



Book of Abstracts

12th

(ICIST 2024)

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

On the occasion of the 120th Birth Anniversary of Her Majesty Queen Rambhai Barni of the Seventh Reign

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

29 November – 1 December 2024
Rambhai Barni Rajabhat University (Thailand)



The 12th International Conference on Integration of Science and Technology for Sustainable Development 2024
(12th ICIST 2024)



The 12th International Conference on Integration of Science and Technology for Sustainable Development 2024 (12th ICIST 2024)

29 November – 1 December 2024

Rambhai Barni Rajabhat University (Thailand)

Please visit: www.aatsea.org; Email: aatsea.icist@gmail.com

Organized by

- Rambhai Barni Rajabhat University (Thailand)
- Association of Agricultural Technology in Southeast Asia (AATSEA)
- Research Institute of Modern Organic Agriculture (RIMOAKMITL, Thailand)
- King Mongkut's Institute of Technology Ladkrabang (KMITL, Thailand)
- Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu (India)
- Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand)
- Bengkulu University (Indonesia)
- Society for Applied Biotechnology (India)
- Periyar University, Salem (India)
- Shwe Kant Kaw, KKS (Myanmar)
- CGC Organic Coffee (Laos)
- General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA, Japan)
- National Research Center, Cairo (Egypt)
- Padmavani Arts and Science College for Women Autonomous, Salem (India)
- Center for Closed Agriculture Production System (c-CAPS, Indonesia)

PREFACE



Asst. Prof. Waigoon Tongaram
(President of Rambhai Barni Rajabhat University RBRU)

On behalf of Rambhai Barni Rajabhat University, I am immensely proud and honored to be a co-host for the 12th International Conference on Integration of Science and Technology for Sustainable Development, 2024, which is being held in conjunction with the celebration of the 120th anniversary of the birth of Her Majesty Queen Rambhai Barni, Queen of the Seventh Reign.

The key themes of this conference are soil, water, and environmental conservation; biodiversity; food security and safety; and sustainable agriculture. These topics reflect the commitment of our university and all participants toward sustainable development and environmental stewardship. Thanks to the grace of Her Majesty Queen Rambhai Barni, this conference has been made possible. Her Majesty's devotion to improving the well-being of the people and her dedication to environmental conservation are fundamental principles that have led to this gathering. Her emphasis on the harmonious relationship between nature and society remains a guiding concept in addressing the challenges of climate change, biodiversity loss, and food insecurity.

The 12th International Conference aims to promote the exchange of knowledge and cooperation between researchers, practitioners, and policymakers, seeking methods for integrating science and technology for sustainable development. Throughout this conference, speakers and experts will share insights on critical issues such as soil quality, water resource management, biodiversity conservation, and sustainable agriculture.

On this occasion, I would like to express my gratitude to the organizing committee, supporters, and volunteers who have worked tirelessly to ensure the success of this conference. The dedication of everyone involved has created an important platform for discussion and collaborative efforts toward shared goals.

I hope the knowledge gained from this conference will contribute to addressing ecological and community issues, while also honoring the legacy of Her Majesty Queen Rambhai Barni, leading us toward a sustainable future that benefits all.

Finally, I would like to thank everyone for giving Rambhai Barni Rajabhat University the opportunity to be part of this conference. I sincerely hope that the knowledge generated here will inspire the creation of new solutions that will bring meaningful benefits to society and communities in the future.

Assistant Professor Waigoon Tongaram
President of Rambhai Barni Rajabhat University



**Prof. Hiroyuki Konuma (Ph.D.)
(Executive Director of GIAPSA, Japan)**

Asst. Prof. Waigoon Tongaram, President of Rambhai Barni Rajabhat University (Thailand),
Assoc. Prof. Dr Komsan Maleesri, President King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand,
Assoc. Prof. Dr. Indra Cahyadinata: Dean Faculty of Agriculture, University of Bengkulu, Indonesia,
Excellency Prof. Dr. Hussein Darwin: President of the National Research Centre, Egypt,
Asst. Prof. Dr. Terdsak Puramongkon: RMUTTO, Thailand,
Dr. Mariazeena Johnson CHANCELLOR, SATHYABAMA Institute of Science and Technology (deemed to be University), India,
Dr. T. Sasipraba VICE CHANCELLOR, SATHYABAMA Institute of Science and Technology (deemed to be University), India
Distinguished Guests, Participants, Ladies and Gentlemen,

On behalf of the Organizing Committee, I have the honor to welcome you all to the 12th International Conference on Integration of Science and Technology for Sustainable Development. I would like to extend my deep appreciation to more than 157 senior and young scientists from 16 countries who registered and participated either on the online or onsite modes. I will look forward for valuable contributions and deliberations during this conference.

In this occasion, I wish to express my sincere gratitude and heartfelt appreciation to Dr. Kasem Soyong for his tireless leadership, and his abled staff for various preparatory arrangements.

My special thanks go to the President of Rambhai Barni Rajabhat for 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 to the members of the organizing committee for their contributions, to all co-organizers and co-sponsors for their valuable support, to all participants for their interest, commitment and active participation, and to all those who provided valuable support for the successful organization and implementation of this conference.

Ladies and gentlemen,

The implementation of Sustainable Development Goals (SDGs) towards achievement by the year 2030 has faced serious challenges in recent past. Now, we have only 6 years left to attain the goals and, yet the situation is worsening in some of key important areas. Indeed, while we all struggled to fight with the negative impacts of climate change such as floods, droughts and cyclones, we also met with new challenges such as trans-boundary disease pandemics, conflicts, wars and economic

slowdowns. Achieving SDG goal No. 2 that is to end hunger, food insecurity and all forms of malnutrition by 2030, is not an exception.

On the other hand, FAO predicts that global food production needs to be increased by 50% by the year 2050 from the level in 2012 to meet increasing population and food demands at that time. FAO also projected that nearly 90 % of the total food production increase is expected to come from existing arable lands by yield increase through harnessing agricultural research and improved farm management technology, as we have very little potential globally to expand arable lands for additional food production. Therefore, it is obviously clear that “science and technology innovation” should play a key role in feeding the future world and ensuring world peace and stability.

The World Food Forum which was held in Rome in October 2022 placed “Science and Innovation” as one of the critical importance of transforming 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 in 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.

Ladies and gentlemen,

At the same time, we need to prevent the risk of widening the technology divide. We should share the research results and promote learning from others. We must raise public awareness on the potential benefits of science and technology innovation. At the same time, we should also advocate their risks and unintended negative consequences. We need to promote dialogue and transformative partnerships actively with all relevant stakeholders including private sector and civil society. In this opportunity, I wish to congratulate our researchers and scientists, including young researchers who are present here today who are committed to promoting partnership. This international conference, organized every year, brings all actors together, thereby continuously reaffirming the importance of collaboration, joint efforts and strong partnership.

Before closing, once again, I wish to thank Dr. Kasem Soyong for his dynamic leadership and tireless efforts ensuring the integration of research, science and technology towards a multisectoral partnership for a concerted and unified action. I sincerely wish the successful outcomes of the 12th International Conference on Integration of Science and Technology for Sustainable Development.

Thank you

Hiroyuki Konuma (Ph.D.)
Chairperson of the International Organizing Committee,
Executive Director of GIAPSA, Japan
Former UN/FAO Assistant Director-General and the Regional Representative for Asia and the Pacific
Former Professor of Meiji University, Japan



**Prof. Dr. Kasem Soyong
(President of AATSEA)**

Asst. Prof. Waigoon Tongaram, President of Rambhai Barni Rajabhat University (Thailand)

Co-organizers:

Rambhai Barni Rajabhat University (RBRU, Thailand), King Mongkut's Institute of Technology Ladkrabang (KMITL, Thailand), Sathyabama Institute of Science and Technology, Chennai, India, Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), SKK (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), Padmavani Arts and Science College for Women Autonomous, Salem (India), Center for Closed Agriculture Production System (c-CAPS, Indonesia).

International Advisory Committee:

Prof. Dr. Hiroyuki Konuma, President of GIAPSA Japan; Assoc. Prof. Dr Komsan Maleesri, President King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand; Assoc. Prof. Dr. Indra Cahyadinata: Dean, Faculty of Agriculture, University of Bengkulu, Indonesia; Excellency Prof. Dr. Hussein Darwin: President of the National Research Centre, Egypt; Asst. Prof. Dr. Terdsak Puramongkon: RMUTTO, Thailand; Dr. Mariazeena Johnson CHANCELLOR , SATHYABAMA Institute of Science and Technology (deemed to be University), India; Dr. T. Sasipraba VICE CHANCELLOR, SATHYABAMA Institute of Science and Technology (deemed to be University), India; Distinguished guests, International and local organizing committees, Chairs of organizing committees, Keynote and invited speakers, AATSEA Awardees, All presenters and participants, AATSEA Committees,

Ladies and Gentleman,

On the occasion of the 120th Birth Anniversary of Her Majesty Queen Rambhai Barni of the Seventh Reign , the 12th International Conference on Integration of Science and Technology for Sustainable Development 2024 (12th ICIST 2024) with the theme "Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture" is being held here at Rambhai Barni Rajabhat University (Thailand) .

The organizers who support the 12th ICIST 2024 are as follows:- the Rambhai Barni Rajabhat University (RBRU, Thailand), King Mongkut's Institute of Technology Ladkrabang (KMITL, Thailand), Sathyabama Institute of Science and Technology, Chennai, India, Rajamangala University

of Technology Tawan-ok (RMUTTO, Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), SKK (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), Padmavani Arts and Science College for Women Autonomous, Salem (India), Center for Closed Agriculture Production System (c-CAPS, Indonesia).

The 12th ICIST 2024 has pre and post conference programs which include visit to organic farms and renewal of the AATSEA Organic Inspectors in each country. November 30, 2024 is a full day conference with 8 plenary papers, and a total of 149 papers for presentation in 10 parallel sessions from 16 countries. 2-3 December 2024 are two visits at AATSEA Laboratory, the Research Institute of Modern Organic Agriculture (RIMOA), KMITL, and Organic Farms in Ratchaburi and Saraburi provinces.

I appreciate very much the constant support of the organizers: Rambhai Barni Rajabhat University (Thailand), King Mongkut's Institute of Technology Ladkrabang, KMITL (Thailand), Rajamangala University of Technology Tawan-ok, Chanthaburi Campus (Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), Shwe Kant Kaw, KKS (Myanmar), 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,

The Association of Agricultural Technology in Southeast Asia (AATSEA) is a non-profit organization officially approved on 17 April 2012. AATSEA has members from seniors and young scientists of many countries e.g. Thailand, Vietnam, Indonesia, Philippines, Malaysia, Laos, Myanmar, Cambodia, India, Pakistan, Bangladesh, Sri Lanka, Finland, China, Russia, Egypt, Turkey, Iran, South Korea, UK, USA, Boswana, Nigeria etc.

AATSEA activities include:

1. The publication of the International Journal of Agricultural Technology (IJAT) since 2005 and is now indexed in SJR- Scopus, CABI, CAS, ACI and TCI.
2. AATSEA is active in various 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; Thailand (2012, 2013), Laos (2014), Vietnam (2015), Myanmar (2016), Philippines (2017), Indonesia (2018), China (2019), Thailand (2020 and 2021), India in 2024.
4. AATSEA gives Outstanding Leadership Awards in Agriculture
5. AATSEA Scholarships for Masteral and Doctoral degrees
6. AATSEA Research Laboratory
7. AATSEA Organic Farm Model and Training Center
8. AATSEA Organic Certification and Earthsafe powered by AATSEA Organic Certification.

AATSEA has signed agreement for research collaboration, contribution of research findings, visiting professors and scientists, and training program to the following:

1. Egypt: National Research Center (NRC), Cairo, 27 November 2018
2. India: Periya 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 Foundation for organic certification, 13 October 2022

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

Furthermore, I am acknowledging with sincerest thanks all committees, members, co-organizers and all participants in making our conference successful. I am extending special congratulations to all AATSEA Awardees. As individuals, they contribute their experiences with sacrifices to work for the society. Also, the AATSEA committee and members, advisory committee, International and local organizing committee, deserve my fullest thanks in making this conference a complete success.

I should mention ahead, if there are any inconveniences and erroneous management during the conference, I apologize and bear all responsibilities to all the mistakes and inconveniences. I will be very appreciative to accept all comments, recommendation, and suggestions to improve the next conference.

Wishing all of you to have a wonderful time in Thailand and your travel back home safely after the conference .

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

Thank you very much for coming with sincere heart and attention to make our conference a complete success and hope you will continue to support the AATSEA family.

Prof. Dr. Kasem Soytong
AATSEA President



Ref. No.04.1/2024

Date: 2 April 2024

Title: The organizing committee for the 12th ICIST 2024

To Whom it may concerns:

AATSEA will organize the 12th International Conference on Integration of Science and Technology for Sustainable Development 2024 (12th ICIST 2024) on the occasion of the 120th Birth Anniversary of Her Majesty Queen Rambhai Barni of the Seventh Reign with the theme “Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture” during 29 November – 1 December 2024 at Rambhai Barni Rajabhat University (Thailand).

With this, the organizers are Rambhai Barni Rajabhat University (RBRU, Thailand), Association of Agricultural Technology in Southeast Asia (AATSEA), Research Institute of Modern Organic Agriculture, King Mongkut’s Institute of Technology Ladkrabang (RIMOA-KMITL, Thailand), Sathyabama Institute of Science and Technology, Chennai, India, Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand), Bengkulu University (Indonesia), Society for Applied Biotechnology (India), SKK (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), Padmavani Arts and Science College for Women Autonomous, Salem (India), Center for Closed Agriculture Production System (c-CAPS, Indonesia).

AATSEA is very much appreciated to appoint the organizing committee to manage the conference as follows:-

International Advisory Committee

Chairmanship:

Prof. Dr. Hiroyuki Konuma, President of GIAPSA, Japan

Asst. Prof. Waigoon Thongaram: RBRU, Thailand

Assoc. Prof. Dr Komsan Maleesri, President, King Mongkut’s Institute of Technology Ladkrabang (KMITL), Thailand

Assoc. Prof. Dr. Indra Cahyadinata: Dean Faculty of Agriculture, University of Bengkulu, Indonesia

Excellency Prof. Dr. Hussein Darwin: President of the National Research Centre (NRC, Egypt)

Asst. Prof. Dr. Terdsak Puramongkon: RMUTTO, Thailand

Dr. Mariazeena Johnson, Chancellor, Sathyabama Institute of Science and Technology (deemed to be University), India

Dr. T. Sasipraba Vice Chancellor, Sathyabama Institute of Science and Technology (deemed to be University), India

Committee

Prof. Dr. Juokslahti Tapio (Finland)	Prof. Dr. Wafaa Haggag (Egypt)
Prof. Dr. Bhat, Rajeev (Estonia, EU)	Prof. Dr. Moammar Dayoub (Finland)
Prof. Dr. Danesh, Y. R. (Iran)	Prof. Dr. Thangadurai Devarajan (India)
Prof. Dr. John C. Moreki (Botswana)	Prof. Dr. Laitha S. (India)
Dr. Hoang Pham (Vietnam)	Assoc. Prof. Dr. Indra Cahyadinata (Indonesia)
Dr. Samantha Chadranath karunarathna (Sri Lanka)	Dr. TSSK Patro (India)
Assoc Prof. Dr. Kampon Sriwatanakul (Thailand)	Prof. Dr. Zainal Muktamar (Indonesia)
Assoc. Prof. Dr. Rungtawan Yomla (Thailand)	Prof. Dr. Pakkapong Pongsuk (Thailand)
Assoc. Prof. Dr. Komkhae Pilasombut (Thailand)	Prof. Dr. Dwatmadji (Indonesia)
Prof. Dr. M. Chozin (Indonesia)	Assoc. Prof. Dr. Tatik Suteky (Indonesia)
Prof. Dr. Dwi Wahyuni Ganefianti (Indonesia)	Prof. Dr. Nanik Setyowati (Indonesia)
Prof. Dr. Fahrurrozi (Indonesia)	Assoc. Prof. Dr. Sigit Sudjatmiko (Indonesia)
Dr. Ali, N.F. (Egypt)	Dr. Nithya, Periya (India)
Assoc. Prof. Dr. Supattra Poeaim (Thailand)	Prof. R. Sarada Jayalakshmi (India)
Prof. Dr. TSSK Patro (India)	

International Organizing Committee

Chairman: Prof. Dr. Kasem Soyong (AATSEA; RIMOA-KMITL, Thailand)

Vice-chairman: Asst. Prof. Waigoon Thongaram (RBRU, Thailand), Asst. Prof. Dr. Terdsak Puramongkon (RMUTTO, Thailand), Assoc. Prof. Dr. Indra Cahyadinata (University of Bengkulu, Indonesia), Prof. Dr. Mamdouh Moawad (Egypt), Prof. Dr. Thangadurai Devarajan (SAB, India), Mr. Thet Lwin Htay (Shwe Kant Kaw, Myanmar), Mr. Young Ah Choi (CGC organic coffee, Laos)

Committee

Prof. Dr. Moammar Dayoub (Finland)	Prof. Dr. Okigbo, Raphael (Nigeria)
Prof. Dr. Jin-Cheol Kim (Republic of Korea)	Prof. Dr. Laitha S. (India)
Prof. Dr. John Moreki (Botswana)	Dr. Hoang Pham (Vietnam)
Prof. Dr. Nanik Setyowati (Indonesia)	Prof. Dr. Younes Rezaee Danesh (Iran)
Beletskiy Sergey (Russia)	Dr. Jiaojiao Song (China)
Dr. Md. Asaduzzaman Sarker (Bangladesh)	Maxim Mitrokhin (Russia)
Dr. V. Gopikrishnan (India)	Prof. Dr. Pakkapong Pongsuk (Thailand)
Asst. Prof. Dr. Jakrapan Wongpa (Thailand)	Asst. Prof. Dr. Preeyanan Sittijinda (Thailand)
Dr. Pheaktra Phal (Cambodia)	Assoc. Prof. Dr. Rungtawan Yomla (Thailand)

Chairman and Co-chairs

Plenary Session

Chair: Asst. Prof. Dr. Gopikrishnan, V. (India)

Session 1

Chair: Prof. Dr. MA Sarker (Bangladesh)

Co-chair: Prof. Dr. Pakkapong Pounsuk (Thailand)

Session 2

Chair: Assoc. Prof. Tatik Suteky (Indonesia)

Co-chair: Prof. Dwatmadji Dwatmadji (Indonesia), Assoc. Prof. Dr. Rungtawan Yomla (Thailand)

Session 3

Chair: Prof. Dr. Mendoza, Bernadette C. (Philippines)

Co-chairs: Dr. Hoang Pham (Vietnam), Dr. Supattra Poeaim (Thailand)

Session 4

Chair: Prof. Dr. Tapio Juokslahti (Finland)

Co-chairs: Dr. Hariz Eko Wibowo (Indonesia), Dr. Naruemon Mongkontanawat (Thailand)

Session 5

Chair: Dr. S. Lalitha (India)

Co-chairs: Assoc. Prof. Sigit Sudjatmiko (Indonesia), Dr. Bancha Wiangsamut (Thailand)

Session 6

Chair: Prof. Dr. Nagia Farag Ali (Egypt)

Co-chairs: Dr. Marufa Sultana (Bangladesh)

Session 7

Chair: Prof. Dr. Teodoro C. Mendoza (Philippines)

Co-chairs: Dr. Wuri Prameswari (Indonesia), Dr. Govindaraj Dev Kumar (India)

Session 8

Chair: Prof. Dr. Fahrurrozi Fahrurrozi (Indonesia)

Co-chairs: Prof. Dr. Mohammad Chozin (Indonesia), Prof. Dr. Devarajan Thangadurai (India)

Session 9

Chair: Prof. Dr. Zainal Muktamar (Indonesia)

Co-chair: Prof. Dr. Nanik Setyowati (Indonesia), Prof. Dr. Radhakrishnan Manikkam (India)

Session 10

Chair: Asst. Prof. Dr. Gopikrishnan, V. (India)

Co-chair: Prof. Dr. Preetha Manikandan (India)

Keynote speakers

Dr. Shikh Tanvee Hossain (IFOAM-ASIA)
Prof. Dr. Yu-Wei Yuan (China)
Prof. Jin-Cheol Kim (South Korea)
Prof. Dr. Radhakrishnan Manikkam (India)

Prof. Tapio Juokslaht (Finland)
Prof. Dr. Peter Phongphaew (Germany)
Prof. Dr. Teodoro Mendoza (Philippines)
Prof. Dr. Zainal Muktamar (Indonesia)

Invited speakers

Session 1

Prof. Dr. M.A. Sarker (Bangladesh)
Assoc. Prof. Dr. Indra Cahyadinata (Indonesia)

Prof. Dr. Pakkapong Pongsuk (Thailand)

Session 2

Assoc. Prof. Dr. Tatik Suteky (Indonesia)

Prof. Dr. Dwatmadji (Indonesia)

Session 3

Prof. Dr. Mendoza, Bernadette C. (Philippines)
Asst. Professor Dr. V. Gopikrishnan (India)

Dr. Hoang ND Pham (Vietnam)

Session 4

Dr. Govindaraj Dev Kumar (India)

Dr. Naruemon Mongkontanawat (Thailand)

Session 5

Assoc. Prof. Dr. Sigit Sudjtmiko (Indonesia)

Session 6

Prof. Dr. Nagia Farag Ali (Egypt)

Dr. Marufa Sultana (Bangladesh)

Session 7

Prof. Dr. Teodoro C. Mendoza (Philippines)
Assit. Prof. Dr. Lalitha, S. (India)
Prof. Dr. Dwi Wahyuni Ganefianti (Indonesia)

Prof. Dr. Jin-Cheol Kim (Republic of Korea)
Assoc. Prof. Dr. Usman Siswanto (Indonesia)

Session 8

Prof. Dr. Avinash Sharma (India)
Prof. Dr. Fahrurrozi Fahrurrozi (Indonesia)
Maxim Mitrokhin (Russia)

Prof. Dr. Mohammad Chozin (Indonesia)
Prof. Dr. Devarajan Thangadurai (India)

Session 9

Prof. Dr. Zainal Muktamar (Indonesia)

Prof. Dr. Nanik Setyowati (Indonesia)

Session 10

Prof. Dr. Preetha Manikandan (India)

Local Organizing Committee

Chairman: Asst. Prof. Waigoon Tongaram

Vice-chairman: Prof. Dr. Kasem Soyong, AATSEA, RIMOA-KMITL

Committee

Asst. Prof. Dr. Preeyanan Sittijinda (RBRU)

Assoc. Prof. Dr. Sinat Koslanant (RBRU)

Assoc. Prof. Sawatchai Sripanomthanakorn (RBRU)

Asst. Prof. Dr. Ekachai Kitkasachroen (RBRU)

Asst. Prof. Dr. Wayakorn Udompoch (RBRU)

Asst. Prof. Dr. Nakrob Tian-am (RBRU)

Asst. Prof. Dr. Jakrapan Wongpa (RBRU)

Asst. Prof. Dr. Naknimit Akkasriworn (RBRU)

Asst. Prof. Dr. Arpaporn Boonme (RBRU)

Assoc. Prof. Dr. Rungtawan Yomla (KMITL)

Prof. Dr. Pakkapon Pongsuk (KMITL)

Asst. Prof. Dr. Bancha Wiangsamut (RMUTTO, Chanthaburi)

Asst. Prof. Dr. Naruemon Mongkontanawat (RMUTTO, Chanthaburi)

General Secretariats: Dr. Jiaojiao Song (AATSEA, China)

Dr. Rujira Tongon (AATSEA, Thailand)

Vice-General Secretariat: Asst. Prof. Dr. Jakrapan Wongpa (RBRU)

Master of ceremony (MC): Miss. Auemporn Rungsiri (RBRU), Miss. Rawisuda Bunkrong (RBRU), Dr. Maythaya Preeyanon (RBRU), Mr. Suttichai Phetsri (RBRU)

Financial management and Registration: Dr. Jiaojiao Song (China), Dr. Rujira Tongon (AATSEA) and Dr. Rungrat Vareeket (AATSEA), Ms Benyapha Thongsri (Thailand)

Registration Desk: Ms. Benyapha Thongsri (AATSEA), Ms Di Chen (China), Ms. Ting-Yu Lin (Taiwan)

Accommodation (Hotel and local transportation): Asst. Prof. Dr. Sutisa Chaikul (RBRU), Mr. Suttichai Phetsri (RBRU), Miss Kanchana Treerat (RBRU), and Mr. Wipat Wittayanukorn (RBRU)

Food & Coffee break, reception: Ms. Orasa Onthavon (RBRU), Dr. Rungrat Vareeket (AATSEA), Ms. Benyapha Thongsri (AATSEA)

Session management: Ms Benyapha Thongsri, Mr. Soravitch Munsamak, Mr. Fortus Sernan Entierro (Philippines), Ms Di Chen (China)

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

Souvenirs: Asst. Prof. Dr. Supattra Raksaphort, Sattrapan Boonnoi, Dr. Jiaojiao Song (China)

General management: Mr. Sridhar D. (India), Mr. Fortus Sernan Entierro (Philippines), Mr. Andioka Jody Sertiawean (Indonesia), Ms. Puja Tri Rahma (Indonesia), Ms. Di Chen (China), Ms. Ting-Yu Lin (Taiwan)

Audiovisual, Photographer, IT and Session Convenors:

Puvadon Buabangplu (RBRU)

Mr. Soravitch Munsamak (Thailand)

Mr. Akkharat Jantub (AATSEA)

Pre and Post Conference:

Dr. Jiaojiao Song (China)

Dr. Rungrat Vareeket (AATSEA)

Mr Andioka Jody Sertiawean (Indonesia)

Mr. Fortus Sernan Entierro (Philippines)

Ms Puja Tri Rahma (Indonesia)

Ms. Benyapa Thongsri (AATSEA)

Mr. Soravitch Munsamak (RIMOA)

Prof. Dr. Pakkapong Pongsuk (KMITL)

Mr. Sridhar D. (India)

Assoc. Prof. Dr. Rungtawan Yomla (KMITL)

Ms Di Chen (China)

Ms. Ting-Yu Lin (Taiwan)

I hereby hope that the 12th ICIST 2024 conference are appointed and hopefully the conference will be completely managed upon your help and well co-operated.



Dr Kasem Soyong
President, AATSEA

AATSEA Outstanding Awards 2024

Lifetime Achievement Award in Scientific Development



Prof. Dr. Hiroyuki Konuma (Japan)



Prof. Dr. Peter Phongphaew (Germany)



Prof. Dr. Teodoro C. Mendoza (Philippines)

Education and Research Outstanding Awards



Prof. Dwi Wahyuni Ganefianti
(Indonesia)



Prof. Yuli Widiyastuti
(Indonesia)



Prof. Dr. M. Radhakrishnan
(India)

Community Development Outstanding Award



Shaikh Tanveer Hossain (Bangladesh)

Business and Entrepreneurship Outstanding Award



Assoc. Prof. Dr. Boonyen Chinachin (Thailand)

AATSEA Awards for Co-organizers

	Representative	Institutions
1	Asst. Prof. Waigoon Tongaram	Rambhai Barni Rajabhat University (Thailand),
2	Prof. Dr. Pakkapong Pongsuk	King Mongkut's Institute of Technology Ladkrabang (KMITL)
3	Assoc. Prof. Dr. Indra Cahyadinata	Bengkulu University (Indonesia)
4	Asst. Prof. Dr. V. Gopikrishnan (India)	Sathyabama Institute of Science and Technology (India)
5	Prof. Hiroyuki Konuma	General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA)
6	Prof. Dr. Nagia Ali	National Research Center, Cairo, Egypt
7	Asst. Prof. Dr. Terdsak Puramongkon	Rajamangala University of Technology Tawan-ok, Chantaburi Campus (Thailand)
8	Dr. Lalitha, S.	Periyar University, Salem (India)
9	Dr. Lalitha, S.	Padmavani Arts and science college for women India
10	Mr. Thet Lwin Htay	Shwe Kant Kaw, KKS (Myanmar)
11	Prof. Devarajan Thagadurai	Society for Applied Biotechnology (India)
12	Mr. Souvandouane, Souliya	CGC organic coffee (Lao PDR)
13	Prof. Dr. Zainal Muktamar	Center for Closed Agriculture Production System (c-CAPS, Indonesia)

OVERALL PROGRAM

Venue: Siri Rambhai Bhan Auditorium, Rambhai Barni Rajabhat University (RBRU)

Friday 29 November 2024: Arrival and Registration Day

Saturday 30 November 2024: 8:00-18:00 Conference Day

Session 1: Agricultural Extension, Education and Development

Session 2: Animal, Fisheries Sciences and Entomology, Marine biotechnology

Session 3: Biological Diversity and Microbiology

Session 4: Food Security, Food Safety, Science and Postharvest Technology

Session 5: Plant Science and Pest Management

Session 6: Soil and Environment, Water conservation

Session 7: Biotechnology and Innovation

Session 8: Organic Agriculture and Smart Farms

Session 9: Plant Biotechnology

Session 10: Animal Biotechnology

Sunday 1 December 2024: Back to Bangkok

DAY 1: Friday 29 November 2024: 3:00 pm. Travelling from Bangkok to Chanthaburi province and check in KP Grand hotel

DAY 2: Saturday 30 November 2024: Conference Day (Conference Hall: Siri Rambhai Bhan Auditorium, 2nd Floor)

Time	
8:00	MC staff
8:00-8:30	Registration
8:30-9:15	<p>Welcoming performance</p> <p>Welcome Address: Mr. Monsit Paisarntanawat, Governor of Chanthaburi Province, Thailand</p> <p>Inaugural address: Asst. Prof. Waigoon Tongaram, President, RBRU, Thailand</p>
	<p>Message for Opening Ceremony: Prof. Dr. Hiroyuki Konuma, President of GIAPSA (Japan)</p>
	<p>Felicitations: Prof. Dr. Kasem Soyong, President, AATSEA, Thailand</p>
	<p>Motivational Song: “Imagine”, Prof. Dr. Kasem Soyong</p>
	<p>AATSEA Awarding Ceremonies</p> <p>Presentation of AATSEA Awards: 8 Awards</p> <p>“Lifetime Achievement Award in Scientific Development”</p> <ul style="list-style-type: none"> - Prof. Dr. Hiroyuki Kunoma (Japan) - Prof. Dr. Peter Phongphaew (Germany) - Prof. Dr. Teodoro C. Mendoza (Philippines) <p>“Education and Research Award”</p> <ul style="list-style-type: none"> - Prof. Dr. Dwi Wahyuni Ganefianti (Indonesia) - Prof. Dr. M. Radhakrishnan (India) - Prof. Dr. Yuli Widiyastuti (Indonesia) <p>“Community Development Award”</p> <ul style="list-style-type: none"> - Shaikh Tanveer Hossain (Bangladesh) <p>“Business and Entrepreneurship Award”</p> <ul style="list-style-type: none"> - Associate Professor Dr. Boonyen Chinachin (Thailand) <p>Awarding the plaque to the co-organizer: 13 Awards</p> <ul style="list-style-type: none"> - Rambhai Barni Rajabhat University (Thailand) - King Mongkut’s Institute of Technology Ladkrabang (KMITL) - Bengkulu University (Indonesia) - Sathyabama Institute of Science and Technology (India) - General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA) (Japan) - National Research Center, Cairo (Egypt) - Rajamangala University of Technology Tawan-ok, Chanthaburi Campus (Thailand)

	<ul style="list-style-type: none"> - Periyar University, Salem (India) - Padmavani Arts and science college for women (India) - Shwe Kant Kaw, KKS (Myanmar) - Society for Applied Biotechnology (India) - CGC organic coffee (Lao PDR) - Center for Closed Agriculture Production System (c-CAPS, Indonesia) <p>Offering by Prof. Dr. Kasem Soyotong, President of AATSEA</p>
	Group photo
9:15-9:30	COFFEE BREAK
9:30-9:50	<p>Commemorative Speech on “Her Late Majesty Queen Rambhai Barni of the Seventh Reign and her orchard and farm in Chanthaburi” by Assoc. Prof. Prudhisan Jumbala, Committee Member and Secretary - General of the Prajadhipok - Rambhai Barni Foundation</p>

9:50-12:30 Plenary Session— Keynote speakers

Chair: Asst. Prof. Dr. Gopikrishnan, V.

Time	
9:50-10:10	<p>Dr. Shaikh Tanveer Hossain (Bangladesh) (Director, Policy & Strategy, IFOAM – Organics Asia) Smart, innovative organic agriculture for agrifood transformation in Asia</p>
10:10-10:30	<p>Prof. Dr. Tapio Juokslahti (Finland) Food safety in Finland, regulation and some practical implementations</p>
10:30-10:50	<p>Prof. Dr. Yu-Wei Yuan (China) Authenticity discrimination of rice with stable isotope and multielement profiles</p>
10:50-11:10	<p>Prof. Dr. Peter Phongphaew (Germany) Future organic farming</p>
11:10-11:30	<p>Prof. Dr. Jin-Cheol Kim (Republic of Korea) Biological control of pine wilt disease and other plant diseases by <i>Bacillus subtilis</i> JCK-1398</p>
11:30-11:50	<p>Prof. Dr. Teodoro Mendoza (Philippines) Fruit trees in agroecosystems: The way to address food insecurity and climate crisis</p>
11:50-12:10	<p>Prof. Dr. Radhakrishnan Manikkam (India) Harnessing actinobacteria from rare habitats for sustainable agriculture</p>
12:10-12:30	<p>Prof. Dr. Zainal Muktamar (Indonesia) Enhancing soil quality through long-term organic farming practice in tropical highland of Bengkulu, Indonesia</p>
12:30-13:30	LUNCH BREAK

RESEARCH FORUM

13:30-17:30 ORAL PRESENTATION - Parallel Sessions

Session 1 (Room 36301): Agricultural Extension, Education and Development

Time	Chair: Prof. Dr. MA Sarker (Bangladesh) Co-chairs: Prof. Dr. Pakkapong Pongsuk (Thailand)
13:30-13:45	IS: Prof. Dr. MA Sarker Rohingya refugee influx and socio-environmental consequences among host communities in the Teknaf Peninsula of Bangladesh
13:45-14:00	IS: Prof. Dr. Pakkapong Pongsuk Development of a commercial meat poultry production subject learning activity module together with the Blended Learning (BL) for knowledge and skill development of agricultural teacher training students
14:00-14:15	IS: Assoc. Prof. Indra Cahyadinata Socio-economic study of mud crab (<i>Scylla serrata</i>) households in Bengkulu Province, Indonesia
14:15-14:30	Patticha Kulsuwan Environmentally friendly consumer training manual and factors influencing buying decisions among undergraduate students at Mahidol University Amnatcharoen Campus, Thailand
14:30-14:45	Elsa Lolita Putri Sustainability issues of social forestry management based on coffee farming intensification in Indonesia
14:45-15:00	Ekkaphon Thongkaew The transmission of local wisdom in herbal processing of Pa Wa agroforestry network members, Kaeng Hang Maeo district, Chanthaburi province
15:00-15:15	Ridha Rizki Novanda Intention of reducing food waste among Indonesian gen Z: The role of religious beliefs, financial attitudes, and consumption cultures
15:15-15:30	Vibol Peuo Assessing the economic impact of livestock disease outbreaks at Battambang Province, Cambodia
15:30-15:45	COFFEE BREAK
15:45-16:00	Kantinan Thongtem Comparison of cost and return for durian farmers on magik growth innovation to increase the quality of durian production in Rayong Province, Thailand
16:00-16:15	Phanu Aeimtom Assessment of landscape quality for agricultural tourism development in Southern Si Chang Island, Chonburi Province
16:15-16:30	Di Chen Guidelines for developing agricultural vocational competencies in the twenty-first century at the Northeastern Institute of Agriculture, Thailand
16:30-16:45	Piyada Sangdang Factors affecting consumer purchasing decision for quality durian in Rayong Province, Thailand
16:45-17:00	Edi Susilo Effect of water stress and varieties on the bioherbicidal effectivity of sorghum aqueous extracts
17:00-17:15	Nuttareena Meehat Factors affecting the sharing of information on quality durian production by farmers in Rayong Province, Thailand
17:15-17:30	Natticha Naknat Opinions on factors affecting the use of Web-based Learning by quality durian farmers in Rayong Province, Thailand
17:30-18:30	Closing Ceremony

Session 2 (Room 36302): Animal, Fisheries Sciences and Entomology, Marine biotechnology

Time	Chair: Assoc. Prof. Tatik Suteky (Indonesia) Co-chairs: Prof. Dwatmadji Dwatmadji (Indonesia), Assoc. Prof. Dr. Dr. Rungtawan Yomla (Thailand)
13:30-13:45	IS: Assoc. Prof. Tatik Suteky Digestible nutrient intake in naturally infected goats with gastrointestinal strongyles in response to mixed-herb pellet supplementation
13:45-14:00	IS: Prof. Dwatmadji Dwatmadji Feed digestibility and efficiency of Bali cattle supplemented with herbs and humic acid fed with fermented palm oil sludge
14:00-14:15	Parinya Tiyaprasertkul Thymol-carvacrol supplementation in broilers: Impact on performance, blood biomarkers, and gut health
14:15-14:30	Papawee Phungkeha Fructooligosaccharides supplementation: Effects on broiler chicken performance, intestinal morphology, microbial community, and stress indicators
14:30-14:45	Endang Sulistyowati Feeding diet containing concentrate with fermented <i>Arenga pinnata</i> by-product on nutrient intakes, digestibility, and milk quality of lactating dairy cows
14:45-15:00	Paitoon Kaewhom The prevalence of capripoxvirus causing lumpy skin disease in beef cattle with no clinical signs on a well-managed cooperative farm
15:00-15:15	Sureewan Srijad The effect of different periods aestivation on recovery and nutritional composition of Apple snail (<i>Pomace</i> sp.)
15:15-15:30	Phunsin Kantha Comparative analysis between <i>Artemia parthenogenetica</i> and <i>Artemia franciscana</i> size from China, Vietnam and United States of America sources
15:30-15:45	COFFEE BREAK
15:45-16:00	Lerma Ocampo Cryo-survivability of frozen-thawed spermatozoa from commercially sold locally processed boar semen: Prospects for Animal Genetic Resources Cryobanking in the Philippines
16:00-16:15	Rachid Pengseesang Effects of dietary supplementation with Garlic and <i>Bacillus subtilis</i> on growth performance of <i>Anabas testudineus</i>
16:15-16:30	Hataichanok Passara Adulticidal activity of star anise, turmeric, cloves and combinations against houseflies
16:30-16:45	Krissana Ruang-Rit Species of commercially-farmed crickets in Thailand
16:45-17:00	Heri Dwi Putranto The KUB chicken feathers growth during 6 weeks of starter phase intensive management
17:00-17:15	Jirisuda Sinthusiri Lavicidal and Pupicidal activity of two plant essential oils and their major compositions against <i>Aedes aegypti</i>
17:15-17:30	Nawapol Arhamad-Armeen Efficacy of plant essential oils for repelling against American cockroach adults (<i>Periplaneta americana</i> L.)
17:30-18:30	Closing Ceremony

Session 3 (Room 36303): Biological Diversity and Microbiology

Time	Chair: Prof. Dr. Mendoza, Bernadette C. (Philippines) Co-chairs: Dr. Hoang Pham (Vietnam), Dr. Supattra Poeaim (Thailand)
13:30-13:45	IS: Prof. Dr. Mendoza, Bernadette C. Pathogenic potential of gram-negative bacteria isolated from organically grown lettuce samples, farm soil and fish amino acid fertilizer in two farms in Sariaya and Tayabas City, Philippines
13:45-14:00	IS: Dr. Hoang Pham The Edible Ectomycorrhizal Mushrooms (EEM) in southern Viet Nam: from nature to utilization
14:00-14:15	IS: Asst. Prof. Dr. Gopikrishnan, V. Exploration of associated actinobacteria for agricultural applications
14:15-14:30	Supattra Poeaim Evaluation of genetic diversity by molecular markers in Indian gooseberry (<i>Phyllanthus emblica</i>)
14:30-14:45	Patamaporn Tilarux Characterization and biological screening of the culturable endophytic actinomycetes from <i>Garcinia cowa</i> Roxb.
14:45-15:00	Nontakorn Taweekhajaroen Screening and characterization of Plant Growth-Promoting Bacteria from plant roots
15:00-15:15	Khemvane Sukkasem Effects of probiotics, <i>Lactocaseibacillus paracasei</i> and <i>Bacillus amyloliquefaciens</i> on water quality and inhibition of <i>Vibrio vulnificus</i> and <i>Vibrio alginolyticus</i> in White Shrimp, <i>Litopenaeus vannamei</i>
15:15-15:30	Sukritta Anutrakunchai Efficacy of indigenous <i>Beauveria bassiana</i> and <i>Purpureocillium lilacinum</i> for controlling <i>Planococcus minor</i> (Maskell) in durian fruits
15:30-15:45	COFFEE BREAK
15:45-16:00	IS: Asst. Prof. Dr. Gopikrishnan, V. Bioprospecting of earthworm cast associated actinobacteria for sustainable agriculture
16:00-16:15	Sararat Monkhung Efficacy of antagonistic bacteria for controlling major fungal rice (<i>Oryza sativa</i> L.) pathogens
16:15-16:30	Junaiporn Banluehan Biocontrol potential of the six strains of <i>Bacillus</i> sp. against rice pathogens, <i>Xanthomonas oryzae</i> .
16:30-16:45	Atcharawan Prathong Efficacy of the strains of <i>Pseudomonas</i> and <i>Acinetobacter</i> as biocontrol agents against bacterial wilt disease in chili
16:45-17:00	Aueangporn Somsri Application of tempeh and split gill mushroom extracts in herbal fresh sausage: Evaluation of antioxidant and antimicrobial activities
17:00-17:15	Karthik Prakash M P Bioprospecting of fish gut associated Actinobacteria for its probiotic properties
17:15-17:30	Tra H MAI Biological characteristics and cultivation of wild <i>Auricularia cornea</i> recorded in southern Viet Nam
17:30-18:30	Closing Ceremony

Session 4 (Room 36304): Food Security, Food Safety, Science and Postharvest Technology

