BOOK OF ABSTRACTS

THE 10th INTERNATIONAL CONFERENCE ON INTEGRATION OF SCIENCE AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT 2022 (10th ICIST)

"Soil, Water and Environmental Conservation, Biological Diversity, Food Security/Safety and Sustainable Agriculture"

King Mongkut's Institute of Technology Ladkrabang

Bangkok, Thailand

November 25, 2022

PREFACE

Associate Professor and the Rector of King Mongkut`s Institute of Technology, Ladkrabang (KMITL), Assoc. Prof Dr. Dr. Komsan Maleesee,
Prof Dr. Kasem Soytong, President of AATSEA and the Organizer of 10th ICIST 2022,
Prof. Dr. Hussein Darwish Mustafa, President of National Research Council, Egypt,
Prof. Dr. Teodoro C. Mendoza from Philippines,
Distinguished Guests, Participants, Ladies and Gentlemen,

On behalf of the Organizing Committee, I have the honor to welcome you all to the 10th International Conference on Integration of Science and Technology for Sustainable Development. I would like to extend my fervent appreciation to more than 240 senior and young scientists from 20 countries who registered and participated either on the online and onsitemodes, I look forward for the worthwhile presentations and discussions during this conference.

You may recall that last year, we were bit worried about the organization of this conference, due to various constraints and disadvantages associated with New Coronavirus pandemics. Today, it is clear that we could overcome the difficulties and created a new precedence and a success example that we can make it if we are all connected with a strong will and enthusiasm.

In this occasion, I wish to express my sincere gratitude and heartfelt appreciation to Dr. Kasem for his tireless leadership, and his abled staff for various preparatory arrangements. My special thanks go to the Lector of the King Mongkut`s Institute of Technology, Ladkrabang and the Dean of the Faculty of Agricultural Technology and their dedicated colleagues and staff, who have kindly hosted this important conference venue and provided various support for the organization. I wish to acknowledge with utmost gratitude the members of organizing committee for their contributions, all co-organizers and co-sponsors for their valuable support, all participants for their interest, commitments and active participation, and all those who provided valuable support for the successful organization and implementation of this conference.

Ladies and gentlemen,

While we all struggle every day to fight with the new coronavirus pandemics and negative impacts of climate changes such as floods, droughts and cyclones, we faced additional new challenges of conflict and economic slowdowns. The war in Ukraine had prevented normal access to staple grains from one of the most important world food baskets which, combined with other factors, resulted in global food price increase. This inevitably and seriously affected everyone, especially the poor and the people in poor food importing countries. Recent FAO Food Price Index shows that it increased by nearly 40% in September 2022 from that of 3 years ago. The food price index of cereals alone increased by nearly 50% in the past 3 years. The Price hike of agricultural inputs such as fertilizer, cost for commodity transport and the costs of water and electricity are some of typical factors affecting farmers. Consequently the food prices have increased even more including the number of global chronic hunger population which increased by 150 million (or increased by 22 %) from that of 678 million in 1999 to 828 million in 2021 as per the UN report. Moreover, this resulted in rapid increase of acute food insecure people who require humanitarian assistance for their survival. Spcifically, it escalated by over 40% from 135 million to 193 million in 2 years between 1999 and 2021. In addition, we should not forget another critical issue that is “widening inequality”. Indeed, prolonged Covid-19 pandemics made our society more divided and created huge gap between those who benefited or less affected, and those who lost business and jobs and affected seriously. This situation became more critical at least developed countries where social protection and safety net are not effectively functioning.

Ladies and gentlemen,

The implementation of Sustainable Development Goals (SDGs) started in 1996 for achievement by 2030. Now, we have only 8 years remaining. Yet, the situation is actually worsening in some key

important areas. SDG goal No. 2 that is to ending hunger, food insecurity and all forms of malnutrition by 2030, is not an exception.

This challenge is added on existing our long-term challenge. That is FAO`s prediction that global food production needs to be increased by 49% by the year 2050 from the level in 2012 to meet increasing population and food demands at that time. FAO also projected that almost all (nearly 90 %) of food production increase is expected to come from existing arable lands by yield increase through harnessing agricultural research and improved farm management technology. If we are unable to achieve this challenging goal, the world, especially the people in food-deficit developing countries would face serious food shortage and starvation, and the world security and stability would be seriously jeopardized. We all should recognize that "Science and technology" are such an important sector which would play a key role in feeding the future world and ensuring world peace and stability.

The World Food Forum which was held in Rome last October 2022 placed "Science and Innovation" as one of key focuses with a recognition of the critical importance of harnessing science, technology and innovation for transforming of our global agrifood systems. It recognized that science and innovation provide the foundations for evidence-based decision making to meet current global challenges such as hunger and food insecurity issues on both short and long-term. The forum also witnessed a revolution in science and technology that has been moving at an incredible speed in recent past, which includes, among others, genetic improvement of crops and livestock, innovations in breeding methods and gene editing technology, improving nutritive value of diets in agri-science, innovative use of remote sensing and satellite information, and application of computer technology, drone, mobile phone, robot and auto-drive technology in agriculture.

At the same time, whatever is our status, we should not be left behind, and we must avoid the risk of widening the technology divide. Scientific experts must raise public awareness on the potential benefits, risks and unintended consequences of science, technology and innovation, promote dialogue actively with all relevant stakeholders, and develop new and transformative partnership with private sector and the civil society.

Finally, I wish to congratulate our researchers and scientists, including young researchers who are present today and who have committed to contribute in research, science and technology as a professional carrier towards achieving sustainable development of the world.

It is the time for research, science and technology in harnessing their role. They must be integrated and play an inter-sectoral approach with increased investment, collaborative research and concerted efforts among all actors including those from governments, academic/research institutions, private sectors and civil society.

This international conference organized every year, brings all actors together, thereby continuously reaffirming the importance of wider-range of collaboration, joint efforts and strong partnership. Again Thank you Dr. Kasem for your dynamic leadership and tireless efforts ensuring the integration of research, science and technology towards a multisectoral partnership for a concerted and unified action.

Hiroyuki Konuma (Ph.D.)
Executive Director of GIAPSA, Japan
(Former UN/FAO Regional Representative for Asia and the Pacific)
(Former Professor of Meiji University, Japan)

Good morning everybody, Magandang umaga, 'sawatdee don chao', 'aroon sawat' ,Selamat pagi, "Namaste", Hyvää huomenta.

Greet the guests of honor, My profuse thanks to everybody for coming over and participate on this occasion , The 10th International Conference on Integration of Science and Technology for Sustainable Development 2022 (10th ICIST 2022) with the theme "Soil, water and environmental conservation, biological diversity, safety food and sustainable agriculture".

Yearly, The Association of Agricultural Technology in Southeast Asia (AATSEA) is organizing ICIST on various topics in biological science, agriculture and related fields. AATSEA realizes its responsibility to serve the community by providing education, research and development in biological science and technology, particularly in the multi- and- interdisciplinary aspects. This conference aims to initiate an international network of academics, researchers, scientists and people interested in science and technology. It is also aimed to serve as a venue for knowledge sharing and exchange and discussion among us seeking for new vision and insights that are creative, innovative in varied fields but interrelated in pursuing the realization of the UN 17 SUSTAINABLE DEVELOPMENT Goals which all of us here agreed.

This is the 10th ICIST, but supposed to be, this should be already be the 11th. As everbody knows, the Global pandemic due to COVID 19 surprised us on how to live with it. Hence, we did not hold it in INDIA in 2020. Last year, we have the 9th ICIST HERE in Bangkok by making adjustments where Thai participants met face to face while overseas participants attended and presented their papers on line; meaning we are able to adjust with the pandemic. We are lucky, the technology is available. We call it Hybrid mode conference.

Our 10th ICIST, while still on hybrid mode but many overseas participants are already around although the storm is not yet over our medical experts say that COVID is here to stay with us . So, we should live with it. NO MORE LOCKED DOWN.

We the organizers are so happy for having you around but also our overseas participants for submitting their papers for presentation, again through online. (We have mastered, I think recording our presentation in compact manner called MP4). And because of this, we have a record number of papers. We have 244 papers scheduled for presentations in 9 sessions and 9 plenary papers coming from 13 countries. All in all, we have 253 papers in different fields of agriculture, biology, biotechnology, digitalization of food and agriculture.

So, we are very thankful to our researchers, scientists and academics for you continuous support to ICIST in this endeavor to support the SDG.

Along with this huge support coming from them is also the big support coming from our co-sponsors of this event, King Mongkut's Institute of Technology Ladkrabang (KMITL Thailand), Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand), Rambhai Barni Rajabhat University (RBRU,Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), CAS Asian Agriculture Bio Engineering (China), BioAgritech Co Ltd (Vietnam), Bio Hi-tech Solutions Co Ltd (Cambodia), SKK Co Ltd (Myanmar), CGC organic coffee (Laos), General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA, Japan), National Research Center, Cairo (Egypt), Periyar University, Salem (India), Sathyabama Institute of Science and Technology (India).

Thank you, Ladies and gentlemen, Our CONFENENCE Host, Association of Agricultural Technology in Southeast Asia (AATSEA), thanks so much.

TEODORO C. MENDOZA, PhD
Currently, Science Director of Community Help and Policy Center, Metro Manila
Agronomist, Retired Professor, Institute of Crop Science, College of Agriculture and Food Sciences,
UP Los Baños, Laguna

Excellency Prof. Dr. Hussein Darwish Mustafa, President of National Research Center (NRC, Egypt),Prof. Dr. Teodoro C. Mendoza (Philippines),Prof. Dr. Hiroyuki Konuma, President of GIAPSA (Japan), Assoc. Prof. Dr. Komsan Maleesee (KMITL Rector), Distinquished guests, International and local organizing committees, Chairs of organizing comittees, Keynote and invited speakers, AATSEA Awardees, All presenters and participants, AATSEA Committees and all Co-organizers, Ladies and Gentleman:

The 10th 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 November 24 - 26, 2022 at Faculty of Agricultural Technology , King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, Thailand.

This year, we have our tentative programs as follows:-

1. Conference and workshop in 25 Novemer 2022
2. Editorial boardc of IJAT meeting
3. Training for AATSEA Organic Inspectiors for each country (Thailand, China, India, Vietnam, Indonesia, Philippines, Cambodia , Bangladesh, Myanmar, Laos etc.)

We organized the meeting on IJAT journal policy of Editorial board. Training for Organic Inspectors of AATSEA in each country for AATSEA Organic certification is organized during the conference.

25 November 2022 is for full day conference with a total of 240 papers for onsite/ online presentation in 9 parallel sessions and 9 plenary papers from 20 countries.and 26 November 2022 is a Field Workshop in Organic Agriculture for practical learning in Organic Crop Production in Ratchaburi province., and visit AATSEA Research Laboratory.

I am really impressed all constantly supported co-organizers; 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), Sathyabama Institute of Science and Technology, India, Mahasarakam University (Thailand).

Association of Agricultural Technology in Southeast Asia (AATSEA) is officially non-profiltable organization which established legally approval by Department of Administration Ministry of Interior , Thailand in 17 April 2021 (2555) 9.5080/2555 (8.A. 4). AATSEA has supported and accepted the membership, 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 activittes have been performed as follows:-

1. International Journal of Agricultural Technology (IJAT) 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) , inVietnam (2015), in Myanmar(2016), in the Philippines (2017), in Indonesia(2018), in China (2019), in Thailand (2020 and 2021).
4. Leadership Awards in Agriculture
5. AATSEA Scholarhips (2 Doctoral studebts)
6. AATSEA Resesrch Laboratory
7. AATSEA Organic Farm Model and Training Center
8. AATSEA Organic Certificatiion

AATSEA has signed agreement for research collaboration, contribution of research findinds, visiting professors and scientists, andc 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, leppiar 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 Foudation for organic certification, 13 October 2022

Earthsafe Foundation in collaboration of AATSEA must promote non-agrochemicals (NAP) in conversion period to Organic agriculture(OA) for organic certification from production to the markets all over the country (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 thanks the AATSEA committee and members, advisory committee, International and local organizing committee, to make this conference perfectly success.

If there is anything inconveniences and mistake during the conference. I would like to be highly apologize and responsible to make a mistake.

I will accept all comments, suggests and recommends for improving the next conference.

Wishing all of you will have a wonderful time in Bangkok and safety back home after conference end.

Hope to meet you again in our future activities, and the next conference in India.

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 Soytong
AATSEA President

The 10th ICIST 2022

Organized by

Association of Agricultural Technology in Southeast Asia (AATSEA), King Mongkut's Institute of Technology Ladkrabang (KMITL Thailand), Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand), Rambhai Barni Rajabhat University (RBRU,Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), CAS Asian Agriculture Bio Engineering (China), BioAgritech Co Ltd (Vietnam), Bio Hi-tech Solutions Co Ltd (Cambodia), SKK Co Ltd (Myanmar), CGC organic coffee (Laos), General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA, Japan), National Research Center, Cairo (Egypt), Periyar University, Salem (India), Sathyabama Institute of Science and Technology (India).

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Mr. Pheaktra Phal (Cambodia)
Mr. Bunny Soem (Cambodia)

Field workshop: Faculty Secretary, Mr. Thammanart Porisipong

Proceedings (full manuscripts): Dr. Jiaojiao Song (China)
Dr. Rungrat Veerakeat (AATSEA)

Souvenirs: Faculty Secretary, Dr. Rungrat Veerakeat (AATSEA)

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Mr.Wutthichai Sornprom

Conference Session management: Dr. Jiaojiao Song (AATSEA, China)

Plenary Session: Keynote Speakers
Chair: Prof. Dr. Teodoro C. Mendoza (Philippines)
Co-chair: Prof. Dr. Pakkapong Poungsuk (Thailand)

ORAL PRESENTATION - Parallel Sessions (onsite/online sessions)

Session 1 Onsite/online: Agricultural Extension, Education and Development
Chair: Prof. Dr. Pakkapong Poungsuk (Thailand)
Co-chair: Assoc. Prof. Dr. Adisak Singseewo (Thailand)
Asst. Prof. Dr. Phattraporn Soytong
(Thailand), Joselito Dar (Philippines)
Session 2A Onsite/online: Animal, Fisheries Sciences and Entomology
Chair: Prof. Fahrurrozi Fahrurrozi (Indonesia)
Co-chair: Prof. Dwi Wahyuni Ganefianti (Indonesia)
Assoc. Prof. Dr. Virapol Jamsawat, (Thailand)
Session 2B Online: Animal, Fisheries Sciences and Entomology
Chair: Dr. Elderico Tabal (Philippines)
Co-chair: Dr. Karunarathra, Samantha. C. (Sri Lanka)
Assoc.Prof. Dr. Sineenart Polyorach (Thailand);

Assoc. Prof. Dr. Rungtawan Yomla (Thailand)
Asst. Prof. Loetchai Chit-aree (RBRU,Thailand)

Session 3A Onsite/online: Biological Diversity and Microbiology
Chair: Dr. Hoang ND Pham (Vietnam)
Co-chair: Dr. Gopi Krishnan (India)
Asst. Prof. Dr. Pornpan Sukhumpinij (RBRU)
Asst. Prof. Dr. Thanidachaya Puthmm (Thailand)
Assoc. Prof. Dr. Supattra Poeaim (Thailand)

Session 3 B Online: Biological Diversity and Microbiology
Chair: Dr. Laxmi Rawat (India)
Co-chair: Assoc.Prof.Dr. Pussadee Tangwatcharin (Thailand)
Assoc. Prof. Dr. Montinee Teerarak (Thailand)

Session 4 Onsite/online: Biotechnology
Chair: Prof. Dr. Teodoro C. Mendoza (Philippines)
Co-chair: Prof. Dwatmadji (Indonesia)
Asst. Prof. Dr. Kannikar Charoensuk (RMUTTO, Thailand)
Assoc. Prof. Dr. Komkhae Pilasombut (KMITL, Thailand)

Session 5A Onsite/online: Food Security/Safety, Food Science and Postharvest Technology
Chair: Prof. Mohamad Chozin (Indonesia)
Co-chair: Prof. Tatik Suteky (Indonesia)
Prof. Sigit Sudjatmiko (Indonesia)
Assoc. Prof. Dr. Nonglak Parinthawong (Thailand)
Asst. Prof. Dr. Duanrung Benjamas (RBRU)
Asst. Prof. Dr. Yardrung Suwannarat (RBRU)

Session 5B Online: Food Security/Safety, Food Science and Postharvest Technology
Chair: Dr. Nithya Priya S. (India)
Co-chair: Assoc. Prof. Dr. Suneeporn Suwanmaneepong (Thailand)
Asst. Prof. Dr. Somsak Kramchote (Thailand)

Session 6A Onsite/online: Plant Sciences and Pest management
Chair: James Kennard Jacob (Philippines)
Co-chair: Asst. Prof. Dr. Wikanya Prathumyot (RBRU)
Dr. Sitthi Kulabtong (RMUTTO)
Asst. Prof. Dr. Najjapak Sooksawat(Thailand)

Session 6B Online: Plant Sciences and Pest management
Chair: Dr. Danilo Josue (Philippines)
Co-chair: Assistant Prof. Dr. Nattaya Montri (Thailand)
Asst. Prof. Dr.Potjana Sikhao (Thailand)

Session 7 Onsite/online: Soil and Environment, Water conservation, Digitalization in Food and Agriculture
Chair: Prof. Zainal Muktamar (Indonesia)
Co-chair: Prof. Dr. Ali, N. F. (Egypt)
Asst. Prof. Dr. Sutisa Chaikul (RBRU)
Assoc. Prof. Dr. Anurug Poeaim (Thailand)
Assoc. Prof. Praprut Promsomboon (RMUTTO)

Session 8 Onsite/online: Organic Agriculture
Chair: Prof. Dr. Nanik Setyowati (Indonesia)
Co-chair: Dr. TSSK Patro (India)
Asst. Prof. Dr. Bancha Wiangsamut (Thailand)
Dr. Teerawat Sarutayophat (Thailand)
Prof. Dr. M.A. Sarker (Bangladesh)

Session 9 Onsite/online: Biology in Agriculture
Chair: Prof Dr. Lalitha, S. (Indonesia)
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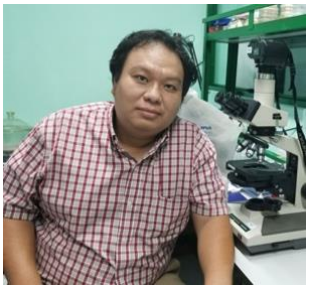
Prof. Dr. Younes (Iran-Turkey)
Prof. Dr. Thangadurai Devarajan(India)
Prof. Dr. Raphael Okigbo (Nigeria)

AATSEA Outstanding Leader Awards 2022

AATSEA Awards in Education and Research



I love mushroom.

Hoang ND, Pham (Vietnam)
pndhoang@gmail.com
http://scholar.google.com/citations?hl=en&user=a4EeWoMAAAAJ
Position and Address: Director of Applied Biotechnology Institute, General Secretary of the Vietnamese Mycological Association (VMA), Country representative of Asian Mycological Association (2015-2023)

He is one of the outstanding research investigations to develop mycoscience and technology. He graduated Bachelor of Science in Biotechnology from Vietnam National University Ho Chi Minh City, Vietnam, and PhD of Horticulture, Course of Biological Resource, Chiba University, Japan. He got certificate of training course between Portland State University, USA and University of Science, Vietnam, and Certificate of "Diplôme de stage de dessins botaniques" training course (2008), The training course of Muséum national d'Histoire naturelle, France in Phnom Penh, Cambodia. He have experienced to be Researcher (staff) in Department of Microbial Biotechnology, Biotechnology Center of Ho Chi Minh City, Vietnam (2/2008 to 2018), Head of Southern Key Laboratory of Biotechnology, Institute of Fungal Research and Biotechnology, 2018 – now and Director, Applied Biotechnology Institute, from 06/2021 - now. He has scrificed his valuable time for professional societies e.g. Vice President of Mycological Society, Ho Chi Minh City, 2014 – 2021, General Secretary of Vietnamese Mycological Association, 2017– 2027, Country Representation in Executive Committee of Asian Mycological Association, 2015 – 2023., Editor of International Journal of Agricultural Technology, Scimago Q4, 2016 – now, Editor of Mycoscience, Scimago Q2, 04/2021 – now, Member of International Advisory Board of Association of Agricultural Technology of Southeast Asia, 2016 –2024, Reviewer in Agricultural Committee of Speed up Fragment – Innovation Start up Program of People Government of Ho Chi Minh City, 2020 – now. His Research interests are Mycorrhizae, Biodiversity and ecology of macro-fungi, Eco-physiology of ammonia fungi, Cultivation and physiology of edible mushrooms, Molecular breeding of edible mushrooms and Organic agriculture. His research through international publication has contributed over 35 research articles.

AATSEA Awards in Education and Research

Dr. V.GOPIKRISHNAN (India)

"Microbial drug discovery for sustainable development goals (SDGs)"

Address : Centre for Drug Discovery and Development Sathyabama Institute of Science and Technology Jeppiaar Nagar, Rajiv Gandhi Road, Chennai TamilNadu, India

FIELD OF RESEARCH INTEREST: Actinobacteriology: Bioprospecting of associated actinobacteria and Marine biofouling and antibiofilm metabolites PROFESSIONAL QUALIFICATIONS: Working experience – 12 years 6 months; Research experience – 10 years 6 months and 58 publications. He has been working in the field of actinomycete research for the past 8 years at Bioprospecting division, Centre for Drug Discovery and Development, Satyabama Institute of Science and Technology, Chennai. He was isolated about 200 actinobacterial cultures were isolated from marine and mangrove ecosystems of South Indiaand investigated for antifouling and antimicrobial activities. Active metabolite purified from two potential Streptomyces sp PE7 and PM33 was showed promising antifouling activity against microfoulers, fungi, algae and molluscs. The taxonomic position of two actinobacterial strains PE7 and PM33 was determined their phenotypic, cell wall and molecular characteristics based on 16 rRNA gene sequencing. The active molecules from both the strains were identified as Quercetin and Taxifolin based on their physico-chemical and spectral properties. The active molecules also showed good antimicrobial, anti Tuberculosis (TB) and anti-canceractivities. Quercetin and taxifolin are mainly presentd in plants and they are not reported from actinomycetes in particular. For the first time he reported the antifouling, anti TB and anti- cancer activity of Quercetin from marine actinomycetes.

AATSEA Awards in Education and Research

Prof. Dr. Devarajan Thangadurai (India)

"Research contributions to the fields of food, agriculture and environment"

Position and Address: Professor, Department of Botany, Karnatak University (University with Potential for Excellence) Dharwad 580003, Karnataka, India, Email: drthanga.kud@gmail.com, drthangaduraid@gmail.com

His extraordinary educational and research contributions to the fields of food, agriculture and environment is internationally acceptable as he has been consistently impressed with diligence, efficiency and passion to do frontier research in all spheres of biological and agricultural sciences. He is an excellent addition as an outstanding research talent in India and around the world. He has organized more than a doz.en national and international conferences in the fields of plant, food, environmental and agricultural sciences, in addition to biotechnology and nanotechnology as convener and organizing secretary; authored and coauthored more than 70 research papers, 120 book chapters and 35 books, supervised 12 PhD and 52 Master's students in the field of plant science; won several fellowships, awards and honors nationally and internationally; and delivered more than *50* invited and keynote lectures in various national and international scientific events in India, Nepal, Maldives, Sri Lanka, Thailand, Singapore, Malaysia, Myanmar, Moldova, Armenia, Georgia, Ukraine, Bangladesh, Russia, South Africa, Oman, UAE, Philippines, Vietnam, Indonesia and Germany . With such understanding He is strongly recommended to deserve for the 2022 AATSEA Outstanding Leadership Award as he is effective in education, communication and popularization in all spheres of plant, food, agricultural and environmental sciences. He is an excellent and committed researcher. AATSEA surely encouraged him to do more pioneer research that will lead to eureka research findings, patent emergence and publications in a high impact factor journal.

AATSEA Awards in Education and Research

Assoc. Prof. F. Fahrurrozi (Indonesia)

"Organic agriculture is the future of mankind"

Assoc. Prof. F. Fahrurrozi, completed his Bachelor degree in Agriculture from Faculty of Agriculture, University of Bengkulu in 1988, and joined the University of Bengkulu in 1989 as a faculty lecturer. After finishing his Master degree from McGill University, Montreal, Canada in 1994, he came back to his home university, teaching courses in Department of Crop Production. In 1997, Dr. Fahrurrozi went back to McGill University, Montreal, Canada. to pursue Ph.D. degree in Plant Science, completed it in 2000, and until now has served as full faculty member at Faculty of Agriculture, University of Bengkulu, conducting teaching, research and community engagements.

Dr. Fahrurrozi has been widely involved in strengthening the educational program in Faculty of Agriculture and University of Bengkulu. He served as Head Study Program (2002), Head of the Departments (2003-2004), Vice Dean for Academic Affair (2005), Vice Rector for Academic Affairs (2005-2013) and Dean of Faculty of Agriculture (2020-2024). He is also extensively assigned in many strategic university task forces. Currently, Dr. Fahrurrozi teaches courses in undergraduate, master and doctorate levels, supervises research project of the students for their degree requirements.

Dr. Fahrurrozi has also proven himself to be an accomplished researcher, an outstanding teacher and a prolific writer. In 2021, he was honored with The Best Teaching Awards at the faculty level. His research focusses on developing agricultural inputs for organic vegetable production, especially in the production of liquid organic fertilizer as substances to improve the effectiveness of solid organic fertilizer application in organic vegetable production. Together with his colleagues, assemblage in Closed Agriculture Production System (CAPS) research group, Dr. Fahrurrozi encourages the scientific community as well the farmers to practice organic vegetable production. During the last 10 years, he has published more than 35 research papers in various international and refereed journals. His current Scopus H-Index is 7, indicating high productivity and quality of his publication. With his research group, he published a book entitled "Liquid Organic Fertilizer for Vegetable Production in Closed Agriculture Production System" (2022). Previously, he also published a book entitled "Plasticulture' (2018). Dr. Fahrurrozi also has been regularly presented his research activities, as keynote or invited speaker, in many scientific conferences at local, national and international forums.

Dr. Fahrurrozi also regularly bridges his research to the farmers through community empowering programs in the provincial level. He is currently serving as the Chairman of Organic Farming Society of Indonesia, Chapter Bengkulu and the Expert Team in Provincial Carbon Council of Bengkulu. These involvements are amongst the way for Dr. Fahrurrozi to promote organic agriculture practices and to ensure the low carbon development strategy by the government which eventually benefits the farmers, society and earth planet. Lastly, Dr. Fahrurrozi believes that organic agriculture is the future of mankind and everyone should put their efforts each in their way, no matter how small it is.

AATSEA Awards for Community Development

Mr. Narongsak Chuensuchon (Thailand)

"Believe in love to support the community for sustainable development"

Position and address: Chairman of NC Coconut Co., Ltd., Vice President of the Federation of Thai Industries, Ratchaburi Province, Minimum Wage Subcommittee Ratchaburi, Provincial Marketing Working Group (Provincial Salesman), Ratchaburi Province

He had been worked with father to plant aromatic coconuts, about 30 rai, Phaengpuay Subdistrict, Damnoen Saduak District, Ratchaburi Province since 1983. He used to plant grapes which applied toxic agrochemicals by himself and found that is not the good way for long life in 1989.-1995. Then, he stopped planting grapes and turned to planting aromatic coconuts by himself in 1996 from production to the markets and try to avoid toxic chemicals. He have started to export aromatic coconuts to Taiwan since 2001, expanded the export market of aromatic coconuts to the United States since 2004. NC Coconut Co., Ltd is established in 2009 to export aromatic coconuts and processed products. He has further been doing research and development on aromatic coconut for better quality since 2012. Advance Agriculture Award 2014 from Bangkok Bank Public Company Limited SME Provincial Champions, Rising Star Group 2015 from University of the Thai Chamber of Commerce. Best Practice Model Enterprise Award under the Smart SME Structure and Promotion of the Year 2017 from the Ministry of Industry. He received the Global Supplier of the Year (2018) from the Pagoda 2019 Annual International Supplier's Conference in China. 2018 He received SMEs EXCELLENCE AWARDS in manufacturing Industry category, Platinum award from Thailand Management Association (TMA). In 2019, He received Outstanding PIM Agricultural Network from Panyapiwat Institute of Management as a Comprehensive Agricultural Administrator from Panyapiwat Institute of Management. The aromatic coconut plantation is expanded at Sam Ruean Garden. In 2020, He has build up the learning media channel on coconut in Platform Online namely Narongsak Chuensuchon to contribute his experience to the society. In 2021, he has successfully developed the coconut cultivar to be the world's first cultivar and using tissue culture for propagation. He awarded as Business Person of the Year Award 2021 in Food and Beverage Business Sector, Honorable Award as START-UP SME for HEALTHY FOOD 2021 as a winner from the 3rd Start-up Innovative F&B Products Competition in the topic of Functional Ingredients for Future Food. As he has shared his successfully experiences to the society he received Governance Award of Best Consumer Treatment in 2022 from Puey Ungphakorn Institute. He is an qualified person in the Provincial Committee on Price of Goods and Services in Ratchaburi Province, Committee

to solve farmers problems due to agricultural products at the provincial level Ratchaburi Representatives of farmers who grow important economic crops, Sub-Committee on Sustainable Agricultural Development Projects in the City at the Provincial Level, Ratchaburi Province Representatives of relevant corporate partners, National Coconut Strategy Subcommittee 2010 Appointed by Police Commissioner (Chiva Wongsamut), Advisor to the Audit and Monitoring Committee of the Police Administration Damnoen Saduak Provincial Police Station. His company is certified for quality and safety standards such as GLOBAL GAP, USDA ORGANIC, GMP, HACCP, CSR -DIW GI Mark, FDA and HALAL mark etc. In 2022, he has started to change his farm to be non-agrochemical production (NAP) which stopped to apply agrochemicals and turning to apply bioproducts and organic fertilizers and produce organic fertilizer from coconut waste which concerns on environmental protection. His coconut products are developed as fresh coconut, polished coconut, coconut jelly and other which exporting to Taiwan, Hong Kong, Malaysia, Singapore, Malaysia, USA, China and European countries. The aromatic coconut beverages are recognized as a partner in the world-class brand Harmless Harvest of KON-JEEB aromatic coconut variety. KON-JEEB aromatic coconut variety is mutual collaborated with Naresuan University, Thailand. In 2021, NC Coconut Company has innovated designation of COCO STRAW punching set for easy drinking with OptiBreath bag or a breathing bag to maintain the freshness of the aromatic coconut and extend the shelf life for exports up to 3 months. He participated as a Key Speaker at the SCG ESG Pathway under the concept to reduce FOOD WASTE with OptiBreath® "breathing bags" with Nai-Namhom Brand, Pure & Real 100%. NC Coconut Co., Ltd., is now accepted as a BCG Model with high-value processed agricultural products. Company policy is changed to be 4 dimensions: 1. Sustainable development 2. Human security in country and the world context 3. Competitiveness through innovation and 4. Comprehensive growth. His coconut farm is conversed to be organic production.

AATSEA Awards for Community Development

Dr. Sophea Kean (Cambodia)

"Work hard to give knowledge for building up agricultural society"

Present position: Director, Department of Horticulture and Subsidiary Crops, General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries (2018 to present).
Home Address : House #20, St. 299, Beung Kak II, Phnom Penh, Cambodia. E-mail: kean.sophea@gmail.com

He graduated BSc. Graduate (Major in Agronomy) Royal University of Agriculture, Phnom Penh. (1985-1989), MSc. in Sustainable Use of Natural Renewable Resources University of Tropical Agriculture/ Royal University of Agriculture, Phnom Penh. (December 1999 - December 2001)and PhD, Plant Pathology, Chiang Mai University, Thailand (2006-2010). He is well trained in Agro ecology, Integrated Pest Management (IPM) and Sustainable Agriculture, Michigan State University, USA, from 16 to 26 June 2013, How to become a plant doctor, module 1 (October 24 – 26, 2011) given by Plantwise, CABI, UK, Royal University of Agriculture, Phnom Penh, Cambodia, International Workshop for the Development of Asian Seed Industry, 10 – 20 October, 2011. Seoul, Korea, Poverty and Food Security Monitoring in Cambodia - Linking Programmes and Poor People's Interests to Policies, Humboldt-University Berlin – Germany (June 15-28, 2005), Finance for Non-Financial Managers (April 11 – May 16 1999) Regent College, Phnom Penh, Strategic Planning and Training Workshop on STD/HIV/AIDS Prevention in the Uniformed Services of South East Asia. 7 to 11 August 2000, Siem Reap, Cambodia, Manager's Development Program (Feb – Dec 1998) VBNK, Phnom Penh, Advanced writing and Presentation Skills (1998), CFBT, Phnom Penh, Gender and Development Orientation Course (September – November 1995), Asian Institute of Technology, Thailand, Accounting and Financial Management (July 11- 22, 1994), Cambodia Development Resource Institute, Phnom Penh, HRD Skills for Functional Managers (September 5-16, 1994), Asian Institute of Technology, Thailand, Basic Management Course (12-15 July 1994), Phnom Penh, MSDOS, Norton Commander, WordPerfect for Windows, Ms Excel for Windows, Khmer for Windows, (February 1993), Agricultural Trainer's Training Course (February 14 – May 15, 1992), Phnom Penh, Farming Systems Research Course (July 20 – September 11, 1992) IRRI, Los banos, Philippines, Operation and Maintenance of Irrigation Systems with Farmer's Participation, (February 16 - March 16, 1991), Quezon City, Philippines.

Work experiences: Develop the implementation and master plan of the department, Coordinating with other institutions and international relationship, Deputy Director, Department of Horticulture and Subsidiary Crops, General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries (2010 to present), Assist the director in proposal writing, planning and reporting, Supervise vegetable research and fruit tree research stations, Provide training in plant diseases, crop production to technical staff and others,, Develop the implementation and master plan of the department. Coordinating with other institutions and international relationship. Senior National Agronomist – Vegetable seeds expert, "Emergency Assistance to Restore the Livelihoods of Vulnerable Farming Families Affected by the Floods in Battambang and Banteay Meanchey provinces" TCP/CMB/3405 (E), develop a detailed work plan of the project activities; develop technical specifications of vegetable seeds and hand tools inputs to be purchased and distributed; develop the terms of reference of the letters of agreement with partners for distribution of

inputs, in close collaboration with the Operations Unit; develop a delivery and distribution plan for the vegetable seed component; liaise with national and provincial Government authorities and other involved partners to work on project site and beneficiaries identification and selection; liaise with national and provincial Government authorities and develop training programme and ensure the quality of the training activities; represent the project at coordination meetings organized by provincial, district and local authorities and organized by partner NGOs or other stakeholders, towards end of the project, assess the impact of the agricultural inputs distribution and training. He is also appointed to be a part-time of National Horticulture Expert, Micro and Small Enterprise Development to achieve food security, food safety and self reliance for urban poor in Phnom Penh", FAO -Phnom Penh (Nov 2012 - 2013), Collect and review existing relevant training curricula and materials in the area of horticulture; Participate in and/or review the results of the knowledge, attitude and practice (KAP) study conducted under the project to identify training needs and requirements among the urban and peri-urban poor in Cambodia, in consultation with the responsible FAO-RAP technical officer and key stakeholders, design training curricula and materials that meet the specific needs and requirements of the urban and peri-urban poor in Cambodia; assist in the translation of existing materials if needed; pilot testing of training materials, and advise if there is a need for further improvement. He is appointed to be a National Agronomist Expert, Emergency agricultural assistance to returning flood-affected farmers in Kampong Thom province (FAO/OSRO/CMB/102/CHA) from Nov 2011 - Jul 2012. Facilitate co-ordination between FAO-Project and all government and other non-government agencies involved in implementation of Emergency agricultural assistance to returning flood-affected farmers in Kampong Thom, Responsible for the effective and efficient management of the Agricultural Training activities in Food Production and its activities in order to achieve its objectives.There are many government development he is appointed to be National Rice Economist, Regional Technical Assistance Support for the ASEAN Integrated Food Security Framework, Asian Development Bank (Sep 2010 - Feb 2011), Collect and analyze the relevant food security information, data, reports, the government's policy statements and/or legal issuances and related documents. Carry out a diagnostic study on the issues and opportunities to ensure the country's sustainable food (rice) security. Conduct interviews with policy makers, private sector, civil society organizations, farmer associations and others as relevant. Summarize the findings in a succinct Country Report, National Team Leader, Special Programme for Food Security, MAFF/FAO (Feb. 2002 to May 2006), Responsible for the project implementation to ensure that the objectives of the National Food Security and Poverty Reduction Programme (NFSPR) to Improve Food Security and Income-generation of Poor Farmers in Cambodia and another project “Livelihood Diversification and Natural Resource Management by Small Group Enterprises”, Facilitate co-ordination between SPFS, FAO and all government and other non-government agencies involved in implementation of food security projects in Cambodia, Take a pro-active lead and supervisory functions to ensure that all relevant activities of SPFS are based on participatory approaches, with full involvement of farmers; Responsible for implementing and managing the project, monitoring progress and reporting to the Government, the Steering Committee and FAO, and as a Manager, UNDP Service Center (June 1997 to February 2002), Managed the administration and finances of the Service Center, procurement for all UNDP and UNDP funded projects, transportation and all business service for UNDP and UN agencies, Made the Service Center client oriented and a cost-recovering center, Facilitated the efficient functioning of the Service Center's work (administrative, financial, and logistical support, and other services) as per UNOPS/UNDP standards, Managed the work of the Service Center as client-oriented and implemented a cost recovery program to make it self-financing, Managed the publication and reproduction of reports and documents of various UN agencies, Maintained regular communication with UN offices, government departments and suppliers. As a Deputy Representative of CIDSE (June 1994 to June 1997): CIDSE, a consortium of 14 European agencies, is an international NGO working in Cambodia since 1980 on agriculture and community development programmes. It has projects in Svay Rieng, Kampot, Kandal, and Ratanakiri provinces and with the Ministries of Agriculture and Rural Development. Further 30 local NGOs receive support under the partnership programme to implement community development projects in various provinces of Cambodia. CIDSE's annual country budget is about US$ 2 million.

AATSEA Awards for Emerging Leader of Young Generation

Dr. DONNA RIA JOSUE-CANACAN (Philippines)

Current Position and address: Professor VI and Chairperson, Agronomy Department, Mindanao State University General Santos Fatima, General Santos City, Philippines. E-mail: Canacan, Donna Ria - donnaria.canacan@msugensan.edu.ph

The AATSEA Award for emerging leaders of young generation, DR. DONNA RIA JOSUE-CANACAN is an exceptionally talented student*.

An outstanding doctoral graduate (PhD) of Oklahoma State University, she was offered employment as Agricultural Extension Officer of Oklahoma State University – US Department of Agriculture (USDA).A very tempting and lucrative offer but love of country and passion to be of service to one's country made her to come home to the Philippines in the year 2012. As a Mindanaon herself and married to a Maguindanaon, a member of the cultural minority of Mindanao, she went to Mindanao dedicating her time, skills and capacity to serve wholeheartedly the cultural communities of Mindanao and to teach at the Mindanao State University-General Santos City (MSU-GSC). Her exemplary academic credentials qualified her to be in a Professor VI rank, one of the highest positions awarded by the University to its faculty members. Furthermore, recognizing her leaderships potentials, she was unanimously selected as Chairperson of the Department of Agronomy, College of Agriculture in MSU-GSC. She also excelled in research which qualified her to become a member of the Research and Development Committee of the University. One more important academic job that Dr. Canacan held was serving as the Editor-in-chief of the Journal of Engineering, Environment and Agriculture Research (ISSN 2599-4395, Print; ISSN 2651-8260, Online) for the year 2018. True to her love to help, she is engaged in several Research, Extension and Development Projects. Her most recent and still on-going research project is on the Dietary Analysis and Feeding Habits of Six Philippine Tuna Species using Metagenomics whose goal is crafting policies on the conservation, preservation, and identification of tuna preys which are expected to affect thousands of local fisher folks. As her expertise is on Crop Pest Management, she led a project entitled "Extending Appropriate Integrated Pest Management (IPM) and Environmental Conservation Technologies (ECT) and Entrepreneurial Assistance to SOCCSKSARGEN Farmers for Enhanced Crop Productivity and Entrepreneurial Capabilities" implemented from year 2016 to 2019. This project benefitted 217 farmer-participants from 13 villages in five towns of Southern Philippines. A very high adoption (85%) of IPM-based practices were observed from these participants. Dr Canacan led another project "Enhancing Economic Capability of Small Landholders in General Santos City through Sustainable Integrated Farming" which involved 64 farmer-participants from seven villages of General Santos City. Almost all farmers (96%) said that the trainings were worthwhile

as they could implement them in their own farms. Despite the COVID 19 pandemic, Dr. Canacan successfully headed the Department of Agronomy in the conduct of a training (year 2021) on Lettuce Production in Greenhouse in collaboration with the National Irrigation Administration and Farmers' Organization in Tupi, South Cotabato benefitting 15 farmer-participants who were also recipients of a newly-constructed greenhouse . True to her young age, the untiring Dr. Canacan, planned and implemented development projects for her College such as upgrading of the College Greenhouse and the Tissue Culture Laboratory. Currently, she manages the Molecular Biology Laboratory of the University. She has commitment to her students which is evident in her high teaching efficiency ratings every semester. Not only is she dedicated in the classroom and as mentor of her students, she also has a big heart for the farmers and fisher folks – especially the Tri-People who are Mindanao's cultural minority groups. She has been also serving as an Agricultural Consultant in various agri-business enterprises and engagements in the region. Her calling to serve her country first, enthusiasm, rigor, and dedication.

**Dr Canacan finished her BS Agriculture degree as Cum Laude, with major in Plant Pathology at the University of the Philippines Los Baños (2002), one of the Agriculture board exam top notchers(2005) ; H.F. "Pat" Murphy Memorial Scholarship by the Plant and Soil Sciences Department as she graduated with Excellence (G.P.A.=3.806) for her MSc at Oklahoma State University, United States of America (2009), Doctor of Philosophy in Plant Pathology an Excellent performance (G.P.A. =3.723) (2012) earned her several awards: First Place, Poster Session, 8th Annual Graduate Research in the Biological Sciences Symposium awarded by the Biochemistry and Molecular Biology Graduate Student Association in September 2011 and Sitlington Enriched Graduate Scholarships for Years 2009 to 2011. While in the United States, she was a co-innovator of two inventions under the Oklahoma State University which included a Rapid Microbial Collection and Nucleic Acid Recovery device (OSU reference number 2010.26) and Soluble Plastic and/or Starch Films for the Collection, Nucleic Acid Recovery, and Release of Polymerization Chain Reaction (PCR) Reagents in Diagnostics and Forensic Applications (OSU invention disclosure number 2011.23).*

AATSEA Awards for Emerging Leader of Young Generation

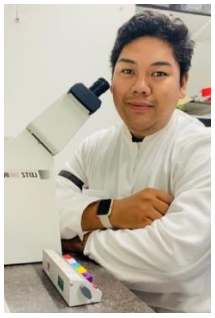
Dr. S. NITHYAPRIYA (India)

"Building up science and technology in microbial technology for sustainable development"

Present position and address: Assistant Professor, Padmavani Arts and Science College for Women, Salem, India. Residential Address: 82,B Maniyakar street, D/O C.Subramani, Chinnapudur, Salem - 636007, Tamil Nadu, India. E-mail : nithyapriyamuthu@gmail.com

She graduated B.Sc. Botany Sri saradha College for women salem-7in 2008, B.Ed, Botany, Vivekananda College for women .Tiruchengode.in 2009, M.Sc Botany Botany, Periyar University in 2012, M.Phil, Botany, Periyar University, Salem in 2012, Ph.D. Periyar University, Salem in 2020. Her excellent research interest and articles published in ISI/SJR indexed journal as Role of the Arbuscular Mycorrhizal associated Rhizobacteria in the Soil borne Phytopathogens in Salem Districts, Improvement of oil yielding crops yield attributies using plant growth promoting rhizobacteria, Biocontrol activity of Siderophore producing *Pseudomonas* spp on *Arachis hypogea.* Isolation and Characterization of *Pseudomonas fluorescens* and its Siderophore production, Production and optimization of microbial iron chelators (siderophore) by *Pseudomonas* spp., Siderophore producing plant growth promoting rhizobacteria and its improvement of oil yielding crops, Studies on siderophore producing PGPR,n Production of bacillibactin siderophore from soil bacteria *Bacillus subtilis* a bioinoculant enhances plant growth in *Arachis hypogaea* through elevated uptake of nutrients, Production, Purification, and Characterization of Bacillibactin Siderophore of *Bacillus subtilis* and its application for improvement in plant growth and oil content in sesame. BOOK CHAPTER PUBLICATIONS: in 2018: Bio intensive approaches Application and effectiveness in plant disease Management-Book Chapter-Precepts of bacterial endophytes in the management of soil borne disease. ISBN: 81-7019-6240. Today and tomorrow's printers and publishers. In 2021: Role of microbial communities for sustainability. Book chapter Metal Stress Impacting Plant Growth in Contaminated soil is alleviated by Microbial siderophore.vol:29.317-332. ISBN: 978-981-15-9912-5. Publisher: Springer, Singapore. She had continuously participated national and international conferences from 2017 til now. She awarded in Appreciation of Innovation festival (2019. 31-Jan- 2 Feb), organized by District Science Centre (National Council of Science Museums Ministry of Culture Government of India) Kokkiriakulam, Tirunelveli, TamilNadu, India.

AATSEA Awards for Emerging Leader of Young Generation



JAMES KENNARD SANZ JACOB (Philippines)

"A tireless mycological scientist"

Position and Address: JAMES KENNARD SANZ JACOB 044 QUEZON ST. FC OTIC, CARRANGLAN 123 NUEVA ECIJA: Email: jameskennard.s.jacob@isu.edu.ph

He is a tireless and outstanding leader and support in the field of Mycological Sciences. He is cooperative and assistive to the Isabela State University, where he works as Faculty and a Researcher, as well as to the community. Further, he is passionate about mycology research and development. Much of his desire to promote the field of mycology, he excels in supervising, guiding, and motivating both graduate and undergraduate students, and the people around him. Through his published papers and current projects in the Philippines, he is a natural leader and problem solver, who efficiently identifies and proposes solutions to any issues he hits. He is someone who will do his best for the welfare of Science, Research, and Development which is relevant to his country, The Philippines.

He has published several relevant research articles including Checklist of Reported Macrofungi in the Philippines, Biocontrol Potential of Endophytic Aspergillus spp. against Fusarium verticillioides, Endophytic Aspergillus spp. Associated with Plectranthus amboinicus Leaves as potential Biocontrol Agents, Mycopharmacological Properties of Endophytic fungi from Cuban Oregano (Plectranthus amboinicus Lour.) Leaves, Species Listing of Macroscopic Fungi in Isabela State University, Isabela as Baseline Information, Morphological Characterization and Bacteriostatic Activity of Entomopathogenic Fungi Isolated from Short-horned Grasshopper (Oxya hyla intrica), Mycelial Growth Performance of Three Species of Pleurotus on Coconut Water Gelatin are just some of his work. He works hand in hand in promoting sciences through membership and collaborations with different leading national and international organizations and agencies, such as AATSEA (Thailand), Wageningen University and Research (The Netherlands), The Mycological Society of Japan, Mycological Society of Philippines and The Philippine Society for Microbiology . He serves to be a young generation who works in investigating microbiological research for sustainable development.

