had undergone coating, this was done to delay germination of sweet corn seeds. The results showed that all types of polymers there was no statistically significant effect on the germination percentage. If further studies are conducted on the types and concentrations of polymers, it is possible to develop seed coating formulations to delay germination.

Keywords: Zea mays, Seed coating, Sodium alginate, Film properties, Seed quality

GGE biplot analysis of genotype by environment interaction and yield stability of yardlong bean lines under nine environments

Pornsuriya, P.¹, Chittawanij, A.¹, Yemor, T.¹, Chinaworn, S.¹ and Tira-umphon, A.²

¹Department of Plant Production Technology, Faculty of Agriculture and Natural Resources, Rajamangala University of Technology Tawan-ok, Chonburi, 20110, Thailand; ²School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University of Technology, Nakhon Ratchasima, 30000, Thailand.
Corresponding Email: pornsuriya@hotmail.com

The purposes of the study were to determine the yield stability of 10 yardlong bean lines and to determine the perfect environments for yield selection using the GGE biplot method. Ten yardlong bean genotypes were examined under 9 environments using a randomized complete block design with 3 replications. The results indicated significant environment (E), genotype (G), and genotype x environment (GE) effects for yield. The environmental main effect explained 77.68% of the total variation, whereas the genotype and GE explained 4.30% and 8.58%, respectively. The genotype plus genotype by environment (GGE) biplot of the first two principal components also explained (PC1 = 69.99%) and (PC2 = 14.02%) of the GEI sum of squares. Bangpra2 (G2) was the most stable line since it had the highest total genotype GE score and the position closest to the ideal genotype from the GGE Biplot. NO.25 (G8) and No.30 (G9) were the

second and third stable lines according to their GE scores and GGE biplot. The best environment for yield selection of the 10 genotypes was planting in Chonburi in the early rainy season and applied with chemical fertilizers (E3) since it had the highest total environment GE score and its position closest to the ideal environment from the GGE Biplot.

Keywords: asparagus bean, GE scores, ideal genotype, ideal environment

Effects of NaOH/urea solution as a solvent and salt crystals as a porogen on the fabrication of porous composite scaffold of bacterial cellulose-chitosan for tissue engineering

Yodsanga, S.¹ and Poeaim, S.²

¹Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University, Bangkok 10330, Thailand; ²Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520 Thailand
Corresponding Email: somchai.yo@chula.ac.th and supattra.poe@kmitl.ac.th

A bacterial cellulose-chitosan composite scaffold fabricated through solvent casting-particular leaching method using NaOH/urea solution as a solvent and salt crystals as a porogen revealed a three-dimensional structure with the high porosity investigated by scanning electron microscope. The average porous size of the composite scaffold was between 300 and 500 μm . The composite scaffold exhibited high water uptake, indicating enhanced water absorption capacity. The compressive test showed that the composite scaffold had good mechanical strength. Fourier-transform infrared spectroscopy analysis confirmed that bacterial cellulose and chitosan were the main components of the composite scaffold. These results indicated that bacterial cellulose-chitosan composite scaffold could be used for application in tissue engineering.

Keywords: Bacterial cellulose, Chitosan, Composite scaffold, Tissue engineering

Study on optimization for *in vitro* propagation of *Dalbergia oliveri* by plant tissue culture

Nonthasila, S.¹, Pongtongkam, P.², Chareonsap, P. P.³ Poeaim, A.¹ and Poeaim, S.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²128/13 Moo5 Tambon Sano Loi, Bang Bua Thong, Nonthaburi, 11110, Thailand; ³Plant Genetic Conservation Project, Chitralada Villa, Dusit, Bangkok 10303, Thailand.
Corresponding Email: anurug.po@kmitl.ac.th,

This research aimed to enhance the *in vitro* propagation of *Dalbergia oliveri*, a species highly valued in the timber industry for its exceptional wood qualities. Seed induction was achieved using a half-strength MS medium (Murashige and Skoog, 1962), supplemented with 0.1% Activated Charcoal (AC). Multiple shoots were induced from cotyledonary node explants obtained from 3-week-old *in vitro* seed germination for the next experimentation phase. The effects of three different plant growth regulators on the proliferation of multiple shoots were studied: 6-benzylaminopurine (BAP), *meta*-Topolin (*mT*), and Gibberellin (GA_3). These plant growth regulators were added to the Murashige and Skoog (MS) medium at varying hormone concentrations (0.5, 1.0, 2.0, and 3.0 mg/l). The results showed that the highest proliferation

frequency (100%) with a maximum number of shoots per explant (3.33 ± 0.52 shoots) and an average shoot length of 30.04 ± 1.70 mm were achieved in the MS medium with 2.0 mg/l of BAP. Once the *in vitro* micro shoots reached 3 to 4 cm, they were transferred to a 1/4 MS medium supplemented with 0.75 mg/l of indole-3-acetic acid (IAA). This resulted in the highest number of roots per shootlet (3.50 ± 0.58), with an average root length of 34.19 ± 0.79 mm. The acclimatization process of the plantlets to the soil was successful, with a survival rate of 80%.

Keywords: Acclimatization, *Dalbergia oliveri*, *In vitro* micro shoots, Propagation

Effect of Stabilizers and Surface Materials on Anti-listeria Efficiency of Hydrogen Peroxide

Wirunwith B., Racha T. and Peamsuk S.

Food science and Technology Department, Thammasat University 99 Paholyothin Rd., Klong luang, Pathumthani, 12120, Thailand
Corresponding Email: speamsuk@tu.ac.th

Hydrogen peroxide (H_2O_2) is a widely used chemical antimicrobial agent in the food industry for cleaning and sterilizing. However, due to its strong oxidizing properties and sensitivity to decomposition, it is considered an unstable disinfectant when exposed to light. In this study, sodium citrate and ethylene glycol were employed as stabilizers to enhance the stability of H_2O_2 and its anti-listeria activity when used to control *Listeria monocytogenes* contamination on PTFE tube and stainless steel surfaces. Additionally, UV-C radiation was used for controlling *L. monocytogenes* on these surfaces. The results demonstrated that the combination of H_2O_2 and stabilizers led to higher residual H_2O_2 levels compared to the control after 48 hours. Regarding the anti-*Listeria* activity, H_2O_2 in the presence of ethylene glycol showed better efficacy against *L. monocytogenes* than those of H_2O_2 in the presence of sodium citrate and H_2O_2 alone. Furthermore, the antimicrobial efficacy against *Listeria spp.* was markedly augmented when UV-C irradiation and hydrogen peroxide (H_2O_2) were employed concurrently, demonstrating the promise of this approach for controlling *Listeria spp.* on food equipment surfaces such as PTFE and stainless steel.

Keywords: *Listeria monocytogenes*, Stainless steel, PTFE, UV-C

Effects of growth regulators on *in vitro* propagation of *Sophora tomentosa* (Necklace pod)

Rungprateepaiboon, N.¹, Chareonsap, P. P.², Pongtongkam, P.³, Poeaim, A.^{1*} and Poeaim, S.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520, Thailand; ² Plant Genetic Conservation Project, Chitralada Villa, Dusit, Bangkok 10303, Thailand; ³ 128/13 Moo 5 Tambon Sano Loi, Bang Bua Thong, Nonthaburi, 11110. Thailand.

Corresponding Email: anurug.po@kmitl.ac.th

This study aims to investigate the optimal condition for *in vitro* propagation of *Sophora tomentosa* and adjusting conditions before planting in the natural environment. In this work, seeds of *S. tomentosa* were sterilized with 0.1% of cefotaxime, plant preservative mixture (PPM) and

mercuric chloride (HgCl_2) for 15 minutes had the maximum survival rate (100%) and then germinated Murashige and Skoog (MS) medium supplemented with 1.0 mg/L of cytokinin (BAP, GA_3 , kinetin, *mT* and TDZ) is added by sodium chloride (NaCl). MS medium with BAP was observed to have a 75% germination rate with the highest amount of multiple shoots (3 shoots per seed) and an average length of 29.56 ± 0.95 mm. However, the germination rate was reduced to 20% by 3% NaCl. Shoot length was increased by culturing on MS medium added by various cytokinin concentrations. MS medium with 1.0 mg/L GA_3 showed the highest average length of 34.13 ± 0.46 mm. The multiple shoots were separated to induce rooting on a half-strength MS (1/2 MS) medium with and without 0.1% activated charcoal (AC) supplemented with different concentrations of auxin (IAA, IBA and NAA) only and a combination of BAP. The optimum 20% rooting was formed in 1/2 MS medium with a combination of 0.5 mg/L IAA and BAP with 0.1% AC, which obtained 3 roots per culture and average root length of 15.36 ± 0.67 mm. 70% of plantlets successfully survived in an open environment after acclimatization in the composition of peat moss and perlite (2:1) under greenhouse conditions for 16 weeks.

Keywords: *Sophora tomentosa*, Shoot multiplication, Root induction, Acclimatization

Micropropagation of Ironwood (*Xylia xylocarpa* (Roxb.) Taub.) by Tissue Culture

Panudom, S.¹, Pongtongkam, P.², Chareonsap, P. P.³, Poeaim, A.¹ and Poeaim, S.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²128/13 Moo5 Tambon Sano Loi, Bang Bua Thong, Nonthaburi, 11110, Thailand; ³Plant Genetic Conservation Project, Chitralada Villa, Dusit, Bangkok 10303, Thailand
Corresponding Email: anurug.po@kmitl.ac.th

Micropropagation is a valuable technique for rapidly increasing the number of trees and conserving specific plant species like *Xylia xylocarpa* (Roxb.) Taub. In this study, the researchers used micropropagation methods to achieve successful germination, shoot and root induction. Seeds were sterilized with 70% ethanol, 0.1% Carbendazim, 6% NaOCl, 0.1% Antibiotic and Cefotaxime and Preservative for plant tissue culture media active (PPM) for 10 min. It was found that the sterilization procedure was highly effective, resulting in a 100% survival rate. After sterilization, the seeds were cultured on a half-strength Murashige and Skoog (MS) medium without adding plant growth regulators (PGRs). A maximum germination percentage of 100% was achieved after 2 weeks of culture. 1.5 cm-sized node segments from both seeds and mother trees were used for shoot induction. These node segments were treated with the same sterilization conditions as the seeds but with the addition of 0.1% HgCl_2 . The node segments achieved a 90% survival rate despite the additional chemicals. The node segments from seeds were then cultured on a full-strength MS medium supplemented with 0.50 mg/l of BAP. The results showed a maximum number of shoots, reaching 4.10 ± 1.20 per explant and a mean shoot length of 3.87 ± 0.30 cm. The part of node segments derived from mother trees showed 3.50 ± 1.27 shoots per explant, accompanied by a mean shoot length of 3.18 ± 0.89 cm when using BAP concentration of 0.25 mg/l after 12 weeks of cultivation. The rooting medium contains half-strength MS medium supplemented with 0.75 mg/l of IBA. After 8 weeks of being cultured in the rooting medium, the shoots exhibited a maximum rooting percentage of about 80%. The technique provides a valuable method for rapidly propagating and conserving this plant species in a controlled and efficient manner.

Keywords: Fabaceae, Micropropagation, Node segments, Shoot induction, *Xylia xylocarpa* (Roxb.) Taub.

The biological activities of the methanolic extract of Santol (*Sandoricum koetjape*) fruits

Poeaim, S.¹ and Pedklang, N.²

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520 Thailand; ²Department of Science and Bioinnovation, Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand

Corresponding Email: naruporn.p@ku.th

This study aimed to investigate the biological activities of phytochemicals, antibacterial, antioxidant, anti-tyrosinase and cytotoxic activities from flesh and peel of Santol (*Sandoricum koetjape*) fruit by macerating with methanol. Phytochemical screening in the methanolic extracts revealed the presence of tannin, coumarin and betacyanin. Saponin was found only in the flesh, and alkaloid was found only in the peel extracts. For antibacterial activity, the extract concentration at 2000 micrograms per disc was found to have inhibitory effects on the growth of *Bacillus cereus* and *Staphylococcus aureus* but no inhibitory effect on the growth of *Escherichia coli*. DPPH and ABTS methods for antioxidant activity, the peel extract exhibited higher activity than the flesh extract. The IC₅₀ values of methanolic extracts from the peel of Santol fruit were 30 and 48 micrograms per milliliter for DPPH and ABTS, respectively. Tyrosinase inhibitory activity was determined by the dopa-chrome method. The peel extract showed higher tyrosinase inhibitory activity than the flesh extract, with 76.37% at 1 milligram per milliliter. For cytotoxicity activity, the flesh and peel of Santol extracts at a concentration of 2000 micrograms per milliliter showed the cytotoxic effect on Human colorectal adenocarcinoma cell line (HT-29) and African green monkey kidney cell line (Vero) at 47.39 and 37.18 percent, respectively. This research showed the pharmacological potential of the Santol fruit extracts for further testing to develop as products.

Keywords: *Sandoricum koetjape*, Santol, Bioactivities

Plant regeneration of *Bauhinia purpurea* by tissue culture technique

Saparam W.¹, Poeaim A.^{1*}, Pongtongkam P.², Chareonsap, P. P.³ and Poeaim S.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520, Thailand; ²128/13 Moo5 Tambon Sano Loi, Bang Bua Thong, Nonthaburi, 11110, Thailand; ³Plant Genetic Conservation Project, Chitralada Villa, Dusit, Bangkok 10303, Thailand.

Corresponding Email: rreiazbiores@gmail.com

Bauhinia purpurea is well known as the source of *Bauhinia purpurea* agglutinin (BPA), widely applied in biochemical, immunochemical and histochemical studies. The ordinary propagation of *B. purpurea* it is fastidious because the trees have many problems, including viruses, diseases and animals feeding on their seeds and plantlets. Therefore, the objective of this study is to

estimate the number of *B. purpurea* rapidly and without mutation and reduce the problems that were the cause of the extinction of trees in the future by using the plant tissue culture technique. The sterilized seeds were inoculated on half-strength Murashige and Skoog (MS) medium supplemented with 3.0 mg/L Gibberellic acids (GA₃) that were 100% germinated and gave 71.137 mm for the highest seedling. The nodal segments from natural trees were sterilized with 20% Teepol detergent solution in the pre-sterilizing process, followed by sterilizing agents, including 0.1% fungicide, 20% Sodium hypochlorite (NaOCl) and 1.0% Mercuric chloride (HgCl₂). Both nodal segments (from natural trees and seeds) were placed on MS medium supplemented with 1.0 mg/L 6-benzylaminopurine (BAP) for shoot induction, and the result showed that 24.270 mm was the highest proliferation of shoots. The highest number of roots was 2.867, and the highest root length was 33.453 mm, obtained at half-strength MS medium supplemented with 0.25 mg/L Indole-3-acetic acid (IAA). The healthy plantlets were planted in a plastic pot, filled with soil and perlite in a 2:1 ratio, and transferred to the greenhouse 2 weeks later.