Time	Chair: Prof. Dr. Tapio Juokslahti (Finland) Co-chairs: Dr. Hariz Eko Wibowo (Indonesia), Dr. Naruemon Mongkontanawat (Thailand)
13:30-13:45	IS: Dr. Govindaraj Dev Kumar Photon based sanitation of food contact surfaces
13:45-14:00	IS: Dr. Naruemon Mongkontanawat Vinegar production from pickled mango peel waste
14:00-14:15	Hariz Eko Wibowo Analysis of household food security post pandemic in Mukomuko District, Bengkulu Province
14:15-14:30	Wanninee Chankaew Evaluation of plant-based protein products: Tempeh derived from the local edible freshwater alga <i>Chara corallina</i> Willdenow on immune function, toxicity, and antioxidant activity
14:30-14:45	Khanitta Ratprakhon Result of forming packaging from durian husk using modified starch and cassava starch
14:45-15:00	Kanyarat Lueangprasert NaCl floatation method on physicochemical quality of Kaew Kamin Mango during harvesting indices
15:00-15:15	Kannikar Charoensuk The nutritional values of chicken feet and effect of cryogenic freezing techniques on freezing rate and its frozen product quality
15:15-15:30	Suharyanto Suharyanto Effect of <i>Melastoma malabathricum</i> leaf powder particle size on the physicochemical properties and acceptability of beef meatballs
15:30-15:45	COFFEE BREAK
15:45-16:00	Uracha Wanich Dried pork curry with Cowa leaves sausage: The effect of drying time and temperature on quality attributes
16:00-16:15	Chirasak Phoemchalard Using Orange Data Mining for meat classification: A preliminary application of machine learning
16:15-16:30	Boondarika Sumana Potential of snake fruit (<i>Salacca zallacca</i>) cultivars on product quality for fermented vinegar beverages
16:30-16:45	Kannikar Charoensuk Formulation, physiochemical and antibacterial of mangosteen (<i>Gacinia mangostana</i>) juice
16:45-17:00	Usman Kris Joko Suharjo Pre-harvest dormancy breaking of potato seeds by gamma-ray irradiation and foliar spray of GA3 applied at different times
17:00-17:15	Ananya Chantharobol Development of healthier durian cookie with added inulin
17:15-17:30	Ma Ysalou Agbayani Antibacterial potential of chitosan extracted from the shells of green mussels (<i>Perna viridis</i> ; linnaeus, 1758) against <i>Escherichia coli</i> and <i>Staphylococcus aureus</i>
17:30-18:30	Closing Ceremony

Session 5 (Room 36305): Plant Science and Pest Management

Time	Chair: Dr. S. Lalitha (India) Co-chairs: Assoc. Prof. Sigit Sudjtmiko (Indonesia), Dr. Bancha Wiangsamut (Thailand)
13:30-13:45	IS: Assoc. Prof. Sigit Sudjtmiko Impact of urea foliar application frequency on swamp rice strains
13:45-14:00	Bancho Wiangsamut Effects of sterilizing agents, phenolic compound inhibitors, and plant hormones on <i>in vitro</i> lateral bud explant culture of three Durian varieties
14:00-14:15	Sridhar, D. Plant growth promoting rhizobacteria adoptive responses of sesame under salinity stress
14:15-14:30	Ritchuda Kaokrathok Growth and yield of newly released Bambara groundnut variety grown in the Central plain of Thailand
14:30-14:45	Muhammad Faiz Barchia Shallot cultivation on unsuitable agro-climate and marginal lowland treated with chicken manure in Bengkulu, Indonesia
14:45-15:00	Pakanan Jiamtae Evaluation of soybean (<i>Glycine max</i> L.) under different salinity stress on seedling growth and biochemical responses
15:00-15:15	Wikanya Prathumyot Effect of seed soaking with nitrophenolate-based biostimulant on germination and growth of Chili var. Kanchanaburi 1
15:15-15:30	Ngoc-An Nguyen <i>In vitro</i> antagonistic effect of <i>Bacillus subtilis</i> D5 against <i>Fusarium oxysporum</i> pathogenic to tomato
15:30-15:45	COFFEE BREAK
15:45-16:00	Supattra Poeaim Evaluation of structural traits and starch yield in sixteen cassava (<i>Manihot esculenta</i> Crantz) varieties grown in Ong Phra Subdistrict, Dan Chang District, Suphan Buri Province
16:00-16:15	Chatphon Tebdoie Optimizing simplified growing media for enhanced cannabis cultivation
16:15-16:30	Jirachaya Yeemin Effect of gamma irradiation on median lethal dose for mutation induction in <i>Zinnia elegans</i> and <i>Cosmos bipinnatus</i>
16:30-16:45	Sutinee Supreeworakij Influence of media and plant growth regulators (PGRs) on <i>in vitro</i> seed germination and development of <i>Doritis pulcherrima</i> Lindl.
16:45-17:00	Porntinun Pitisom Efficacy of mangosteen peel extract and phosphonic acid on Durian root rot disease (<i>Phytophthora palmivora</i>) <i>in vitro</i>
17:00-17:15	Varee Yoosumran Induced mutation of Curcuma hybrid cv. sweetmemory through tissue culture by Ethyl Methanesulphonate (EMS)
17:15-17:30	Pushpalatha Ganesh Genome-wide identification and a relative expression analysis of <i>OsFAR1/FHY3</i> gene family under salt stress in among <i>Oryza sativa japonica</i> and <i>Oryza sativa indica</i>
17:30-18:30	Closing Ceremony

Session 6 (Room 36202): Soil and Environment, Water conservation

Time	Chair: Prof. Dr. Nagia Farag Ali (Egypt) Co-chairs: Dr. Marufa Sultana (Bangladesh)
13:30-13:45	IS: Prof. Dr. Nagia Farag Ali Biodegradation of dyes in textile wastewater using some newly fungal isolates and immobilization method
13:45-14:00	IS: Dr. Marufa Sultana Sustaining soil fertility and enhancing yields in Maize-Mungbean-t. Aman cropping system through long-term integrated nutrient management
14:00-14:15	Kartika Utami Assessing the impact of frequent flooding on soil quality of paddy fields: multidimensional scaling approach
14:15-14:30	Prat Kongsombut Metrics analysis and evaluation of landscape mosaic changes to monitor the identity of forest monastery green space, Northeast Thailand
14:30-14:45	Khairul Amri Determining water flow efficiencies at Kah Pulo Geto primary irrigation channels, Bengkulu, Indonesia
14:45-15:00	Uthaiwan Phewphan Utilizing of aerial photography to study the distribution of seaweed in Saphan Hin Park, Mueang District, Phuket Province, Thailand
15:00-15:15	Benyapha Thongsri Microorganisms for bioremediation of soils contaminated with heavy metals
15:15-15:30	Mayamor Soyong Improving geolocation data from IRRI germplasm collection of rice and Geographic Population Structure (GPS)
15:30-15:45	COFFEE BREAK
15:45-16:00	Priyono Prawito Population and diversity of soil macrofauna in oil palm - banana cropping system in Indonesia
16:00-16:15	Thanadech Kangsawat Water management in areas outside irrigation zone of Tha Takiap sub-district, Tha Takiap district, Chachoengsao province, Thailand
16:15-16:30	Elsa Lolita Putri Projected land use change and impact in South Seluma Sub-district Bengkulu
16:30-16:45	Bandi Hermawan Comparison of permeable and water holding capacity between flat and steep soils
16:45-17:00	Pattana Somniyam Growth and yield of Japonica rice (Koshihikari Var.) that affected by vermicompost
17:00-17:15	Jiraporn Phumthong Acceptance of nutrient management based on soil analysis values among durian farmers in Rayong Province, Thailand
17:30-18:30	Closing Ceremony

Session 7 (Room 36209): Biotechnology and Innovation

Time	Chair: Prof. Dr. Teodoro C. Mendoza (Philippines) Co-chairs: Dr. Wuri Prameswari (Indonesia), Dr. Govindaraj Dev Kumar (India)
13:30-13:45	IS: Prof. Dr. Teodoro C. Mendoza Hybrid rice genotypes: The innovation pathway to make the Philippines rice self-sufficient
13:45-14:00	IS: Prof. Dr. Jin-Cheol Kim Successful commercialization of <i>Bacillus methylotrophicus</i> 8-2 as a biocontrol agent against various plant diseases
14:00-14:15	IS: Dr. S. Lalitha The effect of Plant Growth- Promoting Rhizobacteria (PGPR) on arsenic accumulation and the growth of Pigeonpea (<i>Cajanus cajan</i> L. Millsp)
14:15-14:30	IS: Assoc. Prof. Dr. Usman Siswanto Yield and artemisinin content of six polyploid accessions of <i>Artemisia annua</i> grown at medium altitude in Indonesia
14:30-14:45	Sane Buasanit The effect of using Chinese Water Chestnut flour to partially replace wheat flour in steamed cake (Pui Fai)
14:45-15:00	Sureeporn Boonna Production of herbal kombucha with agarwood (<i>Aquilaria crassna</i> Pierre ex Lec.) levae and its biological properties
15:00-15:15	Muhammad Farid Estimation of sediment thickness in oil palm plantations using the HVSR method and its relation to the crop's productivity
15:15-15:30	Hanh Thi Dieu Nguyen Characterization of antagonistic actinomycete on dragon fruit fungal pathogen <i>Neoscytalidium dimidiatum</i>
15:30-15:45	COFFEE BREAK
15:45-16:00	IS: Dwi Wahyuni Ganefianti Testing the advantages of six new hybrid chili pepper genotypes in the lowlands
16:00-16:15	Sittipun Sinumporn Investigation of Genetic diversity of two elite rice cultivars using SSR based marker
16:15-16:30	Reny Herawati Detection of blast resistance genes in inbred rice lines using site-specific blast races
16:30-16:45	Thanaset Thongsaklaing Identification of new position of DNA insertion and 24-bp INDEL Mutation polymorphism in prolactin gene promoter of Thai native chickens
16:45-17:00	Wuri Prameswari Total phenolic content, flavonoid content, and antioxidant activity in various parts of butterfly pea accessions in Bengkulu, Indonesia
17:00-17:15	Somphit Sornyotha The family 36 carbohydrate-binding module of <i>Paenibacillus xylanoclasticus</i> TW1 xylanase: Characterization and recognition in epidermal tissue of sweet potato roots
17:15-17:30	Putri Mian Hairani Glucose content, viability and vigor four cucumber seed lots
17:30-18:30	Closing Ceremony

Session 8 (Room 36203): Organic Agriculture and Smart Farms

Time	Chair: Prof. Dr. Fahrurrozi Fahrurrozi (Indonesia) Co-chairs: Prof. Dr. Mohammad Chozin (Indonesia), Prof. Dr. Devarajan Thangadurai (India)
13:30-13:45	IS: Prof. Dr. Avinash Sharma Discovering previously uncultured microorganisms from antarctica to exploit their biotechnological potential for a sustainable future
13:45-14:00	IS: Prof. Dr. Mohammad Chozin Evaluation of ear yield stability of organic sweet corn hybrids at different elevations in a humid tropical climate
14:00-14:15	IS: Prof. Dr. Fahrurrozi Fahrurrozi Weed-based liquid organic fertilizer increased growth and yields of organically grown sweet corn
14:15-14:30	IS: Prof. Dr. Devarajan Thangadurai Phenetic engineering of potential microbes for biocontrol and biofertilizer applications in Chili and Coffee
14:30-14:45	Jirachaya Yeemin Effects of LDD1 compost and chemical fertilizer on the growth, yield and antioxidant activity of <i>Chrysanthemum indicum</i> L.
14:45-15:00	Pattana Somniyam Effects of local planting materials on the growth of organic chinese kale in raised bed technique
15:00-15:15	Dwi Wahyuni Ganefianti Growth of Dendrobium Oryen orchids at the acclimatization stage by providing organic materials to the planting media and the spraying foliar fertilizer
15:15-15:30	Souliya Souvandouane Organic agriculture history in Laos
15:30-15:45	COFFEE BREAK
15:45-16:00	IS: Maxim Mitrokhin RF practices with organic and halal products
16:00-16:15	Kasem Soyotong Modern organic agriculture and earthsafe powered by AATSEA organic certification from farm to table
16:15-16:30	Sernan Fortus Pre-test of investigating the impact of organic production in comparison with chemical production on the growth and yield of lettuce in various hydroponics system
16:30-16:45	Panida Duangkaew Yield enhancement efficacy of <i>Bacillus</i> sp. biofertilizer on pineapple (<i>Ananas comosus</i> L. Merr.) producion in Prachuap Khiri Khan, Thailand
16:45-17:00	Kartika Utami Distribution of humic substances and organic matter fraction: effects of long-term application of vermicompost
17:00-17:15	Sunisa Prawat Adoption of organic agricultural standards in organic farming: a case study in community enterprises in Roi-Et Province, Thailand
17:30-18:30	Closing Ceremony

Session 9 (Lanson conference room, 7th Floor): Plant Biotechnology

Time	Chair: Prof. Dr. Zainal Mukhtar (Indonesia) Co-chairs: Prof. Dr. Nanik Setyowati (Indonesia), Prof. Dr. Radhakrishnan Manikkam (India)
13:30-13:45	IS: Prof. Dr. Zainal Mukhtar Distribution of weed species and soil nitrogen, phosphorus, and potassium across various land uses in coastal areas
13:45-14:00	IS: Prof. Dr. Nanik Setyowati Weed control in water-saturated soybean cultivation in the coastal area
14:00-14:15	Yupa Pootaeng-On Assessment of bioactive compounds from <i>Miliusa sessilis</i> plant against anthracnose diseases on mango fruits (<i>Mangifera indica</i> L. 'Nam Dok Mai Si Thong')
14:15-14:30	Chaowanee Laosutthipong Genetic diversity of common figs (<i>Ficus carica</i>) cultivated in Thailand determined by 18S ribosomal RNA sequence
14:30-14:45	Yuli Widiyastuti Morphological variation and chemical profile of <i>Ficus septica</i> Burm. f from different natural population
14:45-15:00	Suthida Aphichartphankawee Nutritional evaluation of santol (<i>Sandoricum koetjape</i>) and the effects of santol flesh extract on <i>Drosophila melanogaster</i>
15:00-15:15	Sempurna Ginting Attack intensity and effectiveness pheromone on <i>Oryctes rhinoceros</i> L. in oil palm, Seluma district, Bengkulu
15:15-15:30	Florenda Temanel <i>In vitro</i> propagation of Turmeric (<i>Curcuma longa</i> Linn.) using Murashige and Skoog (MS) media supplemented with varying concentrations of Thidiazuron (TDZ)
15:30-15:45	COFFEE BREAK
15:45-16:00	Pattama Nitthaisong Optimum potassium fertilizer rate for growth, biomass yield, and fuel properties of <i>Leucaena</i> (<i>Leucaena leucocephala</i>) cv. Tarramba in sandy soil
16:00-16:15	Atra Romeida The screening of soybean drought tolerant using polyethylene glycol 6000 for entisol of Bengkulu Coastal Land
16:15-16:30	Angsima Jitwetkul Plant regeneration of <i>Dimocarpus longan</i> var. obtusus Leenh. by tissue culture technique
16:30-16:45	Wimonsiri Sehawong Comparative effects of drought stress on growth and yield components of Riceberry and KDML 105 rice varieties
16:45-17:00	Marlin Marlin The growth and yield of second-generation of shallot mutants caused by gamma-ray irradiation (<i>Allium cepa</i> var. <i>Aggregatum</i>)
17:00-17:15	Hesti Nur'Aini Morphological diversity of banana accessions collected from Bengkulu Province, Indonesia
17:15-17:30	Indah Liswanti Growth and yield of maize treated with plant-based liquid fertilizers at varying concentrations and frequency of application
17:30-18:30	Closing Ceremony

Session 10 (Samsorn conference room, 8th Floor): Animal Biotechnology

Time	Chair: Asst. Prof. Dr. Gopikrishnan, V. (India) Co-chairs: Prof. Dr. Preetha Manikandan (India)
13:30-13:45	IS: Preetha Manikandan Transformation of waste to wealth from cow dung
13:45-14:00	Excel Rio S. Maylem Overcoming summer infertility in water buffaloes in the Philippines using double PGF2a in a 7-day cidrsynch timed artificial insemination
14:00-14:15	Ilyas Waesulong Effect of supplemented liquid pigments in the diet on growth performance and body skin color of Jewel cichlid (<i>Hemichromis lifalili</i>) fish
14:15-14:30	Yusup Sopian Meta-analysis of dietary supplementation with hemp products (<i>Cannabis sativa</i> L.) in broiler chicken: performances, blood profiles, intestinal morphology, and meat physicochemical parameters
14:30-14:45	Katatikarn Sahatsanon Meta-Analysis of multi-strain bacterial probiotic supplementation on growth performance of post-weaning piglets
14:45-15:00	Hataichanok Passara Plant essential oils, trans-anethole and eugenol, for housefly knockdown and mortality
15:00-15:15	Manatsanun Nopparatmaitree Effect of Phytobiotics from Yanang (<i>Tiliacora triandra</i>) leaf extract containing <i>Pediococcus acidilactici</i> V202 product (PYLEPP) supplementation in diets on in vitro prediction of true nutrient digestibility and cecal fermentation by broiler microbiota
15:15-15:30	Adisak Kongkeaw Optimization of phytocannabinoid extraction from <i>Cannabis sativa</i> L. (Hemp) using crude palm kernel oil via decarboxylation and its potential as an energy supplement for suckling piglets
15:30-15:45	COFFEE BREAK
15:45-16:00	Suwit Thip-Uten Effect of different diets on growth performance and carcass characteristic of Nu Phuk (<i>Bandicota indica</i>) raised under circle cement pond
16:00-16:15	Supawitch Janrong Effect of milk thistle with artichoke or Gingko leaves extract on growth performance and carcass characteristics in broilers
16:15-16:30	Jamree Khrueahong Needs for processing career promotion course to add value for freshwater fish farmers in Nakhon Sawan Province
16:30-16:45	Kannikar Charoensuk Effect of supplementing red pigment from <i>Monascus</i> sp. fermented native black rice (Maepayathong Dum Rice) on production performance and egg quality in laying hens
16:45-17:00	Sayan Subepang Effect of feeding system on productive performance, nutrient digestibility, and economic return in Brahman crossbred cattle
17:00-17:15	Wanninee Chankaew Effectiveness of <i>Chara corallina</i> ingredients fermented and unferment on growth performance and digestive enzyme activity of giant freshwater prawn (<i>Macrobrachium rosenbergii</i> de Man 1879)
17:15-17:30	Sukritta Anutrakunchai Stingless bees collecting pollen in Durian Orchards, Khao Khitchakut district, Chanthaburi province
17:30-18:30	Closing Ceremony

17:30-18:30	Closing Ceremony
	Concluding Remarks by Prof. Dr. Kasem Soyong, President of AATSEA, Thailand Venue: Conference Hall, Siri Rambhai Bhan Auditorium, Rambhai Barni Rajabhat University (RBRU)
	Best Presentation Award
	Closing address by Rambhai Barni Rajabhat University representative
	Closing remarks by Prof. Dr. Hiroyuki Konuma, President (GIAPSA) (Japan)
	Summary and Closing remarks by Prof. Dr. Kasem Soyong, President, AATSEA, Thailand
	Congratulations on hosting the 13th ICIST 2025 address by China representative
	Motivational Song: Prof. Dr. Kasem Soyong and Team
18:30-20:00	Cultural performances & Dinner Venue: Suan Ban Kaew Palace, Rambhai Barni Rajabhat University (RBRU)

Sunday 1 December 2024: Back to Bangkok

Abstracts

PLENARY SESSION

Smart, innovative organic agriculture for agrifood transformation in Asia

Hossain, S. T.*

Policy & Strategy, IFOAM - Organics Asia, Bangladesh.

*Corresponding Email: tanveer@ifoamasia.org

The area of organic agricultural land in Asia is about 6.5 million hectares or 0.4% of the total agricultural sector in the region. Presently, the region contains only 9% of global organic agricultural land. However, Asia has demonstrated a solid commitment to organic practices and a growing interest in organic production and demand. It also has the most organic producers (about 48.6%) globally, who are mostly small-scale farmers. The demand for organic food in Asia continues to grow rapidly, and creating inclusive, productive linkages among all stakeholders is essential. Introducing digital tools and applications from production to the whole supply chain is critical to making organic agriculture more profitable and productive. Organic 3.0 focuses on the importance of making organic farming part of mainstream agriculture. Organic agriculture welcomes all technologies and methods regardless of their applications unless they go against core organic principles, i.e., health, care, ecology, and fairness. With growing demand for organic products, consumers are more concerned about traceability, and thus assuring consumers of the genuineness and safety of organic products is critical for commercial organic agriculture and the movement in Asia. Blockchain and Internet of Things (IoT) technologies, which involve all parties in a smart agriculture ecosystem, are useful in developing trusted, self-organized, open, ecological food traceability systems. The adoption of digital technology in organic farming makes the sector more profitable for enterprises and encourages youth to practice and be involved in agriculture. We should remember that organic or nonorganic agriculture can only be sustainable when it is economically viable. Agriculture is a business, and farming without financial motives would be gardening. Thus, the selection of innovative, smart technologies is a critical factor for improving productivity and profitability in organic agriculture and its long-term sustainability. These new technologies also address the issues of aging and agricultural successors in countries like Japan, the Republic of Korea, PR China, and the Republic of China, and their governments have made mid- to long-term plans for the promotion of organic, green agriculture. In recent years, Asia's organic sector has seen notable developments, including comprehensive support plans and programs from various government and other stakeholder initiatives. Some countries, such as Vietnam, incentivized entrepreneurs to import equipment to promote smart digital organic agriculture. This presentation underscores the importance of creating a nexus among innovation, smart farming, and small-scale farmers in Asia. It discusses smart agricultural transformation, organic agriculture innovation, and the growing demand for organic food in the region. Cost-effective, simple, efficient digital smart technologies can contribute significantly to the organic movement in Asia.

Keywords: Digitization, Organic, Productivity, Profitability, Smart agriculture

Food safety in Finland, regulation and some practical implementations

Juokslahti, T.*

Asian and Pacific Centre for Agricultural Engineering and Machinery, United Nations Economic and Social Commission of Asia and the Pacific, Beijing, P.R. China, and Veterinary Major (res), Field Hygiene Logistics, Finnish Defence Forces.

***Corresponding Email:** tapio.juokslahti@kolumbus.fi

Food safety refers to the practices and procedures that are employed to prevent foodborne illnesses and ensure the safety of food for human consumption. It involves a wide range of activities, from food production and processing to storage, distribution, and preparation. Key elements of food safety include cleanliness, temperature control, proper handling, HACCP (Hazard Analysis and Critical Control Points), and traceability. Food safety is crucial for several reasons: public health, consumer confidence, and for economic impact. Ensuring food safety involves a multidisciplinary approach, drawing upon various scientific fields, including microbiology, chemistry, toxicology, food science, epidemiology, veterinary medicine, agricultural science, environmental science, risk assessment, and regulatory science. The European Union is a group of 27 countries in Europe with additional countries in accession process. The European Commission suggests laws, the European Parliament and the Council of the European Union discuss these laws and decide if they want these laws to happen in Europe. If they decide that a law must happen in Europe, all countries of the European Union must work to make this law happen in them. Legislation and regulation on food hygiene is given in the European Union Regulation on the hygiene of foodstuffs (853/2004/EU) Annex II, Chapter 12, paragraph 1. The new Food Act of Finland (297/2021) and the Finnish Food Authority's regulation on hygiene proficiency (10/2024) implements the European Union legislation. The purpose of the law is to: 1) ensure the safety of foodstuffs and their handling as well as the good health and other quality of food-stuffs in accordance with food regulations; 2) ensure that the information provided on food is truthful, adequate and not misleading; 3) protect the consumer from health hazards and economic losses caused by food in breach of food regulations; 4) ensure the traceability of foodstuffs; 5) ensure high-quality food control; and 6) contribute to improving the operating conditions of food business operators (1).

The government of Finland is responsible for adequate regulatory and legal framework of the food safety. The Ministry of Agriculture and Forestry steers the policy on sustainable use of natural resources. Ministry's aim is that Finland utilises renewable natural resources in a responsible and sustainable way and as an international pacemaker. Finnish food chain is competitive, responds to the consumer needs and operates in a responsible way both nationally and globally, and food safety is of top international standard (www.mmm.fi). Governmental Agencies make research, implement and control the regulation; the Finnish Food Authority promotes, monitors and studies the safety and quality of food, and the health and welfare of animals (www.ruokavirasto.fi), The Natural Resources Institute Finland, Luke, has a task to promote competitive business based on the sustainable use of renewable natural resources, as well as wellbeing and the vitality of the rural areas (www.luke.fi). According to an academic dissertation the primary legal responsibility for ensuring food safety in the European Union including Finland lies though with food business operators. However, official controls shall also be implemented to ensure that food handling complies with the relevant requirements. Level of food safety is thus affected by several factors: the appropriateness of legislation in order to achieve food safety, the compliance of food businesses with legislative demands, and the efficacy of official food controls in verifying and enforcing compliance.

Annually Finnish Food Authority publishes the results of regulatory control related to food safety, official controls and monitoring programmes on food and feed, as well as research and risk assessments. The report also assesses, based on the results, the status of food safety and future needs for regulatory activities in Finland. The report extends the annual report referred to in the EU Control Regulation (EU) No. 2017/625 on official controls with respect to food safety.

Food safety has also other practical implementations than the primary tasks it addresses. One important practical implementation of food safety is to contribute to improving the operating conditions of food business operators. By optimizing operational conditions, businesses can increase efficiency,

reduce costs, improve customer satisfaction, and gain competitive advantage. Among preferential criteria for consumers to choose between similar food items are amongst others; health benefits: awareness of any health benefits associated with consuming the food item, such as reduced risk of chronic diseases or improved digestion, ethical considerations: values based choices related to the item's production methods, environmental impact, or animal welfare, or brand perception: trust and familiarity with a particular brand or manufacturer of the food item.

Finnish authorities want to promote the export of Finnish food, so the government has invested systematically in order to help our international food and beverages business. Finland takes food safety seriously. Finnish food is known for its purity throughout the food chain, its hygiene, traceability and accountability, which are among the best in the world. Finland has a unique salmonella control program which requires all forms of salmonella to be monitored throughout the production chain. Finnish poultry farms have been antibiotic-free since 2009 and the quantity of antibiotics administered to livestock is among the lowest in Europe, according to the Natural Research Institute. Animal welfare is strictly controlled by the authorities in each municipality

By upholding the international competitiveness of the food sector and integrating with international markets, Finland can boost her food exports, improve the competitiveness of the entire food sector, and safeguard the domestic production of primary and specialised products. Food exports must be based on products with high value added and that have a high degree of processing. It requires solid knowledge of export markets and resources which can be used to build up local brands and presence. It is a feature of the farming and food sector that the differences which affect international competitiveness typically lie in national regulation and support schemes for agriculture. Stringent requirements related to food safety, the environment or the health care and welfare of production animals push up companies' costs while they also contribute to supporting high quality and responsible production methods of the products. This, in turn, reinforces the competitiveness of companies in the eyes of well-informed consumers. A Finnish food company may also become successful by increasing the degree of processing of its products and by stressing and reinforcing Finnish food production's competitive factors, such as safety, cleanness and responsibility.

Another practical implementation of food safety is on its contribution to the diplomatic country image of Finland. Country image matters every day, decisions that affect Finland are made around the world. These decisions may be political, economic or, for example, an individual consumer's choice between two products. In addition to facts, decisions are often made based on mental images. The country image also affects whether Finland even comes to mind when weighing alternatives in consumer choices.

Authenticity discrimination of rice with stable isotope and multielement profiles

Yuan, Y. W.*

Zhejiang Academy of Agricultural Sciences, Hangzhou 310021, China.

*Corresponding Email: ywytea@163.com

Rice is one of the most important staple foods in Asian countries, and its origin and cultivation are closely related to safety and quality. With the globalization of trade, consumers pay more attention to the authenticity of the labels of rice producing area and organic production. In this study, IRMS and ICP-MS analysis techniques were used to obtain four stable isotope ratios (i.e. $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^2\text{H}$, $\delta^{18}\text{O}$) and 25 element contents (Na, Ca, Fe, Zn, Rb, Ag, and Cd, etc.) of rice from different producing areas and organically produced rice. Through Chemometrics data processing, like PLA-DA as supervision mode, the discriminant accuracy of rice for Northeast China and Southeast Asia (such as Thailand and Malaysia) was 98% and 85%, respectively. And the results showed ^{15}N of rice was increased with composted manure application, which was as a good indicator for organic production. This research is of great significance to the government's food safety supervision, the protection of consumers' rights and interests and the fair trade of the market.

Future organic farming

Phongphaew, P.*

*Corresponding Email: prof.phongphaew@gmail.com

Specialized laboratories analyzed all important data of all biological components like original plants, semen, insects, microbes, fungus, and historical organic development in any long-term ages. This gives us the knowledge of the real origin biological and natural development. With these analyses, we used to bring back the soil and plant cycle to the real original biological balance of nature law. Natural microbial fertilization is based on nutrient-rich and environmental protective soil Support. In the future, microbial fertilizer technology can be further improved by incorporating sustainable materials as carriers. The application of genomic engineering offers the potential to develop better microbial strains, thereby increasing the effectiveness of microbial fertilization. Plant stem cell therapy and prevention treatment can produce a much better plant immune system. Special negative and toxic environmental influences can provide plants of all kinds with better protection. This also makes manipulating plants with GMO useless. Financial benefits would bring farmers savings of between 20% and 60%. his percentage of ideally constant water directly benefits the plants. Moist soil is easier for young roots to penetrate, build strong networks and draw nutrients from it. A steady supply of water between waterings prevents plants from wilting, even in dry and hot weather. A high-water content of the plant promotes cell elongation, an increase in leaf area and fresh weight during the night. Growth also occurs when soil conditions are favorable, and evaporation is low during the day. Dry matter production, in which photosynthesis is the main process, only takes place during the day. An important factor influencing the productivity of our planet's various ecosystems is the nature of their soils. Organic farming is a vision of working and living in harmony with nature. The result is healthy soil on which to grow healthy plants that make for healthy people. By dispensing with synthetic additives and promoting natural systems, organic farmers help create a better future for people, animals and the environment. This includes maintaining the biological balance of soil biology, insects, animals and birds. Even the water can regenerate itself in this natural process. All of this is based on the knowledge of natural environmental development and requires respect for this. Alley cropping is a way to diversify crop production and increase economic and environmental resilience. This approach to agriculture takes advantage of the interactions between trees and shrubs, and the crops in the alleys. Alley cropping is a specific practice in which trees or shrubs and agricultural crops are grown in alternate rows. The trees are commonly pruned to limit the shading of the agricultural crop. Alley cropping can also contribute to nutrient cycling and erosion control. Agroforestry systems make maximum use of the land. Every part of the land is considered suitable for useful plants. Emphasis is placed on perennial, multiple purpose crops that are planted once and yield benefits over a long period of time. Agroforestry is a mixture of components that consist of woody plants (timber, clump, palm, bamboo, and other cambium-borne plant species) with agricultural plants. species) and/or cattle, which set in temporal arrangement and spatial arrangement as well. Agroforestry is defined as a land use system which integrate trees and shrubs on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability. Agroforestry also generates significant employment opportunities.

Keywords: Agroforestry, Organic, Microorganism, Sustainability

Biological control of pine wilt disease and other plant diseases by *Bacillus subtilis* JCK-1398

Kim, J. C.^{1,2*}

¹JAN153 Biotech Incorporated, Gwangju, 61186, Republic of Korea; ²Division of Applied Bioscience and Biotechnology, Chonnam National University, Gwangju 61186, Republic of Korea.

*Corresponding Email: kjinc@chonnam.ac.kr

Pine wilt disease (PWD) is the most destructive disease threatening pine trees world-wide. The disease is mainly caused by the pine wood nematode, *Bursaphelenchus xylophilus*, which is vectored by pine sawyer longhorn-beetles, *Monochamus* spp. Different methods such as aerial application of insecticides, fumigation of dead pine trees, and trunk injection of nematicides have been conducted to control the plant disease. However, environmental issues, labor cost and health concerns about large-scale application of pesticides have prompted research efforts for finding environmentally safer alternatives. In order to develop a new eco-friendly microbial product which be applied by aerial spray for the control of pine wilt disease, we have tried to select antagonistic bacteria. Through a series of screenings, one *Bacillus* strain JCK-1398 was selected and identified as *B. subtilis*. The strain did not show any biological activity such as nematicidal, antifungal, and antibacterial activities. However, it effectively reduced the development of pine wilt disease in a seedling bioassay. Through optimization of the fermentation and formulation processes, we have commercialized a new microbial product, “JAN Dr 1 Evervaccine”. It was registered as an organic agricultural material and is under registration as a microbial biopesticide. The product showed control values over 70% and 50% against pine wilt disease of *Pinus densiflora* and *P. thunbergii*, respectively in the repeated field experiments. JAN Dr1 also effectively suppresses the development of various plant diseases such as turfgrass dollar spot, ginseng root rot, cucumber *Fusarium* wilt, tomato bacterial wilt, pepper bacterial wilt, kimchi soft rot, apple fire blight, Tobacco mosaic virus on tomato, and Cucumber mosaic virus on tobacco.

Fruit trees in agroecosystems: The way to address food insecurity and climate crisis

Mendoza, T. C.*

Institute of Crop Science, College of Agriculture & Food Sciences, U.P. Los Baños; College, Laguna 4031, Philippines. Currently Science Director, Community Legal Help and Public Interest Center, Philippines.

*Corresponding Email: ecofarm.mndz2011@gmail.com

The last 50 years, human diets become 37 per cent more similar. Ideally, our food should come from at least 48 species. But only 12 crops and 5 animal species provide 75 per cent of the world’s energy intake and only 3 staple crops (rice, corn, wheat) supply 40% of world caloric intake. The consequence: many health issues, malnutrition, and environmental degradation.

Climate change is diet change. “Eat or business as usual” exacerbate food insecurity, increase greenhouse gas emissions and its twin global temperature increase that may exceed 2 degrees centigrade. Eating more fruits and vegetables reaching up to 50 % of the 180 kg per year could reduce consumption of at least 30% of the 3 food staples. Additionally, a 50% reduction in meat intake led to more than 1.0 billion tons of grain for direct human consumption instead of feeding them to animals. Producing 60% more grains to feed the 10 billion people come 2050 and beyond is no longer necessary. People of the world eat fruits at 38 kg per year only while the WHO recommended amount is 73 kg per year. Fruits provide multiple benefits (nutrition & health, economic/financial, biodiversity conservation, soil erosion control, carbon sequestration). Eating more fruits reduce the need to produce and consume high resource intensive staple food crops like rice, corn, wheat.

Planting fruit trees requires lesser or no synthetic nitrogen fertilizer (1.0 kg N emits 12.14 kg CO₂e). Much carbon on the tree biomass and through leaf fall are sequestered back as soil organic

matter. Fruit trees are net C-sequestering (7.3 tons/ha/year, average of 3 fruit trees) compared to rice C- emission at 12.8-ton CO₂ eq./ha/crop, corn at 2.97ton CO₂eq. per ha /crop but wheat is C-sequestering at 1.01-ton CO₂ eq /ha/crop. Raising animals and eating their meat is much more resources intensive i.e. 6 to 8 kg plant protein is needed to produce 1.0 kg animal protein, and much CO₂-GHG emission as 1 kg of beef emits 221.63 kg CO₂eq.; pork 36.3 kg CO₂eq., chicken 31.75 kg CO₂eq.

Fruit trees are best to revegetate large areas that are badly deforested and eroded. Ten years after planting, fruit trees are bearing lots of fruits. They will not be cut but wood trees can provide good lumber, and they will be cut so farmers will earn. Integrating fruit trees in our highly monocropped agri-landscape and as component mix of our badly deforested lands and/ or open lands in urban and peri-urban areas and shifting to plant-based diet (centered on fruits and vegetables) are the ways to address food insecurity and the damaging climate crisis of our time and the next generation to come. Fruit trees can contribute to the attainment of a number of sustainable development goals (SDGs 2, 3, 13, 15, 17).

Harnessing actinobacteria from rare habitats for sustainable agriculture

Manikkam, R.*

Centre for Drug Discovery and Development (CDDD) & Centre for Modern Organic Agriculture Research (CMOAR) Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

***Corresponding Email:** radhakrishnan.cddd@sathyabama.ac.in; mrkactinos@gmail.com

Several cultural practices, pesticide applications, organic amendments, and resistant cultivars are utilized across the world to increase plant growth and productivity. But the outcomes have been inconsistent. Furthermore, the use of chemical fertilizers and pesticides has negative consequences on the ecosystem and non-target species. As a result, biocontrol measures can be considered a safe and successful alternative approach for sustainable agriculture. Numerous bacterial antagonists are recognized as effective biocontrol agents (BCAs) against various phytopathogens. Actinobacteria are one among the largest bacterial phylum with greater ecological and industrial significance. Apart from bioactive secondary metabolite production, actinobacteria have the tremendous potential to enhance plant growth and phytopathogen control. In addition to rhizosphere actinobacteria, actinobacteria from other habitats have also contributing for sustainable agriculture. Hence, focusing on Actinobacteria in agricultural research is a dire need to develop more efficient biofertilizers and biocontrol agents. Especially, searching of actinobacteria from rare habitats leads to the identification and development of new microbial candidate for sustainable agriculture development. Actinobacteria from marine, mangrove, deep sea, mountain, desert, forest and polar regions are identified to exhibit diverse plant growth attributes such as nitrogen fixation, phosphate and zinc solubilization, production of IAA, ACC, siderophore and many other PGP molecules. In addition, actinobacteria from rare habitats were found to produce bioactive molecules effective against diverse plant microbial and insect pathogens. Recent years, psychrophilic and psychrotolerant, halophilic and halotolerant actinobacteria have been identified as potential candidates for biofertilizer and biocontrol agents' development for high altitude and cold climate agriculture.

Keywords: Actinobacteria' sustainable agriculture; PGP; Biofertilizer; Biocontrol agent, Rare habitats

Enhancing soil quality trough long-term organic farming practice in tropical highland of Bengkulu, Indonesia

Muktamar, Z.^{1,2 *}

¹Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Closed Agricultural Production System (CAPS) Research Group, Indonesia.

***Corresponding Email:** muktamar@unib.ac.id

In recent decades, conventional agricultural systems have been extensively adopted to boost crop productivity. While this approach has greatly contributed to meeting the growing demand for agricultural products, particularly food, it heavily relies on synthetic agrochemicals to sustain high yields. However, prolonged and excessive use of these chemicals has led to soil degradation, including increased soil acidity, reduced organic carbon content, and diminished microbial diversity. Organic farming is considered a promising solution to restore degraded soils. This study aimed to evaluate soil quality over nine years of continuous vermicompost application. It was conducted in Air Duku Village, Rejang Lebong District, Bengkulu, Indonesia, at an altitude of 1054 meters above sea level. The soil at the site was classified as Inceptisols with a loamy sand texture. Vermicompost was applied annually at a rate of 15 tons per hectare from 2013 to 2021, and selected soil chemical and physical properties were assessed each year. The results revealed that nine consecutive years of vermicompost application significantly improved soil pH, organic carbon content, total nitrogen, available phosphorus, and exchangeable potassium, while reducing exchangeable aluminum. Additionally, it decreased bulk density and soil porosity. Throughout the study period, the soil quality index showed marked improvement, progressing from low-quality soil in 2013 to moderate quality in 2016-2017 and achieving good quality by 2021. This study confirms that long-term organic farming practices, such as vermicompost application, can effectively enhance soil quality and, in turn, improve soil productivity.

Keywords: Organic farming, Soil chemical properties, Soil degradation, Soil quality, Vermicompost application

SESSION 1: AGRICULTURAL EXTENSION, EDUCATION AND DEVELOPMENT

Rohingya refugee influx and socio-environmental consequences among host communities in the Teknaf Peninsula of Bangladesh

Sarker, M. A.^{1*}, Momin, M. R.¹ and Osamu, K.²

¹DAEE, Bangladesh Agricultural University, Bangladesh; ²Professor, CSEAS, Kyoto University, Bangladesh.

*Corresponding Email: masarker@bau.edu.bd

The world is facing the most severe refugee crisis in history with an average of 28,300 people per day and every 20 minutes forced to flee their homes due to war, violence, or persecution for their race, religion, ethnicity or political opinion, and the number is growing every day (UNCHR, 2022). In August 2017, armed attacks, massive scale violence, and serious human rights violations forced thousands of Rohingya to flee their homes in Myanmar's Rakhine State. Now, more than 1 million people have found safety in Bangladesh with a majority living in the Teknaf Peninsula of Cox Bazar's region (IOM, 2018). The Rohingya refugee crisis has had a profound impact on the environment of the Teknaf Peninsula in Bangladesh, particularly in terms of increased deforestation. As hundreds of thousands of Rohingya refugees sought shelter in the region, the demand for land and resources has led to a concerning rate of forest degradation. The sudden and massive influx of Rohingya refugees has led to the rapid expansion of makeshift camps, which have encroached deeply into the surrounding forests. These total number of refugees has significantly increased the demand for resources such as firewood, timber, and land, leading to widespread deforestation. This destruction of the forests has disrupted the delicate balance of the local ecosystem, threatening the survival of numerous plant and animal species. Keeping in mind such reality the proposed study was undertaken to analyze the effect of Rohingya refugee on deforestation at TWS. The findings of the study showed that due to massive refugee influx in August 2017 the rate deforestation was massive and it was reduced 25.78%. However, due to this Rohingya refugee influx agricultural land area also reduced about 16.3%. On the contrary, the settlement has increased about 189%. Which was actually due to accommodate 01 million new settlers as well as a huge number of INGOs and Donor agencies serving to the refugees. However, this rapid deforestation as well as changes in land use pattern have extensive impact on live and livelihoods of the host communities along with environmental consequences.