The 10th International Conference on Integration of Science and Technology for Sustainable Development 2022 (10th ICIST 2022)

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

November 24 - 26, 2022

Faculty of Agricultural Technology , King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, Thailand
Please visit: www.aatsea.org email: aatsea.icist@gmail.com

PROGRAM

Session 1 Onsite/online: Agricultural Extension, Education and Development

Session 2A Onsite/online: Animal, Fisheries Sciences and Entomology

Session 2B Online: Animal, Fisheries Sciences and Entomology

Session 3A Onsite/online: Biological Diversity and Microbiology

Session 3 B Online: Biological Diversity and Microbiology

Session 4 Onsite/online: Biotechnology

Session 5A Onsite/online: Food Security/Safety, Food Science and Postharvest Technology

Session 5B Online: Food Security/Safety, Food Science and Postharvest Technology

Session 6A Onsite/online: Plant Sciences and Pest management

Session 6B Online: Plant Sciences and Pest management

Session 7 Onsite/online: Soil and Environment, Water conservation, Digitalization in Food and Agriculture

Session 8 Onsite/online: Organic Agriculture

Session 9 Onsite/online: Biology in Agriculture

Overall program

24 November 2022: 13:00-16:00 Desk Registration

25 November 2022: 7:00 Conference day

16:40-17:40 **Training for Organic Inspection of AATSEA** by Prof. Dr. Kasem Soytong and AATSEA Organic Inspector Staff at The Central Library

17:40 Editorial board meeting 2022 at Central Library, KMITL

18:30 Closing ceremony

19:00 Welcome dinner (go to Anusorn Restaurant by Shuttle bus)

26 November 2022: 7:00-16:00 Field Workshop in Organic Agriculture

Excursion program: visit Organic Farm, Practical learning in Organic Crop Production in Ratchaburi province

16:00-17:00 Visit AATSEA Research Laboratory

18:00 Goodbye dinner

DAY 1: November, 24, 2022 Room 1

Time	
13:00 -16:00	Desk registration

DAY 2: November 25, 2022: Conference day

Time (Room 1)	
	MC staff Asst. Prof. Dr. Jakrapan Wongpa (Thailand) Dr. Wanlada Klangnurak (Thailand)
7:00-8:00	**Registration**
8:00 - 8:10	**Welcome Addresses** Excellency Prof. Dr. Hussein Darwish Mustafa, President of National Research Center (NRC, Egypt) Prof. Dr. Teodoro C. Mendoza (Philippines)
8:10 - 8:15	**Message for Opening Ceremony:** Prof. Dr. Hiroyuki Konuma, President of GIAPSA (Japan)
8:15-8:20	**Opening remark:** Assoc. Prof. Dr. Komsan Maleesee (KMITL Rector)
8:20-8:25	**Review the former ICIST with imagine song** Prof. Dr.Kasem Soytong, President of AATSEA
8:25 – 8:35	**Awarding Ceremonies** Prof. Dr. Kasem Soytong, President of AATSEA AATSEA Outstanding Leader Award 2022 in Education and Research

1. Dr. Hoang ND, Pham (Vietnam)
2. Dr. V.GOPIKRISHNAN (India)
3. Prof. Dr. Devarajan Thangadurai (India)
4. Assoc. Prof. F. Fahrurrozi (Indonesia)

AATSEA Award for Community Development

1. Mr. Narongsak Chuensuchon (Thailand)
2. Dr. Sophea Kean (Cambodia)

AATSEA Award for emerging leader of young generation

1. Dr. DONNA RIA JOSUE-CANACAN (Philippines)
2. Dr. S. NITHYAPRIYA (India)
3. Dr. JAMES KENNARD SANZ JACOB (Philippines)

8:35-9:00 **GROUP PHOTO and COFFEE BREAK**

Plenary Session—Room 1

Chair: Prof. Dr. Teodoro C. Mendoza (Philippines)
Co-chair: Prof. Dr. Pakkapong Poungsuk (Thailand)

Time	
9:00-9:20	**Prof. Teodoro C. Mendoza (Philippines)**
Onsite	Transforming meat based diet to plant based diet is addressing food security and climate crisis in this Millennium
9:20-9:40	**Prof. Dr. Bhat, Rajeev (EU, Estonia)**
Online	Future food sector: prospects & challenges.
9:40-10:00	**Dr. Sigit Sudjatmiko (Indonesia)**
Onsite	Climate Change and its effect on cropping schedules and food crop productivity in Indonesia
10:00-10:20	**Prof. Tapio Juokslaht (Finland)**
Onsite	Potato (*Solanum tuberosum)* in the South-East Asian food system: Role in zero hunger target of the united nations sustainable development goals
10:20-10:40	**Prof. Dr. Moammar Dayoub (Syria-Finland)**
Onsite	Agritourism: Challenges and opportunities for rural development
10:40-11:00	**Dr. Kampon Sriwatanakul (Thailand)**
Onsite	Genomics for organic farming
11:00-11:20	**Prof. Dr. Devarajan Thangadurai (India)**
Onsite	Bioprospecting microbes from extreme environments using metagenomics approaches towards environmental sustainability
11:20-11:40	**Prof. Dr. Kasem Soytong (Thailand)**
Online	Non-agrochemical production (NAP) transition period to organic agriculture

11:40 – 13:00 **LUNCH BREAK**

RESEARCH FORUM

13:00-18:30 ORAL PRESENTATION - Parallel Sessions (onsite/online sessions)

SESSION 1 (Room 1) Onsite/online: Agricultural Extension, Education and Development

No.	Time	**Chair:** Prof. Dr. Pakkapong Poungsuk (Thailand) **Co-chairs:** Assoc. Prof. Dr. Adisak Singseewo (Thailand), Asst. Prof. Dr. Phattraporn Soytong (Thailand), Joselito Dar (Philippines)
1	**13:00-13:20**	**IS: Pakkapong Poungsuk**, Manitchara Thongnoi and Piyanard Junlex
	Onsite	Adaptation and new approaches to organic farming production of Naso organic rice producer group in Yasothorn province after the outbreak of Covid-19 pandamic
2	**13:20-13:35**	**Waritsara Orsuwan**, Suneeporn Suwanmaneepong and Somsak Kuhaswonvetch
	Onsite	Farmer's knowledge and perceived impacts of ethylene gas innovation toward increasing yield performance of Para Rubber in Ban Khai District, Rayong Province
3	**13:35-13:50**	**Sirilak Simakorn**, Suneeporn Suwanmaneepong and Rungtawan Yomla
	Onsite	Perceptions on the benefits and limitations of innovative agricultural food production with aquaponics for the communities with limited spaces in urban Bangkok, Thailand
4	**13:50-14:05**	**Bunyisa Ngamchaleaw**, Suneeporn Suwanmaneepong and Jeeranan Khermkhan
	Onsite	Tourists' behavior and importance of marketing factors for the decision to use the community-based agritourism services under the new normal era in Rayong Province, Thailand
5	**14:05-14:20**	**Sorrapong Charoenkittayawut**, Suneeporn Suwanmaneepong and Panya Mankeb
	Onsite	Determinants of income diversification among farm households in Thailand
6	**14:20-14-35**	**Christopher Llones** and Suneeporn Suwanmaneepong
	Onsite	Social capital and production risk: examining the association using the case of irrigated rice farms in Northern Thailand
7	**14:35-14:50**	**Teguh Adiprasetyo**, Irnad Irnad and Nusril Nusril
	Onsite	Strategy to foster smallholder farmers in Indonesia to adopt the sustainable palm oil production system for supporting sustainable development
8	**14:50-15:05**	**Phaitoon Thongsuk**, Pakkapong Pougsuk and Piyanard Junlex
	Onsite	Developing agricultural knowledge and skills by using a learning kit on commercial native chicken rearing of agricultural teacher apprentice students, Surindra Rajabhat University
9	**15:05-15:20**	**Prongsatorn Sinturat**, Sarawut Intorrathed and Pakkapong Poungsuk
	Onsite	Using LED in various colors on the growth and yield of cos salad
10	**15:20-15:35**	**Akbar Abdurrahman Mahfudz**
	Online	Assesing the progress towards achieving sustainable development goals at a city level: Madiun City, Indonesia
	15:35-15:50	**COFFEE BREAK**

11	**15:50-16:05**	**Parinyaporn Topphak**, Jeeranun Khermkhan and Suneeporn Suwanmaneepong
	Online	Comparison of cost and return between paddy production and rice seeds of community enterprise members in Chachoengsao Province of Thailand
12	**16:05-16:20**	Jeeranun Khermkhan, Rangsima Pimthong, Thanat Samanakupt and **Visawat Panyawongsataporn**
	Online	Economic and social effects to the safe agriculture selling products of Institute: case study of farm Chaokhun by KMITL
13	**16:20-16:35**	Surawat Chalorsuntisakul, Charunee Kasornpikul, Manatsanun Nopparatmaitree, Kataya Mahachanawong Suvarnaphaet, Nitinunt Nakburi, Mintra Lukkana Lukkana and **Phisit Suvarnaphaet**
	Online	Leadership of poultry farmer-leaders and implications for organic livestock extension services in Phetchaburi province
14	**16:35-16:50**	**Wattana Saduak**, Amporn Saduak, Nawarat Pourpan and Pakkapong Poungsuk
	Online	Developing knowledge and skills in an agricultural career after the outbrake of Covid-19 pandemic for young farmers by making mixed soil ready for commercial planting
15	**16:50-17:05**	Pornkamon Rahannok, Yingsak Kochakote, **Boonvanich Boonvarichananan**, Suwaree Sripuna, Prapaporn Chulilung and Panya Mankeb
	Online	Community capital for economic development according to the BCG Model
16	**17:05-17:20**	**Heejung Kim**, Adisak Singseewo and Pakkapong Poungsuk
	Online	Learning wild plant toward carbon neutral agriculture in international training program
17	**17:20-17:35**	**Bhutharit Raksasiri**, Thirawat Chantuk, Thongchai Thongmar, Kanokaon Netchu and Prasopchai Pasunon
	Online	Development of organic fertilizers formula for growing vegetables in pots and studying the level of satisfaction of people in the community towards the transfer of knowledge on the production of organic fertilizers for their own use for sustainability in the community.
18	**17:35-17:50**	**Jomah B. Dolo,** Alisa Kongjaimun, Onuma Thonglor, Mana Kanjanamaneesathian and Rachsawan Mongkol
	Online	Factors affecting the implementation of GAP on Cocoa production in Nimba County, Liberia
19	**17:50-18:05**	**Samuel T. King**, On-Uma Thonglor, Mana Kanjanamaneesathian, Rachsawan Mongkol and Alisa Kongjaimun
	Online	Factors Affecting the Implementation of GAP on Cassava Production in Grand Cape Mount County, Liberia

18:30 **Closing Ceremony: ROOM 1**

Session 2A (Room 2) Onsite/online: Animal, Fisheries Sciences and Entomology

No.	Time	
		Chair: Prof. Fahrurrozi Fahrurrozi (Indonesia) **Co-chairs:** Prof. Dwi Wahyuni Ganefianti (Indonesia), Assoc. Prof. Dr. Virapol Jamsawat, (Thailand)
1	**13:00-13:20**	**IS: Dwatmadji Dwatmadji**, Tatik Suteky and Febriana Widodo
	Online	Stocking rate effect on physiology, performance, and behavior of mixed-grazing goat and sheep under naturally infected pasture
2	**13:20-13:35**	**Kamon Chaweewan**, Wiwat Kanyarang, Netanong Phonkate, Ronachai Sitthigripong, Panneepa Sivapirunthep, Chanporn Chaosap and Rutcharin Limsupavanich
	Onsite	Effect of dietary protein levels on productive performance and carcass traits of Thai native pigs from different geometric regions
3	**13:35-13:50**	**Pranee Pirompud**, Chanporn Chaosap and Panneepa Sivapirunthep
	Onsite	Factors influencing dead on arrival and condemnation of broilers during catching, transport, lairage, and slaughter
4	**13:50-14:05**	**Sureewan Srijad**, Kancharika Pilapang and Rungtawan Yomla
	Onsite	Effects of commercial feed, Mulberry leaves, and mixed feed on growth in Apple Snails (*Pomacea* sp.)
5	**14:05-14:20**	**Kancharika Pilapang**, Sureewan Srijad and Rungtawan Yomla
	Onsite	The effect of *Moina* sp. immersion with 17alpha-methyl testosterone (17MT) on sex reversal of Nile tilapia
6	**14:20-14:35**	Kittichon U-Taynapun, **Butsarakorn Ratchapol** and Nion Chirapongsatonkul
	Onsite	Antibacterial, quorum quenching and anti-biofilm formation activities of vinasse extracts against *Vibrio parahaemolyticus*
7	**14:35- 14:50**	Noratat Prachom, Praveena Taveekijakarn, Srinun Nattida, **Wanlada Klangnurak** and Sutthirat Panchakhan
	Onsite	Effects of dietary superworm (*Zophobas morio*) oil on growth and reproductive performance of female zebrafish (*Danio rerio*)
8	**14:50-15:05**	**Teerajet Laohasatian**, Teerayut Chawut, Narin Preyavichyapugdee and Pawat Seritrakul
	Onsite	Development of Loop-mediated isothermal amplification (LAMP) for rapid detection of Lumpy Skin Disease Virus (LSDV) from cattle
9	**15:05-15:20**	**Wanninee Chankaew**, Monsung Yangthong, Manee Srichanan, Suriya Chankaew and Chansawang Ngamphongsai
	Onsite	Effect of Kam Kung Alga (*Chara corallina* Willdenow) on the Growth Performance and Oxidative Defense of Nile Tilapia (*Oreochromis niloticus*)
10	**15:20-15:35**	**Agdippa, Michael Deither T**
	Onsite	Prevalence of heartworm (*Dirofilaria immitis*) of dogs in guimba, nueva ecija using direct blood smear and modified knott's test
	15:35-15:50	**COFFEE BREAK**

11	**15:50-16:05**	Nion Chirapongsatonkul, **Agnesia Damayanti** and Kittichon U-Taynapun
	Onsite	Comparative transcriptome analysis of Nile tilapia (*Oreochromis niloticus*) under different health conditions associated with tilapia lake virus disease (TiLVD)
12	**16:05-16:20**	**Christian Santos**, Jezie Acorda and Marvin Villanueva
	Onsite	Relationship of b-mode ultrasonography features of the mammary gland and teat with CMT finding and somatic cell count in dairy buffaloes *Bubalus bubalis* (*Linnaeus*, 1758) with subclinical mastitis
13	**16:20-16:35**	**Cheepchanok Puwanard**, Tanapoom Moungthipmalai and Mayura Soonwera
	Online	Toxicity of *Litsea petiolata* Hook.f.essential oil against *Aedes aegypti* (Linn.), *Aedes albopictus* (Skuse), *Anopheles minimus* (Theobald) and *Culex quinquefasciatus* (Say)
14	**16:35-16:50**	Mayura Soonwera and **Sirawut Sittichok**
	Online	Insecticidal activity of *Citrus aurantium* and *Eucalyptus globulus* essential oils and their major constituents against nymphs and adults of *Pediculus humanus capitis* De Geer
15	**16:50-17:05**	**Sayan Subepang**, Wimonsiri Sehawong, Anuphan Suwanphan and Sukanya Kamphayae
	Online	Effect of cassava leaf pellet supplementation on growth performance, nutrient digestibility and economic return in Chalorais crossbred cattle fed rice straw as basal diet
16	**17:05-17:20**	**Tanapoom Moungthipmalai** and Mayura Soonwera
	Online	Adulticidal activity against houseflies (*Musca domestica* L.; Muscidae: Diptera) of combinations of *Cymbopogon citratus* and *Eucalyptus globulus* essential oils and their major constituents
17	**17:20-17:35**	**Ruamruedee Panchan**, Pattira Kasamesiri, Nantaporn Sutthi, Wilailak Ounjit and Sujitar Jorjong
	Online	Species composition and diel variation of fish caught by traditional longline fishing
18	**17:35-17:50**	**Sirawut Sittichok** and Mayura Soonwera
	Online	Adulticidal effect of combinations between *Cymbopogon citratus* and *Eucalyptus globulus* essential oils against *Pediculus humanus* capitis De Geer

18:30 **Closing Ceremony: ROOM 1**

Session 2B (Room 10) Online: Animal, Fisheries Sciences and Entomology

No.	Time	
		Chair: Dr. Elderico Tabal (Philippines) **Co-chairs:** Dr. Karunarathra, Samantha. C. (Sri Lanka); Assoc.Prof. Dr. Sineenart Polyorach (Thailand); Assoc. Prof. Dr. Rungtawan Yomla (Thailand); Asst. Prof. Dr. Loetchai Chit-aree (RBRU,Thailand)
1	**13:00-13:15** **Online**	**Sirima Takeungwongtrakul,** Pannepa Sivapirunthep, Trus Kaesang, Tananan Supphakitchanon and Kunya Tuntivisoottikul Association between dairy meat quality with gender, slaughter age, and marbling score, and relationships among the meat quality traits
2	**13:15-13:30** **Online**	**Lerma Ocampo** and Joseph Oliver Lofranco Cryogenic tolerance to freezing temperature and sperm motility characteristics of frozen-thawed spermatozoa of Philippine native pig (Sus scrofa).
3	**13:30-13:45** **Online**	**Tanikan Buathong**, Chansawang Ngamphongsai, Laddawan Krongpong, Tivawan Meechin, Pichet Plaipetch and Jeeraporn Foowut Protein digestibility of feed ingredients in Banana shrimp Fenneropenaeus merguiensis (De Man, 1888)
4	**13:45-14:00** **Online**	**Manee Srichanun,** Sunee Wanlem and Md Arefin Rahman The effect of fermented copra meal for substitution of fishmeal protein on growth, feed utilization, and carcass quality of Nile tilapia (Oreochromis niloticus)
5	**14:00-14:15** **online**	**Tatik Suteky**, Dwatmadji Dwatmadji and Edi Sutrisno Impact of parasitism and herb supplementation on water intake of goats
6	**14:15-14:30** **Online**	**Wiwat Waramit** and Thipwadee Prapaiwong Effects of fresh ivy gourd leaves (*Coccinia grandis* (L.) Volgt) added to concentrate diets on production and egg quality of kabinburi duck eggs of 21 – 32 weeks old
7	**14:30-14:45** **Online**	Ampon Klompanya, Ronachai Sitthigripong, Jamlong Mitrchaothai, **Kanokrat Srikijkasemwat** and Chanathip Thammakarn The Utilization of Water Hyacinth (*Eichhornia crassipes*) and Narrowleaf Cattail (*Typha angustifolia*) as an Alternative Litter Material on Growth Performance of Broilers
	18:30	**Closing Ceremony: ROOM 1**

Session 3A (Room 3) Onsite/online: Biological Diversity and Microbiology

No.	Time	
		Chair: Dr. Hoang ND Pham (Vietnam) **Co-chairs:** Dr. Gopi Krishnan (India), Asst. Prof. Dr. Pornpan Sukhumpinij (RBRU, Thailand), Asst. Prof. Dr. Thanidachaya Puthmm(Thailand), Assoc. Prof. Dr. Supattra Poeaim (Thailand)
1	**13:00-13:20** **Onsite**	**IS: Chozin, M.**, Sumardi, S., Sudjatmiko, S., Candra. D, and Sasmita, R. Salinity stress tolerance of advanced swamp rice breeding lines
2	**13:20-13:40** **Onsite**	**IS: James Kernard Jacob** Integration of Mycology in Education in the Philippines: Status and Future Prospects
3	**13:40-14:00** **Onsite**	**IS:** Hutabarat, F., **Sudjatmiko, S.** and Pujiwati, H. Combination Effect of NPK and Plant Growth Promoting Rhizobacteria on Edamame Soybean Growth and Yield
4	**14:00-14:15** **Onsite**	**Loc Pham Van**, Hoang Pham Nguyen Duc, Dung Nguyen Hoang and Quyen Ho Bao Thuy Monokaryotic characteristics and mating types of phoenix mushroom (*Pleurotus pulmonarius*) cultivars in the south Vietnam
5	**14:15-14:30** **Onsite**	**Bunny Some** and Kasem Soytong Biological control of papaya anthracnose causing by *Colletotrichum gloeosporioides* using *Trichoderma harzianum* PC01
6	**14:30-14:45** **Onsite**	**Patcharanun Laowklang**, Supattra Poeaim and Narumon Tangthirasunun Comparative evaluation of leaf and seed methanolic extracts obtained from *Sophora tomentosa* Linn. for phytochemical, phenolic content, antioxidant and antibacterial activities
7	**14:45-15:00** **Onsite**	**Suriya Chankaew** Effect of Physico-chemical conditions on the phytoplankton community in the Sago Palm Wetlands, Nakhon Si Thammarat Province, the Peninsular East Coast of Thailand
8	**15:00-15:15** **Onsite**	**Quyen Dang Hoang**, Phung Pham Hoang Phi, Mai Duong Thi Thanh, Thu Nguyen Thi Minh, Hoi Pham Khanh, Hoang Pham Nguyen Duc and Chuong Nguyen Hoang Evaluating the mycelial growth of bolete from pine forest in highland Vietnam
9	**15:15-15:30** **Onsite**	**Wanchai Phromkerd** Diversity and utilization of Indigenous Up Land Rice varieties in southern Thailand
	15:30-15:45	**COFFEE BREAK**

10	**15:45-16:00** **Onsite**	Hang Le, **Thuy Luu**, Hoang Nguyen, Phu Dang and Hiep Dinh Study on *In Vitro* Skin Protection Effects of Sulfated Exopolysaccharide Fragment Isolated from Culture Medium of *Ophiocordyceps sinensis*
11	**16:00-16:15** **Online**	Loc Pham Van, Hoang Pham Nguyen Duc, Nhi Nguyen Hoai Linh, Duyen Nguyen Thi My, Thu Nguyen Thi Minh, Thu Nguyen Minh, Dung Nguyen Hoang and **Quyen Ho Bao Thuy** The relationship between mycelial growth and fruit body's yield of oyster mushrooms (*Pleurotus* spp.) collected from southern Vietnam
12	**16:15-16:30** **Online**	**Tanassorn Tawinchure**, Hathairat Urairong and Kittaporn Rumjuankiat Evaluation of SNPs in the THCA and CBDA synthase gene to use in varietal improvement of *Cannabis sativa* L.
13	**16:30-16:45** **Online**	**Borworn Tontiworachai**, Rujira Deewatthanawong and Nattaya Montri Production of F1 *Papilionanthe hookeriana* (Rchb.f.) Schltr. homozygous and heterozygous: Amplified fragment length polymorphism (AFLP) analysis of flower colors and self and cross-pollination ability between different flower colors
14	**16:45-17:00** **Online**	**Saowapar Khianngam**, Kaewta Limhang, Sathit Boonnom, Krueasuwan Kornkamol and Somboon Tanasupawat Quality of waste water management of Nile Tilapia (*Oreochromis niloticus*) culture in pond using photosynthetic bacteria
15	**17:00-17:15** **Online**	**Kitiya Rassamee**, Hathairat Urairong, Suratsawadee Piyaviriyakul and Jantana Yahaufai Neuroprotective Potential of Polysaccharides from *Schizophyllum commune* Mycelium Extract
16	**17:15-17:30** **Online**	**Aunyarat Techanan**, Kittaporn Rumjuankiat and Hathairat Urairong Genetic diversity of arabica coffee varieties from the royal project foundation using Genotyping-by-Sequencing (GBS)

18:30 **Closing Ceremony: ROOM 1**

Session 3 B (Room 10) Online: Biological Diversity and Microbiology

No.	Time	**Chair:** Dr. Laxmi Rawat (India) **Co-chairs:** Assoc.Prof. Dr. Pussadee Tangwatcharin (Thailand); Assoc. Prof. Dr. Montinee Teerarak (Thailand)
1	13:00-13:15	**Varanya Chamsart,** Suneeporn Suwanmaneepong and Panya Mankeb
	Online	Factors affecting farmers' adoption of *Trichoderma* spp. application to control plant diseases in Chachoengsao Province, Thailand
2	13:15-13:30	**Sakulrat Hansuek**, Tassanee Khawniam and Napassawan Liamnimitr
	Online	*In vitro* Propagation of *Musa acuminata* (AAA group) 'Kluai Nak'
3	13:30-13:45	**Suriya Kosinwattana** and Chamaiporn Anuwong
	Online	Influence of tuber cutting size and plant growth regulators on growth and development of Caladium 'Candidum'
4	13:45-14:00	Janejira Phakawan, Benchamaporn Raungpun and **Racha Tepsorn**
	Online	Impact of Chlorinated stress on thermal characteristics of *Listeria monocytogenes*
5	14:00-14:15	**Nutcha Manichart,** Naphat Somala and Chamroon Laosinwattana
	Online	Allelopathic potential of secondary metabolites produced by some fungi and physiological mechanisms on Amaranthus tricolor
6	14:15-14:30	**Le, T. H. Y.,** Le, M. H., Dong, T. H. A., Tran, H. H., Nguyen T. Q., Do, T. X., Vu, X. T., Luu M.D, Katalin P. and Sándor S.
	Online	Arbuscular mycorrhizal fungi (AMF) product for enhancing plant growth promotion and plant protection in corn, pepper and coffee tree
	18:30	**Closing Ceremony: ROOM 1**

Session 4 (Room 4) Onsite/online: Biotechnology

No.	Time	**Chair:** Prof. Dr. Teodoro C. Mendoza (Philippines) **Co-chairs:** Prof. Dwatmadji (Indonesia), Asst. Prof. Dr. Kannikar Charoensuk (RMUTTO, Thailand), Assoc. Prof. Dr. Komkhae Pilasombut (KMITL, Thailand)
1	**13:00-13:20** **Onsite**	**IS: Patro, T.S.S.K.,** Sabina Mary D., Sandhya Rani Y., Anuradha N. and Triveni U. Exploiting the potential of Miracle grains on eve of international year of Millets by ecofriendly management of banded leaf and sheath blight
2	**13:20-13:40** **Onsite**	**Supattra Poeaim**, Narumon Tangthirasunun, Piyarat Parinyapong Chareonsap and Anurug Poeaim Assessing genetic diversity of Yellow Star tree using SRAP markers and efficacy of their endophytic fungi in biological control
3	**13:40-13:55** **Onsite**	Viktorija Kunina, Kasem Soytong, and **Oksana Belous** Biochemical composition of dwarf mandarin cv. 'Miagava-Vase' in the humid subtropics of Russia.
4	**13:55-14:10** **Onsite**	**Benitez, F.A**., Lagora, A.T., and Tabal, E.P. In vitro propagation of cocoyam (*Xanthosoma sagittifolium* L. Schoot) using different explant and plant hormones
5	**14:10-14:25** **Onsite**	**Marufa Sultana,** M M Masud, M A Abedin, M E Haque and M A Sarker Impact of organic amendments on the yield and quality of sweet pepper in Bangladesh
6	**14:25-14:40** **Onsite**	**Worawan Thongsuk**, Pakkapong Poungsuk and Piyanard Junlek The obstacles managing to organic production planning for guiding the creation of Organic Thailand Certification Products
7	**14:40-14:55** **Online**	**Prasanth, P.,** Patro, T. S. S. K., Patibanda, A. K., Palanna, K. B. and Swathi, B. Morpho-cultural, molecular characterization and eco-friendly management of Banded leaf and sheath blight pathogen in Proso millet.
8	**14:55-15:10** **Online**	**Sandhya Rani Yesarapu**, Patro, T.S.S.K., Triveni Ungata and Anuradha Narasapalli Effect of Organic manures in Long Term Nutrient Management system on Yield, Quality and Soil Health in Finger Millet
9	**15:10-15:25** **Online**	**Triveni Ungata**, Nagarjuna Dorasila, Sandhya Rani Yesarapu, Anuradha Narasapalli and Patro T.S.S.K Impact of crop establishment methods on energy auditing and carbon footprint of finger millet
10	**15:25-15:40** **Online**	Jedrick Jose, **Maria Fatima Mercado** and Lucille Elna de Guzman Germinability and vigor of partially-aged (*Zea mays* L.) seeds presoaked in Sampaguita (*Jasminum sambac* [L.] Aiton) flower extract and essential oil
	15:40-15:55	**COFFEE BREAK**

11	**15:55-16:10** **Online**	**Kanokpatch Koprasert**, Chantana Watanakanjana, Umawadee Detthamrong and Jeeranun Khermkhan Application of activity-based costing to the logistics cost system of organic vegetables in Nakhon Pathom, Thailand
12	**16:10-16:25** **Online**	**Abella, L.B**., Sulabo, R.C., Agbisit, E.M. and Angeles, A.A. Energy digestibility and concentration of nitrogen-corrected apparent metabolizable energy
13	**16:25-16:40** **Online**	**Venice Jiezzelle Nesperos,** Roberto Visco, Pastor Malabrigo Jr., Roselyn Paelmo and John Vincent Pleto Blue carbon stock of aquasilviculture-based agroforestry system in Infanta, Quezon, Philippines
14	**16:40-16:55** **Online**	**Tabao, Nik Shawn C.,** Mendoza, Bernadette C., Pedro, Mannix S. and Monsalud, Rosario G. Mycobiome in soils from irrigated, lowland rice-based farming systems in Apalit, Pampanga and Banaue, Ifugao, Philippines: Diversity and potential agro-biotechnological applications as determined by targeted metagenomics

18:30 **Closing Ceremony: ROOM 1**

Session 5A (Room 5) Onsite/online: Food Security/Safety, Food Science and Postharvest Technology

No.	Time	
		Chair: Prof. Mohamad Chozin (Indonesia) **Co-chairs:** Prof. Tatik Suteky (Indonesia), Prof. Sigit Sudjatmiko, Asst. Prof. Dr. Nonglak Parinthawong (Thailand), Asst. Prof. Dr. Duanrung Benjamas (RBRU, Thailand), Asst. Prof. Dr. Yardrung Suwannarat (RBRU, Thailand)
1	**13:00-13:20** **Online**	**IS:** Hegde, S., Sharathcahndra, K., Abhishekha, G. and **Sridhar, K.R.** Comparison of bioactive compounds and antioxidant potential of three floral honey of the Western Ghats and west coast of India
2	**13:20-13:40** **Onsite**	**Naruemon Mongkontanawat**, Saranrat Phuangborisut, Tanawat Chanawanno and Thongjuan Khunphutthiraphi Product development of functional beverage from mangosteen juice supplemented with high anti-inflammatory activity herbal plants from Thailand
3	**13:40-13:55** **Onsite**	**Thanthanasorn Thuion**, Supattra Poeaim and Anurug Poeaim Phytochemical screening, antioxidant activity and total phenolic content of methanolic extract of Phak Wan Ton (*Crotalaria medicaginea* Lam.)
4	**13:55-14:10** **Onsite**	**Panida Oonnom**, Nattawut Rungjindamai and Duangjai Ochaikul Bacterial cellulose production and application on a fat replacer on fat-reduced Chinese sausage
5	**14:10-14:25** **Online**	Unnop Tassanaudom, Nirunya Buntin and **Isara Wattananapakasem** Effect of lactic acid bacteria powder on quality of fermented fish (Pla-Som) product
6	**14:25-14:40** **Online**	**Lotis M. Balala**, Bernadette C. Mendoza, Loinda R. Baldrias, Marilen P. Balolong and Joseph S. Masangkay *Salmonella* in free-range chickens: Pathology of asymptomatic persistent infection
7	**14:40-14:55** **Online**	**Rawiporn Polpued** and Krittiya Khuenpet Improvement the texture properties and frozen storage stability of plant-based squid from konjac glucomannan and inulin gel
8	**14:55-15:10** **Online**	**Yuwana Yuwana** and Bosman Sidebang Performance testing of the tandem hybrid solar-biomass dryer for coffee cherry drying
9	**15:10-15:25** **Online**	**Dia Novita Sari**, Eny Rolenti Togatorop and Andreani Kinata Sensitivity of genotypes of eggplant (*Solanum melongena* L.) by sodium chloride
10	**15:25-15:40** **Online**	**Eny Rolenti Togatorop**, Dia Novita Sari and Susi Handayani Effect of different salinity stress on seedling growth in long beans (*Vigna sinensis*) genotypes
	15:40-15:55	**COFFEE BREAK**

11	**15:55-16:10** **Online**	**Samart Sai-Ut**, Theeraphol Senphan, Jaksuma Pongsetkul, Pensiri Kaewthong, Tuntivisoottikul Kunya, Sirima Takeungwongtrakul and Sitthipong Nalinanona Oxidative stability of *Iresine herbstii* extract-containing coconut oil during storage
12	**16:10-16:25** **Online**	**Arina Fatharani**, Yuwana Yuwana, Dede Yusuf and Lukman Hidayat Drying characteristics of robusta coffee beans using YSD-UNIB18 hybrid dryer based on thin-layer drying kinetics fitting model
13	**16:25-16:40** **Online**	**Bhutharit Raksasiri**, Korawit Prasansin, Manatsanun Nopparatmaitee, Saowapar Khianngam, Rachanon Taweephol, Wuttikorn Injana and Somboon Tanasupawat Development of food products from spent laying hens meat for adding economic value for small farmers
14	**16:40-16:55** **Online**	**Tanom Tathong**, Chirasak Phoemchalard and Pitukpol Pornanek Effects of low-temperature long-time cooking conditions on the quality of sous-vide cooked pork loin and ham
15	**16:55-17:10** **Online**	Bootsrapa Leelawat and **Tanwarat Taikerd** Development of gluten-free and soy-free plant-based chicken meat from young Jackfruit
16	**17:10-17:25** **Online**	**Nuntaporn Aukkanit** and Prapasri Theprugsa The application of high-pressure processing in reduced sodium chloride and phosphate Kai-yor (Thai chicken sausage)
17	**17:25-17:40** **Online**	**Sujitar Jorjong**, Arunrussamee Sangsila, Theeraphan Chumroenphat, Luachai Butekup, Ruamruedee Panchan, Wasana Phlaetita and Ratree Pranakhon Bioactive compounds anti-hyperglycemic anti-oxidation of (*Antidesma thwaitesianum* Müll. Arg.) crude extracted
18	**17:40-17:55** **Online**	**Suteera Vatthanakul**, Suttinai Klamsakun and Surasak Sajjabut Effect of electron beam irradiation on the physicochemical properties of jackfruit seed flour
19	**17:55-18:10** **Online**	Isara Wattananapakasem, Wannapa Srapinkornburee and **Unnop Tassanaudom** The degradation of pickled Ginger Caused by *Enter obacter cloacae* and it's inactivation with different oxidizing agent treatments

18:30 **Closing Ceremony: ROOM 1**

Session 5B (Room 10) Online: Food Security/Safety, Food Science and Postharvest Technology

No.	Time	**Chair:** Dr. Nithyapriya S. (India) **Co-chairs:** Prof. Dr. Rajeev Bhat (UK), Assoc. Prof. Dr. Suneeporn Suwanmaneepong (Thailand); Asst. Prof. Dr. Somsak Kramchote (Thailand)
1	13:00-13:15	**Prapasri Theprugsa** and Charida Pakasap
	Online	Effect of sodium chloride and sugar reduction on the quality of ready-to-eat- healthy Chinese fish sausage
2	13:15-13:30	**Janejira Phakawan**, Kantat Thavornsawadi and Racha Tepsorn
	Online	Potential of chili extract and emulsified chili extract liposome as an antimicrobial against *Escherichia coli* O157:H7
3	13:30-13:45	**Ni-Orn Chomsri** and Kamonwan Manowan
	Online	Comparison of fermentation behaviors and properties of Naem-Hed supplemented with vegetables by spontaneous and controlled lactic acid fermentations
4	13:45-14:00	**Panya Mankeb,** Prapaporn Chulilung, Sorrapong Charoenkittayawut, Somsak Kuhaswonvetch, Duangkamol Parnrostip and Luepong Luenam
	Online	A causal relationship model of promoting food security among farm household in Nakhon Nayok Province, Thailand
5	14:00-14:15	**Natcha Limpasatirakit**, Janejira Phakawan and Racha Tepsorn
	Online	Antimicrobial activity of liposome-encapsulated (S)-(-)-Limonene, Geraniol, Nisin and Natamycin against Escherichia coli O157:H7
6	14:15-14:30	**Krittiya Khuenpet** and Unnop Tassanaudom
	Online	Effect of Nan Golden orange juice on manufacturing process and characterization of processed cheese during storage
7	14:30-14:45	**Julakorn Panatuk**, Juntanee Uriyapongson and Suthipong Uriyapongson
	Online	The effect of black rice bran oil on color appearance, lipid oxidation, antioxidant activity, and microbial growth of fresh ground beef patties during refrigerated storage
8	14:45-15:00	**Wirunwith Boonmuang**, Sirima Takeungwongtrakul, Peamsuk Suvarnakuta and Racha Tepsorn
	Online	Impact of sodium citrate and ethylene glycol as the new H2O2 stabilization for anti-listeria efficiency
9	15:00 -15:15	Suwaree Sripoona, Prapasri Termsaithong, **Kobkhan Gubtapol,** Prapaporn Chulilung and Panya Mankeb
	Online	Nutritional content evaluation of traditional food recipes consumed by ethnic communities of Tai Dum in Loei, Thailand
	18:30	**Closing Ceremony: ROOM 1**

Session 6A (Room 6) Onsite/online: Plant Sciences and Pest management

No.	Time	
		Chair: James Kennard Jacob (Philippines) **Co-chairs:** Asst. Prof. Dr. Wikanya Prathumyot (RBRU, Thailand), Dr. Sitthi Kulabtong (RMUTTO, Thailand), Asst. Prof. Dr Najjapak Sooksawat(Thailand),
1	**13:00-13:20**	**IS: Lalitha, S.** and Sakthi Uma Devi, E
	Onsite	Next-generation technology approaches in plant development
2	**13:20-13:40**	**IS: Hayde F. Galvez**
	Onsite	The expertise/insights on Plant and Pest Management through the application of host resistance and genomics technologies including genome editing
3	**13:40-13:55**	**Suriyasit Somnuek**, Pornprapa Kongtragoul and Tanimnun Jaenaksorn
	Onsite	Fungicide resistance of *Phytophthora palmivora* causing durian diseases in eastern and southern Thailand and the *in vitro* alternative control by cajeput leaf extracts
4	**13:55-14:10**	**Bancha Wiangsamut** and Ma. Evangeline Wiangsamut
	Onsite	Effects of paclobutrazol on flowering of juvenile durian trees cv. 'Monthong' and its costs and returns of production
5	**14:10-14:25**	**Jurairat Khemtong,** Nittaya Phakamas and Pornpen Somchit
	Onsite	Effects of urea and sunn hemp on nitrogen use efficiency and physiological traits related to Japonica rice yield
6	**14:25-14:40**	**Saisuree Wongwichaiwat,** Sathaporn Chotechung, Jakarat Anothai and Nittaya Phakamas
	Onsite	Growth and yield performance of Bambara groundnut advanced line and introduced accessions grown in the rainy season in the South of Thailand
7	**14:40-14:55**	**Nattareeporn Rodnuch** and Chorkaew Aninbon
	Onsite	Harvesting time influences seed gemination and vigour of some coloured rice varieties in Thailand
8	**14:55-15:10**	**Nipawan Makboriboon**, Montinee Teerarak and Kanjana Saetiew
	Onsite	Changes in the Activity of Enzymes Associated with Enzymatic Browning and Chemical Composition during Musa sapientum Linn. 'Kluai Khai' Banana Fruit Ripening
9	**15:10-15:25**	Sumonrat Jintanasirinurak, **Naphat Somala**, Nutcha Manichart, Jantra Dimak and Chamroon Laosinwattana
	Onsite	Stability and pre-emergence herbicidal activity of citronella (*Cymbopogon nardus*) essential oil-based nanoemulsion during storage
10	**15:25-15:40**	**Praeowanit Apithanasakulngeon**, Suriyasit Somnuek, Pornprapa Kongtragoul and Tanimnun Jaenaksorn
	Onsite	In vitro assessment of crude extract from Gomphrena weed (*Gomphrena celosioides*) for control of plant pathogenic fungi causing chili diseases
	15:40-15:55	**COFFEE BREAK**

11	**15:55-16:10** **Onsite**	**Salit Supakitthanakorn**, Karnjana Vichitrakoonthavorn, Kaewalin Kunasakdakul and On-Uma Ruangwong Development of real-time polymerase chain reaction (qPCR) technique for quantitative detection of chrysanthemum chlorotic mottle viroid (CChMVd) and chrysanthemum stunt viroid (CSVd) in chrysanthemum
12	**16:10-16:25** **Online**	**Pramote Pornsuriya**, Patiyut Kwun-On, Rusama Marubodee and Apisit Chittawanij Assessment of yardlong bean (*Vigna unguiculata* (L.) Walp. ssp. *sesquipedalis* Verdc.) genotypes for drought stress tolerance
13	**16:25-16:40** **Online**	**Umi Salamah**, Helfi Eka Saputra, Welly Herman and Muhimmatul Husna Growth performance and sensitivity index of two types of melon under salinity stress on Bengkulu Coastal Land
14	**16:40-16:55** **Online**	**Wutthisak Bunnaen** and Onart Yartniyom Medicinal plants diversity and ethnobotany in Khok Hin Lad Forest of Maha Sarakham Province, Thailand
15	**16:55-17:10** **Online**	**Donna Ria Josue-Canacan** IPM technology adoption, preferences and conversion of annual and perennial crop growers in Southern Philippines for targeted extension program

18:30 **Closing Ceremony: ROOM 1**

Session 6B (Room 10) Online: Plant Sciences and Pest management

No.	Time	
		Chair: Dr. Danilo Josue (Philippines) **Co-chairs:** Assistant Prof. Dr. Nattaya Montri (Thailand); Asst. Prof. Dr.Potjana Sikhao (Thailand)
1	**13:00-13:15** **Online**	**Randolph Candano**, Wilson de Panis, Marcela Navasero, Mario Navasero, Melissa Montecalvo and Joseph Manipol Preliminary field evaluation and comparative predatory efficiency of *Euborellia* species against *Spodoptera frugiperda* (J.E. SMITH) (Lepidoptera: Noctuidae) under laboratory conditions
2	**13:15-13:30** **Online**	**Chaowanee Laosutthipong**, Pawat Seritrakul and Pantipa Nachiangmai Lodging-related gene expression in upland rice varieties from Pala U village, Thailand
3	**13:30-13:45** **Online**	Carla Jane Malbataan, **Florita Carandang** and Maria Fatima Mercado Efficacy evaluation of irradiated carrageenan as plant growth promoter in Cowpea (*Vigna unguiculata* L.) Walp and Bush Sitao (*Vigna unguiculata* (L.) Walp. ssp *sesquipedalis* (L.) Verdc. x *V. unguiculata* (L.) Walp ssp *unguiculata*) production
4	**13:45-14:00** **Online**	**Marcela Navasero**, Melissa Montecalvo, Mario Navasero, Jose Mari Navasero and Janren Sarah Macaraig Biology and mass rearing of *Mythimna separata* (Walker) using young leaves of corn, *Zea mays* L.
5	**14:00-14:15** **Online**	**Hataichanok Passara** Evaluating the acaricidal effect of essential oil nanoemulsion against the cutworm, *Spodoptera litura*
6	**14:15-14:30** **Online**	**Rustikawati Rustikawati**, Entang Inoriah, Marlin Marlin, Atra Romeida, Reny Herawati and Ulfa Husna Callus formation of *Curcuma mangga* in MS media supplemented with 2,4-dichlorophenoxyasetic
7	**14:30-14:45** **Online**	**Hataichanok Passara** Acaricidal effect of plant essential oil nanoemulsions on controlling *Spodoptera exigua*
8	**14:45-15:00** **Online**	**Catur Herison**, Rustikawati Rustikawati, Hermansyah Hermansyah and Sri Nurahayu Individual selection of F5 SSD generation of Hot Pepper (*Capsicum annuum* L.) for soil acidity tolerance in ultisol
9	**15:00 -15:15** **Online**	**Alisa Kongjaimun**, Rachsawan Mongkol, Phrutiya Nilprapruck and Auraiwan Isuwan Factors related to the planting area affecting the yield and fruit quality of Som Keaw (*Citrus nobilis* L.)
10	**15:15-15:30** **Online**	**Tunjung Pamekas** and Usman Kris Joko Suharjo Correlation between biochemical resistance responses and blast disease severity in 11 genotypes of swamp rice
11	**15:30-15:45** **Online**	**Sempurna Ginting**, Hesti Pujiwati and Edi Susilo Insect pests attack sorghum (*Sorghum bicolor* L. Moench) in the coastal region of Bengkulu, Indonesia
12	**15:45-16:00** **Online**	**Alcantara, Nathaniel R.**, Mendoza, Bernadette C., Sabina, Noel G., Simbahan Jessica T., Balatbat, Juancho B., de los Reyes, Francis III L., and Hyman Michael R. Archaeal community discovered in Phytotelmata of *Nepenthes alata* Blco. samples obtained from Nt. Makiling, Philippines as revealed by High throughout Molecular sequencing analysis
13	**16:00-16:15** **Online**	**Rachid Pengseesang** and Sitthi Kulabtong Study on the use of Napier grass in tilapia culture
14	**16:15-16:30** **Online**	**Jayvee Cruz,** Jan Nico A. Lazaro, Woon Goo Ha, and Norvie L. Manigbas Effects of silicon deposition on enhancing the yield of different rice cultivars
	18:30	**Closing Ceremony: ROOM 1**

Session 7 (Room 7) Onsite/online: Soil and Environment, Water conservation, Digitalization in Food and Agriculture

No.	Time	
		Chair: Prof. Zainal Muktamar (Indonesia) **Co-chairs:** Prof. Dr. Ali, N. F. (Egypt), Asst. Prof. Dr. Sutisa Chaikul (RBRU, Thailand), Assoc. Prof. Dr. Anurug Poeaim (Thailand), Assoc. Prof. Praprut Promsomboon (RMUTTO, Thailand)
1	13:00-13:20 **Onsite**	**IS: Zainal Muktamar**, Muhammad Galih Sanjaya, Teguh Adiprasetyo, Anandyawati Anandyawati, Nanik Setyowati and Kartika Utami Available soil phosphorous under the application of vermicompost combined with liquid organic fertilizer in ultisols
2	13:20-13:35 **Onsite**	**Pakapon Poythaisong,** Jeeranan Khermkhun, Peerachai Kullachai, Kanyanee Kullachai, Duangkamon Panosathip Thunmathiwat and Panya Mankeb Value chain management of soil ready for planting products of the Phawa Sub-district agroforestry network Kaeng Hang Maeo District, Chanthaburi Province, Thailand.
3	13:35-13:50 **Onsite**	**Kyi Kyi Shwe**, Sai Huaihongthong and Sukunya Yampracha Assessment of water quality variation for agriculture in Bang Pakong River of Thailand
4	13:50-14:05 **Onsite**	**Preyanuch Jitkaew**, Siriporn Pradit, Karnda Sengloyluan, Mathinee Yucharoen, Varaporn Tanrattanakul, Suvit Suwanno, Kittiwara Sornplang, Thongchai Nitiratsuwan, Prakrit Noppradit and Mila Geindre Accumulation of microplastics in stomach, intestine, and tissue of two shrimp species (*Metapenaeus moyebi*) and (*Macrobrachium rosenbergii*) in U-Taphao canal, southern Thailand
5	14:05-14:20 **Onsite**	**Muhammad Farid**, Lindung Zalbuin Mase, Nanik Setyowati, Zainal Muktamar, Bertoka Fajar Sp Negara and Suched Likitlersuang Identification of soil porosity using geophysical and geotechnical observation for agricultural application
6	14:20-14:35 **Onsite**	**Pattana Somniyam** and Vimolchat Somniyam The effects of seed priming with cattle fecal extracted on seed germination of Coriander (*Coriandrum sativum*)
7	14:35-14:50 **Onsite**	**Prongsatorn Sinturat**, Sarawut Intorrathed and Pakkapong Poungsuk Potential development on smart farmer of alumni members of the Future Farmers Organization of Thailand, central region Thailand
8	14:50-15:05 **Online**	**Kartika Utami**, Evi Sari, Zainal Muktamar and Yudhi Bertham Effects of dairy cattle waste vermicompost on nitrate-n in ultisol and inceptisol
9	15:05-15:20 **Online**	Muhammad Faiz Barchia, **Nasrul Rahman**, Bandi Hermawan and Reflis Reflis Land suitability evaluation of shallot (*Allium ascalonicum* L.) at irrigated marginal lowland in Bengkulu, Indonesia
10	15:20-15:35 **Online**	**Anandyawati Anandyawati**, Wuri Prameswari and Zainal Muktamar Comparison of the quality of animal manure compost conventional methods with vermicompost animal manure from *Lumbricus rubellus*
	15:35-15:50	**COFFEE BREAK**

11	**15:50-16:05** **Online**	**Wimonsiri Sehawong** Effect of using green manure from azolla (*Azolla microphylla* Kaulf.) on the growth for purple rice of 2 cultivars in very strongly acidic soil
12	**16:05-16:20** **Online**	**Thotsaporn Sonboot**, Suwaree Sripoona, Prapaporn Chulilung, Pomhom Cheardgotha and Panya Mankeb Tree bank management pattern for sustainability of environmental and household economies in Thailand
13	**16:20-16:35** **Online**	**Boonvanich Boonvarichchananan**, Suwaree Sripoona, Prapaporn Chulilung, Phomhom Cheadkota and Panya Mankeb Guidelines for developing an integrated community environmental management strategy towards sustainability of local government organizations in Thailand
14	**16:35-16:50** **Online**	**Boonyarid Buarabut**, Krisorn Ruaypom and Roytis Yartcharoen Semi-automatic rambutan boring machine
15	**16:50-17:05** **Online**	**Tanyakorn Khumwong**, Suwaree Sripoona, Phomhom Cheadkota, Prapaporn Chulilung and Panya Mankeb Underground water bank management network to restore environment and community economy in Thailand
16	**17:05-17:20** **Online**	**Piyapong Wongkhunkaew**, Supasit Konyai and Vichai Sriboonlue Climate variability's impact on rainfed-sugarcane production in Thailand's northeast
17	**17:20-17:35** **Online**	Riwandi Riwandi, Hasanudi Hasanudin, **Anandyawati Anandyawati** and Wuri Prameswari Increasing in leaves nutrient levels, N, P, K uptake and yield of Corn (*Zea Mays*. L) BISI 18 varieties with different vermicompost doses
18	**17:35-17:50** **Online**	**Duangthip Rukanee,** Rachaya Tharakunthip, Thanadech Kangsawat and Narakorn Chatchairat The land use suitability evaluation for agricultural planning by using Analysis Hierarchy Process (AHP) in Chachoengsao province

18:30 **Closing Ceremony: ROOM 1**

Session 8 (Room 8) Onsite/online: Organic Agriculture

No.	Time	
		Chair: Prof. Dr. Nanik Setyowati (Indonesia) **Co-chairs:** Dr. TSSK Patro (India), Asst. Prof. Dr. Bancha Wiangsamut (Thailand), Dr. Teerawat Sarutayophat (Thailand), Prof. Dr. M.A. Sarker (Bangladesh)
1	**13:00-13:20**	**IS: Teodoro C. Mendoza**
	Onsite	The challenges of promoting the adoption of organic agriculture under Philippine setting
2	**13:20-13:40**	**IS: Nanik Setyowati**, Josua Valentino Hutapea and Zainal Muktamar
	Onsite	Mexican sunflower (*Tithonia diversifolia*) compost as substitute for synthetic fertilizers for sweet corn in Ultisols
3	**13:40-14:00**	**IS: Benjarong K. Thongbai**
	Onsite	A new concept for organic tomato breeding and determination of pathotypes of tomato leaf mold, *Fulvia fulva*, in Germany
4	**14:00-14:20**	**IS: Danilo S. Josue**
	Onsite	Organic agriculture in the Philippines: Bane or Boon?
5	**14:20-14:35**	M Nivetheetha, **Venugopal Gopikrishnan**, Radhakrishnan Manikkam, Kaari Manigundan, Baskaran Abirami, Sasikumar Ushanandhini and Kasem Soytong
	Onsite	Bioprospecting of plant root associated actinobacteria for Plant Growth Promoting (PGP) properties
6	**14:35-14:50**	**Worasin Malaithong**, Duddoa Khonyang, Surapong Tongrueng and Isara Wattananapakasem
	Online	Carcass quality and fatty acid composition of Thai native chicken raised in organic production system
7	**14:50-15:05**	**Muhimmatul Husna**, Umi Salamah, Welly Herman, Winalia Agwil and Risky Hadi Wibowo
	Online	Stomata and morphology root of oil palm seeds use organic fertilizer in ultisol media
8	**15:05-15:20**	**Edi Susilo** , Nanik Setyowati, Uswatun Nurjannah, Riwandi and Zainal Muktamar
	Online	Inhibition of seed germination under water extract of Sorghum (*Sorghum bicolor* L.) plant and its ratoon cultivated in swamp land
9	**15:20-15:35**	**Fahrurrozi Fahrurrozi**, Zainal Muktamar, Sigit Sudjatmiko, Nanik Setyowati, Dia Novita Sari and Eny Rolenti Togatorop
	Online	Yield responses and nutrient uptakes of peanut (*Arachis hypogaea* L.) as affected by liquid organic fertilizer and vermicompost
	15:35-15:50	**COFFEE BREAK**