Keywords: Plant tissue culture, Propagation, Shoot induction

Genetic characterization of cassava (*Manihot esculenta* Crantz) cultivars using ISSR molecular marker

Poeaim, S.¹, Sansanee, S.², Chantaraprasit, T.³ and Tangthirasunun, N.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520 Thailand; ²Rayong Field Crops Research Center, Department of Agriculture, 320 Huaypong, Muang, Rayong 21150, Thailand; ³Department of Industrial Design, School of Architecture, Art, and Design, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok 10520, Thailand

Corresponding Email: supattra.poe@kmitl.ac.th

We aimed to analyze a set of 22 cassava varieties for genetic diversity using an inter-simple sequence repeat (ISSR) molecular marker. Genetic similarity was constructed from Jaccard's similarity coefficients matrix using the unweighted pair group method with arithmetic average (UPGMA). The genetic similarity coefficient ranged from 0.73 to 0.94. The similarity coefficient at 0.73, cluster analysis clustered 22 cassava varieties into two significant groups. The first group is the sweet variety of cassava used for consumption, consisting of Rayong 2, Ha-na-tee and variegated leaves used for decoration. Another group, the bitter variety of cassava used for industry, consists of Rayong 1, Rayong 3, Rayong 5, Rayong 7, Rayong 9, Rayong 11, Rayong 15, Rayong 60, Rayong 72, Rayong 86-13, Rayong 90, Kasetsart 50, Kasetsart 72, Huay Bong 60, Huay Bong 80, Huay Bong 90, Pirun 1, Pirun 2 and unknown. The sweet and bitter variety contains different levels of cyanide content. So, the ISSR marker can be used to characterize two major cassava varieties.

Keywords: Cassava, *Manihot esculenta*, ISSR, Molecular marker

The Effect of BA on Inducing Shoots of *Philodendron erubescens* 'Pink Princes' In Vitro

Chiewchan, N.¹, Saetiew, K.¹ and Teerarak, M.¹

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok, Thailand.

Corresponding Email: kanjana.sa@kmitl.ac.th

The study investigated the influence of plant growth regulator on the induction of direct shoots from node explants of *Philodendron erubescens* 'Pink Princes' within an in vitro condition. The node explants were cultured on a Murashige and Skoog medium (MS) supplemented with benzyladenine (BA) at varying concentrations 0, 0.1, 0.5, and 1 mg/l. The cultures were incubated in a growth room at a temperature of $25 \pm 3^\circ\text{C}$ and a photoperiod of 16 hours under white LED light (PPFD $40 \mu\text{mol m}^{-2}\text{s}^{-1}$) for a duration of 18 weeks. The result showed that the most of width, length, and height was observed in MS + BA 0.5 mg/l, measuring 3.40 cm × 3.22 cm × 1.96 cm and 1.74 g fresh weight. The highest number of shoots was consistently observed 60.44 shoots per nodal MDA content (1.91 nmol/g FW) and phenolic content (9.51 mg GAE/g FW) are lowest. The explant were cultures on MS medium performed highest chlorophyll content (chl A 213.96 $\mu\text{g/g}$ FW, chl B 162.54 $\mu\text{g/g}$ FW, total chlorophyll 304.64 $\mu\text{g/g}$ FW) and carotenoid content (2.61 $\mu\text{g/g}$ FW) Moreover, they are the largest plant with green leaves when compared to another treatment.

Keywords: Shoot induction, Plant growth regulators

Seed physio-biochemical quality of chili (*capsicum frutescens*) in different seed maturity

Hairani, P. M.¹, Sudjatmiko, S.¹, Setyowati, N.¹, Diaguna, R.² and Triyostin, W.³

¹Crop Production Department, Faculty of Agriculture, The University of Bengkulu, Bengkulu 38121, Indonesia; ²Department of Agronomy and Horticulture, Faculty of Agriculture, IPB University, Bogor 16680, Indonesia; ³Postgraduate School, Faculty of Agriculture, IPB University, Bogor 16680, Indonesia.

Corresponding Email: putrimh@unib.ac.id

Based on the experimental findings, it is evident that mature red chili peppers exhibited the greatest seed vigor. Specifically, these peppers demonstrated a seed vigor index percentage of 62.67% and a seed growth rate of 40.91% etmal^{-1} . There was a positive correlation coefficient observed between the seed vigor parameter of mature red chili peppers and the parameters of fruit chlorophyll and carotenoid content. In contrast, it was shown that the chlorophyll content of the fruit had a negative association with both the germination rate and seed vigor index in fruits of both second mature red and first immature red fruits. The fruit's carotenoid concentration shown negative associations with the seed vigor index in both second mature red and first immature red fruits, as well as negative associations with the germination rate of first immature red fruits.

Keywords: Fruit ripening, Seed quality, Seed viability, Seed vigor

Session 8:

Organic Agriculture and Smart Farms

Study of Insect Pests and Natural Enemies on Sticky Traps in Organic Lettuce Fields

Lakyat, A., Pumnuan, J., Doungnapa, T., Ruddit, A. and Thipmanee, K.

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: jarongsak.pu@kmitl.ac.th

The once of key principles of integrated pest management (IPM) program in agriculture is pest population study and assessment of before eradication action. The sticky traps are a common method useful for monitoring an area crop, and also could be controlling insect pests. The objective of this study was to survey insect pests and natural enemies appearing on various sticky trap colors in organic lettuce fields located in Bangkok, Thailand. Cos lettuces were grown in 8 blocks (wide x long = 1x5 m), and each block containing 3 rows of lettuce. Vermicompost and chicken manure compost were applied for this cos lettuce production and also with non pesticides application. The different capability of sticky trap colors including white, red, blue, green, yellow, orange, purple and black (size as wide x long = 15x15 cm) was evaluated. Those together three colors sticky traps were randomized and placed in each block, with a distance equal to 1.5 m and 30 cm height from the ground. The insect pests and natural enemies found on sticky traps were collected and assessment every 7 days with 4 times per 1 crop in February to March 2022. The results of this insect survey on sticky traps showed that chili thrips (*Scirtothrips dorsalis*) was the most abundance, followed by cowpea aphids (*Aphis craccivora*). These thrips and aphids were most found on blue and yellow sticky traps, respectively. Whereas, the survey of insect natural enemies on sticky traps presented that wasp in the family Pteromalidae as well as Mymaridae and Figitidae and short-winged beetles in the family Staphylinidae were found. Those insects were most found on yellow sticky trap, followed by red and black sticky traps, respectively.

Keywords: sticky traps, IPM, vegetable, thrips, aphids

Light-emitting diodes and temperature effects on lettuce growth and its yield in plant factory

Rittiram, J.¹ and Tira-umphon, A.^{1,2}

¹School of Crop Production Technology, Institute of Agricultural Technology, Suranaree University of Technology, Nakhon Ratchasima, Thailand; ²Innovation of Quality Enhancement of Agricultural Products for Agro-Industry-Research Center, Suranaree University of Technology, Nakhon Ratchasima, Thailand.

Corresponding Email: arak@sut.ac.th

Seedlings of lettuce in vertical hydroponics grown have nutrient solution was renewed every week and adjusted to pH 5.5-6.5, EC of 1.5-1.8 mS.cm⁻¹ and a factorial experiment in completely randomized design (CRD) with two factors including 4 varieties of lettuce (Butter head, Red Oak, Green Oak and Cos) and 5 treatments with different light quality and temperature maintained modes described below 1) maintained at 23 °C conjunction with white light-emitting diode (LED) 2) maintained at 23 °C conjunction with Mix LED 3) maintained at 25 °C conjunction with white LED 4) maintained at 25 °C conjunction with Mix LED and 5) sun light were used in this study. In treatments maintained a 16 h/day photoperiod and light intensity of approximately as

photosynthetic PFD of 100-120 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ and harvested at 50 days after sowing. The result found that the interactions among the two factors studied on growth and yield of lettuce were significant ($P<0.01$). Lettuce grown under maintained at 25 °C conjunction with white LED had the significantly highest plant width, plant height and leaf number, shoot fresh weight, shoot dry weight equivalent to sun light, and variety of lettuce found highly significant Cos varieties most responsive in plant factory followed Green Oak, Red Oak and Butter head varieties that respond the least. The white LED light were achieved in several plant growths, can be implicated for the efficient production of light for crop production in the future.

Keywords: plant factory, light-emitting diode (LED), lettuce

Lotus Flower Extract as a Natural Anti-browning Agent for Fresh Romaine Lettuce (*Lactuca sativa* L. var. *longifolia*)

Pradabkun, N., Yeamsuriyotai, K., Teerarak, M. and Saetiew, K.

Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
Corresponding Email: montinee.te@kmitl.ac.th

The effect of lotus (*Nelumbo nucifera* Gaertn.), butterfly pea (*Clitoria ternatea*) and Siam tulip (*Curcuma sessilis*) aqueous extract on reduction of polyphenol oxidase (PPO) and peroxidase (POD) in romaine lettuce (*Lactuca sativa* L. var. *longifolia*) were evaluated. Results showed that *in vitro* lotus flower aqueous extract exerted the highest reduction of PPO and POD activities on the romaine lettuce. The effectiveness of *in vivo* application of lotus flower aqueous extract to control browning cut stem ends of fresh romaine lettuce (*Lactuca sativa* L. var. *longifolia*) was examined. Romaine lettuce harvested as a whole plant and cut off at the stem. Cut stem ends of romaine lettuce were dipped in various concentrations of lotus flower extract for 5 min and packaged in polypropylene plastic bags. Weight loss, color, browning index as well as PPO and POD activities were evaluated during 12 days of storage at temperature of $10\pm 2^\circ\text{C}$ and relative humidity $50\pm 5\%$. Cut stem ends dipped in 0.5% aqueous extract of lotus flower resulted in inhibition of browning of cut stem ends and decrease in PPO and POD activities. Thus, exogenous 0.5% aqueous lotus flower extract treatment could be a useful application to alleviate browning in cut stem ends of fresh romaine lettuce.

Keywords: Browning, Colour, Polyphenol oxidase, Peroxidase, Weight loss

Young consumers' perceptions and willingness to pay for organic rice: a case study in Kochi, Japan

Thanakorn, C.¹, Suneeporn, S.¹ and Koji, K.²

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand; ²School of Economics and Management, Kochi University of Technology;
Corresponding Email: ksuneeporn@gmail.com

As the organic rice market in Japan undergoes rapid transformation, understanding young consumers' preferences becomes increasingly essential. This study investigates the perceptions and willingness to pay (WTP) for organic rice among 107 young consumers in Kochi, Japan. The

study reveals key insights by utilizing a survey questionnaire and applying descriptive statistics and logistic regression for analysis. While education and income emerged as influential factors, a significant gender imbalance was observed, with females making up 67% of the sample. Interestingly, 56% of respondents were unwilling to pay a premium for organic rice, contrasting with the 44% who were willing, mostly within a modest premium range of less than 10%. The study finds that despite a high perception of organic rice being safer and more environmentally friendly, these factors minimally influenced WTP. Health and gender stood as statistically significant predictors in logistic regression models, emphasizing the role these factors play in shaping consumer behavior. These findings underline the need for targeted marketing and educational campaigns, contributing to the growth of Japan's sustainable organic rice sector.

Keywords: young consumers, organic rice, perception, willingness to pay

Effect of Organic Fertilizer Quantity on Yield and Seed Qualities of Rice

Kaewtaphan, P.¹, Nilkong, P.² and Maniin, P.²

¹Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.²Faculty of Agricultural Innovation, College of Agricultural Innovation and Food, Rangsit University, Phthumthani, Thailand.

Corresponding Email: pranot.m@rsu.ac.th

Using organic fertilizer can reduce production costs. It is a way to help increase rice yields for farmers and reduce the amount of chemical fertilizer that affects the ecosystem and farmer health. Therefore, this experiment will study the quantity of organic fertilizer on the yield and seed qualities of organic rice Pathumthani 1. There are four methods, which consist of non-fertilizer (method 1), the rate of organic fertilizer 10 kgN/rai (method 2), the rate of organic fertilizer 12 kgN/rai (method 3), and the rate of organic fertilizer 14 kgN/rai (method 4). The effect of organic fertilizer quantity on the yield and seed qualities of organic rice Pathumthani 1 shows that 10 kgN/rai of organic fertilizer has the highest seed germination (%), germination index, and pure seed (%) maximum. In addition, the 10 kgN/rai rate has the least inert matter and the lowest number of dead seeds. The average yield of Pathumthani 1 in this method is 424 kg per rai.

Keywords: Pathumthani1 rice seed, Organic fertilizer, Yield, Seed Quality

Factors affecting purchase decisions for organic dried noodles of the community enterprise in Chachoengsao Province, Thailand

Saengnang, B.¹, Suwanmaneepong, S.¹ and Mankeb, P.

School of Agricultural Technology, King Mongkut's Institute of Technology, Ladkrabang, Bangkok, Thailand.

Corresponding Email: suneeporn.su@kmitl.ac.th

This study investigates the interplay between consumers' demographics, purchasing behaviors, and perceptions concerning the critical marketing mix elements, encompassing product, price, place, and promotion (the 4Ps). This analysis focuses on buying decisions related to Organic Dried Noodles (ODN) produced by the Sanam Chai Khet community enterprise in

Chachoengsao province, Thailand. Employing a quantitative research design, data was gathered from 320 respondents, primarily followers of the enterprise's Facebook fan pages and its target customer base, through online questionnaires. The data underwent rigorous analysis using both descriptive statistics and logistic regression analysis. The findings illuminate that the typical potential buyer of ODN is a female aged 40-50 years, demonstrating a propensity for online purchases. Notably, the paramount determinants influencing their purchasing decisions gravitate towards product attributes: the presence of trusted quality certifications like the FDA seal, comprehensive product information detailing benefits or nutritional content, and the credibility and traceability of the brand. These insights offer valuable guidance for businesses, empowering them to fine-tune their marketing strategies and product offerings to better align with consumer preferences and demands.

Keywords: dried noodles, consumer behavior, marketing mix

Factors Affecting the Adoption of Smart Root Washing Innovation of Commercial Vegetable Growers in the Eastern Suburbs of Bangkok, Thailand.

Napassakorn, S.¹ Suwanmaneepong, S.¹ and Llonas, C.²

¹School of Agricultural Technology, King Mongkut's Institute of Technology (KMITL), Bangkok, Thailand; ²School of Economics and Management, Kochi University of Technology
Corresponding Email: ksuneeporn@gmail.com

This study explored the acceptance and factors influencing smart root washer technology integration among commercial vegetable growers in the eastern suburbs of Bangkok, particularly in Ladkrabang, Min Buri, and Nong Chok districts. Surveying 30 farmers, the study employed descriptive and multiple regression analyses for data interpretation. Key findings indicated that 70% of the respondents were male, and the majority cultivated leafy vegetables such as kale, coriander, and morning glory. Natural canals emerged as the primary water source, with manual labor being the dominant washing method used by 10% of the participants. A significant challenge, identified by 73.3% of growers, was the sub-optimal cleanliness during vegetable washing. As for the smart root washer's adoption received a moderate perceived utility score of 3.44, mirroring ratings for ease of use/complexity (mean=3.45). There was a consistent moderate perception across other adoption parameters, including observability (mean=3.44) and risk (mean=3.45). The technology's adoption trajectory encompassed knowledge, persuasion, decision-making, implementation, and confirmation stages, registering moderate acceptance levels, with scores ranging between 3.28 and 3.45. In summation, this research illuminates the dynamics and determinants shaping the uptake of the smart root washer among Bangkok's eastern suburb vegetable farmers. The insights garnered are instrumental for stakeholders aiming to bolster innovative agricultural techniques within the locale.