Along with environmental penalties the host communities in Teknaf peninsula have been experiencing a lot of socio-economic consequences. Among them job market saturations, rising costs of living, poor agricultural production, conflicts and tension etc. However, the international communities and donor agencies have been supporting these refugees from the humanitarian ground since the crisis started. Contrary, the cries of the host communities remain unexplored and neglected. However, this is really essential to providing tailored support and resources to the host communities, addressing their specific needs and concerns, can help mitigate the negative impacts of the refugee crisis. To let it happen, need to foster cooperation and dialogue between the government, international community, and host communities is crucial for addressing the complex challenges posed by the Rohingya influx. Thus, the present study will try to discover the unspoken story of the host communities in Teknaf peninsula of Bangladesh.

Development of a commercial meat poultry production subject learning activity module together with the Blended Learning (BL) for knowledge and skill development of agricultural teacher training students

Poungsuk, P.^{1*}, Klompanya, A.² and Junlex, P.¹

¹Department of Agricultural Education, School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkraband, Thailand; ²Public-Private Collaborative Research Center, School of Agriculture Technology, King Mongkut's Institute of Technology Ladkraband, Thailand.

*Corresponding Email: pakkapong.po@kmitl.ac.th

The develop a learning activity module on commercial production of meat type poultry together with the Blended learning (BL) found that the learning activity modules comprised 8 parts and 11 sub-activities. Integrated teaching techniques with the blended learning focused on the adoption of application (Line and Facebook) in smartphone and computer was used for communication for knowledge and skills development of agricultural teacher training students with in three school years. The experimental group consisted of 63 teacher training students majoring in Agricultural Education, King Mongkut's Institute of Technology Ladkrabang (KMITL) and they were obtained by purposive sampling. The research instruments in this study included the learning activity module, learning achievement test, behavior observation form, and questionnaire. Descriptive statistics was use for data analysis i.e. frequency, percentage, mean, and standard deviation. Besides, t-test (Dependent sample) was employed in this study. Results of the study revealed that the learning activity modules quality was found at a high level based on an assessment by scholars. It was found that the subjects (students) had a higher level of learning achievement that before using the module and there was a statistically significant difference level at .05. This implied that the learning activity module could develop learning of the subjects effectively. As a whole, the subjects were satisfied with the learning activity module at a high level. Based on its details, 2 aspects were found at a highest level.

Keywords: Learning activity module, Commercial meat poultry production, Meat type chicken rearing management, Blended learning (BL)

Socio-economic study of mud crab (*Scylla serrata*) households in Bengkulu Province, Indonesia

Cahyadinata, I.^{1*}, Nusril¹ and Nopiana, M.²

¹Department of Agribusiness, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Department of Management, Faculty of Economics and Business, Universitas Singaperbangsa Karawang, Indonesia.

*Corresponding Email: cahyadinata@unib.ac.id

Food security of mud crab fishermen households in Bengkulu Province, Indonesia is secure. The percentage of fishermen households in the category of less secure is 4%, quite secure is 4% and food secure is 92%. Meanwhile, base on multidimensional poverty category of mud crab fishermen households is not poverty. Overall, the poverty level include 7% is very poor, 3% is poor, 22% is vulnerable poor and 67% is not poor. Furthermore, the welfare of mud crab fishermen households is in the category of high welfare. Those include in moderate category is 47% and high welfare is 53%. In addition, the feasibility of mud crab fishery business carried out by fishermen is in the feasible category with a BC ratio value of 3.04. The socio-economic status of fishermen households included in the sufficient category. That are 1.3% is bad, 70.8% is sufficient and 27.9% is good. Improving the socio-economic status of fishermen households can be done by increasing the income of fishermen households true mud crab fishing efforts. Then, increasing income will increase food security, reduce multidimensional poverty, enhance welfare and raise business feasibility. Increasing income can be

done by enlarging mud crabs caught by fishermen. Beside that, increasing of crab size which have higher selling price.

Keywords: Food security, Mud crab households, Multidimensional poverty, Socio-economic status, Welfare

Environmentally Friendly Consumer Training Manual and Factors Influencing Buying Decisions among Undergraduate Students at Mahidol University Amnatcharoen Campus, Thailand

Kulsuwan, P.* and Phewphan, U.

Innovation for Social and Environmental Management Program, Mahidol University, Amnatcharoen campus, Thailand.

***Corresponding Email:** patticha.kul@mahidol.ac.th

The training manual we developed to train students to be environmentally friendly was found to efficiently promote environmentally friendly product consumption (a score of 84.73/82.00, exceeding the established 80/80 threshold). This indicates that the training was effective in achieving its intended objectives. Moreover, students who underwent the training demonstrated a learning effectiveness index value of 0.5742 (57.42%). This index reflects the degree to which students adopted and applied environmentally friendly consumption practices after completing the training. Additionally, the results of post-training assessments demonstrated that the levels of both knowledge and behavioral adoption pertaining to environmentally friendly consumption practices were increased. We identified marketing promotions as the primary factor influencing the decision to purchase environmentally friendly products, followed by product quality, with price exerting the weakest impact.

Keywords: Training manual, Sustainable production, Environmentally friendly, Product purchase decision

Sustainability issues of social forestry management based on coffee farming intensification in Indonesia

Suhartoyo, H.^{1*}, Barchia, M. F.², Putri, E. L.² and Harwindah³

¹Department of Forestry, Faculty of Agriculture, University of Bengkulu, Indonesia 38122; ²Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia; ³Regional Planning and Development Agency, Bengkulu Province 38225, Indonesia.

***Corresponding Email:** herysuhartoyo@unib.ac.id

Future uncertainty of social forestry program in forest areas become crucial issues related to sustainable forest management (SFM). Purpose of this study was to evaluate the SFM based on coffee farming intensification at the Bukit Daun social forestry scheme and to find significant constraints related to the SFM. This research was conducted from November 2022 to March 2023 at three village forest societies of Tebat Monok-Kelilik-Kandang. Purposive sampling method was used to obtain 50 key informants. A scalable and normative rapid appraisal multidimensional scaling (MDS) was used to examine sustainable status based on three dimensions of ecology, economy, and socio-culture. The future social forestry program at the Bukit Daun was revealed by less sustainable status with value 44.46. The Issues appeared the future uncertainty of the SFM were various attributes of economic- and socio-cultural constraints with values 38.63 and 44.71, respectively. Strengthening the SFM sustainability based on the coffee farming in Bengkulu should initially be facilitated by government through implementing

good governance systems giving the certain rules and policies for the farmers managing their land uses and advocating social capital, in turn, the communities were expected as fruitful achievements concerning their future life and our planet.

Keywords: Community forest, Multidimensional scaling, Bukit daun protected forest

The transmission of local wisdom in herbal processing of Pa Wa agroforestry network members, Kaeng Hang Maeo District, Chanthaburi province

Thongkaew, E., Eamkijkarn Sabaijai, P. *, Chatanan, P., Kerdsriserm, C. and Khermkhan, J.

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

***Corresponding Email:** phatchara.ea@kmitl.ac.th

The purpose of this research was to study the local knowledge transmission in herbal processing among the members of Pa Wa agroforestry network members in Pa Wa Kaeng Hang Maeo district, Chanthaburi province. The study utilized qualitative research methods to explore the components of communication through in-depth interviews with 15 individuals who met the following criteria as involvement in the herbal activities of the agricultural network, knowledge and transmission of local wisdom in herbal processing, and recognition by the agricultural network as knowledgeable in local wisdom related to herbal processing. The content analysis revealed that the transmission of local wisdom in herbal processing among the agricultural network members involved sender/sources of information and transmitters, which included knowledgeable members of the network on herbal properties and processing methods, message or content are medicinal properties of herbs, processing procedures, and packaging methods, communication channels, including hands-on learning, demonstrations, practical involvement, and information exchange through discussions or inquiries, and the receivers of the transmitted knowledge, primarily network members, family members, relatives, and interested individuals participating in learning activities. The findings underscored the importance of preserving local wisdom in herbal processing within the community, as it resides within individuals and could potentially be lost. Therefore, should focus on collecting and storing this knowledge for easier accessibility, to ensure its continuity and potential development in the future.

Keywords: Transmission, Local Wisdom, Herbal, Kaeng Hang Maeo, Chanthaburi

Intention of reducing food waste among Indonesian Gen Z: The role of religious beliefs, financial attitudes, and consumption cultures

Novanda, R. R.¹, Malau, L. R. E.², Rambe, K. R.³, Damanik, M.², Khaliqi, M.⁴, Nurlia, A.⁵, Ulya, N. A.² and Barchia, M. F.⁶

¹Department of Socio Economic of Agriculture, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Research Center for Behavioral and Circular Economics, National Research and Innovation Agency (BRIN), Indonesia; ³Research Centre for Economics of Industry, Services, and Trade, National Research and Innovation Agency (BRIN), Indonesia; ⁴Department of Agribusiness, Faculty of Agriculture, Universitas Sumatera Utara, Indonesia; ⁵Research Center for Society and Culture, National Research and Innovation Agency (BRIN), Indonesia; ⁶Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia.

***Corresponding Email:** rrizkin@unib.ac.id

This research successfully collected a sample of 348 Generation Z individuals in Indonesia, consisting of 63.79% women and 36.21% men, aged 18 to 24, with 25% being 21. Most respondents were Muslim (85.63%) and Javanese (22.99%). The study analyzed four variables: intention to reduce food waste,

religious beliefs, financial attitudes, and consumption cultures. The results demonstrated a strong correlation between religious beliefs and intention (62.4%) and between financial attitudes and consumption cultures (62.9%). Additionally, there was a 41.3% correlation between intentions and finances and a 52.4% correlation between intentions and consumption. All four variables exhibited positive correlations, indicating that they are interconnected in influencing behavior. The findings suggest that religious beliefs, financial attitudes, and consumption cultures significantly impact the younger generation's intention to reduce food waste. These factors play a crucial role in shaping behavior, highlighting the importance of considering them in policy development. The close relationship between intention and religion and between financial attitudes and consumption suggests that these pairs of variables are particularly influential. These insights provide practical guidance for policymakers and practitioners in their efforts to reduce food waste. By understanding and addressing the correlations between religious and financial attitudes and consumption habits, they can develop more effective interventions to promote sustainable practices and reduce food waste, thereby contributing to environmental conservation. The study's findings underscore the importance of considering the behavior of Indonesia's youth, the country's largest demographic, in developing strategies to improve government oversight of food waste and mitigate environmental disruption. The results highlight the significant impact of religious beliefs, financial attitudes, and consumption cultures on reducing food waste among the younger generation, emphasizing the crucial role of these factors in shaping sustainable behaviors.

Keywords: Indonesia, Youth behavior, Intention, Food waste

Assessing the Economic Impact of Livestock Disease Outbreaks at Battambang Province, Cambodia

Peuo, V.^{1*}, Din, M.², Fin, S.¹, Chhum, Y.¹, Dorn, V.¹, Chhouk, S.¹, Pov, C.¹, Chan, N.¹

¹National University of Battambang, Cambodia; ²University of Kratie, Cambodia.

***Corresponding Email:** pouevibol@yahoo.com

Climate change has exacerbated the spread of major livestock diseases, particularly Lumpy Skin Disease (LSD), inflicting significant economic losses on Cambodian households. This study quantifies the economic impact of infectious disease outbreaks on livestock in six communes of Battambang province. Through snowball sampling of 171 households, we found high prevalence rates of LSD (23.83%), Foot and Mouth Disease (17.08%), and Haemorrhagic Septicaemia (11.97%), resulting in an 8% mortality rate. Total economic losses reached approximately \$18,858.64, with LSD causing the most substantial damage. Critically, the average loss per household (\$1,102) nearly equalled annual income (\$1,031), highlighting the devastating financial consequences for farmers. These findings underscore the urgent need for comprehensive preventive and control measures to mitigate the impact of infectious cattle diseases in the face of climate change.

Keywords: Assessing, Diseases, Economic, Impact, Livestock

Comparison of cost and return for durian farmers on magik growth innovation to increase the quality of durian production in Rayong Province, Thailand

Thongtem, K.¹, Suwanmaneepong, S.^{1*}, Suwunnamek, N.² and Kerdsriserm, C.¹

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

²National Metal and Materials Technology Center (MTEC), Thailand.

***Corresponding Email:** ksuneeporn@gmail.com

This study aimed to compare the cost and return between farmers who used the innovation and those who did not use the Magik Growth durian wrapping bag innovation. The sample group was the Khao Hin Taen Durian Large-Scale Community Enterprise, Wang Chan Subdistrict, Wang Chan District, Rayong Province, totaling 73 farmers, which divided into two groups: 24 farmers who used the Magik Growth durian wrapping bag innovation and 49 farmers who did not use the Magik Growth durian wrapping bag innovation. A questionnaire is a tool for collecting data, and the data were analyzed using descriptive statistics, cost-return analysis, and t-test statistics to calculate the statistical difference. The results of the study found that farmers who did not use the Magik Growth durian wrapping innovation had a total cost of 37,647.48 baht per rai, resulting in an average yield of 1,420.41 kilograms per rai and a net profit of 164,999.25 baht per rai. In contrast, farmers who used the Magik Growth durian wrapping innovation had a total cost of 48,724.58 baht per rai, leading to an average yield of 1,420.83 kilograms per rai and a net profit of 195,068.58 baht per rai. An average yield between those using and not using the Magik Growth durian wrapping innovation showed a statistically significant difference at 0.01. Fixed costs and break-even yield also showed a statistically significant difference at 0.05. However, total costs, variable costs, production factors, product prices, net profit, and prices have no statistically significant differences at 0.05.

Keywords: Cost and return, Durian, Magik growth

Assessment of landscape quality for agricultural tourism development in Southern Si Chang Island, Chonburi Province

Aeimtom, P.¹ and Saksriyaphadung, W.^{2*}

¹Bachelor of Science Program in Landscape Design and Creation, Department of Architecture and Environmental Design, Faculty of Agriculture and Natural Resources, Rajamangala University of Technology Tawan-ok, Chonburi 10210, Thailand 10210; ²Bachelor of Science Program in Environmental Landscape Design and Management Office of Interdisciplinary Program Administration in School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

***Corresponding Email:** Wanalee.sa@kmitl.ac.th

The main purpose of this research was to find and evaluate the potential or feasibility of developing the southern area of Si Chang Island for agricultural tourism. In the study to assess the potential of the site with tools. Using questionnaires and interviews from stakeholders in the actual use of the space, both internal and external users. The target groups of the interviews are people living in the area and tourists. Survey to collect physical data of the area. In the process of collecting data to analyse the area. There were surveyed of the actual area to measure and collect sample data. Study various factors, including natural factors. and man-made factors and aesthetic factors or perspectives that will cause beauty. The use of satellite data in combination with geospatial processing made it possible to obtain basic data for the analysis of the potential of the area to use the area for agricultural tourism appropriately and in accordance with the environment of the area. Based on the research findings. Zones B, C, D, and G were identified as the most suitable potential for agricultural tourism. Zones E and F were found to possess distinctive natural features, including unique landforms, sandy beaches, hills, cliffs, and expansive sea views. Additionally, their western-facing orientation offers excellent opportunities for developing valuable scenic areas. The assessment of the scenery quality on Si Chang Island, based on questionnaire analysis, it is concluded that the island's scenery is beautiful. The evaluation of the scenery quality is determined by several factors as visible objects of the visible objects or physical characteristics seen in the landscape considering the variety of elements present.: The quality of the scenery is also judged by the ability to view it from different distances. Scenery viewed from a close distance and from afar can both have high quality. The emotional response elicited by the environment. The suitability of the environment is assessed in relation to human experiences and interest.

Keywords: Assessment landscape quality of the area, Southern Si Chang Island, Agricultural tourism

Guidelines for developing agricultural vocational competencies in the twenty-first century at the Northeastern Institute of Agriculture, Thailand

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

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

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

The study demonstrated that integration, methodical thinking, practical applications, learning by doing, digital agriculture, online marketing, business plan presentations, and agricultural products for health were prioritized in teaching and learning. In general, the teacher informants held firm opinions about the importance of cultivating human capital's skills for the twenty-first-century agricultural profession (\bar{x} =4.47, S.D.=0.42). In terms of knowledge growth, the teacher informants placed a strong emphasis on task control and development (\bar{x} =4.75, S.D. =0.60). It was decided to increase farming knowledge and experience (\bar{x} =4.76, S.D.=0.45, \bar{x} =4.51, S.D.=0.74). It should also encourage societal, organizational, and individual responsibility, they all agreed (\bar{x} =4.87, S.D.=0.41, \bar{x} =4.57 S.D.=0.73).

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

Factors affecting consumer purchasing decisions for quality durian in Rayong Province, Thailand

Sangdang, P. *, Suwanmaneepong, S., Khermkhan, J. and Kerdsriserm, C.

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

*Corresponding Email: 67046028@kmitl.ac.th

This research investigated factors affecting consumers' purchasing of durian quality in Rayong Province, Thailand. The sample consisted of 216 purposive consumers who follow the quality durian grower webpage in Rayong Province. Questionnaires were employed to collect data, which were analyzed using descriptive statistics, including frequency, percentage, and standard deviation, and multiple regression analysis. The study found that the majority of consumers are women. The average age is 36.97 years old, and the marital status a bachelor's degree or higher; the main occupation is non-government businesses with an average monthly income of less than 20,000 baht and less than 5 people living together in a shared household. The study found that the marketing mix factors that are important to the decision to buy quality durian, found to be at the highest level in 4 aspects: price (mean=4.35), product (mean=4.33), service process (mean=4.31), people (mean=4.21), and at a high level, physical evidence (mean=4.20), promotion (mean=4.20), and place (mean=4.14), respectively.

Keywords: Decision, Quality durian, Consumer

Effect of water stress and varieties on the bioherbicidal effectivity of sorghum aqueous extracts

Susilo, E.^{1*}, Setyowati, N.² and Supriyanti, Y. I.³

¹Department of Agrotechnology, Faculty of Agriculture, University of Ratu Samban, Indonesia; ²Department of Crop Production, University of Bengkulu, Indonesia; ³Department of Public Administration Science, Faculty of Social and Political Sciences, Ratu Samban University, Indonesia.

***Corresponding Email:** Susilo_agr@yahoo.com

The research findings indicated that aqueous extracts from Sorghum varieties Super 1, Super 2, Suri 4, Bioguma, and Mandau inhibit the growth of test plants, including sorghum (exhibiting autotoxicity) and mung beans. The source of the sorghum extracts from the five tested varieties did not differ in their effectiveness in suppressing the growth of the test plants. Water stress treatment significantly affected plant growth, with sorghum plants irrigated every 4 and 5 days showing more suppressed growth, as indicated by lower shoot dry weight, compared to those irrigated every 1, 2, and 3 days. The aqueous extracts from sorghum, whether irrigated every 1, 2, 3, 4, or 5 days at a 10% concentration, effectively inhibited the test plants, with no significant differences among the varieties. Therefore, sorghum aqueous extracts had the potential to use as bioherbicides for controlling both broadleaf and grass weeds. Further testing of aqueous extracts from various sorghum varieties at concentrations lower than 10% was found to be the optimal concentration for weed control.

Keywords: Bioherbicide, Crop autotoxicity, Natural weed control, Sorghum extract efficacy, Sustainable agriculture

Factors affecting the sharing of information on quality durian production by farmers in Rayong Province, Thailand

Meehat, N., Suwanmaneepong, S.* and Kerdsriserm, C.

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

***Corresponding Email:** ksuneeporn@gmail.com

This study examined factors influencing information exchange among durian farmers in Rayong province, Thailand, regarding high-quality production practices. A survey of 54 farmers, equally distributed by gender, revealed an average age of 44.52 years, with most being married and holding at least a bachelor's degree. The majority cultivation of durian var monthong on plots of five rai or larger and had over five years of experience. Farmers applied knowledge of water and maintenance systems, among other practices. The study found that motivation levels correlated with farmers' propensity to share information. Factors influencing information exchange, ranked from highest to lowest average value, were knowledge promotion and development ($\bar{x} = 4.24$), marketing ($\bar{x} = 4.00$), and social relations and acceptance ($\bar{x} = 3.46$), resulting in a high overall level ($\bar{x} = 3.90$).

Keywords: Information Sharing, Quality durian, Farmers

Opinions on factors affecting the use of web-based learning by quality durian farmers in Rayong Province, Thailand

Naknat, N.* , Suwanmaneepong, S., Ruttanatrakul, A. and Kerdsriserm, C.

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

***Corresponding Email:** 67046017@kmitl.ac.th

This research aimed to study opinions on factors affecting web-based learning use by quality durian farmers in Rayong Province, Thailand. Data were collected using questionnaires from 134 farmers who used Durian Web-Based Learning (WBL) and analyzed using descriptive statistics, including frequency percentage and standard deviation. The majority of farmers who used the web-based learning system were male, aged 38.45 years, had a lower than a bachelor's degree had durian planting areas of more than five rai, had more than 5 years of experience in durian planting, had learning channel about durian production through an application had a frequency of accessing media less than 5 times per day, and spent an average of less than 5 hours per day online media. As for opinions on factors affecting the use of web-based learning, the results found that the benefits and usage had the highest impact on the usage of web-based learning, with an average of 4.56, while the content design and efficiency factors also influenced the usage of web-based learning at a high level with an average of 4.41 4.40 and 4.26 respectively.

Keywords: Web based learning, Durian digital learning, Platform farmer

SESSION 2: ANIMAL, FISHERIES SCIENCES AND ENTOMOLOGY, MARINE BIOTECHNOLOGY

Digestible nutrient intake in naturally infected goats with gastrointestinal strongyles in response to mixed-herb pellet supplementation

Suteky, T. *, Dwatmadji, D., Soetrisno, E. and Solekhah, N. A.

University of Bengkulu, Indonesia.

*Corresponding Email: tatiksuteky.2008@gmail.com

The administration of mix-herb to infected local goats feed with basal diet containing fermented oil palm sludge, fermented corn stalks, tofu waste rice bran showed that P1: infected goats supplemented mixed- herb pellet of *Andrographis paniculata* + *Melastoma malabathricum* L.+ *Curcuma mangga*) and P2: mixed- herbs pellet of *Andrographis paniculata* + *Melastoma malabathricum* L.+ *Curcuma longa*) did not significantly alter dry matter (DM) organic matter (OM), Crude Protein (CP) Crude Fiber (CF), Ether Extract (EE) and Energy intake ($p > 0.05$) in comparison to the control group P0: infected goats supplemented with non-mix herb pellet + a single dose of Ivermectin). The dry matter intake ranges from 447.13- 492.47 g/head/day, 3.0-3.24 % of Liveweight, Organic matter intake 421.41-463.61 g/head/day Crude protein intake 66.67-73.56 g/head/day. Based on metabolic body weight, dry matter, organic matter, crude protein and crude fibre intake were affected ($P < 0.05$) by the treatments. There was no significant difference in dry matter and organic matter digestibility however the addition of a mixed-herb pellet of *Andrographis paniculata* + *Melastoma malabathricum* L.+ *Curcuma longa* significantly increased the crude protein and crude fibre digestibility. No effect of the treatment on digestible DM, OM CP, EE and energy, however, P1 have numerically lower 5.01-8.02% on digestible nutrients. The initial body weight of all the experimental animals was 15.31 + 2.51 kg which decreased during adaptation and then slightly increased after the treatments with an average daily gain of 58.8, 38 and 58.6 grams/day respectively. It could be concluded that supplementation of mixed-herb pellet on infected goats showed similar results in feed intake and digestible nutrient intake with infected goats supplemented with non-mixed- herbs pellet + a single dose of Ivermectin. The addition of *Curcuma longa* in mixed herb increases CP and CF digestibility.

Keywords: Digestibility, *Melastoma malabathricum*, Oil palm sludge

Feed digestibility and efficiency of Bali cattle supplemented with herbs and humic acid fed with fermented palm oil sludge

Dwatmadji, D., Suteky, T., Soetrisno, E., Kuncoro, R., Turnip, J. and Simanjuntak, D.

University of Bengkulu, Indonesia.

*Corresponding Email: dwatmadji.2008@gmail.com

Results indicated that there were no significant differences among treatments on intake in g/head of Dry Matter (DM), Organic Matter (OM), Crude Protein (CP), Ether Extract (EE), Crude Fibre (CF), and Energy. The DMI (g/head) value ranged from 4,345 to 4,808. In contrast, the data on intake of DM, OM, CP, EE, CF, and Energy in g/kg0.75 and %LW showed that all treatments (T1= Herbs (*Curcuma longa* 0.01 g/kg BW and *Melastoma malabathricum* 0.005 g/kg BW), T2= Herbs + humic acid 20 g/head/day, T3= Herbs + humic acid 40 g/head/day) has higher value compared to those of the control counterpart (T0= Control (No herbs and No humic acid)). For example, the DMI value (g/kg0.75) of T0, T1, T2, and T3 were 87.84, 97.78, 95.50, and 96.78 respectively. There were also no significant differences ($P > 0.05$) among treatments on ADG, FCR, Feed Efficiency, fecal output, defecation period,

and fecal water content. Results also showed that all digestibility values (DM, OM, CF, CP, EE, and Energy) of treatments (T1, T2, and T3) were statistically higher ($P < 0.05$) than those of the Control (T0) value. Digestible nutrient intake of CP and Energy of all T1, T2, and T3 were also significantly higher ($P < 0.05$) than those of the T0. This experiment may conclude that herbs and humic acid supplementation improve feed intake and digestibility, while not influencing the ADG, FCR, and feed efficiency.

Keywords: Feed utilization, ADG, Bali cattle, Digestibility

Thymol-carvacrol supplementation in broilers: impact on performance, blood biomarkers, and gut health

Tiyaprasertkul, P.^{1,2}, Phungkeha, P.¹, Srikijkasemwat, K.^{1*}, Philatha, A.³, Rassmidatta, K.³, Ruangpanit, Y.³, Siwapirunthep, P.⁴ and Chaosap, C.⁴

¹Department of Animal Production Technology and Fisheries, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Center of Excellence on Agricultural Biotechnology (AG-BIO/MHESI), Bangkok 10900, Thailand; ³Department of Animal Sciences, Faculty of Agriculture at Kamphaeng Saen, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand; ⁴Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

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

Under stress conditions induced by a high-dose live coccidiosis vaccine, thymol-carvacrol supplementation in broilers significantly improved feed conversion ratio (FCR) during the starter and grower phases compared to the negative control. In contrast, antibiotic supplementation resulted in better growth performance throughout the rearing period. In addition, antibiotic supplementation lowered serum levels of the oxidative stress marker malondialdehyde (MDA) and the pro-inflammatory cytokine interleukin-17 (IL-17), with thymol-carvacrol supplementation showing comparable but less pronounced effects, followed by the negative control. In addition, antibiotic supplementation improved intestinal morphology as evidenced by decreased crypt depth and increased villus height to crypt depth ratio, followed by thymol-carvacrol supplementation compared to the non-supplemented groups. These results suggest that thymol-carvacrol supplementation can improve the gut health and performance of broilers under stress conditions.

Keywords: Phytobiotics, Oxidative stress substances, Pro-inflammatory cytokine, Intestinal morphology

Fructooligosaccharides supplementation: Effects on broiler chicken performance, intestinal morphology, microbial community, and stress indicators

Phungkeha, P.¹, Tiyaprasertkul, P.¹, Chaosap, C.^{2*}, Sivapirunthep, P.², Ruangpanit Y.³, Rassmidatta, K.³, Philatha, A.³ and Srikijkasemwat, K.¹

¹Department of Animal Production Technology and Fisheries, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ³Department of Animal Sciences, Faculty of Agriculture at Kamphaeng Saen, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand.

***Corresponding Email:** chanporn.ch@kmitl.ac.th

The results of supplementing different levels of fructooligosaccharides (FOS) compared to no supplementation under stress conditions—such as broilers raised on recycled litter and at higher rearing densities were as follows: broiler performance did not show statistically significant differences between FOS-supplemented groups and the control ($p>0.05$), FOS supplementation improved intestinal morphology by increasing the villus height to crypt depth ratio, FOS supplementation increased *Lactobacillus* populations while reducing *Escherichia coli*, and FOS supplementation lowered the heterophil-to-lymphocyte ratio, indicating reduced stress.

Keywords: Prebiotic, Gut morphology, Microbiota, stress index, White blood cells

Feeding diet containing concentrate with fermented *Arenga pinnata* by-product on nutrient intakes, digestibility, and milk quality of lactating dairy cows

Sulistiyowati, E.^{1*}, Wiryawan, I. K. G.², Badarina, I.¹, Naibaho, S. H.¹, Apreza¹, Pratama, W. A.¹, Cahyadi, C.¹, Sistanto¹ and Waspodo, R. J.³

¹Department of Animal Husbandry, Faculty of Agriculture, Univ. of Bengkulu, Bengkulu, Indonesia;

²Department of Animal Nutrition and Feed Technology, Faculty of Animal Sci., IPB University, Bogor, Indonesia; ³Department of Marine Sci., Graduate School, IPB University, Bogor, Indonesia.

*Corresponding Email: esulistiyowati@unib.ac.id

Utilizing fermented *Arenga pinnata* by-product using *Pleurotus ostreatus* that was inoculated for 5 weeks until the full hypha grown, was an alternative for feedstuff. This biomass was ready to be used as one of the ingredients in substitution with rice bran in the concentrate. There were concentrate with fermented *Arenga* (CFA) -by product CFA0 (0/35), CFA10 (10/25), CFA15 (15/20), and CFA20 (20/15). While, other ingredients were ground corn, soybean meal, palm oil, mineral mix, *Curcuma xanthorrhiza*, yeast, NaCl, CaCO₃, and TSP. Those were all in the same amount with the total of 65%. The results showed that the crude protein of fermented *A. pinnata* was improved (11.62%), compared to 1.55% in non-fermented *A. pinnata*; its crude fiber decreased from 30.18 to 24.31%, respectively, in non and fermented *A. pinnata*. While NDF, ADF, hemicellulose, and cellulose contents were decreasing with the increasing levels of fermented *A. pinnata* by-product to rice bran. On the other hand, Ca, P, and Ca/P (2.04) were found high in CFA20. Feces productions (19.50 kg/d in average) were not different ($P>0.05$) among the three diets containing fermented *A. pinnata* by-product concentrates in lactating dairy cows. The nutrient contents in feces were not different ($P>0.05$) among these diets, except for ether extract ($P<0.05$), higher in CFA15 and CFA20. All nutrient intakes were very significantly ($P<0.01$) decreasing with increasing fermented *A. pinnata* by-product in concentrates. Digestibility of nutrients had remained not significantly different ($P>0.05$); while ether extract decreased significantly ($P<0.05$) in CFA15 (86.57%) and CFA20 (87.51%), compared to diet with no fermented *A. pinnata* in concentrate. Milk yields (8.52 kg/d in FCA0 and 8.31 kg/d in CFA20 diets) and milk contents were not affected significantly ($P>0.05$). These results showed that inclusion of fermented *A. pinnata* up to 20% in substitution of rice bran in concentrate could be considered applicable in diets of lactating dairy cows.

Keywords: *A. pinnata*, Concentrate, Dairy, Digestibility, Fermented

The prevalence of capripoxvirus causing lumpy skin disease in beef cattle with no clinical signs on a well-managed cooperative farm

Kaewhom, P.¹, Poolsamran, P.², Ard-rugsa, T.³, Phromnoi, S.⁴, Thammakarn, C.⁵ and Srikijkasemwat, K.^{5*}

¹Faculty of Agricultural Technology, Burapha University, Sakaeo Campus, Sa Kaeo 27160, Thailand; ²Department of Mathematics, Faculty of Science, Burapha University, Chon Buri 20131, Thailand; ³Wattana Nakhon District Livestock Office, Sakaeo 27160, Thailand; ⁴Faculty of Science and Technology, Uttaradit Rajabhat University, Uttaradit 53000, Thailand; ⁵Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok 10520, Thailand.

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

The researchers utilized polymerase chain reaction (PCR) analysis to detect capripoxviruses in asymptomatic beef cattle in the Cobal Burapha Project in Sakaeo, supported by the Thai government. The project is a model for consolidating farmer groups and promoting good farm management practices, representing a significant advancement in combating lumpy skin disease (LSD). Testing occurred during March-April (summer) and June-July (rainy season). Results revealed that the PCR product of infected cattle generated by a occurs within the 1,000 to 1,500 base pairs range. The prevalence of capripoxviruses in cattle was 1.17% (9/770), with no significant difference in infection rates between the summer and rainy seasons ($P > 0.05$). Furthermore, the occurrence of capripoxviruses was not correlated with the geographical region within each sub-district or the period when the blood samples were collected ($P > 0.05$). Findings in infected cattle indicated a lack of clinical signs (no nodules on the skin), allowing the relevant authorities to limit the spread of the disease and treat it without causing severe damage to the animals. This underscores the need for strict disease prevention practices in beef cattle production to prevent potential losses.

Keywords: LSD, PCR, Cow, Asymptomatic, Molecular technique

The effect of different periods aestivation on recovering and nutritional composition of Apple snail (*Pomacea* sp.)

Srijad, S., Pilapang, K. and Yomla, R.*

Department of Animal Production and Fishery, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand.

*Corresponding Email: rungtawan.yo@kmitl.ac.th

Studies on the effect of different periods of aestivation of the apple snail *Pomacea* sp. were divided into 2 experiments. The first experiment was a recovering study of the different periods of aestivation and the second study was the nutritional composition of the different periods of aestivation. The first study was that the apple snails were raised at the age of 5 months and the average initial weight was 19.29 ± 1.17 grams per individual. The aestivation study on different periods was divided into 4 experimental groups: a control group (T1: no aestivation), a 2-week aestivation group (T2), a 4-week aestivation group (T3), and an 8-week aestivation group (T4). The result showed a 100% recovery of all experimental groups. The survival rate of the aestivation group showed a significant difference, and the survival rate was 94.78 ± 4.50 , 90.82 ± 3.11 and 88.78 ± 2.86 percent, respectively. The weight at the end of the trial of the aestivation group was 15.07 ± 3.68 , 15.39 ± 3.56 and 13.75 ± 2.93 percent, respectively and the weight of the aestivation group had no significant difference. The nutritional composition after aestivation showed a significant difference ($P < 0.05$) in protein values among the groups. The protein value was 47.53 ± 0.44 , 51.17 ± 0.53 , 52.88 ± 0.18 and 53.95 ± 0.24 percent,

respectively. The protein values showed an increasing trend over the aestivation period, while the fat and fiber values were no different significantly ($P>0.05$). The values of ash, starch, and sugar were different significantly ($P<0.05$), with higher ash percentages in the 4-week and 8-week groups. Meanwhile, starch and sugar percentages were higher in the control group and showed a decreasing trend over the values period. Calcium values were different significantly ($P<0.05$) between the aestivation groups, with higher values compared to the control group. Phosphorus value no significant difference ($P>0.05$) among all experimental groups.

Keywords: Apple snails, *Pomacea* sp., Aestivation, Nutritional composition

Comparative analysis between *Artemia parthenogenetica* and *Artemia franciscana* size from China, Vietnam and United States of America Sources

Choojit, T.¹, Ratanaprapaporn, T.¹, Dokkaew, S.¹, Nhan, H. T.², Kitikiew, S.³ and Kantha, P.^{1,4*}

¹Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok, 10900, Thailand; ²Collage of Aquaculture, Can Tho University, Can Tho, 92000, Vietnam; ³Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ⁴Research and Academic Service Center for Andaman Region, Faculty of fisheries, Kasetsart University, Krabi, 81130, Thailand.

***Corresponding Email:** phunsin.k@ku.th, suwaree.ki@kmitl.ac.th

Artemia, also known as brine shrimp, are important organisms in the aquaculture industry due to their ability to adapt to high salinity environments and high nutritional value, making them suitable live food for various aquatic species. Our research focused on two distinct species of *Artemia*, *Artemia franciscana* and *Artemia parthenogenetica*, sourced from various geographical regions. Because of the current demand, artemia is the preferred choice for small-sized live feed for aquatic larvae. Hence, it is crucial to choose suitable *Artemia* sources that correspond with the dietary requirements of aquatic larvae. Experiments were conducted under controlled conditions to analyze *Artemia*'s hatching performance and size of each stage, from cyst nauplii to adults. The results revealed significant differences between the species, suggesting potential for optimizing specific strains tailored to distinct aquaculture applications. The findings revealed notable disparities across the species, suggesting the possibility of enhancing certain strains customized for specific aquaculture purposes. The size of cysts and Instar I stage in *A. franciscana* from Vietnam were smaller than those in *A. franciscana* from America and *A. parthenogenetica* from China. The gathered statistics provide preliminary criteria for choosing strains that are well-suited size of live feed to certain aquaculture hatcheries.

Keywords: *Artemia*, Hatching efficiency, Live feed, Nursery, Aquaculture, Cysts

Cryo-survivability of frozen-thawed spermatozoa from commercially sold locally processed boar semen: prospects for Animal Genetic Resources Cryobanking in the Philippines

Ocampo, L. C.* and Lofranco, J. O. C.

Reproduction and Physiology Section, Research and Development Division, Department of Agriculture-Philippine Carabao Center, Science City of Munoz, Nueva Ecija, Philippines 3120.

***Corresponding Email:** ocampolerma040661@gmail.com

Semen cryopreservation technology in the Philippines is far more established in livestock ruminants for artificial insemination (AI) use. Processed boar semen on the other hand, preserved in semen extender solution(s) is chilled at $16\pm 1^\circ\text{C}$ and commercially marketed for pig AI purposes. The dearth

of information on boar semen cryopreservation has spurred the interest of commercial semen producers to save their pig breeder stocks due to the African Swine Fever scare. In this study, spermatozoa from commercial pig breed semen samples #1, #2, #3 and #4 were cryopreserved at negative 196°C using Lactose egg yolk-based Cooling Extender (CE; 0.31M Lactose 80% v/v and 20% Egg yolk v/v) and Freezing Extender Solution/s (CE 92.5% v/v, Glycerol 6% v/v and Equex paste 1.5% v/v). The objective of the experiment was to determine the survivability of pig spermatozoa after cryopreservation. Using the Computer Assisted Sperm Analyzer (CASA-IVOS II, Hamilton Thorne, USA) the sperm motility (CASA-MOT%) and progressively motile sperm (CASA-PMOT %) characteristics were determined before and after cryopreservation. Boar semen samples #1, #2, #3 and #4 registered pre-freeze CASA-MOT average \pm s.e.m. values of 80.75 ± 2.9^A , 67.70 ± 3.42^B , 63.5 ± 4.53^B and 69.0 ± 6.89^B (ANOVA, $p < 0.05$), respectively with CASA-PMOT values of 63.78 ± 1.99^A , 47.93 ± 2.87^B , 42.57 ± 2.73^B and 53.28 ± 7.06^B (ANOVA, $p < 0.05$), respectively. Cryopreservation impacted post thaw sperm motility characteristics of samples #1, #2 and #4 resulting in CASA-MOT (%) values of 40.25 ± 4.35^A , 20.15 ± 4.13^B and 25.23 ± 3.83^B , respectively with CASA-PMOT (%) of 35.64 ± 4.4^A , 17.00 ± 2.62^B and 18.18 ± 2.61^B , respectively (ANOVA, $p < 0.05$). Cryopreserved semen sample #3 registered poorly with 13.32% motile sperm. In conclusion, processed semen from commercial pig breeds are potential sources of freezable spermatozoa with retained sperm motility and progressively motile sperm characteristics after cryopreservation. These findings though basic in nature open opportunities for safeguarding pig gametes thru Animal Genetic Resources Cryo-banking and future research utilization thru *in vitro* fertilization and embryo production.

Keywords: Commercial boar semen, Cryopreservation, Sperm survivability

Effects of dietary supplementation with garlic and *Bacillus subtilis* on growth performance and stress of *Anabas testudineus*

Pengseesang, R., Wiangsamut, B. and Kulabtong, S.*

Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok, Chanthaburi Campus, Chanthaburi, Thailand 22210.

*Corresponding Email: kulabtong2011@hotmail.com

This study investigated the effects of dietary supplementation with garlic and *B. subtilis* on the growth performance and stress tolerance of *A. testudineus*. Utilizing a total of 12 tanks with sex-reversed fish averaging 1.86 ± 0.559 g, the experiment was conducted over 8 weeks with four dietary treatments: control, garlic, *B. subtilis* at 1×10^5 CFU/kg, 1×10^7 CFU/kg, and 1×10^9 CFU/kg. Growth parameters including final weight, mean length gain, weight gain, percentage weight gain, average daily growth, and specific growth rate showed significant improvements ($p < 0.05$) in fish fed the diet supplemented with garlic and *B. subtilis* at 1×10^9 CFU/kg, compared to other treatments. This diet also resulted in the highest survival rate (100%) compared to the control (87.50%). Feed efficiency metrics such as average daily feed intake, feed conversion ratio, and feed efficiency were significantly better in the 1×10^9 CFU/kg treatment group. Water quality analysis indicated no significant differences in temperature ($p > 0.05$) but showed better pH and dissolved oxygen levels in the same treatment group. Carcass composition revealed a higher fillet percentage and lower skeletal proportion in fish fed with the garlic and *B. subtilis* diet at 1×10^9 CFU/kg. Proximate analysis of the fish flesh demonstrated higher crude protein and ether extract content for the same diet. Additionally, stress tolerance experiments under temperature fluctuations revealed that fish receiving the garlic and *B. subtilis* diet at 1×10^9 CFU/kg exhibited significantly lower mortality rates under stress conditions at 15°C and 35°C. Overall, dietary supplementation with garlic and *B. subtilis*, particularly at 1×10^9 CFU/kg, enhances growth performance, feed efficiency, and stress resilience in *A. testudineus*.

Keywords: *Anabas testudineus*, *Bacillus subtilis*, Dietary supplementation, Garlic, Growth performance

Adulticidal activity of star anise, turmeric, cloves and combinations against houseflies

Sinthusiri, J.¹, Soonwera, M.², Puwanard, C.³, Passara, H.^{2*}, Thongsaiklaing, T.⁴, Mounghipmalai, T.³, Sittichok, S.² and Jintanasirinurak, S.⁵

¹Community Public Health Program, Faculty of Public and Environmental Health, Huachiew Chalermprakiet University, Samut Prakan, 10540, Thailand; ²Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ³Department of Plant Production, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ⁴Faculty of Agriculture, Princess of Naradhiwas University, Naradhiwas, 96000, Thailand; ⁵Department of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus, Chumphon, 86160, Thailand.