10	**15:50-16:05**	**Isnin Kurnia Safitri**, Fahrurrozi Fahrurrozi and Zainal Muktamar
	Online	Effects of bio-activators on nutrient contents of goat-manure based solid organic fertilizer
11	**16:05-16:20**	**Haryuni Haryuni**, Fahrurrozi Fahrurrozi, Zainal Muktamar, Nanik Setyowati and Supanjani Supanjani
	Online	Use of Moringa leaves (*Moringa oleifera* L.) and Seaweeds (*Sargassum* sp.) to improve nutrient contents of liquid organic fertilizer
12	**16:20-16:35**	**Cheryl Bundalian**, Roselyn Paelmo, Maria Fatima Mercado and Gina Pangga
	Online	Effects of varying concentrations of organically sourced nutrients on vitamin C, and yield of Okra (*Abelmoschus esculentus*)
13	**16:35-16:50**	Surawat Chalorsuntisakul and **Charunee Kasornpikul**
	Online	Opinions of officers of certification bodies for promotion of organic livestock farming in Thailand
14	**16:50-17:05**	**Panida Duangkaew**, Sararat Monkhung and Thanadol Sangsuwansri
	Online	Screening of antagonistic bacteria to control *Colletotrichum* sp. causing anthracnose disease in tropical fruits
15	**17:05-17:20**	**Saralee Suwandee,** Rattasit Saelee, Prommart Koohakan and Nattaya Montri
	Online	Bioactivity of (*Tectona grandis* L.f.) and cajuput (*Melaleuca cajuputi Powell*) leaf extracted on intibition fruit fungal pathogens
16	**17:20-17:35**	**Melissa Montecalvo**, Janren Sarah Macaraig, Marcela Navasero, Mario Navasero and Jose Mari Navasero
	Online	Effect of organic oil formulation of *Metarhizium rileyi* (Farlow Samson) to third larval instar of fall armyworm, *Spodoptera frugiperda* (J.E. SMITH) (Lepidoptera: Noctuidae)

18:30 **Closing Ceremony: ROOM 1**

Session 9 (Room 9) Onsite/online: Biology in Agriculture

No.	Time	
		Chair: Assoc. Prof. Dr. Lalitha, S. (India) **Co-chairs:** Haggag M. Wafaa (Egypt), Prof Dr Younes (Iran-Turkey), Prof. Dr. Thangadurai Devarajan (India), Prof. Dr. Raphael Okigbo (Nigeria)
1	**13:00-13:20** **Online**	**IS: Haggag M. Wafaa** Application of nano organic materials for sustainable agro-productivity, food security and Environment
2	**13:20-13:40** **Online**	**IS: Okigbo, R. N.** and Isiofia, I. E. Fungal rot of white yam (*Dioscorea rotundata* Poir) and control with *Ocimum gratissimum* L. AND *Moringa oleifera* Lam.
3	**13:40-14:00** **Onsite**	**IS: Ali, N. F.** and Abd-Elsalam, I. S. Production of amylase enzyme from novel bacterial isolates, partial purification, embolization and its application in textile industry for modification of wool fibers dyed with natural dye
4	**14:00-14:20** **Onsite**	**IS: M.A. Sarker** and M.R. Ali Sandbar cropping systems: an innovative organic approach to support livelihood of the climate vulnerable people in Bangladesh
5	**14:20-14:35** **Onsite**	**IS:** Sakthi Uma Devi, E. and **Lalitha, S.** Effect of plant growth promoting rhizobacteria as biostimulant in *Vigna radiata* L. under cadmium stress
6	**14:35-14:50** **Onsite**	**Nithyapriya S.** and Lalitha S Impact of microbial inoculation on herbicide affected soil
7	**14:50-15:05** **Onsite**	**Garan, N. M**., Tabal, E.P. Galo, E.V. and Garan, M.A. Energy bill to produce certified rice seeds in Philrice research station in Zamboanga city, Philippines
8	**15:05-15:20** **Online**	**Marvin Bryan S. Salinas,** Teepakorn Lertwichaikul, Chakorn Khunkaew, Sukolrat Boonyayatra, Korawan Sringarm, Phongsakorn Chuammitri, and Anucha Sathanawongs Atpase subunit beta 1 (atp1b1) and glutathione s-transferase mu 3 (gstm3) expression in high and low freezability buffalo epididymal
9	**15:20-15:35** **Online**	Abirami Baskaran, Akshata Vishwas**, Radhakrishnan Manikkam,** Namitha Ravindran, Govindaraju Kasivelu, Gopikrishnan Venugopal and Manigundan Kaari Characterization of biosynthesized gold nanoparticles from Streptomyces misionensis PYA9 with biomedical and environmental applications
	15:35-15:50	**COFFEE BREAK**

10	**15:50-16:05**	**Elderico P. Tabal,** Mario A. Garan and Queeneevi T. Quijano
	Online	Benefits of organic vegetables grown in raisebeds: Experienced of selected urban barangays in Zamboanga City, Philippines Amidst Covid 19 Pandemic
11	**16:05-16:20**	**Ruffa Mae Murillo**, Judelyn Saberon, Quartus Eugene Sabado and Elderico Tabal
	Online	Redirecting urban farming to waste management: The case of human excreta as biofertilizer applied to tomato and eggplant crops
12	**16:20-16:35**	**Phebe Valdez** and Clarissa Yvonne Domingo
	Online	Detection of Classical Swine Fever Virus (CSFV) using wet and dry Rt- lamp among five- week old weanlings in selected provinces of the cordillera administrative region
13	**16:35-16:50**	**Hesti Pujiwati**, Usman Kris Joko Suharjo, Wuri Prameswari, Muhimmatul Husna, Bambang Gonggo Murcitro and Edi Susilo
	Online	Aluminum stress on 12 Soybean genotypes in nutrient cultures
14	**16:50-17:05**	**Nuengrathai Maiprom**, Rattasit Saelee and Prommart Koohakan
	Online	Characterization of *Phytopythium* and *Pythium* species from freshwater area based on morphological traits and ITS sequence
15	**17:05-17:20**	**Person Pesona Renta**, Zhen-Wei Li and Yi-Min Chen
	Online	Utilization CMS (Condensed Molasses Solubles) for microalgae Tetraselmis sp. Growth
16	**17:20-17:35**	**Usman K.J. Suharjo**, Tunjung Pamekas, Rahmawati C. Zazila and Keken Septada
	Online	Performance of solo garlic and regular garlic grown in vitro at WPM Media
17	**17:35-17:50**	**Wuri Prameswari,** Umi Salamah, Muhimmatul Husna, Hesti Pujiwati, Marulak Simarmata and Ikmal Aziz
	Online	The effect of polyethylene glycol-induced drought stress on seed germination stage and seedling growth of different soybean varieties
18	**17:50-18:05**	Luepong Luenam, Panya Mankeb and **Dusit Aue-Umneoy**
	Online	Biogas production from Co-Digestion of water hyacinth and old substrate mushroom lumps left after mushroom cultivation

18:30 **Closing Ceremony: ROOM 1**

Closing Ceremony: Room 1

18:30-18:50 **Presentation the BEST PAPER AWARDS**

Concluding Remarks: Prof. Dr. Hiroyuki Konuma (Japan)

Chairman of International Organizing Committee

Closing and Future Remarks by Prof. Dr. Teodoro C. Mendoza (Philippines)

Closing address by Asst. Prof. Dr. Thongchai Putthongsiri

Welcome to the 11th ICIST 2023 in INDIA by Assoc. Prof Dr. Lalitha, S., Prof. Dr. Thangadurai Devarajan(India), Dr. TSSK Patro (India),

Future remarks by Prof. Dr. Kasem Soytong, President of AATSEA "IMAGINE"

19:00 **Welcome dinner at Anusorn Resturant (shuttle bus)**

DAY3 **26 November 2022 – Field Workshop in Organic Agriculture**

7:00-16:00 **Excursion program :** visit Organic Coconut Farm, Practical learning in Organic Crop Production in Ratchaburi province

16:00-17:00 **Visit AATSEA Research Laboratory**

18:00 **Goodbye dinner**

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SESSION 8 ONSITE/ONLINE: ORGANIC AGRICULTURE

Abstracts

PLENARY SESSION

Transforming meat based to plant based diet is addressing food security and climate crisis in this millennium

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All leaders of the world are at least climate-change aware, if not literate. All nations' state leaders who participated in the recently concluded 77th United Nations General Assembly consider climate change as the most challenging concern of this century. The aim of this review paper is to present how 50% reduction in global green house gas emissions by 2030 and net zero emissions by 2050 can be achieved to avoid a 1.5 degree centigrade rise in global temperature and its twin effects of global food shortage and hunger.

Transforming meat based to plant- centric diet by reducing meat intake is the way forward. Meat is a very "resource use intensive" food. It takes 75 times more energy to produce meat than corn, 4 to 5 times more water than rice, about 8 to 10 times more land for one person to be nourished. The 3.5 billion pastures and meadows that are used for grazing ruminants animals can be freed and 56 % of the 1.2 billion grains produced annually and fed to animals (that include the pets-dogs,cats)and 90% of all soybeans are fed to animals can be used directly as human food. This implies that we do not need to increase food production by 60% or more when the population in 2050 reach about 9.1 billion or more.

Animals are the main cause of deforestation and deforestation is the main cause of biodiversity loss, soil erosion/land degradation, loss of watershed leading to disrupted hydrologic cycle, diminishing the supply of fresh/clean water in rural areas which are not serviced by local water utilities. Protein-based meat production is very inefficient, resource-use wise. Meat production requires lots of land, water, nutrients and energy, thus high energy footprint and ecological footprint in general.

About 350 milllion tons of meat is consumed yearly and this massive consumption requires slaughtering of 80 billion animals per year. The green house gas emissions equivalent in consuming this much meat is 72 % of the 31.5 billion tons of CO2eq.emissions. Other researchers reported 80% of the carbon emitted per year.

In my calculations, transforming meat based diet to plant based diet would lead to avoided emissions of 22.681 billion tons CO2eq (72%). While beef consumed is only 59.1 million tons, the carbon emissions per ton of beef is 221.63 ton CO2eq, hence the highest at 13.098 billion tons CO2eq.(42%) of all meat.

Shifting to meat based diet is not sufficient. Greening production via adoption of regenerative organic agriculture could sequester 40% of global CO2eq (@ 31.5 billion tons) if done in 1.46 billion croplands. The non-use of synthetic fertilizer and pesticides, the 2 agrochemical inputs in conventional chemical agriculture totaled 1.054 billion tons CO2eq avoided emissions. The sum of CO2eq sequestered and CO2eq emissions avoided is 13.654 billion tons CO2eq. (42%).Add the 2 equals 36.335 billion tons CO2eq. Greening food production and consumption yielded an avoided or reduced emissions + sequestered CO2 eq. is 15% higher than the Carbon emissions of 31.5 billion tons CO2eq. in 2018. Acceptably, 100% Green Production and 100 % no meat is difficult to achieve.

In my sensitivity analysis, 5 scenarios were considered. A 50% carbon emissions reduction by 2030 can be achieved by reducing meat consumption by 50% +50% green production (Scenario 5). Net zero emissions by 2050 can be achieved by 100% Green Production and 80% less meat (Scenario 4).

The adoption of green consumption (50 % no meat) implies that huge tracts of lands for pasture or grazing are freed where trees and carbon sequestering vegetation are left. Even if only 50% of the global pasture lands will be freed from grazing (3.5Bha /2= 1.75 Bha), the potential carbon sequestered per year in the soil is already 10 to 15 billion tons of CO2 eq. The carbon emission attributed to non use of fertilizer and pesticide to grow grains shall lead to 2.8 billion to 4.7 billion tons of carbon emission

reduction after 10 years. Adding the 2, freeing 50% of the 3.5 billion pasture lands shall lead to 10-15 billion tons of carbon sequestered via photosynthesis plus the 2.8-4.7 billion tons CO2eq. avoided emissions summed up 12.8 to 19.7 billion tons CO2eq. (10 to 15 +2.8- 4.7) or 40.64%-62.5% reduction. The 50% greening consumption and production (57.68 % reduction in the avoided Carbon emission) and adding 40.64%-62.5% totaled 98.32% - 120.18% carbon emission reduction. An early net zero emission is achieved by 2030 and not 2050.

A meat-based food is not a diet for all, as poor people are priced out when a global food shortage occurs. Transforming our diet into plant-centric diet can feed us all, an inclusive diet or diet for all that will not price out the poor. Thus, an accelerated shift to plant-based/planetary health diet that will not harm us and also Mother Earth is necessary.

Climate change is diet change. Less and less meat is the way to progressive shift to organic agriculture. The human-triggered global catastrophic food crisis can be avoided and the 6th cataclysmic forecast prevented.

Indeed, massive actions and changes are necessary. Resetting mindsets into ecological citizenships is globalizing the thinking enabling ecological citizens accept responsibility for the present and future generations. Nation citizenships is a narrow and highly confined legal view. But the current narrative is focused on Diet Change to reduce greenhouse gas emission by 50% by 2030 and be net CO2 sequestering by 2050.To achieve this, taxation and transition incentives should be provided.

Keywords: Carbon sequestration, Climate crisis, Diet change, Greening production and consumption, Organic agriculture, Net zero emission

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Future food sector: Prospects & Challenges

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The United Nations 2030 Sustainable Development Goals (UN-SDGs) proposed in 2015 provides a clear blueprint action plan to guarantee a better future for mankind, long-term protection of our planet and preserve our natural resources. To anticipate the success of the proposed UN-SDGs, an effective agri-food system is a necessity. Nevertheless, there have always been gaps, issues and challenges before all the proposed objectives/goals are met by 2030. Just as an example, pandemics like covid-19 and ongoing international socio-political disturbances have contributed significantly to food inflation, and raised concerns over global food security. In addition, as per the estimations, the world population is projected to reach 9.8 billion in 2050, and 11.2 billion by 2100. This necessitates that proper planning is executed beforehand to ensure global food production is intensified to safeguard future food security.

A sustainable and realistic agri-food system depends on various deciding factors encountered from farm to fork (e.g. *minimizing land abuse, reducing carbon footprint, designing a suitable food production, processing, distribution and storage environment, developing climate and disease-resistant crop varieties, effective waste management and disposals skills, understanding consumerism, promoting rural agri-food tourism, and much more*). It is a necessity that modern-day technologies are adopted efficiently by all countries (irrespective of their socio-economic-cultural background) to advance with time to ensure a sustainable future. To be precise, global food crops' productivity can be enhanced by utilizing modern-day precision agriculture and farming systems (e.g. *use of field sensors, artificial intelligence, drone technology, internet of things/IoT and geo-referenced data collection*). Not to forget, the realisation of a successful agri-food supply (value) chain system also depends on the active contributions coming from various stakeholders and driving factors linked there-off.

In the farming sector, it is a compulsion that advanced agricultural practices, climate-resilient practices, sustainable IT, living lab concepts, new proposed frameworks and marketing strategies are well understood and adopted in the future. Concerning the food industrial sector, adopting digitalization (e.g. *Sustainable ICT tools, IoT 4.0, Artificial Intelligence, Robotics, Blockchain technology, Electronic*

marketing systems), opting for green processing and preservation technologies, minimal waste generation with maximal use of by-products (biorefinery approach), supporting green economy and circular economy concepts, innovative business strategies would be a necessity of the future.

The future of the global food sector relies on being self-sufficient and ensuring sustainable food production. Food safety, wholesomeness and quality assurance will always remain as the highest priority for manufacturers and consumers. Trends indicate not only the usage of digitalization technologies but also the development of low-cost reliable environmental friendly green technologies, production of tailored functional or designer foods, promoting of sustainable healthy diets and practical applications of innovative and sustainable predictive models for unit operations. The future research focus will also be on developing protein alternatives, plant-based meat or meat alternatives (*meat analogues or cellular agriculture and insect proteins*), exploiting underutilized food resources (*wild fruits and vegetables, tribal pulses, underexploited fish and marine resources*), undertaking life cycle assessment, understanding consumer attitudes and responding to consumers' demands along with an in-depth understanding of gastronomy, food culture and consumption patterns. Further, future research emphasis will also be inclined towards developing new techniques for minimizing food fraud and overcoming food traceability issues. Promoting urban farming to encourage interest among population living in metropolitan cities and thereby contribute towards food security will remain a high priority. Designing and producing low-cost, wholesome and nutritious livestock and aqua feeds fortified with bioactive ingredients will additionally be the focus of the industries.

Finally, what the future needs is a well-designed and planned agri-food system transformation that can effectively tackle various recurring issues of food security, sustainable food production, minimize environmental stress, develop strategies for regional economic benefits, understand the necessities of a resilient food system and borderless sharing of new technical knowledge (providing training and fostering the communication). In addition, adopting new policies and ensure that these are outreached to benefit the society is crucial. To safeguard the future food systems it would be a necessity that all stakeholders (academicians, agri-food-based scientists, economists, policymakers, NGO's and local governments) function together and plan for a sustainable healthy future with a common vision and mission. The present-day global scenario (issues and challenges there-off), and the future trends in the food sector will be addressed in this talk.

Keywords: Circular economy; Digitalisation; Designer foods; Food security; Green technologies; Living lab concepts; Sustainable healthy diets; Life cycle Assessment, Urban farming

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Climate change and its effect on cropping schedules and food crop productivity in Indonesia

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Climate change has had an impact on agriculture in the majority of countries including Indonesia. One signs of climate change is global increase in temperature. In the tropical countries like Indonesia, it led to an irregular wet and dry seasons. The purpose of this study is to examine the occurrence of climate change in Indonesia using climate data from the last 20 years from three provinces in the country's east, East Nusa Tenggara, North Maluku, and South Sulawesi, and four provinces in the country's west, West Kalimantan, West Java, Bengkulu, and North Sumatra. A 20-year evaluation of the seasonal shift and its impact on water demand and crop productivity is also carried out. The average temperature has risen in all provinces, although at different rates. The Penman formula for calculating standard evapotranspiration (ETo) reveals that the ETo value changes, which is followed by a decrease in water sources from effective rainfall during the regional planting schedule. Furthermore, in eastern Indonesia, the ETo value and effective rainfall have both decreased significantly. Further simulation with AquaCrop software revealed that the main crop planting schedule will need to be adjusted in order to maintain the current yield level.

Keywords: Crop yield, Effective rainfall, Standard Evapotranspiration, Climate change

Potato (*Solanum tuberosum)* in the South-East Asian food system: Role in zero hunger target of the United Nations Sustainable Development Goals

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Bold new thinking and decisive action will be needed to reshape and re-engineer Food Systems in Asia and the Pacific to make them more responsive, more dynamic and more equitable to meet the nutritional and other needs of the most populous -- yet most undernourished -- region of the world. Even before the pandemic engulfed the region, Asia and the Pacific was facing a number of challenges to food and agriculture including, climate change, rapid urbanization and land degradation, scarcity of natural resources such as water, trans-boundary pests and diseases and more recently the impacts of war in Eukcraine.

The Asia-Pacific region is therefore ripe for food system transformation. Yet, while it has been, economically, the fastest growing region in the world for two decades, it is still home to the largest number of malnourished people, and even countries of the region with rising incomes are struggling with multiple burdens of malnutrition. As an example of the AATSEA member countries in Myanmar the prevalence of undernourished children under five years age was 14,1 % in 2018, in Thailand the corresponding prevalence was 9,3 %. Children less than 5 years old moderately or severely stunted were 29 % in Myanmar and 11 % in Thailand (in 2016). Children under five year's age were wasted in 6,6 % in Myanmar and 5,4 % in Thailand (in 2016). Since these years the development is getting still worse, not better. In the rice/wheat-based Food Systems of Asia, potato (*Solanum tuberosum*) consumption per capita is still relatively small but growing rapidly; both fresh potatoes and processed potato products are becoming increasingly popular in the region.

United Nations Economic and Social Commission for Asia and the Pacific organized already in 2003 in Kunming, Yunnan, China, a conference on the opportunities of potato cultivation and post-harvest processing for the rural communities of the South-East Asia region. Potato is an important crop in Food Systems and improving the food security of many Asian countries in the future. Potato means many things to many people; in some cases, potato may mean the difference between subsistence and achieving better income; in others, potato may mean the difference between survival and starvation. In all instances, potato's potential to help improve food security and eradicate poverty will be important. In Asia, faster economic growth would lead to less dependency on cereals and greater demand for potatoes in fresh and in processed forms. Potato can provide the basic needs: food, employment/income. Potato farmers in Asian countries can benefit from potato processing, but most of them are with small holdings, on marginal lands, and at the lower end of the economic scale. Hence, technology and agricultural policy are important in providing assistance to the potato farmers to increase their benefits in income, employment and food security.

The nutritive value of potato is good. The dry matter of boiled potato contains 91 % carbohydrates, the main component being starch. Protein content of whole boiled potato dry matter is 8 %, and the protein quality is high for a plant, higher than that of soybeans and other legumes. The caloric content is high, 380 in 100 grams of dry matter. Potato is rich in some minerals and vitamins, notably potassium, vitamin C, vitamin B6, and folate. The vitamins can be best preserved by cooking the potatoes with the peels.

Upland Farming Systems of Asia are suitable for potato cultivation. The climatological type and soil composition and irrigation possibilities allow potato to be grown as a basic caloric and nutrient food for the population. Mountainous Upland Farming Systems contain large areas of South-East Asia.

Agritourism: Challenges and opportunities for rural development

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Agritourism involves any agriculturally based operation or activity that brings visitors to a farm or ranch. It can improve when we use smart farms with intelligent system design using the Internet of Things (IoT) to help care for crops. Nowadays several farms use this technology to attract tourism, such as Finland and Nordic countries. It also can integrate with educational institutions for research and agricultural production. The technology increases the convenience of farmers in the field.

Agri-Tourism Style includes Individual styles of tourism, Seasonal tourism patterns, Community-based tourism, or farmer's village. IoT (Internet of Things) in Agri-tourism involves sensors, drones, and robots connected through the internet which function automatically and semi-automatically performing operations and gathering data aimed at increasing efficiency and predictability. Agritourism helps farmers and ranchers generate revenue from recreational or educational activities, and agritourism can bring several economic benefits.

It was found that the average income from agritourism accounted for about one-third of the overall household income of farmers. Moreover, food service is an important factor in the success of agritourism as it brings extra money to farmers.

Keywords: Internet of Things – IoT, Agritourism, Economic Benefits

Genomics for organic farming

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In the past, the integration between organic agriculture and biotechnology has been antagonistic. This antagonism resulted in a legal framework preventing the farmers from incorporating GMO, into their production system, even if it would allow for better quality of organic foods and drinks. Several organic advocates claim that genetically engineered crops are harmful to human health, the environment, and farmers. Biotechnology advocates argue that genetically engineered crops are safe, reduce insecticide usages and allow farmers to produce enough foods to feed the world populations. Genomic editing, particularly using the CRISPR system, in crops could significantly speed up the progress of breeding programs. It could increase food production, decrease loss, and improve sustainability.

This presentation will demonstrate the application of organic farming and biotechnology in developing nutrigenomic products for longevity. Nutrigenomics are a research field that studies the changes in the genomes by diets. The development of genomic technologies provides opportunities to examine the molecules controlling cellular networks causing aging, including telomerase activities, bioenergetics, DNA repair, and oxidative stress. The active ingredients to be used in the longevity products comprise of extracts derived from organically grown plants such as resveratrol, curcuminoids and quercetins. Preliminary results of our clinical studies indicated the ability of the longevity formulation in inducing telomere lengthening, possessing strong antioxidant and anti-inflammatory activities, and repairing epigenetic DNA damage as well as activating sirtuin genes. It is expected that the successful development of this nutrigenomic product for longevity would be able to promote the integration of organic agriculture and biotechnology further.

Bioprospecting microbes from extreme environments using metagenomics approaches towards environmental sustainability

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Rich microbial diversity has displayed immense potential in fulfilling the needs of humankind. Especially, the microbes distributed in all kind of environments have revealed their capabilities in becoming the promising bioprospective tools. However, the microbial ecology of the extreme reservoirs, such as extreme cold, heat, pH, pressure, hyper salinity, oxygen, carbon dioxide, radiation, nutrient contents, hot spring and acidity remained unexplored. Microbial communities surviving in such challenging conditions are called as extremophiles. As they are already existed and survived in the extreme unfavorable conditions, it is expected that they might be associated with an innovative metabolites and bioactive compounds. Moreover, there is a need for the search of bioprospective microbes for the sustainable environments viz. biofuel production, biomining and contaminated soil remediation, agricultural practices, organic residues cycling and to sustain in climate change. Exploring the extremophiles by culture dependent approaches generally provide miniature details whereas, independent culturing approaches like high-throughput sequencing tools, genomics, proteomics and metabolomics have revolutionized in identifying these microbial diversity and their applications in environmental sustainability. Extremophiles are producing varieties of enzymes, biomolecules and acids which are all having important implications in many industrial and environmental functioning. Hence, extremophiles needs scientific consideration for its phylogeny, distribution, diversity and bioprospecting for sustainable environment. This keynote lecture will focus on the updated information of diversity and distribution of extremophiles and their biotechnological potential and industrial applications towards environmental sustainability.

Keywords: Culture dependent approach, Diversity, Environmental sustainability, Extremophiles, Molecular tools

Non-agrochemical production (NAP) transition period to organic agriculture

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Deifinitions of non-agrochemical production (NAP) and Organic Agriculture (OA) are proposed by Association of Agricultural Technology in Southeast Asia (AATSEA). Non-agrochemical production (NAP) is defined as the growers must stop for using synthetic agrochemicals, including chemical fertilizers and chemical pesticides (fungicides, insecticides, herbicides, etc.) for their productions, both 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 will be transferred to organic agriculture certification when toxic agrochemical residues are not 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 to apply the synthetic agrochemical inputs, such as synthetic fertilizers and pesticides, veterinary drugs, and genetically modified seeds/organisms. Synthetic agrochemicals are complelety replaced in organic agriculture with innovative products, natural products, beneficial microorganisms, biological products, natural substances, management and cultural practices to maintain and increase long-term soil fertility. Organic agriculture promotes and enhances agroecosystem, human health, biodiversity, biological cycles, soil fertility, and activities. Organic agriculture products must prove to be non- oxic synthetic agrochemical residues in organic products before deliver to the markets and are called safety food.

SESSION 1 ONSITE/ONLINE: AGRICULTURAL EXTENSION, EDUCATION AND DEVELOPMENT

Adaptation and new approaches to organic farming production of Naso organic rice producer group in Yasothorn Province after the outbreak of Covid-19 pandamic

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The Naso organic rice producer group had 5-24 years of experience in 3 main varieties of organic rice growing: 1) Jasmine Rice 105 (*Oryza sativa* L.), 2. Rice RD6 (*Oryza sativa* L.) and 3. Riceberry (*Oryza sativa*). Per household of they had 25 rai rice growing area with 350-400 kg of yields per rai on average. Due to the Covid-19 pandemic and economic downturn, farmers had to adapt themselves by making use of their knowledge and experience in organic rice production to develop other types of organic agriculture. This included vegetable garden, native herbal plants, native chickens, oxen and buffaloes, fish and frog rearing, laying hen rearing, and fruit tree growing, respectively. The selection of organic agriculture production was consistent with needs of consumers and the green market. There was knowledge and experience exchange among group members through online communication technology. There was a comprehensive increase in the potential of production. Some of their activities were: organic fertilizer production to reduce production costs, collecting and exchanging seeds and species as well as processing to add value. Within the period of 5 years, the potential to promote the production increased by 4.26%. This increased the potential in marketing, leading to production and had been certified by international organic agriculture standards by 14.28%. In addition, it increased the capacity of organic farming inspection and certification system by 2.59%. Also, the findings showed statistically significant relationship at 0.01 between farmer adaption and their quality of life. The problem found most was low price of yields. However, 30% of the farmers solved this problem by adding market channels (selling the yields through online market). This was followed by creating innovation to reduce production costs, workforce problem reduction and the problem reduction of production time span, respectively.

Keywords: Adaptation and new approaches, Organic agriculture, Organic farming production, Participatory guarantee system, Green market, Organic online marketing

Farmer's knowledge and perceived impacts of ethylene gas innovation toward increasing yield performance of Para rubber in Ban Khai District, Rayong Province

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Rubber production is the main economic crop in Rayong province, providing livelihood to rural farmers. However, rubber farms faced several problems such as low latex price, labor shortage due to some cases of attack from encroaching wild elephants, and low yield due to climate change. As a result, Rubber Authority in Ban Khai District, Rayong province solved the problem by promoting the use of ethylene gas to stimulate the increase of rubber yield and help the rubber farmers assess the adoption of this innovation. Thus, this study aims to investigate the socioeconomic and perceived impact of ethylene gas innovation in rubber production of adopters and non-adopter. A total of 50 adapters and 50 non-adopter of ethylene gas were surveyed on rubber farmers' socioeconomic characteristics, knowledge of innovation, and perceived economic and social impacts. The empirical data were analyzed using a descriptive and correlation analysis. Results and findings of the study aim to provide guidelines in promoting the use of ethylene gas innovation as yield increasing performance in rubber production that would help improve farmers' livelihood from rubber farming.

Keywords: Rubber, Ethylene gas, Adoption, Innovation

The benefits and limitations of innovative agricultural food production with aquaponics for the communities with limited spaces in Urban Bangkok, Thailand

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The Golden Apple Snail-Vegetable/Herb (GASVH) food production is an innovative technique using an aquaponics system that produces food for households with limited spaces. This innovation can not only produce enough food in terms of quantity, nutritional value, and food safety but can also generate additional income for the household. Moreover, this innovation relates to the social dimension and health of the household members. Hence, this study examines the urban households' perceptions of the benefits, constraints, and trends in adopting GASVH Aquaponics innovation. This study was conducted in Chalong Krung Housing Community, Nong Chok District, an urban community with limited space within a radius of 30 km. This area is also close to the source of innovation and model households applying innovations. This study was conducted by 1) publicizing training on GASVH Aquaponics innovation, 2) organizing training through demonstration to disseminate knowledge on the innovation of GASVH Aquaponics, and 3) collecting data from 100 training participants using a questionnaire. Data gathered include socio-economic data and perceptions on the benefits, constraints, and trends in innovation acceptance of GASVH Aquaponics technology. Data were analyzed using descriptive statistics and correlation analysis using Chi-square statistics. This study's results will help improve the innovation to suit the users. Moreover, the findings can also be used as a guideline for promoting and expanding the adoption of innovative agricultural food production using the aquaponics system in other communities with limited spaces.

Keywords: Agricultural innovation, Adoption, Aquaponics, Urban Thailand

Tourists' behavior and importance of marketing factors for the decision to use the community-based agritourism services under the new normal era in Rayong Province, Thailand

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The easing of Coronavirus Disease 2019 (COVID-19) pandemic restrictions since the last quarter of 2021 have restored travel and tourism in Thailand. This situation has also revitalized agritourism, one of the most popular activities heavily affected by the pandemic. In response to this development, the community-based agritourism (CBAT) operators have to adjust to meet the needs of their customers in the "new normal" era. Hence, this study aims to 1) assess the behavior of tourists patronizing CBAT services and 2) investigate the marketing factors important in using CBAT services. Data were collected from 400 Thai tourists at by "Suan Yai Da Community" Agritourism site in Rayong province, Thailand. This agritourism community was chosen as it can accommodate the greatest number of tourists and has been awarded as an outstanding agritourism site in the fruit orchard category in the province. The questionnaire information comprised customers' socio-demographic data, tourism behavior, and opinion towards marketing mix factors. Data were analyzed using descriptive (means and percentages) and inferential statistics (Chi-square test) to understand consumer information and the relationship of behavior and opinions with marketing factors. The findings of this study will provide information on the target customers, which can be used in drafting marketing plans for CBAT operators under the "new normal". These plans can be systematically implemented and used as a guide to expand agricultural tourist attractions in other communities. Where are the results and discussuions

Keywords: Covid-19 pandemic, Agritourism, New normal, Marketing mix

Determinants of income diversification among farm households in Thailand

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Income diversification among farm households is considered as a crucial strategy for reducing immense risks. Given their importance to livelihood survival, it is essential to have an obvious understanding of the factors affecting income diversification. This paper empirically investigates the determinants of income diversification of farm households in Thailand measured by the Simpson diversification index. An analysis of cross-sectional data from a 2021 Thai national survey using Tobit regression model indicated that the household head's education level and age, household size, household member migration for work, the amount of informal loan, and ability of financial access were found to be positively significant in determining income diversification among farm households in Thailand. In addition, the finding revealed that the dependency ratio of households, the amount of annual income per person, the total area of land have a negative association with income diversification among farm households in Thailand. To enhance participation in income diversification strategies to reduce various risks, the government and policymakers should understand the household resources, conditions, and barriers that farm households face.

Keywords: Income diversification, Farm households, Simpson diversification index, Thailand

Social capital and production risk: examining the association using the case of irrigated rice farms in Northern Thailand

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Although different forms of interventions such as economic incentives have been widely implemented to help farmers manage production risks, farmers continually face high variability in production and declining productivity. While less attention is given to the social capital aspect related to production risk management, this study aimed examine the association of social capital with farmers' production risk. We estimated the output variability as an approximation of the farmer's production risk using a stochastic frontier production function with risk specification. Higher perceived interpersonal trust and network relationships among farmers were found negatively associated with variability in production. The study provided evidence on the importance of developing and strengthening the social capital of farming communities in supporting farmers' risk management. Especially among farmers with less access to information, the farmer's network facilitated knowledge sharing on farming innovations and improved practices.

Keywords: Stochastic frontier, Social capital, Risk, Production, Rice

Strategy to foster smallholder farmers in Indonesia to adopt the sustainable palm oil production systems

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The sustainable development of Indonesia is influenced by the palm oil industry. The palm oil industry's ability to contribute to the sustainability of the development may be hindered if the production system for palm oil, particularly that of smallholder farmers, is not addressed. Smallholder farms is steadily increasing and may eventually make up the majority of palm oil plantations in Indonesia. Indonesia's sustainable technique for producing palm oil may be more widely adopted by smallholder farmers, which would boost the sustainability of the industry. Therefore, the strategies to foster smallholder farmers to adopt Indonesia's environmentally friendly system for producing palm oil need to be developed. We explored different alternative strategies which included increasing support for certification financing, increasing the legality of smallholder oil palm plantations, integrating the Indonesian Sustainable Palm Oil adoption in smallholder oil palm replanting programs, increasing knowledge and competence of smallholder farmers related to Indonesian Sustainable Palm Oil certification, increasing environmentally friendly palm oil production, increasing the coordination of stakeholders to assist smallholder farmers who lack sufficient technical knowledge, facilitating institutional development of farmer groups, cooperatives and associations, developing the synergies and utilization of the available human resources of interested parties, and strengthening of intermediary institutions to create incentives for smallholder farmers. The three strategies that have strong driver power and low dependency are the inclusion of sustainable palm oil production in Indonesia into the replanting program, the coordination of stakeholders to assist smallholder farmers who lack sufficient technical knowledge, and the strengthening of intermediary institutions to create incentives for smallholder farmers.

Keywords: Smallholder farmer, Sustainable, Palm oil, Adoption

Developing agricultural knowledge and skills by using a learning kit on commercial native chicken rearing of agricultural teacher apprentice students, Surindra Rajabhat University

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According to the comprehensive development of agricultural knowledge and skills of the agricultural teacher apprentice students, it was the development of a new agricultural learning kit which was consistent with learning era in the 21st century and the digital age. Results of the study was divided into 3 parts: 1) Five components gained from the learning kid development - 1.1) building a chicken house and appropriate equipment preparation; 1.2) management of native chicken rearing; 1.3) management of waste utilization; 1.4) processing and distribution management; and 1.5) preparing online media for learning. The learning kid assessment showed that it was at a very high level ($\bar{x}$ =4.36; S.D.=0.165). 2) Results of 4 months rearing of 100 netive chicken showed that caged chicken rearing had a higher survival rate than free-range rearing with a statistical significance level at 0.05. However, there was no statistically significant difference at 0.05 in terms of food cost, food intake, weight gain, food conversation ratio, return per head, net profit per head, the return on weight gain, production loss index, and production efficiency throughout the experiment. 3) Development of agricultural knowledge and skills which showed an increase in learning achievement at a significance level at 0.01. As a whole, the assessment of native chicken rearing was found at a high level ($\bar{x}$ =4.43; S.D.=0.178). Based on its details, the management of native chicken rearing was found at highest level ($\bar{x}$ =4.68 S.D.=0.125) followed by skills in processing and distribution ($\bar{x}$ =4.35 S.D.=0.136) and online media preparing ($\bar{x}$ =4.23 S.D.=0.142). The confidence in the adoption of knowledge and skills in teaching native chicken rearing was found at highest level ($\bar{x}$ =4.58 S.D.=0.185). For suggestion, a mixed farming learning kit and a learning kit through online systems should be developed for a highest efficiency.

Keywords: Agricultural knowledge and skills, Native chicken rearing, Caged chicken rearing, Free-range chicken rearing, Learning achievement

Using LED in various colors on the growth and yield of cos salad

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This study focused on increasing yields of cos lettuce (*Lactuca sativa L. var. Longifolia*) by using LED during night time. The results of the experiment showed that there was statistical difference of growth performance in terms of height. That was, the red light had the most average height (20.54 cm.) However, the remaining lights and no light had no statistically different average heights (19.74, 19.31, 18.43 and 17.84 cm. respectively). Regarding a number of leaves, there was statistical difference. That was, the red light had the highest average leaf count without statistically different from other light colors, but unlike no light (16.50, 16.00, 15.50, and 13.25 leaves, respectively). For yields, it was found that the live weight was statistically different. That cos lettuce provided red light had a maximum average weight (83.0g), followed by yellow, bule, green, and on light (73.75, 69.25, 61.75 and 49.45g, respectively). Therefore, providing the red light at night time helped increase growth performance of cos lettuce rather than other colors or even no light. When applying the research results to expand the results in the area of the Future Farmer Organization of Thailand, Phetchaburi province, it was found that they yield per plot increased for 20 percent and the members were satisfied with it at a highest level ($\bar{x}$ =4.75; S.D.=0.265).

Keywords: Cos salad, LED light, Growth performance, Increasing yields

Assessing the progress towards achieving sustainable development goals at a city level: Madiun City, Indonesia

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The Sustainable Development Goals (SDGs) are a set of global goals by 2030. The 17 Sustainable Development Goals are supported by targets and indicators. Indonesia's government endorsed a set of 222 individual indicators for monitoring the progress in achieving SDGs at the regional level (including the city level). The favourability of the 222 indicators values at the regional level compared to the national average value based on the SDGs target value. Four sustainable development pillars in Indonesia are the social development pillar, economic development pillar, environment development pillar, and law and governance development pillar. The progress of achieving sustainable development goals (SDGs) in Madiun City showed that 121 indicators had achieved the national target, 38 indicators had not achieved the national target, and 63 indicators had no data. Amongst the four pillars of sustainable development in Madiun City, the SDGs on the social development pillar are stated to be the most spotlight. On the one hand, the results showed that 20 of 38 indicators had not achieved the national target founded in the social development pillar, but on the other hand, the social development pillar showed the most achieved indicators in Madiun City.

Keywords: SDGs assessment, SDGs performance, Sustainable development

Comparison of cost and return between paddy production and rice seeds of community enterprise members in Chachoengsao Province of Thailand

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This research has the objective: 1. to study the costs and return rice seeds of community enterprise members 2. to make comparison about costs and paddy production return and rice seeds of Ban Na Ngam Community Enterprise Mill members in Sanam Chaikhet District from Chachoengsao Province. This study was conducted using questionnaires for two group samplings namely:1) the good standard rice seeds members in the rice seed production project tested by the Rice Department using for Purposive Sampling among eleven people and 2) the paddy members for selling into the mill using for Simple Randomization with eleven people totaling twenty-two people for the 2 groups. Results showed that the rice seed members had the average income net with 4,995.90 baht per rai, the average profit net with 3,496.04 baht per rai and the average costs net with 1,499.66 baht per rai. On the same way, the paddy members had the average income net was with 4,234.11 baht per rai , the average profit net with 1,943.89 baht per rai and the average costs net with 1,943.89 baht per rai. Comparing 2 groups, the rice seed member had the rice seed production costs lower than the cost of the paddy member, except for productivity, income, price, and profit net per rai fields.

Keywords: Costs and Return, Seeds, Community Enterprise

Economic and social effects to the safe agriculture selling products of institute: case study of farm Chaokhun by KMITL

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A case study of Chaokhun farm by KMITL about the economic and social effects of selling safe agriculture products of institute was conducted .Structured questionnaires were used to interview 400 people consisting of supporting staff personnels and the KMITL students .The results showed that selling safe agriculture products had positive effect from economic income, expenditures, and in the excellent level but the same as the social one from the fields of physical and environment, cultures, and spirits in the excellent level. In contrast, selling safe agriculture products was found negative with the most opinion scores from the high expenditure from buying high priced-organic and premium products . Genders, ages, education, and income affect the different economic and social opinions.

Keywords: Economic and social effects, Safe agriculture products, Agriculture product selling at institute

Leadership of poultry farmer-leaders and its implications for organic livestock extension services in Phetchaburi province, Thailand

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This study primarily aims to explore the leadership of poultry farmer-leaders and the implications for organic livestock extension services. In this study, both secondary data from documentary research and primary data from in-depth interviews with key informants, including 11 individuals from the agricultural business owner, an advisory level committee of the Phetchaburi Provincial Agriculture and Cooperatives Office were used. Moreover, the manager, president, and director of agricultural business, political leader, extensive volunteers with agricultural organizations, or an agricultural education teacher were all considered leaders. Then, we take the information that is described using logical reasoning. The findings revealed that poultry farmer-leaders in Phetchaburi province have: 1) intellectual leadership; 2) a commitment to success (orientation); 3) the ability to adapt to situations; 4) the need for leaders to have technology, 5) the ability to withstand stress, and 6) the ability to be honest, moral, and adhere to principles. Meanwhile, 7) expertise and 8) positivity of poultry farmer-leaders produce organic native chickens in accordance with organic livestock. The following sections comprise Thai Agricultural Standard TAS 9000-part 2-2011: (1) animal source; (2) conversion of production system to organic livestock system; (3) organic feed; (4) animal health management; (5) farm management; animal transport and slaughter; (6) housing and living conditions; and (7) waste management. However, poultry farmers' leaders are unable to keep accurate records.

Keywords: Native chicken, Animal health management, Farm management

Developing knowledge and skills in an agricultural career after the outbrake of Covid-19 pandemic for young farmers by making mixed soil ready for commercial planting

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Comprehensive learning management for developing a future agricultural career after the end of Covid-19 pandemic requires developing knowledge and skills for young farmers as in the case of making mixed soil ready for commercial planting . This starts from production, quality development, and marketing in coordination with professional farmers and entrepreneurs in the community. In this study, mixed soil ready for commercial planting was prepared by using local raw materials with 4 formulas. It was found that the best soil potting formula was the second formula. The group of young farmers had brought the results of the study to develop further to add value by making packing and distributing though a variety of channels.Our findings also showed that learning achievement of the young farmers increased with a statistical significance level at 0.05. There was an assessment of skills in making mixed soil ready for commercial planting, value adding, and marketing which was found at a high level ($\bar{x}$ =4.15, 3.85 and 3.56, respectively); Besides, the following were found at a highest level: the sample group was satisfied with product selling via online market ($\bar{x}$ =4.56); comprehensive learning could promote learning and create skills/experience for developing a future career ($\bar{x}$ = 4.36); adoption of technology and online media could encourage learning ($\bar{x}$ =4.32). In addition, the entrepreneurs agreed that creating a network of online selling directly to farmers and the general public would be a channel for selling agricultural inputs in the future. This was consistent with the era of digital marketing and they were satisfied with making mixed soil ready for commercial planting at a highest level ($\bar{x}$ =4.73). More than one-half of them (56.92%) wished to develop it to be a supplementary career in the future most ($\bar{x}$ = 4.56).

Keywords: Mixed soil ready for planting, Agricultural inputs, Online marketing, Agricultural career skills, Young smart farmers

Community capital for economic development according to the BCG Model

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The emergence of the new COVID-19 disease is causing health and economic problems in both urban and rural areas. The objective of this research was to analyze the situation of community capital and applying community capital for economic development according to the BCG model in a village in Phu Luang District, Loei Province, Thailand. The research apply the qualitative approach using in-depth interviews, and focus group discussions with 30 key informants consisting of community leaders, local philosophers, representatives of government, and private agencies that support the community. The results showed that: 1) human capital was the wisdom of weaving cotton into products, 2) social capital was group forming and local identity activities, 3) economic capital was agriculture, community fund, and community tourism, and 4) natural capital was the fertility of the soil, water, forests, mountains, and physical environment. The use of community capital for economic development according to the BCG model includes 1) applying the concept of sustainable development fairness and participation after the COVID-19 crisis, 2) the goal is to raise income by using the 4-community capital from households to groups and communities for a stable economy and sustainable self-reliance, 3) use the integrated community capital capacity enhancement process to create a variety unique form of products. Selling to people outside the community through nature and culture learning management, green community tourism, and network marketing management, 4) operations to raise the economy with the BCG model. Develop Bio-economy by producing environmentally friendly raw materials for sale such as restoring the cotton variety plants for dyeing cotton, native rice, and organic vegetables. Develop a Circular economy by transforming cotton, food, culture, and nature into varieties of products. Develop a green economy by expanding community capital to outsiders through environmental activities, wisdom, traditions, innovation, tourism, and marketing through community management.

Keywords: Community capital, Economic development, BCG Model

Learning wild plants toward carbon neutral agriculture in international training program

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This research shows that learning about wild plants led students to design carbon neutral agriculture. The results showed as follow: 1) Learning about wild plant increases students' ecological citizenship, 2) Improving agricultural skills improve self-esteem toward carbon emission activities, 3) when the training program finished, students could see the climate change holistically and design carbon neutral society. Among the 67 student who graduated, 14 students answered the questionnaire of the researcher, and 12 students answered that they applied what they've practiced in their fields such as family and community food security. Students 'evaluation of the educational methodology of the program showed that the method of making a roadmap to cut CO2 emission gave the highest score with a mean score of 4.88, and research on wild plant product was the second highest score with mean score of 4.82.

Keywords: Wild plant, Carbon Neutral in agriculture, Environmental education, International Cooperative training program, Ecological citizenship

Development of organic fertilizers formula for growing vegetables in pots and studying the level of satisfaction of people in the community towards the transfer of knowledge on the production of organic fertilizers

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This study aims to promote tourism development activities, and design creative tourism on the model cultural road to drive Phetchaburi Province into a creative city by incorporating learning activities on systematic agriculture in a limited area, focusing on participation of people in the community. This study was done by designing the ingredients of organic fertilizers formulas which contain of fresh leaves (60%), goat shit (20%), cow dung (15%), 1% salt field sun, 4%water, and actinomycosis bacteria , fermented at **3** months (approximately). Chemical analysis of various formulas of compost found that the chemical properties and nutrient content were within the standard criteria of the compost according to the guidelines of the Department of Agriculture, Year 2005, together with pH values was 7.23, electrical conductivity 6.55 ds/m, C/N ratio 8.03, organic matter 54.93%, total nitrogen 2.24%, phosphorus 1.47%, potassium 4.73%, calcium 2.57%, magnesium 0.95% and CEC 51.71cmol(+)/kg.

However, it was found that nitrogen, phosphorus and potassium content were 2-3 times higher than the minimum values of macronutrients according to the compost standard. Bring fertilizer formulas that are passed on to community members and experiment with planting. A study of the level of farmers' satisfaction towards the technology transfer of organic fertilizer production, there were 63 community members participating in the activity, divided into 42 males (66.67%) and 21 females (33.33%). Most of the participants had limited space to grow crops, 59 people (93.65%), 92.13% of the participants of the had never been trained. The knowledge before joining the training activities of the participants was at the lowest level (53.47%). The knowledge after the training was at the high level (83.48%). The suitability of the fertilizer formula, high level (81.13%) ability to be used in future occupations high level (79.63%). The overall satisfaction of training was at the high level (84.89%).

Keywords: Organic fertilizers formula, Vegetables and Agriculture in a limited area

Factors affecting the implementation of Good Agricultural Practices (GAP) on Cocoa in Nimba County, Liberia

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This study used the technique developed by International Fund for Agriculture Development (IFAD) to investigate cocoa productivity in Twah River (TR) and Buu Yao (BY) districts in Nimba county, Liberia, based on good agricultural practice (GAP). The factors affecting the implementation of GAP on cocoa production include lack of farmers' willingness to accept and practice GAP, lack of inputs, inadequate planting materials, poor record keeping, inadequate maintenance of farm, inadequate pests and disease controls, no access to loans and credit, high inputs prices, low farm gate price, lack of integrated approach, limitation of GAP extension services, and ineffective marketing. Data was collected using semi-structured questionnaires. Eighty-one cocoa farmers from TR were interviewed during the study in April 2022, while sixty-nine cocoa farmers from BY were interviewed in May 2022. There were some significant results as follows. The cocoa farmers in Nimba County, Liberia have potential to produce cocoa based on GAP regulation because they have appropriate labour force. Source of finance might be the hindrance for the

cocoa farmers to continue practicing GAP. Cocoa farmers in Nimba County, who practice GAP, have positive attitude about the environment and the quality product. Cocoa farmers in Nimba County are both receptive to and adhere with the compliance issues relating to environment as they have high compliance value on the concern to the environment, the effort to mitigate the negative impact to environment and the adherence to the law and regulation. They are also highly knowledgeable about the proper use of pesticides, pre-harvest practices and use IPM for pest control. All of them complied with harvesting quality cocoa fruits and cleaning the equipment and containers used during these operations. They, however, had low GAP compliance on keeping record on training history, result of health examination and personal hygiene.