Keywords: Root washer, vegetable, innovation, adoption

Non-destructive measurement of Tetrahydrocannabinol (THC) and Cannabidiol (CBD) using near-infrared spectroscopy

Deewatthanawong, R.¹, Kongchinda, P.¹, Chanapan, S.¹, Tontiworachai, B.¹, Sakkhamduang, C.¹, and Montri, N.²

¹Expert Center of Innovative Agriculture, Thailand Institute of Scientific and Technological Research, Pathum Thani, Thailand.

²Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.

Corresponding Email: nattaya.mo@kmitl.ac.th

Tetrahydrocannabinol (THC) and cannabidiol (CBD) are cannabinoids produced by cannabis plants and major compounds found in cannabis products. This study aims to develop a predictive method for non-destructive quantification of THC and CBD. High-performance liquid chromatography (HPLC) conditions were optimized for CBD and THC analyses of samples used in this experiment. Spectral range of 1600-2400 nm was tested for NIR absorption using cannabis extract samples. Predictive equation of THC and CBD were analyzed using Partial least squares regression (PLSR) and predictive calibration models were developed from spectra of cannabis extracts. THC predicted equation showed coefficient of determination (R-squared) and root mean square error of calibration (RMSEC) values of 0.9994 and 0.1926, respectively. The R-squared and RMSEC values of CBD equation were 0.9995 and 0.0006, respectively. Prediction testing was conducted using unknown samples for prediction of THC and CBD concentrations. Predicted values were then compared with HPLC analysis results of the same samples to evaluate the performance of the calibration models. Both methods had regression correlation of 0.9078 for THC measurement and 0.9413 for CBD determination. The test indicated NIR could be a promising alternative method for THC and CBD evaluation.

Keywords: NIR, cannabinoid, THC CBD

Identification of SRAP and AFLP molecular markers associated with fruit traits in Santol (*Sandoricum koetjape*)

Poeaim, S.¹, Pedklang, N.², Sabpayakom, N.¹ and Vanijajiva, O.³

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL); ²Department of Science and Bioinnovation, Faculty of Liberal Arts and Science, Kasetsart University; ³Faculty of Science and Technology, Phranakhon Rajabhat University.
Corresponding Email: supattra.poe@kmitl.ac.th

We investigated the genetic diversity of Santol (*Sandoricum koetjape*) cultivated in Nonthaburi, Lop Buri, Nakhon Nayok and Prachin Buri provinces via sequence-related amplified polymorphism (SRAP) and amplified fragment length polymorphism (AFLP) markers and compared the efficiency of both techniques. The results showed that both techniques effectively divided Santol into two significant groups, large and small-sized fruits. Large-sized Santol consists of Puifai, E-lah and Khanham cultivars, while small-sized Santol consists of Tubtim, Thongkammayi, Nimnuan, Thongbaiyai, Khiaowan and Khanthong. The results are in line with the studies of Santol fruit weight. When analyzing the genetic diversity by combining SRAP and AFLP, it was found that the efficiency of sample clustering increased and showed similar results as the AFLP technique. This study is the basis for studying the genetic diversity of Santol cultivar identification and plans for improving Santol cultivar in the future.

Keywords: *Sandoricum koetjape*, Santol, SRAP, AFLP

Inhibitory effects of gardenia flower essential oil emulsion on browning appearance in jasmine (*Jasminum sambac* Ait.)

Yeamsuriyotai, K., Pradabkun, N., Yonsawad, N., Teerarak, M. and Lasinwattana, C.

Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.

Corresponding Email: montinee.te@kmitl.ac.th

Jasmine (*Jasminum sambac* Ait.) flowers after harvest have delicate petals resulting in rapid browning petals. The effect of plant essential oils on reduction of peroxidase in jasmine flower were evaluated. Peroxidase activity obtained from jasmine flowers was inhibited by gardenia flower (*Gardenia augusta* (L.) Merr.) essential oil. Gardenia flower essential oil was selected to minimize browning appearance in jasmine flower. To dissolve essential oils in water, oil-in-water emulsions prepared with gardenia flower essential oil and the surfactant of Tween 80 + Span 20 in the ratios of 1:3.5 were mixed together and obtained to microparticle size of 240.7 nm with ζ - potential of 14.57 mV. The effect of gardenia flower essential oil treatment on browning and postharvest quality of jasmine was evaluated. Jasmine flowers were dipped in various concentrations of gardenia flower essential oil emulsion for 5 min, packed in polyethylene plastic bags and stored for 24h at room temperature ($27\pm 3^\circ\text{C}$) with relative humidity $66\pm 5\%$. The data of weight loss, color change, browning index, flower opening, loss of fragrance and electrolyte leakage was recorded very six hours. The results revealed that jasmine flower dipped with 0.5% gardenia flower essential oil emulsion showed the positive effect on flower opening, delayed weight loss, and maintained membrane integrity.

Keywords:

Effects of Plant Growth regulators on nodal regeneration of *Rhynchosytilis* orchid by plant tissue culture

Poeaim, A., Boonmee, W. and Poeaim, S.

¹School of Biology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520, Thailand.

Corresponding Email: anurug.po@kmitl.ac.th

In this research, the tissue culture of *Rhynchosytilis* orchids was used to study the effects of plant growth regulators (PGRs). The nodals of *Rhynchosytilis* orchids were cultured on Murashige and Skoog, 1962 (MS) and Knudson C (KC) medium supplemented with 6-benzylaminopurine (BAP), N-phenyl-N-1,2,3-thidizuron-5-yl urea (TDZ), Meta-topolin (*mT*) and 6-(4-hydroxy-3-methyl-trans-2-butenylamino) purine (Zeatin) at different concentrations (0, 0.5, 1, 2, 3, 4 and 5mg/L.). Moreover, it studies the optimal condition for sterilizing the explants of *Rhynchosytilis*. The best condition was using distilled water with 0.15 percent Mercuric Chloride; the highest average number of uncontaminated samples was 86.67 percent. Furthermore, in this study, the optimal condition for plant regeneration from nodals was MS medium supplemented with 2 mg/L. The BAP gave the highest average length of shoot, the number of shoots, the number of leaves and the number of roots were 1.81 cm., 4.20 shoots, 8.20 leaves and 5.00 roots for 8 weeks,

respectively. Moreover, the highest number of protocorms was found in this condition. However, the results showed that the MS medium was more optimal for culturing the explants than the KC medium. The plantlets survived after being transplanted into pots and covered with plastic bags for five weeks.

Keywords: *Rhynchosyilis*, sterilization, plant growth regulator and protocorms

Session 9:
Agricultural Sciences

Assessment of drought in Tamil Nadu based on the Standard Precipitation Evapotranspiration Index

Natarajan¹, J. John Irudaya Raj¹, A. Ganesh Kumar¹, R. Surya Kumar¹

Department of Civil Engineering, Dr. Mahalingam college of engineering and technology, Pollachi – 642003

Droughts pose significant challenges to water resource management, agriculture, and ecosystems. To effectively monitor the drought conditions, the assessment of reliable drought index is crucial. In this study, evapotranspiration (ET) based drought index Standard Precipitation Evapotranspiration Index (SPEI) was calculated for 38 districts of the state of Tamil Nadu, India. To conduct this study, 40 years rainfall and temperature data was collected and SPEI was estimated using the R software. Results suggest that all the districts fall under the category of moderately dry.

Keywords: Drought, Agriculture, SPEI

Osmoadaptation and plant growth promotion by osmolyte - producing rhizobacteria under drought in *Arachis hypogaea* L.

Sakthi Uma Devi E¹ and Dr. S. Lalitha^{2*}

¹Research Scholar, Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem 636011, Tamil Nadu, India

²Assistant Professor, Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India

Drought stress adversely affects plant health and productivity. Drought-resistant bacterial isolates are used to combat drought resistance in crops. Osmotic variations in the soil can affect bacterial growth diminishing the number of inoculated bacteria. In a scenario of water deficit having tolerant bacteria would be beneficial to achieve a better response of the plant to stress. Thus, selection of more resistant bacteria could be useful to design new inoculants to be used in arid zones. Therefore, PGPR is an effective vaccine capable of developing and improving drought tolerance in dryland plants. Bacterial osmolytes and their accumulation have been shown to promote survival of bacteria under drought conditions. The current investigation illustrated the osmoadaptive characters of PGPR to ameliorate drought stress tolerance, plant growth and nutrient status of groundnut. The two most efficient isolates were selected and identified using 16S rRNA gene sequencing. They were registered in the NCBI database and deposited under accession numbers. PGPR isolates deposited in NCBI collection was characterized in order to select strains tolerant to osmotic stress. These isolates were screened for plant growth-promoting properties compared to non-stressed conditions. All screened bacterial isolates exhibited potential plant growth promoting (PGP) attributes such as production of exopolysaccharide, siderophore, ammonia, IAA, and efficiently solubilised phosphate under *in vitro* conditions. To assess the *in situ* plant growth promotion potential of PGPR, a greenhouse experiment was conducted by priming groundnut seeds with screened plant PGPR. The isolated mixture (PGR1 and PGR2) protected the plant from the harmful effects of drought and showed an

increase in the measured variables. Improved water status, osmolyte accumulation, chlorophyll and carotenoid content and ROS scavenging enzymes in plant leaves confirmed the excellent drought tolerance conferring ability of PGR1 and PGR2. Inoculation of groundnut plants with this strain resulted in a better response, encouraging us to develop new inoculants suitable for areas with water deficit. Thus, the outcome of this comparative investigation indicates that PGPR could be utilized as bioinoculant in groundnut since they can improve the physiological status, productivity and nutrient status of groundnut under drought.

Keywords: PGPR, Drought, Tolerance, Groundnut.

Differential gene expression analysis reveals genes commonly expressed between different insect orders

Julie Rebecca Joseph Mathari¹, S. K. M. Habeeb^{*1}

¹Bioinformatics and Entomoinformatics Lab, Department of Genetic Engineering, SRM Institute of Science and Technology, Kattankulathur 603203

Cotton is a very important cash crop in our country. India stands second in the world to produce cotton and fifth for the export of cotton. The cotton crop, however, undergoes several biotic and abiotic stresses during its lifespan. The biotic stress that the crop undergoes mainly includes pest infestation. Cotton is affected by nearly 1300 species of pests of which 40 are key pests. Pest infestation causes losses of around 4-5% in the cotton crops. The study is focused on understanding the gene expression patterns of the different major pests affecting cotton crops using transcriptome analysis. The species spread across the different orders of the class Insecta i.e., Hemiptera, Lepidoptera, Orthoptera, and Thysanoptera were considered in this study. The gene expression patterns of these species were studied in order to understand the transcriptome dynamics of the different species. We have tried to understand the pattern of expression of different genes and identified a few common genes. We set the p-value and FDR to greater than 0.05 and log2foldchange to less than -10 for downregulated and greater than 10 for upregulated genes. We tried to identify common genes and a matrix was prepared for the same. The genes identified in the study may provide useful information for studying the behavior of different pest species.

Keywords: Cotton, Next Generation Sequencing (NGS), differential gene expression, insect orders.

Seasonal Dynamics of Soil Fertility and Arbuscular Mycorrhizal Associations in Kerala's Black Pepper (*Piper nigrum* L.) Fields: A Comprehensive Investigation for Sustainable Cultivation Practices

Rositta Varghese

In order to ascertain the reason behind the limited yield and productivity of black pepper in Kerala, which is one of the origins and largest cultivation areas of the crop in the country, this study examines the soil fertility status and arbuscular mycorrhizal (AMF) association of the traditional black pepper growing fields in Kerala. Additionally, the study investigates the feasibility of employing AMF as an effective ecotechnological tool for sustainable black pepper cultivation. Comparative analysis was possible with the collection of 266 root and soil samples from 133 fields over two seasons in two agroclimatic zones of the five districts in Kerala where black pepper was cultivated most extensively. Spore density and percentage root colonisation in relation to parameters of soil fertility are evaluated using established procedures. The findings indicated that the soil fertility parameters and spore density in the black pepper fields exhibited significant seasonal variations. The majority of pepper-growing fields exhibited an acidic pH, elevated total organic carbon (TOC) levels, diminished soil available nitrogen (SAN), elevated soil available phosphorous (SAP), and moderate soil available potassium (SAK). SAN and SAK, SAP and SAK, pH and field water content (FWC), FWC and TOC, AMF colonisation and FWC, spore density and pH were found to be positively correlated. Conversely, SAK and SAN, TOC and SAP, FWC and TOC, and spore density and SAN exhibited negative correlations. In general, the survey facilitates the determination of the current state of soil fertility in black pepper fields throughout the state, as well as the seasonal patterns of association between AMFs and soil fertility parameters. This allows further investigation into the integration of AMF into sustainable black pepper cultivation, taking into account its correlation with edaphic factors and seasonality and capitalising on the advantages of native AMF in black pepper farming.

Keywords: Pepper, Arbuscular Mycorrhizal Fungi, Soil Fertility

Arbuscular mycorrhizae as an ecotechnological tool for sustainable cultivation of Coconut palms

Sreejamol T N, Joseph George Ray

Laboratory of Plant Science and Ecology, School of Biosciences

Mahatma Gandhi University, Kottayam, Kerala-686560

Since sustainable agriculture remains one of the main goals of the UN Sustainable Development Goals 2030 (SDG 30), it has become imperative to work on alternative agriculture for sustainable production in all crops, including the Coconut Palms. Coconut (*Cocos nucifera* L.) is one of the major commercially cultivated crops and it holds second rank in gross values among the crops in Kerala. Coconut palms are significant to humans in many ways. It serves as the basic resource for multiple products such as functional drinks, functional foods, pharmaceuticals, cosmeceuticals and nutraceuticals, coir, coir pith, grow bags, coir pith briquettes, husk chips, activated carbon, shell charcoal and geotextiles. Coconut farming supports the subsistence of large number of people around the world and plays an important role in the culture and economy of prominent farmers and many smallholders. Thus, it forms an essential crop for the sustainable future world. However, coconut cultivation is becoming unsustainable currently, because of depletion of soil fertility, inadequate nutrition and the attack on the palm by pests and diseases,

and this may also lead to significant yield reduction in coconut palms. The knowledge of native endomycorrhizal association is currently considered inevitable information for sustainable agriculture of all crops. The mycorrhizal association has a very high influence on palms health and immunity.

Although a specific research reports on endomycorrhizal association in coconuts is available, a comprehensive investigation on endomycorrhizal association in Coconut in any part of the country is not conducted so far. In this context, the present study deals with the endomycorrhizal association in coconuts of Kerala. The AMF characteristics in relation to coconut varieties, palm health condition and season are carried out. The results shows that irrespective of the variety, palm health condition and season, AMF root colonization was observed in all the root samples studied from the coconut palms of Kerala. Moreover, twenty-three AMF species belonging to five genera such as Acaulospora, Archaeospora, Funneliformis, Glomus, Sclerocystis, Septoglomus and Scutellospora are identified from the Coconut cultivated fields of Kerala. From this study, it can be concluded that, AMF considered as an inevitable symbiont in coconut palms with significant seasonal variation observed in the root colonization characteristics and AMF spore density. Exploring the arbuscular mycorrhizal interaction offers a promising avenue toward the challenge of developing sustainable coconut cultivation.