*Corresponding Email: hataichanok.pa@kmitl.ac.th

The small droplet size could increase the absorbed ingredients and high stability. The star anise nanoemulsion determined optimum efficacy, with a 1% concentration resulting in the highest knockdown and mortality rate of 100%. Its KT_{50} and mortality effective values were 28 min and 36 times, respectively. Furthermore, the adult stage of houseflies was susceptible to star anise nanoemulsion. In contrast, cypermethrin was less toxic to it, with a high KT_{50} and resistance to adult houseflies. Consequently, the star anise nanoemulsion could be developed into an efficient and safe environment for controlling housefly populations.

Keywords: Housefly, Insecticidal activity, Knockdown, Mortality, Star anise

Species of commercially-farmed crickets in Thailand

Ruang-Rit, K. *, Poommarin, P. and Seritrakul, P.

Faculty of Animal Sciences and Agricultural Technology, Silpakorn University, Sampraya, Cha-Am, Phetchaburi, 76120, Thailand.

*Corresponding Email: ruangrit_k@su.ac.th

Cricket has been commercially farmed in Thailand for over 30 years. Several types of crickets are raised in Thailand, but due to their morphology, there are still confusion and misunderstanding regarding their naming. This hinders the cricket trading and establishment of farming standard. This study aims to investigate the distinct morphology of each cricket species to establish accurate classification and naming and ensure correct information for the public. We sampled commercially farmed crickets from 108 farms along 46 provinces and all regions of Thailand from April 2021 to October 2022. Specific morphological features and partial DNA sequences from mitochondria were investigated, and we found that there are 4 species of commercially farmed crickets in Thailand with some farms raising two or more types of crickets. First, the "Thongdum Cricket" (Two-spotted cricket, *Gryllus bimaculatus*) is the most commonly raised in 92 farms. The "Thongdum Cricket" has two phenotypes: the red-coloured and black-coloured body. Genetic evidence from mitochondrial DNA sequences at the cytochrome oxidase I (COI) gene found that these two phenotypes are indeed the same species. Second, the "House Cricket" (*Acheta domesticus*) commonly known in Thai as "Sa-ding" is raised in 65 farms. Third, the "Thongdaeng Cricket" (Ground Cricket, *Teleogryllus mitratus*) has yellow V-shape mark between the two eyes when viewed anteriorly and is raised in 33 farms. The name "Jing Krong" is often mistakenly used instead of the correct "Thongdaeng Cricket". Our genetic sequence information confirmed that this species indeed should be called "Thongdaeng Cricket". Last, "Thonglai Cricket" (Crazy red field cricket, *Gryllus locorojo*) has distinct M-shaped marking on the head, and the body is red brown. This species is raised in 15 farms and is often mistakenly called "Vietnam Cricket" because they were imported originally from Vietnam.

Keywords: Cricket, Cricket's species, Commercial cricket farming, Cricket farms in Thailand

The KUB chicken feathers growth during 6 weeks of starter phase intensive management

Putranto, H. D.^{1*}, Nurmeliastari¹, Dani, M.¹, Kurniati, N.² and Yumiati, Y.³

¹Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia;

²Agribusiness Program Study, Faculty of Agriculture, Muhammadiyah University of Bengkulu, Bengkulu, Indonesia; ³Agribusiness Program Study, Faculty of Agriculture, Dehasen University, Bengkulu, Indonesia.

*Corresponding Email: heri_dp@unib.ac.id

Indonesia, especially Sumatra and Java Island, has been well recognized for its endemic jungle chicken and became genetically Indonesia's most recent chicken parent stock. This study used a new subspecies of local chicken, namely KUB chicken, to explore its biological information. KUB chicken is an abbreviation of Kampung Unggul Balitbangtan chicken. These chickens resulted from crossbreeding technology and are still uncommonly found reared among farmers in Bengkulu Province, Indonesia. Hundred DOC of KUB chicken reared intensively for 6 weeks, fed by commercial feed, and observed daily for its plumae feathers growth on the chicken wing and tail area. Collected data were analyzed descriptively. Results of the study of the development of kampung unggul balitbangtan (KUB) chicken feathers during 6 weeks of intensive rearing showed an average length and width of plumae feathers on wings were 69 mm and 1.22 mm. The average length and width of plumae feathers on the tail grew to 49.5 mm and 1.23 mm. In conclusion, the plumae feathers on the wing of KUB chicken grew faster and longer than the plumae feathers on the tail.

Keywords: Growth, KUB chicken, Plumae feather, Starter

Larvicidal and Pupicidal activity of combination of two plant essential oils against *Aedes aegypti*

Sinthusiri, J.^{1*}, Puwanard, C.², Passara, H.³ and Soonwera, M.³

¹Community Public Health Program, Faculty of Public and Environmental Health, Huachiew Chalermprakiet University, Samut Prakan, Thailand; ²Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang; ³Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang, Bangkok, Thailand.

*Corresponding Email: jiri_ja@yahoo.com

The larvicidal and pupicidal effects of six mixtures of cinnamon (*Cinnamomum verum* J. Presl.) and nutmeg (*Myristica fragrans* Houtt.) essential oils (EOs) and major compositions (geranial, α -pinene and *trans*-cinnamaldehyde) were tested against early fourth instar and pupal stages of *Aedes aegypti*. The combinations (2% cinnamon EO + 1% geranial, 2% cinnamon EO + 1% *trans*-cinnamaldehyde and 2% cinnamon EO + 1% α -pinene) showed high toxicity against early 4th instar larvae, with 100% mortalities at 24 hours and LT₅₀ between 1.4 and 2.4 hours. Additionally, 2% nutmeg EO + 1% α -pinene showed >99% mortality at 24 hours with LT₅₀ = 4.6 hours. 2% nutmeg EO + 1% geranial and 2% nutmeg EO + 1% α -pinene were highly toxic against pupae, with 100% mortality at 48 hours and LT₅₀ values of 5.8 and 7.8 hours. On the other hand, temephos showed LT₅₀ for larval and pupal stages at 9.8 and 94.1 hours. We showed that 2% nutmeg EO + 1% α -pinene was able to control immature stages and was more effective than temephos. However nutmeg extracts need to be checked for human and valuable species toxicity.

Keywords: *Aedes aegypti*, Combination essential oils, Larvicidal and pupicidal activities, Cinnamon oil, Nutmeg oil

Efficacy of plant essential oils for repelling against American cockroach adults (*Periplaneta americana* L.)

Arhamad-Armeen, N.¹, Soonwera, M.², Passara, H.^{2*} and Jintanasirinurak, S.³

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

***Corresponding Email:** hataichanok.pa@kmitl.ac.th

The combination of four plant essential oils (EOs) from star anise, citronella grass, lemon grass, and cinnamon were evaluated for repelling American cockroaches by the dual-choice method. A combination of star anise + citronella grass had a repellency rate of 95%. In contrast, combinations of star anise + lemon grass and star anise + cinnamon were effective between 73% and 69%, but the synthetic chemical repellent (12% DEET) was less effective at 59%. Therefore, the essential oils formulae had a high potential for effective use and, further, are harmless for healthiness and the environment. Thus, they can replace more toxic synthetic insecticides.

Keywords: American cockroach, Cinnamon, Citronella grass, Lemon grass, Star anise

SESSION 3: BIOLOGICAL DIVERSITY AND MICROBIOLOGY

Pathogenic potential of gram-negative bacteria isolated from organically grown lettuce samples, farm soil and fish amino acid fertilizer in two farms in Sariaya and Tayabas City, Philippines

Lupanggo, A. K.¹, Mendoza, B. C.¹ and Ramos, J. C. T.²

¹Microbiology Division, Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños, Philippines; ²Graduate School, University of the Philippines Los Baños, Philippines.

This study aimed to identify and determine the pathogenic potential of some Gram-negative, facultatively anaerobic bacteria isolated from lettuce, soil, and fish amino acid fertilizer samples from two practicing-organic (PO) farms in Quezon, Philippines. The isolates were morphologically and culturally characterized and subjected to API 20E testing and 16S rRNA gene sequencing analysis. Ten were putative coliforms, but not *E. coli*, as detected on Violet red bile agar, MacConkey agar, Brilliant green lactose bile agar, Eosin methylene blue agar and Chromocult coliform agar. Four of the isolates were β -hemolytic while three were α -hemolytic on 5% Sheep blood agar. API 20E and 16S rRNA gene sequencing analysis data showed that four isolates from Red Rapid lettuce and farm soil samples were identified as *Serratia* sp., one from a soil sample was *Symbiopectobacterium purcellii*, three were *Enterobacter hormaechei* / *E. quasihormaechei*, and one from Red Rapid lettuce sample was *Pseudocitrobacter vendiensis*. *Serratia* and *Enterobacter* spp. are known opportunistic and nosocomial pathogens, while *P. vendiensis* was reported to harbor carbapenamases, and are all, thus, of public health concern.

Keywords: Hemolytic Gram-negative bacteria, Practicing-organic farms, Lettuce, Fish amino acid, Opportunistic pathogens

The Edible Ectomycorrhizal Mushrooms (EEM) in southern Viet Nam: from nature to utilization

Hoang ND Pham^{*}, Quyen Hoang Dang, Tram Thuy Ngo, Nhan Thanh Le

Applied Biotechnology Institute, 25/27/9 Son Ky, Tan Phu District, Ho Chi Minh City, Viet Nam.

^{*}Corresponding Email: pndhoang@gmail.com

The Edible Ectomycorrhizal Mushrooms (EEM) in southern Viet Nam were widespread following the dominant vegetative types of forest. It was diversified from dipterocarps in low elevation and to pines in highland, as well as acacia in reforestation area and fruit trees in farm. Recorded from pomelo and mango farms, *Phlebopus spongiosus* was defined to have an ectomycorrhizal association with *Citrus maxima*. It also was success for artificial cultivation by sawdust with nylon bag model. To survey ectomycorrhizal mushrooms in pine forest, several plots were set up coincided with 4 species of pine in southern Viet Nam: *Pinus dalatensis*, *P. krempfii*, *P. kesiya* and *P. latteri*, distributed from altitude of 800 to 1800 m. The ectomycorrhizal mushrooms (EM) sporocarps communities of all plots were examined. Total 10000 EM sporocarps which belonged to more than 90 genera were collected. Among them, *Russula* group were recorded as the 1st or the 2nd dominant in all pine forest plots. *Amanita* sporocarp groups was dominant in the mixed forest of *P. latteri* and *D. obtusifolius* as well as *P. kesiya* forest with the maximum records of both individuals and frequencies. Both *Russula* and *Cortinarius* sporocarp groups were dominant in the mixed forest of *P. dalatensis* and *P. krempfii* as well as the mixed forest of *P. dalatensis*, *P. krempfii* and *Quercus*. Most of EEM were recorded as bolete group, the other had belonged to *Amanita*, *Tricholoma*, *Lactarius*, *Russula*, *Ramaria* ect. From 313 fungal

strains isolated from the collected sporocarps, 30 fungal strains were chosen based on the edible possibility and the growth rate. *Suillus luteus* showed their ability to establish ECM and stimulate the growth rate of pine seedlings. It could be the potential EEM candidates for reforestation in highland Viet Nam. Other strains of *Suillus*, *Tricholoma*, *Clitopilus*, *Lyophyllum* and *Ramaria* were trialed for artificial cultivation.

Another study was set up to survey EEM in reforestation enterprise of *Acacia* and deciduous forest dominant by dipterocarps. Most of EEM in *Acacia* forest were belonged to *Tylopilus* spp. The EEM in deciduous dipterocarps forest were diversified and mostly belonged to *Amanita*, *Russula* and bolete. The studies are continuing to establish the database of edible ectomycorrhizal mushrooms as well as wild edible mushrooms in southern Viet Nam.

Keywords: Edible Ectomycorrhizal Mushroom (EEM), Southern Viet Nam, Artificial cultivation

Exploration of associated actinobacteria for agricultural applications

Gopikrishnan, V.*

Centre for Drug Discovery and Development (CDDD) & Centre for Modern Organic Agriculture Research (CMOAR) Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India.

***Corresponding Email:** gopikrishnan.cddd@sathyabama.ac.in

Increasing demand from the world's expanding population requires increased agricultural productivity. In addition, a sustainable and healthy agricultural production utilizing advantageous microbes for increased yield is required to counteract the negative effects of current agriculture techniques on the environment, human health, and food security. Although producing biomolecules of interest from these microorganisms with rich biosynthetic repositories is quite difficult, intensive research in related fields and the development of new genetic tools for improved microbial consortia are opening up new avenues for farmers and agriculturists to meet the growing demand for sustainable food production. Associated microorganisms have become a valuable tool in the fight against threats to the sustainability of agriculture. However, research has had difficulty utilizing the advantageous qualities of agricultural microbiomes to enhance crop performance, despite increased interest in optimizing microbial functions for crop yield, resource efficiency, and stress resistance. Here, we provide an overview of the associated bacteria from the salt pan, earthworm cast, and insect nest that have been found to have Plant Growth Promoting (PGP) qualities. We isolated and examined over fifty cultures from salt pan and earthworm cast to determine their PGP characteristics. These isolates were screened for their activities which will be presented. Finally, we suggested areas of focus for future research that take a comprehensive approach to associated microbiomes as potential resources for a range of agricultural systems.

Keywords: Agriculture, Microbes, Associated bacteria, PGP, Earthworm cast, Salt Pan

Evaluation of genetic diversity by molecular markers in Indian gooseberry (*Phyllanthus emblica*)

Poeaim, S.^{1*} and Sangsoy, V.²

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok 10520 Thailand; ²Phrae Agricultural Research and Development Centre, Department of Agriculture, Phrae, 54000 Thailand.

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

This study evaluated the genetic diversity and relationships among 16 cultivars of Indian gooseberry (*Phyllanthus emblica*) using Sequence-Related Amplified Polymorphism (SRAP) and Random

Amplified Polymorphic DNA (RAPD) markers. The cultivars were collected from the Phrae Horticultural Research Center, Thailand. For SRAP analysis, 30 primer combinations were initially tested, comprising five forward and six reverse primers. Seven primer combinations consistently generated well-defined bands and were selected for genetic profiling. These SRAP primers amplified 172 fragments, with 145 (84.30%) polymorphic. For RAPD analysis, 50 primers were evaluated, and eight primers that consistently produced clear bands were used for genetic profiling. These RAPD primers amplified 215 fragments, with 188 (87.44%) polymorphic. The genetic relationships among the cultivars were assessed using a dendrogram constructed with NTSYS-pc (version 2.1X) based on the Unweighted Pair Group Method with Arithmetic Mean (UPGMA). The genetic similarity coefficients ranged from 0.66 to 0.90 for SRAP and from 0.58 to 0.89 for RAPD markers, indicating a high level of genetic diversity among the cultivars.

Keywords: Indian gooseberry, SRAP, RAPD

Characterization and biological screening of the culturable endophytic actinomycetes from *Garcinia cowa* Roxb.

Tilarux, P., Suwanposri, A. *, Anartngam, P. and Supong, K.

Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi, Thailand.

***Corresponding Email:** Khomsan_su@rmutto.ac.th, Patamaporn_ti@rmutto.ac.th

This study described the culturable endophytic actinomycete strains, GcL-T1-1 and GcLT2-2, were isolated from a leaf of cowa (*Garcinia cowa* Roxb.) samples collected from Chanthaburi province. On the basis of morphological and physiological characteristics, strains GcL-T1-1 and GcLT2-2 formed filament cells and produced spores on the mycelium which were classified to actinomycete group. Strain GcL-T1-1 was identified as *Streptomyces* based on morphological and chemotaxonomic characteristics that contained LL-diaminopimelic acid in cell wall. 16S rRNA gene analysis, an actinomycete strain GcL-T2-2 was classified to the genus *Micromonospora* that showed the highest similarity value with *Micromonospora schwarzwaldensis* HKI0641 (99.93%). In addition, neighbour-joining phylogeny confirmed that strain GcL-T2-2 was formed phyletic line within the genus *Micromonospora*. Biological screening for antimicrobial and cytotoxic activities, crude extract of strain GcL-T2-2 exhibited anti-*Bacillus cereus* and anti-tumor NCI-H187 at MIC 50 µg/ml and IC₅₀ 48.12, respectively. Strain GcLT1-1 showed only cytotoxicity against NCI-H187 with the IC₅₀ value of 43.20 µg/ml. However, anti-fungal activity against *Alternaria brassicicola* (Anti-Leaf spot) and *Colletotrichum acutatum* was MIC value >50 µg/ml.

Keywords: Actinomycetes, Biological activity, Endophytes, *Garcinia cowa*

Screening and characterization of plant growth-promoting bacteria from plant roots

Taweesukchaijaroen, N.¹, Somsri, A.¹, Rangjaroen, C.², Siripong, W.², Pongtip, A.³ and Rumjuankiat, K.^{1*}

¹College of Agricultural Innovation and Food Technology, Rangsit University, Pathum Thani 12000, Thailand; ²Faculty of Science and Technology, Phranakhon Rajabhat University; ³Faculty of Agricultural Innovation, College of Agricultural Innovation and Food Technology, Rangsit University, Thailand.

***Corresponding Email:** kittaporn.r@rsu.ac.th

Plant Growth-Promoting bacteria (PGPB) are beneficial microorganisms that can enhance plant growth through various mechanisms. This study aimed to isolate and identify PGPB from soil around plant roots and assess their potential for promoting plant growth. In Activity 1, 29 microbial isolates were obtained using the Spot-on-lawn method and tested for phosphorus solubilization, Indole-3-acetic acid (IAA) production, total phenolic compound, antioxidant activity, and biocontrol efficacy against phytopathogenic microorganisms *Fusarium oxysporum*, *Colletotrichum gloeosporioides* and *Curvularia* spp. using the Dual culture method. Six isolates (NT7-6, NT10-14, NT14-4, NT14-5, NT14-15, and NT16-20) demonstrated significant plant growth-promoting abilities. In Activity 2, these isolates were identified using PCR with primers fD1 [5'-AGA GTT TGA TCC TGG CTC AG-3'] and rP2 [5'-ACG GCT ACC TTG TTA CGA CTT-3'], followed by 16s rDNA sequencing, confirming belong to the genus *Bacillus*. Activity 3 involved testing the efficacy of these PGPB isolates in promoting seedling growth of rice, chili, and tomato seed. Isolates NT-14-4 and NT16-20 significantly enhanced rice shoot height to 6.96±0.29 cm and 6.93±0.93 cm, respectively, while NT16-20 has increase seed vigor index of rice and chili seed at 15.74±0.36 and 3.13±0.60, and the isolate that enhance seed germination are NT7-6 and NT14-5, with statistically significant differences observed. The results indicated that these isolated bacteria effectively promote plant growth and hold promise for future agricultural applications.

Keywords: Plant growth-promoting bacteria, Microbial isolate, Phytopathogenic microorganisms

Effects of probiotics, *Lacticaseibacillus paracasei* and *Bacillus amyloliquefaciens* on water quality and inhibition of *Vibrio vulnificus* and *Vibrio alginolyticus* in White Shrimp, *Litopenaeus vannamei*

Sukkasem, K.¹, Thiankham, S.¹, Srisomwong, K.², Kantha, P.³ and Kitikiew, S.^{1*}

¹Department of Animal Production Technology and Fisheries, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Chachoengsao Shrimp Farmers Club, Thailand; ³Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok, 10900, Thailand.

*Corresponding Email: suwaree.ki@kmitl.ac.th and phunsin.k@ku.th

Infections caused by *Vibrio alginolyticus* and *Vibrio vulnificus* pose significant threats to white shrimp, *Litopenaeus vannamei* farming. The use of probiotics for disease prevention and water quality improvement offers a promising, eco-friendly alternative, as it avoids chemical residues. This study evaluated the effectiveness of a probiotic formulation containing *Lacticaseibacillus paracasei* and *Bacillus amyloliquefaciens* at a concentration of 10⁶ CFU/g. The probiotics were applied to water at concentrations suitable for 0.125 mL/L and 0.1875 mL/L, and shrimp (average weight of 6 grams) were stocked at a density of one shrimp per liter for 15 days. Results demonstrated that ammonia levels were significantly lower in the groups treated with probiotics compared to the control group. However, nitrite levels were elevated in the treated groups. The probiotics did not affect temperature, pH, dissolved oxygen, or total alkalinity. Notably, the probiotic treatment effectively reduced *Vibrio* spp. levels in the system, with bacterial counts markedly lower in treated groups compared to the control. Shrimp survival rates following a challenge with *Vibrio* spp. were 90% and 96.67% for the groups treated with 0.125 mL/L and 0.1875 mL/L of probiotics, respectively, while the control group exhibited 0% survival by day 13. The probiotic treatment also enhanced the shrimp's immune response, as evidenced by increased Total Hemocyte Count and Clearance Efficiency. Thus, probiotics can effectively reduce *Vibrio* spp. and ammonia levels while improving shrimp survival, even under infectious conditions.

Keywords: *Lacticaseibacillus paracasei*, *Bacillus amyloliquefaciens*, *V. vulnificus*, *V. alginolyticus*, White shrimp

Efficacy of indigenous *Beauveria bassiana* and *Purpureocillium lilacinum* for controlling *Planococcus minor* (Maskell) in durian fruits

Anutrakunchai, S. and Thongkamngam, T.*

Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok Chanthaburi Campus, Chanthaburi, Thailand 22210.

*Corresponding Email: Titi_th@rmutto.ac.th

Planococcus minor (Maskell) spread in durian fields has a great impact on durian farmers. Because *P. minor* can damage durian at almost every stage, from fruit setting to harvest. Therefore, it is necessary to select indigenous entomopathogenic fungi that have the potential to control *P. minor* in durian fruit. The objective of this research was to the efficacy of indigenous *B. bassiana* and *P. lilacinum* for Controlling *P. minor* (Maskell) in durian fruits. Insect pest samples were collected from durian orchards in three provinces: Chanthaburi, Trat, and Rayong. The collected samples were identified and classified based on fungal morphology, confirming the presence of *B. bassiana* and *P. lilacinum*. The results indicated that both *B. bassiana* and *P. lilacinum* at three concentrations (10^4 , 10^6 , and 10^8 spore/ml) were able to inhibit the growth of all *P. minor* stages. Notably, the concentration of 10^8 spore/ml resulted in the highest mortality rates for *P. minor* nymphs, achieving 97% and 100%, respectively. In conclusion, indigenous *B. bassiana* and *P. lilacinum* should be applied to *P. minor* at the nymph stage rather than during the adult stage, as the nymphs are more susceptible to the effects of entomopathogenic fungi.

Keywords: Indigenous, *Beauveria bassiana*, *Purpureocillium lilacinum*, *Planococcus minor* (Maskell) and Durian fruits

Bioprospecting of earthworm cast associated actinobacteria for sustainable agriculture

Clement, P. R.¹, Gopikrishnan, V.^{2*}, Gayathri.V.¹, Radhakrishnan, M.² and Soyong, K.³

¹Department of Biotechnology, Rajalakshmi Engineering College, Chennai, 602105, India; ²Centre for Drug Discovery and Development, Dr. Col. Jeppiaar Research Park, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu - 600 119, India; ³Research Institute of Modern Organic Agriculture (RIMO), King Mongkut's Institute of Technology (KMUTT), Ladkrabang, Bangkok, Thailand.

*Corresponding Email: gopikrishnan.cddd@sathyabama.ac.in

This research endeavour was centred on investigating the actinobacterial communities residing within earthworm casts and elucidating their potential contributions to promoting plant growth. A significant proportion of the microorganisms that inhabit the root zone are recognized for their ability to act as plant growth-promoting (PGP) agents, exerting beneficial effects on plant development and productivity. The field of actinobacterial research encompasses a broad spectrum of aspects, ranging from the isolation and characterization of these microorganisms and their functional activities to cutting-edge investigations into their secondary metabolite production capabilities through the application of modern post-genomic approaches. In this particular study, the researchers focused on isolating and studying culturable actinobacterial strains derived from earthworm casts. Subsequently, the isolated strains were evaluated for their potential to enhance the growth and development of black gram plants, a commercially significant crop species. The findings obtained from this research endeavour provide a solid foundation for further in-depth exploration of actinobacterial communities, their diversity, and their plant growth-promoting traits. Such investigations hold promise for the development of innovative biofertilizer formulations or other sustainable agricultural strategies.

Keywords: Actinobacteria, Bioprospecting, Agriculture, Biofertilizer and PGP

Efficacy of antagonistic bacteria for controlling fungal rice (*Oryza sativa* L.) pathogens

Monkhung, S. and Duangkaew, P.*

Faculty of Animal Sciences and Agricultural Technology, Silpakorn University, Phetchaburi IT campus, Sampraya, Cha-am, Phetchaburi 76120, Thailand.

*Corresponding Email: duangkaew_p@su.ac.th

A total of 59 bacterial isolates were isolated from the rhizosphere soil of rice in Tha-rang sub-district, Ban-Lham district, Phetchaburi province. The preliminary study was conducted using a dual culture assay to investigate the efficacy of antagonistic bacteria to control rice fungal diseases, which include *Curvularia* spp., *Fusarium* spp. and *Rhizoctonia* spp. The result showed that 5 isolates: BL-44, BL-48, BL-55, BL-56 and BL-59 have an efficiency to control the fungal pathogens. The BL-59 isolate revealed a maximal percentage of mycelial growth inhibition against *Curvularia* spp. (65.67%) and *Fusarium* spp. (54.74%) and BL-44 isolate showed a maximal mycelial growth inhibition percentage (PIRG) against *Rhizoctonia* spp. (74.29%) ($P < 0.05$) using PDA medium. Whereas, the inhibitory activity of BL-59, which performed on TSA medium had highly PIRG values of 93.33, 82.84 and 31.03% against *Curvularia* spp., *Fusarium* spp. and *Rhizoctonia* spp. tested on TSA medium, respectively. The volatile assay revealed that BL-44 isolate showed the highest antifungal efficacy against *Curvularia* spp. (82.26%) and *Fusarium* spp. (67.86%), whereas BL-48 and BL-56 isolates showed the highest antifungal efficacy against *Rhizoctonia* spp. by 73.33 and 76.67%, respectively ($P < 0.05$). Microscopic observation of the hyphal morphology of fungal diseases revealed the severely damaged hyphae, including deformation, loss of apical growth, and lysis. Furthermore, these bacterial isolates produced volatile compounds that inhibited mycelial growth and reduced pigment production. In addition, BL-44 and BL-56 isolates demonstrated temperature endurance from 20 to 50°C. BL-48 and BL-59 demonstrated tolerate salinity levels ranging from 4 to 7% NaCl. BL-48, BL-56 and BL-59 isolates were identified as *Enterobacter roggkampii*, *Enterobacter cloacae* and *Bacillus subtilis* subsp. *spizizenii* based on 16S rRNA analysis. As a result, the antagonistic bacteria isolated from this study can be used as an alternative choice to control rice diseases caused by fungal pathogens.

Keywords: Rice disease, Biological control, Rhizospheric bacteria, Volatile compounds

Biocontrol potential of the six strains of *Bacillus* sp. against rice pathogens, *Xanthomonas oryzae*

Banluehan, J. and Mattana, T.*

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

*Corresponding Email: mattana.tu@kmitl.ac.th

This study aimed to obtain bacteria that have antagonistic activity against rice pathogenic bacteria, *Xanthomonas oryzae*. *X. oryzae* pv. *oryzae* (*Xoo*) and *X. oryzae* pv. *oryzicola* (*Xoc*), caused bacterial blight and bacterial leaf streak diseases in rice, are seriously damaging rice production. Rhizosphere soil samples were collected from healthy rice in Suphanburi, Kanchanaburi, and Surin provinces of Thailand. A total of 135 bacterial strains isolated from the soil samples were tested, but only six isolates were selected mainly based on *Xoo* growth inhibition results. By dual culture test, strain KRI2, SRN19, and SPB1_1 provided the top three largest *Xoo* inhibition zone diameters of 30.16 mm, 24.30 mm, and 24.06 mm, respectively. The largest *Xoc* inhibition zone diameter was obtained from strain SRN19 (15.46 mm) followed by strain SPB1-1 (14.21 mm) and strain SPB1_10 (14.00 mm). In addition, all six selected strains were able to inhibit growth of *Curvularia lunata*, the rice pathogenic fungal. Morphological characterization revealed that all six strains were Gram-positive bacteria with rod-

shaped. Molecular characterization by 16S rDNA gene sequencing analysis exhibited that all six strains belong to the genus *Bacillus*. Strain SPB1_1, SPB1_10, SRN19, and KRI6 were identified as *Bacillus velezensis*. Strain KRI2 and KRI4 were identified as *Bacillus sonorensis* and *Bacillus subtilis*, respectively. Besides, plant growth-promoting traits and extracellular enzyme production ability of the six strains were observed. It was found that all six strains were able to produce protease and cellulose, but showed an ability to solubilize phosphate and nitrogen fixation slightly.

Keywords: Rice diseases, *Xanthomonas oryzae*, Antagonistic bacteria, Biocontrol

Efficacy of the strains of *Pseudomonas* and *Acinetobacter* as biocontrol agents against bacterial wilt disease in chili

Prathong, A. and Tunchai, M.*

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

*Corresponding Email: mattana.tu@kmitl.ac.th

Bacteria wilt of chili (*Capsicum* spp.) caused by *Ralstonia solanacearum* is an economically damaging disease of chili production in Thailand and tropical regions worldwide. This study screened bacteria isolated from the rhizosphere soil of healthy chili plants from Surin, Ratchaburi, and Chanthaburi provinces with strong antagonistic activity against *R. solanacearum*. A dual-culture assay revealed the best three isolated strains which were able to inhibit the growth of the pathogen. Strain D402-5(3) showed the largest inhibition zone diameter of 2.63 cm, followed by strain M601-4 and KJB01 with that of 2.50 cm and 2.33 cm, respectively. By morphological observation and molecular characterization via 16S rDNA gene sequencing analysis, strain D402-5(3) and KJB01 were identified as *Pseudomonas* sp., and strain M601-4 was identified as *Acinetobacter* sp. The suppression of bacterial wilt disease in chili by the three antagonistic strains was carried out by pot experiments in greenhouse. Strain D402-5(3) exhibited the highest biocontrol efficacy of 73.12% on the 12th day post *R. solanacearum* inoculation, followed by strain M601-4 and KJB01 with biocontrol efficacy of 58.19% and 43.2%, respectively. Plant growth-promoting traits and lytic enzymes production ability of the three strains were detected. The results showed that strain D402-5(3) was able to produce cellulase and protease, strain KJB01 produced only protease and strain M601-4 could solubilize phosphate and fix nitrogen.

Keywords: Antagonistic bacteria, Biocontrol, *Capsicum* spp., *Ralstonia solanacearum*

Application of tempeh and split gill fungal extracts in herbal fresh sausage: Evolution of antioxidant and antimicrobial activities

Somsri, A.¹, Yodsene, K.^{1,2}, Suthirawat, S.³, Pilasombut, K.⁴ and Rumjuankiat, K.^{1*}

¹College of Agricultural Innovation and Food Technology, Rangsit University, Pathum Thani 12000, Thailand; ²Faculty of Agricultural Technology, Rajamangala University of Technology Thunyaburi, Pathum Thani, Thailand; ³Department of Microbiology, Faculty of Science, Kasetsart University, Bangkok, Thailand; ⁴Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand.

*Corresponding Email: kittaporn.r@rsu.ac.th.

Tempeh, recognized as a high-protein meat alternative, is gaining popularity across Asian countries, while Split gill fungus (*Schizophyllum commune*), rich in essential nutrients, are increasingly consumed

in Southeast Asia. This study aimed to investigate the antioxidant properties and inhibitory activities of tempeh and Split gill fungus in different herbal sausage formulations. Fresh tempeh and Split gill fungus were used as plant-based protein sources in herbal sausage products. Six formulations of herbal fresh sausage were created: a control (CT) containing chicken breast, R1 (tempeh), R2 (tempeh and Split gill fungus in a ratio of 3:1), R3 (tempeh and Split gill fungus in a ratio of 2:2), R4 (tempeh and Split gill fungus in a ratio of 1:3), and R5 (Split gill fungus). After 0, 3, 6, and 9 days of storage at 4°C, physicochemical analyses were performed, including pH, color, protein content, and antioxidant determination. It was found that formulation R2 showed the highest protein content compared to the other formulations. The antioxidant activities of all treatments were significantly higher than the control ($p < 0.05$). Furthermore, formulations containing Split gill fungus (R3, R4, and R5) exhibited lower initial total plate count (TPC) values compared to the other formulations. Sensory evaluation was then conducted on sausages containing tempeh, Split gill fungus and their combinations in ratios of 1:1, 1:3, and 3:1, yielding overall acceptance scores of 3.93, 3.30, 4.27, 5.33, and 3.37, respectively. The combination with a 3:1 tempeh-to-mushroom ratio demonstrated the highest consumer acceptance. Therefore, our study on the application of tempeh and split gill macrofungus extracts in herbal fresh sausage provided valuable information for developing plant-based products and functional foods in the future.

Keywords: Tempeh, Split gill mushroom, Antioxidant, Antimicrobial, Herbal fresh sausage

Bioprospecting of fish gut associated Actinobacteria for its probiotic properties

Karthik, P. M. P., Gopikrishnan, V. *, Jacklin, T. J., Annamalai, K. K. and Radhakrishnan, M.

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

*Corresponding Email: karthikempy78@gmail.com

Gut microbiome plays a critical role in nutrition, development, immunity and resistant against invasive pathogens. Further, recent studies revealed that fish gut-associated microbes are the promising source for secondary metabolites, enzymes which can be an ideal potential for aquaculture probiotics. Actinobacteria are the group of gram-positive bacteria which contain high guanine and cytosine (G+C) in their DNA are well-recognized as a source for novel secondary metabolites. Actinobacterial members are widely distributed, the marine sediments are the richest source for bioactive actinobacteria and the distribution of actinobacteria in marine organisms such as fishes are also documented. However, reports on probiotics properties of fish gut associated actinobacteria are very few. Moreover, it has been postulated that emphasis on underexplored niches leads to the discovery of novel bioactive compounds. In the present study the fish gut associated isolates were screened for its probiotic properties. In our study, strain IM20 isolated from Indian Mackerel has showed promising antagonistic activity against fish such as *Aeromonas hydrophila*, *Aeromonas caviae*, *Aeromonas salmonicida*, *Staphylococcus aureus*, *Vibrio harvei*, *Edwardsiella tarda* as well as extracellular enzyme production such as Amylase, Lipase and Cellulase, Siderophore activity and bile tolerance activity. The actinomycetes strain IM20 is strong candidate for being used as a probiotic in aquaculture.

Biological characteristics and cultivation of wild *Auricularia cornea* recorded in Southern, Vietnam

Tra H MAI^{1,2,3}, Nhan T LE⁴, Tram T NGO⁴, Hung T NGUYEN⁵, Thuoc L TRAN^{1,2}, Hoang ND PHAM^{4*}

¹Biology and Biotechnology Faculty, University of Science, Ho Chi Minh City, Vietnam; ²Vietnam National University, Ho Chi Minh City, Vietnam; ³Faculty of Science and Food Technology, Lac Hong University, Vietnam; ⁴Faculty of Biotechnology, Ho Chi Minh City Open University, HCMC, Vietnam; ⁵Applied Biotechnology Institute, Ho Chi Minh City, Vietnam.

Corresponding Email: pndhoang@gmail.com

Two different isolates of *Auricularia cornea* collected from the forest in the southeast region of Vietnam were recorded, investigated the physiological characteristics and trialed the cultivation ability on rubber sawdust. The results showed that both isolates ABF101 (white strain) and ABF102 (brown strain) had similar morphological characteristics, and indicates to *Auricularia cornea* based on the phylogenetic analysis inferred from ITS and LSU markers. Both strains grew well in MCM broth, pH 6 - 7 and at a temperature of 30°C. The best mixture substrates for mushroom propagation were oat and paddy grain. The mycelial running speed of these strains on a 1 kg nylon bag spawn were 29.87 ± 1.19 and 31.6 ± 2.03 days. The optimum content of rice bran and corn bran for the cultivation by the rubber sawdust substrate are 1.5% with the highest yield of 542.23 ± 121.72 and 671.41 ± 127.38 (g/kg substrate). The biological efficiency achieved 84.8 ± 19.02 and $102.45 \pm 19.9\%$ respectively. From the above results, both strains of *Auricularia cornea* are potential for cultivation.

Keywords: Cultivation, Jelly fungi, Mycelial growth, Phylogeny, Sawdust

SESSION 4: FOOD SECURITY, FOOD SAFETY, SCIENCE AND POSTHARVEST TECHNOLOGY

Photon based sanitation of food contact surfaces

Kumar, G. D.*

Center of Food Safety, University of Georgia, Griffin, USA.

*Corresponding Email: goraj@uga.edu

The rise in fresh produce consumption has been associated with an increase in occurrences of foodborne outbreaks. Among several causative foodborne pathogens, *L. monocytogenes* and *S. enterica* have been implicated in recent foodborne outbreaks (CDC, 2020; CDC 2015; CDC 2012). In multiple cases, these outbreaks have been traced back to the isolation of these pathogens within the produce processing facilities or directly from food contact surfaces (FCS). The use of light-based technologies for dry sanitation is an innovative concept and has found its application in the disinfection of several food products, water, air, and food contact surfaces. Within the ultraviolet irradiation spectrum (100- 400 nm), UV-C light (200-280 nm) and blue light (405 nm) has shown excellent germicidal properties due to their ability to disrupt the molecular bonds, inducing dimerization of pyrimidine bases, in the genetic material (DNA and RNA) of microorganisms. Previous studies have reported that Far UV-C (222 nm) does not cause mammalian skin or eye damage upon exposure due to their limited penetrability to biological tissues but has comparable antimicrobial efficacy to germicidal UV-C (254 nm) light. The cell membrane damage induced by the inactivation of enzyme (respiratory chain dehydrogenase), lipid peroxidation, and DNA damage induced by ROS production were identified as key bactericidal mechanisms of Far UV-C (222 nm). Data highlighting the efficacy of 405 nm and 222 nm light against foodborne pathogens will be presented. Options to optimize antimicrobial efficacy of the treatments will be discussed.

Vinegar production from pickled mango peel waste

Mongkontanawat, N.^{1*} and Prapaiwong, T.²

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

*Corresponding Email: naruemon_mo@rmutto.ac.th

The pickled mango industry was found to reduce waste by fermenting pickled mango peel into vinegar. This study determined the optimal ratio of pickled mango peel to water for wine production using *Saccharomyces cerevisiae*. The most suitable conditions to evaluate the effect of acetic starter concentration on vinegar production was selected. The properties of the resulting vinegar were also evaluated. The study consisted of two main steps. First, five treatments were used to estimate the optimal ratio of mango pickle peel to water for wine production. Next, the best treatment was selected to determine the optimum concentration of *Acetobacter pasteurianus* TISTR 102 for vinegar production. The results revealed that a 1:4 ratio of mango pickle peel to water resulted in the highest ethyl alcohol content production, with a significant difference ($p \leq 0.05$). Moreover, a 15 % (v/v) acetic acid culture showed significantly ($p \leq 0.05$) high acetic acid content. The produced pickled mango peel vinegar was then subjected to sensory evaluation and compared with commercial apple cider vinegar. Interestingly, the produced vinegar exhibited significantly ($p \leq 0.05$) higher aroma, taste, and overall acceptability compared to the commercial vinegar, although there were no significant differences in

color and texture. Overall, this study is represented a novel approach to vinegar production from pickled mango waste, contributing to waste reduction and environmental sustainability.

Keywords: Vinegar, Pickled mango peel, Waste, Value-added

Analysis of household food security post pandemic in Mukomuko District, Bengkulu Province

Hariz, E. W. *, Ifebri, R., Khairani, L. and Agusti, N.

Department of Socio Economic of Agriculture, University of Bengkulu, Bengkulu City, Indonesia.

***Corresponding Email:** hariz.ekowibowo@unib.ac.id

Food security is one of the most important issues, especially in developing countries. In Indonesia, food is closely associated with rice, as most Indonesians consume rice as their staple food and primary source of carbohydrates. Rice is a crucial commodity for Indonesia, not only as a staple food but also as the main source of income for millions of farmers. Additionally, the availability of rice at affordable prices is an important factor for national food security, public safety, and government stability. Efforts to increase rice productivity continue, even as the area of harvested land decreases and the population grows. While aggregate rice production in Indonesia shows a downward trend, Mukomuko Regency in Bengkulu Province has been relatively successful in maintaining its rice production levels. This is notable because, overall, the harvested area and rice production in Bengkulu Province have been declining. The harvested area and rice production in Mukomuko Regency have a significant impact on the food security index. From 2018 to 2023, Mukomuko Regency consistently ranked in the "food secure" and "very food secure" categories. Household food security in Mukomuko Regency can serve as a model, and it is important to analyze the factors that contribute to this level of security. The purpose of this study is to provide a descriptive overview of household food security after pandemic and to identify the variables that affect household food security in Mukomuko Regency. This study can serve as a foundation for strategic policy decisions by the Mukomuko Regency regional government. The findings can also act as an early warning system in case of a decline in the food security index, whether due to the pandemic or other factors. Furthermore, the results of this study can be used as a reference for future research.

Keywords: Household food security, Post pandemic

Evaluation of plant-based protein products: Tempeh derived from the local edible freshwater alga *Chara corallina* Willdenow on immune function, toxicity, and antioxidant activity

Chankaew, W. *, Bunprab, K., Kongthong, S. and Sumana, B.

Rajamangala University of Technology Srivijaya, Thailand.