Keywords: Cocoa, Factors, Good agricultural practice (GAP), Questionnaires

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Factors affecting the implementation of GAP on Cassava production in Grand Cape Mount County, Liberia

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The surveys conducted in Grand Cape Mount County, Liberia to study the factors affecting the implementation of good agricultural practice (GAP) on cassava production using semi-structured questionnaires. In our study area, socio-economic characteristics of cassava farmer differred significantly for each GAP implementation item. Age of the farmers negatively influenced the product storage and on-site transportation (-0.18, $P<0.05$). The land ownership positively influenced the level of how cassava pests were controlled (0.30, $P<0.01$). Income (-0.20, $P<0.05$) and GAP practicing period (-0.21, $P<0.05$) negatively influenced while the type of farmer group positively influenced the access to better quality seeds (0.26, $P<0.05$). In addition, the type of farmer group positively influenced to the post harvesting handling (0.28, $P<0.01$). The level of GAP compliance was at moderate level in all items while data recording was at low level. Agricultural extensionists should thus emphasize in elevating the level of GAP compliance among the farmers in Grand Cape Mount County, Liberia.

Keywords: Good Agricultural Practice, GAP, Cassava, Liberia

SESSION 2A ONSITE/ONLINE: ANIMAL, FISHERIES SCIENCES AND ENTOMOLOGY

Effect of stocking rate on physiology, performance, and behavior of mixed-grazing goat and sheep under naturally infected pasture

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The results indicated that all blood parameters (Packed Cell Volume or PCV and Haemoglobin level) of goats and sheep measured which were kept in nematode infested pasture were all lower than those of goats and sheep kept in the un-infested pasture. Goats that were grazed in High Stocking Rate (HSR) had the lowest PCV, and there was a very rapid decrease after six weeks of infestation. The average hemoglobin of all goats infested at both HSR and Low Stocking Rate (LSR) was 4.7±0.14 g/dl and 5.2±0.47 g/dl, respectively. Meanwhile, the PCV and Hb levels of infested sheep are still within normal limits. The results also indicated that the Fecal Egg Count (FEC) of infested goats ranged from 373-564 eggs while infested sheep 290-410 eggs per gram of feces. All physiological parameters measured in goats and sheep, both infested and non-infested, still ranged under the normal healthy conditions, respiration (35 vs 44 times per minute), heart rate (106 vs 101 times per minute), and rectal temperature (38.6°C and 38.7°C). Goats in this study were more sensitive to nematode infestation than those sheep which is characterized by a decrease in PCV, a decrease in hemoglobin, and high FEC. Live weight gain of goat and sheep were lowest in HSR and infested pasture treatment, and lowest in LSR and non-infested pasture. Grazing behavior was also evaluated. This experiment showed that under different stocking rates (HSR vs LSR) and different levels of nematode infestation (infested vs non-infested) seemed that sheep performed better than the goat.

Keywords: Blood parameter, Nematode infestation, Goat, Sheep, Oil palm

Effect of dietary protein content on production performance and carcass characteristics of native pigs from different geometric regions in Thailand

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The objective of this study was to investigate the influence of dietary protein content on the production performance and carcass characteristics of native pigs from different geometric regions of Thailand: (1) northern native pigs (NT), (2) northeastern native pigs (NE), and (3) southern native pigs (ST). The initial age of the pigs studied was significantly different and it was used as a covariate for all data analyses. There was a significant difference in body weight at day 21 and day 42 of the rearing period ($P < 0.05$) but not in the final weight between groups. NT had the highest average daily gain (ADG) during the first 21 days of the rearing period, whereas ST had the highest ADG after 42 days ($P < 0.05$). Feed conversion ratio (FCR) of NE was higher than those of NT and ST ($P < 0.05$). ST had the highest weight gain (WG), while NE had the highest feed cost per gain (FCG) ($P < 0.05$). The lowest FCG was obtained with a 12% protein diet and the highest at 18% ($P < 0.05$). For carcass characteristics, only tenderloin weight, fat and skin weight, belly weight and offal and tenderloin percentage were affected by the native pig groups ($P < 0.05$), but not the protein content of the diet.

Keywords: Thai native pigs, Average daily gain, Feed cost per gain, Carcass composition

Factors influencing dead on arrival and condemnation of broilers during catching, transport, lairage, and slaughter

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To determine the risk factors associated with dead on arrival (DOA) and condemnation of commercial broiler chickens, a statistical analysis - the multilevel method was performed. Data were obtained from 211 broiler flocks slaughtered at a slaughterhouse in Thailand in 2021. The average percentage of broilers dead on arrival (DOA) and condemnation were 0.18% and 0.63%, respectively. Factors associated with the percentage of DOA were season, time of transport, rearing stocking density, weight per crate, and feed withdrawal time. Factors associated with the percentage of condemnation similar to those associated with DOA.

Keywords: Broiler, Risk factor, Time of transport, Stocking density

Effects of commercial feed, Mulberry leaves and mixed feed on growth in Apple Snails (*Pomacea* sp.)

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The effects of different feeds on the growth performances of apple snails (*Pomacea* sp.) in a closed recirculating aquaculture system were determined using three treatments consisting of commercial feed, mixed feed (commercial feed mixed with fresh mulberry leaves) and fresh mulberry leaves. Apple snails at four to five weeks old with average weight of 0.09 g/snail, water flowing twice a day(morning-evening) and fed feed once a day for six weeks. At the end of the trial, results showed that the total weight fed to the mixed feed group was higher than those of the two groups ($P<0.05$). The average weight in the mixed feed, commercial feed, and fresh mulberry leaves were 1018.7±76.7, 557±37.3, and 440.6±18.9 g, respectively. The feed conversion ratio was 1.16 in the commercial feed, and 1.34 in both the mixed feed and fresh mulberry leaves. Protein content of dried weight in the apple snail fed with fresh mulberry leaves (54.31%) was significantly different from those feds with the other two diets. This group was shown a high survival rate than the other groups ($P<0.05$) (99.4%). Finally, the results suggest that commercial fish feed, fresh mulberry leaves, and mixed feeds can be used in apple snail culture.

Keywords: Apple snails, *Pomacea* sp., Mulberry leaves, Commercial feed, Growth performance

The effect of *Moina* sp. immersion with 17alpha-methyl testosterone (17MT) on sex reversal of Nile tilapia

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A completely randomized design with un-equal replication was used in this trial. 1300 larvae of Nile tilapia at the age of three days after hatching were separated into four groups consisting of two groups with eight replicates feeding with *Moina* sp. immersed in 17MT at concentrations of 50 and 100 mg/l. The third group as a positive Control used 60 mg17MT/kg mixed in commercial feed. The final group as the negative used only commercial feed. These larval Nile tilapias were fed ad libitum in different feed groups for 21 days by rearing in a closed circulation system. Growth performances and survival rates were evaluated, and gamete histopathology was used to prove male production. The results showed *Moina* immersion with 17MT can be used to induce male production at the concentration of 50 and 100mg/l, with a high survival rate. High growth performance in positive and negative controls were observed.

Keywords: 17 α-methyltestosterone, *Moina* sp., Nile tilapia

Antibacterial, quorum quenching and anti-biofilm formation activities of vinasse extracts against *Vibrio parahaemolyticus*

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Vibrio parahaemolyticus is the causal agent of vibriosis that can cause economic losses in aquaculture industry. Our previous study revealed that concentrated vinasse, a byproduct of bioethanol production, was able to inhibit the growth of *V. parahaemolyticus* through anti-quorum sensing or quorum quenching activity. This research therefore aimed to explore natural substances derived from vinasse to control *V. parahaemolyticus* isolated from white shrimp showing vibriosis clinical signs. Sequential extraction using four solvents of varying polarities, hexane, dichloromethane, ethanol and water, was performed to obtained the extracts of vinasse. All these extracts were tested for their ability to control the growth and biofilm formation of *V. parahaemolyticus*. We found that at the test concentration of 2% (w/v) of hexane and dichloromethane extracts, named H-V and DCM-V, respectively, showed antibacterial activities while ethanolic extract (EtOH-V) exhibited quorum quenching activity. No inhibitory activity was detected in an aquaes extract (H_2O-V) of vinasse. In addition, four vinasse extracts were tested for its anti-biofilm formation. The results obtained from crystal violet assay and scanning electron microscopic (SEM) showed that the extracts of hexane, dichloromethane and ethanol were able to arrest the biofilm formation comparable to the results of bacterial growth. This finding revealed that the vinasse extracts could be a good candidate of natural substances for bacterial control in sustainable aquaculture.

Keywords: Antibacterial, Anti-biofilm, Quorum quenching, *Vibrio parahaemolyticus*, Vinasse

Effects of dietary superworm (*Zophobas morio*) oil on growth and reproductive performance of female zebrafish (*Danio rerio*)

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Natural fish oil for dietary supplementation became more inaccessible due to decrease of by-catch fish. Study of another alternative fat sources such as insect oil is necessary. This research aims to compare growth and reproductive performance of female zebrafish (*Danio rerio*) fed with fish oil and superworm oil. Survival of *D. rerio* in both treatments was 100%. Feed conversion ratio and gonadosomatic index were not significantly different. Relative expression of ovulation-inducing genes including *ptgs2a*, *sik1*, and *slc37a4a* were not significant different. Our results suggested that superworm oil can be used in female zebrafish diet with no adverse effects on both growth and reproductive performance. This information could be beneficial to the feed industries.

Keywords: Gene expression, qPCR, GSI, Ovulation-inducing genes

Development of Loop-mediated isothermal amplification (LAMP) for rapid detection of Lumpy Skin Disease Virus (LSDV) from cattle

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Lumpy skin disease virus (LSDV) is an infectious double-stranded DNA virus of the genus *Capripoxvirus* that causes Lumpy skin disease (LSD), a serious problem in cattle livestock. LSD has the potential to spread rapidly and cause substantial economic damage. LSDV has a G-protein-coupled chemokine receptor (GPCR) that binds to the extracellular factors of the host cells, resulting in abnormal intracellular signal transduction and induces immunosuppression in the host. Detection of LSDV can be done in the laboratory by cell culture and PCR assay, but it still has limitations because it requires specialized personnel, high biosafety level, equipment, and a long time to results. The key to preventing the spread of LSDV in cattle is rapid and accurate detection of the virus. Loop-mediated isothermal amplification (LAMP) assay is a novel technique that works by amplifying the specific target nucleic acid at a constant temperature, which is simple, fast, and easy to use in the field. This study aimed to develop a prototype LAMP assay for a rapid detection of LSDV in the field. The DNA of LSDV was extracted from blood, nasal swab, saliva, and fecal samples colleted from cattle with clinical signs of LSD, and then the presence of LSDV was detected by LAMP assay, in comparison to conventional PCR assay targeting the GPCR gene of LSDV. The PCR assay showed 16.67% of the sampled cattle were positive to LSDV, while the LAMP resulted to 36.67% of the sampled cattle were positive for LSDV. This indicates that LAMP has a higher accuracy than conventional PCR. The LAMP assay can effectively detect the GPCR gene in LSDV from cattle samples, and this can be used for developing a LAMP test kit to detect LSDV in the field.

Keywords: Lumpy skin disease virus (LSDV), Lumpy skin disease (LSD), G-protein-coupled Chemokine receptor (GPCR), Loop-mediated isothermal amplification (LAMP)

Effect of Kam Kung Alga (*Chara corallina* Willdenow) on the growth performance and oxidative defense of Nile tilapia (*Oreochromis niloticus*)

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The effect of Kam Kung Alga (*Chara corallina* Willdenow) on the growth performance and oxidative defense of Nile Tilapia (*Oreochromis niloticus*) were studied. Nutrition compositions of the algae was determined, the protein content and total carotenoid were 16.87±0.11% and 0.582±0.046 mg/g dw, respectively. A feeding trail was conducted to study the effects of diets supplemented with the algal powder, at 0% (control), 2.5, 5.0, 7.5 and 10.0%, on growth performance and chemical composition of Nile tilapia carcass after feeding with experimental diets for 120 days. There were statistically significant differences between protein efficiency ratio of fish from treatment groups and control group ($p<0.05$). While survival rate and FCR of the fish fed with algal inclusion diets at 5, 7.5 and 10%, were significant higher ($p<0.05$) than those of the control group and 2.5% inclusion diet. The percentage of protein content in fish carcass fed with experimental diets at 7.5 and 10% were significantly higher than those of the protein content in fish carcass from the control group ($p<0.05$). There was no difference of lipid peroxidation among treatments. At 2.5% inclusion, the lowest lipid oxidation was found, 96.39± 13.08 nmol MDA/ g liver, and statistically different ($p<0.05$) from those fed with the diets supplemented with algal powder at 5, 7.5 and 10 %, which were 125.32±17.88, 122.24±18.50 and 122.52±25.60 nmol MDA/ g liver, respectively. Glutathione and Specific glutathione activity of fish fed with algal inclusion diets at 0 and 10.0% were statistically different ($p<0.05$), 91.34±30.42 and 164.26±41.50 and 94.99±36.75 and 162.12±48.97, respectively. The findings conclude that *C. corallina* led to reduced oxidative stress in fish. Therefore, this alga has the potential to be used as a feed supplement in aquaculture.

Keywords: Edible macroalgae, Freshwater macroalgae, Glutathione, Lipid peroxidation

Prevalence of heartworm (*Dirofilaria immitis*) disease of dogs in Guimba, Nueva Ecija detected using direct blood smear and modified Knott's test

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Heartworm disease also known as Dirofilariosis, is an emerging parasitic disease of dogs worldwide caused by *Dirofilaria immitis*. The study aimed to detect the microfilaria of *Dirofilaria immitis*, compare the performance of direct blood smear and modified Knott's test, and determine the geographical distribution and risk factors associated with Dirofilariosis. A total of 90 blood samples were collected to determine the prevalence rate and geographical distribution of Dirofilariosis of dogs in Guimba, Nueva Ecija by detecting the presence of microfilariae in the peripheral blood samples using direct blood smear and modified Knott's test. Results showed the presence of Dirofilariosis in Guimba, Nueva Ecija with a prevalence rate of 8.8% and 20% in direct blood smear and modified Knott's test, respectively. Risk factors analyzed revealed that among the possible risk factors that may add to the probability of an animal having Dirofilariosis, age, vaccination, and bath frequency were statistically significant (p value≤0.05).

Keywords: Dirofilariosis, Direct blood smear, Dogs, Modified Knott's test, Prevalence rate

Comparative transcriptome analysis of Nile tilapia (*Oreochromis niloticus*) under different health conditions associated with tilapia lake virus disease (TiLVD)

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Transcriptomic analysis was performed in liver tissue of three different treatments of Nile tilapia including normal or healthy (no *Tilapia tilapinevirus* or Tilapia lake virus (TiLV) infection) fish (TiN), moribund TiLV-infected fish (TiB) and recovered fish from TiLV infection (TiR). The obtained results revealed that diverse genes were expressed among TiN, TiB and TiR that could lead to the different functions and involving pathways. Differential expressed genes (DEGs) in TiR and TiN showed similar read numbers and expressed genes whereas the DEGs result in TiB was distinctly detected. All DEGs of these three samples revealed that the expression of genes involved in metabolic pathways was high and their expression levels were remarkably different. Gene ontology (GO) enrichment analysis and Kyoto encyclopedia of genes and genomes (KEGG) was analyzed comparatively among three pairs of tilapia samples; (1) TiB vs. TiN (2) TiR vs. TiN and (3) TiR vs. TiB. The results showed that genes encoding proteins involving in apoptosis, peroxisome and phagosome were detectable and significantly different in TiB vs. TiN and TiR vs. TiB but absent in TiR vs. TiN. However, genes involved in oxidative phosphorylation were only detected in TiR vs. TiN. A set of genes involved in proteasome, a sophisticated protease complex that function in regulated degradation of unneeded or damaged proteins by proteolysis, only appeared in TiB vs. TiN. These results are important knowledge regarding a new emerging disease leading to surveillance, cultural and farm management practices and bioactive compound development to reduce losses due to TiLV.

Keywords: Nile tilapia, Tilapia lake virus (TiLV), *Tilapia tilapinevirus*, Transcriptome analysis

Relationship of b-mode ultrasonography features of the mammary gland and teat with CMT finding and somatic cell count in dairy buffaloes *Bubalus bubalis* (*Linnaeus*, 1758) with subclinical mastitis

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The study was conducted to determine the relationship of B mode ultrasound features of mammary gland and teat with CMT findings and somatic cell count in dairy buffaloes with subclinical mastitis. Milk samples of dairy buffaloes were subjected to CMT and Porta SCC to determine the somatic cell count level. Ultrasonography of the mammary and teat of the buffaloes with and without subclinical mastitis was conducted. The ultrasound features were determined, and the echo mean values were computed from the ultrasonograms. The significance of the study is to determine the correlation of ultrasound features with CMT findings and Porta SCC results. So that the ultrasound machine in the farm can be utilized not only for pregnancy diagnosis but also for detection of subclinical mastitis. The ultrasound appearance of the udder from buffalo with subclinical mastitis consisted of hypoechoic udder parenchyma, with anechoic gland cistern, alveoli and lactiferous duct. In the normal mammary gland of buffalo, the udder revealed moderate echogenic parenchyma with interspersed anechoic alveoli and lactiferous ducts. Teat of buffalo with sub-clinical mastitis revealed homogenous hypoechoic features of the three-discrete layer of the parenchyma. The contour lining of the teat lumen has an irregularity, and the size of the lumen decreases. The teat in animals without subclinical mastitis showed hyperechoic to hypoechoic features of the teat wall. The teat cistern had dilated anechoic area and showed a few hypoechoic dots, representing milk particles. The mean ± SD echo mean values of mammary gland and teat with subclinical mastitis were relatively higher than their respective echo mean values in the mammary gland and teat without subclinical mastitis. Pearson's correlation showed a positive correlation between ultrasound echo mean values of the udder and CMT finding and ultrasound echo mean values of the udder and porta SCC. Also, the study showed a positive correlation between ultrasound echo mean values of teat and CMT and findings and the correlation between the ultrasound echo mean values of teat and SCC results. The results of the study suggest that ultrasonography can be useful in detecting subclinical mastitis in dairy Murrah buffaloes.

Keywords: Buffalo, CMT, Porta SCC, Subclinical mastitis, Ultrasonography

Toxicity of *Litsea petiolata* Hook.f. essential oil against *Aedes aegypti* (Linn.), *Aedes albopictus* (Skuse), *Anopheles minimus* (Theobald) and *Culex quinquefasciatus* (Say)

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This study evaluated the oviposition deterrent, ovicidal, larvicidal, pupicidal, and adulticidal activities of essential oil (EO) from *Litsea petiolata* leaves against *Aedes aegypti*, *Aedes albopictus*, *Anopheles minimus* and *Culex quinquefasciatus* with double-choice, dipping, and contact assays**.** *Litsea petiolata* EO was tested at 1, 5, and 10% concentrations in ethanol and their efficiencies were compared with those of 1% w/w temephos and 10 % w/v cypermethrin. Oviposition deterrence was evaluated on gravid females. Larvicidal and pupicidal activities were tested on the fourth instar larvae and 2-day-old pupae. The adulticidal activity was tested against two-day-old adult females. Ten percent of *L. petiolata* EO exhibited the highest oviposition deterrent activity against gravid females and 100% repellency against *Ae. albopictus* and *An. minimus*, 97**.0%** against *Ae. aegypti*, and 94**.6%** against *Cx. quinquefasciatus***.** The oviposition activity index (OAI) against females of those four mosquito species ranged from -0.9 to -1.0. Ten percent of *L. petiolata* EO also exhibited the highest ovicidal activity against the eggs of the four mosquito species, with an inhibition rate ranging from 87.2 to 100%. Moreover, it also showed the highest larvicidal and pupicidal activities against the larvae and pupae of the four mosquito species, with a 100% mortality rate at 10 and 60 min, respectively. The adulticidal activity was recorded at 1 and 24h. Ten percent of *L. petiolata* EO exhibited the highest toxicity to female adults of the four mosquito species, with 100% knockdown (1h) and mortality (24h) rates. On the other hand, 1%w/w temephos did not deter oviposition by gravid females, and it was only slightly toxic to the eggs and larvae and non-toxic to the pupae. In the same manner, 10%w/v cypermethrin was less effective against the female adults of the four mosquito species than 10**%** *L.petiolata* EO. *L.petiolata* EO is a highly effective and eco-friendly alternative to synthetic insecticides.

Keywords: *Litsea petiolata*, *Aedes aegypti*, *Aedes albopictus*, *Anopheles minimus*, *Culex quinquefasciatus*, Essential oil

Insecticidal activity of *Citrus aurantium* and *Eucalyptus globulus* essential oils and their major constituents against nymphs and adults of *Pediculus humanus capitis* De Geer

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Insects have developed resistance to synthetic chemical pediculicides worldwide. It also has serious side effects to humans. Use of plant-derived essential oils has been recommended as an alternative method for head lice control. This study investigated the insecticidal activity of essential oils (EOs) from *Citrus aurantium* and *Eucalyptus globulus* and their major constituents against *Pediculus humanus capitis* De Geer nymphs and adults. A comparison was made between their efficacy and that of 25% (w/v) benzyl benzoate, a synthetic pediculicide. Each EO and its constituents at 1% and 5% (v/v) concentration in ethyl alcohol was assayed in an immersion test. Head lice nymphs and adults were immersed for 1 min in the treatments. Mortality rate was observed and recorded under stereomicroscope at 1, 10, 30, and 60 min after exposure. Every tested EO and its constituents exhibited a higher pediculocidal activity against nymphs and adults of *P. humanus capitis* than 25% (w/v) benzyl benzoate did. In particular, 5% 1,8-cineole exhibited the highest insecticidal effects against *P. humanus capitis* nymphs and adults with 100% mortality rate at 1 min with an LT_{50} of 0.2 min and an LC_{50} of 0.7%. The other EO formulations provided a mortality rate ranging from 0-96.0% and an LT_{50} ranging 0.3-315.9 min against nymphs. Against the adults, the mortality rate ranged from 12.0-96.0% with an LT_{50} ranging from 1.2-314.5 min. Our data showed that 1,8-cineole has a great potential to control head lice populations and should be further developed into a safe and effective pediculicide.

Keywords: *Pediculus humanus capitis*, *Citrus aurantium* EO, *Eucalyptus globulus* EO, d-limonene, 1,8-cineole, Pediculicides

Effect of cassava leaf pellet supplementation on growth performance, nutrient digestibility, and economic return in Chalorais crossbred cattle fed rice straw as basal diet

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The expensive price is a critical problem in the protein sources for feeding ruminants. Approaches to using agricultural by-products such as cassava leaf could solve the problem. Cassava leaf pellet (CLP) is readily available and cheap alternate protein source for ruminant nutrition in Thailand. The results showed that increasing the level of CLP supplement had no significant effect on animal body weight and monthly growth rate (weight gain and average daily gain) but increased linearly in the overall period ($P<0.05$). Increasing the level of CLP supplement also had no significant effect on daily dry matter (DM) and nutrient intake, including organic matter (OM), crude protein (CP), ether extract (EE), neutral detergent fiber (NDF) and acid detergent fiber (ADF) intake. Increasing the supplementation levels resulted in a significant linear increase in ADF digestibility ($P<0.05$). The nutrient (DM, OM, CP, and NDF) digestibility in the cattle, did not differ significantly. Increasing the level of CLP supplement increased linearly net profit per head (THB) and profit (%) ($P<0.05$). It is concluded that CLP could be supplemented in concentrate up to 20% as protein soured in Charolais crossbred cattle.

Keywords: Feed security, Feeding trial, Ruminant, Alternate feed

Adulticidal activity against houseflies (*Musca domestica* L.*; Muscidae: Diptera*) of combinations of *Cymbopogon citratus* and *Eucalyptus globulus* essential oils and their major constituents

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The efficacies of *Cymbopogon citratus*, *Eucalyptus globulus*, eucalyptol, geranial, and their combined formulations against houseflies (*Musca domestica*) were evaluated and compared against that of cypermethrin, a common synthetic insecticide. The knockdown and mortality rates were determined by a standard susceptibility assay recommended by World Health Organization (WHO). The tested concentration range of these essential oils and their constituents was between 1% to 5%. The highest efficacy (100% knockdown rate and mortality rate) were provided by a combined formulation of 2% *E. globulus* EO + 1% geranial. This formulation had a KT_{50} of 4.27 min. The two next best formulations were 2% *C. citratus* EO + 1% eucalyptol that provided a KT_{50} of 5.85 min and an individual 5% *C. citratus* EO that provided a KT_{50} of 6.69 min. Most importantly, several tested formulations provided a higher knockdown rate than 1% cypermethrin. Therefore, these formulations have a full potential as an alternative natural insecticide to replace cypermethrin. Moreover, they are safer because they have been used as food and medicine since ancient times.

Keywords: *Cymbopogon citratus,* Eucalyptol, *Eucalyptus globulus,* Geranial, *Musca domestica*

Species composition and diel variation of fish caught by traditional longline fishing

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The study of fish species composition and diel variation of fish caught by traditional longline fishing was conducted during December 2020 to January 2022. Many sizes of circle hooks ranging from No. 9/0 to No. 18/0 attached with branch lines, main lines and baits (earthworm and small live fish) were used to collect fish samples from three stations along the middle Chi River, Maha Sarakham, Thailand. In the current study, a total 414 fish belonging to 9 families with 21 species were found. *Pangasius larnaudii* was the most dominant species in terms of number (15.2%) whereas *Chitala ornate* was the most dominant species in terms of weight (35.6%). The most dominant species in terms of %IRI was *Hemibagrus wyckioides* (16.7%). Total cacth per Unit effort of longline fishing ranged from 0.01 to 15.6 kg•day^{-1} with an average of 2.8 ± 0.31 kg•day^{-1}. Investigation of diel variation of caught fish, showed that *Hemibagrus wyckioides, Hemibagrus filamentus, Pangasius larnaudii* and *Mastacembelus armatus* were caught during both day and night. Four and 14 fish species were found during the day and night, respectively. Catch per unit effort during the night with an average of 1,845.5 ± 409.1 g. •12 hours^{-1} was significantly greater than the catch per unit effort during the day with an average of 264.4 ± 132.7 g. •12 hours^{-1} ($p < 0.05$). These results suggest that longline fishing should be operated during the night to gain more catch compared to fishing during the day.

Keywords: Longline fishing, Hook, bait, Species composition, Diel variation, CpUE

Adulticidal effect of combinations between *Cymbopogon citratus* and *Eucalyptus globulus* essential oils against *Pediculus humanus capitis* De Geer

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Pediculosis is caused by head lice, *Pediculus humanus capitis* De Geer. It is a public health problem with high prevalence, especially among children in school age. Several common synthetic chemicals have lost their adulticidal efficacy against head lice due to increasing resistance against synthetic pediculicides. Essential oils (EOs) obtained from aromatic plants are safer alternatives because of their low toxicity to mammals and easy biodegradability. The present study evaluated the adulticidal effect against *P. humanus capitis* of combinations between *Cymbopogon citratus* EO and *Eucalyptus globulus* EO. The evaluation included a comparison of the combinations against a synthetic pediculicide, 0.5% (*w/w*) permethrin shampoo. The adulticidal activities were evaluated with an immersion test. Adult lice were immersed for 1 and 3 min in each treatment. Mortality rate was observed and recorded under stereomicroscope at 1, 5, 15, 30, and 60 min after exposure. All head lice adults that were immersed in a combination of 15% *C. citratus* EO + 15% *E. globulus* EO, 20% *C. citratus* EO + 20% *E. globulus* EO, and 30% *C. citratus* EO + 30% *E. globulus* EO for 3 min were destroyed with the highest mortality rate of 100% at 30 min and an LT_{50} ranging from 1.2 to 1.5 min. However, 0.5% (*w/w*) permethrin shampoo provided a slightly higher adulticidal activity than all EO formulations in terms of LT_{50} (0.9 min). According to the LD_{50} values reported in the literature, *C. citratus* EO + *E. globulus* EO can be developed into a safer shampoo for head lice treatment for schoolchildren.

Keywords: *Pediculus humanus capitis*, *Eucalyptus globulus* EO, *Cymbopogon citratus* EO, Adulticidal effect, Head louse infestation, Pediculicide

SESSION 2B ONLINE: ANIMAL, FISHERIES SCIENCES AND ENTOMOLOGY

Association between dairy meat quality with gender, slaughter age, and marbling score, and relationships among the meat quality traits

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Gender of dairy cattle did not influence all studied traits (P>0.05). Age at slaughter did not influence most meat traits, except L* value (P<0.05). Meat from the oldest animals, ≥5 yr old, exhibited significantly lower L* value than the younger animals, 2, and 3 yr old (P<0.05). Marbling score significantly affected traits studied (P<0.05), except pH, a* and b* color values (P>0.05). The muscle, which obtained higher marbling scores had more dry matter and ether extracted (intramuscular fat content). Increased marbling score was related to decreased shear force. The lightness of muscle with the highest marbling score had the highest mean L* =52.8. There was strong positive correlation between %DM and %EE (r= 0.91, P<0.01). The positive relationships between %EE, and L* and b* were found. Shear force was positively correlated with cooking loss (P<0.01), but it was negatively related to L* (P<0.01).

Keywords: Dairy beef, Marbling score, Meat quality, Intramuscular fat content

Cryogenic tolerance to freezing temperature and sperm motility characteristics of frozen-thawed spermatozoa of Philippine native pigs (*Sus scrofa*)

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Philippine native pigs (**PnPs**) in rural farming communities still thrive due to their adaptability and resilience to adverse environment challenges, perceived disease resistance traits and consumer demand for their tastier meat. These qualities make them likely candidates for gametes conservation for Animal Genetic Resources (**AnGRs**) Cryobanking. PnPs spermatozoa were cryopreserved using Lactose egg yolk-based **C**ooling **E**xtender (**CE**; 0.31M Lactose 80% v/v and 20% Egg yolk v/v) and **F**reezing **E**xtender **(FE)** Solutions (**CE** 92.5% v/v, Glycerol 6% v/v and Equex paste 1.5% v/v). With the use of a Computer Assisted Sperm Analyzer (**CASA**) the average ± s.e.m sperm motility (CASAMOT%) and progressively motile (CASA PMOT%) were determined before and after cryopreservation. In study 1, epididymal spermatozoa (EpS) had a pre-freeze CASA MOT values of 71.75 ± 2.32% and CASA PMOT of 44.0 ±1.96%, that decreased significantly after freezing to 30.1± 5.0% and 12.0 ± 3.0%, respectively (Student's T-test:p<0.05). In study 2, ejaculated semen of native Boar stud #1 and #2 registered a pre-freezing CASA MOT values of 53.1±3.6% and 52.3± 3.0% with sperm post thaw motility values of 29.1 ±4.1% and 31.0± 4.9%, respectively.The CASA PMOT values for Boar Stud #1 and #2 before cryopreservation was 45.9 ±3.6% and 46.4.±3.3%, which manifested a significant decline to 25.0 ± 3.9% and 26.6 ± 4.6, respectively. Fluorescence microscopy using Live/Dead® Sperm Viability Kit revealed sperm head with green fluorescence confirming live sperm and viability indicative of intact plasma membrane integrity post thawing. These results demonstrated the cryogenic tolerance to freezing temperature and survivability of Philippine native pig spermatozoa for future research on *in vitro* fertilization and eventual AnGR cryo-conservation/cryobanking.

Keywords: Philippine native pig, Spermatozoa, Cryopreservation, CASA sperm motility

Protein digestibility of feed ingredients in Banana shrimp *Fenneropenaeus merguiensis* (De Man, 1888)

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Banana Shrimp (*Fenneropenaeus merguiensis*) is one of the domestic species of marine shrimp in Thailand. It is popular because of its taste. Banana shrimp culture has not been fully developed since the shrimp feed has not been successfully formulated. In order to formulate the efficient shrimp feed, apart from nutrition requirements, size and feeding behavior, and enzyme in each stages, digestibility of ingredients is also required. Shrimp larvae from zoea 1 to post larval 60 stages were cultured. The samples at Z1-3, M1-3, P1, P5, P10, P15, P20, P30, P40, P50 and P60 stages were collected and stored in -80 °C until analysed. Then crude samples were extracted with 50 mM Tris-HCl buffer, pH 8, for trypsin analysis, total protein and in vitro digestibility. Trypsin specific activity (µmol *p*-Nitroaniline) was measured using 1.25 mM bensoyl-L-arginine-*p*-nitroanilide (BAPNA) as substrate and *p*-Nitroaniline as a standard (Rungruangsak-Torrissen *et al.,* 2002). Total protein was determined following the method of Bradford (1976) and bovine serum albumin was used as a standard. *In vitro* digestibility, Trinitrobenzene sulphonic acid (TNBS) was measured in the feed ingredients and compared to *DL*-alanine as µmol *DL*-alanine per g feed per trypsin specific activity. The ingredients were finely ground and sieved through 500 µm. It was found that for all stages of Banana shrimp larvae, the highest digestibility among raw materials tested was yeast. It was followed by soybean meal (Z1), squid meal (Z2, M2) and wheat gluten. Each ingredient varied in protein digestibility due to stage structure and property, and enzyme activity of the larvae. Information on the protein digestibility of the ingredients served as guide in formulating the highly efficient artificial feed for successful Banana shrimp culture in the near future.

Keywords: Shrimp, Ingredients, Trypsin

The effect of fermented copra meal for substitution of fishmeal protein on growth, feed utilization, and carcass quality of Nile tilapia (*Oreochromis niloticus*)

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Two experiments were conducted to determine optimum conditions for copra meal fermentation and to replace fishmeal protein with fermented copra meal (FCM) in the Nile tilapia (*Oreochromis niloticus*) diets. In the first experiment, a factorial (3×5) completely randomized design was used to ferment high protein copra meal in an anerobic environment with three yeast fermentation formulas and five levels of media concentrations (0, 100, 200, 300 and 400 mL) for 10 days. The findings showed that there was an

interaction effect on the FCM protein content (p<0.05). The highest protein content (43.34%) of FCM was observed using media formula 2 at 400 mL media concentration. In the second experiment, a completely randomized design was employed to formulate six isonitrogenous and isolipidic diets to substitute fishmeal protein with FCM at 0, 20, 40, 60, 80 and 100 %. The diets were fed to apparent satiations in triplicate groups of fish with an average initial weight of 14.41±0.14 g/fish for eight weeks. At the end of the feeding trial, survival rate, growth performance, feed efficiency, production cost and carcass quality were assessed. The fishmeal protein substitution levels with FCM significantly affected weight gain (g/fish), average daily gain (ADG, g/day), specific growth rate (SGR, %/day), feed efficiency and production cost (p<0.05). The ADG, SGR, and feed efficiency of fish fed 20 and 80% fishmeal replacement diets were not statistically significant compared to the control group, but were significantly reduced in fish fed 100% fishmeal replacement diets. The carcass quality was not affected by FCM substitution levels. Nile tilapia fed 80% fishmeal protein replaced diet with FCM reduced fish production cost by 4.66 baht/ kilogram fish. In conclusion, FCM could be substituted at 80% for fishmeal protein to reduce diet production cost without compromising growth and carcass quality of Nile tilapia.

Keywords: Fermented copra meal, *Oreochromis niloticus,* Alternative protein source, Growth, Carcass quality

Impact of parasitism and herbs supplementation on water intake of goats

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Thirty-two (32) female goats aged 7 to 8 months were used in the current study to assess the impact of parasitism and herb supplementation on goat water intake. Our research revealed that parasite infection considerably reduced water intake, with averages of 758.84 ml/day for control infected goats compared to 554.43 ml/day for parasitized goats, and 87.21 vs. 65.09 ml/day/kg 0.75 for water intake per kg of metabolic BW. Additionally, it was discovered that there was no discernible difference in the amount of water used by the groups of positive controls and infected goats. The findings demonstrated that total DMI and water intake were correlated in parasitized goats but not in an infected control group. Additionally, it was discovered that supplementing with herbs considerably increases the amount of water, dry matter, and water consumed per kilogram of metabolic BW. Throughout the trial period, the mean daily temperature and humidity were within the thermal neutral zone with no effect on water intake. In conclusion, herbs can therefore be used to maintain the water intake requirements of parasitized goats.

Keywords: Andrographis paniculate; Curmuma; Haemonchus; Melastoma malabatricum

Effects of fresh Ivy Gourd leaves (*Coccinia grandis* L. Volgt) added to concentrate diets on production and egg quality of Kabinburi Duck

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This study aimed to investigate the effect of the addition of fresh ivy gourd leaves on the production and egg quality of Kabinburi duck that were 21-32 weeks old and weighing 1467±90.87 g. A total of 120 female Kabinburi duck were maintained in litter cages; each measuring 1×1 ducks. The treatment included

the addition of fresh ivy gourd leaves in the diet as follows: T1=control feed+0% of fresh ivy gourd leaves, T2=control feed+5% of fresh ivy gourd leaves, and T3=control feed+10% of fresh ivy gourd leaves in the feed. A completely randomized design was used in this study. The production performance and egg quality of Kabinburi duck of 21-32 weeks old were evaluated. The addition of fresh ivy gourd leaves in the diet had no significant impact on the production performance and quality of the eggs ($p>0.05$), except for the egg mass (g) and yolk color. The egg mass (g) tended to show significant differences ($P=0.08$) between the treatment groups when compared with the control group, while a significant increase ($p<0.05$) in yolk color was observed when 10% of fresh ivy gourd leaves was added in the feed (T3). However, increasing the levels of the fresh ivy gourd leaves resulted in a linear increase of egg mass (g) and yolk color ($p<0.05$; $p<0.05$; respectively). The addition of 10% of fresh ivy gourd leaves increased the egg mass (g) and yolk color but did not improve the production performance, production, physical appearance, and quality of Kabinburi duck eggs.

Keywords: Fresh ivy gourd leaves, Production, Egg quality, Kabinburi duck eggs

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Comparative utilization of dried water hyacinth (*Eichhornia crassipes*) and narrowleaf cattail (*Typha angustifolia*) as an alternative litter material on growth performance of broilers

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Chicken production is increasing these days to meet higher consumer demand due to world population growth, leading to a lack of supply and an increase of production cost. Litter material is one important factor for chicken performance. Shaving wood and rice husk are two common litter materials that farmers use. However, these materials are inadequate, and expensive because of competition. Therefore, alternative materials with lower cost and more availability were evaluated. Water hyacinth (*Eichhornia crassipes*) and narrowleaf cattail (*Typha angustifolia*) were chosen in this study. The growth performance and footpad dermatitis of broiler chickens (Cobb500) raised on water hyacinth, cattail, and a 1:1 combined material of water hyacinth and cattail were compared to chickens raised on rice husk for 35 days. The results showed that water hyacinth and cattail were good litter materials which can be used as an alternative. Additionally, the combined material gave a better growth performance than rice husk without significant difference in footpad dermatitis occurrence.

Keywords: Bedding materials, Footpad dermatitis, Feces score, Lesser bulrush, Pontederia crassipes

SESSION 3A ONSITE/ONLINE: BIOLOGICAL DIVERSITY AND MICROBIOLOGY

Salinity stress tolerance of advanced swamp rice breeding lines

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Problem of salinity stress often occurs on rice grown on tidal swamps, especially those located in estuaries near river mouths. Salinity stress can drastically reduce plant growth and yield. The use of varieties better adapted to saline swamplands would lessen the risk of yield reduction or crop failure. The objectives of this study were to examine the salinity tolerance of 10 advanced swamp rice breeding lines during early plant vegetative growth and to evaluate their agronomic performances on a saline swampland. A greenhouse experiment was performed to grow the lines on a nutrient solution containing different concentrations of NaCl. Similarly, all these genotypes were subjected to field experiments on inland swampland and estuarine swampland. The mortality data on the greenhouse experiment during the first 7 days after transplanting (DAP) showed that the median lethal concentration of NaCl (LC50) ranged from 1963.28 ppm to 4863.44 ppm has placed UBPR 1, UBPR 3, UBPR 4, UBPR 6, and UBPR 8 as tolerant genotypes, UBPR 2, UBPR 7, UBPR 9, and UBPR 10 as medium tolerant genotypes, and UBPR 11 as susceptible genotype. However, as the plants reached 14 DAP the range of LC50 was reduced to between 1456.72 ppm and 3374.26 ppm, and accordingly no breeding lines could be deemed as tolerant genotype The water salinity of estuarine swampland reached 5865.23 ppm had resulted in a substantial reduction in the agronomic performances of all breeding lines. The grain yield of the breeding lines obtained from estuarine swampland was reduced between 25.8% and 52.9% when compared to those obtained from inland swampland, with the highest reduction found on UBPR 8. The current study provides new insight into the development of new rice varieties tolerant to salinity stress.

Keywords: Growth performance, Estuarine swampland, Grain yield, Inland swampland, *Median lethal concentration* (LC50)

The status of mycology research and education in Cagayan Valley, Region 02 Philippines

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Among the 73 higher education institutions (HEIs) in Cagayan Valley, the Philippines, seven (7) institutions offer BS Biology degree programs at the undergraduate level with an average of 22 graduates per year. Only one university with a satellite campus offers BS in Biology with microbiology as a major field. Five other universities offer microbiology as a subject course in their BS Biology program. Fifty-seven percent of these seven regional HEIs offer General Mycology as a subject course but only 43 percent have essential laboratories to cater mycological research and instruction. Moreover, these universities have only one full-time faculty that teaches mycology and microbiology which led to a few mycology research in the region. Alongside this setback are a lack of institutional and financial support, students with a low preference for mycology research, and fewer mycological trainings as shown by much-unpublished research archived in these higher educational institutions for the last decade. Among the 1143 archived research from the seven HEIs, our data showed that only 7 percent or 79 undergraduate research were mycological in nature. Hence, it is recommended that students be exposed to mycology research, and administrative support from the HEIs to provide infrastructure to support experiments and encourage students and faculty members to publish results in peer-reviewed scientific journals.

Keyword: Cagayan valley, Education, Mycology, Philippines, Research

Combination effect of NPK and plant growth promoting rhizobacteria on Edamame Soybean growth and yield

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This research aimed to determine the optimal NPK fertilizer doses (16:16:16) and Plant Growth Promoting Rhizobacteria (PGPR) concentrations for edamame soybean growth and yield. The following describes the treatment combination of NPK and PGPR: No treatment (control); 300 kg ha^{-1} NPK; 225 kg ha^{-1} NPK+7,5 mL L^{-1} PGPR; 150 kg ha^{-1} NPK+15 mL L^{-1} PGPR; 75 kg ha^{-1} NPK+22,5 mL L^{-1} PGPR; and 30 mL L^{-1} PGPR. The results showed that the combination of treatments had a significant effect on plant height and shoot fresh weight, total number of pods, number of pithy pods, and their weight. NPK application alone (300 kg ha^{-1}) resulted in greater growth than PGPR alone (30 mL L^{-1}) and control plants. Plant height was highest at 300 kg ha^{-1} NPK but did not differ significantly from 225 kg ha^{-1} NPK+7,5 mL L^{-1} PGPR and other combination. Meanwhile, the shoot fresh weight was highest at 300 kg ha^{-1} NPK but did not differ significantly from 225 kg ha^{-1} NPK+7,5 mL L^{-1} PGPR and 150 kg ha^{-1} NPK+15 mL L^{-1} PGPR. The absence of fertilizer and the use of exclusive application of biofertilizer PGPR led to edamame soybeans with inferior yield. The highest yield, as expressed by total number of pods, number of pithy pods, and their weight was produced by 300 kg ha^{-1} NPK alone and 225 kg ha^{-1} NPK+7.5 mL L^{-1} PGPR, but the latter did not differ from 150 kg ha^{-1} NPK+15 mL L^{-1} PGPR; and 75 kg ha^{-1} NPK+22.5 mL L^{-1} PGPR. The maintenance of edamame soybean growth and yield, enhancement of soil quality, and reduction of chemical residues are all potential outcomes of the incorporation of 7.5 mL L^{-1} PGPR with 225 kg ha^{-1} NPK compound fertilizer. These outcomes have the potential to improve soil condition.

Keywords: Promoting bacteria, Edamame soybean, Combination effect

Monokaryotic characteristics and mating types of phoenix mushroom (*Pleurotus pulmonarius*) cultivars in the South Vietnam

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Phoenix mushroom (*Pleurotus pulmonarius*) is one of the most important cultivated mushrooms in Vietnam. Monokaryon is a fundamental breeding material in conventional procedures of *Pleurotus* crossbreeding. In the present study, three *P. pulmonarius* strains, were collected from the southern part of Vietnam, to determine monokaryotic isolates. Mycelial growth rate on agar medium, decolorizing rate of YBLB medium and of these monokaryotic isolates were investigated. Then, mating types of monokaryons were determined by random hybridization. The results showed that 60 monokaryotic isolates were collected; four types of monokaryon's colony morphology were observed: rooting type, cottony type, dense mycelial type and concentric striate type. The mycelial growth rate was 15,8 – 428,86 mm^2/day on PDA medium, the decolorizing rate of monokaryons ranged from 11,23% to 90,68%. All monokaryotic isolates were determined the mating type and noted that *P. pulmonarius* species has a bifactorial tetrapolar mating system. As a result of interstrain crosses, the numbers of A and B factors three *P. pulmonarius* strains were 2 and 2, respectively. The mycelial growth rate and the decolorizing rate of most monokaryotic isolates were high. Therefore, they could be used for breeding programs.

Keywords: Decolorizing rate, Mating types, Monokaryon, *P. pulmonarius,* PDA

Biological control of papaya anthracnose caused by *Colletotrichum gloeosporioides* using *Trichoderma harzianum* PC01

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The papaya anthracnose caused by *Colletotrichum gloeosporioides* has become a significant problem in the cultivation of papaya var. holland in Thailand. Chemical control is no longer practical due to the pathogen developing resistance to the chemical fungicide.In this study, *C. gloeosporioides* was isolated and identified through morphology and molecular analysis. Antifungal activity of *Trichoderma harzianum* PC01 to inhibit *C. gloeosporioides* in dual culture was proven as antagonist and a promising biocontrol agent. That *C. gloeosporioides* was proven to be a causal agent of papaya anthracnose as confirmed by Koch's postulates. Dual culture test proved that *T. harzianum* PCO1 suppressed colony growth of *C. gloeosporioides* by 84.77%. Crude hexane metabolite from *T. harzianum* PC01 significantly inhibited the colony growth of *C. gloeosporioides* by 64.3% at the 1000 ppm. Futher research are being done for phytoalexin production by papaya plants applying active metabolites and nanoparticles derived from *Trichoderma harzianum* PC01

Keywords: *Colletotrichum gloeosporioides*, Anthracnose, Biological, *Trichoderma harzianum*

Comparative evaluation of leaf and seed methanolic extracts obtained from *Sophora tomentosa* Linn. for phytochemical, phenolic content, antioxidant and antibacterial activities

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Sophora tomentosa Linn. (Fabaceae), also known as a yellow necklace pod, is a traditional medicinal plant widely used to treat dysentery and diarrhea. However, there are few reports of biological activities and identification of natural bioactive compounds from this plant. This study was carried out to evaluate the biological activities of methanolic leaf and seed extracts of *S. tomentosa*. The plant was collected from Koh Yao Yai, Phang Nga province of southern Thailand. The total phenolic content of methanolic leave (STL) seed (STS) and dechlorophyll of leave extract (DSTL) showed 92.02 ±1.78, 38.48 ± 0.61, and 35.35 ± 2.45 mg GAE/g extract), respectively. For antioxidant activity, *DPPH*, *ABTS* and *FRAP* assay was found in leaves (STL) than in dechlorophyll of leave extract (DSTL) and seed (STS). The methanolic extracts were assessed for antibacterial activity against eight pathogenic bacterial species. The seed extract showed the most potent antibacterial activity against *Kocuria rhizophila* with 12.85±3.85 mm inhibition zones. For phytochemical evaluation, both leaf and seed extracts exhibited alkaloids and coumarin. The results showed that the leaf extract (STL) had higher antioxidant activity and total phenolic content than seeds and dechlorophyll of leave extract (DSTL). On the other hand, the seed extract presented the most potent antibacterial activity. The current study suggests that both leave and seed extracts of *S. tomentosa* have the potential source of natural bioactive compounds, which will be further evaluated in other biological activities.

Keywords: Phytochemical, Total phenolic content, Antibacterial, Antioxidant, *Sophora tomentosa* Linn.

Effect of physico-chemical conditions on the phytoplankton community in the Sago Palm Wetlands, Nakhon Si Thammarat province, the Peninsular East Coast of Thailand

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Fisheries in small wetlands are a crucial food source for Thais and therefore require effective management. The Sago Palm Wetlands play an important role in biodiversity of these area.This study aimed todetermine the diversity, seasonal changes of freshwater phytoplankton in order to develop guidelines for managing fisheries in the peninsular east coast basins of Nakhon Si Thammarat Province, Thailand. Samples were collected between March 2020 to November 2020, from four wetlands: the upper Pak Phanang River basin (UP), the lower Pak Phanang River basin (SP), the Trang River basin (TR), and the Tapi River basin with 20 stations for study abundance and distribution of phytoplankton and their correlation with the Physico-chemical water quality. A total of 30 genera of phytoplankton belonging to four divisions were identified. The highest of Shannon Wiener diversity index of phytoplankton were 2.463 in dry season of Trang River basin (TR4). The second-most abundant genera were *Euglana* and *Pandorina*. The water quality of all sampling sites were not clearly different and could be classified as oligotrophic-mesotrophic status Canonical correspondence analysis (CCA) was also carried out to analyze the relationships between the physico-chemical parameters and the phytoplankton. Among the environmental parameters, hardness and pH seemed to have the most important role for the *Bacillaria* and *Gomphonema* in the dry season, respectively. While, the wet season, *Eudorina*, *Pleurosigma* and *Synedra*, positively correlated with dissolve oxygen. *Fragilaria* positively correlated with the ammonia content but *Bacillaria* negatively correlated with total dissolved solids, and conductivity.