A study on the biodiversity and effect of environmental parameters on calliphoridae flies of forensic importance

Balu M Nair, Majesh Tomson

CHRIST (Deemed to be University), Dharmaram College Post, Hosur Road,
Bangalore - 560029, Karnataka, India
balu.nair@res.christuniversity.in

Calliphoridae, commonly known as blowflies, are a diverse family of flies with over 1500 species worldwide. They play a significant role in various ecological and forensic functions in nature by decomposition of animal carcasses, their larvae act as food source for other animals and in forensic they play a major role in determining the post-mortem interval (PMI). In India the studies regarding Calliphoridae is in the developing phase and the studies are important for understanding ecosystem functioning, public health and forensic investigations. From the study a total of 7 species belonging to 3 genera were identified based on the morphological characters. *Chrysomya megacephala* and *Chrysomya rufifaces* are found to be the most abundant species. Furthermore, environmental factors like temperature, humidity and rainfall showed correlation to the Calliphoridae diversity. The study highlights the baseline data on the diversity of blow flies from Kerala along with the importance of environmental parameters on blow flies which can be used for future research.

Keywords: Calliphoridae, diversity, forensic entomology, environment, morphology

Elemental composition, nutritional, and anti-nutritional content of *saraca asoca*, a sacred tree

Monica Suresh and Dr. Manikantan. P

Department of Life Sciences, CHRIST (Deemed to Be) University, Hosur Rd,
Bhavani Nagar, S. G. Palya, Bengaluru, Karnataka 560029

As the population grows alarmingly, it is necessary to utilize available resources wisely to meet the demands. According to the reports by FAO, the global demand for food is expected to increase by 60% in the year 2050 because of this population hike. Food with medicinal values can be a better diet option that serves the dual purpose of meeting daily needs and giving disease resistance power. *Saraca asoca* (L.), commonly known as Sita Ashoka or Ashoka, belonging to the Caesalpiniaceae family, has been used in the Indian ayurvedic traditional system to treat various conditions. Reports showed that leaves of *S.asoka* possess high antioxidant activities in multiple solvents (Shivhare et al., 2023). In the present study, the mineral composition of the *S.asoka* leaves and flowers was analyzed for nutritional and antinutritional factors. Antinutrients in adequate amounts have been demonstrated to lessen blood sugar and insulin responses to dietary cholesterol and starchy meals. *Saraca* contained an appreciable amount of carbohydrates 7.59 ± 0.01 to 9.69 ± 0.13 , crude protein 6.81 ± 0.15 to 8.43 ± 0.12 , Crude fat 23.23 ± 0.35 to 40.63 ± 0.80 , crude fiber 21.73 ± 0.20 to 35.3 ± 0.69 , ash 10.0 ± 0.02 to 17.0 ± 1.02 , moisture content 8.08 ± 0.57 to 10.44 ± 0.05 . The presence of antinutrients was negligible. The elemental composition was also examined and found to have macro and micronutrients. This study provides new insights for the better utilization of plant parts.

Keywords: *Saraca asoca*, antinutrient content, elemental composition, nutrient composition

Invitro studies and bioactive compounds analysis of leaf and stem extract of tridax procumbens I.

Dr. T. Sivakumar

Department of botany, Annamalai university, Annamalai nagar, tamil nadu, india 608 002.
Department of botany, Thiru A Govindsamy government Arts College Tindivanam, TamilNadu, India 604001.
Mail.id: Drtsivanano@gmail.com; 9486420513

The present study was to examine phytochemical screening, antioxidant, and antimicrobial activities of the leaf, stem, methanol and chloroform extracts of *Tridax procumbens*. In recent work, preliminary phytochemicals were extracted from different parts of plants using various solvents ethanol (ETOH), and Chloroform. These phytochemicals include alkaloids, terpenoids, tannins, flavonoids, amino acids, saponins, aromatic acids, phenolic compounds, triterpenoids, xantho proteins, bilopatinins, carbohydrates, sugars, and they are identified by the standard methods. Furthermore, the antimicrobial activities of the ethanolic fraction were determined by different types of bacteria. The agar well diffusion method was used for antimicrobial activity. The evaluation of Phytochemical Screening of extracts indicated the existence of Alkaloids, terpenoids, tannins, flavonoids, amino acids, saponins, aromatic acids, phenolic compounds, triterpenoids, xantho proteins, bilopatinine, carbohydrates, sugar, proteins. All tested bacteria exhibit effective efficacy in leaf extracts compared to stem extracts. The ETOH extract of the leaf observed high antibacterial activity against *Pseudomonas aeruginosa* (13.64 mm), followed by *Salmonella ebonyi* (12.23 mm), *Escherichia coli* (11.55 mm), *Staphylococcus aureus* (10.71 mm) *Micrococcus luteus* (9.65 mm), and *Micrococcus luteus* (8.60 mm) when compared to stem extracts. *Tridax procumbens* leaf extracts highlighted effective antioxidant, antibacterials activities compared with stem extracts against all the tested bacteria. The present study shows that the *Tridax procumbens* plant has significant antimicrobial activity in EtOH

extracts. *T. procumbens* has strong antioxidant and antibacterial activity due to saponin, tannins, and flavonoids present in it.

Key Words: *Tridax procumbens*, alkaloids, phenolic compounds, antibacterial activity.

Assessment of Heavy Metals in Tilapia Fish from Ulsoor and Agara Lakes in Bengaluru, Karnataka, India: An ecotoxicological impact of a metropolitan city

Shashank Ajjigudde Shreenivasa and Krishnakumar Velayudhannair*

Department of Life Sciences, CHRIST (Deemed to be University), Bangalore Central Campus, Hosur Road, Dharmaram Post – 560029, Bengaluru, Karnataka, India.

*For correspondence: krishnakumar.v@christuniversity.in

Fish, a significant source of protein for humans, has been challenged by heavy metal accumulation in recent years, threatening human livelihoods. This study aimed to assess Cadmium (Cd), Copper (Cu), Zinc (Zn), Chromium (Cr), and Lead (Pb) levels in tilapia fish *Oreochromis niloticus* gills, muscles, kidneys, liver, and gonads from Ulsoor and Agara lakes in Bengaluru, India during the pre-monsoon, monsoon, and post-monsoon seasons of 2021-2022. The samples were digested and analysed using an Atomic Absorption Spectrophotometer (AAS). The results revealed that the metals Cd, Cu, and Zn had higher levels in both lakes during the pre-monsoon season, whereas Cr in Agara lake had higher levels during the pre-monsoon season. Pb levels in Ulsoor lake were high during the monsoon season, while Pb levels in Agara lake peaked during the post-monsoon season. Except for Cu, which surpassed the allowed levels recommended by WHO 2006 and FEPA 2003, the metal concentrations in the fish samples stayed below acceptable limits specified by various organizations. Continuous exposure to toxic metals such as Cd, Cr, and Pb, even at low concentrations, has been associated with mental retardation, kidney damage, different cancers, and occasionally death in cases of extremely high exposure in the human body. Therefore, it is crucial to regularly monitor these lakes to prevent potential future consequences.

Keywords: Fish, Heavy metals, Seasons, Permissible limit.

Utilization of *Anacardium occidentale* leaf to extract protein as a Cleansing Agent for Water Purification

Grace Regina E, Shanmugapriya. S, Sanjay. S.

Department of Biotechnology, Rathinam College of Arts and Science, Techzone campus, Coimbatore, Tamil Nadu, India

The treatment of effluents using biological methods such as plants is a intricate waste management option comprising water, substrate, plant leaf and a huge amount of microorganisms which interdepend. A main advantage of this system is that it can be instigated *in situ* where the sewage is produced, with low cost of operation, low energy consumption and operational simplicity. The action is basically using *Anacardium occidentale* to utilize nutrients contained in the effluent and convert to green mass, in other words the plants acting as extractors of macro- and micro-nutrients in the seepage material. In accumulation, such plants may also extract or permit the possibility of transforming materials containing heavy metals and toxic organic compounds that may appear difficult to treat. However, in order to succeed in such treatment option, a selection of plants should first be carried out, which is based on some criteria such as: (i) good natural adaptation to the local climate; (ii) rapid growth and high biomass production; (iii) nutrient absorption capacity; (iv) adaptation and ease of propagation; (v) good

chlorophyll development; (vi) oxygen transfer capacity through leaves by creating aerobic environment. However, due to the great diversity of flora, further research to be continued with antimicrobial and SDS – PAGE for protein and followed by Isolation of amino acid components for water purification process.

Keywords: SDS – Sodium dodecyl sulphate, PAGE- Polyacrylamide gel electrophoresis

A study on development of composite flour with lotous seed flour incorporated products

Kowsalya¹, Dr S. Angeline Esther Preethi², R. Nagajothi³

Department of Home science, Government Arts College For Women, Sivagangai and Research scholar, Department of Foods and Nutrition, Rathnavel Subramaniam College of Arts and science, Coimbatore.

2Department of Foods and Nutrition, Rathnavel Subramaniam College of Arts and science, Coimbatore

3. Government Arts College For Women, Sivagangai.

The study aimed at production and quality evaluation of composite flours incorporated with lotus seed flour. Methods: Flour was respectively produced (conceptual frame work).(A) Ready to prepare Roasted millet coarse grain products - Idly, pongal, upma, adai.(B)Ready to prepare Roasted composite flour mix products (1) Phase I steamed food – puttu , idiappam .(2)Phase II Snacks items - murukku, thattai (c). Phase III sprouted Composite flour Bakery products – Biscuits , cake. This study focused on the use of sprouted millet flour and roasted millet flour mixed with antioxidant rich lotus seed flour incorporated products developed in the form of Phase I,II and III was(1) Steamed food,(2) Snacks items, (3) Sprouted Composite flour Bakery products proportion of S1,S2,S3 list samples of roasted composite flour and sprouted composite flour (S1=55gmR.R + 40gmR.C.F+5gmL.F)(S2=30gmR.R+60gmR.C.F+10gmL.F)(S3=10gmR.R+75gmR.C.F+15gmL.F), S1,S2,S3,sprouted flour(S1=50gmW.F+45gmS.C.F+5gmL.F)(S2=30gmW.F+60gmS.C.F+10gmL.F) (S3=10gmW.F+75gmS.C.F+15gmL.F) respectively before being analyzed for nutritional information and antioxidant assay and functional properties. The functional properties were found to be roasted composite flour. Nutritional value is 76.4gm(Carbohydrate), 12.8gm(Protein), 89.2mg(calcium),3.1mg(iron). The sensory scores S1,S2,S3 and compared with standard result showed S1 and S2 showed highest mean value. Conclusion: The composite flour product produced by roasting and sprouting helps to enhance the bioavailability of the micronutrients and to improve the quality of millet diets by the way of incorporation of lotus seed flour helps to increase the antioxidant property(SCF Antioxidant value was 200µg/g Ascorbic acid and RCF Antioxidant value result was showed 158µg/g Ascorbic acid .The functional and nutritional properties of composite flour helps to overcome life style disease like Diabetes, CVD and Obesity

Key words: Composite flour- Lotus seed, antioxidant-product.

Impact of dietary *Lactiplantibacillus plantarum* feed additive on intestinal histology, digestive enzyme and microbial profile in Pacific white shrimp, *Penaeus vannamei*

N. Lalitha*, T. Sivaramkrishnan, R. Nanthini, Oimps Lunghar and K. Ambasankar

Aquaculture key industrial sector caters the food security and income of the world population. Recent studies focused on the application and positive impact of probiotic dietary supplementation in shrimp to impart beneficial effect to the host by changes in the morphology of the intestine, increase in the production of the digestive enzymes and changes in the microbial load in the gut. The shrimp feed is complex with the composition comprising crude fibre, crude protein, crude lipids which has to be break down to simpler compounds for the digestion and assimilation of the nutrients. Beneficial probiotic supplementation augments these breakdowns of the complex compounds into simpler ones by production of extracellular enzymes. *P. vannamei* were supplemented with probiotic 10^{11} CFU/ Kg of feed (LLP), paraprobiotic (DLP) *L. plantarum* supplemented feed and control (CON) with basal diet for the period of 45-day, to study the its effect on the gut histology, digestive enzymes and microbial load. It was found that dietary probiotics supplementation has the beneficial effect on intestinal histology, digestive enzymes and microbial load. The intestinal histology depicts the villi height, crypt depth and muscular layer thickness was significantly $p(<0.05)$ high in LLP (Villi height - $59.53 \mu\text{m} \pm 10.42$; Crypt depth - $23.68 \mu\text{m} \pm 8.20$; Muscular Layer thickness - $91.92 \mu\text{m} \pm 13.98$) than DLP and CON. The intestinal digestive enzymes specific activity of shrimp trypsin ($20.71 \pm 0.45 \text{ U mg}^{-1}$), chymotrypsin ($8.11 \pm 0.04 \text{ U mg}^{-1}$), leucyl aminopeptidase ($0.21 \pm 0.01 \text{ U mg}^{-1}$) were significantly $p(<0.05)$ high in DLP. LLP supplemented diet showed significantly high $p(<0.05)$ total heterotrophic bacterial count ($7.41 \pm 0.07 \log_{10}$ CFU/ g of gut), and low total vibrio count ($6.79 \pm 0.06 \log_{10}$ CFU/ g of gut). Further, lactic acid bacterial count was $5.72 \log_{10}$ CFU/g gut in the LLP. In conclusion, the probiotic supplementation in the diet impacted the intestinal histology and gut microbial load, whereas paraprobiotic group enhanced intestinal digestive enzymes in *Penaeus vannamei*.

Keywords: *Lactiplantibacillus plantarum*, intestinal histology, digestive enzymes, microbia load, *Penaeus vannamei*

Utilization of *Anacardium occidentale* leaf to extract protein as a Cleansing Agent for Water Purification

Shanmugapriya. S, Sanjay. S, Grace Regina. E. Jayanthi Murugan*

Department of Biotechnology, Rathinam College of Arts and Science, Techzone campus, Coimbatore, Tamil Nadu, India

The treatment of effluents using biological methods such as plants is a intricate waste management option comprising water, substrate, plant leaf and a huge amount of microorganisms which interdepend. A main advantage of this system is that it can be instigated *in situ* where the sewage is produced, with low cost of operation, low energy consumption and operational simplicity. The action is basically using *Anacardium occidentale* to utilize nutrients contained in the effluent and convert to green mass, in other words the plants acting as extractors of macro- and micro-nutrients in the seepage material. In accumulation, such plants may also extract or permit the possibility of transforming materials containing heavy metals and toxic organic compounds that may appear difficult to treat. However, in order to succeed in such treatment option, a selection of plants should first be carried out, which is based on some criteria such as: (i) good natural adaptation to the local climate; (ii) rapid growth and high biomass production; (iii) nutrient absorption capacity; (iv) adaptation and ease of propagation; (v) good chlorophyll development; (vi) oxygen transfer capacity through leaves by creating aerobic

environment. However, due to the great diversity of flora, further research to be continued with antimicrobial and SDS – PAGE for protein and followed by Isolation of amino acid components for water purification process.