***Corresponding Email:** Wanninee.c@rmutsv.ac.th

This study provided the first comprehensive evaluation of a plant-based protein powder product, specifically tempeh (ATF-C) derived from the local freshwater alga *Chara corallina*. Through a multi-faceted approach, we assessed its safety, antioxidant potential, and immunomodulatory effects. Three key methods were employed as cytotoxicity analysis via 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay, antioxidant activity assessment through H₂O₂, superoxide dismutase (SOD), glutathione peroxidase (GPx), catalase (CAT) levels, and qRT-PCR in human dermal

fibroblast cells, and immune response evaluation in macrophage cells by measuring phagocytic activity and gene expression of Lysozyme M, TNF-alpha, and IL-8 using qRT-PCR. The results demonstrated that ATF-C at concentrations of 3.90–500 µg/mL exhibited no cytotoxicity, with cell viability exceeding 90%. Furthermore, it promoted cell proliferation and significantly enhanced the mRNA expression of key antioxidant enzymes (SOD, GPx, CAT) at concentrations of 62.5–500 µg/mL ($p < 0.05$). In addition, ATF-C stimulated nitrite production and phagocytic activity in a dose-dependent manner. ATF-C significantly upregulated immune-related genes (Lysozyme M, TNF-alpha, IL-8) at the same concentration range ($p < 0.05$). These findings suggested that a novel plant-based protein product is found to be not only safe but also exhibited promising antioxidant and immunomodulatory properties. Its potential as an immune enhancer and antioxidant could pave the way for innovative applications in human health. This research is offered a strong foundation for future exploration into the therapeutic benefits of plant-based proteins in promoting immunity and reducing oxidative stress.

Keywords: Edible freshwater algae, Plant-based protein, Cytotoxicity, Immune-potentiator, Antioxidant

Results of forming packaging from durian husk fiber using modified starch and cassava starch

Ratprakhon, K.^{1*}, Ninlanon, W.¹, Puttame, K.¹, Sangsuwan, S.¹ and Namwong, J.²

¹Faculty of Agricultural Technology, Rambhai Barni Rajabhat University, Thailand; ²Faculty of Industrial Technology, Rambhai Barni Rajabhat University, Thailand.

***Corresponding Email:** khanitta.r@rbru.ac.th

The formation of packaging from durian husk fibers using modified starch and cassava starch as binders, through a heat baking process, has been analyzed for physical, chemical quality, and shelf life. The results showed that packaging made from durian husk fibers presents a good physical appearance, including strength, hardness, flexibility, and brightness. Packaging formed with cassava starch provides better oil, water resistance, and hardness than modified starch. The water and oil resistance values were 0.16-2.12 min/ml and 0.43-1.43 min/ml, respectively. The hardness of the packaging was 0.90-0.93 kg/cm². Regarding chemical composition, the packaging contained 7.83-7.94 % moisture and 1.42-4.55 % ash. The moisture content of the packaging increased after storage. A 35-day shelf-life study revealed no significant difference in color value, with the L*-value decreasing (67.96-68.57), the a*-value increasing (3.75-4.21), and the b*-value decreasing (18.42-18.99) over time. No microbial growth was observed throughout the shelf life.

Keywords: Durian husk, Durian husk fiber, Packaging

NaCl floatation method on physicochemical quality of kaew kamin mango during harvesting indices

Lueangprasert, K.¹, Pattanayaiying, R.², Chuajedton, A.³, Choojit, S.⁴ and Saelim, K.^{1*}

¹Faculty of Agriculture Technology, Burapha University Sakaeo Campus, Sakaeo, Thailand; ²Faculty of Science and Technology, Suan Sunandha Rajabhat University, Bangkok, Thailand; ³Faculty of Science, Lampang Rajabhat University, Lampang, Thailand; ⁴Faculty of Science and Technology, Muban Chombueng Rajabhat University, Ratchaburi, Thailand.

***Corresponding Email:** kriyot@buu.ac.th

This study was carried out to investigate the influence of harvesting indices (HI) on physicochemical quality characteristics of Kaew Kamin mango. Forty mango trees were selected and randomly tagged

at 70% flowering. Fruits were harvested every week between 70-105 days after full bloom (DAFB). A batch of 60 fruits was collected at each harvest date. The mango fruits were cleaned and divided into three groups: those floating in water (specific gravity (SG) less than 1.000; SG1), those sinking in water and floating in 2% sodium chloride (NaCl) solution concentration (SG 1.000 to 1.015; SG2) and those sinking in water and 2% NaCl solution concentration (SG > 1.015; SG3). The physical and chemical analyzes were performed every week on mango fruits: fresh weight, pulp and peel color, firmness, total soluble solids content (TSS), titratable acidity content (TA), ascorbic acid content, electrolyte leakage (EL), total antioxidant activity, total phenolic content and total carotenoid content. It was suggested that harvesting stages significantly affected the fruit quality. Fruit weight of Kaew Kamin mango followed a sigmoidal pattern. NaCl floatation method was not appropriated for determination of HI but could be used in cases where indicator for the quality assessment of fruits. SG2 group showed good properties for unripe mangoes, considering as physiological mature. The highest number of fruits in SG2 group (more than 80%) was harvested at 98 DAFB and considered as optimum physiological maturity stage for harvesting Kaew Kamin mango. Conclusively NaCl floatation method could be used to separate the Kaew Kamin mango quality grading in commercial and physiological maturity period.

Keywords: Kaew Kamin mango, Harvesting indices, NaCl floatation method

The nutritional values of chicken feet and effect of cryogenic freezing technique on freezing rate and its frozen product quality

Greedumrongsak, S., Dorndi, S. and Charoensuk, K.*

Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Thailand.

*Corresponding Email: kannikar_ch@rmutto.ac.th

Chicken feet are cooked and eaten in many countries. In Thai cuisine, the chicken feet are served in a variety of dishes, such as in a version of chicken green curry. After an outer layer of hard skin is removed, most of the edible tissue consists of skin and tendons with no muscle. This gives the feet a distinct gelatinous texture different from the rest of the chicken meat is the edible. In this study, the nutritional value of chicken feet and effect of cryogenic freezing techniques on freezing rate and its frozen product quality were concerned. As the result, the effect of freezing methods on the freezing rate (°C /h) and physical properties of the chicken feet were evaluated. Chicken feet samples were frozen using cryogenic freezing (CF) at -100 °C and natural convection freezing (NF) at -20 °C. The freezing rate of the CF and NF was calculated when the core temperature of chicken feet reached -20°C. It was found that, the freezing rate of CF was 4 times higher than that of the NF. Then, the quality parameters, such as drip loss, cooking loss, colour and nutritional value of the CF and NF were elucidated after natural convection thawing at 4°C. The chicken feet quality of the CF and NF did not cause any remarkable change in the quality. These results demonstrated that the CF for chicken feet processing may have practical applications in the frozen chicken feet industry.

Keywords: Nutritional value, Chicken feet, Cryogenic freezing, Freezing rate

Effect of *Melastoma malabathricum* leaf powder particle size on the physicochemical properties and acceptability of beef meatballs

Suharyanto, S.* , Warnoto, W., Oktavia, J. and Bangun, R. C.

Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia.

*Corresponding Email: suharyanto@unib.ac.id

The increasing consumption of meatballs accompanied by various serving and selling methods poses challenges related to product shelf life. The use of synthetic preservatives in meatballs can negatively impact consumers, making the use of natural ingredients like senduduk (*Melastoma malabathricum*) leaves essential. This study aimed to evaluate the physicochemical properties and panelist acceptance of beef meatballs with the addition of senduduk leaf powder of different particle sizes including 30, 40, and 50 mesh. The senduduk leaf powder was added at 0.75% of the meat weight. Ingredients, in one batch of manufacturing, included meat (400 g), tapioca flour (200 g), ice cubes (104 g), salt (12 g), pepper powder (4 g), garlic powder (4 g), and senduduk leaf powder according to the treatments. Variables observed included cooking yield, pH, moisture content, water-holding capacity, emulsion stability, tenderness, folding test, and panelist acceptance. Results showed no significant differences in cooking yield, pH, and moisture content except for T1, which had the highest moisture content. Water-holding capacity did not differ significantly except for T1. Emulsion stability of meatballs with senduduk leaf powder (T1, T2, T3) was lower than T0. Overall, adding senduduk leaf powder improved tenderness and folding test scores. The addition of 50 mesh senduduk leaf powder (T3) enhanced panelist acceptance. These findings indicate the potential of fine senduduk leaf powder to improve the physicochemical properties and acceptability of meatballs.

Keywords: Beef meatball, *Melastoma malabathricum*, Physico-chemical properties

Dried pork curry with cowa leaves sausage: the effect of drying time and temperature on quality attributes

Wanich, U.¹, Ninmanee, M.¹, Panisan, T.¹, Ninlanon, W.², Kangkawisut, N.³ and Settapramote, N.⁴*

¹Department of Home economics, Faculty of Science and Technology, Rambhai Barni Rajabhat University, Chanthaburi, Thailand; ²Department of Food science and Technology, Faculty of Agricultural Technology, Rambhai Barni Rajabhat University, Chanthaburi, Thailand; ³Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok Chanthaburi Campus, Chanthaburi, Thailand; ⁴Food Business and Nutrition, Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna, Tak, Thailand.

***Corresponding Email:** koonjip@gmail.com

Pork Curry with Cowa Leaves made from traditional curry paste with cowa leaves and dried at different temperature and time. The aim was to investigate the impact of drying time and temperature on the quality of dried pork curry with cowa leaves sausage. The results showed that time and temperature have an impact on the colours of the sausage, with longer drying times significantly resulting in a darker colour of the curry paste. The hardness of the texture was increased with prolonged drying. The Pork Curry with Cowa Leaves showed a protein content of 18%, a fat content of 35%, and a fiber content of 3.43 %.

Keywords: Died sausage, Pork Curry with cowa leaves

Using orange data mining for meat classification: the preliminary application of machine learning

Phoemchalard, C.^{1,2*}, Senarath, N.^{1,2}, Malila, P.^{1,2}, Tathong, T.³ and Khamhan, S.⁴

¹Department of Agriculture, Mahidol University, Amnatcharoen Campus, Amnatcharoen 37000, Thailand; ²Excellence Center on Agriculture and Food for Health, Mahidol University, Amnatcharoen Campus,

Amnatcharoen 37000, Thailand; ³Department of Food Technology, Faculty of Agriculture and Technology, Nakhon Phanom University, Nakhon Phanom 48000, Thailand; ⁴That Phanom College, Nakhon Phanom University, Nakhon Phanom 48110, Thailand.

*Corresponding Email: chirasak.pho@mahidol.edu

In this Orange Data Mining study on the classification of meat, Machine Learning (ML) classifiers including Support Vector Machine (SVM), Neural Network (NN), and Naïve Bayes (NB) performed exceptionally well, achieving 100% accuracy across all features. Random Forest (RF) also demonstrated the best performance with more than 97% in AUC, CA, F1, and MCC. Other models such as Gradient Boosting (GB), AdaBoost, CN2 Rule Induction (CN2), Decision Tree (DT), and k-Nearest Neighbors (KNN), performed better but were less efficient. In the application of specific classifiers for species-based meat quality attributes, SVM, NN, and NB should be considered as the best options.

Keywords: Machine learning, Data mining, Classification algorithms, Meat quality, Ruminants

Potential of snake fruit (*Salacca zalacca*) cultivars on product quality for fermented vinegar beverages

Hirankerd, W. *, Tachai, S., Darapong, P. and Sumana, B.

Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi Campus, Thailand.

*Corresponding Email: wannasiri_hi@rmutto.ac.th

The aim of this study was to evaluate how different snake fruit (*Salacca zalacca*) cultivars affect product quality of fermented vinegar beverage. A fermented vinegar beverage was produced from three snake fruit cultivars, namely Nern Wong, Mor and Sumalee. Two fermentation methods were trialed, naturally vinegar fermentation and using fermented vinegar starter culture. Results showed that using naturally vinegar fermentation methods was not successfully shown in two of the cultivars of Mor and Sumalee. Although, Nern Wong showed completely succeed in the naturally fermenting vinegar, the final product had undesirable flavor characteristics. Vinegar fermentation from all three snake fruit cultivars using the yeast, *Saccharomyces cerevisiae* and *Acetobacter pasteurianus*, yielded the desired product of vinegar beverage. A higher level of total phenolic content was detected in the vinegars produced from Nern Wong cultivar, while those produced from Mor cultivar exhibited the highest levels of antioxidant activity. Sensory evaluation based on the 9-point hedonic scales and tested with 30 panelists, showed that vinegars produced from Mor and Sumalee cultivars showed the highest overall preference, with an average score of 6.07-6.13, which indicated a medium pleasant level of the vinegar preference.. This study concluded that the Mor cultivar is most suitable for making fermented vinegar beverage. However, it is recommended that the color characteristics could be improved.

Keywords: *Salacca zalacca*, Fermented vinegar, Beverage

Formulation, physiochemical and anti-bacterial properties of mangosteen (*Garcinia mangostana*) juice

Dorndi, S.¹, Greedumrongsak, S.¹, Monchaising, J.¹, Srivilai, D.³, Suwanposri, A.², Boonna, S.¹ and Charoensuk, K.^{1*}

¹Department of Food Innovation and Business, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand; ²Department of Plant Production and

Landscape Technology, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand; ³Department of Fishery Technology, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand.

*Corresponding Email: kannikar_ch@rmutto.ac.th

Mangosteen (*Garcinia mangostana*) is a popular tropical fruit widely grown in South-East Asia. June to August is the harvest season of mangosteen in Thailand. The edible portion (aril) of the mangosteen fruit is 1 of 3 of the whole fruit. In this study, the effect of freezing technique on freezing rate by using Quick-freezing (QF) at -80°C and Slow-freezing (SF) at -20°C. The freezing rate of the QF and SF was calculated when the core temperature of mangosteen reached at -20°C. It was found that, the freezing rate of QF was 3 times higher than that of the SF. Due to it is highly nutritional value, thus, mangosteen juice was formulated from frozen mangosteen with different concentrations of 45 and 100 % w/w of mangosteen juice. The effects of different concentrations of mangosteen puree on various parameters (e.g., colour, pH, total soluble solids (TSS) and microbiological evaluation) were investigated. The juice was to be red brown in colour with depended upon the concentration of the puree. The results indicated that TSS of the juice increase varied by the puree concentration while pH was decreased. The suitable 1 serving size (100 ml.) of sterilized mangosteen juice contain total calories of it was 50-76.3 Kcal, total carbohydrate expressed 12.2-18.6 grams, and some amount of iron (Fe). DPPH scavenging activity ranged from 20.98±0.96% to 28.21±1.44. Mangosteen juice at the concentrations of 100% inhibited *Bacillus subtilis*, *Staphylococcus aureus* and *Escherichia coli*. Additionally, sensory evaluation scores for color, aroma, taste, and overall preference were in the range of moderate to high preference of both 45 and 100% of mangosteen juice.

Keywords: Mangosteen, Frozen, Juice, Biological properties

Pre-harvest dormancy breaking of potato seeds by gamma-ray irradiation and foliar spray of GA₃ applied at different times

Suharjo, U. K. J.^{1*}, Pamekas, T.², Widodo, W.¹ and Siswanto, U.¹

¹Department of Agronomy, Faculty of Agriculture, University of Bengkulu, Jl. W.R. Supratman, Kandanglimun, Bengkulu 38371, Indonesia; ²Department of Plant Protection, Faculty of Agriculture, University of Bengkulu, Jl. W.R. Supratman, Kandanglimun, Bengkulu 38371, Indonesia.

*Corresponding Email: usman_maine@yahoo.com

The effect of GA₃ application time and its concentration along with the effect of GA₃ and gamma-rays irradiation on pre-harvest dormancy breaking of potato seeds were investigated either *in vitro* or in the polybag. The results of *in vitro* experiemnt showed that GA₃ treatment (0, 12.5, 50.0, and 50.0 ppm) did not significantly promoted dormancy breaking. However, applying GA₃ 6 weeks before harvesting time significantly shortened the dormancy period of potato seeds than 4 or 2 week before harvesting time. In addition, there was no significant effect of the interaction between GA₃ concentration and application time on dormancy breaking of potato seeds. In the greenhouse experiment experiment, however, the interaction between high GA₃ (100 ppm) and gamma-ray irradiation (30 Gy) significantly shortened the dormancy period of potato seed and caused the potato seeds to produce seedling before the seeds were harvested.

Keywords: Dormancy release, Foliar spray, *In vitro*, Plant growth regulator, Potato seeds

Development of a healthier durian cookie enhanced with inulin

Chantharobol, A., Chanawanno, T., Wasikadilok, N. and Mongkontanawat, N.*

Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok, Chanthaburi Campus, Chanthaburi, Thailand 22210.

*Corresponding Email: naruemom_mo@rmutto.ac.th

Cookies are characterized by their high sugar and fat contents. To enhance their nutritional profile, the incorporation of functional ingredients such as inulin has been proposed. This study aimed to formulate durian cookies with inulin as a partial substitute and to observe various physicochemical and sensory characteristics. Initially, four different concentrations (0%, 10%, 20%, and 30% w/w) of durian powder were tested as a partial replacement for wheat flour. The results indicated that the substitution of durian powder led to a reduction in moisture content, lightness (L*), yellowness (b*), and caloric value, while hardness and redness (a*) increased. The cookies with 20% w/w durian powder exhibited the highest overall acceptability ($p \leq 0.05$). Thus, this formulation was selected for further investigation, where sugar was partially replaced with inulin at concentrations of 0%, 20%, 40%, and 60% w/w, respectively. The results demonstrated that the substitution of inulin tended to decrease lightness (L*) and yellowness (b*), while moisture content, hardness, calories, and redness (a*) increased. In sensory evaluation, cookies with 20% w/w inulin supplementation received significantly ($p \leq 0.05$) higher scores for taste, texture, and overall liking. Interestingly, the caloric content of the developed durian cookies was significantly lower ($p \leq 0.05$) than that of the control cookies. Scanning electron microscope analysis revealed the presence of an inulin gel network within the cookies. In conclusion, this study offers important insights into the development of healthier cookies utilizing low-grade durian, presenting a significant opportunity for food manufacturers to address the current market demand for healthier dietary options.

Keywords: Durian, Cookie, Prebiotic, Inulin

Antibacterial potential of chitosan extracted from the shells of green mussels (*Perna viridis*; Linnaeus, 1758) against *Escherichia coli* and *Staphylococcus aureus*

Lagmay, D. S. and Agbayani, M. Y.*

Department of Biological Sciences, College of Arts and Sciences, Isabela State University – Echague, 3309 Isabela, Philippines.

*Corresponding Email: ma.yasalou.respicio@isu.edu.ph

This study focused on the characterization and determination of the antibacterial potential of the chitosan extracted from green mussel shells using microwave irradiation. Results have shown that chitosan was successfully extracted from green mussel shells yielding a moisture content of 4% and a percentage yield of 1.92%. The result of FTIR analysis revealed different functional groups of organic compounds such as hydroxyl- (3637.17 cm⁻¹ and 3324.31 cm⁻¹), amide- (1652.22 cm⁻¹), alkane/ether- (1026.24 cm⁻¹ and 963.82 cm⁻¹), and carbonate-containing compounds (2517.85 cm⁻¹, 1798.47 cm⁻¹, 1405.89 cm⁻¹, 871.51 cm⁻¹ and 711.65 cm⁻¹). Analysis from FT-IR spectroscopy revealed the Degree of Deacetylation (DDA) as 64.36%, making it suitable for biomedical applications. This study showed that the chitosan samples extracted from the green mussel shells showed antibacterial potential against *E. coli* and *S. aureus*. While the chitosan treatments were not as potent as the antibiotic Ciprofloxacin and did not differ significantly from each other, they demonstrated greater inhibition compared to the negative control. Therefore, further comprehensive investigation could establish green mussel shell chitosan as a valuable natural source of antibacterial agents

Keywords: *Perna viridis*, Chitin, Chitosan, FT-IR, Antibacterial

SESSION 5: PLANT SCIENCE AND PEST MANAGEMENT

Impact of urea foliar application frequency on swamp rice strains

Sudjatmiko, S.^{*}, Maharani, P. A., Munthe, H. A. P., Pujiwati, H. and Chozin, M.

University of Bengkulu, Indonesia.

*Corresponding Email: sigitsudjatmiko@unib.ac.id

The results indicated that the treatment of different varieties with varying frequencies of Urea application had a significant impact on the dry grain weight per clump. Specifically, the UBPR 8 strain, which received Urea through spraying twice, exhibited higher dry grain weight compared to the UBPR 9, UBPR 11, and INPARA 4 varieties. However, there was no significant difference between the UBPR 8 strain with Urea applied through spraying and the provision of Urea through broadcast. Increasing the frequency of urea application using the spray method on the leaves decreases the occurrence of empty grains, particularly in UBPR 9 and UBPR 11 varieties. When considering the harvest index, the performance of swamp rice strains varies. UBPR 8 and UPBR 11 strains show superiority when urea is applied by broadcasting. On the other hand, UBPR 9 strains and Inpara 4 kinds exhibit higher performance when urea is sprayed 2 or 3 times. The UBPR 9 line is a specific variety of swamp rice that consistently exhibits the greatest average in terms of both panicle length and number of grains per panicle, regardless of the method used to apply Urea. In summary, while the UBPR 8 variety benefits most from urea spraying in terms of dry grain weight, other varieties like UBPR 9 and UBPR 11 show improved quality and yield metrics with different application methods. The choice of urea application method should be tailored to the specific variety to optimize growth and yield outcomes.

Keywords: Urea, Foliar application, Swamp rice, Broadcast fertilizer

Effects of sterilizing agents, phenolic compound inhibitors, and plant hormones on *In Vitro* lateral bud explant culture of three durian varieties

Wiangsamut, B.^{1*}, Tilarux, P.² and Wattana, K.¹

¹Department of Agricultural Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok at Chanthaburi Campus, Chanthaburi, Thailand; ²Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok at Chanthaburi Campus, Chanthaburi, Thailand.

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

The most effective sterilizing agent for achieving sterility in durian lateral bud explants of ‘Monthong’, ‘Kradum Thong’, and ‘Puangmanee’ durian varieties is by using a 0.3% mercuric chloride (HgCl₂) solution for 10 minutes. This treatment resulted in significantly higher contamination-free survival rates ($P < 0.05$) by 70%, 60%, and 50%, respectively, compared to the control treatments. The control treatments involved 30% Clorox (sodium hypochlorite, NaOCl) for 15 minutes followed by 5% Clorox for 10 minutes, resulting in 0% survival. The liquid Woody Plant Medium (WPM) supplemented with Polyvinylpyrrolidone (PVP) at a concentration of 1.0 g/L achieved the most effective reduction in mucilage (phenolic compounds), resulting in 100% effectiveness. PVP acts as an antioxidant, contributing to reduced phenolic compound formation. As a result, the lateral bud explant of durian remained green and clean, and the phenolic compound on the cut surface of the explant effectively dissolved. Notably, this result was significantly better ($p < 0.05$) than using the control liquid medium (WPM). Over 7 months of subculturing on a solid medium once every month, findings have revealed a distinct pattern in ‘Monthong’ durian lateral bud explants. When cultured on WPM supplemented with 1.0 mg TDZ (Thidiazuron)/L and 10% coconut water, these explants exhibited significantly longer

green callus lengths compared to all 18 solid media tested in this study. The combination of a low TDZ level (1.0 mg/L) with coconut water in the WPM solid medium appeared to play a crucial role in promoting callus formation. Interestingly, WPM supplemented with 3.0 mg BA (6-Benzyladenine)/L led to lateral bud explants of 'Kradum Thong' durian splitting into two shoots, each with leaf growth. Conversely, WPM supplemented with 3.0 mg TDZ/L promoted larger shoots with green leaf color. These findings provide valuable insights into optimizing tissue culture conditions for different durian varieties.

Keywords: Callus, Durian, Plant hormone, Phenolic compound, Tissue culture

Plant growth promoting rhizobacteria adoptive responses of sesame under salinity stress

Sundaram, L.^{1*} and D. Sridhar²

¹Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India; ²Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India.

*Corresponding Email: lara9k@gmail.com

Soil salinity is a major abiotic factor which adversely affects the crop growth and productivity worldwide. Salinity inhibits plant growth and oil crop production by disrupting ionic and osmotic balance and hormonal regulation. Sesame is an important oilseed crop. Rhizobacteria improve plant growth employing a variety of growth promoting mechanisms including nutrient up-take, root growth, proliferation and biocontrol activities. The present study aimed to investigate the ability of sesame plant growth promoting rhizobacteria (PGPR) strains BSS1 (*Bacillus subtilis*) and PTS2 (*Pseudomonas toyotomiensis*) under NaCl (0 mM, 100 mM). Overall PGPR inoculation (BSS1 and PTS2) improved growth parameters of sesame seedlings under salinity stress. PGPR inoculation altered biochemical parameters such as chlorophyll content, proline content, total soluble sugar, electrolyte leakage and activities of antioxidant enzymes to reduce salt stress. Also, PGPR-inoculated plants showed lower electrolyte leakage and H₂O₂ content compared to unexposed sesame seedlings under salinity. Our findings suggest a beneficial role of PGPR in mitigating the detrimental effect of salinity on sesame seedling growth and yield and could be used as bioinoculants to improve crop productivity in saline environments.

Keywords: Salinity, Sesame, Plant growth-promoting rhizobacteria, Antioxidant enzymes, Yield

Growth and yield of newly released Bambara groundnut variety grown in the Central plain of Thailand

Kaokrathok, R. and Phakamas, N.*

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

*Corresponding Email: nittaya.ph@kmitl.ac.th

The newly released Bambara groundnut variety (DOA Songkhla 2) exhibited notably reduced growth and production compared to the check variety (DOA Songkhla 1) when cultivated in the Central Plain of Thailand. The yield of Bambara groundnuts was significantly affected by the growth characteristic of leaf dry weight when measured 85 days after planting till harvest. Leaf dry weight was the primary factor contributing to the initial dry weight accumulation, followed by root dry weight and stem dry weight.

Keywords: Clay soil, Growth analysis, Dry matter accumulation, Multiple regression

Shallot cultivation on unsuitable agro-climate and marginal lowland treated with Chicken Manure in Bengkulu, Indonesia

Barchia, M. F.^{1*}, Rahman, N.², Reflis³, Marlin⁴, Hermawan, B.¹, Sulisty, B.¹ and Putri, E. L.¹

¹Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Departement of Agriculture Science, University of Bengkulu, Indonesia; ³Departement of Socio-Economics, Faculty of Agriculture, University of Bengkulu, Indonesia; ⁴Departement of Crop Science, Faculty of Agriculture, University of Bengkulu, Indonesia.

*Corresponding Email: faizbarchia@unib.ac.id

Agro-climatological condition in Bengkulu is unsuitable and most areas have marginal soil characteristics for shallot cultivation. The purposes of this study were to find shallot varieties that were adaptable and grown on the marginal lowland and to examine the dose of chicken manure applied which gave the highest yields of the shallot bulbs. The experiment was carried out from August 2022 to January 2023 at the Cawang Kidau irrigation region, Kaur District, Bengkulu Province, which is located at 103016' E and 4029' S and has an altitude of 287 m above sea level. The field experiment was factorial in a randomized complete block design (RCBD) with two factors: ten (ten) shallot cultivars and five dosages of chicken manure, with three replications and 150 units per plot of a 3m² planting area. Each plot included 75 shallot clumps since the planting space was 20 cm × 20 cm. The temperature was classified as moderately suitable and the rainfall was categorized as permanently unsuitable for shallot cultivation. All shallot varieties were adaptable and grown on the cultivation area after the soil characteristics were ameliorated. Furthermore, all shallot varieties responded significantly to the chicken manure applied. When chicken manure was sprayed, the greatest yields of shallot bulbs grown on irrigated marginal lowland in this location were 20 tons' ha⁻¹, yielding 20.996 tons' ha⁻¹ for the dry weight of the shallot bulbs collected.

Keywords: Chicken manure, Climatological, Irrigated marginal lowland, Land suitability, Shallot

Evaluation of soybean (*Glycine max* L.) under different salinity stress on seedling growth and biochemical responses

Jiamtae, P.¹, Touyjaroon, T.², Sarutayophat, T.² and Nitthaisong, P.^{2*}

¹Faculty of Regional Innovation, University of Miyazaki, Japan 889-2155; ²Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

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

Salinity is an agricultural problem that negatively affects crops, especially seedling growth stages. The response of three cultivars (Chiang Mai 84-2, Chiang Mai 60 and Nakorn Sawan 1) in different NaCl concentrations (0, 40, 80 and 120 mM) was evaluated. The plant growths including the plant height, the root length, the number of leaves, the leaf greenness, fresh and dry biomass were decreased when the NaCl concentrations increased. However, the increasing NaCl concentrations also increased the proline level in soybean which is a mechanism for survival under salt tolerance. The concentrations of NaCl affected chlorophyll A, chlorophyll B and total chlorophyll contents by decreased with high concentration. There were significant interactions between cultivars and NaCl concentrations in most parameters. The highest concentration gave the plant death in Chiang Mai 84-2 and Chiang Mai 60. Only Nakhon Sawan 1 could survive under salinity stress so can be provided as a material for developing high salt tolerance soybean cultivars in the future.

Keywords: Soybean, Sodium chloride, Salt stress, Proline content, Chlorophyll content

Effect of seed soaking with nitrophenolate–based biostimulant on germination and growth of chilli var. Kanchanaburi 1

Prathumyot, W.^{1*}, Sittijinda, P.¹, Rueangkoed, P.¹, Rassami, W.¹, Sawatmongkhon, D.¹, Chit-aree, L.¹, Na Chiangmai, P.² and ChuePhet, B.²

¹Faculty of Agricultural Technology, Rambhai barni Rajabhat University, Thailand; ²Plant Propagation Center No.1, Department of Agricultural Extension, Thailand.

*Corresponding Email: wikanya.p@rbru.ac.th

The objective of this experiment was to study the effects of seed soaking with nitrophenolate–based biostimulant on germination and seedling growth of chilli var. Kanchanaburi 1. The experiment was designed as a Completely Randomized Design (CRD) with 5 treatments and 3 replications. Each replication consisted of 50 chilli seeds. The treatments included: control (non-soaking), soaking in distilled water and three concentrations of nitrophenolate–based biostimulant (3, 5 and 7 ppm) for 5 hours. The experiment was conducted from November to December 2023 at Plant Propagation Center No. 1, Chonburi Province. The germination rate was recorded at 14 days after planting. The plant height and leaf number were recorded at 14 and 21 days after planting. The results showed that there was significant difference in germination rate. Three ppm of nitrophenolate–based biostimulant increased the germination rate more than the other treatments. However, there was no significant difference among treatments in the leaf number at 14 and 21 days after planting and also the plant height at 14 days after planting. The seeds which were soaked in 7 ppm of nitrophenolate–based biostimulant for 5 hours, resulted in the tallest plant height at 21 days after planting.

Keywords: Chilli, Nitrophenolate, Biostimulant, Germination, Growth

In vitro antagonistic effect of *Bacillus subtilis* D5 against *Fusarium oxysporum* Pathogenic to tomato

Nguyen, N. A. *, Nguyen, K. H. T., Nguyen, H. T. D. and Pham, T. V.

Institute of Biotechnology and Food technology, Industrial University of Ho Chi Minh City, 12 Nguyen Van Bao Street, Go Vap District, Ho Chi Minh City, Vietnam

*Corresponding Email: *nguyennngocan.cns@iuh.edu.vn

The genus *Bacillus* comprises aerobic and facultative-anaerobic endospore-forming Gram-positive bacteria, most of which are non-pathogenic to animals and plants. These bacteria are well-known for their ability to inhibit a wide range of harmful bacteria and molds. *Fusarium oxysporum*, a highly adaptable and widespread fungal pathogen, causes Fusarium wilt and affects a broad spectrum of hosts, including tomatoes, cucurbits, cotton, chickpeas, and bananas. In an effort to identify an eco-friendly approach to controlling the diseases caused by this species, the antifungal properties of antagonistic bacteria were explored. This study revealed that *Bacillus* sp. strain D5 demonstrated significant antifungal activity. Based on macroscopic and microscopic analysis, along with 16S rRNA sequencing, strain D5 was identified as *Bacillus subtilis* with 100% sequence identity and was subsequently named *B. subtilis* D5. The culture of *B. subtilis* D5 inhibited spore and mycelial growth of *F. oxysporum* by over 90% and induced abnormal mycelial morphology, such as swelling and degradation. In a tomato model, *B. subtilis* D5 exhibited strong antagonistic effects against *F. oxysporum*, significantly reducing disease severity. These findings suggest that *B. subtilis* D5 is a promising biocontrol agent against *F. oxysporum* in tomatoes and other crops, offering a sustainable solution for future agricultural practices.

Keywords: Antifungal, *Bacillus subtilis*, *Fusarium oxysporum*, Tomato

Evaluation of structural traits and starch yield in sixteen cassava (*Manihot esculenta* Crantz) varieties grown in Ong Phra Subdistrict, Dan Chang District, Suphan Buri Province

Poeaim, S.^{1*}, Sansanee, S.², Chantaraprasit, T.³ and Tangthirasunun, N.¹

¹Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, 10520, Thailand; ²Rayong Field Crops Research Center, Department of Agriculture, 320 Huaypong, Muang, Rayong 21150, Thailand; ³Department of Industrial Design, School of Architecture, Art, and Design, King Mongkut's Institute of Technology Ladkrabang (KMITL), Ladkrabang, Bangkok, 10520, Thailand.
*Corresponding Email: supattra.poe@kmitl.ac.th

The research finding evaluated the structural traits and starch yield of sixteen cassava (*Manihot esculenta* Crantz) varieties grown in Ong Phra Subdistrict, Dan Chang District, Suphan Buri Province, Thailand, soil group number 48. The assessment included plant height measurements, total plant weight (encompassing the leaf and stem), fresh root weight, fresh root yield, the number of tubers and starch yield, providing insights into each cultivar's productivity. Based on starch content, the top five recommended cassava varieties are Rayong 11, Rayong 9, Rayong 5, Huay Bong 90, and Kasetsart 50, ranked in order of descending starch percentage. The recommended varieties for optimal yield or average root weight per plant are Rayong 5, Rayong 9, Phirun 1, Rayong 11, and Huay Bong 60, which listed from highest to lowest yield. These findings suggested that certain cassava varieties may be more suitable for regional cultivation based on their performance. This information is valuable for farmers and agricultural researchers to enhance cassava production by selecting the most suitable varieties for each area or soil type.

Keywords: Cassava cultivars, Starch yield, Structural traits, Regional cultivation

Optimizing simplified growing media for enhanced cannabis cultivation

Tebdoie, C.¹, Khana, A.¹, Pajareeyanont, S.¹, Deewatthanawong, R.², Kongchinda, P.² and Montri, N.^{1*}

¹Department of Plant Production Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²Expert Canter of Innovative Agriculture, Thailand Institute of Scientific and Technological Research, Pathum Thani, Thailand.
*Corresponding Email: nattaya.mo@kmitl.ac.th

The suitable growing media for *Cannabis sativa* L. strains Platinum Kush Breath Remix cultivation was investigated. The experiment was conducted in Completely Randomized Design with 4 treatments and 5 Replications each replication has 3 plants. The plants were grown in different growing media ; PM (Peat Moss, Perlite, Vermiculite in a ratio of 3:1:1), CC (Coconut coir, Perlite, Vermiculite ratio 3:1:1), CC1 (Coconut coir, perlite, vermiculite, vermicompost ratio 3:1:1:1), CC2 (Coconut coir, perlite, vermiculite, claw leaf compost, ratio 3:1:1:1). Plant height, stem diameter, node number, and inflorescences dry weight were recorded. Dried leaves were extracted with 95 percent ethanol in an ultrasonic bath (Elmasonic) at 40 °C for 30 minutes (X 3) before then filtered with Whatman paper No. 1. The chlorophyll a, chlorophyll b, and total chlorophyll in leaves were measured with a Microplate Reader at 666 and 653 nm. The result found that growing in PM media could promote plant growth in terms of plant height, stem diameter, and node number. The maximum content of chlorophyll a were achieved in CC1. The high content of chlorophyll b and total chlorophyll were also found in CC1 and PM.

Keywords: Growing media, Cannabis, Peat moss, Coco coir, Vermicompost, Rain tree

Effect of gamma irradiation on median lethal dose for mutation induction in *Zinnia elegans* and *Cosmos bipinnatus*

Yeemin, J.¹, Dadkhunthod, P.², Chothongtanasate, A.² and Phadungsawat, B.^{2*}

¹Faculty of Agricultural Technology, Burapha University Sakaeo Campus, Sakaeo, Thailand; ²Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi Campus, Thailand.

*Corresponding Email: bodin_ph@rmutto.ac.th

Zinnias and cosmos are popularly grown as decorative flowers in homes, gardens, and as potted plants. In this study, the appropriate gamma radiation doses for inducing mutations in zinnias and cosmos were investigated. Experiments were conducted by irradiating seeds with acute gamma radiation at doses of 0, 100, 200, 400, 600, and 800 Gy. These irradiated seeds were then planted in seedling trays and transplanted into soil beds for further evaluation. Seed germination parameters were evaluated and found that gamma radiation significantly improved the germination of both zinnias and cosmos. Vegetative growth traits were assessed, and our results showed that both zinnias and cosmos had a decreased survival rate, fewer shoots, and reduced plant height as the irradiation dose increased. At a dose of 800 Gy, seeds were able to germinate, but seedlings grew stunted and eventually died. The median lethal dose (LD₅₀) of zinnias and cosmos was determined as 459.6 and 345.5 Gy, respectively. Gamma radiation also affected the development of flowers as it delayed the flowering time in zinnias. In addition, gamma irradiation induced morphological changes in both plants, including stunted stems, curled leaves, smaller flowers and light green variegated leaves in zinnias, and the asymmetry and curling petals, in cosmos. Our findings provide crucial information for optimizing the gamma radiation dose to induce mutagenesis in zinnias and cosmos while minimizing other deleterious effects.

Keywords: Ionizing radiation, Induction mutation, Ornamental plants, Seed irradiation

Influence of media and plant growth regulators (PGRs) on *in vitro* seed germination and development of *Doritis pulcherrima* Lindl.

Supreeworakij, S.^{*}, Saetiew, K. and Montri, N.

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

*Corresponding Email: 63604048@KMITL.ac.th

This study was conducted in two experiments. The first experiment was conducted in a 3x2 factorial in completely randomized design (factorial in CRD) 2 factors; Factor 1 different media with 3 treatments such as Murashige and Skoog medium (MS), Half- Murashige and Skoog medium (1/2MS) and Vacin and Went (VW). Factor 2 pods of *D. pulcherrima* Lindl. with 2 treatments such as Cross-pollination seed and Self-pollination seed. That was found in term of seed germination, protocorm like bodies formation (PLBs) and seedling development. The result showed that half-MS gave the highest seed germination of both self-pollination and cross-pollination seed at 74.82 and 76.88% at 8 weeks. In week 12 ½MS the germination rate decreased, but VW showed the highest development. However, the highest leaf number of both self-pollination and cross-pollination seed at was found in VW at 80.54 and 87.94. The results suggest that media type has influenced on germination and development. After 12 weeks of culture, Seedlings were cultured on VW with 0, 0.5, 1 and 2 mg/l N6-benzyladenine (BA) and 1-Naphthaleneacetic acid (NAA) for 8 weeks. The result showed that VW supplemented with 0.5 mg/l BA induced a highest leaf length 1.5 cm. The concentration of 0.5 mg/l NAA resulted in the highest of shoots and roots, with an average of 3.2 shoots/seedling and 4 roots/seedling.

Keywords: Plant tissue culture, Orchid, Protocorm like bodies (PLBs)

Efficacy of mangosteen peel extract and phosphonic acid on durian root rot disease (*Phytophthora palmivora*) *in vitro*

Pitison, P.¹, Lertsuchatavanich, U.², Wiangsamut, B.³ and Mongkontanawat, N.^{1*}

¹Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok, Chanthaburi Campus, Chanthaburi, Thailand 22210; ²Department of Plant Pathology, Faculty of Agriculture, Kasetsart University, Bangkok, Thailand 10900; ³Department of Agricultural Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-Ok, Chanthaburi Campus, Chanthaburi, Thailand 22210.

*Corresponding Email: naruemon_mo@rmutto.ac.th

Phytophthora root rot disease, caused by *Phytophthora palmivora*, poses a notable challenge to durian farming in Thailand. The objective of this study was to analyze the effects of mangosteen peel extract (*Garcinia mangostana* L.) on the growth of *P. palmivora* (C15-F11 and C15-F12) compared to a combination of acid *in vitro* as an alternative to conventional chemical management strategies. Five treatments were tested, with mangosteen peel extract concentrations at 10, 100, 1000, and 10,000 ppm, either alone or combined with phosphonic acid at 50 ml./20L. Each treatment solution was incorporated into potato dextrose agar (PDA). Interestingly, the results indicated that all treatments containing mangosteen peel extract combined with phosphonic acid exhibited 100±0.00% inhibition of mycelial growth, outperforming the purified mangosteen peel extract alone. In contrast, the mangosteen peel extract alone resulted in mycelial growth inhibition of only 52.41±5.27%-97.50±0.60%. In conclusion, this study provides valuable insights into utilizing mangosteen peel waste for controlling durian root rot disease, reducing reliance on chemical fungicides in crop protection, minimizing environmental pollution, and adding value to agricultural waste.

Keywords: Durian root rot disease, Mangosteen peel extract, Phosphonic acid, *Phytophthora palmivora*

Induced mutation of curcuma hybrid cv. sweetmemory through tissue culture by Ethyl Methanesulphonate (EMS)

Yoosumran, V.^{1,2}, Saetiew, K.^{1*}, Ruamrungsri, S.³, Akarapisarn, A.⁴ and Teerarak, M.¹

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Center of Excellence on Agricultural Biotechnology (AG-BIO/PERDO-CHE), Bangkok 10900, Thailand; ³Departments of Plant and Soil Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand; ⁴Department of Entomology and Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand.