Keywords: Phytoplankton, Sago Palm Wetlands, Water quality

Evaluating the mycelial growth of bolete from pine forest in highland Vietnam

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Ectomycorrhizal fungi were difficult to isolate and to culture artificially. The evaluation of mycelial preservation was important for predicting the mushroom cultivated potential of this group. In this study, 24 bolete sporocarps collected from *Pinus kesiya* pine forest at Da Nhim Watershed Protection Forest and they were successfully isolated. Based on macroscopic characteristics and molecular phylogenetic retrieved from ITS marker, all sporocarps were under 5 genera *Suillus, Boletus, Baorangia, Leccinum, Tylopilus*. All fungal isolates were evaluated for mycelial growth and then preserved on MMN agar medium at 10^{o}C. The *Suillus* genus had the best mycelium growth potential significantly different from the others. After 1 year and 2 years of storage, 24 fungal isolates were evaluated for mycelial growth both under MMN broth and agar. The results showed that all isolates belonging to genus *Suillus* were viable after 2 years preservation except isolate A04101. These are the ectomycorrhizal fungi resources for studies about inoculation, biochemistry, and artificial culture.

Keywords: Ectomycorrhizal fungi, Mycelium, *Pinus kesiya*, Bolete

Diversity and utilization of indigenous upland rice varieties from Nakhon Si Thammarat Province in Southern Thailand

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This study aimed to explore and analyze the diversities of indigenous rice by seed morphology collected from rice seed farmer's plots .The genetic diversity of indigenous rice were estimated. 17 of farmers were still using about 20 species of indigenous rice. The biodiversity estimated through seed morphology had 4 types of quality and 7 types of quantity by using diversity index (H'). The color of seed (H'= 2.90832) was the most number of the diversity, followed by brown rice length (H'= 2.8553), brown rice color (H'= 2.79396) and brown rice appearances (H'=2.91743). In cluster analysis, we found statistic significance of distinctness ($P<0.05$) in cluster analysis. The result from 25% dendrogram has classified indigenous rice to 2 groups. The 1st Group: Nheaw Dum Dard, Med Fai, Nheaw Kluay, Nheaw Dum, Chor Mood, Dok Payom, Nheaw Dum Ton keaw, Hom mali rai, Sung Yod Rai, Gai Rheang, Ya Sai, Nheaw Dum Plakkoew, Nheaw Dum Ka Ton Dum, Nang Khean, Leb Nok Rai, Pukoew tong and Chor Mai Phai while the 2nd Group were: Dok Kham, Nheaw Dum Plee and Nheaw Nam Phueng. Result indicates that indigenous rice from in southern Thailand have high diversity besides that they have community enterprise of rice productions to consume in daily life, such as making dessert in festival, animal feed and to sell as local products.

Keywords: Indigenous rice, Biodiversity, Seed morphology

In Vitro skin protection effects of sulfated exopolysaccharide fragment isolated from culture medium of *Ophiocordyceps sinensis*

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Ophiocordyceps sinensis (the former name is *Cordyceps sinensis*) is a valuable Chinese medicinal fungus and has various biological activities. Exopolysaccharides are derived from cultivated medium of O. sinensis and considered as extracellular metabolites in living organisms. Free radical accumulation has been confirmed as the main driver of skin premature aging and other skin damage. This study aimed to enhance the skin protection activities of sulfated EPS fragment below 100 kDa. To obtain high biological activities, sulfur trioxide-pyridine (SO3.Py) method was applied to sulfate exopolysaccharides. After sulfation process, S-EPS10 and S-EPS11 had the highest DS of 1.70 and 1.79 corresponding with 33.31% and 34.90% of sulfate amount, respectively. S-EPS12 had DS of 1.70 and 24.67% of sulfate amount. This confirmed that the ratio between EPS fragments below 100 kDa and SO3.Py of 1:10, 1:15, and 1:20 were successfully sulfated at 80^{o}C. Sulfated fragments had higher antioxidant, anti-tyrosinase activity that were correlated with sun protection factor. S-EPS11 that had the highest DS , anti-tyrosinase and photoprotective effect with IC50 and SPF of 1.05 mg/mL and 15.66, respectively. EPS fragment below 100 kDa isolated from Ophiocordyceps sinensis with sulfated modification has exhibited the potentials as skin protective factor in the application of cosmetics or functional food.

Keywords: *Ophiocordyceps sinensis*, Sulfated exopolysaccharide, Antioxidant activity, Anti-tyrosinase activity, Photoprotective effect

The relationships between mycelial growth and fruit body's yield of oyster mushrooms (*Pleurotus* spp.) collected from Southern Vietnam

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Pleurotus spp. is one of the most important cultivated mushrooms in the world. This study aimed to understand the relationship between mycelial growth and production yield of *Pleurotus* strains collected from southern Viet Nam. A total 10 both wild and cultivated strains including 6 phoenix and 4 oyster strains were used in this study. The mycelial growth rate was conducted by 4 models such as the acreage of mycelial colonies on potato dextrose agar, the dried weight of mycelia in potato dextrose broth, the area of mycelial colonies on sawdust plates and the depth of mycelial colonies on sawdust testubes. The volume of mycelial colonies was estimated based on the area of mycelial colonies and their depth on sawdust plates. The results showed that the higher yield was obtained from wild mushroom strains. It was noted that there was a relationship between biological efficiency and volume of mycelial colonies of *P. pulmonarius*. These results provide the fundamentals for further studies on development of fast screening methods for *strains* of phoenix *mushroom with high yield*.

Keywords: Biological efficiency*, P. pulmonarius, P. ostreatus,* Volume of mycelial colonies

Evaluation of single nucleotide polymorphism in the Tetrahydrocannabinolic acid and Cannabidiolic acid Synthase Gene in Varietal Improvement of *Cannabis sativa* L.

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Cannabis sativa contains major cannabinoids which are Tetrahydrocannabinol (THC), a psychoactive compound, and Cannabidiol (CBD), which is a non-psychoactive compound that has the potential for medical uses. These compounds were metabolically regulated by two genes that are Tetrahydrocannabinolic acid (THCA) synthase and Cannabidiolic acid (CBDA) synthase gene, respectively. Each cannabis strain contains different THC and CBD that could be analyzed by HPLC. Single nucleotide polymorphism (SNP) is a variation at a single position in a DNA sequence of individuals. SNP has been used as a molecular marker for the study of the genotype of the organism .The purposes of this study were to use the Pyrosequencing technique for evaluation of the previously reported SNPs and other positions in the THCA and CBDA synthase genes that could distinguish between THC and CBD content in the cannabis plant. The primers were designed and optimized from the sequence of each SNP position to use as the marker-aided selection in cannabis varietal improvement. The results revealed that 19 cannabis strains could confirm the previous SNP positions and this research found the new effective positions on protein translation which caused the different content of THC and CBD in each cannabis strain. The tetra-primer ARMS-PCR primers were designed according to potent SNP positions.

Keywords: Cannabis, SNPs, THC, CBD, Tetra-primer ARMS-PCR

Production of F1 *Papilionanthe hookeriana* (Rchb.f.) Schltr. homozygous and heterozygous: Amplified fragment length polymorphism (AFLP) analysis of flower colors and self and cross-pollination ability between different flower colors

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Papilionanthe hookeriana (Rchb.f.) Schltr. was studied to evaluate combinations of purple (Pu), pink (Pi) and white (Wh). Flower colors were self and cross pollinated in a diallel fashion. Percentages of self and cross-pollination ability, pod size and weight, and seed weight were recorded 90 days after pollination. Seeds were cultured in Vacin and Went (VW) medium 1949, and percentage of germination and seedling numbers were measured. Results showed that percentage of seed germination was not significantly different between self-pollination treatments, while percentage of self-pollination ability and seedling numbers were significantly different at 0.01 and 0.05 levels, respectively. Pink and purple flowers had the highest percentage of self-pollination ability at 100%, while numbers of seedlings were highest at 12.95 for self-pollination of pink flowers. Percentages of cross-pollination ability, pod size and weight, and seed weight were not significantly different between treatments, while percentages of seed germination and seedling numbers were significantly different at the 0.01 p-level. The PixPu hybrid had the highest percentage of seed germination at 100%, while the PixWh hybrid recoreded highest seedling numbers of 4,032. Amplified fragment length polymorphism (AFLP) technique was used to study the genetic relations between various flower colors of *P. hookeriana* (Rchb.f.) Schltr. and the F1 hybrids of self and cross pollinated plants were classified into two clusters.

Keywords: *Papilionanthe hookeriana,* DNA finger print, AFLP, Breeding

Quality of waste water management of Nile Tilapia (*Oreochromis niloticus*) culture in pond using photosynthetic bacteria

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Six isolates of photosynthetic bacteria were isolated from waste water samples in Phetchaburi Province using modified organic agriculture medium and Rhodospirillum medium (RM) and were incubated anaerobically at room temperature under 3,500 lux illumination for 7 days. The isolates were divided into 4 groups based on the color of colonies. These photosynthetic bacteria were applied for waste water improvement of Nlie Tilapia culture in the pond. They could reduce ammonia and COD value at 5.38-92.38% and 0-87.5%, respectively. However, the strain PS-3 showed highly efficient ammonia decomposition at 92.38% and reduced COD value at 87.5% when compared with the control of waste water sample without any bacteria. Strain PS-3 was selected for 16S rRNA gene sequence analysis and it was closely related to *Rhodocista pekingensis* JCM 11669^T with 99.8% sequence similarity. Therefore it was identified as a purple non sulfur bacteria, *Rhodocista pekingensis*. This is the first finding of *Rhodocista* strain that showed the quality of waste water management. Thus, this strain is useful for waste water improvement in aquaculture before release to the environment.

Keywords: Effluent quality parameters, Aquaculture, Purple non sulphur bacteria, Sustainable agriculture

Neuroprotective potential of the *Schizophyllum commune* mycelium extract

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Split gill mushroom; *Schizophyllum commune*, was commonly found natural worldwide. It could be commercially cultivated and give high nutrition and medically necessary polysaccharides with anticancer properties. The objectives of the current study were to determine the potential of a polysaccharide extract from the *S. commune* mycelium on neuroprotection. The *S. commune* strain was collected from Than-To District, Yala Province. Its species has been identified using the morphological fruiting body, including molecular identification of ITS1 and ITS4 regions showed 99.67% homology with the *S. commune*. The polysaccharide was extracted from cultured mycelium with distilled water and then autoclaved. The supernatant was precipitated with ethanol. Subsequently, the neuroprotective activity of the extract was evaluated on SH-SY5Y cell lines, induced oxidative stress with 100 μM H_2O_2. Cell morphology was illuminated with fluorescent microscopy by Hoechst 33342 stained. It was found that the polysaccharide extracts dose at 250 μg/mL had the potential to reduce intracellular nuclear deformation compared to H_2O_2 treated cells. The cells were stained with Annexin-V and PI for apoptosis protection and then evaluated by a Flow cytometer. The results showed that a 125-250 μg/mL dose of polysaccharide extracts could reduce neuronal apoptosis at the Sub-G1 stage in SH-SY5Y cells.

Keywords: *Schizophyllum commune* mycelium, Polysaccharide, Neuroprotective

Genetic diversity of arabica coffee varieties from the royal project foundation using Genotyping-by-Sequencing (GBS)

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Arabica coffee is one of the important crops of the highland areas in the Northern Thailand that has been studied, morphologically characterized, and selected elite lines by the Royal Project Foundation. However, little is known about the genetic diversity of Arabica coffee conserved by the Royal Project Foundation in a different region. This research used Genotyping-by-Sequencing (GBS) to study the genetic diversity of 23 Arabica coffee varieties collected from the Royal Project Foundation at several research centers. Sequencing generated 1,945,389 average high-quality read tags per sample, of which 95.83% were successfully aligned to the reference genome. The average SNP and InDel locations per sample are 51,315 and 5004, respectively. The analysis of genetic diversity of 23 arabica coffee varieties using the Unweighted Pair Group Method with Arithmetic (UPGMA) method was divided into three major groups. The result can be used to develop molecular markers and applications for plant breeding.

Keywords: Arabica coffee, Genotyping-by-Sequencing (GBS), SNP, InDel

SESSION 3 B ONLINE: BIOLOGICAL DIVERSITY AND MICROBIOLOGY

Factors affecting farmers' adoption of *Trichoderma* spp. application to control plant diseases in Chachoengsao Province, Thailand

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Trichoderma spp. has been widely used as antagonistic fungal agents against several pests as well as plant growth-promoting fungus and plant diseases. This study was conducted to 1) investigate the socio-economic characteristics, knowledge, attitude and adoption of farmers who apply *Trichoderma* spp. 2) identify factors affecting farmers' adoption of *Trichoderma* spp. application to control plant diseases in Chachoengsao province, Thailand. A structured interview was used to collect data from 83 farmers who had registered with the Chachoengsao Provincial Agriculture Office (CPAO) and also a member of the *Trichoderma* biological control user group. Descriptive statistics and multiple regression analysis were employed to analyze the data. The results revealed that most respondents were rice farmers (61.45%). The annual income of agriculture was an average of 164,148.19 baht and the average non-farm income was 24,626.51 baht, respectively. The average experience of using *Trichoderma* was 2.54 years. Most information about *Trichoderma* application was obtained from Agricultural Extension Officials (AEO) (92.77%) and used for plant disease control in rice farming (57.83%). *Trichoderma* products were used as a leavening agent (produced and propagated by themselves) (62.65%), most received from the District Agricultural Office (DAO) (81.93%). Regarding farmers' knowledge, attitude, and adoption of *Trichoderma*. The farmers had a moderate level of knowledge (48.19%), a high level of attitude (63.86%), and a moderate level of adoption (57.83%), respectively. The regression results pointed out four factors affected statistically significant: age, educational level, and knowledge were statistically significant ($P<0.01$) while attitude was statistically significant ($P<0.05$). It was also observed that knowledge and attitude were positive and significantly correlated whereas age and educational level were found to be negatively correlated.

Keywords: Farmers' adoption, Biological control, Plant disease, *Trichoderma* spp.

In vitro propagation of *Musa acuminata* (AAA group) 'Kluai Nak'

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In vitro Propagation of *Musa acuminata* (AAA group) 'Kluai Nak' is influenced by different factors such as surface sterilization methods, plant growth regulator and acclimatization of different substrate for transplanting. The results showed that MS medium supplemented with 5 mg/L of BA for 1 month gave the highest average of survival rate 97.50%. Shoots induction from shoot explant were cultured on MS medium supplemented with 0-5 mg/L of BA for 3 months. The results revealed that MS medium supplemented with 4 mg/L BA gave the highest number of 3.20 shoot/explant and number of 11.20 leaf/explant while culturing on MS medium without plant growth regulator gave the highest average of high 14.90 centimeter. Roots induction from shoot explant were cultured on MS medium supplemented with 2.5 mg/L BA gave the highest number of 59.80 root/explant after 3 months of culturing. The MS medium supplemented with 3 mg/L BA and 0.2% activated charcoal gave the highest root length 5.96 cm. Subsequently, the plants of 3 months old and 7 cm high were acclimatized with the soil mixed with husk at ratio 1:1 gave the highest survival rate at 90% and the height of 8.40 cm obtained after 1 month transfer to the soils.

Keywords: *In vitro* propagation, *Musa* (AAA group) "Kluai Nak", Tissue culture

Influence of tuber cutting size and plant growth regulators on growth and development of *Caladium* 'Candidum'

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Tuber cutting is an approved technique for propagating *Caladium*, mainly due to the increase in the percentage and quality of adventitious roots and reducing the time for the formation of clonal seedlings. This study aimed to evaluate the optimum IBA or GA3 level and tuber cutting sizes of *Caladium* 'Candidum'. The results showed that 1 cm of tuber cutting size was a higher significant difference in the average number of days taken for sprouting, tuber size, plant height, canopy width, and the number of leaves than the 0.5 cm of tuber cutting size. Besides, IBA at 150 ppm was a higher significant difference in the average survival rate, number of days taken for sprouting, tuber size, plant height, canopy width, and number of leaves than others. The interaction between the tuber size at 1 cm and IBA at 150 ppm gave the highest survival rate, days to sprouting, tuber size, plant height, canopy width, and the number of leaves. Therefore, the *Caladium* 'Candidum' was cut at 1 cm size and soaked in 150 ppm of IBA to induce growth after cutting within four months.

Keywords: IBA, GA_3, *Caladium*, Tuber, Cutting method

Impacts of chlorinated stress on thermal characteristics of *Listeria monocytogenes*

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Listeria monocytogenes is recognized as a gram positive psychrotrophic foodborne pathogenic bacteria. This bacterium caused gastrointestinal disease and was found to contaminate meat, milk, ready to eat products stored at low temperature. Primary decontamination processes such as the use of chlorine compounds are often chosen to reduce the risk of contamination. However, the use of these at inappropriate concentrations caused bacteria to exhibit different stress responses. This study was conducted to investigate the thermal characteristics as a result of stress from chlorine compounds in terms of D-value, Z-value and F-value. Those obtained values were correlated using the Arrhenius equation. From the experiments, the results showed that the D-value significantly decreased with increasing temperature which is due to heat damaged cell. The increased temperature range resulted in L. monocytogenes being heat sensitive. When comparing inactivation time of microorganisms calculated from the formula and actual experiment by F-value equation and Arrhenius equation, there were no significant differences.

Keywords: Listeria monocytogenes, D-value, Z-value, Arrhenius equation

Allelopathic potential of secondary metabolites produced by some fungi and physiological mechanisms on *Amaranthus tricolor*

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This study was designed to identify and evaluate fungal species that can produce allelochemical metabolites with herbicidal activity as a pre-emergence herbicide against amaranth (*Amaranthus tricolor*) weed. The results revealed that all fungi strains had significantly reduced germination and early growth of amaranth compared to control. The metabolites from fungus coded as i003 showed the highest inhibition rate was identified as a strain of *Fusarium* sp., which was suppressed with the maximum inhibitory level (76.20%) over control. In a similar pattern, the growth of the tested plant was significantly reduced by the cultural filtrates. Based on efficacy in the seed bioassay, the *Fusarium* sp. metabolites were selected for exposure with the tested seed to determine the mechanism of action . The results showed that the *Fusarium* sp. metabolites inhibited imbibition and α-amylase activity of seed, suggesting the inhibition of germination and seedling growth which is indicative that the fungal metabolite contain potent herbicidal compounds to control weed amaranth.

Keywords: *Fusarium*, Cultural filtrates, Herbicidal activity, Mechanism of action

Arbuscular mycorrhizal fungi (AMF) product for enhancing plant growth promotion and plant protection in corn, pepper and coffee tree

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Arbuscular mycorrhizal fungi (AMF) are one of the most abundant organisms in the rhizosphere and the relationships can be found within a broad range of more than 200,000 species of host plants. They have mutualistic relationships with more than 90% of terrestrial plant species and play an important role in plant growth by accessing plant roots to absorb nutrients and water to promote plant growth and plant protection. Applying AMF as fertilizer is an effective way to improve the quality of soil, reduce the chemical fertilizer and increase plant growth promotion as well as plant bio-protection. In this study, firstly, the dominant AMF from corn, pepper, and coffee cultivated soil were isolated and sterilized. Then each kind of AMF were added to corn seed in inoculant boxes. After three days, the fungal pathogens (*Fusarium oxysporum* or *Phytophthora* sp.) were added. Seed germination ratio and plant growth promotion were checked after 5 days. The results showed that all AMF can promote corn seed germination and plant growth. *Acaulospora longula* (Aca1), *Gingaspora gigantea* (Gig2), and *Gingaspora marganita* (Gig3) isolated from corn, pepper, and coffee cultivated soil showed the highest activity; The inoculum potential (IP) of these AMF were (Aca1), (Gig2) and (Gig3) were 2582.63; 2757.50 and 2016.27, respectively. Germination ratio of corn seed in AMF treated experiment increased by 26.7 - 43.35 % compared with the none treated AMF plants. Furthermore, these AMF could protect plant pathogen at a high rate: 75-90 % in pepper tree after 3 months infected by *Phytophthora* sp.; 73.3 – 90 % in corn after three months infected by *Rhizoctonia solani.* 85 – 95 % in the coffee after three months infected by *Fusarium oxysporum.*

Keywords: Biofertilizer, Corn seed germination, Plant pathogen

SESSION 4 ONSITE/ONLINE: BIOTECHNOLOGY

Exploiting the potential of miracle grains millets by ecofriendly management of banded leaf and sheath blight

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Millets are considered to be "future crops" as they are resistant to most of the pests and diseases and adapt well to the harsh environmental conditions. Millets are a highly nutritious crop and contain considerable amount of vitamins and minerals and also good source of energy and dietary fiber. Banded leaf and sheath blight incited by *Rhizoctonia solani* (Kuhn.) is one of the emerging malady in the successful cultivation of millets. There is a need for ecofriendly management of banded leaf and sheath blight disease by using biocontrol agents. The field experiment was conducted during *kharif* 2022-2021, at Agricultural Research Station, Vizianagaram. The disease severity and yield parameters (grain yield and straw yield) were evaluated against banded blight using potential biocontrol agents *viz*., *Trichoderma asperellum Bacillus subtilis, Pseudomonas fluorescens*, an organic amendment (Neem cake), natural polymer Chitosan and fungicides Trifloxystrobin + Tebuconazole (0.05%) were tested. Among all the treatments, foliar spray of Trifloxystrobin + Tebuconazole (0.05%) showed maximum reduction in disease intensity (19.33 %) with higher grain and fodder yield over control.

Keywords*:* Banded leaf and sheath blight, Biocontrol agents, Management and small millets

Assessing genetic diversity of Yellow Star tree using SRAP markers and efficacy of their endophytic fungi in biological control

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Yellow Star (*Schoutenia glomerata* King subsp. *peregrina* (Craib) Roekm.) belongs to the Malvaceae family. It has been reported that this plant is critically endangered. In addition, the Yellow Star tree has been chosen to symbolize the reign of King Maha Vajiralongkorn. This study was conducted to assess the Yellow Star's genetic diversity based on Sequence-Related Amplified Polymorphism markers. The fifteen samples were collected from Chiang Mai, Bangkok and Nonthaburi provinces. The result showed that 52 fragments (64.22%) were polymorphic bands from seven combinations of SRAP markers. The genetic relationship was analyzed using the UPGMA method by NTSYpc software version 2.11X showed a similarity coefficient ranging from 0.59 to 0.98. Endophytic fungi were isolated from fresh leaves. The fungi were identified by both morphology and DNA barcoding. The fungi were identified in *Colletotrichum siamense, Alternaria alternata, Phyllosticta capitalensis, Xylaria cubensis* and *Diaporthe arengae.* The efficacy of endophytic fungi isolated from Yellow Star tree against *Colletotrichum gloeosporioides* and *Phomopsis asparagi* causing plant disease in asparagus were evaluated using the dual-culture test. The results revealed that *X. cubensis* had the potential to inhibit the spore germination of the *C. gloeosporioides* ASGC06 and *P. asparagi* ASGP04; there was percen of spore germination inhibition by about 99.97 and 100 percent, respectively. However, this fungus should be further studied for biological control and bioactive secondary metabolites.

Keywords: Yellow Star tree, Endophytic fungi, Biological control, SRAP markers

Biochemical composition of dwarf mandarin cv. 'Miagava-Vase' in the humid subtropics of Russia

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The influence of growth regulators on the presentation and biochemical composition of the fruits of dwarf mandarin was studied. It is shown that heavier fruits (44.8-48.2 g at 41.3 g in the control) are formed during treatment with siliplant, nanoelisitor and zerbra agro due to the formation of a thicker peel (20.1-20.9%), which is associated with the protective mechanism of these drugs (thicker peel is a mechanical protection against pathogens and phytoparasites. Siliplatin treatments provide a higher juice output – about 54.5% (compared to other growth regulators). Treatments with obstactin and silver agro significantly increase the fructose content in fruits (17.53-16.98 g / kg). The nanoelicitor variant has significantly higher sugar content (107.49 g /kg) due to the increased sucrose content (73.12 g/kg). The use of growth regulators leads to a decrease in ascorbic acid (AA) to 30.61 mg / 100 g, which is an undesirable factor, the most significant decrease in ascorbic acid (LSD = 8.27) was noted in variants with obstactin and siliplant treatment. Taking into account the influence of growth regulators on plant resistance and increased AA synthesis under stress, a decrease in ascorbic acid may be associated with an improvement in the functional state of tangerine under the influence of non-root treatments. With the introduction of growth regulators, there is a significant increase in the amount of polyphenols (up to 9.33 mg /g at 7.72 mg /g on the control), especially on variants with treatments with obstactin (7.53 mg /g), siliplant (7.39 mg /g) and zerebra agro (7.33 mg/g). Treatments with growth regulators lead to a significant increase in the Rutin in mandarin fruits (from 7.39 to 7.58 mg /g). The highest values of vitamin P were noted in the variant with obstactin and nanoelicitor treatment (7.53-7.58 mg/g at 6.68 mg/g). Nanoelicitor treatments accelerate fruit ripening, which represents consumer value and economic benefits of growing crops for the resort town/area.

Keywords: Mandarin, Growth regulators, Quality, Fruits, Vitamins, Phenolic components

In vitro propagation of Cocoyam (*Xanthosoma sagittifolium* L. Schoot) using different explant and plant hormones

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Cocoyam (*Xanthosoma sagittifolium* L. Schoot) has been recognized as one of the caloric-rich food crops which play a key role in achieving food security fully aligned in the 10-year comprehensive food security plan of Zamboanga City, Philippines. Despite of its increasing importance, the production of cocoyam has not been given importance which resulted to low supply attributed to limited availability of quality planting material. To this constraint, there is a need to develop a production protocol for in vitro micropropagation of cocoyam to determine which explant would successfully grow and which plant hormones would effectively influence growth and shoots of Cocoyam. A 2x4 factorial experiment was laid out in a Complete Randomized Design (CRD) to determine the shoot growth formation. The results showed a highly significant on the shoot formation both in factor A (explant) and factor B (plant hormone) at Pval=0.05. Corms produced a maximum shoot with a mean of 2.3 and 1.97 per explant, respectively. On the other hand, the hormone Benzyl aminopurine (BAP) influenced the shoot formation with the highest

shoot mean of 2.11, while the lowest shoot mean was observed at 1.30 using Indole butyric Acid (IBA). A significant interaction was observed in the height of plantlets and number of leaves at Pval=0.05. Among the treatments, the combination of corm and BAP (T1) gave the highest mean of 5.65 cm height of plantlets and mean of 3.40 for the number of leaves. cocoyam has been successfully micro-propagated in vitro condition using the combination of corm explant and BAP plant hormone. Numerous benefits can be derived from cocoyam, hence much more attention should be accorded to this crop, which has the potential to contribute to food security in the City of Zamboanga, Philippines.

Keywords: Cocoyam, Micro-propagation, Plant extract, Plant hormone

Impact of organic amendments on the yield and quality of sweet pepper in Bangladesh

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A field experiment was carried out at the research field of Bangladesh Agricultural Research Institute, Soil Science Division, Gazipur to investigate the effect of integrated nutrient management on the fruit yield and quality of sweet pepper. The treatments used were: T1 = 100% RD (N115P70K125S20Zn2 kg ha-1), T2 = 75% RD + 5 t ha-1 CD, T3 = 75% RD + 5 t ha-1 CD Slurry, T4 = 75% RD + 3 t ha-1 PM, T5 = 75% RD + 3 t ha-1 PM Slurry, T6 = Native fertility. The tested variety was BARI Misti Morich-1. The experimental treatments were arranged in randomized complete block design with three replicates. Results revealed that the T5 (75% RD+ 3 t ha-1 PM Slurry) produced the highest fruit yield (26.15 t ha-1), Pericarp thickness (6.91 mm), Shelf life (12 days), pH (5.86), TSS (5.4 oBrix), Vit-C (107.83 mg 100g-1), Firmness (0.34 kgf cm-2) and the lowest yield (11.08 t ha-1) with Pericarp thickness (5.14 mm), Shelf life (8 days), pH (5.48), TSS (4.0 oBrix), Vit-C (54.99 mg 100g-1), Firmness (0.28 kgf cm-2) was in control treatment (native fertility). An inclusion of 3 t PM Slurry ha-1 with 75% RD reduced by 25% the chemical fertilizer. Integrated use of PM Slurry at the rate of 3 t ha-1with 75% RD was found as the best combinations for improving sweet pepper yield and enriching organic matter content of soil.

Keywords: Sweet pepper, Chemical fertilizer, Organic amendments, Yield and quality

The obstacles in managing organic production planning for guiding the creation of organic Thailand certification products

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Most organic farmers have the knowledge and ability but lack of capability in management. A mix method to study obstacles in managing organic production planning is necessary. In this study, we selected 1)population in qualitative research were 5 organic leaders with Simple Random Sampling 2)defined the quantitative research with questionnaires 30 organic farmers by Taro Yamane randomized. 3)net Promoter Score (NPS) survey of 30 organic consumers sampling by Khazanie formula. The conceptual framework demonstrated a management of obstacles toward the organic production planning (Independent Variable) then combined NPS survey (Independent Variable) for guiding creation of Organic Thailand Certification Products (Dependent Variable). Qualitative research conveyed in-depth interview in open-ended questions. Conclusions in success, solutions and improvement. Discussions of failures led farmers to have a method

of problems solving after encountering the issues. Main 4M-1E factors impacted (sequencing most to least) were Method, Man, Material, Machine and Environment. Questionnaires in quantitative research in rating scale, the opinion analysis found organic farmers had appropriated production plan, adaptive to a changing world, aligned with government policies, required further support throughout the supply chain management, realized on country's organic strategies to achieve objectives. Organic production should be well- planned for next 10 years (respectively). Analysis of cognitive measurement, new practices have been found with adaptive to be smart farmers, new technologies are being introduced, ongoing production process were suitable, organic farmers intended to transfer their knowledge to next generations, also realized to utilize organic resources (respectively). Analysis of satisfaction measured in obstacles managing, planning ahead in organic agriculture, well planning in strategies implemented, able to address issues and take preventive action immediately, satisfied their production process with can lead to sustainable development in the country. They were proud to be apart of driven 2030 Sustainable Development Goals (respectively). NPS results = 45 calculated from promoter = 61.29%, detractors = 16.13%, passives = 22.58%. Researcher generated descriptive statistic found 70 percent of organic consumers were willing to recommend the Organic Thailand Certification Products to others. Most purchased frequency in once a week(60 percent consumed for last 1-2 years). The place to purchase from department stores at 60 percent and 20 percent from agricultural shop. NPS survey found most consumers were interested in certified products rather than non-organic products, a good health being main factor of decision to consume organic products.

Keywords: Obstacles management, Preventive action, Customer survey, Organic certificate

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Morpho-cultural, molecular characterization and eco-friendly management of Banded leaf and sheath blight pathogen in Proso millet

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Proso millet (*Panicum miliaceum* L.) is an important millet grown widely across the country because of its high nutritive value, special adaptation attributes for poor degraded lands, quick maturity and the ability to withstand drought due to its low water requirement. However, it is being incited by the advancing dreadful Banded leaf and sheath blight (BLSB) disease caused by *Rhizoctonia solani* which inflicts significant grain and fodder loss thereby acting as a malady in successful cultivation and production of proso millet. The problem of BLSB is increasing in various regions of India. Characterization of the newly emerging population is necessary to generate information about the emergence of new pathotypes having the adaptability to new traditional areas. A total of ten isolates were collected from five different states of India and were characterized for their morphological, cultural and molecular variation. The isolates showed wide morphological variation in terms of hyphal width, their growth rate and also sclerotial characteristics such as size, colour and abundance of sclerotia production. Molecular variation of these isolates was analysed using Universal primer pairs ITS1 and ITS4 which resulted in an amplicon size around 600 bp region for all the ten isolates. Also, management is a pre-requisite approach to regulate this disease hence an integrated disease management approach utilizing bioagents, fungicides and a biorationale was tested under sick plot conditions to find out the best management practice where, seed treatment and soil application with biocontrol agents offered greater protection against the BLSB disease and found to be an ideal management approach

Keywords: Banded leaf and sheath blight, Morpho-cultural characterization, Molecular studies, Eco-friendly management

Effect of organic manures in long term nutrient management system on yield, quality and soil health in finger millet

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Low soil fertility is one of the bottlenecks to sustain production and productivity. Anthropogenic factors such as inappropriate land use systems, monocropping, nutrient mining and inadequate supply of nutrients have aggravated the situation. Keeping in view of sustained crop yields as well as soil health, a long term experiment is being conducted at Agricultural Research Station, Vizianagaram for eight years from 2014 to 2021 during *Kharif* season to study the effect of use of organic source of nutrients in comparison with conventional method on soil health, Yield and quality of finger millet crop. The objective of the study was to assess the effect of organic farming in comparison with conventional method on growth parameters, yield, soil fertility status, nutrient uptake and grain quality of finger millet. The experimental site located at Agricultural Research Station, Vizianagaram, where the soil texture is sandy loam with neutral pH with normal E.C, low organic carbon status (0.42) and soil available nitrogen (227 kg/ha) and medium in phosphorus (59 kg/ha) and potassium (265kg/ha). The organic manures are supplied as *in-situ* incorporation of green manures (sunhemp), application of farmyard manure, neem cake whereas the inorganic plot was treated with recommended fertilizer dose (60-40-30 kg/ha of NPK). The pooled data have been statistically analysed using T- test and revealed that, after 7 years the grain yields and straw yields in both inorganic plot (2694 kg/ha) and organic plot (2577 kg/ha) are on par with each other, with B:C ratio of 1.65 in organic plot and 2.20 in Inorganic plot. Consequently, in the 8th year the grain yield in the organic treatment (2788 kg/ha) is 4.10% higher than the inorganic plot (2677 kg/ha) and are significantly on par with each other with B:C ratio of 1.79 in organic plot and 2.19 in the Inorganic plot. The soil OC% in organic plot has shown an increase from 0.42% to 0.50% but was statistically not significant over the inorganic plot. The soil available N, P_2O_5 and Zn, Mn has shown significant increase the organic plot compared to the inorganic plot, whereas the soil available K_2O, Fe and Cu has showed an increase in the organic plot but not statistically significant. Organic manures are an excellent natural source containing nitrogen, phosphorus, potassium and micronutrients. The use of only organic manures may not increase the straw and grain yields of finger millet crop in a very short period particularly in sandy loam soils, but will certainly help to enhance the soil organic carbon content which improves the soil health along with the quality of the crop yield.

Keywords: Conventional, Finger millet, Organic, Nutrient uptake, Soil fertility and Yield

Impact of crop establishment methods on energy auditing and carbon footprint of finger millet

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Finger millet, a nutri-cereal is gaining momentum as a potential vehicle for elimination of malnutrition in economically underprivileged countries. Increased productivity with little or no harm to environment assumes significance for sustenance of the finger millet crop. Crop establishment method is one such effort, which determines the optimum plant population per unit area. In this endevour, a two year field experiment was conducted in South India to assess the impact of crop establishment on productivity, profitability, energy use efficiency and environmental sustainability. The results indicated that square planting at 30 cm has shown 20% and 13% increase in productivity and 35% and 46% increase in B:C ratio respectively over the most common practices of South India viz., direct sowing by broadcasting and transplanting on flat beds. Square planting at 30cm also showed lowest specific energy(3.99MJ/kg grain), carbon footprint(0.063kg CE/kg grain) and Green House Gas Intensity(0.23 kg CO_2-e /kg grain). However, it was on par with square planting at 22.5cm and SRI method of planting (25cm×25cm). Hence, Square planting is the best method among different establishment methods and with adoption of mechanization and substitution of chemical nitrogen fertilizers with biofertilizers, crop rotation with legumes, etc. may further benefit the environmental safety.

Keywords: Finger millet; Establishment; Profitability; Energy; Carbon footprint

Germinability and vigor of partially-aged (*Zea mays* L.) seeds presoaked in Sampaguita (*Jasminum sambac* [L.] Aiton) flower extract and essential oil

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Seed treatments are vital in improving seed quality during crop production. One technique is seed pre-soaking using organic materials like flower extract and essential oil of Sampaguita (*Jasminum sambac* [L.] Aiton). Sampaguita flower extract and essential oil contain active biochemical substances which exhibit antioxidant and antimicrobial properties. The study conducted at Seed Science and Technology Laboratory, Institute of Crop Science, UPLB aimed to determine the effects of Sampaguita flower extract and essential oil on the germination and vigor of two corn varieties (BPI Lagkitan and Sweet Corn). Partially-aged corn seeds obtained naturally and artificially were presoaked in different concentrations (1%, 2%, and 3%) of flower extract and essential oil. Untreated seeds served as control. The percent germination and vigor parameters (first count, vigor index, root and shoot length, seedling biomass, and seedling emergence) were evaluated. Results showed that seeds soaked in 3% concentration of flower extract resulted in higher percent germination and vigor compared to the other treatments for both varieties. The optimum concentration of essential oil needed to enhance germination and vigor was 1% and 2% for BPI Lagkitan and Sweet Corn, respectively. The 3% essential oil concentration was shown to be detrimental to partially-aged seeds. The use of essential oil somehow ensured pathogen-free seeds based on visual examination. Seed presoaking in Sampaguita flower extract or essential oil may be an alternative to chemical seed treatment in support of organic seed production.

Keywords: Artificially-aged seeds, Naturally-aged seeds, Seed quality, Seed treatment

Application of activity-based costing to the logistics cost system of organic vegetables in Nakhon Pathom, Thailand

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The objective of this research is to study the logistic costs of organic vegetables in Nakhon Pathom by applying application of activity-based costing from logistics cost system with share cost. Besides, it has thirty group sampling with purposive sample as the interviewing tool with questionnaires. The results showed that the logistic costs based on the activity-based costing of organic vegetables in Nakhon Pathom had the average costs of logistic system with 38 ,568 baht per rai and the order quantity costs or total production order with 17,753 baht per rai or with 46.03 percentages including of total transportation costs with 20,500 baht per rai or with 53.15 percentages , total warehouse costs with 300 baht per rai or with 0.78 percentages and the information process costs with 1 5 baht per rai or with 0 . 0 4 percentages, respectively. With this case, there must be guidelines for logistic costs reduction by gathering for the network members of organic vegetable growers with the production plan under the relevant agency support including of the setup for the production distribution center.

Keywords: Activity-based costing, Logistics cost system, Organic vegetables

Energy digestibility and concentration of nitrogen-corrected apparent metabolizable energy of Azolla (*Azolla* sp.) and Duckweed (*Lemna* sp.) in broiler

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The most practical system in estimating the energy of an ingredient and or diet is using apparent metabolizable energy (AME) and corrected to zero nitrogen retention (AMEn) in poultry. In the current study, 24 heads 13 days old broiler chickens were used and placed individually to a metabolic cage with feeder and water inside the cage and collection pan installed below the slatted floor for total collection of excreta. Three treatment diets were formulated: 1. Basal as control 2. Basal + 20 % azolla, and 3. Basal + 20% duckweed, fed to broiler chickens for a total of 10 days, 7 days adaptation and 3 days collection. Results revealed that soybean meal (SBM) have similar values on gross energy (GE), and AMEN to azolla, duckweed was lower. Azolla was significantly different than duckweed on GE, AME, and AMEN but with similar values on body weight gain, N gain and GE for N gain. This means that duckweed was more digestible than azolla despite of lower values on GE, AME, and AMEN but still inferior compared to SBM. Azolla can be used as an alternative feed source, while duckweed results need further studies for validation.

Keywords: GE, AME, AMEN, N gain, Azolla, Duckweed, Broiler chickens

Blue carbon stock of aquasilviculture-based agroforestry system in Infanta, Quezon, Philippines

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Aquasilviculture (AQS) is a type of coastal agroforestry system in which mangrove rehabilitation is integrated with aquaculture. Existing aquasilviculture knowledge is primarily concerned with its economic and social benefits. However, research on how aquasilviculture contributes to climate change mitigation efforts by quantifying its carbon (C) stock potential is still insufficient. The blue carbon stock of the four AQS within a Community-based Forest Management (CBFM) area in Infanta, Quezon was assessed. To calculate the total blue carbon stock of each AQS, the aboveground (or mangrove tree) biomass, root biomass, and sediment carbon stocks were measured. The results demonstrated that the aboveground biomass and root carbon stock of the four AQS differed significantly ($p<0.05$). AQS 4, adopted the peripheral/separate model type of AQS and dominated by *Rhizophora* sp., possessed significantly greater aboveground C stock (101.12 Mg ha^{-1}) and root C stock (48.05 Mg ha^{-1}). While the *Aegiceras* sp.-dominated AQS 3, which adopted the mixed model type, and with semi-intensive grow-out polyculture, had the highest total C sediment stock at 1,023 Mg ha^{-1}. Overall, AQS 4 had the highest total carbon stock, calculated at 1,141.47 Mg ha^{-1}. A large portion of the C stock potential of each AQS is derived from the sediment carbon pool, which can account for up to 87.5% of the total C pool, according to the results. Findings indicated that AQS contributes a substantial amount of total carbon stock comparable to that of a pure mangrove ecosystem. If valued, the blue carbon stock of the aquasilviculture systems ranged between Php 901,491.86 (USD 16,510.84) and Php 983,540.38 (USD 18,013.56). This can provide the People's Organization with additional income in addition to the income generated from their cultivation of aquatic species. Therefore, aquasilviculture system is a good climate mitigation strategy with socio-economic advantages.

Keywords: Agroforestry, Aquaculture, Mangroves, Community-Based Forest Management (CBFM)

Mycobiome in soils from irrigated, lowland rice-based farming systems in Apalit, Pampanga and Banaue, Ifugao, Philippines: Diversity and potential agro-biotechnological applications as determined by targeted metagenomics

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Mycobiomes of soils from two irrigated, lowland rice-based farming systems in the Philippines, one in Apalit, Pampanga and another in Banaue, Ifugao, were assessed and compared by targeted metagenomics. The different phyla identified in this study were: Aphelidiomycota, Ascomycota, Basidiomycota, Chytridiomycota, Entorrhizomycota, Glomeromycota Monoblepharomycota, Mortierellomycota, and Rozellomycota. All except Aphelidomycota were found in both sites. The most abundant fungal genera observed were: *Arnium*, *Fusarium*, *Neurospora*, *Talaromces*, unidentified Pleosporales (Ascomycota), *Saitozyma*, *Westerdykella*, Massariosphaeria, *Boothiomyces*, *Nakataea*, *Penicillium,* unidentified Sordariales (Ascomycota), unidentified Sordariomycetes (Ascomycota), unidentified (Rozellomycota), unidentified Chytridiomycota, and the unidentified fungal genus. These phyla and genera had varying relative abundances and dominance across rice cultivation stages in the sites. The Unidentified Fungal Phylum in the sites had sizeable abundances across rice cultivation stages in both sites that indicate its possible importance in the sites. Samples from Banaue, Ifugao had greater species richness and evenness compared to those from Apalit, Pampanga based on Chao1, Fisher, Shannon, and Simpson alpha diversity indices. The fungal diversities of both sites were different based on their weighted and unweighted Unifrac distances and PCoA ordination plot. Soil chemical characteristics did not correlate to fungal diversity collectively in each site but correlated well with specific taxonomic compositions at the phylum and genus levels. The uncovered composition and variation of mycobiomes of soils in these sites can help provide information for those seeking potential solutions to challenges faced in the sites and similar irrigated, rice-based farming systems.

Keywords: Soil mycobiome, Rice-based farming systems, Fungal diversity, Edaphic factors, Targeted metagenomics, Biotechnological applications

SESSION 5A ONSITE/ONLINE: FOOD SECURITY/SAFETY, FOOD SCIENCE AND POSTHARVEST TECHNOLOGY

Comparison of bioactive compounds and antioxidant potential of three floral honey of the Western Ghats and west coast of India

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This study was designed to assess the bioactive compounds and antioxidant potential of three floral honey samples obtained from the combs of honey bees *Apis dorsata, Apis indica* and *Trigona iridipennis* from the two locations of southwest India (west coast and the Western Ghats). Bioactive compounds assessed include total phenolics, tannins, flavonoids and vitamin C. Antioxidant potential evaluated were total antioxidant activity, reducing power, ferrous ion-chelating capacity and free radical-scavenging activity. Compared to the earlier study of the six honey samples of the Western Ghats, the current study showed higher content of total phenolics as well as flavonoids, also some of the Turkish honey samples of *A. indica* and *T. iridipennis*. Similarly, the reducing power of all the honey samples at 0.5 mg/ml of aqueous extract was significantly higher than the reducing power of five honey samples from Turkey. Honey samples of *A. dorsata* and *T. iridipennis* possess substantial antioxidant activity in the present study proving their ethnic or traditional uses for therapeutic purposes. Further investigation on the beneficial properties of the honey samples (medicinal, bopactive and nutritional) of the Western Ghats and its vicinity is warranted.

Keywords: *Apis dorsata, Apis indica,* Ferrous ion-chelating capacity, Flavonoids, Free radical-scavenging activity, Honeybees, Reducing power, Tannins, Total antioxidant activity, Total phenolics, *Trigona iridipennis,* Vitamin C

Product Development of Functional Beverage from Mangosteen Juice Supplemented with High Anti-inflammatory Activity Herbal Plants from Thailand

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In this study, the anti-inflammatory activity effect of eight Thai herbal plant extract were investigated using nitric oxide assay. Significant lowest IC_{50} was exhibited in Sappan wood(*Caesalpinia sappan* Linn) with the value 5.11±0.51 µg/ml. Therefore, this herbal plant was selected for further product development of mangosteen juice supplemented with high anti- inflammatory activities herbal plants. Best on the criterion used for selecting was amount of anti-inflammatory activities and the preference score acceptability. Mangosteen juice supplemented with 0.20%w/v Sappan wood extract was chosen in term of high nutritional value. Then, the futher formula of mangosteen beverage with high anti-inflammatory activities was improved by using Ratio Profile Test (RPT). Results revealed that the closest to an ideal formula contained mangosteen juice 55% w/v and 0.20%w/v Sappan wood extracted, which had potential antioxidant activity of 91.15 ± 0.47 DPPH %, total phenolic compound of 5.34± 0.34, tannin content 6.92± 0.27, anthocyanin content of 4.59± 0.53 being higher than the control formula. Interestingly, the low concentration of developed mangosteen beverage exhibited to be have higher toxicity to breast cancer cell (MDA-MB-231) than that of the control formula. This finding suggested that these developed functional mangosteen beverage could be served as a healthy alternative functional beverage for general consumers, especially adult and elderly in Thailand.

Keywords: Mangosteen, Herbal plants, Sappan wood, Product development

Phytochemical screening, antioxidant activity and total phenolic content of methanolic extract of Phak Wan Ton (*Crotalaria medicaginea* Lam.)

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Evaluation of biological activities, isolation and identification of natural bioactive compounds from plant materials are essential for drug research. *Crotalaria medicaginea Lam. commonly known in Thai as Phak Wan Ton,* is a folk medicinal plant belonging to the family Fabaceae which has not been previously reported for its biological activities. Therefore, the objectives of this study were to investigate the phytochemicals, antioxidant activity and total phenolic contents of *C. medicaginea*. The plant was collected from Suphanburi province, Thailand. The methanolic extracts were examined with chlorophyll removal and without chlorophyll removal for antioxidant activity and total phenolic content. Chlorophyll was removed from the methanolic extracts, only stems and leaves using palm oil by the liquid-liquid extraction method. The total chlorophyll contents without chlorophyll removal ranged from 2.492 to 6.255 mg/g, and with chlorophyll removal ranged from 0.480 to 0.893 mg/g. The highest total phenolic content using the Folin-Ciocalteu method was presented in leaves extract without chlorophyll removal as 48.333 mg GEA/ g extract. Moreover, the leaves extract without chlorophyll removal showed the highest antioxidant activity with 50% inhibitory concentration (IC_{50}) in DPPH radical scavenging assay at 344.755 µg/ml. The results showed that the extracts without chlorophyll removal had more efficiency than those with chlorophyll removal. Hence, the phytochemical screening was investigated only in the methanolic extract without chlorophyll removal. All extracts exhibited alkaloids and coumarin, while tannin and saponin were found only in roots and leaves. The current study suggests that the extracts of *C. medicaginea* have the potential source of natural bioactive compounds, which will be further studied in other biological activities.

Keywords: Antioxidant, Chlorophyll removal, *Crotalaria medicaginea*, Phytochemical, Total phenolic content

Bacterial cellulose production and application on a fat replacer on fat-reduced Chinese sausage

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Bacterial cellulose (BC) produced by *Acetobacter xylinum* TISTR 976 strain was used as a fat replacer in Chinese sausage and the properties of this product were investigated in the present study. The BC was prepared by fermentation with a coconut medium for 10 days. To remove bacterial cells, the purified BC was soaked in 1% (w/v) NaOH. The bacterial cellulose powder (BCP) was prepared by two methods including soaking in NaOH (M1) and grinding and soaking in NaOH (M2). The BC was neutralized, squeezed and kept in -20°C. The frozen BC were freeze dried at -50°C for 8 hours. The BC dried product was finally ground into fine powder (diameter 0.5 mm). The second method (M2) produced the better quality of BC by showing physical appearance, water holding capacity, oil holding capacity were not significant difference from commercial BCP. In addition, BCP-M2 presented non-cytotoxic effect to Vero cell by MTT cytotoxicity. BCP can be replaced for pork fat for Chinese sausage production. The fat contents of Chinese sausage were reduced significantly (1-2%) when BCP was incorporated into the Chinese sausage. Fiber contents were increased significantly in this product compared to those of control (containing no BCP and 24% fat). 1% BCP and control had the higher springiness scores than other samples. Textural hardness was significantly increased for BCP-added treatment. Moreover, the concentration of 1% BCP also increased acceptable sensory qualities. The product shelf life in the vacuum-package was studied at 4°C and room temperature (30±2°C) for 30 days. Thiobarbituric acid value was increased at room temperature. When it was stored at 4°C, there is a few changes of concentration of thiobarbituric acid. Bacterial pathogens were not detected in the samples. The result indicated that BCP could be used to replace fat in the production of Chinese sausage.