Keywords: SDS – Sodium dodecyl sulphate, PAGE- Polyacrylamide gel electrophoresis

Preparation and characterization of *Sargassum wightii* and its biochar

Rekha.A^{1*} and Dr.A.Vidhya²

^{1*} Research Scholar, Department of Microbiology, D.K.M College for Women (Autonomous), Vellore-632001, Tamil Nadu, India.

² Assistant Professor & Head, Department of Microbiology, D.K.M College for Women (Autonomous), Vellore-632001, Tamil Nadu, India

Seaweeds, or macroalgae are highly significant renewable resources in terms of ecology and economy, and their use is growing in light of climate change. The current study compares the structural and functional characterization biochar with the of brown algal seaweed (*Sargassum wightii*) using FT-IR, XRD, TGA, SEM-EDX, and BET analyses. Using elemental analysis (CHNSO), algal biochar was created for one hour at various pyrolysis temperatures ranging from 300°C to 600°C in order to maximize carbon sequestration. The biochar that had the maximum carbon content was found at 600°C. FTIR showed the presence of functional groups such as carboxylate, hydroxyl, and amino groups in the algal biomass's surfaces and the alkyl groups C-H was detected in mannuronic and guluronic acids in biochar. The crystallinity of the biomass and its biochar was enhanced by the interaction between the covalent and non-covalent bonds between the NH₂, OH, C=O, and C=C groups. At the final stage of the thermal analysis, an increased residue of 40.49% and 72.20% had been found among the three stages of the thermogravimetric study. The surface area of the algal biochar was increased to 102.82 m²/g from 2.834 m²/g of biomass. The increased surface area improves the adsorption efficiency of heavy metals. The algal biochar was shown to be more thermally stable than the biomass based on the TGA data. Algal biochar has the potential to remove organic and inorganic pollutants from wastewater and enhanced the soil fertility due to its high nutritional content, ion-exchange capability, and improved carbon sequestration. Algal biosorbents are inexpensive, ecologically friendly, and effective in eliminating toxic heavy metals from soil while simultaneously enhancing soil quality and crop productivity.

Keywords: *Sargassum wightii*, Algal biochar, Characterization, Surface area, Carbon content

Supplementary rice manufacturing from greens for diabetes sufferers

Soundariya Sri.T

B.Tech – Food Technology (III year)

Dhanalakshmi Srinivasan college of engineering and technology, ECR Road, Mamallapuram

Several studies and statistics till today have reported that Diabetes mellitus, a disease that results in too much of sugar in the blood (high blood glucose) are at high rates among the peoples. And the ultimate reason for the increase in blood glucose level is due to the intake of food by the individual. Most of the foods are rich in the sugary carbohydrate content which ultimately increases the blood sugar level. Rice is the major food taken all over the India. As rice normally has high glycemic index (GI) which when consumed at higher rates rapidly increases the blood

glucose level i.e the blood sugar levels leading to several problems and health risks such as damage of the body's system, especially the nerves and the blood vessels. This can be overcome by the use of low glycemic index rice (GI). However the production of low GI rice remains to be accomplished. And here it is reported about the production of low glycemic index rice (GI). This rice which is manufactured from the green vegetables is low in glycemic index (GI) and rich in fiber content. This production is yet to be achieved by the extrusion rice production methods. As the components of this rice is low in glycemic index (GI) and high in fiber content, this rice provides the energy what a diabetic patient normally needs and acts as an excellent supplementary rice for them. Apart from this, not only for the diabetes patients this can also be used for body fitness and weight losing purposes. Weight losing is also a major concern in today's modernized generation. People working in the IT fields and other fields find it hard to lose weight and maintain a fit body due to their working hours and at last it leads to obesity and many other health risks. This can also be overcome by the use of this rice. Therefore this rice is also going to be a beneficiary one for everyone.

Session 10:
Biological Sciences

Heavy metal degradation of *Cajanus cajan* L. by Plant Growth-Promoting Rhizobacteria

C. Sathya¹ & Dr.S. Lalitha²

Ph.D. Research Scholar, Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-11.

² Assistant Professor, Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-11

Plant growth-promoting rhizobacteria (PGPR) are a specific kind of microbes that, through their interactions with plant roots, increase plant development and promote greater resistance to metal stress. We examined the results of mixing the arsenic accumulator *Cajanus cajan* L. with two isolates of As- and Mg-resistant bacteria. To figure out how PGPR and its host plant interact. From soil polluted with heavy metals, two Arsenic and Mercury-resistant PGPR with different growth-promoting qualities were identified. The two isolates were identified as belonging to the *Pseudomonas* genus by 16S rRNA analysis and given the names PSA1 and PSA2. Inoculation may enhance the rhizosphere soil environment and encourage plants to absorb Fe and P, according to pot tests. In addition to increasing the dry weight of shoots and roots of plants growing in As- and Mg-contaminated soil by 1.37 and 1.75 fold, respectively, and by 1.24 and 1.76 fold, respectively. Treatment with PAS1 and PAS2 also distinctly increased the total As (1.52-1.69 fold) and Mg (1.09-1.67 fold) content in aerial organs, compared to non-inoculated controls. Additionally, we observed increases in acid phosphatase activity in rhizosphere soils treated with PAS1 and PAS2, respectively, of 26% and 21%. However, neither the concentrations of As and Mg in plants nor the amount of accessible As and Mg in the rhizosphere soils were significantly different between the inoculated and non-inoculated treatments. We showed that PGPR-assisted phytoremediation is an effective method for cleaning up heavy metal contamination in soils, with the potential to increase phytoremediation effectiveness and boost soil quality.

Keywords: Rhizospheric soil, Concentration, Phytoremediation, Plant growth promoting, Treatment.

Seasonal responses of phytoplankton community in the heterogeneous coastal water regimes of southwestern India: microscopy/HPLC-CHEMTAX approaches

Anil, P. ^{a,b}, *Madhu, N.V ^{a*}., Vishal, C. R. ^a, Gopika, P. ^a, Jyothi, S. ^a, Praveena Sudheesh ^a, Arya, K.S. ^a, GireeshKumar, T. R. ^a

^aCSIR-National Institute of Oceanography, Regional Centre, Kochi, Kerala 682018

^bCochin University of Science and Technology, Kochi, Kerala 682022

The present study elucidates the ecological characteristics of phytoplankton communities in the Chandragiri estuary (CE) and adjacent nearshore waters (<20m depth), southwest coast of India. Seasonal (spring intermonsoon-SIM, summer monsoon-SM, fall intermonsoon-FIM and winter monsoon-WM) sampling was carried out in 7 prefixed stations covering the nearshore and estuarine waters during 2018-2019. The study found that the water column was warm (>29°C), high saline (28-35) and well mixed during the non-monsoon seasons (SIM and WM) with moderate levels of inorganic nutrients. However, the CE appeared to be

freshwater dominated with elevated nutrient levels and turbidity during the SM. Phytoplankton biomass (chl *a*) exhibited distinct seasonality but remained generally low (<5 mg m⁻³) especially during the SM (<1 mg m⁻³). Microscopic analysis revealed the dominance of diatoms (*Chaetoceros* sp., *Cyclotella* sp., *Trieres* sp. etc) followed by dinoflagellates, cyanobacteria and green algae in the CE. The HPLC-CHEMTAX analysis complemented the dominance of diatoms in the CE by a relative increase in fucoxanthin and its substantial contribution to total chl *a* (SIM: 29-95%, SM: 66-89% and WM: 68-88%). By contrast, the increase in zeaxanthin and alloxanthin in the CE during the FIM signifies the dominance of small-sized PFGs (cyanobacteria and cryptophytes). Conversely, the near-shore waters showed the consistent dominance of diatoms, though their numerical abundance and chl *a* contribution was relatively less compared to the estuarine stations. The results revealed significant spatio-temporal variations in phytoplankton composition and chl *a* contributions of each PFGs to the total biomass pool in the CE with respect to the seasonally variable hydrographic properties. By contrast, such variability was less noticeable in the nearshore waters owing to the prevalence of small-scale seasonal hydrographic changes. This study provides information on current biological productivity and pollution status, vital for assessing the prevailing trophic status of the CE and adjacent nearshore waters.

Key words: Phytoplankton; Chlorophyll *a*; HPLC-CHEMTAX; Monsoon; Diatoms

Ecology of Endomycorrhiza in Rice (*Oryza sativa* L.) of South India

Sayona Anna John

Mahatma Gandhi University, Kottayam, Kerala,

Rice cultivation is of global importance, providing sustenance for a significant portion of the world's population. The ecological significance of endomycorrhiza in rice cultivation has gained attention, as these symbiotic fungi have the potential to enhance crop productivity and promote ecosystem sustainability. This oral presentation explores the intricate relationship between endomycorrhizal fungi and rice plants, with a focus on their prevalence and importance in South India. The role of these associations as biofertilizers is highlighted, as they offer the potential for increased crop yields and reduced environmental impacts. To harness these benefits, the environmental components of South Indian rice agroecosystems, including agro-climate, soil types, rice cultivars, and soil physico-chemical parameters, are examined. This analysis leads to the identification of optimal conditions for the symbiotic relationship between endomycorrhiza and rice plants. Understanding these ecological interactions provides a foundation for developing strategies to promote sustainable rice cultivation in South India. By emphasizing the unique attributes of endomycorrhiza in this region, this presentation contributes to a broader understanding of their crucial role in rice production and their potential to drive sustainable agricultural practices.

Innovation technology for microbes in agriculture and sustainable development

Granap Blessy Ramesh¹, Prabakar Singh¹ and Kunal Biswas^{2*}

¹ Department of Biotechnology, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Chennai-119, India

² Centre for Nanoscience & Nanotechnology, International Research Centre, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Chennai-600 119, India

Corresponding author's email: kunalbiswas.irc@sathyabama.ac.in

Agriculture occupies a significant position in global endeavors aimed at achieving sustainable development goals. As the global population continues to expand, the importance of innovative and sustainable agricultural practices becomes increasingly crucial. Microbes, frequently overlooked but indispensable, play a pivotal role in improving soil health, nutrient cycling, and plant growth. This abstract analyzes the convergence of innovation, technology, and microbes in agriculture, highlighting their potential to fundamentally transform sustainable development. Recent advancements in biotechnology, genomics, and precision agriculture have opened up new avenues for harnessing the potential of microbes. These innovations enable the identification and manipulation of specific strains of microbes, empowering farmers to enhance soil fertility and control harmful pathogens. Moreover, digital technologies such as the Internet of Things (IoT) and data analytics allow for real-time monitoring of soil conditions and microbial populations, optimizing resource utilization and minimizing environmental impacts. The integration of microbial technology into agriculture brings numerous benefits. It reduces dependence on synthetic fertilizers and pesticides, thereby mitigating environmental degradation and reducing greenhouse gas emissions. Additionally, microbial-based solutions can enhance crop resilience to climate change and promote crop diversity, ensuring food security in an uncertain future. However, there are challenges associated with adopting these innovations. Disseminating knowledge, ensuring affordability, and providing access to technology are significant factors to consider. Policymakers, researchers, and industry leaders must collaborate to ensure that these innovations are accessible to all, regardless of the scale of farming operations.

In conclusion, the combination of innovation and technology with microbes in agriculture presents an enticing frontier for sustainable development. It offers a pathway to increased agricultural productivity, environmental stewardship, and robust food systems. Embracing these advancements is essential for transforming agriculture and striving for a sustainable and prosperous future for all.

Keywords: Agriculture, Microbes, Sustainable Development.

Enhancing the Utilization of Textile Sludge as Sustainable Construction Materials

M.Sakthivel*², S.Senthilkumar¹, S.Southamirajan³ and S.Elango⁴

^{1,3} Civil Engineering, Kongunadu College of Engineering and Technology, Trichy, India.

^{3,4} Civil Engineering, K.S.R. College of Engineering, Namakkal, INDIA.

(E-mail: senthil.env@gmail.com, s.elango@ksrce.ac.in)

Textile industry is the largest provider of employment after agriculture. It is one of the largest sectors of Indian economy and it contributes rural economy, industrial production and exports. At the same time, it also generates large quantity of effluent which contains high level of Colour, BOD, COD, pH, Total Suspended Solids and Total Dissolved Solids. Hence, the wastewater treatment plants such as Effluent Treatment Plants (ETPs) and Common Effluent Treatment Plants (CETPs) are used to treat these effluents. During the treatment process huge quantity of sludge has been produced. Textile sludge has toxic nature and therefore disposal of sludge on land may cause serious environmental issues. Sludge management practices are more important and becoming global challenge for effective reuse and safe disposal of sludge. Utilization of textile ETP sludge in the manufacturing of non-structural building materials like cement concrete flooring tiles, hollow blocks, solid blocks, common burnt clay building bricks and pavement blocks was reported by researchers. In civil engineering it is obvious that about 60 to 70% of project cost is devoted to building materials like bricks, sand, coarse aggregate, cement etc. Keeping this in mind, the journal used to derive to utilize textile sludge from textile ETP in the making of building materials with improved mechanical properties. Optimize the process parameters with respect to percentage loading of waste materials; furnace temperature etc., to achieve physical and mechanical properties of prepared building materials better than the conventional materials. To characterize and find a potential use of TETP sludge in the making of non-structural building materials such as flooring tiles, pavement blocks, and bricks. The outcome of this article work will certainly bring out a unique process for producing cost effective building materials viz., paver blocks, flooring tiles; bricks etc., using textile ETP sludge.

Keywords: Physical and Mechanical Properties, Textile Sludge, Waste to Wealth

Studies on Reinforcing Scorched Concrete through Self-Repair Mechanisms

Southamirajan S^{*1}, SenthilKumar S², Sakthivel M³, Elango S⁴

^{1,3} Department of Civil Engineering in Kongunadu College of Engineering and Technology, Anna University, Tamilnadu, India

^{2,4} Department of Civil Engineering in K.S.R. College of Engineering, Anna University, Tamilnadu, India

* corresponding author: email address: southamirajan@gmail.com

Bacterial concrete, known as bio-concrete, harnesses microbial activity to facilitate the deposition of calcium carbonate, enabling the self-repair of concrete cracks. This process is not only natural but also environmentally friendly. This study aims to evaluate the performance of concrete and mortar, focusing on aspects such as self-healing, mechanical properties, and durability. The findings of this research highlight the effectiveness of using bacteria to enhance the strength of concrete and mortar, even when subjected to varying external temperatures, such as 100°C, 200°C, and 300°C. Various factors influencing autogenous self-healing were examined, including the composition of the mix, the material's age, the duration of self-healing, and exposure conditions. The investigation covered both surface and subsurface crack healing, encompassing assessments of crack closure, the chemical composition of the resulting self-healing products, microscopic analysis, as well as observations of compressive and flexural strength. One noteworthy observation was that higher cement concentrations tended to reduce the efficiency of the precipitation process in crack self-healing. In conclusion, bacterial concrete

holds great promise for construction, offering the benefits of self-healing, crack repair, and enhanced durability.