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

This research was to use EMS to induce mutation in Curcuma hybrid cv. sweetmemory. The CRD design was utilized with two factors, EMS concentrations of 0, 0.5 and 1% and immersion durations of 60 and 120 minutes. The shoot size 1 cm were cultured on Murashige and Skoog medium (MS) supplemented with 2 mg/l BA for plantlet induction. After 8 weeks of culture, it was observed that the shoots soaked in 0% EMS at 60 and 120 minutes survived 100%. In additions it was found the highest percentage of shoot emergence, number of shoots, and plant height. While plants treated with EMS solution had decreased survival and growth rates. Thereafter, existing plantlets were potted, and growth was observed. It turned out that the plants none receiving EMS solution (control) had the survival rate and growth rate were better than those of the plants receiving EMS solution. Results showed that control plants receiving 0% EMS at 60 minutes gave highest content of chlorophyll a as 4.06 µg/cm², chlorophyll b of 2.08 µg/cm² and carotenoid of 3.09 µg/cm² but there was none statistical difference

with the plants that received EMS solution. The control plants had larger stomata sizes than those that received the EMS solution. However, there was no difference in the number of chloroplasts among treatments. And living plantlets from all treatments were tested Random amplified polymorphic DNA (RAPD) marker. Genomic DNA was extracted from fresh leaves. 18 RAPD primers were initially screened, and 5 primers were chosen for further analysis. A dendrogram was constructed based on polymorphic bands using the NTSYSpc program (version 2.10p). 2 clusters could be separated with similarity coefficients ranging from 0.74-1.00.

Keywords: EMS, Mutation, Curcuma hybrid, RAPD

Genome-wide identification and a relative expression analysis of OsFAR1/FHY3 gene family under salt stress in among *Oryza sativa japonica* and *Oryza sativa indica*

Ganesh, P.^{1*}, Chander, S. G. H.², Vishnu, S. V.² and Pareek, A.⁴

¹Department of Plant Biotechnology, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha, India; ²Department of Genetics and Plant Breeding, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha, India; ³Department of Botany, School of Applied Sciences, Centurion University of Technology and Management, Odisha, India; ⁴National Agri-Food Biotechnology Institute (NABI), Punjab, India.

*Corresponding Email: pushpalathag@cutm.ac.in

Salinity stress poses a significant challenge to crop productivity, particularly in rice (*Oryza sativa*), an essential cereal sustaining a large part of the world's population. The FHY3/FAR1 gene family plays a major role in crucial regulatory mechanisms associated with plant responses to environmental stimuli, including stress conditions. This study aimed to conduct a comprehensive genome-wide analysis to identify and characterize members of the FHY3/FAR1 gene family in two subspecies of rice, *Oryza sativa indica* and *Oryza sativa japonica*, specifically focusing on their response to salinity stress. The study investigated the expression profiles of the identified FHY3/FAR1 genes in response to salinity stress. Expression profile showed an understanding of the genes with differential expression patterns under salinity stress conditions. The study highlighted two significant rice genotypes, Pokkali from *Oryza sativa Indica* and IR64 from *Oryza sativa Japonica*. Under salt stress conditions, OsFRS-1, OsFRS-2 and OsFRS-7 showed upregulation in Pokkali, while two genes Os*FRS-1 and Os*FRS-4 in IR64. A potential network interaction of POT5, SS1, SCI1, BGLU3, FRS5, FRS6, FRS2 and other FRSs with the OsFHY3/FAR1 and Os*FRS members was significant in the study. This comprehensive analysis serves as a resource for further investigations to explore the molecular mechanisms of stress responses in rice, thereby contributing to developing more resilient crop varieties to ensure global food security.

Keywords: *Oryza sativa Indica*, *Oryza sativa Japonica*, Salinity, Rice, Genotype

SESSION 6: SOIL AND ENVIRONMENT, WATER CONSERVATION

Biodegradation of dyes in textile wastewater using some newly fungal isolates and immobilization method

Ali, N. F.^{1*} and Abd-Elsalam, I. S.²

¹Dyeing and Printing Dept. National Research Center, Cairo, Egypt; ²Chemistry of Natural and Microbial Products Dept. National Research Centre (www.nrc.sci.eg), Cairo, Egypt.

*Corresponding Email: aali_04@hotmail.com

Textile wastewater contains dyes and excessive amounts of nitrogen, phosphorus, and metal compounds, as well as organic pollutants that. Wastewater also contains chemical wastes that are not biodegradable that can cause infectious disease. The chemical and biological waste in sewage and water must be broken down before it is deposited to the soil and environment. The extensive use of dyes often causes pollution problems. The presence of very low concentrations of dyes in large water bodies is highly visible and indisputable and also reduces light penetration and photosynthesis. In addition, some dyes either toxic or mutagenic and carcinogenic. There are several research involve the methods of removing dyes from wastewater and different methods have been developed, such as biological processes involving microbes, plants, or their products (such as enzymes) are alternate cost-effective methods for decolorization and degradation of such synthetic dyes. In this study, wastewater was treated by microbial isolates from Egyptian soil. The present study aims for the screening of the potent fungal isolate used for the degradation of the excess dye used in textile industry and wastewater. The study involved investigation of the biodegradation process under different growth conditions. Different parameters will be tested involving, dyes concentration, inoculum size incubation time, temperature as well as pH of the growth medium. The study extended also to investigate the different immobilization method and its application on the biodegradation process. The decolourization efficiency for these dyes were investigated. These isolates had belonged to species: (*Aspergillus*, *Penicillium*, and *Pleurotus*) after they screened for optimum efficiency and the condition for temperature and pH were optimize and the effectiveness of biodegradation process. In this study biodecolorization and biodegradation of dyes was carried out using enzymes, with emphasis on some recent updates such as immobilization techniques.

Keywords: Biodegradation, Textile wastewater, Dyes, Decolorization

Sustaining soil fertility and enhancing yields in Maize-Mungbean-t. Aman cropping system through long-term integrated nutrient management

Sultana, M. *, Masud, M. M., Islam, M. S. and Naser, H. M.

Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.

*Corresponding Email: marufa79@gmail.com

The study aimed to assess the effectiveness of long-term integrated nutrient management (INM) in maintaining soil fertility and increasing crop yields within a Maize-Mungbean-T. Aman (rice) cropping system. Six treatments were randomly assigned to different plots: T₁ (Native fertility), T₂ (75% Soil Test Based [STB] chemical fertilizer + 5 t ha⁻¹ cow dung [CD]), T₃ (100% STB chemical fertilizer), T₄ (100% STB chemical fertilizer + 5 t ha⁻¹ CD), T₅ (100% STB chemical fertilizer + 3 t ha⁻¹ poultry manure [PM]), and T₆ (75% STB chemical fertilizer). The experiment followed a randomized block design, spanning 17 cropping cycles between 2008 and 2023 on Gazipur's Grey Terrace Soil (AEZ-28). The results showed that Treatment T₅, combining 100% STB chemical fertilizer and 3 t ha⁻¹ poultry

manure, produced the highest maize and T. Aman rice yields, alongside improvements in soil pH, organic matter, and nutrient levels. Additionally, mungbean contributed 10 t ha⁻¹ of green biomass, which enhanced soil nitrogen content. In contrast, T₁ (native fertility) resulted in the lowest yields and negative nutrient balances. Treatment T₅ also delivered the highest economic return, with a gross margin of 173,144 Tk ha⁻¹ and a benefit-cost ratio of 2.28. The study concluded that a balanced use of organic and inorganic inputs is essential for sustaining soil health, improving crop productivity, and promoting sustainable agriculture in intensive cropping systems. The findings emphasized the importance of INM in optimizing both crop yields and soil fertility while reducing reliance on chemical fertilizers.

Assessing the impact of frequent floodings on the soil quality of paddy fields: multidimensional scaling approach

Utami, K.¹, Adiprasetyo, T.^{2*}, Barchia, M. F.¹ and Bella, S.³

¹Soil Science Study Program, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia; ²Natural Resources Management Study Program, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia; ³Student of Soil Science Study Program, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia.

***Corresponding Email:** teguhadi@yahoo.com

The increase in flood frequency due to climate change may cause a decrease in the soil quality of paddy fields. The results of the study showed that the multidimensional scaling approach can be used to calculate the soil quality index and assess the impact of frequent flooding on soil quality of paddy fields. Several physical, chemical and biological characteristics of the soil were not significantly different in the paddy fields that were often flooded if compared to those that were not flooded, except for exchangeable kalium content. Frequent flooding on the paddy fields tends to decrease the Soil Quality Index. The Soil Quality Index of paddy fields have a tendency to decrease if the paddy fields were often flooded, either by standing water from rivers or sea water. The Soil Quality Index category of paddy fields that were not flooded was good (86.1). While the Soil Quality Index category of paddy fields that were flooded by rivers was average (62.0) and paddy fields that were flooded by sea water was slightly good (75.8). The leverage attributes of the soil characteristics are exchangeable natrium and kalium, and total phosphorus.

Keywords: Rice, Soil properties, Soil quality index

Metrics analysis and evaluation of landscape mosaic changes to monitor the identity of forest monastery green space, Northeast Thailand

Pattanakiat, S.¹, Kongsombut, P.^{2*}, Phutthai, T.¹, Phewphan, U.² and Rakasachat, C.³

¹Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom, Thailand; ²Innovation for Social and Environmental Management, Mahidol University, Amnatcharoen Campus, Amnatcharoen, Thailand; ³Faculty of Environment, Kasetsart University, Bangkok, Thailand.

***Corresponding Email:** prat.kon@mahidol.edu

This study aimed to explore landscape ecological structures and patterns of forest monastery green space in Ubon Ratchathani Province. Employing the hybrid interpretation method, Support Vector Machine, and visual analysis based on multi-index proportional visualization from sentinel satellite images to classify the main component of green space. Based on such information, the landscape ecological structures and patterns of monasteries were analyzed, and the relationship between settlement pattern and landscape mosaics changed around monasteries within a radius of 1 km. Using the multi-index image including NDVI, NDTI, NDBI, BI Index, the results of the classification were

able to distinguish the vegetation type from the land cover type of bare soil and built-ups, with an overall accuracy of 94.87%. Meanwhile, kappa index 0.92 classified 39.40% as green areas and 60.06% as non-green areas, suggesting that the green landscape pattern is mostly in the core pattern with the most suitable characteristics to serve as a forest habitat is 19.50%. The patterns also mostly appear in forest monastery around the province in both urban and rural settlement. This can influence settlement pattern and landscape mosaic changes, making it possible to identify the uniqueness of forest monasteries in terms of areas, natural, developed, agriculture, and mixed. Also, it reflects existence, and characteristics of forest monastery patches in different landscape system. Forest monasteries with developed uniqueness are likely to experience a decrease in natural areas at a higher rate than those with natural, agricultural and mixed uniqueness. However, from the landscape metrics results, Wat Pah Nanachat and Wat Nong Pah Phong could still maintain the identity of the green area patches in terms of landscape structures and patterns. The results suggest that the metrics assessment of landscape mosaic changes can be used to understand the identity, situation and monitor changes in the forest monasteries green space.

Keywords: Forest monastery, Green area classification, Landscape ecology, Landscape mosaic change, Geo-informatics

Determining water flow efficiencies at Kah Pulo Geto primary irrigation channels, Bengkulu, Indonesia

Amri, K.^{1*}, Heriansyah, A.¹, Aprizal, Y.¹ and Barchia, M. F.²

¹Department of Civil Engineering, Faculty of Engineering, University of Bengkulu, Indonesia; ²Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia.

*Corresponding Email: kamri@unib.ac.id

Unproperly functions from the irrigation channels and networks *cause* inefficiently water distribution to supply rice fields for the paddy growth demand. The results showed that the water loss from the primary canal with whole channel length of 800 m at Kah Pulo Geto Bengkulu around 13.76% and at the same time the water efficiency in this channel amounted to 86.24%, slightly below the theoretical efficiency limit value, 90%. From 10 primary canals, 7 canals conveyed water inefficient to next channel networks. The water loss resulting inefficiency water supplies in the irrigation canals were caused by seepage, 1.351×10^{-4} m day⁻¹ while the water loss through evaporation was about 0.0207 mm sec⁻¹. Cracks and concrete damage occurrences causing the water seepage in the irrigation channel because of lack of maintenance.

Keywords: Primary irrigation channels, Seepage, Soil cracks, Water efficiencies

Utilizing of aerial photography to study the distribution of seaweed in Saphan Hin Park, Mueang District, Phuket Province, Thailand

Kumlom, T.^{1,5}, Phewphan, U.^{2,5*}, Ponganan, N.³ and Rakasachat, C.⁴

¹Environmental Science Program, Science and Technology Faculty, Phuket Rajabhat University, Phuket, Thailand; ²Innovation for Social and Environmental Management, Mahidol University, Amnatcharoen campus, Amnatcharoen, Thailand; ³Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand; ⁴Center of Research and Academic Services, Faculty of Environment, Kasetsart University, Thailand, ⁵Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom, Thailand.

*Corresponding Email: uthaiwan.phe@mahidol.edu

Seaweed is essential in ecosystems for producing oxygen and absorbing carbon dioxide, thereby reducing the greenhouse effect. It also provides habitat and food for various aquatic species and helps mitigate coastal erosion. This study aims to investigate the distribution of seaweed in Saphan Hin Park, Muang District, Phuket Province, Thailand. We utilized Unmanned Aerial Vehicle (UAV) to capture high-resolution images for monitoring seaweed distribution and analyzing land use changes. UAV offer precise spatial data and flexibility for surveying dynamic coastal areas. The collected UAV aerial images were processed and analyzed using the Maximum Likelihood Classification (MLC) method, a supervised classification technique widely used for land cover mapping. MLC was applied to classify the seaweed areas and other land use categories, resulting in accurate classification outputs. Our periodic surveys identified seaweed distribution in four periods: January, April, August, and October, with areas of 897.96 sq.km, 9,164.26 sq.km, 6,462.12 sq.km, and 14,678.95 sq.km, respectively. For Seaweed lumps, the areas were 30.12 sq.km, 310.54 sq.km, 903.28 sq.km, and 1,552.02 sq.km, respectively. The classification results were invaluable for effective natural resource planning and management. While the overall seaweed distribution remained stable, some areas showed changes in density. The resulting maps highlighted the advantages of using UAV aerial snapshots and MLC techniques for accurately identifying seaweed in shallow waters. Our findings are anticipated to serve as a model for monitoring changes to support seaweed conservation and restoration and can be applied to other contexts involving natural resource and environmental management.

Keywords: Seaweed distribution, Aerial photograph, UAV, Remote sensing, Saphan Hin Park

Microorganisms for bioremediation of soils contaminated with heavy metals

Thongsri, B.^{1*}, Soyong, K.² and Sundarum, L.³

¹School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²Research Institute of Modern Organic Agriculture, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ³Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-636011, Tamil Nadu, India.

***Corresponding Email:** Benyapha.thongsri@gmail.com

The contaminated soil was treated with microorganism, PAS1 – *Pseudomonas alcaliphila*, PAS2 – *Pseudomonas aeruginosa*, AC01 – *Aariefobacter calcoaceticus*, BS01 – *Bacillus subtilis*, BA01 – *Bacillus amyloliquefacien*, PTS2 – *Psuedomonas toyotomeinsis*, BSS1 – *Bacillus subtilis*. Preliminary result showed that As, Pb, Cr, Cd and Hg were decreased. Heavy-metal contaminants have faced the problem of agricultural soil. They are high toxicity and accumulated in soils and crops which pose a serious threat to food security. Bioremediation is an effective treatment for agricultural soil pollution. It relies on the ability of microorganisms to remove pollutants. Further research will be targeted to develop a biological product to improve the efficiency of soil remediation to withdrawn from contaminated agricultural soil. These promising strains removed heavy metals from contaminated soil.

Keywords: Environment, Contaminated soil, Heavy metals

Improving geolocation data from IRRI germplasm collection of rice and Geographic Population Structure (GPS)

Soytong, M.^{1*}, Galvez, H. F.^{2,3}, McNally, K. L.⁵, Laurena, A. C.⁴, Reano, C. E.³ and Diaz, M. G. Q.¹

¹Institute of Biological Sciences (IBS), College of Arts and Sciences, University of the Philippines Los Baños (UPLB), College, Laguna 4031, Philippines; ²Institute of Plant Breeding, College of Agriculture and Food Science, University of the Philippines Los Baños (UPLB), College, Laguna 4031, Philippines; ³Institute of Crop Science, College of Agriculture and Food Science, University of the Philippines Los Baños (UPLB), College, Laguna 4031, Philippines; ⁴Philippine Genome Center for Agriculture, University of the Philippines Los Baños, Laguna 4031, Philippines; ⁵International Rice Research Institute, Laguna 4031, Philippines.

*Corresponding Email: s.mayamor@gmail.com

Rice holds significant importance as a staple food globally, leading to a widespread request for rice data collection. It is crucial to accurately pinpoint the geographical locations of germplasm and standardize passport data. By leveraging extensive germplasm collection data, our goal is to enhance location data and imputed genotypic data, location, and information using the geographic population structure (GPS) method. This research has the potential to uncover how genotypic data is connected to genetic and geographic distance. We hope that it can help predict the country of origin of a population, providing valuable insights for future research and practical applications.

Keywords: Rice, Geographic Population Structure (GPS)

Population and diversity of soil macrofaunal in oil palm-banana intercropping system in Indonesia

Karima, N.¹, Prawito, P.^{1*}, Gusmara, H.¹, Putri, E. L.¹, Kamil, M. I.¹, Fahrurrozi², Alnopri² and Purwanti, S.³

¹Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Department of Agronomy, Faculty of Agriculture, University of Bengkulu, Indonesia; ³Department of Agronomy University of Mayjen Sungkono, Mojokerto, Indonesia.

*Corresponding Email: priyono@unib.ac.id

Indonesia, as the world's largest oil palm producer, has seen a continuous expansion of oil palm plantations, which now cover over 16.5 million hectares and produce approximately 11 million tons of crude palm oil (CPO) annually. While economically beneficial, this growth has raised significant environmental concerns, including greenhouse gas emissions, land degradation, and biodiversity loss. A key aspect of sustainable agricultural practices involves understanding the impact of monoculture versus multiple cropping systems on soil health, particularly through the study of soil macrofauna—essential organisms for soil fertility and ecosystem services. This study explores the impact of oil palm-banana intercropping systems (ICS) compared to traditional oil palm monocropping systems (MCS) on soil macrofaunal diversity and abundance in Bengkulu, Indonesia. Our findings indicate that ICS promotes higher biomass and litterfall, which in turn supports a richer diversity of soil macrofauna, including species absent in MCS, such as beetle larvae and bees. Despite the MCS supporting a higher total number of macrofaunal individuals, the ICS demonstrated enhanced species diversity and habitat complexity, fostering a more balanced soil ecosystem. These results highlight the potential of intercropping to mitigate the environmental impacts of oil palm cultivation by promoting biodiversity and improving soil health. This study underscores the importance of adopting multiple cropping strategies in oil palm plantations to achieve sustainable land management and balance agricultural productivity with ecological conservation.

Keywords: Biodiversity, Diversity index, Evenness, Monoculture, Multiple cropping

Water management in areas outside irrigation zone of Tha Takiap sub-district, Tha Takiap district, Chachoengsao province, Thailand.

Kangsawat, T.¹ and Rukanee, D.^{2*}

¹Faculty of Management Science, Rajabhat Rajanagarindra University, Chachoengsao, Thailand; ²Department of Agricultural Machinery Technology, Faculty of Agricultural Technology and Agro-Industry, Rajamangala University of Technology Suvarnabhumi, Phra Nakhon Si Ayutthaya, Thailand.

*Corresponding Email: duangthip.r@rmutsb.ac.th

The study examined the adequacy of the Runoff water supply in the area of Tha takiap district, Chachoengsao province, Thailand. Compared to the amount used in all activities. The study calculated the runoff using the NRCS-CN method. Crop water requirement was determined by Penman–Monteith method. Water balance principle to compare the water requirement of each activity with the water budget. The results showed that there was a total amount of runoff was about 6,831,447.60 cubic meters, and the total water use for each activity in an area of about 6,685,449.46 cubic meter. When comparing the total watery supply with the water consumption of every activity throughout the year, the water supply was sufficient to meet the demand for water. Analyzed the monthly rainfall, we found that in August, there was more water than in all activities, about 724,586.66 cubic meters. Therefore, there should be more water storage for water retention during water shortages, excavation of pools and reservoirs to optimize water capture efficiency, planting planning.

Keywords: Run off, Water management, Evapotranspiration

Projected Land Use Change and Impact in South Seluma Sub-district Bengkulu

Bi'iznih, H.¹, Barchia, M. F.² and Putri, E. L.^{2*}

¹Undergraduate Student of Soil Science Departement, Faculty of Agriculture, University of Bengkulu, Indonesia;

²Departement of Soil Science, University of Bengkulu, Indonesia.

*Corresponding Email: elsalolitaputri@unib.ac.id

Analysis of agricultural rice cultivation areas has become an urgent issue in the effort to calculate, monitor, manage, and evaluate for sustainable staple food production, as land use changes create uncertain conditions for rice production and food security in both Indonesia and Bengkulu. This study aims to project changes in land use and its impact in South Seluma Sub-district Bengkulu response. The tools used in this study consist of tools for analyzing land use change and projections, namely the CLUE-S model and for hydrological responses using HEC-GeoHMS tools combined with GIS tools. The existing land use in three periods was analyzed used satellite imagery with appropriate resolutions and multitemporal time taken out 2013, 2018 and 2023 released by United States Geological Survey (USGS). The rice fields in those years were 846.78 ha, 727.95 ha, and 555.42 ha, respectively while the oil palm plantation were 3,879.10 ha, 4,087.97 ha, and 4,045.89 ha, respectively. The rice fields at the South Seluma sub-district within one decade drastically decreased about 34.41% while the oil palm plantation cultivated by the local farmers slightly increased about 4.29%. The huge loss of rice cultivation areas at the South Seluma sub-district could threat rice production in Bengkulu.

Keywords: Land use change analysis, Projected, Oil palm, Rice field

Comparison of permeable and water holding capacity between flat and steep soils

Hermawan, B.^{1*}, Novela, D. E.², Putri, E. L.¹ and Utami, W. A.¹

¹Department of Soil Science, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia; ²Graduate Student of Soil Science Departement, Faculty of Agriculture, University of Bengkulu, Bengkulu, Indonesia.

***Corresponding Email:** bhermawan@unib.ac.id

Permeability and water holding capacity are changes in land use type can lead to variations in soil water characteristics. Both soil characteristics are strongly related with other solusion such as the bulk density, soil porosity, and particle size characterized. The objective of this study was to identify the responses of soil permeability (SP) and soil water holding capacity (SWHC) to land use type. The soil permeability and water characteristic curve describe the relationship between gravimetric water content and soil suction. We measured the soil water characteristic parameters representing SP and SWHC, which we derived from soil water characteristic curves, in the 0-10 cm soil layer at sites. Treatments were arrangements into 3°12'24.44" Latitude and 102°7'34.18" Longitude, to five different levels which 0-8, 8-15, 15-25, 25-45 and 45-100 percents. Our results showed that the SP and SWHC was higher at the flat than in the steeper sites, and there was no significant difference between the latter two sites, the trend of SP was similar to the SWHC. From flat to steep lands, the soil physical properties in the 0-10 cm soil layer partially improved, bulk density, soil porosity and texture were significantly higher at the flat than at the steep sites. Soil texture, porosity and bulk density were the key factors affecting SP and SWHC. The results of this study provide insight into the effects of vegetation restoration on local hydrological resources and can inform soil water management and land use planning on the regional.

Keywords: Flat soil, Permeability, Steep soil, Water holding capacity

Growth and yield of Japonica rice (Koshihikari Var.) that affected by vermicompost

Somniam, P.^{*}, Somniam, V., Rangseesakorn, K. and Krongtadech, D.

Faculty of Agriculture, Uttaradit Rajabhat University, Thailand.

***Corresponding Email:** somniam51@gmail.com

We conducted a study to investigate the impact of vermicompost rates on Japonica rice (Koshihikari Var.) in Uttaradit, Thailand. The study utilized a completely randomized design (CRD) with 8 treatments and 3 replications to assess the growth and yields of the rice. Our findings revealed significant differences in plant height, number of tillers, and chlorophyll content. Specifically, the plant height was influenced by the application of chemical fertilizer 60 days after sowing. Notably, the treatment involving 10% vermicompost exhibited the tallest plants on day 88. While the treatment combining chemical fertilizer and vermicompost (T8) resulted in the highest number of tillers per plant, it did not significantly differ from the treatment with 20% vermicompost (T4). Initially, significant differences were observed in T8; however, towards the end of the study, the vermicompost-containing treatments outperformed the chemical fertilizer. Most yield parameters also showed highly significant variations. For instance, T5 produced the highest total number of seeds, while T4 yielded the healthiest seeds and the greatest total fresh dry weight. In terms of seed characteristics, after conducting our research, we found that T4 showcased the widest, longest, and thickest seeds, similar to those treated with chemical fertilizer. Additionally, it exhibited a substantial fivefold increase in total dry seed weight compared to the control. Our findings strongly suggest that vermicompost-amended soil has a more significant impact on the growth and yields of Japonica rice compared to chemical fertilizer. As a result, we highly recommend the use of vermicompost, especially for organic rice production, at a rate of 10-

30%. This amendment demonstrated a more positive influence on the growth and yields of Japonica rice than chemical fertilizer.

Keywords: Vermicompost, Japonica rice

The acceptance of nutrient management based on soil analysis by quality durian farmers in Rayong Province Thailand

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

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

***Corresponding Email:** ksuneeporn@gmail.com

This research aimed to study the acceptance of nutrient management based on soil analysis values of durian farmers in the Noen Kho Durian Large-Scale Community Enterprise, Klaeng District, Rayong Province, Thailand. A total of 52 durian farmers were selected to collect data. Data were analyzed using descriptive statistics and multiple regression analysis. The data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation. The study results found that most farmers were male, aged 31-40 years, had a bachelor's degree, had less than ten years of durian orchard experience, and had less than 30 rai of durian orchard area. As for the acceptance of nutrient management based on soil analysis values of farmers, the result showed age affected the acceptance of soil conditioner/nutrient supplementation practices with significant values of 0.43. As for fertilizer application practices according to growth stages and post-harvest practices, the results show that opinions on fertilizer application technologies based on soil analysis values affect the acceptance of nutrient management practices according to soil analysis values of farmers, with significant values equal to .043 and .049, respectively.

Keywords: Nutrient management, Soil analysis, Durian farmers

SESSION 7: BIOTECHNOLOGY AND INNOVATION

Hybrid rice genotypes: The innovation pathway to make the philippines rice self-sufficient

Mendoza, T. C. *, Oo, M. S. and Sulonteh, I. F.

ICrops, College of Agriculture and Food Sciences, UP LosBanos, Philippines.

*Corresponding Email: Ecofarm.mndz2011@gmail.com

Employing good agronomic practices using inbred genotypes can increase grain but yield increase could not make the Philippines self-sufficient in rice. Growing hybrid rice genotypes under low external input (organic) or fossil fuel energy based- inputs free production systems and agrochemical intensive production systems were assessed. Hence, series of studies were conducted as follows: *In study 1*, we evaluated 20 rice cultivars (17 inbreds, 3 hybrids, planted in 20x20cm) and they were grown under organic production systems. Of the 20 cultivars, highest grain yields were obtained among the inbreds. Best inbred (PSB RCI8 8.5 t ha⁻¹) outyielded the hybrids when grown in double row planting pattern. *In study 2*, we evaluated hybrids and inbreds grown in 3 spatial arrangements and under organic and agrochemical intensive production systems. Under organic, *Bigante plus* (a hybrid) yielded the highest (5.7 t ha⁻¹) when grown in 30cm x 30cm spacing. The energy return over input was 16 (EROI=16) and energy footprint was only 80 kg CO₂e/ton. PSB Rc222 (inbred) yielded 5.3 t ha⁻¹ had the same energy footprint with *Bigante plus*. Fossil fuel energy based- inputs intensive grown SL8 (hybrid) yielded the highest under double row spacing at 8.6 t ha⁻¹. The energy footprint was 425 kg CO₂e ton⁻¹ of unmilled grain which was 5.3 times higher than organically grown rice. *In study 3*, fertilizer applied at 50% of recommended rates and planted the hybrids (SL8, M20) and inbreds (PSBRc222, PSB82) in 3 spacings (20x20cm, 30x30cm, double row (2x25) x 50cm). When grown under agrochemical intensive production systems, SL-8, a hybrid yielded 9.2 t ha⁻¹ in double rows and 9.07 t ha⁻¹ when planted in 30cm x 30cm spacing. When planted in 20cm x 20cm, yield was 21% lower at 7.2 t ha⁻¹. *Heterosis* in hybrid rice can be realized (@21% increase in yield) through application of fossil fuel energy based- inputs but higher energy footprint. Yields of 6.0 t ha⁻¹ using hybrids or a high yielding inbred and grown under organic method had the lowest energy footprint. The yield increasing pathway through *hybrid rice* genotypes could make the Philippines rice self-sufficient. But hybrids require high fossil fuel energy based- inputs and hybrid seeds are 70 times more cash expensive than inbreds. These must be addressed to obtain sustainable yields. High seed cost could be decreased by the Philippines Rice research institute developing and producing hybrid seeds. There must be a transition method for farmer to move towards chemical free or organic method of growing both for inbred and hybrid genotypes for sustainable and climate resilient rice production systems.

Keywords: Hybrids, Inbreds organic, Fossil fuel-based energy inputs, Energy footprints

Successful commercialization of *Bacillus methylotrophicus* 8-2 as a biocontrol agent against various plant diseases

Kim, S. H. *

JAN153 Biotech Incorporated, Gwangju 61186, Republic of Korea.

*Corresponding Email: shkim@jan153biotech.com

Developing commercial products using versatile strains of *Bacillus spp.* have continued since their discovery. Here, we introduce the latest product named JAN Dr6 Neverbacto Suspension Concentrate whose active ingredient is *Bacillus methylotrophicus* 8-2., registered as an organic material (Reg. No.

3-6-063) in South Korea for controlling rice bacterial leaf blight and bacterial grain rot. The product also controls very effectively the development of apple fire blight, showing similar disease control efficacy with the chemical bactericide (streptomycin sulfate). Additionally, the strain *B. methylotrophicus* 8-2 possesses strong antimicrobial activity against various phytopathogens; (1) bacteria – *Erwinia amylovora*, *Xanthomonas arboricola* pv. *pruni*, *Agrobacterium radiobacter*, *Rhizobium rhizogenes*, *Agrobacterium tumefaciens*, *Ralstonia solanacearum*, *Pectobacterium carotovorum* subsp. *carotovorum*, (2) fungi – *Botrytis cinerea*, *Sclerotium cepivorum*, *Phytophthora infestans*, *Magnaporthe oryzae*, *Pythium ultimum*, *Fusarium oxysporum* f. sp. *lycopersici*, *Collectotrichum coccodes*, *Rhizoctonia solani* AG4. The application of the product is expected to reduce the risk of resistance developed from the pathogens. Further, the flexible application such as compatibility with other products to some extent, application time, and methods makes farmers satisfied using the JAN Dr6. As the product has a high possibility to gain the battle of bacterial and fungal diseases, it can be worked as an effective agent applied to an integrated pest management program contributing to reducing the input of chemical pesticides while increasing the overall control efficacy.

Keywords: Biological control, Plant diseases, Crop protection, Sustainable disease management solution

The effect of Plant Growth- Promoting Rhizobacteria (PGPR) on arsenic accumulation and the growth of pigeonpea (*Cajanus cajan* L. Millsp)

Sathya, C.¹ and Sundaram, L.^{2*}

¹Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-11, India; ²Soil Biology and PGPR Lab, Department of Botany, Periyar University, Salem-11, India.

***Corresponding Email:** lara9k@gmail.com

Plant growth-promoting rhizobacteria (PGPR) are a specific kind of microbes that, through their interactions with plant roots, increase plant development and promote greater resistance to metal stress. We examined the results of mixing the arsenic accumulator pigeonpea with isolates of As- resistant bacteria. To figure out how PGPR and its host plant interact. From soil polluted with heavy metal, Arsenic resistant PGPR with different growth-promoting qualities were identified. The bacterial isolate was identified as belonging to the *Pseudomonas aeruginosa* genus by 16S rRNA analysis and given the name PSA2. Inoculation may enhance the rhizosphere soil environment and encourage plants to absorb Fe and P, two different concentration of Arsenic (100ppm, 200ppm) was used in this pot culture studies with and without bacterial culture. In addition to increase the dry weight of shoots and roots of plants growing in arsenic contaminated soil and arsenic induced soil. Treatment with PAS2 distinctly increased the total chlorophyll and carotenoid content 63.26% and 41.22% content compared to non-inoculated plants. Additionally, we observed increases in Prolein, carbohydrate, protein, lipid content and antioxidant were analyzed in rhizosphere soils treated with PAS2 and Arsenic. However, neither the concentrations of Arsenic stress in plants nor the amount of accessible as in the rhizosphere soils were significantly different between the inoculated and non-inoculated treatments. We showed that PGPR-assisted phytoremediation is an effective method for cleaning up heavy metal contamination in soils, with the potential to increase phytoremediation effectiveness and boost soil quality.

Keywords: *Pseudomonas aeruginosa*, Antioxidant, Phytoremediation, Induced, Contamination

Yield and artemisinin content of six polyploid accessions of *Artemisia annua* Grown at medium altitude in Indonesia

Siswanto, U.^{1*}, Subositi, D.², Isnawati, A.² and Widiyastuti, Y.²

¹Agriculture Faculty, University of Bengkulu Jl. WR Supratman Kandang Limun Bengkulu 38371, Indonesia;

²Research Center for Pharmaceutical Ingredients and Traditional Medicine, Medicinal Plant and Traditional Medicine Research and Development Center National Research and Innovation Agency, Indonesia Jl. Raya Lawu 11, Tawangmangu, Karanganyar, Jawa Tengah 57792, Indonesia.

*Corresponding Email: usiswanto@yahoo.com

The high incidence of malaria in Indonesia has resulted in a very high dependence on malaria drugs. The effort to self-sufficiency in artemisinin raw materials is very possible because of the suitable geographical climate for large scale cultivation of *Artemisia annua*. Artemisinin production will be efficient and economical if the content levels reach more than 0.6%. On the other hand, *Artemisia annua* is a short-day plant, which is a typical sub-tropical plant. Growing this species in the tropics causes a short vegetative period and results in low levels of artemisinin. The development of a polyploid variety of *A. annua* with better growth character than its wild type of parental accession has been underway. To examine the stability of its growth and yield, a field study was carried out to measure the growth potential and adaptation of polyploid varieties in Tawangmangu region at the altitude of 1.200 m above sea level. A total of 25 plant seeds per accession were grown in each experimental plot with a plant spacing of 40 x 60 cm and 3 replicates. The parameters observed were plant height, stem diameter, fresh weight and dry weight of biomass, essential oil, and artemisinin content. The results showed that 6 polyploid accessions resulted in different morphological characteristics based on growth, leaf shape, branching, stem colour, and flowering characteristics. In general, each accession has performed inconsistency in the growth, yield, and artemisinin content. Artemisinin levels of each individual sample of each accession were highly fluctuated. This variation in levels indicated that each accession number was not genotypically stable or uniform. Further evaluation is required to determine a suitable accession to grow.

Keywords: *Artemisia annua*, Polyploid, Accession, Artemisinin, Tawangmangu

The effect of using chinese water chestnut flour to partially replace wheat flour in steamed cake (pui fai)

Buasanit, S., Rukanee, D.* , Yokesahachart, C. and Arrilak, P.

Faculty of Agricultural Technology and Agro-Industry. Rajamangala University of Technology Suvarnabhumi, Phra Nakhon Si Ayutthaya, Thailand.

*Corresponding Email: duangthip.r@rmutsb.ac.th

This study used Chinese water chestnut flour to replace some of the wheat flour in steamed cake (Pui Fai) and aims to study the ratios of Chinese water chestnut flour to wheat flour for the manufacture of steamed cake (Pui Fai) products. The physico-chemical properties and sensory evaluation for consumers perception were tested. By studying, the ratios of Chinese water chestnut flour to wheat flour were varied 0:100, 10:90, 20:80, 30:70, 40:60 and 50:50 respectively. The mixture of Chinese water chestnut flour to wheat flour was 20:80, showed moisture content value of 39.57%, water activity (a_w) value of 0.90, oven spring value of 3.83% compared to the control, hardness value of 30.36 N, brightness (L^* value) of 88.20, redness/greenness (a^* value) of -0.58, and yellowness/blueness (b^* value) of 14.13. Consumers quality assessment was found that the average appearance score of 7.10, color score of 7.32, flavor score of 6.88, odor score of 6.53, texture score of 7.25, taste score of 7.13, and the overall preference score of 7.32.

Keywords: Chinese water chestnut flour, Wheat flour, Steamed cake (Pui Fai), Physico-chemical properties, Sensory evaluation

Production of herbal kombucha with agarwood (*Aquilaria crassna* Pierre ex Lec.) levaes and its biological properties

Suwanposri, A.¹, Khamphinit, W.¹, Sonthichai, P.¹, Maliyam, R., Charoensook, K.² and Boonna, S.^{2*}

¹Department of Plant Production and Landscape Technology, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand; ²Department of Food Innovation and Business, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand.

*Corresponding Email: Sureeporn_bo@rmutto.ac.th

Herbal kombucha made from hibiscus (*Hibiscus sabdariffa* L.) and peppermint (*Mentha × piperita*) mixed with agarwood leaves (*Aquilaria crassna* Pierre ex Lec.) was produced and its biological activity was examined. After 14 days of static fermentation, it was found that all kombucha formulations had acetic acid levels ranging from 0.28±0.01% to 0.41±0.00%, alcohol levels from 1.07±0.15% to 1.32±0.08%, and total phenolic content from 3,577.78±96.86 to 8,066.67±905.13 µg/mL. DPPH scavenging activity ranged from 56.02±0.11% to 84.91±0.84%. The population of acetic acid bacteria, lactic acid bacteria, and yeast ranged from 7.75±0.05 to 7.97±0.01 log CFU/mL, 7.63±0.07 to 7.98±0.02 log CFU/mL, and 7.59±0.04 to 7.89±0.017 log CFU/mL, respectively, which meet the standards of the Food and Drug Administration. Kombucha made from hibiscus and hibiscus mixed with agarwood leaves at concentrations of 0.01% and 0.05% inhibited *Staphylococcus aureus* and *Escherichia coli*. Additionally, sensory evaluation scores for color, aroma, taste, and overall preference were in the range of moderate to high preference. This indicates that the production of herbal kombucha with agarwood leaves could be suitable for commercial development.

Keywords: Kombucha tea, Agarwood leaves, Herbal, Biological properties

Estimation of sediment thickness in oil palm plantations using the HVSR method and its relation to the crop's productivity

Farid, M.^{1*}, Hadi, A. I.¹, Refrizon, R.¹, Chozin, M.², Gustina, R.¹ and Saputri, W.¹

¹Department of Geophysics, Faculty of Mathematics and Natural Sciences, University of Bengkulu, Jl. WR Supratman, Bengkulu, 38371, Indonesia; ²Department of Agriculture Production, Faculty of Agriculture, University of Bengkulu, Jl. WR Supratman, Bengkulu, 38371, Indonesia.

*Corresponding Email: mfarid@unib.ac.id

Indonesia is one of the world's largest palm oil producers, contributing 56.94% of global production. Palm oil (*Elaeis guineensis*) is a crucial commodity for Indonesia's economy, with the agricultural sector contributing 13.7% to the Gross Domestic Product (GDP) in 2020. Palm oil is utilized in various industries, including food, cosmetics, and renewable energy, making it a leading sector in agriculture. In rural areas like Ipuh, communities heavily rely on palm oil plantations for their livelihood. However, palm oil productivity is significantly influenced by geological conditions and soil fertility. A key factor in determining soil fertility is the thickness of subsurface sediment layers, which supports essential elements for plant growth. This study utilizes the HVSR (Horizontal to Vertical Spectral Ratio) method, a geophysical technique, to estimate sediment thickness. The HVSR method, known for its environmental friendliness and cost-effectiveness, measures soil amplification and natural frequency to infer subsurface structures. Thirty HVSR measurement stations were recorded across Ipuh's palm oil plantations. Data processing followed SESAME standards and utilized GEOPSY software for analysis. Results indicated predominant frequencies ranging from 1.8 to 2.4 Hz, with higher values in northern regions. Soil amplification factors varied between 2.5 and 7.1, correlating with sediment thickness and

influencing seismic vulnerability. The study found a significant linear correlation ($r^2=0.92105$) between sediment thickness and palm oil productivity, suggesting thicker sediments enhance productivity. These findings highlight the importance of sediment thickness in optimizing palm oil production and can be replicated in other regions to improve agricultural practices and farmer welfare in Indonesia.

Keywords: Amplification factor, Ground water, Plant root, Resonant frequency, Shear wave velocity

Characterization of antagonistic actinomycete on dragon fruit fungal pathogen *Neoscytalidium dimidiatum*

Nguyen, H. T. D. *, Thu, M. T. A., Yen, H. N. H., Pham, T. V. and Nguyen, N. A.

*Corresponding Email: nguyenthidieuhanh@iuh.edu.vn

Pitahaya or dragon fruit (*Hylocereus* spp.), renowned for their nutritional value and delicious taste, represent a significant economic asset in subtropical and tropical regions. However, global dragon fruit cultivation is frequently threatened by fungal pathogens, notably *Neoscytalidium dimidiatum*, which induces stem canker and fruit rot, resulting in substantial economic losses. In an effort to develop an environmentally sustainable control method for this pathogen, 36 out of 50 isolated actinomycetes were shown to possess antagonistic activity against *N. dimidiatum*. Among these, the strain CNXK121 exhibiting the most potent antifungal activity was selected. Morphological and molecular analyses, including 16S rRNA sequencing, revealed that strain CNXK121 shared 100% sequence identity with *Streptomyces plicatus* and was subsequently designated *Streptomyces* sp. CNXK121. This strain demonstrated the capacity to biosynthesize chitinase, protease, and cellulase, which affect the intact of fungal cell wall. Volatile organic compounds produced by *Streptomyces* sp. CNXK121 were also observed to inhibit *N. dimidiatum* growth. Furthermore, the culture of *Streptomyces* sp. CNXK121 was found to inhibit fungal spore germination and induce defects in fungal mycelia, characterized by swelling and degradation. In vivo experiments on fruits and stems supported the efficacy of *Streptomyces* sp. CNXK121 in controlling stem canker and fruit rot. These findings underscore the potential of *Streptomyces* sp. CNXK121 as a biological control agent and suggest its potential application in sustainable agricultural practices.