Keyword: Bacterial cellulose, Chinese sausage, Fat replacer

Effect of lactic acid bacteria powder on quality of fermented fish (Pla-Som) product

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The objective of this study was to optimize the spray drying condition in producing lactic acid bacteria starter powder for manufacturing fermented fish (Pla-som). The effects of different types of coating materials (rice flour and maltodextrin) and levels of their concentration (5, 7.5 and 10%) were investigated. The inlet and outlet temperatures of hot air were controlled at 140 °C and 70 °C, respectively. Encapsulated powder made from 10% of rice flour obtained the highest count of lactic acid bacteria (11.57 log CFU/g), whereas the microbial load in the powder made from10% of maltodextrin was 11.46 log CFU/g. Fermentation properties of encapsulated powder and sensory evaluation in fermented fish were subsequently studied. The results showed that the incorporation of 3% encapsulated powder provided the best quality compared to a control group such as a decrease in pH and the development of Pla-som flavor. Furthermore, encapsulated lactic acid bacteria was stored at 30 °C and 4 °C for 90 days. As a result, the viable counts were 6.07 and 9.38 log CFU/g, respectively.

Keywords: Fermented fish, Spray dry, Lactic acid bacteria, Coating material

Salmonella in Free-range Chickens: Pathology of subclinical persistent infection

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Persistent *Salmonella* infection in poultry often goes undetected owing to the asymptomatic nature of the illness. There is a problem with the carrier state as the pathogen is intermittently shed and becomes source of contamination in the free-range environment. This study detected *Salmonella* from cloacal swabs of apparently healthy Philippine native chickens using conventional culture and PCR assay. Tissue samples were collected at 10, 30, 120, and 150 days to examine histopathologic changes in the intestine, liver, spleen, and cecum through standard histopathological procedure. *Salmonella* was detected in 2.11% (5/237) and 8.04% (16/199) of the samples by culture method and PCR, respectively, with an overall detection rate of 8.86% (21/237). Major histopathological lesions consistent with *Salmonella* infection were observed in the liver and spleen at Days 10 through 150, and in the intestines at Days 120 through 150. Sinusoidal congestion (83.3%) and lymphoid hyperplasia (66.7%) were the most predominant lesions in the spleen persisting from Day 10 until Day 150. Cloudy swelling (40%) with cytoplasmic granulation and typhoid nodules (26.7%) were observed in the liver beginning Day 10. Cecal tonsil activation was observed at Day 10 while structural changes and infiltration of inflammatory cells in the submucosa were the major histopathological changes in the intestines throughout Day 150. *Salmonella* is a silent threat to public health in subclinical infections. Active surveillance and monitoring of this pathogen should be carried out continuously to improve detection and diagnosis. Sustainable and mitigating strategies should be designed for free-range poultry in order to control *Salmonella* and achieve food security and safety.

Keywords: Culture method, Detection, Histopathology, PCR

Inulin gel formation and its application in frozen plant-based squid

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The objectives of this research were to study the formation of inulin gel and its rheological properties and to develop frozen plant-based squid by adding inulin gel. The effect of long-chain inulin with three different concentrations at 20, 30, and 40 % (w/w) on the formation of inulin gel and rheological properties were investigated. The result showed that an increase in inulin concentration from 20 to 40% (w/w) significantly increased both elastic modulus (G') and viscous modulus (G''). All inulin-water suspension samples formed the homogenous texture and every the appearance of gel concentration specimens were changed from clear yellow solution to opaque white gel. The optimum preparation level of inulin gel was suggested to be 30% (w/w). In order to improve texture of plant-based squid, completely inulin gel was added to recipes. The finished products were kept in frozen condition (-18^{o}C). Texture profile analysis of cooked samples after freezing and thawing were measured. The results showed that the freezing point of both plant-based squids is -2.8 ^{o}C. Adding of inulin gel could improve the texture profile, exhibit the lower hardness and cohesiveness after thawing, and comparable with commercial vegan squid.

Keywords: Freeze-thaw, Inulin gel, Plant-based, Squid

Performance testing of the tandem hybrid solar-biomass dryer for coffee cherry drying

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This study investigated the dryer specially designed for drying coffee cherries which consisted of front and rear drying chambers each equipped with 10 racks arranged on 5 levels. The front drying chamber operated with solar heat and combustion heat from the furnace while the rear drying chamber operated with heat from the flue gases of the furnace chimney. The dryer was tested by turning on the furnace with firewood with an initial supply of 5 kg and a follow-up supply of 4 kg every 20 minutes to dry coffee cherries with a bed thickness of 3, 6, 9, and 12 cm. The experimental results indicated that the temperature, relative humidity, and chimney air velocity of the front drying chamber were 59.8(±6.3)^{o}C, 27.5.6(±13.0)%, and 1.3(±0.44)m/s while the temperature, relative humidity and chimney air velocity of the rear drying chamber were 57.1(± 6.1)^{o}C,73.0(±8.8)%, and 0.35(±0.07)m/s with the referent ambient temperature and relative humidity were 30.4(±2.1)^{o}C and 73.8(±9.9)%. The moisture content of the coffee cherries decreased drying time following a sigmoid-shaped curve model for all cherry samples of the bed thicknesses in both drying chambers. The coffee cherry drying process for the front drying chamber was faster than that of the rear drying chamber. The time to complete the drying process marked by the green bean maximum moisture content of 12% for the bed thicknesses of 3, 6, 9 and 12 cm were 58.7 h, 62.3 h, 73.8 h, and 86.9 h respectively for the cherry samples in the front drying chamber and 71.0 h, 80.8 h, 88.7 h and 91.4 h for the cherry samples in the rear drying chamber suggesting that the dryer needed to be further explored for a wider range of drying temperature, cherry bed thicknesses, and the resulting coffee beans quality high enough leading to adoption by the users.

Keywords: Bed thickness, Drying time, Moisture content, Temperature, Velocity

Sensitivity of genotypes of eggplant (*Solanum melongena* L.) to sodium chloride

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The decline in Indonesia's eggplant production is caused by many factors, one of which is the limited optimal land area. This fact shows that it is necessary to expand the planting area by utilizing sub-optimal lands. The coastal agricultural lands have a limiting factor, namely high salt content. The high salt content can cause abnormal plant growth and development. One solution that could be done planting varieties tolerant to salinity stress. Improving varieties of eggplant that are adaptive and high-yield in environment saline is necessary. This study aimed to obtain the lethal concentration (LC_{50}) on genotypes of eggplant tested. The experiment was arranged in a randomized complete block design with two factors and three replications. The first factor was the genotypes of eggplant. The second factor was the concentration of NaCl which consisted of 4 treatment levels, 0 ppm, 6000 ppm, 12000 ppm, and 18000 ppm. Observed variables were percentage of lethal, plant height, the number of leaves, leaf greenness, length of root, fresh weight and shoot dry weight. The collected data were analyzed statistically by analysis of variance and curve expert. The result showed that the value LC_{50} for the genotype G1 (Local variety) was 6542.22 ppm. The value LC_{50} for the genotype G2 (Hamas) was 2452.15 ppm. The value LC_{50} for the genotype G3 (F1 EPA 18174) was 2188.19 ppm. The value LC_{50} for the genotype G4 (F1 TM Spartan) was 7019.65 ppm. The response pattern of the four eggplant genotypes to salinity stress was a polynomial fit. The tolerance limit of eggplant to salt was at a salt concentration of 6000 ppm. The genotype G4 (F1 TM Spartan) was the most salinity tolerant genotype.

Keywords: Coastal agricultural lands, Lethal concentration, Salinity, Salt, Seedling

Effect of different salinity stress on seedling growth in long bean (*Vigna sinensis*) genotypes

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Coastal land has a high concentration of soluble salts. The ability of the roots to absorb water and nutrients is restricted by the accumulation of salt content. Plant toxicity increases with increasing salt levels in the soil. The use of high-yielding long bean cultivars that are tolerant to salinity stress has the potential to be developed in coastal areas. The most important prerequisite for the production of high-yielding cultivars is the genetic diversity of the germplasm. There are several long bean genotypes has not been characterized for salinity tolerance. The lethal concentration 50 (Lc 50) is a parameter to measure the sensitivity of plants to salinity. The objective of this study was to observe the sensitivity of long bean genotypes and determine LC50. A factorial randomized block design with three replications wa used where the first factor was genotypes of long beans and the second factor was salinity concentration (0 mM, 70 mM, 140 mM, 210 mM). The results showed the LC50 of the long bean genotypes was found to range between 93 mM to 210 mM. The genotypes Metro super, Salsa, Branjangan, and Pujangga 2 showed better growth performance.

Keywords: Lethal concentration, Salt, Tolerant

Oxidative stability of *Iresine herbstii* extract-containing coconut oil during storage

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Virgin coconut oil was used as green solvent for the extraction of total phenolics from *I. herbstii* (*I. herbstii*: coconut oil, 1:10 (w/w)). *I. herbstii* extract-containing coconut oil (ECC) had dark red in color. Acid value (AV), peroxide value (PV), thiobarbituric acid-reactive substances (TBARS), ρ-anisidine value and volatile compounds were taken as parameters for evaluation of oxidative stability of EEC sample. All parameters of EEC sample were lowered, in comparison with the control sample during storage for 7 weeks. ECC sample produced less TBARS value than the control ($p<0.05$). Abundance of volatile compounds in all samples correlated well with the TBARS value. Results reveal the use of coconut oil as green solvent for extraction of bioactive compounds and natural red pigment from *I. herbstii*, where *I. herbstii* as antioxidant to prevent lipid oxidation in vegetable oil.

Keywords: *Iresine herbstii*, Green extraction, Oxidation, Storage, Coconut oil

Drying characteristics of coffee beans using YSD-UNIB18 hybrid dryer based on thin-layer drying kinetics fitting models

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The YSD-UNIB's drying chamber temperature and relative humidity fluctuated changed due to the influence of the temperature of the heat exchanger and water. The temperature of YSD-UNIB18's drying chamber was 38.3-78.6℃, averaging 61.5℃. It reached two times higher than the ambient temperature. The relative humidity of YSD-UNIB18's drying chamber was 10-55%, averaging 17.5%. It reached 3-5 times lower than the relative ambient humidity. The moisture content was 60-65%wb, which then reduced until it reached ≤12%. For every increase of 2 cm of coffee thickness , the drying time average increased by 25-30%. YSD-UNIB18 dried the coffee bean until 33-72 hours for dry-processed coffee and 39-77 hours for semi-washed processed coffee. The drying rate increased in the first 10 hours and then decreased in the next 10 hours. For every 2 cm of coffee thickness increase, the drying rate decreased by 20-25%. The range of R^2 for Newton, Page, and Henderson-Pabis models were 0.9696-0.9893, 0.9757-0.9897, and 0.9596-0.9880, respectively. The range of RMSE for Newton, Page, and Henderson-Pabis models were 0.0315-0.0527, 0.0017-0.0996, and 0.0003-0.0743, respectively. All of the P value of X^2 for all three models was 1. All three models can describe the behavior of moisture ratio during the coffee bean drying process using YSD-UNIB18. The range of Deff values was from 10.53 x 10-8 m²/s to 1.15 x 10-8 m²/s. For every 2 cm, the Deff increased 2-3 times higher. The highest value was 59.65 at the thickness of 12 cm from the dry-processed coffee. In contrast, the lowest value was 23.63 at the thickness of 4 cm from the semi-washed processed coffee. The ANOVA analysis shows that the thickness of coffee during the drying process influenced the number of defects ($p<0.05$).

Keywords: Dry-processed; Effective diffusivity; Henderson-Pabis; Newton; Page; Semi-washed processed

Development of food products from spent laying hens meat for adding economic value for small farmers

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Using low-value raw materials to develop products to create identity leads to the creation of the concept of the prototype product.. A case study was done on physical quality, chemical and biological including consumer acceptance testing to communicate with consumers in marketing, maintaining product position and expanding market to increase future product sales. The experiments were divided into 2 namely: effect of pineapple juice in combination with a salt solution on the nutritional characteristics of spent laying hens meat (1),a) the meat of the hens was marinated in the pineapple - salt solution in ratio of 0:0, 25:75 and 50:50, b) consumer acceptance of food products from spent laying hens meat , the satisfaction level of 4 Thai food recipes was studied (meatballs, meat loaf, grilled and shredded chicken) testing laid out in completely randomized design (CRD) experiment. The results of physical and biological properties showed that value of pH, shear force and total bacteria with decreases, while the lightness, hue angle and hardness higher was in groups of the hens that was marinated in the pineapple - salt solution with a ratio of 25:75 and 50:50, with statistical significance ($P < 0.05$).This is an important feature in the selection for processing. However, the consumer acceptance of appearance, color, smell, texture, taste and overall score of food products from meat spent laying hens found that grilled chicken food products was at the favorable acceptance like (4.44-5.29), while meatballs, meat loaf and shredded chicken, consumer acceptance at a very like (5.30-6.15). Assessing production costs showed that cost of spent laying hen is 20.56-24.66 baht/kilogram which is lower than that of broilers.

Keywords: Spent laying hens, Food products, Pineapple juice, Salt solution and Consumer acceptance

Effects of low-temperature long-time cooking conditions on the quality of sous-vide cooked pork loin and ham

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One of the most common methods of improving meat quality is using a modern, minimal processing technique known as sous-vide cooking. This method uses a temperature of 50-80°C and a longer time. This study described the influence of different lower temperatures (55, 59, 63, and 67°C) for a longer time (12 h) compared to traditional cooking (TC; 80°C for 20 min) on sous-vide cooked pork loin (*Longissimus dorsi*, LD) and ham (*Semimembranosus*, SM). The meat pH, a*b*C* colors, and browning index (BI) were lower, and the L*h* colors, cooking loss (CL), and longitudinal shrinkage (LS) were more remarkable in the LD samples. Cooking at 67°C increased the colors of b*C* h*. Samples cooked at 63-67°C had greater shear force (WBSF) and work of shear (WS) like TC-cooked meat, indicating a tougher meat. Almost all textural profile analyses (TPA) showed an interaction between muscle type and cooking temperature. The hardness, springiness, gumminess, and chewiness values were the lowest in SM samples cooked at 55°C. SM meats look darker, have high moisture, and have lower shrinkage than LD samples. Lower-temperature sous-vide cooking helped maintain water and tenderize pork.

Keywords: Sous-vide, Meat quality, Tenderness, Pork

Development of gluten-free and soy-free plant-based chicken meat from young jackfruit

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Nowadays plant-based meats are mostly made from soy products such as tofu, and often contains gluten, which people who have allergic to soy or gluten will not be able to eat. Thisstudy aimed to develop gluten-free and soy-free plant-based chicken meat from young jackfruit. Three levels of pea protein to water (1:0, 1:1, and 1:2 by weight) were investigated to determine the optimal ratio. It was found that as the water content increased, the hardness and chewiness of the plant-based chicken meat decreased. The redness(a*) and yellowness (b*) values decreased while the brightness (L*) was increased. Afterward, the ratios between young jackfruit: hydrated pea protein isolate at 3 different levels (50:25, 55:20, 60:15 by weight) were evaluated. It was shown that when the ratio of young jackfruit increased, the hardness and chewiness decreased. The a* value decreased while the values of L* and b* increased. The mixture of Benecel MX (BM) (20%, 30%, 40%) and Transglutaminase (TG) (0%, 0.15%, 0.3%) were investigated to determine the suitable level for texture enhancement. The hardness and chewiness were significantly increased with an increasing amount of BM ($p < 0.05$), The L* increased as BM content increased, whereas a* and b* decreased. The hardness and chewiness also increased as TG increased, except for the 0.3% by weight. From the texture properties, the four formulas out of nine were selected, based on different group of texture characteristics, for sensory evaluation using the 9-Point Hedonic Scale method. The results revealed that 40% BM without TG received the highest overall acceptability score. Therefore, this formulation was chosen to determine nutrition contents. In 100 g of plant-based chicken meat, it contains 72.4 g of moisture, 7.29 g fat, 8 g of protein, 1.67 g of ash and 10.6 g of total carbohydrate.

Keywords: Plant-based meat, Chicken, Gluten-free, Soy-free, Young jackfruit

The application of high-pressure processing in reduced sodium chloride and phosphate Kai-yor (Thai chicken sausage)

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This research investigated the effects of high-pressure processing (HPP) with sodium chloride (NaCl) and phosphate reduction on emulsion stability, pH, color, and texture in Kai-yor (Thai chicken sausage). A 2×3×3 factorial design was established associated with two pressure levels (0.1 and 300 MPa), three NaCl levels (0.5, 0.75, and 1.0%) and three phosphate levels (0, 0.1, and 0.2%). The resulte showed that decreasing NaCl and phosphate levels, particularly at 0.5% NaCl and 0% phosphate under high pressure, had an impact on the emulsion stability and cooking loss of sausages. Emulsion stability was not affected by HPP significantly ($p>0.05$), whereas cooking loss significantly ($p\leq0.05$) increased when treated at 300 MPa. The pH value of the sausage was not significantly impacted by NaCl or HPP ($p>0.05$). However, high levels of phosphate gave the high pH value in sausage. The lightness (L*) and redness (a*) of sausage were not significantly ($p\leq0.05$) affected by HPP. Additionally, the lightness decreased with the reduction of NaCl and phosphate, while the redness and yellowness (b*) increased. Texture profile analysis indicated the hardness, springiness, cohesiveness, and chewiness were improved by high pressure. Chicken sausage with 0.75% NaCl and 0.1% phosphate at 300 MPa had not significantly different ($p>0.05$) in the hardness, springiness, and cohesiveness compared to the control (1% NaCl and 0.2% phosphate at 0.1 MPa).

Keywords: Chicken sausage, Emulsion stability, High pressure processing, Phosphate, Sodium chloride

Bioactive compounds anti-hyperglycemic anti-oxidation of (*Antidesma thwaitesianum* Müll. Arg.) crude extracted

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Mao Luang (*Antidesma thwaitesianum* Müll. Arg.) is highly nutritious and rich in phytochemicals. This study aimed to determine the α-glucosidase inhibitory activities that affect high blood sugar conditions and to determine the antioxidant and antimicrobial activity of coarse extract of five Mao Luang cultivars grown in Sakon Nakhon Province, including Kam Lai (T1), Sang Koh 2 (T2), Fah Prathan (T3), Phu Song (T4) and Phu Phan Thong (T5). Different plant parts including leaves, flowers, immature green fruits, mature red fruits, ripe black fruits and seeds were studied. The results revealed that the ethanol crude extracts from leaves and flowers had high bioactive substances in Sang Koh 2, Phu Phan Thong and Kam Lai, respectively. The high content of bioactive substances was found in the flavonoids include (-) - epicatechin (+) - catechin, for phenolic acids group including gallic acid and chlorogenic acid. Relationship between bioactive substances with the inhibition of the α-glucosidase, antioxidant. It was found that the inhibition of the α-glucosidase to be positively and significantly associated with (-)-epicatechin, (+)-catechin, gallic acid and chlorogenic acid. This affects the reduction of sugar levels in the bloodstream after eating of diabetics in addition to antioxidants. Therefore, the part of the leaves and the flower of Mao Luang cv. Sang Koh 2, Phu Phan Thong and Kam Lai have the potential to be developed further to create added value and product from local resource crops as economic crops.

Keywords: Mao Luang (*Antidesma bunuis* L.), Phytochemicals, Alpha-glucosidase

Effect of electron beam irradiation on the physicochemical properties of jackfruit seed flour

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Jackfruit seeds are a good source of important nutrients, including resistant starch, protein, thiamine, riboflavin, and antioxidants. Election beam radiation technology applied to foods is growing progressively to improve their preservation, storage, and physical properties. The effect of electron beam irradiation on the physicochemical characteristics of jackfruit seed flour was investigated. Jackfruit seed flour, which is a good source of important nutrients, was applied 4 conditions at doses of 0, 2, 4, and 6 kGy of the electron beam, respectively. SEM studies were performed on electron beam radiated jackfruit seed flour for evaluation of structural changes. Some of the starch granules were destroyed by electron beam irradiation, and the breakage was much greater at a higher dose. The result showed that jackfruit seed flour displayed a type C crystal structure after being irradiated. Pasting properties (Peak, Breakdown, Holding, Final and Set-back Viscosities) decreased considerably with increasing irradiation dose. The final viscosity of jackfruit seed flour with electron irradiation intensity at 2 KGy, 4 KGy, and 6 KGy was 614, 521, and 348 RVU, respectively. Furthermore, electron irradiated flour showed a decreasing trend in syneresis (%) was observed with increasing irradiation dose in jackfruit seed flour.

Keywords: Jackfruit seed flour, Electron beam irradiation, Physicochemical properties, Pasting properties syneresis

The degradation ability of pickled ginger by *Enterobacter cloacae* and it's inactivation with different oxidizing agent treatments

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Deterioration of pickled ginger (ginger tip is soft and messy) during pickling process by *Enterobacter cloacae*, resulting in the lost of pickled ginger approximately 12%, or about 1,000 tons per year. To find the *E. cloacae* control measures, the objectives of this research were to optimize the oxidizing agent treatments (sodium hypochlorite: NaOCl, acidic electrolyze water: AcEW and ozonated water: O_3) in order to reduce *E. cloacae* vegetative cell. The results revealed that *E. cloacae* had ability to digest ginger structural tissue (cellulose) by pectinase enzyme. Consequently, the structure was destroyed and the texture of pickled ginger was changed considerably. However, using of 200 ppm NaOCl for 30 min was the best condition to inactivate *E. cloacae*. The initial load of bacteria was reduced from 10.1 log CFU/ml to only 2.8 log CFU/ml. The results of this study could be used to improve the process of pickling ginger especially in steps of raw materials and the pickling pond cleaning.

Keywords: Pickled ginger, *Enterobacter cloacae*, Sodium hypochlorite, Acidic electrolyze water

SESSION 5B ONLINE: FOOD SECURITY/SAFETY, FOOD SCIENCE AND POSTHARVEST TECHNOLOGY

Effect of sodium chloride and sugar reduction on the quality of ready-to-eat- healthy Chinese fish sausage

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The replacement of sodium chloride with potassium chloride in the ratio of 50:50 was not found to affect the physical properties in the term of hardness and toughness but significantly reduced the free water content of product. The acceptability sensorial score of 50% sodium chloride replaced with potassium chloride was 7.41±0.84 which indicated that the panelists like the sample very much. For the replacement of sugar by using sweeteners experiment, it was found that the use of maltitol and adjustment the sweetness by using sucralose were able to replace 100 % of sugar and showed the most comparable quality to control sample without affecting the sensorial quality. For the final product, total microorganism found was <10 CFU/g, *Staphylococcus aureus* < 10 CFU/g, *Salmonella* spp. and *Esherichia coli* was not found. The microbiological quality of product had met Thai community product standard of dried fish sausage product (TPCS107/2555). The ready-to-eat- healthy Chinese fish sausage has 25.24% lower sodium content than control formula and sugar content was not detected in 100 g sample.

Keywords: Fish sausage, Potassium chloride, Sodium chloride, Sweetener

Potential of chili extract and emulsified chili extract liposome as an antimicrobial against *Escherichia coli* O157:H7

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Crude chili extract, prepared by soxhlet extraction using 95% ethanol as solvent was test as antimicrobial activity against *Escherichia coli* O157:H7. The Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) were determined by Macro-broth dilution assay. Time killing analysis were also evaluated. The results demonstrated that the MIC ranged from 6.0-14.0 %w/v and MBC ranged from 8.0-25.0 %w/v. According to the Time killing analysis the results indicated that the completed destruction phenomenon was detected within 30 min at the concentration of 5.0%w/v. The antimicrobial of chili extract was decreased when the interfering substances was presented. Thin film hydration method was applied to encapsulate chili extract within liposome. The antimicrobial potential was investigated. MIC value of liposome was ranged from 4.5-7.8 %w/v and MBC value was ranged from 6.9-11.7 %w/v. The complete destruction was detected within 30 min with chili extractconcentration of 6.0 %w/v in liposome. Interfering substances also interrupted the antimicrobial susceptibility of chili extract liposome.

Keywords: Chili Extract, Liposome, *Escherichia coli* O157:H7

Comparison of fermentation behaviors and properties of Naem-Hed supplemented with vegetables by spontaneous and controlled lactic acid fermentations

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Lactic acid bacteria (LAB) are widely studied microorganisms among the various fermentation processes as having a positive impact on unique sensory characteristics to food products and growth inhibition of pathogens. This study described the application of *Lactobacillus plantarum* compared with spontaneous fermentation to ferment Naem-Hed and Naem-Hed supplemented with vegetables. The LAB growth kinetics, chemical characteristics and sensory evaluation were investigated. Acid production and LAB growth in each sample varied with the use of different fermentation protocols. Enhancement of bioactive properties was observed in supplementation of vegetables. Sensory evaluation of the fermented samples revealed that samples from Naem-Hed supplemented with vegetables featured a highly intense 'appearance', 'color', 'flavor' and 'overall preference' attributes. The possibility of using *L. plantarum* as a starter with vegetable supplementation as a new effective fermentation strategy to improve the production of Naem-Hed was demonstrated .

Keywords: Lactic acid fermentation, Spontaneous fermentation, Fermented mushroom, Naem-Hed

A Causal relationships model of promoting food security among rice-farming households in Nakhon Nayok Province, Thailand

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The objectives of this research were to 1) study the level of food security and approach for promoting food security among rice-farming households, 2) investigate factors affecting food security and construct a causal relationship model of promoting food security among rice-farming households. The area of this study was in Pak Phli District, Nakhon Nayok Province, Thailand. The questionnaire was used to collect data from 381 rice farmers who registered farming within the Pak Phli District Agricultural Office. Data were analyzed by using descriptive statistics, regression analysis, and a structured equation model. The results revealed that the overall food security of the rice-farming household level and the approach to promoting food security among rice-farming households had the highest level at 91.46% and 84.48%, respectively. The regression analysis pointed out that two factors significantly affected food security in rice-farming households were non-farm income and household debt. The finding showed that non-farm income had a positive effect on household food security whereas household debt was found to be negatively correlated with household food security. The structural equation model analysis indicated the approaches to promoting food security in farm households relates to building an understanding within the household, adopting a self-sufficiency philosophy, enhancing social support, and having a supplementary work.

Keywords: Promoting food security, Farmers' household, Nakhon Nayok province, SEM

Antimicrobial activity of liposome-encapsulated (S)-(-)-Limonene, Geraniol, Nisin, and Natamycin against *Escherichia coli* O157:H7

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This research aimed to study the antimicrobial activity of liposome-encapsulated (S)-(-)-Limonene, Geraniol, Nisin, and Natamycin against *Escherichia coli* O157:H7. The essential oils with Nisin and Natamycin were encapsulated by a thin film hydration technique using cholesterol and phosphatidylcholine. The particle sizes and zeta potential of liposome-encapsulated essential oils with Nisin and Natamycin were measured by dynamic light scattering which was 262.6 nm and -32.1 mV, respectively. The antimicrobial activity of essential oils with Nisin and Natamycin in liposomes showed that The MIC of (S)-(-)-Limonene, Geraniol, Nisin, and Natamycin were 1,062.5, 43.75, 0.5, and 1,087.5 mg/L, respectively. The MBC were 2,125, 87.5, 1, and 2,175 mg/L, respectively. In addition, a Time-kill analysis of liposomes without interfering substances showed that the concentrations of liposome-encapsulated essential oils with nisin and natamycin at 20, 40, and 50%v/v liposomes resulted in more than a 6 log reduction in CFU/mL of *E. coli* O157:H7 within 6 h., whereas liposomes under different sodium chloride concentrations (1, 1.5 and 3%w/v NaCl) and at different pH conditions (pH3, 4.5 and 7) showed 50% liposomes resulted in more than a 6 log reduction CFU/mL of *E. coli* O157:H7 within 6 h.

Keywords: Liposomes, Essential oils, Nisin, Natamycin, Antimicrobial

Effect of Nan golden orange juice on manufacturing process and characterization of processed cheese during storage

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The objectives of this study were to produce functional processed cheese with Nan golden (NG) orange juice and to investigate effects of NG orange juice on production and characterization of orange-cheese during storage. Four soft cheeses were produced by adding citric acid solution, rennet, a combination of citric and rennet, and NG orange juice. The result showed that separately acidified with citric acid solution presented a soft set curd and had the highest yield of 72.00$\pm$1.53%. The prepared soft cheese was then mixed with milk and butter to produce the cheese blend. NG orange juice was fortified with different ratios (0,10,20,30,40 and 50%) to cheese blend. It was found that NG orange juice was able added up to 50%. The appearance of NG orange juice-cheese blend was uniformly with yellow-orange tone color. Corn starch (5,10 and 15%) was added to make a firmer texture. An increase of corn starch could cause higher hardness and lower springiness values ($p<0.05$). The optimized addition of corn starch was 5 % as it created a smooth surface. The improvement of processed cheese texture was studied by using carrageenan (0,0.6,0.8,1 and 1.2%). It was found that the use of carrageenan at 0.8% improved the hardness, cohesiveness, gumminess and chewiness of product. The NG orange juice-cheese can be stored at 4^{o}C for 14 days without microbial qualities changes.

Keywords: Carrageenan, Cheese, Citric acid, Orange

The effect of black rice bran oil on color appearance, lipid oxidation, antioxidant activity, and microbial growth of fresh ground beef patties during refrigerated storage

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The objective of this study was to determine the ability of black rice bran oil (RBO) to extend the shelf life and quality of fresh ground beef patties. The beef samples were treated with four different concentrations of RBO (0%, 0.2%, 0.4%, and 0.8% [v/w]). The ground beef patties were packaged in polyvinyl chloride (PVC) and kept in cold storage at 2 – 4°C. pH, color appearance, lipid oxidation, antioxidant activity, and aerobic plate count were determined on 0, 3, and 6 days of storage. The result found that adding RBO did not affect pH ($P>0.05$). The microbial population and lipid oxidation value in all groups increased in all samples following the storage time up to 6 days. However, the beef sample addition with 0.4% RBO decreased lipid oxidation compared with the control group and reduced the microbial population counts after 6 days ($P<0.01$). These results suggested that RBO could be used as a natural bio-preservative in ground beef to improve shelf-life.

Keywords: Beef patties, Black rice bran oil, Color appearance, Lipid oxidation

Impact of Sodium citrate, EDTA and ethylene glycol as the H_2O_2 stabilization for anti-listeria efficiency

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Hydrogen peroxide (H_2O_2) is a chemical widely used as a antimicrobial agent in food indrustry. Because of H_2O_2 is strong oxidizing agent and decomposes easily, also called as an unstable chemical. In this study , hydrogel was used for enhanched H_2O_2 stability and their anti-listeria activity . For the result, a 1.0-2.0% (w/v) H_2O_2 absorded with hydrogel showed a higher H_2O_2 remaing than 1.0-2.0% (w/v) H_2O_2 solution when stored at 48 h. For anti-listeria acitivity, the hydrogel with 1% (w/v) H_2O_2 showed an antilistirial clear zone on the TSA-YE agar but the 1% (w/v) solution still found the survival of *L. monocytogenes* cells. In addition, a hydrogel with H_2O_2 was used for inhibiting a *L. monocytogenes* contaminated milk on 304 stainless steel model. The results demonstrated that hydrogel cloud can stabilze hydrogen peroxide and their anti-listeria activity.

Keywords: Hydrogen peroxide, Hydrogel, *Listeria monocytogenes*, 304 Stainless steel

Nutritional Content evaluation of traditional food recipes consumed by ethnic communities of Tai Dum in Loei, Thailand

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Food is a necessity of life. In the era of emerging diseases, it is necessary to search for more healthy food. This research aimed to evaluate various nutritional content of traditional food recipes consumed by ethnic communities of Tai Dum in Loei, Thailand. Participatory action research was applied to Tai Dum ethnic community in Loei, Thailand. Data was collected from key informants; local food experts and housewives through in-depth interviews and programmatic nutrition analysis with INMUCAL-Nutrient V3. The results showed that the traditional food of the Tai Dum ethnicity has a unique identity. There were 30 recipes divided into 6 categories, namely curry, grilled, spicy salad, Homok, chili paste, and dessert, respectively. There were 4-5 recipes in 1 deck, with sticky rice as the main food. 80% of the food ingredients were local herbs and vegetables sourced, and another 20 percent were meat, fish, chickens, eggs, insects, and small animals. Distinctive features of curry dishes include a variety of herbs. Nutritional content analysis results in recipes with the highest energy and nutrients in 3 or more aspects in each category: 1) Catfish Salad with the energy of 166.17 kcal, 10.53 g fat, and 12.01 g protein. 2) "Oh Pla" provides the energy of 136.11 kcal, 3.68 g fat, and 18.73 g protein and 3) "Ua Dok Mak U" provides 6.68 grams of carbohydrates, 38.11 RAE, vitamin A, 13.14 milligrams of vitamin C, and 0.72 grams of dietary fiber. The findings revealed that the Tai Dum recipe had a high overall nutritional content, suitable for eating as an immune-boosting drug for a healthy life, preventing emerging diseases and the environmental community should be preserved to obtain high-value food.

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Keywords: Tradintional food recipes, Nutritional content, Tai Dum ethnic, Loei province

SESSION 6A ONSITE/ONLINE: PLANT SCIENCES AND PEST MANAGEMENT

Next-generation technology approaches in plant development

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One of the most interesting and significant groups of organisms on Earth are plants. They provide food, influence our environment, and act as a conduit for energy into the biosphere. Applying the most cutting-edge technologies to the study of plant life will help us advance our understanding of how these vital organisms work and build the foundation for a more sustainable future. Modern farms and agricultural operations work far differently than those a few decades ago, primarily because of advancements in technology, including sensors, devices, machines, and information technology. The agriculture industry has radically transformed over the past 50 years. Advances in machinery have expanded the scale, speed, and productivity of farm equipment, leading to more efficient cultivation of more land. Seed, irrigation, and fertilizers also have vastly improved, helping farmers increase yields. Now, agriculture is in the early days of yet another revolution, at the heart of which lie data and connectivity. Today's agriculture routinely uses sophisticated methods and technologies such as robots, bioprinting, gene stacking and GPS technology. These advanced devices and precision agriculture allow businesses to be more profitable, efficient, safer and more environmentally friendly. Innovation in agriculture is leading an evolution in agricultural practices, thereby reducing losses and increasing efficiency. This is positively impacting farmers. Use of digital and analytic tools is driving continuous improvement in agriculture. Artificial intelligence, CRISPR/Cas 9, Nanobionics, Vertical farming, Space gardening and other emerging technologies could further improve the efficiency of water and other inputs, and build sustainability and resilience across crop cultivation.

Keywords: Agriculture, Artificial intelligence, Space gardening, CRISPR/Cas 9 and Vertical farming

The expertise/insights on plant and pest management through the application of host resistance and genomics technologies including genome editing

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Fungicide resistance of *Phytophthora palmivora* causing durian diseases in eastern and southern Thailand and the *in vitro* alternative control by cajeput leaf extracts

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At present, the threat of fungicide resistance has been rising and resulting in the loss of fungicide effectiveness. This research was carried out to determine the emerging fungicide resistance in populations of *Phytophthora* sp. causing durian disease in the eastern and southern areas of Thailand. Subsequently, the *in vitro* evaluation of a possible alternative control on fungicide cross-resistance *Phytophthora* isolates was

made using cajeput extract. A total of 40 isolates were collected from fruit, stem, and root rot symptomatic tissues of durian and identified as *Phytophthora palmivora*. Then, their pathogenicity were confirmed on the detached durian leaf test. Our results confirmed the existing of fungicide resistance in *Phytophthora* spp. in the above-mentioned survey areas. Twenty-four, 25 and 40 of 40 collected isolates were revealed to be resistant to metalaxyl (at EC_{50} >100 mg/L), mancozeb (at EC_{50} >100 mg/L) and fosetyl-al (at EC_{50} >1000 mg/L), respectively. Interestingly, 20 of 40 isolates showed cross-resistance to the 3 tested fungicides, thereby selecting for the *in vitro* evaluation of cajeput extract effect. Moreover, mapping between the survey areas and all *Phytophthora* isolates with the resistant levels to the 3 tested fungicides was depicted. Lower than expected, only 9 out of 20 fungicide cross-resistance isolates were shown to be significantly sensitive to the tested cajeput extract based on paper disc assay. Further tests should be conducted to obtain definite positive scientific evidence of cajeput extract to support as alternative control uses.

Keywords: Fungicide resistance, *Phytophthora palmivora*, Cajeput extract, Durian rot disease, Alternative control

Effects of paclobutrazol on flowering of juvenile durian trees cv. 'Monthong' and its costs and returns of production

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Application of paclobutrazol 25% WP with foliar spray at 750 ppm or 60 ml/20 L water/tree on juvenile durian trees cv. 'Monthong' in treatment December5 (paclobutrazol application on December 5, 2020) had a significant effect in enhancing flower bud emergence duration faster by 7 days than in treatment November5 (paclobutrazol application on November 5, 2020). However, both treatments (November5 and December5) had a very high percentage of flowering ranged from 93.6-97% after flower induction. Application of paclobutrazol in treatment December5 contributed to having a high number of flowered branches per tree, high fruit number per tree, high fruit weight per tree and consequently high yield compared with treatment November5, except one-fruit weight. Although this value was not a significant parameter to determine the high yield. Through stepwise multiple regression analysis, the fruit weight per tree had the most significant influence on yield. The positive coefficient value indicates that by increasing fruit weight per tree, yield also increases. The gross cost of production in both treatments was not significantly different. But, the gross rate of return derived from treatment December5 was significantly higher than from treatment November5. Treatment December 5 contributed to having mature fruits harvested at the peak season in June, which obtained the selling price higher than treatment November 5 where mature durian fruits harvested at the middle season in May. Therefore, flowering induced by paclobutrazol in treatment December 5 on the juvenile trees of durian cv. 'Monthong' was better than in treatment November 5. This accounted for treatment December 5 having a high net profit as indicated by the value of benefit-cost ratio that was greater than 1 suggesting that this treatment can deliver a positive net present value to the producers of the juvenile durian trees and its investors rather than in treatment November 5.

Keywords: Benefit-cost ratio, Durian, Flowering, Growth retardant, Juvenile

Effects of urea and sunn hemp on nitrogen use efficiency and physiological traits related to Japonica rice yield

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Because of their ability to fix air nitrogen, legumes represent an alternative green manure to supply nutrients, substitute or complement mineral fertilizer in cropping systems. Sunn hemp (*Crotalaria juncea* L.) is one of several legumes that has potential to be used as green manure in Japonica rice production system. Nitrogen sources were significantly different ($P \leq 0.01$) for nitrogen use efficiency (NUE), tiller number, leaf area (LAI), crop growth rate (CGR), biomass, grain yield of Japonica rice (DOA1). Sunn hemp alone had NUE, tiller number, LAI, CGR, biomass and grain yield higher than urea alone. There were inter-relationships among tiller number, LAI, CGR, NUE, NUE for grain yield (NUEg), biomass and grain yield, and the correlation coefficients (r) were in the range between 0.65 and 1.00. Indicating that application of sunn hemp as green manure can promote growth and yield of Japonica rice and can be a good choice for supplying nitrogen in Japonica rice production.

Keywords: Leaf area index, Crop growth rate, Organic fertilizer, *Oryza sativa* L.

Growth and yield performance of Bambara groundnut advanced line and introduced accessions grown in the rainy season in the South of Thailand

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Bambara groundnut (*Vigna subterranean* L.) is a cash crop grown in intercropping system with rubber trees in newly established plantations. Only late maturing varieties are available in Bambara production in Thailand, and early maturing varieties, which are more suitable for many cropping systems, are required. TVsu 89 had the lowest days to 50% flowering and days to harvest, but it had poorer agronomic performance control, whereas its fresh pod yield and dry pod yield were similar. Correlation analysis indicated that only harvest index contributed to fresh pod yield and dry pod yield.

Keywords: Cropping system, Correlation, Early maturity, Rubber plantation, Physiological traits

Harvesting time influences seed gemination and vigour of some coloured rice varieties in Thailand

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Rice seed is the important factor in rice production. The objective of this study was to evaluate the effects of harvesting time on seed germination and vigour of some coloured rice varieties in Thailand. Rice Berry and Tubtim Chumphae had high germination percentage after storage for six months. Rice varieties harvested at 20 days after anthesis had the highest germination percentage, root fresh weight, shoot fresh weight, root dry weight and shoot dry weigh in all rice varieties, and they also had the lowest mean germination time.

Keywords: Antioxidant, Correlation, Days after anthesis, Gemination percentage, Health food, Mean germination time

Changes in the Activity of Enzymes Associated with Enzymatic Browning and Chemical Composition during *Musa sapientum* Linn. 'Kluai Khai' Banana Fruit Ripening

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The major postharvest concern for bananas after harvest is the brown coloration on the fruit peel which reduces their marketing value and the attractiveness of the fruit. The objective of this study was to investigate the dynamics in the activity of enzymes associated with the enzymatic browning and chemical composition during the fruit ripening process for *Musa sapientum* Linn. 'Kluai Khai' banana. Samples harvested at the mature-green fruit stage were allowed to ripen at ambient temperature. The bananas were removed from storage according to the fruit ripening, including the raw stage (harvest stage), unripe stage, ripe stage, overripe stage, and very ripe stage. These bananas were evaluated for quality elements and the activity of enzymes associated with enzymatic browning. The results showed that the firmness of the fruit decreased from 7 N at the raw stage to less than 2 N at the overripe and very ripe stages. The total soluble solids increased throughout the ripening period, whereas the titratable acidity maintained a high level during the ripening process. The banana peel stayed green during the raw stage, and the yellow color formed between the unripe stage to the overripe stage. The lightness of the banana peel increased from the raw stage to the ripe stage, decreased at the overripe stage, and then dropped sharply at the very ripe stage. This color change was linked to the browning incidence of the fruit peel and an increasing browning area and soluble browning pigment content. The PPO and POD showed a low activity at the raw stage and then increased with advancing ripening and maintained a significantly higher level than the raw fruit. The findings of this study exhibited that the ripening stages of the 'Kluai Khai' banana influence the firmness, peel color, and browning incidence of the fruit peel and the polyphenol oxidase and peroxidase activities.

Keywords: Banana, Browning pigment, Polyphenol oxidase, Peroxidase

Stability and pre-emergence herbicidal potential of citronella (*Cymbopogon nardus*) essential oil-based nanoemulsion during storage

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Natural herbicides from essential oils (EOs) are widely used in sustainable weed control. A citronella (*Cymbopogon nardus*) EO-based nanoemulsion was fabricated for use as a natural herbicide. It was created using a high-energy emulsification method in a microfluidizer. A gas chromatograph-mass spectrometer (GC-MS) was employed to determine the chemical composition of the citronella EO. The major components of the EO were 33.59% citronellal, 21.42% geraniol, 11.23% citronellol and 4.38% limonene. The citronella EO was formulated to nanoemulsion with a nonionic surfactant mixture (Smix). The Smix at hydrophilic-lipophilic balance (HLB) 14 consisted of Tween 60 (91.2% w/w) and Span 60 (8.8% w/w). The droplet size of the nanoemulsion decreased from 78.6 to 35.2 nm with an increasing number of microfluidization cycles, from 1 to 3 cycles, at 15000 psi. The optimal number of microfluidization cycles was 3, which produced the smallest droplet size. The effect of stability storage on droplet size and herbicidal activity of the nanoemulsion was investigated for 10, 20, 30 and 60 days. Droplet size increased with storage time through to 60 days (from 35.2 to 55.2 nm). The herbicidal activity of the nanoemulsion at concentrations of 62.5, 125 and 250 μL L^{-1} was determined on *Amaranthus tricolor* L. During 60 days of storage, the inhibitory effect percentage on seed germination and seedling growth decreased slightly. Also, the inhibition of seed imbibition and α-amylase activity showed non significBBBantly changed with storage time. Our findings provide essential information for using and storing citronella EO nanoemulsion. The results revealed that the nanoemulsion could be stored at 4 °C for at least 60 days without phase separation occurring. The results show that the citronella EO-based nanoemulsion can be used as a natural herbicide and can stored for a long time.

Keywords: Bioherbicides, Nanotechnology, Microfluidizer, Storage stability

In vitro assessment of crude extract from Gomphrena weed (*Gomphrena celosioides* Mart.) for control of plant pathogenic fungi causing chili diseases

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Our study aimed to examine the preliminary phytochemical component of ethanolic crude extract from Gomphrena weed (*Gomphrena celosioides* Mart.) and its *in vitro* effect on mycelial growth and spore germination of 5 plant pathogenic fungi causing chili diseases, namely *Fusarium* sp., *Sclerotium* sp., *Cercospora* sp., *Colletotrichum gloeosporioides* and *C. capsici*. Before doing so, fungal isolation, identification and pathogenicity were confirmed. Paper disc diffusion and poisoned food technique were employed for evaluating the antifungal activity of the tested weed extract. Regarding phytochemical screening, the alkaloids, flavonoids, saponins, phenolics/tannins, and terpenoids were detected in both aerial parts and flowers of the extract. Based on paper disc diffusion, the extracts from both aerial and flower parts at 80, 160 and 240 mg/ml were shown to significantly inhibit the mycelial growth of *C. gloeosporioides* and *Fusarium* sp. compared to inoculated control. Regard to the poisoned food technique, the extract at the highest concentration (160 mg/ml) significantly showed the greatest inhibitory effect on mycelial growth of *Sclerotium* sp. (100 percent), followed by *C. gloeosporioides* (82.5 percent), *Cercospora* sp. (41.76 percent) and *Fusarium* sp. (24.41 percent). However, this antifungal activity of the extract did not exhibit against *C. capsici*. From the spore germination test, two parts of the weed extract at all tested concentrations gave complete inhibition (100 percent) on the spore germination of *C. capsici*, *C. gloeosporioides,* and *Fusarium* sp. Further evidence of antifungal properties of this tested weed, such as mechanisms of antifungal action and *in vivo* antifungal activity are required to confirm as a natural fungicide.

Keywords: Phytochemical components, Plant extracts, Anthracnose, Frogeye leaf spot, Root wilt

Development of real-time polymerase chain reaction (qPCR) technique for quantitative detection of chrysanthemum chlorotic mottle viroid (CChMVd) and chrysanthemum stunt viroid (CSVd) in chrysanthemum

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Chrysanthemum is a famous ornamental plant in the world, especially in Thailand. The production and propagation of chrysanthemum are achieved by vegetative propagation, which is a fast, easy, convenient method and many plantlets are obtained. However, this method is prone for viroid contamination. To disinfect viroid contamination, the meristem tip culture has been used for generating viroid-free plantlets. The real-time polymerase chain reaction (qPCR) was developed to detect chrysanthemum chlorotic mottle viroid (CChMVd) and chrysanthemum stunt viroid (CSVd) from chrysanthemum plantlets obtained from meristem tip culture for verification of viroid-free plantlets production. New sets of primers were designed and were optimized through optimal annealing temperature. The results showed that annealing at 50°C was suited for both CChMVd and CSVd detection. The standard curve analysis was illustrated and found that the lowest quantification cycle (Cq) values for detecting CChMVd and CSVd were 5.42 and 18.81, respectively. Moreover, the lowest copies number of CChMVd and CSVd which could be detected were 1×10^8 and 1×10^9 copies/µl, respectively. The qPCR techniques were applied to detect both viroids from chrysanthemum plantlets and revealed that all plantlets were free from viroid-contamination. Therefore, the qPCR with high sensitivity and specificity should be used as a main technique for detecting CChMVd and CSVd in chrysanthemum.

Keywords: Quantitative PCR, Molecular detection, Viroid, Meristem tip culture

Assessment of yardlong bean (*Vigna unguiculata* (L.) Walp. ssp. *sesquipedalis* Verdc.) genotypes for drought stress tolerance

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Drought stress is one of the most important causes of damage to agriculture, especially in crop production. Yardlong bean is a vegetable that needs water throughout the growing season for well growing, high yield and quality pods. This research was conducted to evaluate for drought-tolerant yard long bean lines. 36 genotypes of yardlong bean were laid out in 6 x 6 simple lattice design with 2 sets (4 squares). They were planted in plastic bags in a rain-protected greenhouse (1 plant/bag). To assess the effect of drought conditions, the experiments were therefore divided into two conditions: (1) the experiment under normal (non-stress; NS) and (2) the experiment under drought stress (DS). Data from both conditions were examined, and they were combined after a check for homogeneity of error variance verified the validity of an ANOVA with genotypes fixed and environments randomized. The results revealed that the harshness of the effect of drought stress on yield per plant of yardlong bean genotypes in the present experiment was measured by a drought intensity index of 0.44, which is moderate. The top five genotypes with the highest drought tolerance index were No.33P, BP1, BP2, No.37G. and BPP. The yield reduction rate corresponded to the drought susceptible index for each genotype, with a genotype with a high drought susceptible index also having a high yield reduction rate. When considering yield productivity, the top 5 genotypes with the highest mean productivity were No.33P, BP1, BP2, No.19G and BPP, while the top 5 for geometric mean productivity were No.33P, BP1, BP2, No.37G and BPP. These genotypes can be used for selection or hybridizaton in the next breeding program for development of drought tolerance yardlong bean cultivars.

Keywords: Asparagus bean, Drought tolerance, Evaluation, Breeding

Growth performance and sensitivity index of two types of melon under salinity stress on Bengkulu Coastal Land

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Salinity stress can reduce the appearance of the plant. The aim of the study was to obtain information and difference about the right salt concentration for selection by types of melon. The research was conducted from May to June 2021 at the Agronomy Laboratory Greenhouse, Faculty of Agriculture at an altitude of ± 10 m above sea level. The study was arranged in a factorial randomized complete block design. The first factor is the type of melon, namely Merlin (M1) and melon Melindo (M2). The second factor is the salt concentration, namely 0 ppm (K1), 2000 ppm (K2), 4000 ppm (K3), 6000 ppm (K4), 8000 ppm (K5), 10000 ppm (K6), and 12000 ppm (K7). The results showed that the two melon genotypes had not die but experienced growth inhibition for 2 weeks after treatment at a concentration of 6000 ppm. The Merlin genotype was able to survive up to 6000 ppm. The leaf greenness of Melindo still persisted until the 4th week at a concentration of 10000 ppm. The concentration of 6000 ppm determined the Merlin and Melindo genotype sensitivity index. The results of the analysis showed that two genotypes were still classified as sensitive.