Key words: Bacterial Concrete, Biomineralization, MICP, Self-healing, Mechanical, Properties, Durability.

Biodiversity of epiphytes in and around Yercaud hills

Grace Charls¹ & Dr. S. Lalitha²

¹Research Scholar, Department of Botany, Periyar University, Salem-11, Tamil Nadu

²Assistant Professor, Department of Botany, Periyar University, Salem-11, Tamil Nadu

E-mail ID: lara9k@gmail.com

Epiphytes, a significant group of slow growing plants, are more associated with tropical rain forests compared to temperate forests. Orchidaceae are dominant among tropical rainforest epiphytes, possibly due to adaptations to temporary water stress in different climates and microclimates. Orchids make major contributions to the forest communities they inhabit and they are also valued for their horticultural, medicinal, ethical, and edible prospects. Most tropical forests support many tons of epiphytes per hectare, up to, one-third of the local vascular flora. Global research on vascular epiphytes shows that they are extra ordinarily adaptive, unique to forest canopy habitat, and occur in great abundances. This representation is usually related to variations in the local environment, climate and resultant high niche diversification. Therefore, the selection of habitat and climate by different species of epiphytes may closely be interconnected. Canopy epiphytes like a community tend to make a set of micro habitat and micro climatic conditions within the canopy. Epiphytes show specificity not for host species but for host characteristics such as tree architecture bark relief, water retention capacity and allelopathic components and more. The objectives of this study will be to assess patterns of species diversity, abundance, and endemism among epiphytic orchids in Yercaud.

Keywords - Vascular epiphytes, Adaptations, Microclimate and Host specificity

Strength analysis of geopolymer concrete with optimal fiber fraction

¹S.Kavipriya, ²B.Sasivarman.

Professor & Head, Department of Civil Engineering, Kongunadu College of Engineering and Technology- (Autonomous),Trichy ,Tamilnadu, India.

Assistant Professor, Department of Civil Engineering, Kongunadu College of Engineering and Technology - (Autonomous),Trichy, Tamilnadu ,India.

Geopolymer Concrete is a type of concrete that is made by reacting aluminate and silicate bearing materials with a caustic activator. Commonly, waste materials such as fly ash or slag from iron and metal production are used, which helps lead to a cleaner environment. This is because the waste material is actually encapsulated within the concrete and it also does not have to be disposed of as it is being used. This paper focuses on varying the proportions of organic and inorganic fibers such as coir fibers and polypropylene fibers in geopolymer concrete and

evaluating its strength characteristics at ambient temperature. The alkaline activator solution used is a mixture of 10 molar Sodium hydroxide and Sodium silicate in the ratio 1:2. The specimens are cured under room temperature. The mechanical strength properties such as compressive strength tests are conducted at 3 days, 7 days and 28 days. The test results revealed that very high early age strength was achieved in geopolymer concrete by adding fibers. And optimal strength results are achieved by adding 0.5% of coir fibers, 1% of polypropylene fibers and 1% of hybrid fibers. Portland cement-based concrete requires both heat + CO₂. The greenhouse gas emissions are about 1.35 billion tons annually which is about 7% of the total greenhouse gas emissions. Moreover, cement production also consumes significant amount of natural resources. Also, Ordinary Portland Cement (OPC) is traditionally used as a binder for the fine and coarse aggregates. Therefore, to reduce the pollution, it is necessary to reduce or replace the cement from concrete by other cementitious materials like fly ash and GGBS. The main motive is to make the geo-polymer concrete greener by using ambient curing conditions by mixing ground granulated blast furnace slag (GGBS) with Fly ash as a binder for the exorbitant increase in strength in the concrete. Since water plays a major role in any concrete and ineptly water is liberated during the polymerization process in geo-polymer concrete, it is necessary to develop a new mix design procedure for geo-polymer concrete to achieve the desired strength and benedictory workability. Hence, geo-polymer concrete mix design procedure is proposed on the basis of quantity of water to achieve required degree of workability, grading of fine aggregate, solution to fly ash ratio by 0.35, water to geo-polymer binder ratio of 0.35, sodium silicate to sodium hydroxide ratio by 2, and tested after ambient curing for 24 hours and tested for the compressive, split tensile and flexural strengths after 28 days.

Keywords: FA-Flyash, GPC-Geopolymer Concrete, M-Sand-Manufacture Sand

Experimental study on replacement of ceramic waste for fine aggregate in concrete

¹B Sasivarman, ² Dr.S.Kavipriya, ³Dr.R.Nagalakshmi

¹ Assistant Professor, Department of Civil Engineering, Kongunadu College of Engineering and Technology, Trichy. 621215, Tamilnadu, India.

²Professor & Head, Department of Civil Engineering, Kongunadu College of Engineering and Technology- (Autonomous),Trichy ,Tamilnadu, India.

³ Associate Professor, Department of Civil Engineering SRM Institute of Science and Technology, kattankulathur, 603602, Tamilnadu, India.

Natural sand in any part of the country is not graded properly and has excessive silt and it is very difficult to get due to government policies and need to preserve natural resources. Hence the fine aggregate can be replaced fully or partially by materials like M-sand, quarry dust, saw dust, rice husk ash, ceramic waste etc, in concrete. The ceramic waste may be used as an alternative for natural sand. On the other hand , ceramic waste does not contain silt or organic impurities and can be produced to meet desired gradation and fineness as per requirements. Also the continuous reduction of natural resources and the environmental hazards posed by the disposal of ceramic waste has reached alarming proportion such that the use of ceramic waste in concrete manufacture is a necessity than a desire. The aim of this project is to determine the strength characteristics of recycled aggregates for application in concrete , which will give a better understanding on the properties of concrete with ceramic aggregates as an alternative material to coarse aggregate in

structural concrete. A total of three batches of concrete mixes were designed using various percentages of ceramic waste replaced for fine aggregates. The percentage of ceramic wastes used are 25%,50% and 75% for natural aggregates for M20 grade concrete.

The investigation of fresh concrete property was carried out using workability test and hardened concrete by conducting compressive strength test, split tensile strength test and flexural strength test. The results of the strength tests for control mix and mix with various percentages of ceramic wastes were compared. It was found that the workability of concrete considerably reduced as the amount of ceramic aggregate increased. For strength characteristics, it was found that as the percentage of ceramic aggregate increased the compressive strength, tensile and flexural strength increased gradually. The maximum strength was observed for 75% replacement of fine aggregates with ceramic waste aggregates. Hence it is concluded that utilization of ceramic wastes in concrete is more effective in strength as well as economic aspects.

Keywords: Ceramics, Control mix, M sand, Quarry dust.

Anti-biofilm properties of Actinobacteria from the Indian Himalayan region (IHR)

Thenmozhi. G. S¹., Ashmitha. K²., Kishore Kumar. A¹., Radhakrishnan. M^{1*}., Anita Pandey³,
Gopikrishnan., V¹., Ranjani. S¹.,

¹Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai-600119, Tamil Nadu, India.

²Saveetha School of Engineering (SSE), Saveetha Institute of Medical and Technical Sciences (SIMATS), Thandalam-602105, Tamil Nadu, India.

³Department of Biotechnology, Graphic Era (Deemed to be University), Dehradun-248002, Uttarakhand, India.

*Corresponding author: mrkactinos@gmail.com

ABSTRACT

The production of antibiofilm metabolites from rare ecosystem gives a great remedy for clinical biofilm which is a serious global health concern, resistant to antibiotics, host defence systems and other external stresses leads to chronic infections. Therefore, it is essential to produce new bioactive metabolites against biofilm pathogens from rare habitat Actinobacteria. The present study aimed to evaluate the Streptomyces for Antibiofilm properties against biofilm forming bacterial pathogens viz., *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. For the study about 33 actinobacterial strains were isolated from Indian Himalayan region. Actinobacterial extracts were prepared by agar surface fermentation using ethyl acetate and evaluated for biofilm inhibition against biofilm pathogens by crystal violet – microtitre plate (CV-MtP) method, which revealed that 11 extracts showed prominent inhibition against *K. pneumonia* and *P. aeruginosa* for about 50 – 75% of inhibition at 200 µg/mL concentration. Among that, the extract of HS2C7 showed the eradication of biofilm for about 87% against *K. pneumonia* in CV-MtP method at 100 µg/mL concentration. During optimization Lactose, Yeast extract and CaCl₂ at pH 7 with Distilled water was found to influence the metabolite production. Based on phenotypic and molecular characterization, the potential strain HS2C7 was identified as *Streptomyces mutabilis*. Partial purification was done which shows five bands in the solvent of Ethyl acetate: chloroform (0.7:0.3). In Further studies like confocal Analysis and SEM/TEM analysis of the compound will be done.

Key words: Anti-Biofilm, CV-MtP method, Himalaya, Streptomyces.

Assessment of Phytochemical-Bioactive Properties of *Azolla pinnata* and its Efficiency in Cadmium Chelation from Wastewater system.

Vinanthi Rajalakshmi K S¹, Kuppusamy Alagesan Paari^{1*}

Department of Lifesciences, CHRIST (Deemed to be University), Bangalore, Karnataka, INDIA-560029.

*Correspondence mail ID: paari.ka@christuniversity.in

The major environmental issue raised throughout the world is the egression of toxic pollutants in water bodies due to the disposal of toxic wastes originated from automobile engines, industrial sectors and domestic operators. Hence, employment of novel technological interventions such as bioremediation and phytoremediation for mitigating the toxic effects caused by the pollutants has gained attention. The aquatic macrophyte, *Azolla pinnata* is utilized as a biofiltering agent in present study for the chelation of metal toxicants from the artificial wastewater system. The study investigated the phytochemical profile and their bioactive properties to explore its suitability in the remediation of cadmium metal accumulation. The nutritive value of *A. pinnata* was determined to be 268.99Kcal/100g energy and the mineral profiling showed the highest amount of calcium (54.7ppm), iron (14.04ppm) and manganese (7.96ppm). The quantitative screening of total phenolic and total flavonoid contents showed a maximum of 402.33±4.29 mg/g GAE and 105.25±3.81 mg/g QE respectively and the sample exhibited a strong antioxidant activity in quenching the DPPH radicals with a IC₅₀ value of 88.27µg/ml. Similarly, highest bioactivity was observed in methanolic and chloroform extract of *A. pinnata* biomass showing the zone of growth inhibition against *E. coli* (17mm) and *S. aureus* (18mm). The results recorded from the SEM-EDX, FTIR and XRD confirmed adsorptive properties of biomass. The chemically modified and unmodified *Azolla* exposed to cadmium metal solution showed the maximum adsorption of about 0.47±0.001 and 0.48±0.003 ppm in 60mins using the unmodified biomass with dosage of 0.75 and 1.0g respectively. The results obtained from the biosorption study exhibited promising ability to chelate metal ions due to the modifications caused in porosity, surface structure and due to the addition of functional groups in the treated biomass surface. The outcome of the research aims to develop a novel candidate that could address the crucial issues related to water treatment and environmental management.

Keywords: Phytoremediation, Antimicrobial activity, Biomonitoring, *Azolla pinnata*.

Key messages: *Azolla pinnata* is a 'one wonder plant with many powers' having the ability of sequester carbon, act as green fertilizer, biofuels, involve in nitrogen fixation, and also aid in water purification and no information on its medicinal applications. The present study showed the potentiality of *Azolla pinnata* as an antibacterial agent with good antioxidant properties. Moreover, the Phyto remediating efficiency of the *Azolla* biomass in the chelation of cadmium metals ions is also reported.

Fabrication of nano selenium incorporated biodegradable food packaging film

Rameshwar Chandran R^a, Muthu Bharath T^a, Stalin Dhas T^{b*}, Sowmiya P^b, Devi B^a, Jancy Mary^a, Ramesh Kumar V^a

^aDepartment of Biotechnology, Sathyabama Institute of Science and Technology, Chennai 600119, TamilNadu, India

^bCentre for Ocean Research (DST-FIST Sponsored Centre), Sathyabama Institute of Science and Technology, Chennai 600119, TamilNadu, India

*Correspondence mail ID: *stalindhas.cor@sathyabama.ac.in

Plastics are considered to be the greatest invention of mankind. However, the chemical structure of most of the synthetic polymers renders them resistant to many natural processes of degradation and as a result these polymers have destroyed the environment by contaminating land, water and the ecosystem around us. Polymers used for food packaging contributes to nearly 35 % of the total plastic accumulation in the environment. In this study, we investigated the fabrication of a novel biodegradable nano biowrap from plant based polymers for food packaging applications. The pectin biowrap is enriched with selenium nanoparticles, which improves the structural integrity and the antimicrobial properties of the wrap. The biowrap had increased opacity, swelling percentage with a comparatively lower moisture content. The biowrap was also subjected to real time testing with corn and grapes, in a week's time for weight loss percentage and study the morphological changes. The degradation assays were carried out in soil and water and visual data sets were promising enough to prove the biodegradable nature of the film. The DPPH radical scavenging activity assay proved that the film had 94.6 % of scavenging activity which is high enough to counter the free radicals that cause oxidation to spoil the food during the packaging process. Thus, these biowraps have the capacity to replace the conventional plastic wraps in the industry and help to preserve the foods in a sustainable and efficient manner.

Keywords: Pollution, Biopolymers, Food Packaging, Pectin, Antimicrobial.

Marine Derived Chitin as a Promising Biostimulant for Sustainable Agriculture

Sugesh Kumar S¹ and G. Rajalakshmi*

¹M. Sc Marine Biotechnology, Academy of Maritime Education and Training (AMET) Deemed to be University, Kanathur, Chennai

*Professor, Department of Marine Biotechnology, Academy of Maritime Education and Training (AMET) Deemed to be University, Kanathur, Chennai

grajalakshmi@ametuniv.ac.in

As sustainable agriculture becomes more imperative, biocontrol using natural compounds such as chitin, a carbohydrate chain polymer, and its derivatives, is a promising strategy. Chitin and its derivatives induce or enhance natural defensive mechanisms in plants. They are recognized as plant growth regulators, growth stimulants, and elicitors for the production of secondary metabolites. They have beneficial effects as fertilizers, soil conditioning agents, plant disease control agents, antitranspirants, ripening retardants, and seed and fruit coatings. Chitinous materials (chitin and its derivatives) are obtained from renewable sources, mainly shellfish waste, having a great potential for the development of bioproducts as alternatives to synthetic agrochemicals. Recent studies have provided evidence that the use of these biopolymers can help control postharvest diseases, increase the content of nutrients available to plants, and elicit positive metabolic changes that lead to higher plant resistance against pathogens (Juan D. Giraldo et al., 2023).

Hence, the present study was aimed to collect crustaceans from coastal region and chitin extraction. The extracted chitin is fortified with soil mixture as manure and subjected to detect the growth of plants such as okra and tomato. The formulation and application of Chitin manure to soil and Analysis of Plant Growth Parameters at different time intervals is recorded and the data interpretation carried out.