Keywords: Antifungal, Dragon fruit, *Neoscytalidium dimidiatum*, Pitahaya, *Streptomyces*

Testing the advantages of six new hybrid chili pepper genotypes in the lowlands

Ganefianti, A. W. *, Rahmadani, R., Alnopri and Armadi, Y.

University of Bengkulu, Indonesia.

*Corresponding Email: ganefianti_crp@yahoo.com

Excellence tests are carried out to obtain candidate varieties that have distinctive characteristics and advantages over other varieties. Excellence tests can be carried out at various altitudes. This research aims to test the superiority of six new hybrid chili genotypes in the lowlands based on their agronomic characteristics. The research was conducted using a randomized complete block design (RCBD) with one factor consisting of six new hybrid chili genotypes. and two varieties comparison. The results showed that the UNIB C H23 genotype was the best because it was superior in growth (plant height, stem diameter, canopy width, leaf length), yield (flowering time, harvest time, fruit length, fruit diameter, fruit weight per fruit, fruit weight per plant, fruit weight per plot), and has the lowest incidence of Pepper Yellow Leaf Curl Virus disease (15%) and severity of Pepper Yellow Leaf Curl Virus disease (13%), with potential yields reaching 12.23 tonnes ha⁻¹ The UNIB C H63 genotype was

superior in growth (plant height, canopy width), yield (fruit diameter, number of fruit per plant, number of fruit per plot), and disease severity (13%). The UNIB C H13 genotype was superior in growth (dichotomous height, canopy width), yield (flowering time, harvest age, fruit length, fruit weight per plant), and disease severity (31%). The UNIB C H73 genotype was superior in growth (dichotomous height), yield (fruit length, fruit diameter), and disease severity (14%). The UNIB C H43 genotype is superior in growth (plant height, canopy width, leaf length, leaf width), yield (harvest age, fruit diameter), and disease severity (20%).

Keywords: Genotype, Selection, Superior

Investigation of Genetic diversity of two elite rice cultivars using SSR based marker

Sinumporn, S.*

Faculty of Science and Liberal Arts, Rajamangala University of Technology Isan, Nakhon Ratchasima, Thailand.
*Corresponding Email: Sittipun.si@rmuti.ac.th

Rice diversity plays an important role in breeding program. Microsatellite or SSR can be utilized to distinguish rice cultivar at specific loci. Polymorphism showed between different rice cultivars population are considered as useful SSR. Khao Dawk Mali 105 (KDML105) and IR64 are two elite rice cultivars and survey showed that 7 out of 27 SSR revealed polymorphism. Polymorphism information content (PIC) ranged from 0.0 (Monomorphic) – 0.5 (Polymorphic) with average PIC value was 0.13 per locus. RM551 RM5371 RM20224 RM424 RM3 RM17470 RM6480 possessed highest PIC value of 0.5. Total 34 single locus allele were amplified with average was 1.26 allele per locus. Due to two studied rice cultivars, maximum of 2 alleles were detected in two cultivars (RM551 RM5371 RM20224 RM424 RM3 RM17470 RM6480) and one allele were detected in remaining SSR. Preliminary study provided a useful SSR information for extension study with a greater number of rice cultivars population.

Keywords: Rice, Genetic diversity, Simple sequence repeat, Polymorphism

Detection of blast resistance genes in inbred rice lines using site-specific blast races

Herawati, R.^{1*}, Bustamam, H.², Fahrurrozi¹, Alnopri¹, Ganefianti, D. W.¹, Marlin¹ and Romeida, A.¹

¹Departement of Crop Production, Faculty of Agriculture, University of Bengkulu, Indonesia; ²Departement of Crop Protection, Faculty of Agriculture, University of Bengkulu, Indonesia.
*Corresponding Email: reny.herawati@unib.ac.id

Blast disease attacks by *Piricularia oryzae* on lowland rice were quite extensive in the Province of Bengkulu, Indonesia. Screening of 19 lines inoculated with four local races (333-BT, 001-BU, 043-RM, and 373-BS) revealed variations in blast disease resistance. There were nine rice lines (G7, G8, G9, G11, G13, G14, G15, G18, and G19) that showed resistance to blast disease with lower severity. There are race-sensitive lines with high virulence (333-BT and 373-BS), namely G3, G4, G6, G12, and G17. In addition, races 333-BT and 373-BS tended to show high virulence in sensitive varieties of Kencana Bali. Almost all lines had low levels of severity in low-virulence races (001-BU and 043 RM). Detection of blast-resistant genes using specific primers is able to detect the existence of the genes Pib, Pii, Pi5, and Pita2. In this study, we found that the G7, G8, G9, G11, G13, G14, G15, G18, and G19 lines have the potential to be further evaluated because they contain the Pii, Pi5, and Pita2 genes, which have multigenic and broad-spectrum blast resistance.

Keywords: Bengkulu isolates, Blast resistance, Broad spectrum, Race, Virulence

Identification of New Position of DNA Insertion and 24-bp INDEL Mutation Polymorphism in *Prolactin* Gene Promoter of Thai Native Chickens

Datumada, H.^{1,3} Passara, H.² and Thongsaiklaing, T.^{1,3*}

¹Faculty of Agriculture, Princess of Naradhiwas University, Narathiwat, 96000, Thailand; ²School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang Bangkok, 10520, Thailand; ³Biotechnology and Molecular Biology Laboratory (BMBL), Faculty of Agriculture, Princess of Naradhiwas University, Narathiwat, 96000, Thailand.

*Corresponding Email: Email: thanaset.t@pnu.ac.th

This research identified a 24-bp INDEL (-358) on the promoter region of the *PRL* gene in Thai native chickens. The allele frequencies for allele I and allele D were 0.20 and 0.80, respectively. The genotype frequencies were II (0.028), ID (0.349), and DD (0.622) respectively. The heterozygosity values were composed of the H_o (0.350) was higher than the H_e value (0.323). Moreover, our findings revealed new DNA duplication on *PRL* promoter region, with three distinct polymorphisms of 30 bp (-358), 24 bp (-358), and 14 bp (-358), respectively.

Keywords: *Prolactin* promoter, INDEL mutation, 24 bp polymorphism, DNA duplication, Chicken

Total phenolic content, flavonoid content, and anthocyanin content in various of butterfly pea accessions in Bengkulu, Indonesia

Prameswari, W.^{1*}, Yulian, Y.¹, Oktoviani, O.², Sari, D. K.³ and Situmeang, K.⁴

¹Department of Crop Production, Faculty of Agriculture, University of Bengkulu, Bengkulu 38121, Indonesia; ²Departement of Pharmacology and Pharmacy, Faculty of Medicine and Health Sciences, University of Bengkulu, Bengkulu 38121, Indonesia; ³Departement of Pharmacy, Faculty of Mathematics and Natural Sciences, University of Bengkulu, Bengkulu 38121, Indonesia; ⁴Student Undergraduate of Departement Crop Production, Faculty of Agriculture, University of Bengkulu, Bengkulu 38121, Indonesia.

*Corresponding Email: wprameswari@unib.ac.id

The results showed that the three accessions of *Clitoria ternatea* had phenotypic diversity of flowers and flower colors, namely dark blue-double petal (CTE_002), light blue-single petal (CTE_006), and light purple-single petal (CTE_013). In addition, the three accessions of *Clitoria ternatea* also had total monomeric anthocyanin content, total phenolic content, and total flavonoid content determined in the ethanol extract of the sample. Accession CTE_002 with dark blue-double petals had a total monomeric anthocyanin, phenolic, and flavonoid content of 56.76 ± 1.32 mg/l, 40.82 ± 1.40 mg GAE/g DW, and 4.76 ± 0.72 mg QE/g DW. Variability in the anthocyanin content of the three accessions was only found in flowers with values ranging from 12.38 ± 0.33 - 56.76 ± 1.32 mg/l. The phenolic content of the three accessions ranged from 33.38 ± 0.37 - 40.82 ± 1.40 mg GAE/g DW. This shows that the three *clitoria ternatea* accessions in Bengkulu Province have high phenolic content and extract yield. Therefore, this accession can be used commercially in the food and cosmetics industry and shows high potential for medicinal plant breeding programs.

Keywords: Agro-morphology, Anthocyanins, Flavonoid, *Clitoria ternatea*, Secondary metabolites

The family 36 carbohydrate-binding module of *Paenibacillus xylaniclasticus* TW1 xylanase: Characterization and recognition in epidermal tissue of sweet potato roots

Tangthirasunun, N., Sornyotha, S.* and Jatupornpipat, M.

Department of Biology, School of Science, King Mongkut's Institute of Technology Ladkrabang, Chalokkrung Road, Ladkrabang, Bangkok 10520, Thailand.

*Corresponding Email: somphit.so@kmitl.ac.th

Paenibacillus xylaniclasticus TW1 was able to produce multienzyme complex under aerobic conditions. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of crude enzyme preparation exhibited at least 12 proteins bound to insoluble cellulose. Only band of cellulose bound protein 12 (CBP12) from SDS-PAGE could identify as xylanase family 11 with a carbohydrate-binding module family 36 (CBM36) by using matrix-assisted laser desorption/ionization time-of-flight/time-of-flight mass spectrometry (MALDI-TOF/TOF MS). In this report, CBM36 of *P. xylaniclasticus* TW1 (*PxTW1CBM36*) was cloned, expressed, purified and studied for binding characteristic. The results found that *PxTW1CBM36* displayed broad binding ability to polysaccharides which high affinity for xylan and insoluble cellulose. Interestingly, this is the first report indicated that CBM36 had an affinity for insoluble cellulose. Although the amino acid residues involved in binding of *PxTW1CBM36* was conserved, the binding capacity of *PxTW1CBM36* do not perturb by the addition of ethylenediaminetetraacetic acid (EDTA). It is possible that *PxTW1CBM36* had different binding mechanisms with other CBM36. In addition, the binding characteristic of CBM36 on polysaccharides embedded within plant cell walls was also elucidated. It displayed the strong recognition for ligands located in epidermal tissue of sweet potato roots. Therefore, this study might provide a new tool for targeting enzymes to surface of plant.

Keywords: Carbohydrate-binding module family 36, MALDI-TOF/TOF MS, *Paenibacillus xylaniclasticus* TW1, Sweet potato roots, Xylanase family 11

Glucose content, viability and vigor four cucumber seed lots

Hairani, P. M.^{1*}, Diaguna, R.² and Afifah, N.³

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

*Corresponding Email: putrimh@unib.ac.id

The evaluation of cucumber seed lots reveals significant variations in vigor and germination, with lots of Vanesa 2, Vanesa 3, and Vanesa 4 exhibiting robust performance compared to lot Venus 1. The notable differences underscore the critical importance of seed quality in ensuring optimal germination establishment and enhancing overall crop performance. Additionally, while a strong correlation exists between soluble glucose content and various vigor parameters, the lack of statistical significance suggested that other influencing factors may also play a role.

Keywords: Alpha - amylase, Enzymatic Activity, Cucurbitaceae, Germination, Seed quality

SESSION 8: ORGANIC AGRICULTURE AND SMART FARMS

Discovering previously uncultured microorganisms from antarctica to exploit their biotechnological potential for a sustainable future

Sharma, Avinash*

BRIC-National Centre for Cell Science, Pune-411007, India.

*Corresponding Email: avinash@nccs.res.in

Antarctica, a pristine ecosystem, harbours extreme conditions such as sub-zero temperatures, high UV radiation, and low nutrient availability. This unique environment presents an untapped reservoir of microbial diversity with significant implications for sustainable biotechnological applications. Employing multi-omics approaches, including advanced targeted metagenomics and traditional culture-based genomics, we explored the microbial diversity of Antarctica. High-throughput sequencing revealed a diverse microbial community dominated by bacterial phyla Actinobacteriota, Proteobacteria, and Bacteroidota, as well as fungal phyla such as Ascomycota, Basidiomycota, and Chytridiomycota. Functional predictions highlighted pathways associated with biogeochemical nutrient cycling (carbon, nitrogen, sulfur), methane metabolism, and DNA repair mechanisms, all of which are critical for ecosystem sustainability and functioning. Further, through prolonged incubation with specific substrates and low-nutrient media, we isolated 10 novel microorganism with <98% similarity to known species, including genera like *Arthrobacter*, *Pseudarthrobacter*, and *Deinococcus*. Genome mining of these isolates uncovered DNA repair pathways and biosynthetic potential for biotechnologically valuable compounds like allantoin and orotate, offering promising avenues for sustainable industrial applications.

Evaluation of ear yield stability of organic sweet corn hybrids at different elevations in a humid tropical climate

Chozin, M.*, Sudjatmiko, S. and Fahrurrozi, F.

Faculty of Agriculture, University of Bengkulu, Jl. W.R. Supratman, Kandang Limun, Bengkulu 38121, Indonesia.

*Corresponding Email: mchozin@unib.ac.id

Yield trials are an important step in a breeding program to evaluate the performance of selected genotypes under various environments. The present study was undertaken to estimate the ear yield stability of 10 sweet corn hybrids bred for organic production as grown at different elevations of a humid tropical climate and to determine the elevations best suited for the ear yield production of the hybrids. The study was conducted at three locations differing in elevations in Bengkulu Province, Indonesia, i.e. lowland (10 m asl), midland (600 m asl), and highland (1050 m asl). A randomized complete block design with three replication was employed to allocate 10 experimental hybrids and 2 checks of commercial hybrids on the experimental plots. The collected data of unhusked ear yield were subjected to a combined analysis of variance to elucidate the existence of hybrid x elevation interaction effect. The AMMI (additive main effect and multiplicative interaction) analysis was performed to give insight into the effect of elevations on the stability of hybrid's ear yield and to determine the adaptability of a given hybrid. The combined analysis of variance indicated that the elevation effect (E) was a primary source of variation in ear yield (35%), followed by hybrid (G) and hybrid x elevation interaction (GE) effects, which accounted for 27% and 16%, respectively. Among the tested elevations, highland was identified as the most productive environment. However, the significant GE effect suggests a possible inconsistency in the ear yield among the hybrids across latitudes. Both the estimates

of AMMI stability value (ASV) and yield stability index (YSI) distinguished the cross of Caps 17B x Caps 23, Caps 22 x Caps 23, and Caps 2 x Caps 17A as the stable hybrids with high mean ear yield.

Keywords: AMMI stability value, Combined analysis of variance, Experimental hybrid, Principal component, Unhusked ear yield

Weed-based liquid organic fertilizer increased growth and yields of organically grown sweet corn

Fahrurrozi^{1*}, Setyowati, N.¹, Sudjatkiko, S.¹, Mukhtar, Z.² and Chozin, M.¹

¹Department of Crop Production, University of Bengkulu, Bengkulu, 38121, Indonesia; ²Department Soil Science, University of Bengkulu, Bengkulu, 38121, Indonesia.

*Corresponding Email: fahrurrozi@unib.ac.id

This experiment intended to evaluate the effects of weed-based liquid organic fertilizer (LOF) concentration on sweet corn growth and yield cultivated in an organic production system. Field experiment was organised in randomized complete block design to evaluate the effects of treatments (0, 25, 50, 75, and 100 % in concentrations). Research indicated that the use of weed-based liquid organic fertilizer elevated sweet corn growth and yield. The use of weed-based LOF had a greater impact on generative growth than on vegetative growth of sweet corn. The best concentration of LOF for increasing plant height, fresh weight of unhusked ear, length of unhusked ear, and sweetness level of sweet corn were 57 %, 68 %, 72 %, and 76 %, respectively. These results provided important information about how the use of weeds in LOF production for maximizing production of organic sweet corn.

Keywords: Liquid organic fertilizer, Organic vegetables, Sweet corn, Weed-based fertilizer

Phenetic Engineering of Potential Microbes for Biocontrol and Biofertilizer Applications in Chilli and Coffee

Thangadurai, D.*

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

*Corresponding Email: thangadurai.kud@gmail.com

Strain improvement of important microorganisms is carried out by variety of methods such as mutations, protoplast fusion, recombinant DNA technology, and gene cloning. Among these, random mutagenesis and genome shuffling through protoplast fusion are the simpler and more commonly used techniques to get genetic recombinants with desired traits. Genome shuffling requires development of parental library with repeated genetic modifications and selection from a variety of strains before conducting recursive protoplast fusion. The achievements of genome shuffling basically rely on the initial screening of strains, the effectiveness of recombination techniques, and strength of selection techniques of shuffled strains. The fungi and bacteria were proved to be beneficial in sustainable agricultural practices. Species of the genera, *Trichoderma*, *Penicillium*, *Chaetomium*, *Pseudomonas*, *Bacillus*, *Azotobacter* and *Rhizobium* are well known biofertilizers for most of the crops and biocontrols for their disease management. Chilli (*Capsicum annum* L.), the ‘wonder spice’ is an essential vegetable as well as spice, cultivated throughout the world, area covering about 1,832 thousand hectares, with the production of 2,959 thousand tonnes and Coffee is an important cash crop responsible for significant employment, contributing to socio-economic development and poverty alleviation. Both of these important crops are susceptible to several diseases by abiotic and biotic factors, which become

major constraints in their production causing devastating loss by lowering the yield and production. Thus, there is an urgent need to improve the existing beneficial microbes for betterment of their biofertilizer and biocontrol efficacies using this cutting-edge technology. And thus, this presentation highlights the techniques and tools for improving the traits of beneficial microbes for sustainable agriculture.

Keywords: Strain engineering, Genome shuffling, Protoplast fusion, Beneficial microbes, Biocontrol agents, Biofertilizers, Sustainable agriculture

Effects of LDD1 compost and chemical fertilizer on the growth, yield and antioxidant activity of *Chrysanthemum indicum* L.

Phadungsawat, B.^{1*} and Yeemin, J.²

¹Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi Campus, Chanthaburi, Thailand; ²Faculty of Agricultural Technology, Burapha University, Sakaeo Campus, Sakaeo, Thailand.

*Corresponding Email: bodin_ph@rmutto.ac.th

Chrysanthemum, one of the most valuable crops and medicinal plants, is increasingly cultivated for its pharmacological benefits. To meet this demand, this study compared the growth and yields of yellow-flowered *Chrysanthemum indicum* using LDD1 compost, chemical fertilizers, and a combination of both. The results showed no significant differences in plant height, canopy size, and flower number across the fertilization treatments. However, the combination of LDD1 compost and chemical fertilizer showed the highest number of flowers, which was significantly greater than other treatments. Additionally, LDD1 compost alone resulted in the highest dry root weight. The antioxidant activity of bioactive compounds extracted from dried chrysanthemum flowers was evaluated by measuring total flavonoids, phenolics, and 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity. Although the flavonoid and phenolic contents did not significantly differ among the treatments, fertilization led to significantly higher antioxidant activity compared to non-fertilized plants. This study highlights the potential of using LDD1 compost, or a combination of LDD1 compost and chemical fertilizer at half the rate, to promote vigorous growth, high yields, and enhanced antioxidant activity. This approach helps reduce the reliance on chemical fertilizers.

Keywords: LDD1 compost, Antioxidant, Free radical scavenging, Flavonoid, Phenolic

Effects of local planting materials on the growth of organic chinese kale in raised bed technique

Somniam, V. *, Somniam, P., Pupakdeepan, W. and Phatdiphanpreeda, P.

Faculty of Agriculture, Uttaradit Rajabhat University, Uttaradit, Thailand.

*Corresponding Email: Vimolchat@yahoo.com

Uttaradit Province is an agricultural area with an abundance of material residues that have the potential to be used in organic production as a replacement for chemical fertilizers. Utilizing local organic materials can improve soil fertility and enhance its physical and chemical properties, making it more suitable for various types of plants. This approach also reduces costs and risks from chemical inputs through planting techniques. The research focused on selecting various local materials with the potential to improve soil fertility and have physical and chemical properties suitable for producing organic Chinese kale in raised bed conditions. The results indicated that there was no significant

difference in kale growth and yield between the planting materials mixed with plant organic matter and those mixed with animal manure. However, planting materials containing a mixture of organic matter from plants, such as rice husks, old mushroom lumps, rain tree leaves, and filter cake, resulted in greater height. Specifically, a mixture of filter cake and old mushroom lumps led to larger stem sizes and more leaves, while materials containing filter cake resulted in the largest canopy size and the highest fresh and dry weights of above-ground parts in 30 days after transplanting. Additionally, the composite material with copper pod leaves had the highest ratio of fresh weight and dry weight of roots to shoots. Regarding the animal manure, it was observed that mixing planting materials with porcine manure increased plant height, stem diameter, canopy width, and the number of leaves per plant, as well as the fresh and dry weights of both above-ground parts and roots. The planting materials mixed with porcine manure and chicken manure provided the greatest leaf width and length. Additionally, materials mixed with porcine manure and cow manure had the highest SPAD values and the highest ratio of fresh and dry weights of roots to shoots.

Keywords: Local material, Organic Chinese kale, Raised bed technique

Growth of *Dendrobium oryzen* orchids at the acclimatization stage by providing organic materials to the planting media and the spraying foliar fertilizer

Sinaga, A. O.¹, Ganefianti, D. W.^{1*}, Romeida, A.¹, Armadi, Y.² and Herawati, R.¹

¹Department of Crop Production, Faculty of Agriculture, University of Bengkulu.Jl. W.R. Supratman Bengkulu, 38121 Indonesia; ²Faculty of Agriculture, University of Muhammadiyah Bengkulu, Jalan Bali, Bengkulu, 38119, Indonesia.

*Corresponding Email: dw_ganefianti@unib.ac.id

Acclimatization is an important stage in orchid tissue culture. At this stage, the orchids that were tissue-cultured in an in vitro environment are placed back in their natural environment. At this stage, adding organic materials to the planting medium and misting via leaves will optimize the orchid growth. The objective of this study was to determine the best organic material to use and the frequency of foliar fertilizer application to boost orchid growth during the acclimation phase. Summary of facts: In this study, a completely randomized design (CRD) was used to construct a split plot. The main plot, which is split into three layers, shows how often leaf fertilizer is sprayed: F1 represents how often it is sprayed once every six days, F2 represents how often it is sprayed once every three days, and F3 represents how often it is sprayed once every two days. Subplots: There are four tiers to these planting media additions: B0, no organic material; B1, santoro leaf litter; B2, moringa leaf litter; and B3, coffee skin. The results of the study showed that fertilizing once every six days with organic material drawn from Moringa leaf litter produced the most leaves, while fertilizing once every six days with organic material derived from coffee husks generated the broadest leaves. When organic material from Lamtoro leaf litter is placed in an orchid growing environment, the longest orchid roots are generated.

Keywords: Growth, Organic material, Fertilization

Organic agriculture history in Laos

Souvandouane, Souliya

RF practices with organic and halal products

Maxim Mitrokhin

Modern organic agriculture and earthsafe powered by AATSEA organic certification from farm to table

Soytong, K.^{1,2*}

¹Association of Agricultural Technology in Southeast Asia (AATSEA), Bangkok, Thailand; ²Research Institute of Modern Organic Agriculture (RIMOA), Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand.

*Corresponding Email: ajkasem@gmail.com

Modern organic agriculture is proposed to be revolutionized to quit toxic agrochemicals for agricultural production or completely organic agriculture by using agricultural inputs from the based scientific research investigation. Non-agrochemical production (NAP) is defined as the growers stop the using synthetic agrochemicals, including chemical fertilizers and chemical pesticides (fungicides, insecticides, herbicides, etc.) for their productions, including crop and animal production. It is to revitalize the surrounding agroecosystem and surrounding environment, improve soil biodiversity, soil fertility with high organic matter, and proper soil pH for plant growth. NAP products leave low concentrations of toxic chemical residue in the soil, water, and agricultural products at a minimum standard for hazardous to consumers and living organisms in surrounding environments. The growers combine conventional methods to maintain and improve soil fertility, biological activities, biodiversity, soil revitalization and remediation with beneficial microorganisms and apply biological products and natural products as agricultural inputs for their production to maintain the quantity and quality of agricultural products with food security and safety. NAP can be transferred for organic agriculture certification when no toxic agrochemical residues are detected in the soil, water, and agricultural products. Organic agriculture (OA) is defined as a system that relies on the ecosystem and environmental and social impacts by stopping synthetic agrochemical inputs, such as synthetic fertilizers and pesticides, veterinary drugs, and genetically modified seeds/organisms. Synthetic chemicals are replaced in organic agriculture with innovative products, natural products, beneficial microorganisms, biological products, natural substances, and management practices to maintain and increase long-term soil fertility. Organic agriculture promotes and enhances agroecosystem health, biodiversity, biological cycles, soil fertility, and activities. Organic agriculture products do not contain toxic synthetic agrochemical residues and are called safety food. Finally, the certified organic products must not detect toxic agrochemicals, nitrate (NO₃), nitrite, formalin and other synthetic chemicals, *Salmonella* sp, *E. coli*, low concentration of heavy metals and non-genetically organisms(non-GMOs). Association of Agricultural Technology in Southeast Asia (AATSEA) is officially non profitable organization which established in 2011. We have members mostly scientists from many countries eg Thailand, PR China, Russia, Finland, Japan, India, Bangladesh, Sri Lanka, Indonesia, Philippines, Vietnam, Cambodia, Laos, Myanmar, Nigeria, Boswana, Turkey, Estonia EU etc. AATSEA Organic certification is one activity. In 2016 we have started to the accredited the organic farmers without charge for organic certified eg Organic coffee in Laos, Organic rice in Cambodia, Organic tea in Vietnam, Organic Vegetables in Myanmar, Organic tea in China, Organic Vegetables, Fruits, Eggs, Shrimps, Fishes etc., Organic resort and Organic golf course etc. In 2022, AATSEA has collaborated with Earthsafe foundation which established by Central TOPS Supermarkets in Thailand for organic certify of Earthsafe powered by AATSEA and AATSEA-RIMOA organic certified which the farmers can directly deliver to TOPS supermarkets. We have started to evaluate from non-agrochemical production (NAP) in conversion period to Organic Agriculture (OA).

Keywords: Organic agriculture, Non-agrochemical production

Pre-test of investigating the impact of organic production in comparison with chemical production on the growth and yield of lettuce in various hydroponics system

Fortus, S.^{1*} and Soytong, K.^{1,2}

¹Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²Research Institute of Modern Organic Agriculture, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.

*Corresponding Email: sernan2005@gmail.com

Preliminary trial found that plant height and leave number of lettuces were 17,40 cm/plant and 12.2 leaves/plant in Organic hydroponic were not significantly differed from chemical hydroponic which plant height and leave number of lettuces were 17,86 cm/plant and 10.71 leaves/plant. The fresh plant weight (yield) in organic hydroponic was 25.29 g/plant which was significantly better yielded than the fresh plant weight (14.11 g/plant) in chemical hydroponic. The fertilization for organic hydroponic was applied Nutri-cop high N, Bio_NPK, Nutri-food high K and for chemical hydroponic was applied chemicals solution A and B. Further research finding on organic hydroponic has been investigating to develop bio-nutrition, bio-plant protection and proving for nontoxic agrochemical residue in organic lettuce production.

Keywords: Bio-Nutrition, Bio-NPK, Nutri-crop, Nutri-food, Organic hydroponic

Yield enhancement efficacy of *Bacillus velezensis* CE 100 biofertilizer on pineapple (*Ananas comosus* L. Merr.) production in Prachuap Khiri Khan, Thailand

Duangkaew, P.¹, Kim, K. Y.² and Monkhang, S.^{1*}

¹Faculty of Animal Science and Agricultural Technology, Silpakorn University, Phetchaburi Information Technology Campus, Phetchaburi, Thailand; ²Department of Agricultural and Biological Chemistry, Institute of Environmentally Friendly Agriculture, College of Agriculture and Life Sciences, Chonnam National University, Gwangju, Republic of Korea.

*Corresponding Email: monkhang_s@su.ac.thof

Biofertilizers are the best choice to promote organic and sustainable agriculture by enhancing productivity and reducing chemical fertilizer use. In this study, we examined the effect of *Bacillus velezensis* biofertilizer application on the growth, productivity, and fruit characteristics of pineapple (*Ananas comosus* L. cv. Patavia) planted in Prachuap Khiri Khan, Thailand from January to August 2023. Four treatments include control (T1; no biofertilizer), diluted biofertilizer culture (T2= 1:4 v/v and T3=1:2 v/v dilution), and 100% pure culture (T4). Each treatment was sprayed every 2 weeks until harvest. All treatments were done with 3 replications in Completely Randomized Design (CRD). The results showed that T4 bacterial pure culture significantly improved plant height (96.83±0.50 cm) and D-leaf length (84.06±1.55cm) at the third month of application (P < 0.05). In addition, T4 significantly enhanced fruit weight (1.12±0.07 kg/fruit) and fruit yield (66.3 t/ha) compared to other treatments (P < 0.05). However, the fruit characteristics including fruit lengths, perimeters, citric acid contents, and total soluble solids (TSS) of pineapple fruits showed no significant differences. Therefore, these findings indicate the efficacy of *B. velezensis* as a biofertilizer to enhance pineapple productivity in Thailand.

Keywords: Plant-growth-promoting bacteria, Organic agriculture, Tropical fruits

Distribution of humic substances: effects of long-term application of vermicompost

Utami, K.^{*}, Muktamar, Z., Barchia, F., Gusmara, H., Sucahya, H. and Salim, H.

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

***Corresponding Email:** kartikautami@unib.ac.id

The results indicated that long-term fertilization with vermicompost presented a positive correlation for fulvic acid than humic acid. Fulvic acid as a part of humic substances can predict metal existence and its bioavailability in soil. In depth of 0-20cm, content of fulvic acid about 6.72 to 9.87%, higher than 20-40 cm about 3.78 to 6.84%. In vermicompost utilization, application 25 Ton ha⁻¹ has not significantly differenced with 5 Ton ha⁻¹. Meanwhile, organic carbon started range 3.29 to 5.32% and 2.59 to 3.64% on soil depth 0-20cm and 20-40cm, respectively. Carbon stock at 0-20cm has range about 53.02 to 88.29% and 34.02 to 64.30% at 20-40cm. Carbon, it was consisting of total organic carbon; carbon stock; and lignin, has a primary effect on humification processed. A positive correlation between level dose of vermicompost and soil depth for soil pH, fulvic acid, organic carbon, total nitrogen, carbon stock, and lignin showed that this organic fertilizer can give a positive impact to remain soil health and quality.

Keywords: Carbon, C-stock, Humification, Soil depth

Adoption of organic agricultural standards in organic farming: a case study in community enterprises in Roi-Et Province, Thailand

Prawat, S.¹, Chulilung, P.², Mankeb, P.¹, Khernkhun, J.¹ and Charoenkittayawut, S.³

¹King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ²Valaya Alongkorn Rajabhat University, Pathumtani, Thailand; ³Faculty of Education, Burapha University, Bangsaen, Muang, Chonburi, 20131, Thailand.

***Corresponding Email:** sunisa.prawat@gmail.com

Organic farming is gradually gaining momentum across the world. Growing awareness of health and environmental issues in agriculture has increased the demand for organic food, which is emerging as an attractive source of rural income generation. As consumer demand for organic products becomes more pronounced, sustainability in crop production has become a primary concern in agricultural development. This study aimed to identify the factors affecting the adoption of organic agriculture standards (OAS) among members of the organic farming community enterprises (OFCE) in Phanom Phrai district, Roi Et province, Thailand. Data were collected from 75 respondents who were members of the OFCE group in Phanom Phrai district, Roi-Et province. The findings revealed that members of the Organic Farming Community Enterprises had a high level of adoption of OAS. In addition, the multiple regression analysis showed that factors affecting the adoption of OAS included the number of times participating in training related to OAS, extension contact, knowledge related to OAS, and attitude related to OAS.

Keywords: Organic agricultural standard, Adoption, Compliance, Community enterprise

SESSION 9: PLANT BIOTECHNOLOGY

Distribution of weed species and soil nitrogen, phosphorus, and potassium across various land uses in coastal areas

Muktamar, Z.^{1*}, Setyowati, N.², Utami, K.¹, Haris, H. A.², Nurjanah, U.², Sukisno, S.¹ and Hindarto, K. S.¹

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

*Corresponding Email: muktamar@unib.ac.id

The survey identified a total of 81 weed species, which included 42 species of broadleaf weeds, 25 grasses, 9 sedges, and 5 ferns. The oil palm plantation exhibited the most weed diversity, with a total of 40 species, including 19 broadleaf, 13 grasses, 3 sedges, and 5 ferns. In contrast, the rice farm had the lowest weed diversity, consisting of just 8 species, including 3 broadleaves, 3 grasses, and 2 sedges. The number of weed species in oil palm plantations is comparable to that in rubber plantations, although greater than in coconut plantations. In coconut and oil palm plantations, broadleaf weed species are the most common, accounting for 58.05% and 50.89% of the total weed population, respectively. On the other hand, in rubber plantations and swamp land, grasses are the dominating weed species, making up 44.68% and 56.24% of the Summed Dominance Ratio (SDR), respectively. *Melastoma affine* D. Don is the dominant weed species in oil palm and rubber plantations, with an SDR of 9.44% and 7.09%, respectively, while *Borreria alata* Aubl. is the primary weed species in coconut plantations, with an SDR of 12.70%. However, in swamp land, *Isachne globosa* (Thunb.) O.K., a type of grass, makes up 14.43% of SDR. Furthermore, the swamp land exhibited the highest soil nitrogen concentration (5982.53 mg/kg). The coconut plantation had the highest soil phosphorus level (2.76 mg/kg), while the rice farm had the highest soil potassium (226.18 mg/kg). The Pearson correlation analysis reveals a negative association between the prevalence of broadleaf weed species and grasses. Likewise, there is a negative correlation between broadleaf weeds and soil N, suggesting that these specific weeds can compete under low nitrogen. The discovery of this study has advantageous implications for the management of weed control in coastal environments.

Keywords: Coastal regions, Land use, Plantations, Soil nutrient, Weed diversity

Weed control in water-saturated soybean cultivation in the coastal area

Setyowati, N.^{1*}, Pujiwati, H.¹, Rasid, R. N.³ and Muktamar, Z.²

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

*Corresponding Email: nsetyowati@unib.ac.id

The study indicated that soybean growth and yield under water-saturated conditions did not significantly differ among various weed control periods or weeding frequencies. Soybeans weeded twice or three times grew similarly to those weeded once. During the study, soybean growth was inhibited even after weed control, indicating faster weed growth compared to soybeans. At 2, 3, and 4 weeks after planting, the predominant weed species was *Fimbristylis miliacea*, followed by *Ludwigia octovalvis* and *Cyperus sphaclatus* R. By harvest time, the experimental site was dominated by *Cyperus halpan*, *F. miliacea*, *Fimbristylis ciliaris*, and *C. sphaclatus* R., with SDR (Summed Dominance Ratio) values of 25.45%, 24.86%, 13.88%, and 11.67%, respectively. These findings are crucial for managing weeds in soybean cultivation under water-saturated environment.

Keywords: Coastal area, Low land, Soybean, Water-saturated cultivation, Weed control

Assessment of bioactive compounds and synergistic effects from *Miliusa sessilis* plant against anthracnose diseases on mango fruits (*Mangifera indica* L. 'Nam Dok Mai Si Thong')

Pootaeng-on, Y. and Monkhung, S.*

Faculty of Animal Sciences and Agricultural Technology, Silpakorn University, Phetchaburi IT campus, Sampraya, Cha-am, Phetchaburi 76120, Thailand.

*Corresponding Email: pootaengon_y@su.ac.th

This study investigated the efficacy of bioactive compounds from the ethyl acetate extract of *Miliusa sessilis* (MSE) in controlling *Colletotrichum* sp. The compounds were identified and quantified include three neolignans: dehydrodieugenol A (dA), dehydrodieugenol B (dB), and miliusin A (mA). *In vitro* antifungal activity of bioactive compounds from MSE were tested through radial mycelial growth using dual culture technique. The bioactive compounds (dA, dB, mA, dB-mA, mA-dA and dB-dA) at concentrations of 50, 100, 500, 1000, 2000, 3000, 4000 and 5000 ppm were carried out to determine and shown that the mixture of two bioactive compounds from MSE had more efficiency than purified bioactive compounds. The result showed that dB-dA at 5000 ppm inhibited mycelium growth by 43.46% while purified bioactive compounds (dA and dB) had a high fungal inhibition effect by 43.46% and 45.50%, respectively. However, there is no significant difference in these treatments ($p < 0.01$). Furthermore, the potential antifungal activity using poison food technique revealed the greatest percentage inhibition in significant difference ($p < 0.01$) compared to control and all treatments at 1000 ppm of mA, dA and dB-dA as 76.07%, 75.38% and 74.79%, respectively. The MIC values of dA, dB-mA, mA-dA and dB-dA were 6.25 ppm exceptionally; dB and mA had higher MIC values (12.5 ppm). *In vivo* antifungal activity evaluation, MSE had efficacy to suppress and reduce lesions on mango fruits. These findings supported that the synergism of MSE showed strong antifungal effects and could be developed as an alternative to synthetic fungicides.

Keywords: Mango disease, *Colletotrichum* sp., Synergism, Antifungal combination effect, Neolignans

Genetic diversity of common figs (*Ficus carica*) cultivated in Thailand determined by 18S ribosomal RNA sequence

Laosutthipong, C.* and Seritrakul, P.

Faculty of Animal Sciences and Agricultural Technology, Silpakorn University, Phetchaburi IT Campus, Cha-am, Phetchaburi, 76120, Thailand.

*Corresponding Email: laosutthipong_c@silpakorn.edu and seritrakul_p@su.ac.th

The common fig (*Ficus carica*) is an economically important fruit crop widely consumed worldwide. Originating in the Middle East, humans have cultivated and bred figs for thousands of years. In Thailand, figs are a relatively new crop that has been imported and cultivated for only a few decades. Farmers and collectors have imported several varieties of fig cuttings and scions from various countries, and some varieties perform better than others in Thailand's tropical climate. However, in Thailand, the genetic diversity of common figs has not been studied at a molecular level. This study aimed to investigate the genetic diversity of 5 varieties of figs commonly grown in Thailand (Longue d'Aout, Col De Dama Blanca, Weihai, Iraqi, and White Israel) by comparing the DNA sequence of 18S ribosomal RNA gene. We found that all 5 varieties showed highly similar 18S rRNA, and similar to 2 other related species (*Ficus palmata* and *Ficus Johannis*). The only exception is the Iraqi fig, which possesses 2 positions of single nucleotide substitutions (C to T). Interestingly, Iraqi is a fig variety with distinct characteristics that facilitate rapid growth in the tropics (single-lobed leaf, robust growth, and nematode-resistance) and is commonly used as a rootstock. In conclusion, our study provides a

fundamental starting point for further works on figs molecular genetics, which can facilitate fig commercialization and further breeding in Southeast Asia.

Keywords: Common fig, 18S ribosomal RNA gene, Genetic diversity

Morphological variation and chemical profile of *Ficus septica* Burm. f from different natural population

Widiyastuti, Y.¹, Haryanti, S.¹, Jokopriyambodo, W.¹, Subositi, D.¹, Widodo, H.¹, Siswanto, U.², Widowati, L.³ and Fakhrudin, N.⁴

¹Research Center for Pharmaceutical Ingredient and Traditional Medicine, National Research and Innovation Agency, Jl. Raya Jakarta-Bogor KM 46, Cibinong, Bogor, Jawa Barat, Indonesia; ²Agriculture Faculty, University of Bengkulu, Jl. WR Supratman Bengkulu, Indonesia; ³PT. Konimex, Jl. Mantung, Grogol, Sukoharjo, Indonesia; ⁴Faculty of Pharmacy, Gajah Mada University, Sekip Utara Jogjakarta, Indonesia.

*Corresponding Email: ywidiyasis@gmail.com

Ficus septica Burm. f. is a keystone species growing naturally in all Indonesia Province and categorized as cosmopolite plant. This species has been deeply studied related to its cytotoxic activity against several types of cancer cell lines. Addressing the variation of habitat of the plant, it is required to evaluate the morphological characteristics along with phytochemical profile of *F. septica* from different natural populations. The study was carried out by mapping and experimental design. Site mapping was determined in ten (10) site locations based on desk study referring to natural populations in Jawa and Bali Island. The morphological determination and phytochemical analysis were conducted in The Integrated Laboratory at Tawangmangu. The study showed that morphological characteristics of *F. septica* from different areas was able to be grouped into 5 clusters. The leaves shape and size were the main morphological character suitable to differentiate the *F. septica* accession. The dry yield and total extract content of *F. septica* leaves were strongly affected by collection areas. The phytochemical evaluation qualitatively demonstrated the alkaloid content of *F. septica* leaves from all collection areas, while thyloporine the marker compound was detected at 4 areas. In conclusion different morphological characteristics and quality of *F. septica* were determined by location.

Keywords: Morphological characteristic, *Ficus septica*, Phytochemical, Natural population

Nutritional evaluation of santol (*Sandoricum koetjape*) and the effects of santol flesh extract on *Drosophila melanogaster*

Aphichartphankawee, S.¹, Poeaim, S.^{1*} and Pedklang, N.²

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

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

This study aimed to evaluate the nutritional value of the santol (*Sandoricum koetjape*) fruit and the effects of crude santol flesh extract in fruit flies (*Drosophila melanogaster*). It was found that santol fruit is low in calories and lacks vitamins B1, B2, and C. However, santol is high in potassium, ranging from 156.05 to 188.48 milligrams per 100 grams. The study investigated the effects of ethanolic extract of santol flesh on fruit flies by mixing the extract into the food at 20, 40, 60, 80, and 100 mg/mL. In the parental generation (P), the survival rates were 100.00, 90.00, 90.00, 46.67, and 6.67% at concentrations of 20, 40, 60, 80, and 100 mg/mL, respectively. However, in the first filial generation

(F1), recorded on the 3rd day after emergence from the pupae, the observed survival rates exceeded 90% at each concentration. For the climbing assay, at a concentration of 100 mg/mL, climbing speed over a 10 cm distance was reduced by 9.35 times in the P generation and 7.74 times in the F1 generation compared to the control group. For the adult emergence rate, at a concentration of 100 mg/mL, the rate of adult emergence was reduced to only 53%. When comparing body weight to the control group, the P and F1 generations decreased at a 100 mg/mL concentration. However, body weight did not differ from the control group at 20, 40, 60, and 80 mg/mL. The results suggest that santol fruit can be a good source of potassium, and high concentrations of santol extract can harm the health and performance of fruit flies.