Keywords: Concentration, Tolerance, Salinity index

Medicinal plants diversity and ethnobotany in Khok Hin Lad Forest of Maha Sarakham Province, Thailand

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This research aimed to explore the diversity of medicinal plants in Khok Hin Lad Community Forest and to study the ethnobotany of medicinal plants in Khok Hin Lad Community Forest, Waeng Nang Sub-district, Mueang Maha Sarakham District, Maha Sarakham Province using four 20m x 50m plots . The main focus was to allow the area to represent the local community at its best through suggestions of local medical practitioners and experts and explore types of plants and herbs with a trunk diameter at 1.30 m greater than or equal to 10 cm. Species diversity index (H), Diversity (D), and Evenness (J) analyzed using Shannon Wiener Index showed that (H) was at 3.312066269; (D) was at 27.44176899; and (J) was at 0.73072114. Species diversity (H) was low which indicated that there were small number of medicinal plant species. Evenness (J) was moderate. Data compilation and interviews with local medical practitioners and scholars regarding the use of medicinal plants in Khok Hin Lad Community Forest in Maha Sarakham Province showed that all 93 species of medicinal plants various were used, including 60 species that were prepared through decoction; 18 species that were consumed fresh or used for cooking; 4 species that were crushed and squeezed for consumption, and 11 species that were used for bathing, showering, rubbing, or wound dressing.

Keywords: Medicinal plants diversity, Ethnobotany, Khok Hin Lad community forest

IPM technology adoption, preferences and conversion of annual and perennial crop growers in Southern Philippines for targeted extension program

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IPM adoption was prevalent in both annual (73 respondents) and perennial crop growers (42 respondents) in Southern Philippines after two years of participating in an IPM training program. Majority of the respondents (44 to 78%) adopted IPM at moderate level, adopting 25 to 50% of the technologies introduced in the program. Only annual crop growers (6 to 7%) showed very high IPM adoption level (>76% adopted technologies), particularly, rice and corn growers. Of the 64 technologies introduced, only four varied in terms of adoption among grower groups, while the rest of the technologies were adopted at the same level among grower groups. These four were also more preferred by perennial crop growers than annual crop growers. Perennial crop growers were 16%, 34%, 49% and 33% more to adopt technologies related to harvest and storage, antagonism, use of indigenous microorganisms (IMO), and agroforestry management, respectively, than annual crop growers. Majority of the respondents (>72%), who were identified as conventional pesticide users at the beginning of the program, converted as ETL-based pesticide users at the end of the program. Therefore, IPM adoption by annual and perennial crop growers is moderate to very high. Four technologies related to harvest and storage, antagonism, use of IMO, and agroforestry management vary among grower groups and preferred more by perennial crop growers. A high percentage conversion from conventional to ETL-based pesticide user is promoted with IPM training. Thus, in crafting IPM extension programs, it is vital to develop training designs that take into consideration these differences and preferences to promote sustainable IPM adoption.

Keywords: IPM adoption, Technology preference, Extension, IPM training, Training design

SESSION 6B ONLINE: PLANT SCIENCES AND PEST MANAGEMENT

Preliminary field evaluation and comparative predatory efficiency of *Euborellia* species against *Spodoptera frugiperda* (J.E. SMITH) (Lepidoptera: Noctuidae) under laboratory conditions

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The fall armyworm (FAW), *Spodoptera frugiperda* (J.E. SMITH), is an invasive pest of corn in the Philippines. The effectiveness of two species of predatory earwigs, *Euborellia annulipes* Lucas and *Euborella annulata* (Fabricius), in the management of this pest, was evaluated in the field. The treatments were: T1= *E. annulipes,* T2= *E. annulate*, T3= *Metharhizium anisopliae,* T4= *Beauveria bassiana,* and T5= Control. The earwigs were released twice at the rate of 1 earwig/ m^2/ release. FAW damage was monitored 1 week before and after earwig release. The yield taken after harvest was converted to ton/ ha. All treatments resulted in lesser damage and higher yield over the control. In the laboratory, prey consumption of adult *E. annulipes* and *E. annulata* were determined on 3rd and 5th instar larvae of *S. frugiperda.* Results showed that *E. annulipes* significantly killed more preys than *E. annulate.* However, no significant difference was observed on prey consumption between males of the two species. Further research is needed for IPM development using predatory earwigs as major component.

Keywords: Biological control, Integrated Pest Management, Predatory earwigs, Prey consumption

Lodging-related gene expression in upland rice varieties from Pala U village, Thailand

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Native upland rice has been cultivated in Pala U village, Prachuap Khiri Khan Province, Thailand. In this study, we characterized gene expression patterns of five lodging-related genes in eight varieties of native upland rice, compared with Pathumthani-1 rice. For lignin biosynthesis genes (*OsPAL* and *Os4CL3*), the levels of gene expression in all eight native rice varieties were not significantly different from the Pathumthani-1 rice. Although, the relative fold of *OsPAL* gene expression in R1, R3, and R4 varieties were 5.3, 9.0 and 6.1-fold expression, respectively. Two other genes are involved in the control of strigolactone signaling and affects the culm strength were *OsTB1* and *OsAPO* gene. The R4 varieties showed 5.4-fold expression in *OsTB1* gene and 9.4-fold expression in *OsCESA9* gene, which is involved in secondary cell wall biosynthesis. These results suggest that some genes that are important in plant cell structure and effect on lodging in rice had a trend to highly express in some varieties of native upland rice.

Keywords: Lodging, Gene expression, Upland rice

Efficacy evaluation of irradiated carrageenan as plant growth promoter in Cowpea (*Vigna unguiculata* L.) Walp and Bush Sitao (*Vigna unguiculata* (L.) Walp. ssp *sesquipedalis* (L.) Verdc. x *V. unguiculata* (L.) Walp ssp *unguiculata*) production

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Cowpea and bush sitao are important vegetable crops in the Philippines, being plant based protein sources for Filipino families. Increasing productivity of these crops will be beneficial to many. The objective of the study was to determine the effect of irradiated carrageenan, a plant growth promoter on flowering time, commercial crop and seed production of cowpea and bush sitao. The field experiment was laid out in RCBD with four replications. The treatments were: T1 - recommended fertilizer (RF), T2 - irradiated carrageenan (IC), T3 - RF + IC, T4 1/2 RF + IC and T5 – control (no fertilizer). Cowpea plants applied with IC and 1/2 RC + IC and bush sitao plants applied with IC, RF + IC and ½ RF + IC flowered earlier than RF – treated and untreated plants. For cowpea, highest plant height was obtained in RF + IC and ½ RF + IC treatments while for bush sitao, all RF- and IC- treated plants were taller than the control. For commercial crop production parameters, only weight and yield of fresh pods in cowpea showed significant differences among treatments. Cowpea pods were heavier in RF + IC and 1/2 RF + IC treated plants than in other treatments. Highest fresh yield in cowpea was obtained in ½ RF + IC treated plants. Seed diameter and 100-seed weight for cowpea and gross and net weight of harvested seeds and 100-seed weight for bush sitao were the seed production parameters that showed significant differences among treatments. Application of 1/2 RF + IC improved the gross and net weight of harvested seeds of bush sitao and 100-seed weight of both crops. Seed diameter of cowpea was highest in all treatments with IC. This study recommends the use of IC in cowpea and bush sitao crop and seed production in combination with the RF.

Keywords: Commercial crop production, Recommended fertilizer, Seed production

Biology and mass rearing of *Mythimna separata* (Walker) (Lepidoptera: Noctuidae) using young leaves of Corn, *Zea mays* L.

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The paddy armyworm *Mythimna separata* (Walker) is an invasive pest of cereal, pasture, and forage crops in East Asia, South Asia, and Australia. In the Philippines, severe outbreaks have been recorded in the past. Recently localized increases in the population density of the pest have been encountered in corn fields. To generate additional information about *M. separata*, basic life history parameters were gathered. The results showed that, on average, the total development period from egg to adult of 28.95±1.89 days for the male and 28.43 ±1.55 days for the female. It passed through six larval instars over 16.07 ±1.31 days for the male and 15.96 ±0.5 days for the female larva. The durations in days for the different larval instars: 1st and 5th larval instars, 2.0 for both male and female, 2nd 1.43 ±0.53 and 1.5 ±0.58, 3rd 1.86 ±0.8 and 1.5 ±0.8, 4th 2.14 ±0.35 and 2.5 ±0.58 and 6th 3.71±0.49 and 4.0 days for the male and female, respectively; pre-pupal period of 1.57 ±0.5 days for the male and 1.55 ±0.5 days for the female. The pupal period was 8.88 ±1.04 days for the male and 8.45 ±0.55 days for the female. Female moths laid up to 730 eggs, and adult longevity for males and females were 7.54 ±2.10 and 8.09 ±1.88 days, respectively. The native variety of corn, IPB var 6, supported the optimum growth and development of the larvae of *M. separata*. Nineteen generations were successfully reared in the laboratory.

Keywords: Biological study, Mass rearing technique, Paddy armyworm

Evaluating the acaricidal effect of essential oil nanoemulsion against the cutworm, *Spodoptera litura*

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The cutworm, *Spodoptera litura* is an important pest of cruciferous vegetables and it causes economic impact worldwide. The aim of this study was to evaluate the efficiency of turmeric and star anise essential oil nanoemulsions (nEOs) against the cutworm, including mortality, antifeedant, and growth inhibition effects. Essential oil nanoemulsions (nEOs) were prepared by mixing the essential oils with surfactants and co-surfactants. Ten 2nd stage instar larvae of cutworms were tested by leaf dipping method and were observed after 24 hours. The results showed that the two nEOs, which were turmeric and star anise, performing the mortality, and growth development effect on *Spodoptera litura* as well as having antifeedant property. Complete mortality rate was shown at 0.35 % concentration of turmeric and star anise nEOs, when 100% antifeedant affect was found at 0.20% concentrations of nEOs, and 100% growth inhibition was observed at 0.30% concentrations of nEOs. The nEOs from star anise had antifeedant and insecticidal properties.

Keywords: Nanoemulsion, Cutworm, Mortality, Antifeedant effect, Growth inhibition

Callus formation of *Curcuma mangga* in MS media supplemented with 2,4-Dichlorophenoxyasetic

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Curcuma mangga is a biopharma containing natural antioxidants such as curcuminoids, flavonoids, and polyphenols. Its rhizome also contains essential oils and toxic proteins that can inhibit the growth of cancer cells. Rapid multiplication through tissue cultures is required in mass propagule production of curcumas instead of conventional propagation. The research aimed at evaluating the callus formation of C. *mangga* in MS medium supplemented with 2,4-dichlorophenoxyacetic acid (2,4-D). The experiment was laid out in completely randomized arranged in a factorial design with four replications. The first factor was the source of explant, i.e. apical bud, lateral buds and leaf sheath. The second factor was the level of 2,4-D, i.e. 0, 0.5, 1.0, 1.5, 2.0, or 2.5 ppm. The result showed that there was no interaction between the source of explants and the concentrations of 2.4-D. We found that 2,4-D has significant effects on callus induction of C. mangga. Apical bud was the best source of explant in callus formation of C. mangga indicated by the earliest emergence, largest size and highest weight of callus among the source of explants. The callus was white and fragile. Supplementation of 0.5 to 1 ppm of 2,4-D on MS media produced larger size of callus than higher concentration of 2,4-D. Increasing 2,4-D concentration tended to reduce the size and weight of callus. There was no callus formation in the MS media without 2,4-D. Apical bud culture in MS media without 2,4-D produced considerably high number of shoots, on the average of 2.3 shoot/explant.

Keywords: Auxin, Indirect propagation, Mango ginger, Rhizome bud

Acaricidal effect of plant essential oil nanoemulsions on controlling *Spodoptera exigua*

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Spodoptera exigua is the major pest of vegetable crops as it causes economic losses. The objective of this research was to evaluate the effectiveness of *Curcuma longa* and *Illicium verum* essential oil nanoemulsion (nEOs) on *Spodoptera exigua* in terms of mortality, antifeedant activity, and growth inhibition. Ten second-stage instar larvae of *Spodoptera exigua* were tested by leaf dipping method. The results showed that *Curcuma longa* and *Illicium verum* nEOs performed extremely high mortality and antifeedant activity, and affected the growth and development of *Spodoptera exigua*. Essential oil nanoemulsions at 0.35 % concentrations caused 100% mortality, 100% antifeedant activity, and 100% growth inhibition. According to the results, *Curcuma longa* and *Illicium verum* nEOs could be used as botanical insecticide for controlling *Spodoptera exigua*.

Keywords: Nanoemulsion, Acaricide, Mortality, Antifeedant activity, Growth inhibition

Individual selection of F5 SSD generation of Hot Pepper (*Capsicum annuum* L.) for soil acidity tolerance in Ultisol

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Extending hot pepper planting areas to less fertile acidic soil, such as Ultisol should be done to increase national hot pepper production of Indonesia as availability of more fertile land is becoming limited. Huge potential of Ultisol, however, come along with many problems of acidic reaction due to high exchangeable Al, and low soil fertility, both of which hampers crop productivity. The use of adaptive crop developed by many breeding programs is believed the most prospective manner instead of environmental engineering. Our breeding program elaborating a single seed descent (SSD) to develop Al tolerant varieties have come up with the fifth generations and ready for further step of selection. This study was conducted to evaluate the growth and yield performance of the F5 individuals and to identify the most adaptive ones in acidic soil. Four hundred individuals of F5 generation, bred from an SSD selection procedure of a cross of UNIB CHR17 x PBC396, were grown in the field of acidic soil without replication. Measurement was conducted on plant height, stem diameter, plant fresh weight, plant dry weight, age to harvest, number of fruit, fruit length, fruit diameter, and yield per plant. The data obtained was descriptively analyzed and index selection. The data was analyzed for descriptive statistics, and the selection was executed by selection index on Z distribution standardized data. Considering all variables measured, the selection on 400 individuals of F5 generation showed that G338, G105, G195, G86, G34, G254, G258, G108, G387, G113, G162, G73, G29, G324, G48, G243, G69, G165, G163 and G337 were the most adaptive individuals. Those genotypes were of valuable for further selection cycles.

Keywords: Identification, Chilli pepper, Breeding, Al tolerance

Factors related to the planting area affecting the yield and fruit quality of Som Keaw (*Citrus nobilis* L.)

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In this study, the factors related to the planting area affecting the yield and fruit quality of Som Keaw including water quality and soil quality were investigated in 13 plots of Samut Songkhram and Chachoengsao provinces. The results showed that the water quality of all plots had higher pH than the standard, with a neutral to weak alkaline (pH ≥ 7), the value of electrical conductivity and chloride content of 13 plots fell into the standard whereas the value of water hardness in the planting area of Samut Songkhram province was about twice as high as Chachoengsao province. Assessment of soil fertility levels in both provinces demonstrated that these were high in all plots (score 13-15). Results of fruit quality evaluation revealed that the plot no.5 (at Samut Songkhram province) had the best fruit quality with fruit weight (438.13±30.16 g), fruit width (10.38±0.34 cm) and juice content (204.07±5.33 ml/fruit) while the plot no.3 (at Samut Songkhram province) gave the highest sweetness (10.67±0.85 °Brix), with significant level of 99.9% ($P<0.01$). The correlation analysis shoed that soil quality, water quality and fruit quality , soil and water qualities were both positively and negatively related to fruit quality of Som Kaew. Somkaew growing in Samut Songkhram province had better fruit quality than Chachoengsao provinces. Farmers should be concerned about their field conditions, soil and water for Som Kaew planting area management to increase the yield quality .

Keywords: Citrus nobilis; Factor; Planting area; Samut Songkhram

Correlation between biochemical resistance responses and blast disease severity in 11 genotypes of swamp rice

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Blast disease attacks almost all phases of rice plant growth. This disease can reduce paddy rice production by 42.84% - 64.05%, while in swampland it has the potential to lose yield by 61% or equivalent to 3.365 tons/ha. The resistance of varieties to plant diseases is one of the important components in rice cultivation. The aim of the study was to evaluate the correlation between biochemical resistance responses and the severity of blast disease in 11 genotypes of swamp rice. The research in swampland was carried out in a randomized block design with 3 blocks and 11 genotypes of swamp rice. Observations were made on the incubation period, the incidence of disease, the severity of blast disease, the content of salicylic acid and phenolic compounds. The content of salicylic acid and phenolic compounds was positively correlated with the severity of blast disease in 11 genotypes of swamp rice.

Keywords: Blast disease, Salicylic acid, Phenolic compoun, Severity of blast disease, Swap rice genotype

Insect pests attack sorghum (*Sorghum bicolor* L. Moench) in the coastal region of Bengkulu, Indonesia

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Sorghum bicolor L. Moench is one of the world's most important cereal crops. Besides being a source of income to the farmers, sorghum grains are a good source of carbohydrates for many people in Indonesia, the leaves and stems are processed for animals, and the grains are used as a raw material to produce beverages in food processing industries. Since many uses of sorghum, there is a growing need for an increase in its production in Indonesia. However, one of the obstacles to increase sorghum production are the insect pests that attack the plants. The purpose of this study was to evaluate insect pests attacking sorghum (*Sorghum bicolor* L. Moench) in the coastal region of Bengkulu, Indonesia. This research was conducted in Kandang Mas, Kampung Melayu, Bengkulu province. The study used a randomised block experimental design and sample plants observed were five varieties of sorghum (Numbu, Ketan, Super 1, Super 2, and Suri) cultivated on land plots of 3m by 2m each. The observations made included types of insect pests, symptoms of the attack, and yield loss value. The results showed that the insect pests attacking cultivated sorghum varieties were *Spodoptera frugiperda, Peregrinus maidis, Rhopalosiphum maidis, Valanga nigricornis, Ostrinia furnacalis, Helicoperva armigera*, and *Sitophilus* sp. Among the sorghum varieties cultivated, the Numbu variety was more resistant to *Spodoptera frugiperda* attack, but susceptible to *Ostrinia furnacalis*, Ketan variety was resistant to *Valanga nigricornis*, and Suri was susceptible to *Helicoperva armigera* attack. The highest yield loss by *Sitophilus zeamais* was found in the Numbu variety, and the lowest was in Suri 4 and Ketan.

Keywords: Attack, Insect pests, Sorghum, Varieties

Archaeal communities discovered in the phytotelmata of *Nepenthes alata* Blco. samples obtained from Mt. Makiling, Philippines as revealed by High-Throughput molecular sequencing analysis

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Nepenthes alata Blco. is a carnivorous tropical pitcher plant that is endemic to the Philippines. To date, however, no publication is available yet regarding the presence, abundance and composition of archaea in *Nepenthes alata* Blco. from the country. Here, we make the first likely report on the community

composition and relative abundance of archaea in the phytotelmata of young and mature pitchers of *N. alata* Blco. samples from the Mt. Makiling Forest Reserve in the Philippines based on 16S amplicon metagenomic sequences. Results from alpha diversity analyses revealed that the ten most abundant archaeal phyla detected were classified under "Others", underscoring the potential discovery of uncharacterized archaea. At the genus level, *Methanocorpusculum*, Candidatus_Nitrosopumilus and *Methanomicrococcus* were detected to be the most abundant in the phytotelm of young pitchers. In contrast, no significantly abundant genera of previously identified archaea were detected in the phytotelm of mature pitchers. Further analyses archaeal composition through time showed that of the 560 total phylotypes detected in young pitchers, 269 (48.04%) were consistently present across three monthly sampling periods. On the other hand, of the 570 total phylotypes detected in the mature pitchers, 200 (35.08%) were consistently present across the same sampling periods. This paper establishes that *N. alata* hosts multiple species of archaea regardless of age of the pitchers and implies a high possibility that *N. alata*-archaeome interactions exist which have not been examined previously.

Keywords: Mt. Makiling, Archaea, *Nepenthes alata* Blco.

The use of Napier grass in feed mixture for tilapia culture

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The use of Napier grass for tilapia culture *(Oreochromis niloticus)* as feed in tilapia culture was studied. This study used a Completely Randomized Design (CRD) with 4 different feed formula mixing processes, 3 replications, namely Treatment 1 (T1): 100% commercial feed, Treatment 2 (T2): Napier grass: rice bran: 50%: 30%: 20%, Treatment 3 (T3): Napier grass: rice bran: 30%: 50%: 20% and Treatment 4 (T4): Napier grass 80%: rice bran: 20%. Tilapia was cultured in 12 cement ponds with a diameter of 0.78 m, a height of 50 cm, with a stock density of 30 fish per pond for 12 weeks. At the end of the experiment, feed formula T1 had the highest average weight gain of tilapia, 274.24 g, followed by feed formula T2, T3, and T4, respectively. The average weight gain of tilapia was 273.07 g, 271.73. g and 270.95 g, respectively. There was no statistically significant difference in all treatments ($p>0.05$). In terms of survival rate, it was found that the feed formula T4 had the highest survival rate ($p<0.05$) at 95.56 %, and the feed formula T1 had the lowest survival rate ($p<0.05$) at 91.22 %. In terms of Feed conversion ratio (FCR), it was found that the feed formula T1 had the lowest FCR, which was 2.57, followed by the feed formula T3, which was 2.58. Finally, the feed formula T2 and T4 had the same FCR of 2.59 ($p<0.05$). In terms of feed cost per kg, it was found that the feed formula T4 had the lowest cost at 2.28 baht/kg, followed by the feed formula T3, T2, and T1, which was 7.05, 10.23, and 17.50 baht/kg, respectively ($p<0.05$). From the results of this study, it can be concluded that Napier grass is suitable for efficient use in feed production for tilapia and reduce the cost of culture.

Keywords: Tilapia, Napier grass, Fish feed

Effects of silicon deposition on enhancing the yield of different rice cultivars

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Excessive use of chemical fertilizers negatively affect the overall soil health and the environment. There is a need to come up with alternative strategies to ensure competitive yields of crops and at the same time maintain long-term ecological balance of the soil ecosystem. The use of silicon fertilizers in agriculture is considered an alternative approach to enhance crop yield and soil health. Silicon is an important nutrient for the safe and competitive growth of all Asian cereals, including rice. In this study, scanning electron microscopy (SEM) analysis was conducted to evaluate the effectiveness of silicon fertilizer on enhancing the yield of rice. NSIC Rc160, NSIC Rc512 and NSIC Rc600 were the varieties that were used. Silicon treatments include 0 ton Si/ha, 1 ton Si/ha and 2 tons Si/ha. In SEM analysis, highest silicon reading was obtained in NSIC Rc512 with 2 tons Si/ha application rate (12.76% Si by weight). In NSIC Rc160, plants in plots treated with 1 ton Si/ha had the highest silicon content (10.32% Si by weight). On the other hand, NSIC Rc600 obtained its highest silicon content at 0 ton Si/ha (8.93 Si by weight). In all varieties, higher grain yield was obtained in 1 ton Si/ha treated plots (NSIC Rc160, 7.24 Kg/plot; NSIC Rc512, 8.7 Kg/plot and NSIC Rc600, 7.98 Kg/plot). Lower grain was recorded in control treatment (0 Si ton/ha). The enhanced Si uptake and the increase in grain yield demonstrate the potential of Si fertilizer on improving rice production.

Keywords: Silicon, Chemical fertilizer, Rice, Grain yield, Scanning electron microscopy (SEM)

SESSION 7 ONSITE/ONLINE: SOIL AND ENVIRONMENT, WATER CONSERVATION, DIGITALIZATION IN FOOD AND AGRICULTURE

Available soil phosphorous under the application of vermicompost combined with liquid organic fertilizer in ultisols

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Supplementation of liquid organic fertilizer (LOF) to solid organic fertilizer is necessary to improve the availability of plant nutrients for better growth. Phosphorous availability during the decomposition of vermicompost in the soil is not fully understood; therefore, the study was intended to determine the effect of vermicompost and its combination with LOF on available P during the period of time. A completely Randomized Design was used to lay out to 6 treatments of vermicompost and its combination with LOF. The study resulted that the application of vermicompost on Ultisols prominently increased the availability of phosphorous (P-Bray I) during the incubation period of 7 weeks. The increase in the available P was less significant in the first two weeks of the incubation, then continuously increased afterwards. At the end of the incubation, the highest available P was achieved at the treatment of 30 Mg ha^{-1} in combination with LOF, even though it was not significantly different from 15 Mg ha^{-1} with LOF as well as 30 Mg ha^{-1}. Moreover, the application of vermicompost increased total soil organic carbon (TSOC) and total soil nitrogen (TSN) and reduced exchangeable Al but did not affect the soil pH. These findings are of important in organic fertilization of Ultisols.

Keywords: Vermicompost, Available P, Ultisols, Liquid organic fertilizer

Value chain management of soil ready for planting in the Pawa Sub-district agroforestry network Kaeng Hang Maeo District, Chanthaburi Province, Thailand

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Main activities of pawa sub-district agroforestry network group are traditional activities and learning activities. The problem with this group is that the group does not expand. Therefore, they need to increase income generating activities to attract new members to join group. This research uses value chain management tools to help generate income-generating activities for the Pawa Sub-District Agroforestry Network. The data were collected from in-depth interviews, brainstorming forums, trainings, workshops and focus group. The data were collected from 15 samples selected from members of agroforestry groups who were primarily involved in group activities. The results showed that the value chain management of soil ready for planting crops added value after development are: 1) bulk purchase of raw materials to reduce costs 2) group production with participation. 3) there has been an increase in online sales channels, customers and revenue. 4) participation of members within the group and develop the business model of soil ready for planting from upstream, midstream and downstream to be able to compete with the market.

Keywords: Soil ready for planting, Value chain management, Participation

Assessment of water quality variation for agriculture in Bang Pakong River of Thailand

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The quality of water from the river was carried out from November, 2021 to April, 2022. The water samples were collected from 13 sampling points and analyzed considering the following : pH, electricity conductivity (EC), salinity, calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^{+}), chloride (Cl^{-}), sulphate (SO_4^{2-}) and sodium adsorption ratio (SAR). The seawater mixing ratio was calculated using chloride concentration from the river and sea. The maximum pH value (7.56) was observed in February and the minimum value (6.53) was occurred in December among the collection months. The EC and salinity were the highest in February. The highest concentration of cation in water sample was Na^{+} and the lowest value of cation was Ca^{2+}. The concentration of Mg^{2+} was higher than that of Ca^{2+} from February to April. The sequence of major anions in water were $Cl^{-} > SO_4^{2-}$. All parameters were higher in February compared to other collection months. Additionally, the highest seawater mixing ratio was observed in February (25.40%) followed by March (3.87%) and April (1.27%). The acceptable limits of irrigation water were EC (<0.7 mS cm^{-1}), SAR (< 10) and Cl^{-}(<10 meq L^{-1}). The EC (13.90 mS cm^{-1}), SAR (22.81) and Cl^{-} (117.00 meq L^{-1}) values were high in the river water was unsuitable for irrigation in February, which caused many problems to soil and plants. Therefore, it was concluded that the properties of water in Bang Pakong River were changed in every month depend on precipitation and freshwater flow in this region. Besides, presence of high salinity and sodicity of irrigation water other than rainwater could deteriorate the soil properties of valuable agricultural land as well as damaged the crop production. The results provided that the river water was suitable for irrigation in agricultural fields in specific month in order to increase agricultural production in this area.

Keywords: Electrical conductivity, Chloride, Water sodicity, Water salinity

Accumulation of microplastics in stomach, intestine, and tissue of two shrimp species (*Metapenaeus moyebi* and *Macrobrachium rosenbergii*) at the Khlong U-Taphao, Southern Thailand

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Microplastic contamination in river and marine ecosystems of Thailand has recently attracted attention. The ingestion of microplastic by aquatic organisms has become an emerging environmental issue with consequences for seafood safety. In this study, the occurrence of microplastic in the stomachs, intestines, and tissue of two species of shrimp (Metapenaeus moyebi and Macrobrachium rosenbergii) in Khlong U-Taphao, a river in Songkhla Province in Southern Thailand, was investigated. The two species of shrimp were selected because they are widely consumed and economically important to the region. The shrimp samples were digested with 10% potassium hydroxide for analysis of type, colour, and amount of microplastic. The results revealed that fiber was the dominant type of microplastic, followed by fragments ranging in size between 100 µm – 1 mm. Several colours were found in microplastic, including blue, black, deep blue, red, and green. Surprisingly, no significant difference ($p > 0.05$) was found in the amount of microplastic among the three organs of the shrimps. There was no correlation between microplastic and the length of *Metapenaeus moyebi* ($p > 0.05$), but correlation was found in *Macrobrachium rosenbergii* ($p < 0.05$; $R > 0.5$). The research showed that microplastic accumulated in the two types of commercially fished shrimps in the study area. Future regular monitoring of the aquatic organisms is needed.

Keywords: Microplastic, River, Shrimp, Seafood, Thailand

Identification of soil porosity using geophysical and geotechnical observation for agricultural application

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Until recently, laboratory testing was the main method used to measure soil porosity, one of the main parameters determining soil health. This method has high accuracy, but has limited testing area, as well as the analysis time. Meanwhile, geophysical and geotechnical measurement methods offer the ability to test the soil's resistivity and physical values. Further analysis of these two parameters is conducted to determine the porosity value. These two methods offer measurement benefits in the form of higher accuracy, larger area tested and shorter test time. In this study, resistivity measurement was conducted using geo-electric tools in three different areas representing coastal, lowland, and upland agricultural areas. Meanwhile, the soil's physical value was determined using a handbore to obtain the density, humidity, void ratio, mass density, dry density and soil type. In addition, validation was carried out using the Archie equation, to obtain each location's porosity value. This validation's results show a linear correlation, between porosity and resistivity.

Keywords: Geophysics, Geotechnique, Porosity, Resistivity, Soil

The effects of seed priming with cattle fecal extracted on seed germination of Coriander (*Coriandrum sativum*)

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Coriander (*Coriandrum sativum*) had been used as an ingredient in various Thai foods. The biggest problem of Coriander growers is low seed germination. Seed priming is a method that may help the Coriander seed germination better. For this reason, the cattle fecal extract was used for seed priming of coriander. A factorial experiment using a completely randomized design: factorial in CRD) was used to study the germination of Coriander. Two factors were factor A, seed priming (priming, no priming), and factor B, the concentration of cattle fecal extraction (20, 40, 60, 80, and 100 %). The experiments were conducted in the laboratory. The results showed that factor A had highly significant differences. The seed primed had germinated higher than no primed (2.5 times of seed germination). Factor B differed significantly at days 2, 4, 5, and 6 after sowing. The seed primed by 60 % of cattle fecal extracted gave the lowest MGT, the highest germination, and normal seedling. From the results, we recommend that farmers should seed primed before seed sowing into the field by using a 60 % concentration of cattle fecal extraction.

Keywords: Seed priming, Coriander, Seed germination, Cattle fecal extract

Potential development on smart farmer of alumni members of the Future Farmers Organization of Thailand, Central Region of Thailand

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Results of the study revealed that 37 out of 130 alumni members were engaged in agriculture. Based on its details, they grew field crops most (21.62%). This was followed by vegetable growing, beef/dairy cattle rearing, duck rearing, ornamental plant growing, organic farming, mixed farming, orcharding and seed producing (16.21, 13.51, 13.51, 10.81, 8.10, 8.10, 5.40 and 2.70%, respectively). The sample group adopted knowledge and experience gained from activities of the Future Farmers Organization of Thailand (FFT) for creating production cooperation networks most (86.52%), followed by marketing 63.75% and body of knowledge exchange (60.65%). The sample group needed potential development in production at a highest level ($\bar{x}$ =4.56, S.D.=0.132), followed by processing and product value addition ($\bar{x}$ =4.32, S.D.= 0.163). The following were approaches to increase production capacity the form of member network group of the Future Farmers Organization of Thailand: 1) creating a smart farming system; 2) product and service management; 3) branding, packaging development and accreditation; 4) agribusiness administration and marketing; and 5) financial and accounting management by establishing an accounting system and analyzing capital for business planning. Regarding a comparison of the development of agricultural production potential, there was statistically significant difference at 0.01 between female and male sample group members. The former put the importance on processing, creating innovation to reduce production costs and using technology to replace labor, respectively.

Keywords: Production potential development, Agricultural career, Smart farming, Agricultural innovation, Future Farmers Organization of Thailand (FFT)

Effects of dairy cattle waste vermicompost on nitrate-N in ultisols and inceptisols

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Vermicomposting is one of the recycling technologies which transformed waste products to accelerate the stabilization of organic matter and modifying soil physical and biochemical properties. This study aimed to determine nitrate availability in Ultisol and Inceptisol after applying dairy cattle waste vermicompost. This experiment was designed for 7 weeks incubation with 3 levels of vermicompost dosage. They were 0, 15, and 30 tons ha^{-1}. All treatments were replicated 3 times. The concentration of nitrate (NO_3^-) was determined at 3, 5, and 7 weeks after incubation. Results indicated that there was the significant effect between dairy cattle waste vermicompost with the concentration of nitrate (NO_3^-N) during the incubation periods. The significant effect from improvement of nitrate occurred after 5 weeks incubation on both soils. The stable condition of nitrate availability of vermicomposted dairy cattle waste occurred in 15-ton ha^{-1} dosage.In turn, this is the best dosage of dairy cattle waste vermicompost producing suitable environment for the nitrification process.

Keywords: Vermicompost, Dairy cattle waste, Nitrate-N, Ultisols, Inceptisols

Land suitability evaluation of shallot (*Allium ascalonicum* L.) at irrigated marginal lowland in Bengkulu, Indonesia

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Shallot (*Allium ascalonicum* L.) is one of the strategic vegetable commodities that farmers have been intensively cultivating in almost fertile highlands of Indonesia because of its high economic value and attractive market prospects. However , there is lack of shallot cultivation in the marginal dry lowland due to inherent soil physical and chemical constraints. The study was conducted to evaluate and classify the current and the potential land suitability for shallot cultivation in the areas of 1,325.21 ha on the Cawang Kidau irrigated marginal dry lowland, Kaur District, Bengkulu Province conducted from June to August, 2022. Soil sampling was based on land mapping unit resulted by overlying land unit and slope. Land suitable evaluation for shallot cultivation based on soil characteristics and land qualities classification was depicted using ArcGIS 10.3. The result showed the actual suitability classes for shallot cultivation covered 1,131.73 ha classified in marginal suitable (S3) with the heaviest limiting factors are erosion hazard, nutrients retention and nutrient availability and the rest areas, 193.48 ha classified as unsuitable classes for the shallot cultivation. Efforts to overcome the constrains and to improve from the marginally suitable classes to moderately suitable classes for the shallot cultivation are implementing terrace constructions, amelioration with lime, and optimum fertilizers applied.

Keywords: Inherit soil properties, Land evaluation, Marginal dry lowland, Shallot cultivation

Comparison of the quality of animal manure composted conventionally with vermicomposted animal manure from *Lumbricus rubellus*

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The potential for large amounts of livestock waste needs to be balanced with improving its quality. This quality improvement can be done by a bioconversion process, namely the vermicomposting method. This method has not been widely used, the data and literature that discusses it are also few found. This study aims to determine the effect of vermicomposting on improving the quality of livestock waste. The research was conducted by utilizing the activity of the Lumbricus rubellus worm in the bioconversion of livestock waste into compost called vermicompost. The parameters for improving the quality of livestock waste observed were macronutrient content, namely N, P and K, C-Organic, C/N ratio, pH and physical properties including texture, color and odor which were adjusted to the Vermicompost Organoleptic Score Standard (KEPMENTAN Number 261 of 2019 concerning Minimum Technical Requirements Organic Fertilizer, Biological Fertilizer, and Soil Conditioner). The data analysis shows that changes in the physical properties of animal manure by vermicomposting are faster and produce better macronutrient values, C-Organic, pH and C/N than conventional composting. Changes in physical properties of cow dung vermicompost were faster than goat dung vermicompost and chicken manure vermicompost. Parameters of chemical properties of vermicompost animal manure are not in accordance with the standard of KEPMENTAN Number 261 of 2019, but the parameters of chemical properties of vermicompost of goat dung are better than vermicompost of cow dung and vermicompost of chicken manure.

Keywords: Chicken manure, Cow dung, Goat dung**,** Vermicompost, Vermicomposting

Effect of using green manure from azolla (*Azolla microphylla* Kaulf.) on the growth for purple rice of 2 cultivars in very strongly acidic soil

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The effect of azolla fertilization on the growth of Khao Kum rice 2 cultivars as a guideline to increase the yield of Khao Kam along with soil development from azolla culture in very strongly acidic soil. The experiment was designed using Factorial in Randomized Complete Block Design (RCBD). The two factors were variety and treatments with 3 replicates. The results showed that soil pH, yield, seed weight of 1,000 seeds, height, number of spikelet per plant and filled grains. In the process of growing rice along with raising azolla, yielded better results than no raising azolla. But there were no statistical differences. In addition, found that the average organic matter content of azolla and non-azolla culture were 2.30 and 1.60, respectively. Soil organic matter content of azolla culture was significantly higher than that of no azolla culture ($p < 0.05$). The two varieties of Khao Kam rice are Lum Pua rice and Kam Kanya rice. Found that Kam Kanya rice was high number of spikelets per plant and the yield was significantly higher than that of Lum Pua rice ($p < 0.05$).

Keywords: Purple rice, Green manure, Azolla

Tree bank management pattern for sustainability of environmental and household economies in Thailand

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Intensifying global warming has reduced forest areas. COVID-19 epidemic has exacerbated the economic crisis amongst both urban and rural dwellers. Tree bank is a mechanism that can increase forest areas in individual and community lands which positively benefit household economy and community environment in accordance with environmental economy and sustainable development goals. This research aimed to analyse the tree bank management pattern for the sustainability of environmental and household economies.The study areas were the tree bank models in three regions, namely 1) Khao Chakan Agroforestry Bank, Sa Kaeo Province, 2) Ban Tham Suea Tree Bank, Phetchaburi Province and 3) Ban Khlong Ruea Tree Bank, Chumphon Province. The study adopted a qualitative research method. The data was collected by in-depth interviews, group discussions, field surveys and content analyses on the tree bank committees, tree bank members and representatives of the Bank of Agriculture and Agricultural Cooperatives. The results of study found that all three tree bank models had tree bank management patterns which planted four groups and 58 species of precious woods as identified by the Bank of Agriculture and Agricultural Cooperatives, together with 400 other plants to increase the forest areas in the communities and household plots. The models also utilised the tree bank plots to conduct environmental-related activities which were COVID-free. The seedlings obtained from tree bank plotes also helped increase incomes of the households. Additional incomes of the households could be obtained from planting seedlings, making wood-smoked vinegar, and producing compost. The models were also used as learning centres, natural tourist spots and homestays. The communities decided to plant more trees annually. Additional tree bank learning networks were continually established within the communities, government offices and international agencies which helped contribute to sustainbable development.

Keywords: Tree bank, Community environment, Household economy, Sustainable development

Guidelines for developing an integrated community environmental management strategy towards sustainability of local government organizations in Thailand

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Community environmental problems are exacerbated. Thailand decentralizes localities to develop self-improvement plans by formulating a development strategy to cover all aspects of the problem. This research aims at analyzing the community's environmental management strategic plan. Strategies and approaches to developing integrated community environmental management strategies towards the sustainability of local government organizations. The studied sites were 108 local government organization in Saraburi Province. Archived from the document is the Local Development Plan 2023-2027 and in-depth interviews. Strategic Foresight of the executives and representatives, there were 216 executives and representatives. The results showed that: The most severe environmental problems are dust from stone milling and rail transport construction. Garbage overflowed the city and flooded the drought, respectively. In the local development plan, there is a department that every department defines to carried out over the course of 5 years, namely, the department of waste management, dust, noise, water for agriculture, water supply and plant genetics conservation. The other side is defined differently. The problem of strategy has been found that all aspects of environmental strategy are linked in few areas. There is still a lack of emphasis on the Sustainable Development Goals. Strategizing on a central policy rather than aiming to solve problems in the area is holistic, participatory, of all parties to involved and intensively. It emphasizes the company's cooperation with communities and partners throughout the strategy building process. Analyze all environmental issues holistically in the area to manage the environment in tandem with social and economic development according to the BCG Model, systematically and continuously.

Keywords: Environmental community, Strategy integrated management, Local government organization

Semi-automatic Rambutan boring machine

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Semi-automatic rambutan boring machine were developed with dimensions of the machine 80 x 170 x 100 cm. The semi-automatic rambutan boring machine was powered by Motor Ac 220 Volt 0.25 kW and transmitted power to a 1:60 reduction gear, driving a chain with 20 sets of rambutan transport with a diameter of 40 mm to transport the rambutan to the seed drill set, size 18 mm. The drilling system was a 4 bar air pressure pneumatic, and the Geneva sprocket controlled the drilling range. The average rambutan boring capacity was 3,185 fruits h^{-1}, and variability of rambutan seed boring speed, rambutan diameter, rambutan height, rambutan weight, rambutan seed diameter, rambutan seed height, rambutan seed weight, rambutan peel, and rambutan seed boring ability were 1.13±0.54, 44.04±2.78, 60.60±3.83, 21.39±1.35, 8.60±0.54, 17.01±1.07, 5.41±0.34, 2.62±0.16 and 69.44±4.39, respectively. The efficiency of the semi-automatic rambutan boring machine was 95.75%, with a machine payback period of 140 days and a break-even point of 288.2 h $year^{-1}$.

Keywords: Rambutan, Semi-automatic machine, Boring machine

Underground water bank management network to restore environment and community economy in Thailand

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Climate change increases the odds of worsening drought in many parts of Thailand, where drought is leading to already limited natural water sources. However, some Thai communities have innovated underground water banks which concretely resolved drought problems. This innovation should be promoted widely by utilising the wisdom of the model community which has successfully built an underground water bank and used it to restore the environment and community economy. This research aimed to analyse the characteristics of underground water bank innovations which were suitable for social landscape, management of network cooperation scheme, restoration of the environment and community economy and other supporting factors. The study area comprised three model communities which successfully managed underground water banks with different social landscapes. It was found that the innovative underground water banks which were suitable for household and community areas should be a closed system. They comprised two sub-systems, namely 1) pond type which should be built in a horizontal catchment area and 2) rail type which should be built in a sloped catchment area. As for an open system, it should be built in the community's large public area. The open system comprised two categories, namely 1) canal vicinity and 2) pond. Both closed and open underground water banks from every pond and every rail in the community were linked to form the underground water networks. There was a horizontal network cooperation scheme which formed the underground water banks that could support one another and provide fertility to soil and water. Maximum biodiversity could also be introduced to farming in the area. Economy, learning and tourism could be upgraded further for the community. Internal and external agencies could cooperate while dwellers and communities could set common goals which made the environment the foundation of life for both present and future generations.

Keywords: Network, Underground water bank, Community environment, Community economy

Climate variability's impact on rainfed-sugarcane production in Thailand's northeast

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Sugarcane is one of Thailand's most valuable cash crops. However, besides being used for sugar production, sugarcane can also be used to manufacture biofuel, resulting in an increase in demand for sugarcane. Although north-eastern Thailand has the most sugarcane production and cultivation areas, it receives less yield than other parts. The climate fluctuation has both direct and indirect effects on sugarcane yields. Actual evapotranspiration is a mechanism that occurs during plant transpiration and soil surface water evaporation. It helps plants to absorb nutrients and water from the soil, which, in turn, facilitates plant growth. Consequently, the present study aimed to investigate the impacts of climate variability on sugarcane yields and productivity in north-eastern Thailand. The study relied on ENSO index data, meteorological data, and sugarcane cultivation data from 2008 to 2020. The results showed that ONI and SEaI's return periods were 3.3 and 4-10 years, respectively. Besides, according to spectrum analysis, ENSO events happened 3-4 months before SEaI events. The fluctuation in SEaI would occur more rapidly than the ENSO. In comparison, SEaI 1, 3, 6, and 12 months were implemented. The best time scale of SEaIs with yields was the 6 and 12 months of time scale. The highest yield correlated with SEaI at six months at 0.78 on Nakhon Phanom station, with an increase in yield with SEaI for every station. However, the production and harvested area were inconsistent with SEaI. It revealed that yield depended on the amount of soil moisture and rainfall. However, sugarcane production and the harvested area also rely on other factors, such as politics, prices, and farm management.

Keywords: Climate variability, Standardized actual evapotranspiration index, Sugarcane production and yield

Increasing nutrient levels of N, P, K uptake and yield of corn (*Zea mays*. L) BISI 18 varieties with different vermicompost doses

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The results showed that the Entisol soil had low nutrient content, acid, sandy loam texture, and a very low exchangeable Al content with pH (H_2O 1:2.5 w/v) 5.00 and pH (KCl1:2.5 b/v) 4.38. Vermicompost has pH (H_2O 1:2.5 w/v) 8.48 and high levels of organic C, sufficient levels of total Nitrogen, Phosphorous, Calcium, Magnesium, and high levels of Potassium. The highest levels of Nitrogen, Phosphorous, and Potassium in leaves were N 2.20%, P 0.18%, K 1.15% and N, P and K uptake in maize gave N uptake levels of 4.80 $gplant^{-1}$, P 0.073 $gplant^{-1}$, and K 0.455 $gplant^{-1}$ at a vermicompost dose of 10 $MgHa^{-1}$. Husked corn weight, corn weight without husk, and kernel weight per plant were 309.91 $gtan^{-1}$, 273.58 $gtan^{-1}$ and 160.49 $gtan^{-1}$ obtained at a dose of 10 $MgHa^{-1}$vermicompost. The husked corn weight, corn weight without husk, and kernel weight per experimental plot were 11.28 $KgPlot^{-1}$, 9.72 $KgPlot^{-1}$, and 5.94 $KgPlot^{-1}$, respectively, obtained at a dose of 15 $MgHa^{-1}$vermicompostequivalent to 18.80 $MgHa^{-1}$, 16.20 $MgHa^{-1}$, and 9.90 $MgHa^{-1}$. The weight of kernel corn was obtained in the vermicompost dose range of 7.5 to 15 $MgHa^{-1}$, respectively, namely 5.67 $KgPlot^{-1}$, 5.63 $KgPlot^{-1}$, 5.64 $KgPlot^{-1}$, and 5.94 $KgPlot^{-1}$ is equivalent to 9.45 $MgHa^{-1}$, 9.38 $MgHa^{-1}$, 9.40 $MgHa^{-1}$, and 9.90 $MgHa^{-1}$. The recommended doses of vermicompost to produce the highest kernel corn weight were 7.5 and 15 $MgHa^{-1}$, respectively.

Keywords: Entisols, Maize plant weight, Nutrient uptake

Land use suitability evaluation for agricultural planning by using analysis hierarchy process (AHP) in Chachoengsao province

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Chachoengsao province is located in the eastern, Thailand.It covers an area of 535,100 hectares and has Bang Pa Kong river basin, the main river through the area. It is generally suitable for agriculture. However, it is facing the shortage of water and salinity of water .This study was conducted to estimate the appropriateness of land use by using analytical hierarchy process (AHP) for land use planning . Results of the study by using AHP revealed that there was a moderate level of the appropriateness in the development area. The higtliy suitable area (S1) accounts for 35.55 %, the moderately suitable area (S2) accounts for 46.96 %, and the lowly suitable area (S3) accounts for 17.49 % of the area. As guideline for agricultural area planning , the results showed that most appropriate area particularly for field crops growing such as cassava, sugar cane, and maize and followed by rice growing and orcharding (35.55, 46.96 and 17.49 %, respectively).

Keywords: Land use, Analysis hierarchy process, Water consumption

SESSION 8 ONSITE/ONLINE: ORGANIC AGRICULTURE

The challenges of promoting the adoption of organic agriculture under Philippine setting

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An archipelagic country, the Philippines (113 million people) has 30 million ha and only about 10 million ha are agricultural lands. With more than 5 million farmers, farm sizes are small (2.0 ha). Many youths and more educated Filipinos do not find farming as attractive occupation and farmers are aging (57 years and above). *We have a*n agrarian reform program since the 1960's (RA 3844 of 1963) but its completion remains to be achieved after 6 decades. Farmers in the Philippines could either be *kasama* (tenant farmers), *namumuisan* (leaseholders). We do not know exactly how many are land owner farmers-*mga tunay na magsasaka*.

This narrative report whose goal is to promote the adoption of organic agriculture as we work with the farmers, is taking off from the above major backgrounder. The baseline data: only 2 out of 100 farmers are into organic farming despite the many seminars/trainings we have conducted to explain the many benefits of organic farming. Their reasons are many: Yield decline during conversion stage, organic production practices are more laborious and time-consuming than conventional practices; production problems such as :pests and diseases, natural calamities (climate change - super typhoons, flooding, drought), lack of irrigation water ; lack of knowledgeable farm workers in organic farming, difficult to access organic inputs: organic fertilizer, and seeds ,limited market opportunities- difficult and expensive certification process. Also, adoption is low despite our 5 decades efforts could be attributed to the budgetary allocations that excessively favour chemical agriculture. Less than 1% of the total budget is allocated for organic agriculture although we have a law on organic agriculture. The budget for agriculture department is only about 2 % of the national budget but neighboring countries allocate as much as 5%. Agricultural staff and extension agents are not knowledgeable too as government funded Colleges of Agriculture do not offer any college degree on Organic Agriculture except for one of the 110 state supported agricultural colleges. The beneficiaries or outcome of any research or innovations are the consumers- the public. This opens the opportunity of public or consumer participation in research and development. The public or the consumers should also have the initiatives to know how their food is being produced, harvested, packaged, processed, transported / delivered or sold in the retail markets.In turn, the farmers should receive all the support- financial, materials, morale/encouragement to name a few. Leaving it all to them is inflicting further injustice and the height of ingratitude on our part as consumers. Consumers have to be aware and learn too how to farm organically. As practiced in some countries, they now have varied form of consumer supported organic agriculture (CSA). Producing safe, nutritious, and healthy food is not only the farmers domain. Food is a shared responsibility between farmers and consumers. Consumers should share with the responsibilities on how food is produced until it reaches the table. Many of our farmers are suffering from farming fatigue. Moreso, with the climate crisis and Philippines being a typhoon path, planting schedules become extra difficult and risks are very high. The war in Ukraine added undue burden even for organic farmers as the price of oil had increased. Farmers need all the support and care, motivations and incentives. In addition to crop insurance, they need life insurance as well.