Keywords: Chitin, marine source, crustaceans, okra, tomato, sustainable agriculture

ABSTRACTS

POSTER PRESENTATION

Designing and operation of photo-bioreactor for Microalgae cultivation

Havinesh Kumar U, Ramesh kumar V

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

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

Microalgae possess exceptional biotechnological potential for producing various substances through photosynthesis. However, the process of light capture and electron transport in microalgae results in energy losses due to reflection, fluorescence emission, and energy dissipation as heat, leading to a maximum theoretical efficiency of 8-9% for microalgae energy capture and conversion to biomass. To unlock the full potential of microalgae, understanding the light capture process is essential. It is crucial to establish a connection between photobioreactor design and the biological processes occurring inside. In large-scale microalgae cultures, light gradients are formed, influenced by factors such as biomass concentration, cell types, cell sizes, pigment content, as well as the geometry, hydrodynamics, and light conditions within the photobioreactor. The relationship between the light energy capture process, photobioreactor design and operational conditions were explored, including aspects like agitation, gas exchange, and nutrient requirements. Ultimately, the efficiency and costs are analyzed, taking into account the factors that determine the economic viability of any microalgae culture. By understanding and optimizing these interactions, researchers and engineers can enhance the productivity and economic feasibility of microalgae cultivation processes.

Biological transformation of iron in soil through different column treatments using potential iron solubilizer

M. A. Mary Deva Prasanna P.M. Ayyasamy*

Department of Microbiology, Periyar University, Salem - 636 011, Tamil Nadu, India

*Corresponding author

Email : pmayyasamy@gmail.com

Mobile : 9486327103

Iron is an inevitable nutritional supplement needed for the growth and development of living organisms. However, most of the iron in nature are present as precipitates or insoluble forms. In order to change this situation, biological mechanism has been employed to transform Fe(III) oxides into Fe(II) through microbial action to increase availability of the soluble iron. The isolated potential bacterium of *Bacillus* sp. (SP10) shown effective transformation of iron in synthetic medium when 1% starch as the sole carbon source and maintained at a pH of 7. In the column study, the soil amended with synthetic Fe(III) oxide was treated with the bacterial strain of SP10 for a period of 25 days. The soluble iron was determined in each effluent collected from different treatment column which showed gradual increase in Fe(II) concentration. A maximum concentration of ferrous was obtained in effluent obtained from treatment D column on 25th day. Similarly, the plants grown on soil obtained from treatment D column showed good growth and maximum shoot length was observed in those plants. This clearly defines that the availability of iron can be increased through biological transformation which in turn has helped in plant growth.

Keywords: Biotransformation, iron, column study.

Smart pesticide sprinkler: Designing an iot-enabled arduino-based prototype

Diya Chatterjee

Department of Mechanical Engineering, Atria Institute of Technology, Bangalore, Karnataka.

This project presents the development of a Smart Pesticide Sprinkler system, leveraging Internet of Things (IoT) technology and Arduino-based frameworks to revolutionize agricultural pest management. Traditional pesticide application methods often result in overuse, leading to environmental degradation and reduced efficiency. The primary objective of this prototype is to create a targeted, automated pesticide dispersal system that minimizes environmental impact while ensuring safe and effective pest control. Key components of the system include Bluetooth, relay, power supply, motor driver, dc motors, pesticide pump, sprinkler unit, modules. Arduino microcontrollers process this data, enabling automated decision-making for precise pesticide deployment and irrigation control.

The system enhances resource efficiency by reducing pesticide wastage and minimizes environmental impact by preventing over-application. Furthermore, remote accessibility via a web or mobile interface without the use of internet allows farmers to monitor and control the pesticide sprinkler system in real time. In conclusion, the Smart Pesticide Sprinkler prototype represents a significant step towards precision agriculture, emphasizing sustainable pest management through IoT-driven components, Arduino-based control, mitigate the shortage of labour and targeted pesticide application.

Keywords: IoT Arduino, Pesticide Sprinkler, Precision Agriculture, Automated Control System,

Exploring actinobacteria from less explored manipur forest soil samples against non-tuberculosis mycobacterium species

Hemasri D., Ranjani Singaraj., Radhakrishnan M*

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

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

Nontuberculous mycobacteria (NTM) are emerging pathogens that affect both immunocompromised and immunocompetent patients. The NTM-pulmonary diseases (NTM-PD) occur frequently in patients with pre-existing lung diseases. NTM may also present as localized disease involving extra-pulmonary sites in lymph nodes, skin and soft tissues and rarely bones. Disseminated NTM disease is rare and occurs in individuals with congenital or acquired immune defects such as HIV/AIDS. Management of the emerging infection is under question since there are very few studies going on NTM infections. Therefore there is a need for development of proper drug and medicine for the same. Actinobacteria are one of the largest bacterial phyla in the domain bacteria. The results of culturable and unculturable studies revealed that the members of this phylum are widely distributed in wide range of living and nonliving sources in diverse

ecosystems including the extreme one. In recent years, there are several novel actinobacterial genera, and species were reported from living and non-living sources of entire environment. We have been investigating bioactive potentiality of actinomycetes isolated from certain less explored Indian ecosystems against nonmycobacterial pathogens. Actinomycetes were isolated from the soil samples of Manipur forest and screened against *M. smegmatis* by agar plug method and, the isolates which showed anti-*smegmatis* activity were further selected for extraction by fermentation. The anti-NTM activity of the extracts will be screened against NTM species like *M. kansasii* and *M. fortitium* through a liquid based assay - Microplate Alamar Blue Assay (MABA). The potential cultures will be selected for further process. Metabolite responsible for the anti-NTM activity will isolated through HPLC and LCMS and these metabolites will be again screened against Various NTM species. The novel metabolite will definitely provide us with better management and treatment for the emerging less explored NTM disease.

Keywords: TB, Actinobacteria, Pulmonary Infections

A systemic study on antifungal properties of actinobacteria obtained from coal mines

Rejith R.S. Kumar¹⁺., Parkavi. K. P¹⁺., Thenmozhi. G.S²., Radhakrishnan. M^{2*}., Mahalakshmi. K., Usha Nandhini. S¹

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

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

³Department of Microbiology, Sree Balaji Dental College, Chennai – 600 100, Tamil Nadu, India

*Corresponding author- mrkactinos@gmail.com

The study explores the potential of Actinobacteria, sourced from the Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, to produce bioactive metabolites with antimicrobial properties. Twenty isolates were cultivated under selective conditions, and strains BM-I A6 and BM-I A2 exhibited significant antimicrobial activity against pathogenic *Candida* species. Following isolation in the ISP2 broth medium, metabolic activity was observed using the Well diffusion technique. Both strains showed optimal growth in most ISP2 media, with notable inhibition against *Candida krusei* and *Candida Pelli culosa*. Subsequent optimization tests revealed optimal growth conditions. Mannitol as a carbon source, soybean as a nitrogen source, and CaCl₂ as a mineral source showed higher inhibitory zones, indicating increased production of metabolites. The strains demonstrated strong antifungal activity against *Candida krusei* and *Candida Pelli culosa*, with a maximum inhibitory zone of approximately 20mm. A time point assay technique indicated peak metabolite production on days 9 and 10. Further processing involved centrifugation and solvent extraction using methanol, ethyl acetate, chloroform, n-hexane, and DCM (dichloromethane). Extracts were concentrated and tested for antifungal activity against specific *Candida* species. This comprehensive study suggests promising avenues for the utilization of Actinobacteria-derived metabolites in clinical and medical applications, particularly in combating pathogenic fungi.

Keywords: Actinobacteria, Neyveli, antifungal activity, candida, metabolite production, extraction

Treatment of sago mill effluent through a bioreactor approach using aerobic bacterial consortium

Siva Sankar P¹, G. Surendran² and P.M. Ayyasamy*

Department of Microbiology, Periyar University, Salem - 636 011, Tamil Nadu, India

India is the main centre for the production of sago in and around the world. In Tamil Nadu, there are currently 400 sago manufacturing units, the majority of the sago industries are located in and around the Salem district. Drinking water, the most precious element for the survival of all species, is currently undergoing an unrelenting contamination. It is a priority to develop low-cost wastewater treatment to treat and recycle wastewater from the industry. The waste generated from the sago industry and these wastes are not properly discarded due to their acidic pH concentration, they produce harmful effects to the environment and health of soil. In this study to isolate, identify and screen the potential starch degrading bacterial strains. There are 3 bacterial strains were used in this study. The strain SS3, showed a maximum degradation of starch in this study carried out with 30°C. The results showed that there was a maximum reduction of starch using 0.75% as an inoculum. Treatment of sago mill effluent through a bioreactor approach and its impact on seed germination and plant growth of green gram was investigated. This work was done as a preliminary cultured and used for pilot to understand their efficiency in the treatment of sago factory effluent. The pots irrigated with treated effluent showed 100% germination. The maximum shoot length was observed in control (9.8 cm) followed by 25% (9.6 cm), 50% (9.1 cm), 75% (8.0 cm), 100% (5.2 cm) concentration of effluent. Thus this study focuses on the aerobic treatment of sago industry waste, which is simple, economical and eco-friendly when compared to the physical and chemical treatment.

Keywords: sago, effluent, starch, bioreactor

Azo Dye degradation by Actinobacteria

Sriman K R 1 ., Manigundan K1 ., Radhakrishna M1 ., Kishore Kumar A1 ., Ramesh Kumar2 ., Devi B *

1 Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai 600119. 2 Department of Biotechnology, Sathyabama Institute of Science and Technology, Chennai 600119. *Corresponding Author: famidevi@gmail.com

Azo dyes are widely prevalent in commercial coloring due to their strong retention provided by their chemical properties. Their environmental impacts include not fewer than genetic defects, hormonal imbalance, and growth distortion. This impact is further bolstered by the equally impactful chemical removal process, due to which a natural mostly microbial removal method is required. In this study, actinobacteria are chosen due to their known environmental resilience, diverse enzymatic repertoire, and cost-effectiveness. Six Soil isolates were obtained from the historical textile production hubs Chrompet and Kanchipuram regions using serial dilution method and inoculation onto different media plates AIA (Actinobacteria Isolated Agar) and SCA (Starch Casein Agar) media. Six potential strains streaked onto ISP-2 media plates for preservation and the strains were treated with specific azo dyes (Safranin, Methylene Blue, and Malachite Green) at 1000 ppm. Four strains showed high tolerance in azo dye presence and KT-1 showed near-to-complete absorption of azo dye. Further study would be conducted using ISP-2 media broth with varying azo dye concentrations (50 ppm, 100 ppm, 500 ppm, and 1000 ppm) with emphasis on specific azo dye-bacterial relationships. The degree of azo dye decolorization was conducted through 7 day-daily spectrophotometer analysis. Optimization strategies will be implemented for enhanced yield, degradative efficacy, and growth time by media modification,

and physical and chemical factors configuration such as pH and temperature. Further study would be conducted for strain identification using 16s rRNA and to identify post-degradation metabolites FTIR and LCMS would be used. The optimization would eventually lead to the industrial application of these strains that would degrade and remove azo dyes from the soil at an increased and efficient pace.

Keywords: Actinobacteria, Azo dye, Methylene Blue, LCMS, Malachite Green

Screening of polyhydroxyalkonate (pha) producing bacteria from insect nests

Suvidha Laharika .P¹ & Meganathan P. Ramakodi^{1*}

¹CSIR-National Environmental Engineering Research Institute (NEERI), Hyderabad Zonal Centre, IICT Campus, Tarnaka, Hyderabad, Telangana- 500007

*Correspondence: Meganathan P. Ramakodi, Senior Scientist, CSIR-NEERI, Hyderabad Zonal Centre, IICT Campus, Tarnaka, Hyderabad, Telangana- 500007.

E.mail: pr.meganathan@neeri.res.in; meghanathan.pr@gmail.com

Plastic cause severe environmental problems and researchers around the world are trying to find ways to mitigate issues associated with plastics. Bioplastics, an alternative to the conventional plastics, could reduce the burden of plastic pollutions as they are bio-degradable. Polyhydroxyalkonate (PHA) is one of most durable type biopolymer that could be used to make bioplastics. PHA is produced by microorganisms as granules in cytoplasm of the cell to tolerate extreme stress full conditions. The ability of bacterium to produce PHA as a bioproduct has attained a great height in the recent times. Several researchers are in search of novel indigenous microbes with the ability to produce PHA. This study explored the microbes isolated from insect nests to produce PHA. The soil samples from insect nests were collected in sterile conditions and inoculated on nutrient agar medium. The production of PHA by the bacteria was screened by staining technique. The colonies that were found positive were isolated and observed through microscope after staining, which confirmed the presence of PHA. This preliminary study found that the microbes present in insect nests are potential sources for the production of PHA.

Keywords: PHA, Biopolymer, Bioplastics.

Designing a fully automated bioreactor

Yuvaraja T , Ramesh Kumar V

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

Bioreactors assume a crucial part in different biotechnological processes, filling in as controlled conditions for the development of microorganisms, cells, or tissues for the creation of important bio-items. This theoretical investigates the new progressions in the advancement of completely computerized bioreactors, meaning to smooth out and upgrade bioprocesses. The mix of state of the art advancements, including man-made consciousness, sensors, and

mechanical technology, has empowered the making of another age of bioreactors that can work independently, giving remarkable accuracy, effectiveness, and reproducibility in bioproduction. Key parts of these completely mechanized bioreactors incorporate high level control frameworks able to do progressively managing key boundaries like temperature, pH, disintegrated oxygen, and supplement fixations. Moreover, the joining of AI calculations considers versatile control, expecting and answering changes in the bioprocess conditions continuously. The utilization of modern sensors and checking gadgets empowers persistent information obtaining, guaranteeing complete understanding into the bioreactor climate. The execution of automated frameworks for undertakings like vaccination, testing, and gathering further decreases the requirement for human mediation, upgrading the adaptability and unwavering quality of bioproduction processes. In addition, the improvement of easy to use interfaces works with remote checking and control, opening additional opportunities for adaptable and decentralized biomanufacturing. While the reception of completely computerized bioreactors presents huge benefits concerning effectiveness, reproducibility, and adaptability, difficulties like high starting expenses, framework intricacy, and the requirement for specific mastery should be tended to. This theoretical examines the present status of completely robotized bioreactors, featuring their likely effect on different businesses, including drugs, biopharmaceuticals, and biofuels. The continuous innovative work in this field plan to conquer existing difficulties and make ready for the broad reception of completely mechanized bioprocessing frameworks, reforming the scene of biotechnology and biomanufacturing.