Keywords: *Drosophila melanogaster*, Santol (*Sandoricum koetjape*), Santol extract, Nutritional value

Attack intensity and effectiveness pheromone on *Oryctes rhinoceros* L. in oil palm, Seluma district, Bengkulu

Ginting, S.* , Djamilah, Pryatiningsih and Gusnitha, F. W.

Department of Plant Protection, Faculty of Agriculture, University of Bengkulu, Indonesia.

*Corresponding Email: sempurnaginting@unib.ac.id

Oil palm production continues to increase as the area of oil palm plantations increases. Seluma is one of the oil palm production centers in Bengkulu, which is located in the wet tropical region directly bordering the Indian Ocean. One of the main pests on oil palm plants is *Oryctes rhinoceros*, this pest can cause attacks on immature and mature plants. The use of ferotrap can control *O. rhinoceros* beetles. However, information regarding *O. rhinoceros* attacks oil palm has not been reported in Bengkulu. This study aims to calculate the intensity of the *O. rhinoceros* attack and find out the effectiveness of pheromone traps *O. rhinoceros* on oil palm in Seluma Regency, Bengkulu. Sample plants were determined by systematic sampling at each research location (1. Tanjung Seluai Village, South Seluma subdistrict, Bengkulu. 2. Riak Siabun Village, Suka Raja subdistrict, Bengkulu, and 3. PT. Sandabi Indah Lestari, Lujuk Village, West Seluma sub-district, Bengkulu). The observation variables were the population of *O. rhinoceros* beetles, the percentage of attacks, and the intensity of attacks by *O. rhinoceros* beetles. The results of the research showed that the percentage of attacks against the beetle *O. rhinoceros* was highest in oil palm plantations in Tanjung Seluai Village was 10.53% with an attack intensity was 12.33%, then in Riak Siabun Village the percentage of attacks was 3.09% with an attack intensity was 4.67 % and on oil palm plantations at PT. Sandabi Indah Lestari had no attacks. The lowest average population of *O. rhinoceros* beetles was 4.67 individuals/ha/2 months in Tanjung Seluai Village, and 7 individuals/ha/2 months in PT. Sandabi Indah Lestari and the highest was 7.67 individuals /ha/2 months in Riak Siabun Village.

Keywords: Attack, Ferotrap, Intensity, Oil palm, Pests

***In Vitro* propagation of turmeric (*Curcuma longa* Linn.) using Murashige and Skoog (MS) media supplemented with varying concentrations of Thidiazuron (TDZ)**

Temanel, F. B.^{1*}, Alipio-Ayaban, L. B.², Sacayanan, A. S.³ and Aquino, J. C.¹

¹Department of Biological Sciences, College of Arts and Sciences, Isabela State University – Main Campus, Echague, Isabela, Philippines; ²Benguet State University, La Trinidad, Benguet, Philippines; ³Research Department, Isabela State University – Main Campus, Echague, Isabela, Philippines.

*Corresponding Email: florenda.b.temanel@isu.edu.ph

Turmeric (*Curcuma longa* Linn.) is a valuable spice and medicinal herb with growing demand worldwide. In vitro propagation techniques offer a promising opportunity for enhancing turmeric cultivation by providing a controlled environment for mass production of planting materials. Thidiazuron (TDZ), a plant growth regulator, has shown potential for improving in vitro propagation efficiency in various plant species. This study investigates the use of Thidiazuron (TDZ) as a supplement to Murashige and Skoog (MS) media for the in vitro propagation of turmeric (*Curcuma longa* Linn.). The study aimed to determine the optimum concentration of TDZ to facilitate efficient in vitro propagation of turmeric. Results showed that supplementing the MS medium with TDZ at levels ranging from 1.0 to 2.5 mg/L of water can result in higher bud proliferation, optimal shoot fresh weight, and higher stem girth in the in vitro-grown turmeric. Moreover, adding TDZ in media ranging from 0.01 to 2.5 mg/L of water promotes longer shoot length, a higher number of leaves, and a greater leaf area in the in vitro-grown turmeric. However, higher TDZ concentrations led to fewer but longer roots. Hence, TDZ can facilitate shoot and root regeneration in turmeric during in vitro propagation, providing several advantages for commercial production.

Keywords: Root regeneration, Plant growth regulators, Explant inoculation, Bud initiation, In vitro Shoot regeneration, Micropropagation

Optimum potassium fertilizer rate for growth, biomass yield, and fuel properties of *Leucaena (Leucaena leucocephala)* cv. Tarramba in sandy soil

Nitthaisong, P.¹, Thupwong, K.², Tonmukayakul, N.², Utharapan, J.², Chaisan, T.², Rungmekarat, S.², Tudsri, S.² and Chotchutima, S.^{2*}

¹Department of Plant Production Technology, School of Agricultural, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand; ² Department of Agronomy, Faculty of Agriculture, Kasetsart University, Bangkok, 10900, Thailand.

*Corresponding Email: fagsyc@ku.ac.th

The application of fertilizer plays an important role in enhancing growth of leucaena plantations in sandy soil where exchangeable potassium is insufficient (<9 ppm). This experiment aimed to evaluate the effect of the application of potassium fertilizer on the growth, biomass yield, and fuel properties of *Leucaena (Leucaena leucocephala)* cv. Tarramba for use as a fuel crop. The experiment was arranged in a randomized complete block design (RCBD) with four replications and was conducted at the Buriram Livestock Research and Testing Station, Pakham district, Buriram Province, Thailand. Treatments consisted of five potassium application rates: 0 (control), 93.75, 187.5, 375 and 750 kg ha⁻¹. The results showed that the 187.5, 375 and 750 kg ha⁻¹ application rates increased plant height and stem diameter, while the control (0 kg ha⁻¹) showed a potassium deficit, resulting in stem dieback. High leaf, branch, and stem yield were found at application rates greater than 93.75 kg ha⁻¹, while plant height, stem diameter and biomass yield were slightly further increased in the 187.5, 375 and 750 kg ha⁻¹ treatments. In the case of fuel properties, the potassium application rate did not affect the heating value and ash content, but it did decrease the N and S contents. The potassium content tended to increase with increasing potassium application rate. However, the leucaena wood under all the treatments had suitable fuel properties for use as a fuel crop.

Keywords: Leucaena, Potassium fertilizer, Biomass yield, Fuel properties, Sandy soil

The screening of soybean drought tolerant using Polyethylene Glycol 6000 at Entisol of Bengkulu Coastal Land

Romeida, A.¹, Pujiwati, H.¹, Sutrawati, M.², Marlin¹, Herawati, R.¹, Ganefianti, D. W.¹, Saputra, H. E.¹ and Supanjani¹

¹Departement of Crop Production, Faculty of Agriculture, The University of Bengkulu, Indonesia; ²Departement of Plant Protection Faculty of Agriculture, The University of Bengkulu, Indonesia.

*Corresponding Email: supanjani@unib.ac.id

The result of the experiment showed that tested four soybean varieties (Anjasmoro, Dering 1, Devatra 2 and Grobogan) and the concentrations of PEG 6000 (0% control, , 5% 10 %, 15% and 20%) did not interact in affecting the number of flowers and the number of pods. Soybean varieties varied in their tolerance to drought stress at Entisol. Based on all observed both vegetative and generative growth variables, the order of drought tolerance of soybean varieties (from the most to the least tolerant) were Anjasmoro, Dering 1, Devatra 2, and Grobogan. Increasing the concentration of PEG 6000 to the highest one of 20%, constantly reduced the vegetative and generative growths (plant height, number of leaves, number of flowers and number of soybeans pods). The predicted effective dose selection of PEG 6000 for soybean drought tolerant was 19.50%; it reduced yields up to 50%.

Keywords: Coast, PEG, Plant stress, Varieties

Plant regeneration of *Dimocarpus longan* var. *obtusus* Leenh. by tissue culture technique

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

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

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

In this study, we established a regeneration system of *Dimocarpus longan* var. *obtusus* Leenh. They were using seeds and nodal segments as explants. The effect of different sterilizing agents with various concentrations and duration times was that seeds were cultured on a Murashige and Skoog (MS) solid medium without adding plant growth regulators (PGRs). The minimum contamination percentage (25%) was recorded in the experiment using 0.2% mercuric chloride (HgCl₂) for 20 min, which was observed to be 50% germination rate after 2 weeks of culture. The maximum germination rate (68%) was obtained on Murashige and Skoog (MS) solid medium supplemented with 1.0 mg/L 6-benzylaminopurine (BAP), giving a shoot length of 48.00 mm. and root length of 31.40 mm. The optimal condition of nodal segment sterilization was recorded in the experiment using 0.1% mercuric chloride (HgCl₂) for 10 min, which gave 80% of survival explants. For shoot induction, it was worked on MS solid medium with 0.5 mg/L 6-benzylaminopurine (BAP) that induced the highest average length of 11.31 mm. The highest root formation frequency (50%) and root length (3.0 mm) were achieved on MS medium containing 2.0 mg/L indole-3-butyric acid (IBA). The plantlets were acclimatized and established in soil.

Keywords: *Dimocarpus longan* var. *obtusus* Leenh., Plant induction, Seed germination

Comparative effects of drought stress on growth and yield components of Riceberry and KDML 105 rice varieties

Sehawong, W.^{1*}, Samran, A.², Saiyod, P.², Subepang, S.¹ and Chotchutima, S.³

¹Department of Agricultural Technology, Faculty of Liberal Arts and Science, Sisaket Rajabhat University, Mueang Sisaket District, Sisaket Province 33000, Thailand; ²Department of Research and Development, Kao Industrial (Thailand) Co., Ltd., Chonburi Province 20000, Thailand; ³Department of Agronomy, Faculty of Agriculture, Kasetsart University, Chatuchak, Bangkok 10900, Thailand.

*Corresponding Email: wimonsirisehawong@gmail.com

This study evaluated the effects of different water levels (1,000, 3,000, 5,000, and 7,000 mL per 10 days) on growth and yield components in two rice varieties, KDML 105 and Riceberry. Key parameters assessed include stem height, tiller number, hill width, panicle length, and grain yield. KDML 105 exhibited the greatest stem height (89.33 cm) at 7,000 mL, while Riceberry reached 69.67 cm. Riceberry produced more tillers per hill (29.78) compared to KDML 105 (22.96 tillers). KDML 105, however, outperformed Riceberry in grain production, with a maximum of 124.67 grains per panicle and a higher 100-seed weight, reaching 30.36 g. KDML 105 also demonstrated significantly higher fresh and dry biomass. In contrast, Riceberry showed greater water use efficiency (WUE) through superior soil moisture retention at all water levels. The study concludes that KDML 105 is more suitable for water-abundant environments due to its higher growth and yield potential, while Riceberry's conservative water use makes it better adapted to drought-prone conditions. These findings provide valuable insights for optimizing irrigation strategies and selecting appropriate rice varieties for varying water management practices.

Keywords: Riceberry, KDML 105, Drought, Rice

The Growth and Yield of Second-Generation of Shallot Mutants Caused by Gamma-Ray Irradiation (*Allium cepa* var. *Aggregatum*)

Marlin*, Simarmata, M., Romeida, A., Herawati, R., Masdar, M. and Sivarabbila, M.

Departement of Crop Production, Faculty of Agriculture, University of Bengkulu, Indonesia.

*Corresponding Email: marlin@unib.ac.id

The objective of this study was to evaluate the diversity of the second generation of shallot mutants through physical irradiation using gamma-rays. The research was conducted in the experimental station of the Agriculture Faculty, the University of Bengkulu, at an altitude of 10 meters above sea level (3°45'44" S; 102°16'45" E). The experiment was evaluating the characteristics of shallot mutants arranged in a completely randomized design (CRD) with three replications. The planting material consisted of bulbs from the first-generation mutation (MV1) gamma-irradiated at doses of 0, 25, 50, 75, 100, and 125 Gy. Each replication consists of 10 sample plants. Fertilization was applied at planting time using Urea, SP-36, and KCl at 200, 150, and 110 kg/ha, respectively, along with liquid organic fertilizer (10 ml/L). The data collected were the morphological characteristics of plant growth and yield. The data were analyzed statistically by ANOVA at a 5% level, followed by an LSD test at a 5% level. The results showed that gamma-ray irradiation affected the growth and yield of a second-generation of shallot plants. Irradiation treatment with a dose of 100 Gy increased the number of leaves, with the highest number being 21.9 leaves. Irradiation treatment with a dose of 125 Gy increased the number of stomata, with a maximum number of 37.7 stomata. However, the untreated plant showed a maximum height and length of the umbel stalk of 44.2 and 56.8 cm, respectively.

Keywords: Cobalt-60 energy, Gamma-ray irradiation, Mutant generation, Mutation breeding

Morphological diversity of banana accessions collected from Bengkulu Province, Indonesia

Nur'Aini, H.* , Chozin, M., Romeida, A. and Budiyanto

Faculty of Agrucultural, University of Bengkulu, Indonesia.

*Corresponding Email: hestinuraini@unived.ac.id

Bengkulu Province has banana germplasm with diverse appearance and potential benefits. However, a closer look at the characteristics of each germplasm has not been conducted. Explorations conducted in the lowlands, midlands and highlands from 3 transects aimed to evaluate the pattern of morphological character diversity and the degree of similarity between banana germplasm in Bengkulu Province, Indonesia. Observations were made on 13 characters of fruiting plants. Principal component analysis (PCA) was used to evaluate the pattern of diversity among characters and cluster analysis to group the accessions obtained based on 3 principal components (PC). PCA revealed that the three components (PCs) explained 44.5% of the variability of the 79 accessions collected. PC1 is characterized by pseudostem height, leaf blade length and peduncle length PC2 is characterized by pseudostem colour, bract apex shape, number of fruits and fruit length while PC3 is characterized by peduncle length, fruit position, fruit length and immature fruit peel colour. Using the three PCs as the basis for clustering and with a cutoff point of semi-partial R-square of 0.05, the accessions can be classified into 6 groups.

Keywords: Accession, Clustering, Principal component analysis, Transect, Variability

Growth and yield of maize treated with plant-based liquid fertilizers at varying concentrations and frequency of application

Liswanti, I., Chozin, M.* and Sumardi, S.

Department of Agriculture Production, Faculty of Agriculture, University of Bengkulu, Jl. W.R. Supratman, Kandang Limun, City of Bengkulu, Indonesia 38371A.

*Corresponding Email: mchozin@unib.ac.id

Azolla (*Azolla pinnata*), water lettuce (*Pistia stratiotes*), and banana peel are known to contain nutrients that can serve as an environmentally friendly fertilizer. The objective of the study was to compare the growth and yield of maize foliar fertilized with liquid fertilizer prepared from extracts of *Azolla*, water lettuce, and banana peel with different concentrations and frequency of application. A factorial experiment involving the concentrations of the mixture of the extracts of three plant materials (control, 10, 20, and 30%) and the frequency of application (2, 4 and 6 weeks after planting) was arranged on a randomized complete block design with three replications. The control treatment was soil fertilization of Urea 200 kg/ha, Sp36 150 kg/ha, and KCl 100 kg/ha. Currently, the data collection is underway, and the findings will be presented on both conference presentation and full paper.

Keywords: Foliar spray, Grain yield, Leachate, Macro nurients, Plant growth

SESSION 10: ANIMAL BIOTECHNOLOGY

Transformation of waste to wealth from cow dung

Manikandan, P.

2, 6th Street, 1st cross, Surendra Nagar, Adambakkam, Chennai – 600088, India.

*Corresponding Email: Preetha.manikandan@gmail.com

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

Overcoming summer infertility in water buffaloes in the Philippines using double PGF2a in a 7-day cidrsynch timed artificial insemination

Maylem, E. R. S.^{1*}, Ablaza, N. F.², Atabay, E. P.¹ and Atabay, E. C.¹

¹Reproduction and Physiology Section, Philippine Carabao Center National Headquarters and Genepool, Science City of Muñoz, Nueva Ecija, Philippines; ²Animal Breeding and Genomics Section, Philippine Carabao Center National Headquarters and Genepool, Science City of Muñoz, Nueva Ecija, Philippines.

*Corresponding Email: ersmaylem@gmail.com; excelrio.maylem@pcc.gov.ph

Water buffaloes often have seasonal reproductive activity, and they may experience a decrease in fertility during the summer months due to factors such as temperature, photoperiod, and nutrition. This seasonal breeding pattern significantly impacts the farm's production of calves and milk, as well as its overall economic viability. The focus of this research is to create a specialized breeding program tailored to the summer conditions in the Philippines, with the goal of improving artificial insemination (AI) conception rates and, consequently, increasing calf and milk production. During the summer months (March to June), there is a decrease in luteal function or an increased occurrence of persistent corpus luteum, which can contribute to decreased fertility in the cows. To address this issue, a timed artificial insemination (TAI) technology focusing on luteolysis was employed. The water buffaloes were synchronized using CIDR + GnRH on Day 0, followed by CIDR removal + PGF2a injection on Days 7 and 8, and finally, hCG injection and AI on Day 10. The summer protocol involved a double PGF2a injection on days 7 and 8 of the treatment and was compared to the single PGF2a injection (control protocol) on day 7 alone. The results from the PCC Genepool farm showed that, in 2023, using the summer protocol, the conception rate was 52.63% (10/19) compared to 27.27% (3/11) in the control group. In 2024, utilizing the summer protocol alone, the conception rate increased to 57.14% (20/35). To assess the contribution on overall milk production on the farm, after 11 months of gestation since the summer of 2023 (February to June 2024), the % milk production per cow per day ranged from 52% to 56.61%, with 5.16 to 5.45 liters of wet milk, compared to 47.19% to 54.37% and 2.62 to 3.0 liters,

respectively, in 2023. The use of the double PGF2a injection helped increase the AI conception rate during the summer, subsequently leading to a rise in the volume of milk production. The development of a reproductive TAI protocol specific to the summer conditions allow the farm to produce more calves and a higher volume of milk year-round, consequently promoting sustainable livestock production.

Keywords: Water buffalo, Summer, Infertility, Conception rate, Milk production

Effect of supplemented liquid pigments in the diet on growth performance and body skin color of Jewel cichlid (*Hemichromis lifalili*) fish

Chunwijitra, S.¹, Sivapirunthep, P.², Kaewdang, C.², Jamjaksu, D.², Panchimplee, M.¹, Waesulong, I.¹, Taboonpong, K.¹, Noidad, S.¹, Chaosap, C.^{2*}, Patthararangarith, P.² and Srisuwon, C.²

¹Green Nutrition Co., Ltd. 1/37 Moo 8, Banglen, Bangyai, Nonthaburi 11140, Thailand; ²Department of Agricultural Education, Faculty of Industrial Education and Technology, KMITL, Bangkok, 10520, Thailand.

***Corresponding Email:** chanporn.ch@kmitl.ac.th; sawankamol.greennutrition@gmail.com

The weight, average daily gain (ADG), and body skin color values of Jewel cichlid (*Hemichromis lifalili*) fish were measured on the 0, 30, 60, and 75 days of the experiment. The fish received liquid feed for the first 60 days and no supplementary feed from day 61 to 75. The body weight and ADG of fish raised for 0-30, 0-60, and 0-75 days did not show statistically significant differences ($p < 0.05$). However, it was found that fish fed with the supplemented different pigments had different L* and a* values at each stage of the experiment, i.e. when fish were fed with diets containing natural capsanthin and synthetic astaxanthin for 60 days, the L* and a* color values were higher than those of the other groups. The L*, and a* values were lowered after the liquid pigment's supplementation was withdrawn.

Keywords: Astaxanthin, Canthaxanthin, Capsanthin, Fish body skin color, Ornamental fish

Meta-analysis of dietary supplementation with hemp products (*Cannabis sativa* L.) in broiler chicken: performances, blood profiles, intestinal morphology, and meat physicochemical parameters

Sopian, Y.^{1*}, Pirompu, P.², Patthararangarith, P.³, Sivapirunthep, P.³ and Chaosap, C.³

¹Doctoral Program in Innovative Tropical Agriculture, School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Sungroup Company, Thailand 1/97-98 Phaholyothin Soi 40, Senanikom, Jathujak, Bangkok 10900 Thailand; ³Department of Agricultural Education, School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

***Corresponding Email:** yusupsopian31@gmail.com

Hemp products (hemp seed, hemp cake, hemp oil) have received more attention since the legalization of Hemp (*Cannabis sativa* L.) in many countries. Several studies have evaluated their potential as an alternative feedstuff in broiler production. This meta-analysis aimed to explore the effect of dietary hemp products on broiler performances, blood profiles, intestinal morphology, and meat physicochemical parameters. Fourteen publications were retrieved from several databases, including Scopus, PubMed, and Google Scholar search engines. The obtained data were analyzed using OpenMEE software. The data were analyzed using random effect models, and the results were presented as standardized mean difference (SMD) at 95% confidence intervals. The pooled results showed that dietary hemp products reduced plasma triglycerides (SMD = -2.263; $P < 0.01$), cholesterol

(SMD = -1.239; $P < 0.05$), and low-density lipoprotein (SMD = -5.711; $P < 0.01$), whereas the plasma high-density lipoprotein (SMD = 3.193; $P < 0.01$) and jejunal villus height (SMD = 4.536; $P < 0.01$) were increased. However, broiler performances (average daily feed intake, body weight, feed conversion ratio) and meat physicochemical parameters (pH, lightness, redness, yellowness, crude protein, and ether extract) were not significantly affected. Therefore, the study indicated that dietary hemp products in broiler chicken could improve blood profiles and gut health, suggesting their potential as an alternative feedstuff in broiler production.

Keywords: Cholesterol, High-density lipoproteins, Low-density lipoproteins, Villus height

Meta-Analysis of multi-strain bacterial probiotic supplementation on growth performance of post-weaning piglets

Sahatsanon, K.¹, Chaosap, C.^{1*}, Sivapirunthep, P.¹, Sopian, Y.¹, Pirompu, P.², Patthararangarith, P.¹ and Limsupavanich, R.³

¹Department of Agricultural Education, School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand; ²Sungroup Company, 1/97-98 Phaholyothin Soi 40, Senanikom, Jathujak, Bangkok 10900, Thailand; ³Department of Animal Production Technology and Fishery, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

*Corresponding Email: chanporn.ch@kmitl.ac.th

The meta-analysis showed that multi-strain bacterial probiotic supplementation significantly improves the performance of piglets after weaning. The probiotic-treated groups demonstrated a significant increase in average daily gain (standardized mean difference, SMD = 1.11, $P < 0.001$) and average daily feed intake (SMD = 0.81, $P < 0.001$) compared to control. Feed conversion ratio was also significantly reduced in the supplemented piglets (SMD = -1.89, $P < 0.001$). These results indicate that supplementing with multi-strain probiotics can significantly enhance the growth performance of piglets after weaning.

Keywords: Average daily gain, Body weight, *Lactobacillus* spp.

Plant essential oils, trans-anethole and eugenol, for housefly knockdown and mortality

Passara, H.^{1*}, Sinthusiri, J.², Soonwera, M.¹, Thongsaklaing, T.³, Sittichok, S.¹, Mounghipmalai, T.⁴, Puwanard, C.⁴ and Jintanasirinurak, S.⁵

¹Office of Administrative Interdisciplinary Program on Agricultural Technology, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ²Community Public Health Program, Faculty of Public and Environmental Health, Huachiew Chalermprakiet University, Samut Prakan, 10540, Thailand; ³Faculty of Agriculture, Princess of Naradhiwas University, Naradhiwas, 96000, Thailand; ⁴Department of Plant Production, School of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520, Thailand; ⁵Department of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus, Chumphon, 86160, Thailand.

*Corresponding Email: hataichanok.pa@kmitl.ac.th

We measured the knockdown and mortality of some compounds from natural oils (trans-anethole, eugenol and a combination of trans-anethole and eugenol) against adult houseflies (*Musca domestica*) compared with cypermethrin. The knockdown and mortalities were highest at 100% of 1% trans-anethole with $KT_{50} = 31$ min and $LT_{50} = 31$ min. The mortality index of trans-anethole was 82.1 times that of cypermethrin. In contrast, 1% eugenol had knockdown, and mortality was 36% and 0.5% trans-

anethole + 0.5% eugenol had knockdown and mortality of 68%, with mortality indexes of 1.6 and 3.2 times versus cypermethrin. The trans-anethole high toxicity and low residue made it a superior control for houseflies.

Keywords: Plant essential oils, Trans-anethole, Knockdown, Mortality, *Musca domestica*

Effect of phytobiotics from Yanang (*Tiliacora triandra*) leaf extract containing *Pediococcus acidilactici* V202 product (PYLEPP) supplementation in diets on *in vitro* prediction of true nutrient digestibility and cecal fermentation by broiler microbiota

Nopparatmaitree, M.^{1*}, Hwanhlem, N.¹, Thongnum, A.² and Incharoen, T.¹

¹Division of Animal Science and Feed Technology, Department of Agricultural Science, Faculty of Agriculture, Natural Resources and Environment, Naresuan University, Phitsanulok, 65000, Thailand; ²Department of Animal Science and Fishery, Faculty of Sciences and Agricultural Technology, Rajamangala University of Technology Lanna (Phitsanulok Campus), Phitsanulok, 65000, Thailand.

*Corresponding Email: Nopparatmaitree_m@silpakorn.edu

The term "Phytobiotics" refers to advanced formulations that integrate the synergistic effects of synbiotics and phytobiotics. *Pediococcus acidilactici* V202 is a notable lactic acid bacterium and has shown considerable potential as a probiotic for livestock due to its ability to improve gut microbiota and enhance feed efficiency. Yanang (*Tiliacora triandra*) is a medicinal herb renowned for its rich content of phytochemicals, beta-carotene, antioxidants, xylooligosaccharides, gums, and vitamins. This research aimed to evaluate the effects of a Phytobiotics product derived from Yanang leaf extract, containing *Pediococcus acidilactici* V202 (PYLEPP) on *in vitro* predictions of true nutrient digestibility and cecal fermentation by broiler microbiota. The experimental design involved a corn-soy diet supplemented with 0 (control), 5, 10, 20, or 40 g/kg of PYLEPP. *In vitro* assessments were conducted to determine true nutrient digestibility and probiotic viability using a two-step enzymatic approach with pepsin and pancreatin incubation. Additionally, batch culture fermentation of cecal contents was carried out under anaerobic conditions at 42 °C for 24 hours. Gas production was monitored at 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, and 24 hours, and short-chain fatty acids (SCFAs) were quantified at the 6-hour mark using gas chromatography. Probiotic viability was assessed using the total plate count (TPC) method. The results indicated that the inclusion of PYLEPP significantly enhanced *in vitro* predictions of true nutrient digestibility and probiotic viability compared to the control group following pepsin and pancreatic digestion ($P < 0.05$). Furthermore, the kinetic parameters of degradation (P, a, b, and c) were significantly improved in the PYLEPP-supplemented groups ($P < 0.05$). PYLEPP groups demonstrated a significant increase in propionic and butyric acid concentrations ($P < 0.05$), suggesting potential benefits for gut health. Additionally, the PYLEPP groups showed significantly higher populations of lactic acid bacteria and *Enterococcus* ($P < 0.05$) and decreased *Salmonella* sp. and *E. coli* content ($P < 0.05$).

Keywords: Phytobiotics, Yanang, *Pediococcus acidilactici*, *In vitro* prediction, Digestibility

Optimization of phytocannabinoid extraction from hemp (*Cannabis sativa* L.) with decarboxylation-based crude palm kernel oil and its potential as an energy supplement product for suckling piglets

Kongkeaw, A., Charoensook, R., Incharoen, T., Hwanhlem, N. and Tartrakoon, W.*

Division of Animal Science and Feed Technology, Department of Agricultural Science, Faculty of Agriculture, Natural Resources and Environment, Naresuan University, Phitsanulok 65000, Thailand.

*Corresponding Email: wandecta@nu.ac.th

This study aimed to determine the optimal conditions for extracting phytocannabinoids from *Cannabis sativa* L. (hemp) using medium-chain triglyceride (MCT) oil and to evaluate the potential of these extracts as energy supplements for suckling piglets. In the first experiment, a 2x2 factorial in a completely randomized design (CRD) was used to assess the effects of different hemp parts (leaves and roots) and MCT oil types (purified palm kernel oil [PPKO] and crude palm kernel oil [CPKO]). The combination of 6% hemp leaves with CPKO, and decarboxylation for 4 hours at 110 °C, yielded the highest total phenolic content (TPC) (48.34 mg GAE/g DW), total antioxidant capacity (TAC) (25.65 mg GAE/g DW), DPPH assay (26.48%), ABTS assay (46.40%) and FRAP assay (38.33%) (P<0.01). In the second experiment, a 3x5 factorial design in CRD was utilized to investigate the optimal hemp leaves to CPKO ratio (6%, 12%, and 18%) and duration of decarboxylation (0, 2, 4, 6, and 8 hours). The most effective conditions were found to be 12% hemp leaves in CPKO with a 6-hour heating period, resulting in the highest TPC (57.38 mg GAE/g DW), DPPH assay (34.43%), ABTS assay (64.33%) and FRAP assay (53.18%) (P<0.01). The extract also contained 0.016% cannabidiol (CBD), 0.015% cannabidiolic acid (CBDA), 0.029% total cannabidiol, along with 54.50% medium chain fatty acids, 47.09% lauric acid, 96.48% total fat, and a gross energy content of 8,813 kcal/kg. In the third experiment, an MCT emulsion with phytocannabinoids and lauric acid highly concentrated (EMPL prototype product) was orally administered to 70 newborn piglets, with a control group receiving the antibiotic (Toltrazuril). The EMPL group showed significantly higher average weight (2.00 kg), average daily gain (ADG) (132.59 g/piglet/day), and milk intake (552.01 ml/piglet) at days five post-birth compared to the control group (P<0.01). These findings indicate that 12% hemp leaves extract in CPKO, heated for 6 hours at 110 °C increases antioxidant and phytocannabinoid content, improves piglet growth performance and milk intake, supporting its potential as an energy supplement for suckling piglets.

Keywords: Antioxidant potential, Decarboxylation, Chemical composition, Fatty acid, Suckling piglets

Effect of different diets on growth performance and carcass characteristics of Nu Phuk (*Bandicota indica*) raised under a circle cement pond

Thip-uten, S.¹, Jitjak, T.¹, Saensri, P.¹, Kaewsena, T.¹, Muangkhot, W.¹, Thip-uten, T.², Butrlakorn, C.³, Mingjaidee, M.³ and Subepang, S.^{4*}

¹Department of Animal Science, Faculty of Agricultural Technology, Sakon Nakhon Rajabhat University, Mueang Sakon Nakhon District, Sakon Nakhon Province, Thailand; ²Department of Fishery Science, Faculty of Agricultural Technology, Sakon Nakhon Rajabhat University, Mueang Sakon Nakhon District, Sakon Nakhon Province, Thailand; ³Ban Muang Subdistrict Administrative Organization, Ban Muang District, Sakon Nakhon Province, Thailand; ⁴Department of Animal Science, Faculty of Liberal Arts and Science, Sisaket Rajabhat University, Mueang Sisaket District, Sisaket Province, Thailand 33000.

*Corresponding Email: sayanneng@gmail.com

The results showed that growth performance, chemical composition, fatty acid profile, and amino acid profile in edible meat were significant different (P<0.05) but, carcass traits were no significant different

($P > 0.05$). In conclusion, edible meat of Nu Phuk (*Bandicota indica*) was abundant essential fatty acid and essential amino acid, thereby promoting future food, end hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Keywords: Amino acid, Animal feed, Carcass, Fatty acid, Rat meat

Effect of milk thistle with artichoke or ginkgo leaves extract on growth performance and carcass characteristics in broilers

Janrong, S., Tumvijit, N. and Taemchuay, D. *

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

***Corresponding Email:** duangkamol.ta@kmitl.ac.th

The present study was conducted to investigate the effects of milk thistle combined with artichoke or ginkgo leaves extract supplements in drinking water on growth performance, carcass characteristics, and organ weight in broilers. A total of 630 one-day-old broiler chickens (Cobb 500) were randomly divided into 3 groups with 6 replications (35 birds/replication). The control group (C) did not supplement, Treatment 1 (T1) supplemented with milk thistle and artichoke extract 1 ml./L and Treatment 2 (T2) supplemented with milk thistle and ginkgo leaves powder 250 mg/L. The supplements were added to the drinking water every day. Body weight gain and feed intake were recorded and calculated every week. The results showed that both groups (T1 and T2) had a significant decrease the FCR values on days 35 to 42 compared to the control group (C) ($P < 0.05$). However, the growth performance that is shown from the body weight gain (BWG), the feed intake (FI) and the average daily gain (ADG) which tend to increase but still not different from the control group (C). Carcass characteristics were studied by sampling 2 birds at 42 days from each replicate, then slaughtered and weighing the organs. Carcass and organs weight of the chickens in the treatment groups (T1 and T2) were no different from those in the control group (C). Therefore, supplementing this substance in broilers should help adjust the FCR values and improve growth performance.

Keywords: Milk thistle, Artichoke, Ginkgo, Growth performance, Carcass characteristics

Needs for processing career promotion course to add value for freshwater fish farmers in Nakhon Sawan Province

Khrueahong, J. *, Pongsuk, P. and Junlex, P.

Department of Agricultural Education, Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.

***Corresponding Email:** Jamree.k@nsru.ac.th; 65036062@kmitl.ac.th

The objectives were to explore the needs for processing career promotion to add value for freshwater fish farmers in Nakhon Sawan Province, compare the needs to socio-economic attributes to the farmers and develop a training course on freshwater fish processing. A set of questionnaires was used for data collection, administered to 306 freshwater fish farmers in Nakhon Sawan province. The obtained data were analyzed by using descriptive statistics, t-test, and F-test. Results of the study revealed that the respondents needed training course on the following: fish crackers, dried fish strips, sour pickled fish, fish sausage, and fermented fish, respectively. They needed a 1–2-day training course at the training place in the village during the off-season for rice growing. The participants should be around 21-30 persons, and the training program should be informed at least one week in advance. Training activities

should focus on actual practice (91.50%) and the training organizer must be responsible for expenses (99.02%). Each time of the training should have only one topic (\bar{x} = 3.55; S.D. = 1.08). Assessment through observation during the training should be done (\bar{x} = 3.77; S.D. = 0.58) and assessment after the training must be conducted (\bar{x} = 3.75, S.D. = 0.79), For the training session, it should include demonstration (\bar{x} = 4.23, S.D. = 0.67) actual practice (\bar{x} = 4.40, S.D. = 0.61) and diverse use of media (\bar{x} = 4.29, S.D. = 0.68). According to the comparison, there was a statistical difference between the needs for training and the socio-economic attributes of the respondents. The latter included sex, educational attainment, farmer group membership, number of household labor, and debts or sources of loans. A training course for value-added processing of freshwater fish has been developed for future training sessions with farmers.

Keywords: Freshwater fish, Processing career, Farmers, Training course

Effect of supplementing red pigment from *Monascus* sp. fermented native black rice (Maepayathong Dum Rice) on production performance and egg quality in laying hens

Suwanposri, A.¹, Charoensuk, K.², Kongroi, K.³, Wetchagool, N.³, Wetchagool, W.³ and Thipsrirach, S.^{3*}

¹Department of Plant Production and Landscape Technology, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand; ²Department of Business and Food Innovation, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand; ³Department of Animal Production Technology, Faculty of Agro-industrial Technology, Rajamangala University of Technology Tawan-ok, Chanthaburi campus, Chanthaburi, Thailand.

*Corresponding Email: sujitra_th@rmutto.ac.th

This study was conducted to determine the effects of the dietary supplementation of red pigment from *Monascus* sp. fermentation in native black rice (Maepayathong dum rice) on production performance and egg quality of laying hen. A total of 120 hybrid breeds and 28-week-old divided into 4 treatments, with 5 replications of 6 birds each were randomly assigned. Completely Randomized Design was used in this experiment. The experimental diets were control (no red pigment) and supplemented with red pigment at 2, 4 and 6%, respectively. The results indicated that the addition of red pigments led to a deeper-colored yolk compared to the control group, with the highest intensity observed at a 6% red pigments. Furthermore, the addition of red pigments helps to promote the quality of chicken eggs and production performance. This indicates that Maepayathong dum rice could be used as a raw material for producing natural pigments to replace synthetic dyes in egg-laying hen feed.

Keywords: Red pigment, *Monascus* sp., Production performance, Egg quality, Egg yolk

Effect of feeding system on productive performance, nutrient digestibility, and economic return in Brahman crossbred cattle

Subepang, S.¹, Sehawong, W.¹, Wirunphan, P.² and Thip-uten, S.^{3*}

¹Department of Agricultural Technology, Faculty of Liberal Arts and Science, Sisaket University, Mueang Sisaket District, Sisaket Province, Thailand; ²Department of Marketing, Faculty of Business Administration and Accounting, Sisaket Rajabhat University, Mueang Sisaket District, Sisaket Province, Thailand; ³Department of Animal Science, Faculty of Agricultural Technology, Sakon Nakhon Rajabhat University, Mueang Sakon Nakhon District, Sakon Nakhon Province, Thailand.

*Corresponding Email: suwit@snru.ac.th

The study results indicated that the different feeding systems for three groups of Brahman crossbred cattle, such as I) separated feeding group I followed by dried concentrate, SF-RDC; II) separated feeding group II, followed by wet concentrate, SF-RWC; and III) TMR group, did not have a significant impact on animal body weight (including weight gain and average daily gain) and feed conversion ratio of all groups in the overall period. However, the SF-RDC group had the lowest feed cost per gain ($P < 0.05$). The dry matter intake, measured in grams per kilogram of metabolic body weight, was significantly higher in the FTMR-R group than in the other treatment groups. In contrast, the nutrient intake and digestibility in the cattle did not differ significantly among the groups. In the SF-RWC and FTMR-R groups, the net profit (%) was higher than in the SF-RDC group. We conclude that separate feeding of rice straw and dried concentrate may not be practical, as it decreases the net profit percentage.

Keywords: Feeding regime, Feeding trial, Ruminant

Effectiveness of *Chara corallina* ingredients fermented and unferment on growth performance and digestive enzyme activity of giant freshwater prawn (*Macrobrachium rosenbergii* de Man 1879)

Chankaew, W.^{1*}, Bunprab, S.², Srichanan, M.¹ and Ngamphongsai, C.³

¹Rajamangala University of Technology Srivijaya, Thailand; ²Rajamangala University of Technology Isan Surin Campus, Surin, Thailand; ³National Centre for Genetic Engineering and Biotechnology, NSTDA, 12120, Thailand.

*Corresponding Email: Wanninee.c@rmutsv.ac.th

Chara corallina is brittle wort in Division Charophyta. It can be found in freshwater, and it is edible algae. While some season this alga is lower quality for consumption, may be a potential dietary protein which replacement the soybean meal from *C. corallina* for giant freshwater prawn, *Macrobrachium rosenbergii* culture. The aim of this study to the effect of *C. corallina* fermented and unferment at different levels on growth and digestive enzyme activities: protease, lipase, amylase and cellulase in liver of the prawn. The experiment design was the 2x4 factorial in completely randomized design. Factor A consisted of fermented and unferment algae. Factor B included 4 levels algae concentrations (0 %, 7.5%, 15.0%, 30%). After a 12 weeks reared period, the results found the weight gain, specific growth rate, feed conversion ratio, protein efficiency ratio, were not significantly different among the treatment ($p > 0.05$), while the survival rate were significant different ($p < 0.05$). The highest of survival rate were found in the prawn fed by diet containing 30 % fermented algae added. Protease, amylase and cellulose activities in liver were significant different ($p < 0.05$) among treatment. This result concluded that, the soybean meal protein can be replaced with the *C. corallina* fermented and unferment in diet of *M. rosenbergii*.

Keywords: Fermented, Giant freshwater prawn, Growth, Digestive enzyme

Stingless bees collecting pollen in durian orchards, Khao Khitchakut district, Chanthaburi Province

Anutrakunchai, S.¹, Thongkamngam, T.¹, Puramongkon, P.² and Charoensuk, K.^{3*}

¹Department of Plant Production Technology and Landscape, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok Chanthaburi Campus, Chanthaburi, Thailand 22210; ²Department of Agricultural Technology, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok Chanthaburi Campus, Chanthaburi, Thailand 22210; ³Department of Food Innovation and Business, Faculty of Agro-Industrial Technology, Rajamangala University of Technology Tawan-ok Chanthaburi Campus, Chanthaburi, Thailand 22210.

*Corresponding Email: kannikar_ch@rmutto.ac.th

Stingless bees are small social insects that collect nectar and pollen from plants for food and play a crucial role in pollination. In this study, stingless bees from a durian orchard were examined to analyze the pollen they gathered. The results identified two species: *Tetragonula pagdeni* and *Lisotrigona furva*. *T. pagdeni* primarily collected the dominant pollen from nectar-rich flowering plants which were *Asystasia gangetica* (83%), *Tridax procumbens* (65%), and *Wedelia trilobata* (53%). Interestingly, *T. pagdeni* collected the occasional pollen from *Durio zibethinus* (L.) which was “Mon-Thong (1%) and Kradum Thong (1%). Unlike *T. pagdeni*, the smaller *L. furva* focused on various plants and weedy plants with smaller flowers, which, collecting pollen from *A. gangetica* (12-20%), *T. procumbens* (14-18%), *Bougainvillea glabra* (15%), *Gomphrena globosa* (8%), *Eleutheranthera ruderalis* (11%), and *Eleusine indica* (13%), and however, no pollen of *D. zibethinus* was observed. Overall, the study shows that both species adapt their foraging behavior in response to environmental changes, such as El Niño and La Niña, highlighting their resilience and adaptability to survive in varying climatic conditions.

Keywords: Stingless Bees, Pollen, Durian orchards, *Tetragonula pagdeni* and *Lisotrigona furva*