Keywords: Organic agriculture, Organic farmers, Public participation in research, Consumers

Mexican Sunflower (*Tithonia diversifolia*) compost as substitute for synthetic fertilizers for Sweet Corn in Ultisols

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The use of organic fertilizer improves the fertility of Ultisols, consequently an increase in crop productivity. The aim of the study was to determine the optimum combination of Mexican sunflower (*Tithonia diversifolia*)-based organic compost and NPK synthetic fertilizer for the growth and yield of sweet corn in Ultisols. This study employed a completely randomized design (CRD), replicated three times. The treatment consisted of a combination of Mexican sunflower (MS) compost and NPK fertilizer, namely without fertilization (control), 100% of the recommended dose of NPK (600 kg/ha), 450 kg NPK + 3.75 tons/ha MS compost, 300 kg NPK + 7.5 tons/ha of MS compost, 150 kg of NPK + 11.5 tons/ha of MS compost, and 15 tons/ha of MS compost. The data were analyzed using analysis of variance (ANOVA) at a significance level of 5%. The treatment means were separated using Least Significant Difference (LSD) at 5 %. The results showed that the combination of MS compost + NPK fertilizer significantly affected the yield component of sweet corn. Three hundred kg of NPK + 7.5 tons/ha of MS compost produced highest yield, indicated by husked cob weight (256.56 g), unhusked cob weight (183.31 g), husked cob length (26.93 cm), husked cob diameter (43. 10 mm), and unhusked cob diameter (38.37 mm). Nonetheless, there were not significant effect of the combination on the growth of sweet corn where the combination tended to provide beter fresh root weight (39.14 g), shoot dry weight (121.76 g), root dry weight (14.32 g) and plant dry weight (136,08 g). Accordingly, an MS compost application rate of 7.5 tons/ha could replace 50% of the recommended NPK fertilizer.

Keywords: Natural resources, Organic fertilizer, Sustainable agriculture, Weed

A new concept for organic tomato breeding and determination of pathotypes of tomato leaf mold, *Fulvia fulva*, in Germany

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Leaf mold caused by the fungus *Fulvia fulva* (syn. *Passalora fulva* and *Cladosporium fulvum*) is an increasing problem in organically grown tomatoes in Germany. The disease first appeared in Germany in the 1983s and has become more prevalent since then. Breeding resistant varieties containing resistant genes (*Cf*) provided a solution to this problem, however, monogenetic resistances are being broken through newly developed pathotypes of the pathogen in recent times. Thus, the aims of this study were (1) to test the effectiveness of a breeding strategy based on F4 cross-breeding populations and the verification of new breeding varieties with a focus on optimum yield stability and pathogen resistance. (2) to record the regional distribution and dynamics of races of *F. fulva* in Germany from 2018 to 2020 as well as report on other known or unknown leaf pathogens. As a result, the breeding strategy of F4 progenies in general and the repeatability of the strategy were tested. Several tomato varieties were successfully selected under standardized conditions due to their resistance to *F. fulva*. More than 110 isolates from 32 different locations throughout Germany were obtained and identified as *F. fulva,* based on the molecular and morphological evidence. A total of 39 isolates were inoculated on a differential set of tomato varieties carrying different *Cf* resistance genes. Selected isolates were sequenced for the avirulence (*Avr*) genes *Avr2*, *Avr4*, and *Avr9* and determined the occurrence races of *F. fulva* in Germany. In addition, first detection and occurrence of *Trichothecium roseum* and *Stemphylium vesicarium* causing leaf spots on tomatoes were reported here.

Keywords: Organic crop production, Plant disease

Organic agriculture in the Philippines: Bane or Boon

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Organic agriculture as an effective, better approach, and a sustainable farming system has been a controversial concept and practice. It has been promoted and advocated by sustainable agriculture practitioners as a productive and a profitable bio-enterprise but is often questioned by conventional–modern agriculture practitioners. The approach has been designed as a viable technology that provides appropriate production and management skills for rural folks especially the small–limited resource landholders. It is reportedin several studies that this approach has increased productivity, lowered farmer's production cost, increased income, and provided food sufficiency and food security that raised the quality of life of the small landholders. It features the use of animal manures, crop residues, cover crops, crop rotation, and biologically based pest and disease controls. It does completely not allow the use of fossil-fuel based synthetic chemicals and fertilizers.

The adoption of this approach varies from country to country. It is developing rapidly but this adoption has not been satisfactory. In the USA, out of 911 million acres (≈ 369 million hectares) total farmland, only less than 1% share of agricultural land is into organic farming. Most of these farms are small landholdings. In India, adopters are about 2% and in the Philippines about 5%.

It is commonly recognized that organic agriculture can contribute to socio-economic and ecologically sustainable development, especially in poorer countries. Yet, some farmers especially the large landholders opined that organic agriculture system is the most unsustainable agriculture system. These contrasting notions about organic agriculture are discussed in this paper.

Keywords: Viable technology, Organic agriculture farming systems, Profitable bioenterprise, Small–limited resource landholder

Bioprospecting of plant root associated actinobacteria for plant growth promoting (PGP) properties

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Actinobacteria has enormous environmental applications and plays a significant role in ecosystem. These actinobacteria are commonly found in soil, rhizosphere, shoot region and extremophiles condition. Actinomycetes produce various secondary metabolites. In early studies, less work is done with root associated actinobacteria when compared with work on soil and rhizosphere associated actinobacteria. Studies with root deals with isolation, antimicrobial activity and PGP property. In addition to these activity, siderophore production and enzyme activity is also done. Actinobacteria from understudied ecosystem are promising for novel bioactive activities. In this study, Actinobacteria were isolated and characterized from Oryza sativa and Vigna mungo of Madurai, Tamilnadu. Out of 7 isolated cultures, 3 cultures have shown PGP properties. Strains PA1, PA2 and PA5 have shown significant production of Siderophore and IAA. The strains PA1, PA2 and PA5 were also sequenced to 16s rRNA sequencing, PA5 was confirmed as streptomyces, PA1 and PA2 are likely said to be streptomyces. The strains PA1, PA2 and PA5 were treated to seed germination by pot method, the plant growth was faster and good in all 3 strains when compared to control seeds. Another interesting observation in our study, root associated actinobacteria has been found to produce antimicrobial activity against plant pathogens, siderospore, enzyme and dye degradation. The isolation of microorganisms from within the tissue of healthy plant suggests that the host derives some benefit from harboring the endophyte. In this case the advantage may take the form of a secondary metabolite produced by the endo-phyte, since actinobacteria are well known for their ability to produce a broad range of antibacterial, antifungal, and plant growth-regulatory metabolites. Further experiments to determine the role of these endophytes in the development of the host plant are ongoing in our laboratory. The results are also as indication of the root associated actinobacterial diversity that can be found and explored for biotechnological purposes, especially for agricultural application.

Keywords: Actinobacteria; Root microbiome; Siderophores

Carcass quality and fatty acid composition of Thai native chicken raised in organic production system

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The objective of the study was to investigate the carcass characteristics, fatty acid composition and lipid indices of Thai native chicken raised in organic production system. A total of 240 1-day old chicks, 120 each of Lueng-hangkhao (LK) and Pradu-hangdum (PD), were assigned to three sub-groups and subjected to an extensive indoor rearing until 21 day of age and followed by a free-range rearing during 3 weeks of ages. All birds were provided with the same organic diet and were raised for 20 weeks. Four birds (2 male and 2 female) of each replication were slaughtered to evaluate carcass characteristics, sensory quality, chemical and fatty acid composition. The results showed that the thigh percentage and a* value of PD chicken were higher than that the LK chicken but lower in b* value of skin ($p<0.05$). In addition, The LK breast had the highest hardness and elasticity, while the overall sensory test was not different. The n-3, n-6 and n-9 fatty acid composition in breast meat of PD chicken were higher but lower in thigh meat than that the LK chicken.

Keywords: Organic production system, Thai Native chicken, Carcass characteristic, Fatty acid composition

The effect of organic fertilizer in ultisol media to stomata and morphology root's Oil Palm seeds

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Oil palm seedlings in Bengkulu have used ultisol soil media which has high aluminum content and acid soil properties. Acid soil disturbances can be identified from the nature of the leaves and roots. This study wasconducted to determine the stomata and morphology of the roots of oil palm in pre- nursery phase with organic fertilizer application. The experiment was conducted from July until October 2021 at the Research Experiment ,Faculty of Agriculture in Beringin Raya, Bengkulu city. The experiment used a Split Split Plot design with three factors. The main plot was shade (50% and 75%). The subplot was liquid organic fertilizer (LOF) with three levels (0 ml/L, 50 ml/L and 100 ml/L). The subplot was manure kinds with four levels. There were cow manure, chicken manure, goat manure and no manure. The experiment used seeds from Oil Palm Research Centre Indonesia, Simalungun variety. The cellular analysis variable measured stomata and root tissues. The analysis was done 3.5 months after plant in pre-nursery. The results gained from organic fertilizer application did not affect the size and stomatal index. Organic fertilizer treatment provides changes in tissues and root morphology. That increased the number of transport vessels, the size of the transport vessels and the size of the cortex which is a sign of at least Al accumulation in the roots. Morphologically, giving chicken manure forms more quaternary roots that play a role in nutrient absorption.

Keywords: Acid soil, Ultisols, Organic fertilizer, Root

Inhibition of seed germination under water extract of sorghum (*Sorghum bicolor* L.) plant and its ratoon cultivated in swamp land

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Allelopathy is a secondary metabolite produced by plants that affect the growth of surrounding plants. Sorghum produces allelopathic compounds for a bioherbicide. The application of sorghum water extract can control weeds. The study aimed to determine the inhibition of seed germination by water extract of different parts of sorghum cultivated in swamps. This study used a randomized block design with 7 treatments of the water extract of sorghum plant parts at seven weeks old, including control, leaves, stems, and roots of the main plant and its ratoon. The experiment applied the bioassay method to a petri dish. The findings revealed that the root of the main plant and the stem of the ratoon had the greatest germination inhibition. The lowest sorghum germination was accomplished by water extract application of root main plant and the stems of ratoon with germination inhibition 94% and 88%, plumule length (3.29 cm; 3.57 cm), radicle length (0.84 cm; 2.58 cm), plumule fresh weight (0.033 g; 0.030 g), radicle fresh weight (0.003 g; 0.008 g), sprouts fresh weight (0.075 g; 0.075 g), plumule dry weight (0.0033 g; 0.0030 g), radicle dry weight (0.003 g; 0.008 g), cotyledon dry weight (0.0185 g; 0.0168 g), seeds did not grow (48.00%; 47, 00%), cotyledon fresh weight (0.043 g; 0.038 g), and abnormal sprouts (46.00%; 31.00%), respectively. These findings indicate that bioherbicides can be developed from water extract of either from the roots of the 1st crop sorghum or stems of its ratoon.

Keywords: Allelopathy, Bioherbicide, Organic agriculture, Organic farming, Autotoxicity

Yield responses and nutrient uptakes of peanut (*Arachis hypogaea* L.) as affected by liquid organic fertilizer and vermicompost

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The use of leguminous crops, especially peanut, has been recommended as the rotation crop in the cropping systems of organic vegetable productions. In addition, vermicompost has been also widely applied as major nutrient sources, but its effectiveness was improved when it is accompanied by the use of liquid organic fertilizer. This research aimed to determine the effect of liquid organic fertilizer on yields and nutrient uptake of peanut grown in different dosages of vermicompost. A field experiment was arranged in Split Plot Design with three replicates. The main plot was vermicompost dosages (5, 10, 15, 20, and 25 tons ha^{-1}), and the sub-plot was liquid organic fertilizer applications (with and without fertilizer). Results indicated that the application of 15 tons ha^{-1} vermicompost was considered as the best dosage for increasing pod weight, grain weight of peanuts as well as N, P, and K uptakes. Moreover, the use of liquid organic fertilizer increased phosphorous uptakes by peanuts. There was no interaction effects of liquid organic fertilizer and vermicompost on all observed variables. The use of vermicompost is a necessity to increase yields of peanut grown in organic production systems.

Keywords: Liquid organic fertilizer, Organic vegetable production, Nutrient uptakes, Peanut, Vermicompost

Effects of cow rumen as bio-activators on nutrient contents of goat-manure based solid organic fertilizer

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Solid organic fertilizer is commonly applied in organic vegetable production including animal-manure based fertilizer. Goat manure is one of most widely available in the coastal agricultural areas of Bengkulu. However, this solid organic waste is classified as difficult to be decomposed by the microorganisms due to its specific texture. The uses of locally available bio-activators are strongly recommended in organic production system including cow rumen. This animal waste contains many xylanolytic bacteria that play important roles in organic material decomposition. This experiment was conducted to determine the effect of using rumen as bio-activators on the nutrient content of solid organic fertilizer of goat manure. The experiment was arranged in a Completely Randomized Design with three replicates. Treatments consisted of (1) goat manure + white sugar, (2) goat manure + cow blood + white sugar (3) goat manure + cow rumen + cow blood + white sugar, (4) goat manure + yeast + cow blood + white sugar, and (5) goat manure + EM4 + white sugar. Observed variables were pH, C-organic, N total, P_2O_5, K_2O, and color of goat-manure based solid organic fertilizer. This experiment is in progress and expected to be completed on August 2022. A full paper will be submitted to the conference at the expected date of submission. The results are expected to provide significant information on how cow rumen increase nutrient contents of goat-manure based solid organic fertilizer, which can be used to accelerate growth of vegetables in coastal agricultural lands.

Keywords: Bio-activator; Cow blood; Cow rumen; Goat manure; Solid organic fertilizer

Use of Moringa leaves (*Moringa oleifera* L.) and Seaweeds (*Sargassum* sp) to improve nutrient contents of liquid organic fertilizer

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Coastal agricultural lands could serve as alternative area for organic sweet potato production due to declining production areas in the highlands. The uses of organic fertilizer, both as solid organic fertilizer (SOF) and liquid organic fertilizer (LOF) are among the major inputs in organic production system. The uses of LOF had been reported to increase SOF application in many organic vegetable productions. Development of locally available resources in coastal area for organic fertilizer are becoming important to have successful organic production systems. There are several local resources in coastal areas that can be used as major nutrient sources for LOF, including moringa leaves and seaweed. This study was conducted to determine the effects of using moringa leaves and seaweeds in LOF production on its nutrient contents. A Completely Randomized Design experiment was established with the single factor treatments including (1) the flowering leaves of the moringa, (2) the unflowering leaves of moringa, and (3) seaweed with three replications. Observed variables were pH, C-organic, N total, P_2O_5 K_2O, Mg, and Ca contents in LOF. This experiment is in progress and expected to completed on August 2022. A full paper will be submitted to the conference at the expected date of submission. The results are expected to provide significant information on how moringa leaves and seaweeds increase nutrient contents of LOF which eventually can be used to accelerate growth of sweet potato in coastal agricultural lands.

Keywords: Coastal agricultural lands, Liquid organic fertilizer, Nutrient contents, Moringa leaves, Seaweeds

Effects of varying concentrations of organically sourced nutrients on vitamin C, and yield of Okra (*Abelmoschus esculentus*)

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Farmers used solely synthetic fertilizers for crop production. Consequently, problems such as deteriorating soil fertility and decreasing yields become a production issue. To mitigate the problems caused by the unsustainable use of these synthetic resources, organic production of crops has been promoted. Effects of using organic nutrient sources such as biochar, fish amino acid (FAA) and vermicompost on the vitamin C content and yield of okra were investigated. Biochar served as a soil amendment, FAA acted as an organic plant supplement, and vermicompost served as an organic fertilizer and soil conditioner. Sixteen treatments were used in this research. Abundant amounts of vitamin C were found in T12 (1FAA+1VC), which is 111.08 mg/100g, followed by T10 (1BC+1VC) with 76.91 mg/100g, and T8 (1BC+1FAA), having 46.8 mg/100g. Significantly lowest vitamin C was found in T2 (1BC), which only 6.97 mg/100g. The highest number of fruits and fresh fruit yield obtained was in T11 (2BC+2VC), which is highly significant with the control and other treatments such as T3, T4, T5, T6, T7,T8, T9, T10, T12, and T13.

Keywords: Biochar, Fish amino acid, Organic farming, Vermicompost

SWOT analysis of organic livestock farming in Thailand and opinions of officers of certification bodies for its promotion

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Organic agriculture production in Thailand uses two methods of certification, namely, self-certification (conducted by farmers) and certification by government divisions and non-government certified organizations. Officers responsible for certifying is an important force to promote organic livestock farming. The objective of the study is to compile the opinions of a group of officers responsible for certifying organic livestock production concerning farming and promotion to obtain information on the development of organic livestock farming. The study posted independent opinion polls anonymously concerning their attitudes towards the use of organic products; SWOT analysis of organic farming; and methods for enhancing organic farming. The results contained on the responses to the online poll revealed that they are not selective for organic products. The SWOT analysis indicated that the strengths of organic products are safety, benefits to health and the environment, biodiversity in Thailand, and premium organic products. The weaknesses of organic farming were marketing and productivity. For opportunities, the respondents pointed to health-living trends and premium grades of organic products. Finally, the threats to organic farming, are composed of the lack of knowledge and markets. Government support may provide organic farmers with opportunities to connect to marketing channels, such as public relations to switch to organic food.

Keywords: Organic livestock farming, SWOT analysis, Promotion

Screening of antagonistic bacteria to control *Colletotrichum* sp. causing anthracnose disease in tropical fruits

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The purpose of this study was to screen for antagonistic bacteria that are effective in controlling *Colletotrichum* sp., a causative agent of anthracnose disease in postharvest fruits. A total of 72 bacterial isolates were collected from the rhizosphere soil around the roots of the mango tree planted in Prachuap Khiri Khan Province, Thailand. Preliminary screening for fungal control efficacy against *Colletotrichum* sp. isolated from mango and papaya fruits by dual culture assay showed that the SP-51 isolate inhibited mycelial growth at 62.8% and 62.9%, respectively. The SP-51 isolate demonstrated the mycelial inhibition of the *Colletotrichum* sp. isolated from mango fruits at a maximum of 48.5% on day 2 and 31.9% for 7 days on average by the volatile organic compounds (VOCs) assay. VOCs assay of *Colletotrichum* sp. isolated from papaya showed a 7-day average inhibition of 31.4% by SP-51. A morphological study of *Colletotrichum* sp. mycelial growth cultured with SP-51 under a light microscope showed swelling and thinner fiber walls compared to the control. The characteristic study of SP-51 showed that it was a gram-positive, rod-shaped, spore-forming bacteria with heat tolerance up to 80 °C. SP-51 isolate should be further studied and developed as an alternative bioagent to control *Colletotrichum* sp. in mango and papaya fruits.

Keywords: Dual culture, Fungal control, Postharvest, VOCs

Bioactivity of (*Tectona grandis* L.f.) and cajuput (*Melaleuca cajuputi Powell*) leaf extracted on intibition fruit fungal pathogens

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This study aimed to examine the bioactivity of crude extracts from *Tectona grandis* L.f., as well as crude extracts and essential oils of *Melaleuca cajuputi* Powell on inhibition of mycelium growth of *Phomopsis* sp., *Rhzoctonai* sp., *Fusarium* sp., *Phytophthora* sp., *Pestalotiopsis* sp., *Lasiodiplodia* sp., *Colletotrichum* sp., *Greeneria* sp., *Gliocephalorichum* sp. Isolated from fruit disease by using poisoned food method and spore germination test. The results showed that, cajuput oil had highest percentage inhibitory effect on fungal mycelial growth. The highest concentration can inhibit 90-100% followed by 92.84% cajuput crude extract and 67.50% teak crude extract, respectively, Effective concentration (EC_{50} and EC_{95}) fo each extract were presented in this paper. The results showed that teak and cajuput extracts were highly effective in inhibiting the growth of some fungai fruit pathogen. The utilization of such plants could be a new alternative for biological disease control.

Keywords: Plant extracts, Bioactivity, *Tectona grandis*, *Melaleuca cajuputi Powell*

Effect of organic oil formulation of *Metarhizium rileyi* (Farlow Samson) to third larval instar of fall armyworm, *Spodoptera frugiperda* (J.E. SMITH) (Lepidoptera: Noctuidae)

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Metarhizium rileyi (Farlow) Samson is a cosmopolitan entomopathogenic fungus effective against major insect pests of agricultural crops. In the Philippines, this fungus was successfully isolated from mycosed armyworm larvae collected in corn and onion fields. Our previous bioassays showed the virulence of crude fungal suspensions of *M. rileyi* isolate from onion armyworm (*Spodoptera exigua* Hübner) to S. exigua and its cross infection to fall armyworm (*S. frugiperda* J.E. Smith) and true armyworm (*Mythimna separata* (Walker)). This research work aimed to formulate this entomopathogenic fungus for increased efficacy and stability. Emulsifiable concentrate (EC) of *M. rileyi* was prepared using various solvents. Exposure to EC formulations resulted to mycosis of 3rd larval instar of *S. frugiperda*. Pupation and emergence to adults were also affected. The efficacy and stability of these EC formulations are continuously being evaluated under storage conditions.

Keywords: Organic oil formulation, Metarhizium rileyi, Larval instar, Fall armyworm

SESSION 9 ONSITE/ONLINE: BIOLOGY IN AGRICULTURE

Application of nano organic materials for sustainable agro-productivity, food security and environment

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Global agricultural production suffers from many challenges and problems, including environmental pollution, soil degradation, climate change, depletion of natural resources and others. Nanotechnology represents one of the most important solutions that will help us overcome these challenges. Nanotechnology is helping to better manage organic farming using nano-fertilizers, nano-pesticides, biosensors, nano-diagnostics, nano-growth stimulators, and others. Organic nanos are formed through biological methods, not physical or chemical, as they do not follow the standards of organic farming. Hence, the green synthesis of nanomaterials or the so-called nano-methods is one of the requirements and components of organic farming. The use of plant parts such as stems, roots, leaves, flowers, fruits and various beneficial microbes such as bacteria, fungi and algae is essential for nanoparticle synthesis or the so-called green synthesis. In addition, organic nano-elements help agricultural production make optimal use of natural resources in a more sustainable way and reduce agricultural waste. Therefore, this review will highlight new ways and approaches to using nanomaterials in organic agriculture for sustainable agricultural productivity, food security and climate change.

Keywords: Nano organic fertilizer, Nano pesticides, Nano plant growth stimulators, Green synthesis

Fungal rot of white yam (*Dioscorea rotundata* Poir) and control with *Ocimum gratissimum* L. AND *Moringa oleifera* lam

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This study investigated the fungal rot of white yam (*Dioscorea rotundata* Poir) and control with *Ocimum gratissimum* L. and *Moringa oleifera* Lam. Yams (*Dioscorea rotundata* Poir) with symptoms of soft rot were obtained from Eke Awka market, Awka, Nigeria. The yams were surface sterilized, inoculated and plated out in Sabroaud Dextrose Agar and kept in ambient temperature ($30^{o}C \pm 5^{o}C$) for a period of five days for adequate growth of fungal mycelia. Ethanolic extract of *Ocimum gratissimum* L and *Moringa oleifera* Lam. of different concentration were prepared and introduced into sterile petri dishes and 15ml of molten SDA poured into sterile petri dishes. The fungal isolates were introduced into the petri dishes and were subsequently incubated at $370^{o}C$ for 24hrs. After incubation, the plates were collected and the zones of growth inhibition were measured. Pathogenicity test revealed that *Aspergillus niger* Van Tiegh, *Aspergillus terreus* Thom., *Aspergillus fumigatus* Fresenius and *Fusarium oxysporum* Schlecht were the causal organisms of rot in the white yam tuber with *Aspergillus niger* (39.5%) being the most virulent while *Aspergillus fumigatus* (7.5%) was the least virulent. All extracts showed varying degrees of antimyotic efficacy with moderately effective inhibition on the growth of the fungi mycelia. The potency of the extracts varied with plant materials and concentration of the extract. Inhibition of fungi growth increased with a corresponding increase in the concentration of extract. Ethanolic extract of *Moringa oleifera* proved to be more effective than *Ocimum gratissimum* and was the most fungitoxic. This potential can provide an alternative way of reducing and controlling yam rot by farmers as it is less expensive, environment friendly, non-phytotoxic and easy to prepare.

Key words: Yam pathogens, Plant extracts, Fungitoxic, Rot

Production of amylase enzyme from novel bacterial isolates, partial purification, embolization and its application in textile industry for modification of wool fibers dyed with natural dye

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Amylase is an extracellular enzyme, which plays an important role for the starch processing industry. It has extensive application in brewing and sugar production, in textile industries and in detergent manufacturing processes. The screening experiments from soil samples led to the isolation of 12 amylase producing bacterial isolates. Among these, 2 isolates showed maximum amylase production and they were selected for further physiological and biochemical investigation. Partial purification of the crude enzyme and its characterization and immobilization using nanoparticles were carried out. The potential application of the immobilized and partially purified enzyme was also studied in the field of textile for pre-treatment of wool fibres dyed with madder natural dye. Soil samples were collected and serial dilution methods done to selected single pore colonies and tested for amylase production .They were subjected further morphological and biochemical identification. Fermentation process on suitable medium was conducted to select the proper producing isolates, the enzyme was partially purified and applied to textile industry. The results showed that the maximum activity was obtained by using fermentation medium consists of starch ,10 peptone 10 yeast extract 5 , ammonium sulphate 5, magnesium sulphate 0.25 , CaCl 0.25 tween 80 1ml at pH 5.6 , fermentation time 48 h at $30C^0$. The obtained amylase was undergoing partial purification using ammonium sulphate at conc.60%. The purified enzyme was applied to textile industries. Amylase play an important role in different industries involving food, detergent as well as textile. The results obtained indicated that the wool fibers samples treated with enzyme exhibits higher color strength and fastness properties than the untreated fibers. The antimicrobial activity for the fibers treated with amylase enzyme gave higher results than the untreated fibers. Isolation of new bacterial strain with high amylase production was carried out. The potential application of the purified enzyme was studied in the field of textile. Partially purified amylase enzyme was used in the textiles in the treatment of wool fibers before dying with madder natural dye to improve the dyeing properties and the antimicrobial activity.

Keyword: Amylase, Production, Purification, Textile

Sandbar cropping systems: An innovative organic approach to support livelihood of the climate vulnerable people in Bangladesh

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Riverbank erosion displaced approximately 50,000 to 200,000 people in the country every year and the annual erosion rate along the Brahmaputra and Teesta had been recorded for 2,000 ha in recent years (CEGIS, 2020). Every year, this erosion of the aforesaid river developed barren sandbars and segments of *chars* along its main streams. *Char* refers a tract of land surrounded by the water of sea, lake or streams and it usually means of any accumulation in a river course or estuary that has been always confined by water body over the year (CLP, 2010). The study aimed at assessing the effects of sandbar cropping systems on household labour utilization and migration in *char* of Teesta riverine areas of North-Western part of Bangladesh. Keeping in view the focal objective, the specific objectives of the study were to ascertain the effect of sandbar cropping systems on household food security and well-being of the people in *char* land. The study was conducted in Gangachara and Kaunia upazilas under Rangpur district and Sundarganj and

Sadar upazilas under Gaibandha district. Eight (08) villages from eight unions of the four upazilas were selected purposively as the location of the research. The climate vulnerable people (>23 years old) who were involved in sandbar cropping systems in *char* land were the population of the study. Based on the criteria a list of 2060 sandbar farmers was collected from Practical Action Bangladesh an implementing NGO of sandbar farming systems. From this list, 20% sandbar farmers were selected randomly as sample of the study. Thus, the final sample size was 400. Necessary data were collected using a structured interview schedule from the sample during the period of October 2020 to December 2020. The findings showed that, after introduction of sandbar cropping systems in *char* land, the household labour utilization had increased significantly and simultaneously the status of seasonal labour migration reduced remarkably. Specifically, findings showed in Gaibandha that there had been 46.50% households and in Rangpur about 70% households had obtained 4 times higher working opportunities over the lean seasons (Nov-Mar) as outcome of sandbar cropping systems in *char* land. The study results also showed that sandbar cropping systems had great effects on women labour utilization in *char* land. Also, the level of women labour utilizations (21-30 days working opportunities in a month) had increased up to 41% Hhs in Gaibandha and 36% Hhs in Rangpur. Besides labour utilization, sandbar copping systems simultaneously decreased the seasonal labour migration status of *char* populations due to their continuous working engagement in introduced sandbar cropping systems. It has been observed that, about 51% Hhs in Rangpur and 33.5% Hhs in Gaibandha district had stopped their seasonal labour migration during the period of sandbar cropping operations. The sandbar cropping systems had also a positive effect on improving household food security and wellbeing. In Gaibandha, 81% of the people having low-income previously, moved to middle and high level of income by 50.5% Hhs and 30.5% Hhs, respectively. Whereas in Rangpur, the medium and high-level-income had increased by 22.5% and 52% Hhs, respectively. This increasing income had contributed in improving their purchasing power and resulting of their better household food security in *char* land. It is evident from the study that, about half (52%) of the Hhs in Gaibandha and 56%Hhs in Rangpur had shifted to sufficient household food secured situation from the previous low food secured condition as an outcome of sandbar cropping systems. Finally, sandbar cropping systems had pushed a large segment of vulnerable *char* populations into stabled and secured livelihoods through increasing their labour utilization opportunities in peripheral *char* land and thus, the household's income, food security and family wellbeing status had increased in a significant manner. The study findings formed part information capital for the extension workers, policy makers and international donors in designing policies and programs to eradicate extreme poverty in *char* lands through utilizing these barren sandbars into productive farming systems.

Keywords: Sandbar cropping systems, Innovative organic approach, Char

Plant growth promoting rhizobacteria as biostimulant in *Vigna radiata* L. under cadmium stress

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Inoculation of plant growth promoting rhizobacteria (PGPR) as microbial biostimulant agent is an appropriate strategy to be carried out to improve the phytoremediation of heavy metals. In this work, a phytoremediation system integrated with microbial biostimulants was evaluated for remediating heavy metal contaminated soils. The aim of the study was to examine the potential of PGPR based microbial biostimulants in increasing the phytoremediation system of *Vigna radiata* L. Plant growth and biological fertility were monitored to assess the efficacy of the microbial biostimulants. The microbial biostimulants consisted of two bacterial strains that showed plant growth-promoting traits like IAA, siderophore, HCN, phosphate solubilization along with the capacity to remediate heavy metal compounds. The results obtained in the showed the beneficial effects of the two microbial biostimulants on *V.radiata* under cadmium stress conditions with respect to increasing plant biomass, photosynthetic pigments, protein, carbohydrate and phenolic compounds. Furthermore, a positive interaction between PGPR-based biostimulant inoculation and host plant was recorded. Collectively, plants-treated with PGPR –derived biostimulants can diminish the heavy metal-induced deleterious effects in *V.radiata* and contaminated sites.

Keywords: PGPR, Microbial Biostimulant, Phytoremediation, *Vigna radiata* L.

Impact of microbial inoculation on herbicide affected soil

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The use of herbicides to control weed growth affects soil microbes.This study was done to investigate the morphological, photosynthetic pigments and soil glyphosate characteristics in *Capsicum annuam* with *Rhizobium* spp inoculation under herbicide and non-herbicide treatment. Soil samples were collected from Pannapatti located in the Salem District, Tamil Nadu, India. 1% of glyphosate herbicide was sprayed the sterilized soil. After herbicide soil and non-herbicide soil were put in 16 pots (8 pots: 8 pots). *Capsicum annuam* seeds were sown in each pot at green house. Analyzed the growth parameters of plant length, fresh weight and dry weight at 45 DAI. *Rhizobium* inoculated plants of leaf, stem, root length, fresh and dry weight were compared to uninoculated plants at 45 DAI. Results showed that herbicide content significantly decreased in *Rhizobium* inoculated soil compared to the control. The result was showed that microbes may possess potential to be used in bioremediation of glyphosate contaminated environments and protected the agricultural soil.

Keywords: Glyphosate, *Rhizobium,* Bioremediation, Herbicide

Energy bill certified rice seeds produced in Philrice research station in Zamboanga city, Philippines

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A study was conducted to calculate the energy bill utilized in the production of certified rice seeds in Philippine Rice Institute or PhilRice Experimental Station in Zamboanga City, Philippines. Four major farm operations were investigated to determine the total energy bill (TEB) derived from the direct energy bill (DEB), indirect energy bill (IEB) and embedded energy bill (EEB) using various energy coefficients and energy accounting procedures in various literatures, where all Mcal units were converted into liter diesel oil equivalent (LDOE). The four major farm activities include the pre-planting operation (PLO), crop establishment (CE), crop care and maintenance (CCM), harvest and postharvest (HPH). Results showed, the TEB amounted to 6,388.76 Mcal (559.73 LDOE).Of this total, the DEB, IEB and EEB contributed 66.68%, 30.57% and 2.75%, respectively. Of the four major farm operations, the CCM obtained the highest energy bill amounted to 217.14 LDOE, followed by CE (205.73 LDOE), PLO (98.39 LDOE) and HPH operation (38.48 LDOE). The seed production system is too dependent on fuel (66.68%), fertilizers and herbicides (21.33%) and labor (9.5%) or call these the “energy hotspots”.

Keywords: Efficient water management, Direct energy inputs, Indirect energy inputs, Embedded energy inputs, Restorative soil management system

ATPase subunit beta 1 (atp1b1) and glutathione s-transferase mu 3 (gstm3) expression in high and low freezability buffalo Epididymal spermatozoa

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The isolation and cryopreservation of cauda epididymal spermatozoa (ES) open new horizons for assisted reproductive technologies and animal genetic resource banking. However, variations in sperm freezability challenge the significance and potential applications of these techniques. This groundwork in swamp buffalo (*Bubalus bubalis*) distinguished high (HF) and low (LF) freezability ES by analyzing conventional and alternative sperm parameters and protein expressions following slow-freezing procedures. ES were recovered from the cauda epididymis of 18 individual swamp buffaloes after their humane slaughter. After cryopreservation, ES samples were categorized into HF and LF using post-thaw sperm motility. Sperm motion, kinematics and velocity and membrane integrity were assessed using computer-assisted sperm analysis (CASA) and hypo-osmotic swelling test (HOST), respectively. Accordingly, reactive oxygen species (ROS) generation and lipid peroxidation were also measured via fluorescence staining and thiobarbituric reactive substances (TBARS) assay. Proteins of interest, namely ATP synthase subunit beta 1 (ATP1B1) and glutathione S-transferase Mu 3 (GSTM3), were also examined for their presence in fixed cauda tissues via immunohistochemistry and relatively quantified from ES through Western blot. Results revealed that almost all CASA parameters except wobble, linearity, and straightness were significantly higher in HF as compared to LF. However, there were no substantial differences in plasma membrane integrity among freezability groups after a hypo-osmotic state. Nevertheless, the amounts of ROS and malondialdehyde were considerably greater in LF than HF. ATP1B1 and GSTM3 proteins were also found to appear in the luminal ES and the epididymal tubular epithelium. While ATP1B1 levels were comparable between freezability clusters, the abundance of GSTM3 significantly differs between HF and LF, which can be attributed to the protein's protective role against oxidative stress. These findings suggest that the variabilities in slow-freezing responses may be explored to differentiate freezability phenotypes in the swamp buffalo ES.

Keywords: Hypo-osmotic swelling test, Computer-assisted sperm analysis, ATP synthase subunit beta 1, Swamp buffaloes

Characterization of biosynthesized gold nanoparticles from *Streptomyces misionensis* PYA9 with biomedical and environmental applications

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Synthesis of nanoparticles using microorganisms is proven to be an environment friendly and cost effective approach compared to physical and chemical alternatives. Despite several researches on microbial

nanoparticles synthesis, reports on gold nanoparticles synthesis by Actinobacteria are only few. Actinobacteria, especially the genus, *Streptomyces*, is known for the production of bioactive secondary metabolites with potentials in medicinal, agricultural, environmental, and food industries. In this study, marine actinobacterium PYA9 isolated from the coastal sediments of Pondicherry, India effectively reduced aqueous chloroauric acid to gold nanoparticles (AuNPs). Characterization of actinobacteria mediated AuNPs was performed using UV-Vis, Particle size analyzer, TEM, FTIR, and XRD. A strong absorbance peak was observed at 539 nm in the visible region confirming the presence of AuNPs. The average size of AuNPs was found to be 61 nm. Images from TEM analysis revealed the presence of spherical and triangular nanoparticles. The biosynthesized AuNPs were screened for their antibacterial activity against *Salmonella typhi*, *Enterococcus fecalis*, *Staphylococcus aureus* and *Escherichia coli*. Relative to the actinobacterial compounds, the synthesized AuNPs displayed highest activity. The biosynthesized AuNPs also displayed anti-biofouling property when tested against two biofouling bacteria. Taxonomy of the actinobacterial strain PYA9 was identified using 16S rRNA sequencing as *Streptomyces misionensis*. Our study opens new opportunities of utilizing actinobacterial extracts as a reducing agent for synthesizing biocompatible, large scale AuNPs with potential applications in the fields of medicine and environment.

Keywords: *Streptomyces misionensis*, Gold nanoparticles, Biosynthesis, Marine, Applications

Benefits of organic vegetables grown in raisebeds: Experienced of selected urban barangays in Zamboanga City, Philippines amidst Covid 19 pandemic

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The COVID 19 pandemic crisis had significantly caused disruptions on local food production and distribution, from local buying to wholesaling, and from cross-regional logistics to consumptions and this is felt across the highly urbanized barangays in Zamboanga City, Philippines. This paper presents the experienced of selected urban barangays amidst CoVid 19 pandemic. The Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development or PCAARRD funded a project to evaluate the yield level and income of organic vegetables grown in raisebeds with 150 participating beneficiaries. Ten (10) raisebeds were required for each beneficiary where 1.0 sqm utilized for one vegetable crop per raisebed making a total of 1,500 raisebeds. A total of 5,446.1 kg of assorted vegetables were harvested in eight months period.Of this total, leafy vegetables contributed 79.8% (4,347.5 kg), while fruit vegetables shared 20.2% (1,098.6 kg), respectively. The total vegetables produced generated PHP236,630.50 (~4,732.6 USD) in total sales or this is equivalent to PHP1,577.54 raisebed^{-1}. Vegetable grown in raisebeds also offered direct access to food where each beneficiary consumed about 40% of the total vegetables produced which provide a savings (indirect income) of PHP94,652.20 from the total food consumed, while 60% (PHP141,978.30) derived from direct sales of surplus vegetables (direct income). Direct access to healthy food and income are the potential benefits of vegetable grown in raisebeds in addressing food security and unemployment amidst CoVid 19 pandemic. Organic vegetable production in raisebeds is one initiative to further enhance the capability of urban communities to be resilient and self-sufficient. Expansion of this type of production system with improved soil mix using locally available organic substrates, home-based organic inputs and concoctions can be achieved if government interventions and community supports are in place.

Keywords: Organic vegetables, Raisebeds, Urban barangays, Direct income, Indirect income

Redirecting urban farming to waste management: the case of human excreta as biofertilizer applied to tomato and eggplant crops

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Rapid urbanization and agricultural land conversion require increased production of food. In this case, about a million people where more than 86% of the population resides in highly urbanized zone in Zamboanga City. Increase in human population will result to increase in the disposal of human excreta and when this is mismanaged, this can contribute to environmental pollution. Addressing environmental protection at the same time addressing food security, human excreta is a potential source of nutrients for crops. Based on various literatures, utilization of human excreta as biofertilizer applied to various crops yielded potential results. A field experiment was conducted to characterize human excreta as night soil biofertilizer (NSB) and determine the growth and yield performance of tomato and eggplant crops applied with NSB. The latter was laid out in Randomized Complete Block Design (RCBD), while the former in Complete Randomize Design (CRD) both with subsampling. A total of 144 sample pots for each crop were utilized for data collection and subjected for Analysis of Variance (ANOVA) and use of LSD for the test of significance at Pval=0.05 and Pval=0.01, respectively. Results showed, NSB contains 1.9% N, 0.58% P, 0.21% K, 38.3% OM, 22.2% OC and 6.38 pH at 25^{o}C. Of the six treatments, 100% NSB application yielded significant results in terms of the number of leaves, plant height, stem diameter, number of flowers and fruit sets, number of harvested fruits and weight of harvested fruits across both crops. Population growth demands food, one of the many solutions that agriculture can offer is the urban agriculture where NSB can address the high cost of commercial grade chemical fertilizer and problem on waste disposal.

Keywords: Waste management, Human excreta, Night soil biofertilizer, Urban agriculture

Detection of classical swine fever virus (CSFV) using wet and dry rt- lamp among five- week old weanlings in selected provinces of the Cordillera Administrative Region, Philippines

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Classical Swine Fever Virus (CSFV) is one of the most economically important disease found in both wild and domestic pigs which is considered as the natural hosts. CSFV infected pigs resemble the same clinical signs associated with other diseases, therefore, a laboratory test is required to confirm its diagnosis. Dry and Wet format of RT-LAMP assay was used in this study to detect the virus from animals from different sources: blood, OP, serum, feces. A total of 31 weanling pigs were collected with whole blood, serum, oropharyngeal and fecal samples from different backyard farms in three selected provinces (Mountain Province, Ifugao and Benguet) of Cordillera Administrative Region (CAR). Half of the animals were apparently healthy, and the other half were ill upon collection. The samples were preserved in cold storage and were transported to the laboratory for extraction and amplification. These were further subjected to Wet and Dry format RT-LAMP assay and were detected for the presence of the virus with a specific target gene (E2 gene) in each type of sample. According to results, whole blood has the highest positivity rate of 61.3% (19/31) followed by sera at 48.4% (15/31) and finally, the oropharyngeal at 12.9% (4/31) but none in fecal samples. Furthermore, there were 23 pigs detected positive of the CSFv using the dry RT- LAMP regardless of the samples tested. On the other hand, only (9) animals were positive of the virus in wet RT- LAMP among the three different provinces. The study also revealed a higher diagnostic sensitivity of the dry RT-LAMP than wet RT-LAMP in the detection of CSFv.

Keywords: CAR, Classical Swine Fever Virus, E2 gene, RT-LAMP assay, Swine

Aluminum stress on 11 Soybean genotypes in nutrient cultures

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Aluminum stress was studied using 11 soybean varieties. This experiment aimed to evaluate eleven soybean varieties against Al stress. The research was carried out from May to June 2022. The location of the experiment was in the greenhouse of the Agronomy Laboratory, Faculty of Agriculture, Bengkulu University, Bengkulu. The study used a 2-factor completely randomized design with 3 replications. The first factor is the concentration of Al, namely: without Al; 0.5; 0.7 and 0.9 mM Al. The second factor was soybean varieties: Dega 1, Dena 1, Dena 2, Gepak Kuning, Deja 2, Devon 1, Demas, Detam 1, Agromulyo, Grobogan, and Detam 4. Al distribution was observed using hematoxylin. Observation variables include plant growth and plant sensitivity index to aluminum stress. Evaluation of 12 soybean varieties showed that Al stress caused Dega 1, Dena 1, Dena 2, Gepak Kuning to be sensitive varieties (0.5 ; 0.7 and 0.9 mM Al), Deja 2 to be tolerant varieties (0.5 mM). and sensitive (0.5 and 0.9 mM Al), Detam 4 became tolerant varieties (0.5 mM and 0.7 mM) and sensitive (0.9 mM Al), Devon 1, Demas, Detam 1, Agromulyo and Grobogan was tolerant variety (0.5 ; 0.7 and 0.9 mM). Staining with hematoxylin showed that root damage was getting worse by increasing the aluminum stress.

Keywords: Soybean varieties, Sensitive, Tolerant, Aluminum stress

Characterization of *Phytopythium* and *Pythium* species from freshwater area based on morphological traits and ITS sequence

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Despite the fact that *Phytopythium* and *Pythium* spp. are two important oomycetes genera found in a variety of envronments, many studies have focused solely on their pathogenic potential. The purpose of this study was to investigate and characterize the distribution of these genera in freshwater environments in Kanchanaburi and Nakhon Nayok Provinces using morphological and iternal transcribed sequence data. All 20 isolates were identified as *Globisporangium nunn, Pythium acanthicum, Phytopythium chameahyphon, Phytopythium cucurbitacearum, Phytopythium helicoides*, *Phytopythium iriomotense, Pythium torulosum*, *Phytopythium vexans* and unknown *Phytopythium* species. The reconstruction of phylogenetic trees using Neighbour-joining, maximum-likelihood, and maximum-parsimony algorithms revealed that the majority of isolates belonged to clade K. Furthermore, this is the first report of *Ph. iriomotense* has been found in Thailand or Southeast Asia. The current information on the discovered oomycetes will be useful in future research and applications.

Keywords: Oomycetes, *Phytopythium* sp., *Pythium* sp., ITS sequence, Diversity

Utilization CMS (Condensed Molasses Solubles) for microalgae *Tetraselmis* sp. growth

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Utilizing industrial waste to cultivate microalgae provides the chance to produce valuable biomass for various industrial applications. CMS is a byproduct of several fermentation industries that still include some nutrients, including amino acid, crude protein, and sugar residue. Utilization of nutrients from CMS from industrial waste by microalgae *Tetraselmis* sp. was investigated using an agar plate and followed by growth observation in a liquid medium with various replacement percentages of CMS (0%, 20%, 40%, 60%, 80%, ad 100%). CMS medium was suitable for the cultivation of *Tetraselmis* sp. On the agar plate, the results showed that *Tetraselmis* sp. can grow up to 40% CMS replacement. These results were followed by observations of growth in a liquid medium using an M3 medium as a control. After culture for nine days, the cell density of *Tetraselmis* sp. in M3 and 40% CMS medium was 7.4 x 10^6 and 9.4 x 10^6, respectively. Tetraselmis sp. can utilize the nutrients present in CMS for its growth, reducing production costs in microalgae cultivation.

Keywords: Agar plate, Cell density, CMS, Liquid medium, *Tetracelmis* sp.

Performance of solo garlic and regular garlic grown *in vitro* at WPM Media

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Garlic must be propagated vegetatively because it almost never produces fertile seeds. Unfotunately, conventional propagation is condiered not economical for solo garlic, as one seed of solo garlic can only produce one seed. In this respect, *in vitro* propagation offers a solutoin, allowing us to produce lots of seeds in very short of time. The objectives of this experiment were to get the best growing media, the right plant materials, and the best interaction between growing media and plant materials in promoting explant growth of garlic *in vitro*. The experiment used completely randomized design, arranged in factorial (2 factors, 9 replications). Sterilized plant materials (regular garlic, solo garlic) were planted in WPM, WPM + 2 ppm BAP, WPM + 2 ppm 2,4-D, WPM + 2 ppm BAP + 2 ppm 2,4-D, and MS media. The results showed that solo garlic demonstrated better growth than regular garlic. The best growing media for shoot regeneration was found in WPM + 2 ppm BAP while that for root initiation was in WPM + 2,4-D. The best shoot growth was found when plant materials were grown in WPM + 2 ppm BAP, shown by quick shoot emergence (1.6 days), heighest shoot length (8.23 and 7.97 cm), and largest leaf number (4.08 blade). In addition to producing rooting shoots, both plant materials also produced callii. The best interaction was found when solo garlic was grown in WPM + 2 ppm BAP or WPM + 2 ppm BAP + 2 ppm 2,4-D.

Keywords: Callus, Shoot growth, Propagation, Tissue culture

Polyethylene glycol-induced drought stress on seed germination stage and seedling growth of different soybean varieties

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Soybean is one of the potential crops to be developed in Indonesia as the primary source of vegetable protein. Along with population growth, the need for soybeans continues to increase from year to year. However, soybean productivity is low in Indonesia due to abiotic stresses, especially drought stress. Non-availability of drought-tolerant soybean varieties at different growth stages is a significant obstacle to increasing soybean productivity in Indonesia. There is a need for early screening of drought tolerant varieties at various growth stages to increase soybean productivity. The study was conducted at the seed germination stage, and seedling growth of five soybean varieties under polyethylene glycol (PEG) induced stress. Including the control (0.0 Mpa) , three osmotic potentials induced by PEG were -0.19 Mpa, and -0.67 Mpa. The soybean varieties used were Gepak Kuning, Derap 1, Dega 1, Dena 1, Dena 2, and Devon 1. The results showed that the interaction between varietal treatment and osmotic potential significantly affected growth percentage, root length, shoot length, root fresh weight, root dry weight, shoot fresh weight, shoot dry weight, root shoot ratio, and chlorophyll index (SPAD value)—both at the stage of seed germination and seedling growth. Induction of potential osmotic -0.19 Mpa reduced the growth percentage by 21.93% and 33.99%, 32.04% and 41.66 at root length, and by 41.66% and 36.77% at shoot length both at seed germination and seedling growth stages, respectively. Meanwhile, the potential osmotic induction of -0.67 MPa reduced the growth percentage by 39.75% and 52.81%, by 51.68% and 61.32% in root length, and by 61.82% and 55.95% on shoot length at both seed germination and seedling growth respectively. Gepak Kuning Variety has a better tolerance for osmotic potential than the other four varieties. Gepak Kuning variety can be used as a breeding material to develop drought-resistant soybean varieties.

Keywords: Abiotic stress, Crops, PEG-6000, Ratio root, shoot, Screening

Biogas production from co-digestion of water hyacinth and old substrate mushroom lumps left after mushroom cultivation

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This paper aims to study biogas production from co-digestion of water hyacinth and old substrates mushroom left after mushroom cultivation. The experiment design contains a single tank fermentation system using a 200 liters plastic tank connected to a gas storage tank which can read the gas level by using the fluid displacement method. The leaf and petiole of water hyacinths were chopped and mixed with old substrates mushroom lumps that were left after mushroom cultivation. The five ratios of co-digestion of old substrate mushroom lumps: water hyacinth, there were the old substrate mushroom lumps 100%, 70%: 30%, 50%: and water hyacinth 100%, respectively. The results showed that the volume of biogas generated from the five experiments was not significantly different ($P>0.05$). The 100% old substrate mushroom lump had the highest average biogas content of 219,245.72 cm^3, followed by the ratio of 30%: 70%, with an average biogas volume of 213,401.54 cm^3 whereas the least was the ratio of 50%: 50%, with an average biogas content of 191,635.72 cm^3, respectively. The ratio of 30%: 70% of the co-digest of old substrate mushroom lump: water hyacinth had the best rate to produce biogas.

Keywords: Biogas production, Waste material, Water hyacinth, Substrate mushroom