Development of groundnut de-oiled cake incorporated in recipes for - an alternative potential resource for food formula

Beula Christina. W ^a, Dr. Sumanth Kumar B^b, Dr. Muninathan^c, Dr. Anitha. R^d

^a Research Scholar, ^bAssociate Professor, ^cResearch scientist, Meenakshi Medical College Hospital and Research Institute, Kanchipuram, Tamilnadu, India, Email: beulachristina16@gmail.com

^dAssistant Professor, PG Department of Foods and Nutrition, Muthurangam Govt Arts College (A), Vellore-632002, Tamilnadu, India

Background: Oilseed cakes are the residues obtained after the extraction of oil from the plant source such as oilseed, by expelling or solvent extraction. Groundnut cake is a by-product of the oil industry. **Objective:** This study aimed to formulate a healthy meal such as chappathis, cookies and breads that are incorporated by groundnut de-oiled cake. **Materials and Methods:** Raw ingredients were procured from the local market and were processed. The groundnut de-oiled cake was obtained from the oil milling shop and it was dried, powdered, and sieved to get uniform powders. The individual powdered samples were mixed in the ratio of whole wheat grain (150g), bajra (150g), green gram (150g), Pineapple (25g) and red ponnanganni (*Alternanthera Sessilis*) (25g) for the preparation of nutritionally adequate food mixes. The developed food mixes were incorporated by adding de-oiled groundnut cake in the ratio of T0 (0%), T1 (10%), T2 (20%), T3 (30%), T4 (40%) and T5 (50%). The different mixed samples were used for preparing chapathis. For cookies and breads, incorporation was done at the rate of T1 (10%), T2 (20%) and T3 (30%) and they were tested organoleptically for acceptability. The most accepted incorporation was popularised for public and the knowledge imparted was evaluated. **Results and Discussion:** The results revealed that the developed chappathis using deoiled groundnut cake incorporated

recipes were nutritionally adequate and comparable. All the prepared samples were accepted and scored good results. The nutritional content of the groundnut de-oiled cake powder showed to be rich in proteins, antioxidants, fibers, vitamins and minerals. It also possessed higher antioxidant scavenging activities. **Conclusion:** This study concludes that deoiled groundnut cake can also be used as a potential food resource since it possesses higher nutritional content and antioxidant properties.

Keywords: Ground de-oiled cake, Nutritional Content, Food mixes, Chappathis, Cookie Breads

Bioprospecting of fish gut microbes

Monisha Vijayan, Boomika Venkatesan, Usha Nandhini, Saqib Hassan, Karthik Prakash Panneer, Gopikrishnan Venugopal, Radhakrishnan Manikkam, Manigundan Kaari.

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

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

In recent years there has been a growing interest in exploring the fish gut microbes for various biotechnological applications. The gastrointestinal tract of fish shows diverse and complex microbial community that plays a vital role in the host's health, digestion and overall well-being. Fish gut microbes have been a source of antimicrobial compounds in aquaculture and in many pharmaceuticals industries. In fish, the gut microbes living in the gastrointestinal tract influence the physiology, nutrition, lifespan, immunity besides acting as a barrier against pathogens. By understanding this interaction, we can lead the development of novel probiotic and prebiotics, contributing to sustainable aquaculture practices and reduced antibiotic usage. The gut microbiome not only augment the digestive and immune system in fish but is itself shaped by several host-associated factors. Sometimes the fish gut microbes can affect the nutrition, growth, reproduction and population of the host fish. This review provides an in-depth overview of the bioprospecting efforts focused on fish gut microbes, highlighting their bioactive compounds, enzymes, and other valuable biomolecules. It also discusses the challenges and future prospects of fish gut microbe bioprospecting and also highlight the importance of their industrial importance.

Keywords: Fish Gut, Bioprospecting, Pigments.

Studies on enzymatic properties of southern ocean bacteria

Ebshiba. N¹., Thenmozhi. G. S²., Masilamani Selvam. M¹., Radhakrishnan. M^{2*}., Kishore Kumar. A²., Manigundan. K²., Baskar. V.Parli³

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

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

³National Centre for Polar and Ocean Research, Vasco-da-Gama – 403804, Goa, India.

*Corresponding author: mrkactinos@gmail.com

Bacteria offer superior biological materials like cold active enzymes with potential economic and biotechnological uses. The present study aimed to screen the enzyme properties of southern ocean bacteria. For this study, about 30 bacterial strains previously isolated from Southern Ocean were obtained from Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai. For this enzyme study, 30 bacterial strains were subculture and incubated in 4^o C and 30C. All the strains were screened for various enzymatic activities which include amylase, lipase, protease, xylanase, cellulase, urease and glutaminase. Among these, SOSIST 3, SS-M-11-5, Sea Ice 5 and Sea Ice 9 showed promising activity for at least one substrate at 30C. Surprisingly, Sea Ice 9 showed activity even at 4C. By time point assay, it revealed that Sea ice 9 showed maximum lipase activity for about 20 mm in diameter in 5 day of incubation both 4C and 30C. The quantitative assay by DNS method was performed to identify the percentage of the sugar reduced. Further, the crude enzyme was partially purified and characterized.

Keywords: *Psychrophilic bacteria, Lipase, Sea Ice, Enzyme activity*

Unravelling the soil metabolites and pollutants in degraded agricultural lands using gc-ms analysis

Nidhin I K, Ramavath V, Chattopadhyay I*

Department of Biotechnology, Central University of Tamil Nadu, Thiruvarur, Tamil Nadu -610005, India

*Corresponding author email id: indranil@cutn.ac.in

Heavy metal contamination is a major source of soil pollution. Polycyclic Aromatic Hydrocarbons are hazardous chemicals and are found in polluted soils. The objective of our study was to unravel the major possible cause of land degradation by assessing the level of heavy metal contamination and detecting the various soil metabolites and toxic volatile organic compounds present in the soil samples. In the present study, we compared the soil metabolites and pollutants of a normal cultivatable paddy field and two degraded lands in Tamil Nadu (KTS and NMS). The concentrations of various heavy metals in these fields were estimated using Atomic Absorption Spectroscopy (AAS), and soil metabolites and various toxic volatile organic compounds present in the soil samples were identified using GC-MS analysis. The results showed that degraded lands had higher concentrations of Lead, Manganese, Chromium, Copper, Zinc, and Magnesium when compared with the Control sample. The control sample and the degraded land samples had the presence of eukaryotic and bacterial metabolites including Fatty acid methyl esters, terpenoids, cholesterol and Amino acid derivatives. Whereas the presence of Polycyclic Aromatic Hydrocarbons (PAHs) was only detected in the degraded land samples. We concluded that increased concentrations of the heavy metals and the presence of pollutants including Polycyclic Aromatic Hydrocarbons (PAHs) may have led to the deterioration of the soil fertility, which in turn caused the degradation of these lands.

Keywords: Soil metabolites, Heavy metal contamination, soil pollutants, paddy field, degraded land

An investigation into cell suspension parameters of moringa

Janani T^{1*}, Janavi G J¹, Rajangam J¹, Muthiah C¹ and Rajagopal B²

¹Ph.D. Scholar, Department of Vegetable Science, HC& RI, Periyakulam, India

¹Professor and Head, Department of Post-Harvest Technology, HC& RI, Periyakulam, India

¹Dean, Horticultural College and Research Institute, Periyakulam, Tamil Nadu, India

¹Professor and Head, Department of Plant Protection, HC& RI, Periyakulam, India

²Centre for Plant Molecular Biology and Biotechnology, TNAU, Coimbatore, India

The abstract presents an investigation into cell suspension parameters of Moringa, focusing on optimizing growth conditions for enhanced cell culture. Moringa, known for its nutritional and medicinal value, holds potential for various applications. This study delves into the effects of key parameters including growth media composition, pH levels, temperature, agitation, and inoculum density on cell suspension cultures of Moringa. Through systematic experimentation and analysis, the research identifies optimal conditions that promote cell growth, metabolite production, and biomass accumulation. The findings shed light on the intricate interplay between these parameters and their impact on cellular behavior. Furthermore, the study contributes to the broader understanding of plant cell suspension systems and their potential applications in biotechnology, pharmaceuticals, and agriculture. The insights gained from this investigation pave the way for scalable and sustainable cultivation of Moringa cells, fostering advancements in diverse sectors reliant on this remarkable plant.

Keywords: Investigation, cell suspension, Moringa, growth conditions, culture optimization, growth media, pH levels, temperature.

Potential secondary metabolite from Himalayan soil actinobacteria against *Mycobacterium tuberculosis* [H37Ra and Rv strain]

Keerthana R, Ranjani Singaraj, Radhakrishnan. M

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

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

Mycobacterium tuberculosis (M. tb), also known as Koch's bacillus, is a species of pathogenic bacteria in the family Mycobacteriaceae and the causative agent of tuberculosis. First discovered in 1882 by Robert Koch. Humans are the only known reservoirs of *M. tuberculosis*. The route of transmission is through aerosols released by infected individual. Globally 1.8 billion people are infected and 80% of people lead to death due to TB. The burdensome challenge faced is the emergence of resistance in TB infection, this makes the management of the disease very difficult. Though certain drugs are available for the management but development of resistance makes the disease management a difficult process. Therefore it is very important to find a molecule which can help in the management of the same. Actinobacteria are one of the largest bacterial phyla in the domain bacteria. The results of culturable and unculturable studies revealed that the members of this phylum are widely distributed in wide range of living and nonliving sources in diverse ecosystems including the extreme one. In recent years, there are several novel actinobacterial genera, and species were reported from living and non-living sources of entire environment. We have been investigating bioactive potentiality of actinomycetes isolated from certain less explored Indian ecosystems against mycobacterial pathogens. Actinomycetes were isolated from the soil samples of himalayan region and screened against *M. smegmatis* by agar plug method and, the isolates which showed anti-TB activity were further selected for extraction by fermentation. The anti-TB activity of the extracts will be screened against TB species through a liquid based assay - Microplate Alamar Blue Assay (MABA). The potential cultures will be selected for further process. Metabolite responsible for the anti-TB activity will be isolated through HPLC and LCMS and these metabolites will be again screened against various TB species. The novel metabolite will definitely provide us with better management and treatment for the emerging less explored tuberculosis disease.

Evaluation of bacterial resources for biosurfactant production

Sobana Lakshmi K V²., Roja G²., Usha Nandhini S²., Kishore Kumar A¹., Ramesh Kumar²., Radhakrishnan M^{*}.,

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

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

*Corresponding Author: mrkactinos@gmail.com

Biosurfactants, surface-active compounds produced by microorganisms, have gained significant attention due to their diverse applications in industries ranging from agriculture to pharmaceuticals. This study aims to evaluate various bacterial resources for their potential in

biosurfactant production, focusing on their surfactant properties and industrial applicability. This study aims to explore the Bacterial Resources for Biosurfactant Production derived from microbial sources isolated from Kitchen Chimney in Kancheepuram District. Totally 31 morphologically different bacterial cultures were isolated using Actinomycetes Isolation Agar (AIA), Starch Casein Agar (SCA) and Nutrient Agar (NA) and screened for biosurfactant production. In 31 different cultures 15 Cultures gives positive result in both Primary (Hemolysis) and secondary (Drop collapse) screening. Biosurfactant Positive cultures further tested against different bacterial and fungal pathogens for their medical applications. 16s Rna sequencing was analysed for potential biosurfactant producing cultures and furthermore LC-MS analysis also revealed the presence of different Bioactive molecules

Keywords: Biosurfactant, Kitchen Chimney, LC-MS, Bioprospecting, Surface tension, Hemolysis

Production and characterization of a bioflocculant produced by *Bacillus cereus* and its applications in removal of chromium (Cr⁶⁺)

V. Suruthi and P.M. Ayyasamy*

*Corresponding author

Email : pmayyasamy@gmail.com

Department of Microbiology, Periyar University, Salem – 636 011, Tamil Nadu, India

The production, optimization and characterization of the bioflocculant produced by synthesizes by a *Bacillus cereus* strain isolated from Hi-tech industry area surrounding Salem district, Tamil Nadu. The flocculating activity of bioflocculant present in the selected strain was found to be 79.4%. The optimal culture for flocculant production was achieved after cultivation at pH 7± 0.2 using a carbon source. The bioflocculant were characterized SEM, FTIR, GC-MS and HPLC. The functional moieties in the molecular chain of bioflocculant were identified with FTIR spectrophotometry. The spectrum displaced an intense broad stretching peak at 3439.78 cm⁻¹, which indicated the presence of a hydroxyl or amide group. The present study GC-MS analysis was found that the methyl salicylate and dimethyl phthalate compounds. Hexavalent chromium (VI) is highly toxic in nature and large amount of chromium (VI) can leads to cause pulmonary diseases, cancer, brain tumor, damage of blood streams and liver. The extracted bioflocculant were applied to removal of hexavalent chromium (VI) synthetic medium. Optimization study were included such as, varrious concentration of chromium and constant dosages of bioflocculant, various concentration of bioflocculant and constant chromium concentration and various pH, constant chromium and constant bioflocculant were studied.

Keywords: Chromium (VI), Bioflocculant, *Bacillus cereus*, Optimization

A review on the bioprospecting potential of actinobacteria associated with earthworm cast, focusing on their novel antimicrobial properties

Pontiana Ritika Clement¹, Gayathri.V¹, M.Radhakrishnan², K.Soytong³ and Gopikrishnan, V^{2*}

¹Department of Biotechnology, Rajalakshmi Engineering College, Chennai, 602105, India

²Centre for Drug Discovery and Development, Dr. Col. Jeppiaar Research Park, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu - 600 119, India

³KMITL Research Institute of Modern Organic Agriculture (RIMOA), Lat Krabang Sub-district, Lat Krabang District, Bangkok, Thailand

To date, researchers are focusing on novel microbes in unusual and unexplored ecosystems. Actinobacteria are unique secondary metabolites producers having versatile bioactive compounds with industrial importance. Earthworm cast are less explored for actinobacteria having bioactive compounds. This review clearly says that the earthworms and their associated microbes can largely be explored for bioprospecting, especially actinobacteria. Developing and conserving the earthworm associated microbial diversity is playing a major role in economic development of country. Earthworm cast holds promise for biofertilizer applications, stressing its importance in biotechnological breakthroughs. In summary, the study emphasizes the critical function of actinobacteria from earthworms cast in bioprospecting, with the potential for novel bioactive compounds. The earthworm cast appears as a rich resource with biotechnological applications, particularly in biofertilizer creation.

Keywords: Actinobacteria, Streptomyces, Bioactive compounds, and Earthworm cast

Therapeutic Intervention For Dengue Infection - present scenario

Lavanya D and Krupakar Parthasarathy

Centre for Drug Discovery and Development

Sathyabama Institute of Science and Technology, Chennai-600119.

ABSTRACT

Dengue virus (DENV), a member of the *Flaviviridae* family, is the causative organism of Dengue hemorrhagic fever and Dengue Shock Syndrome. It exists as 4 serotypes (DEN1-4), all of which can cause full spectrum of the disease. Dengue is one of the most re-emerging arboviral diseases in the world with a record of 390 million cases globally, putting 3.9 billion people at the risk of infection annually. With dengue being enlisted as a high burden disease in the tropical countries, there is a dire need to bring about efficient therapeutics that help to prevent and treat the diseased population. The present mode of treatment of Dengue is based on the management of symptoms and includes the use of Nonsteroidal Anti-inflammatory Drugs (NSAIDs), antibiotics, antipyretics and corticosteroids. These provide symptomatic treatment and also bring about undesirable side effects. Presently, there are no approved vaccines or antivirals for Dengue treatment in India. It is thus important to consider the biology of the virus with special focus on identification of effective anti-viral targets for therapy. With the alleviation of symptoms alone being insufficient for the disease treatment, there is a shift in research to find alternative forms of medicine for the treatment of the disease. In particular, leaves of *Carica papaya* and Nilavembu kudineer are potential candidates for this purpose. This review focuses on bringing to light the various therapeutic interventions presently in use and development.

Keywords: Flaviviridae, NSAIDs, *Carica papaya*, Nilavembu Kudineer.

