



Book of Abstracts

13th International Conference on Integration of Science and Technology for Sustainable Development 2025 (13th ICIST 2025)

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

30 October – 1 November 2025

Zhejiang Academy of Agricultural Sciences (ZAAS)

Hangzhou, P.R. China

*The 13th International Conference on Integration of Science and Technology for Sustainable Development 2025
(The 13th ICIST 2025)*



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30 October to 1 November 2025

Zhejiang Academy of Agricultural Science (ZAAS)

Hangzhou, P.R. China

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

Organized by

Zhejiang Academy of Agricultural Science (ZAAS)

Association of Agricultural Technology in Southeast Asia (AATSEA)

Research Institute of Modern Organic Agriculture (RIMO), King Mongkut’s Institute of Technology Ladkrabang (KMITL) (Thailand)

Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, (India)

Periyar University, Salem (India)

Rajamangala University of Technology Tawan-ok, Chantaburi Campus (Thailand),

University of Bengkulu, Bengkulu (Indonesia)

CAPS (Circular Agricultural Production System), (Indonesia)

GIAPSA for self-reliance Assoc. (Japan)

National Research Center, Cairo (Egypt)

Padmavani Arts and science college for women Autonomous.Salem (India)

PREFACE



Prof. Dr. Fucheng Lin
President of Zhejiang Academy of Agricultural Sciences

On behalf of the Zhejiang Academy of Agricultural Sciences (ZAAS), it is my great pleasure and honor to extend a warm welcome to all distinguished guests, speakers, and participants of the 13th International Conference on Integration of Science and Technology for Sustainable Development, 2025.

I am deeply grateful to our co-organizer, the Association of Agricultural Technology in Southeast Asia (AATSEA), for its unwavering partnership and dedication in bringing this prestigious conference to life. I would also like to extend special appreciation to the International Organizing Committee and International Advisory Committee for their invaluable guidance and support. Furthermore, I wish to express my sincere thanks to the Local Organizing Committee, supporters, and volunteers for their dedicated efforts in ensuring the smooth organization of this conference.

The key themes of this conference focus on soil, water and environmental conservation, biological diversity, food security/safety and sustainable agriculture. Strengthening international exchanges and cross-regional cooperation in agriculture and biotechnology is essential to jointly foster technological innovation and application aligned with sustainable development goals.

This gathering aims to shape new dynamics and advantages in agricultural science and technology development, promote the iterative upgrading of agricultural technologies, models, and formats, and ultimately contribute wisdom and solutions to global food security and agricultural sustainability.

On this occasion, I am delighted to welcome over 200 researchers, scholars and related practitioners from 19 countries. Your presence underscores the global importance of science and technology in addressing pressing challenges. I look forward to your insightful presentations and vibrant discussions, which will undoubtedly enrich the conference.

Finally, I would like to thank everyone for giving ZAAS the opportunity to host this event. I hope that the inspiration gained here will lead to tangible benefits for future societies and communities. I wish everyone a successful, stimulating, and memorable conference in the beautiful city of Hangzhou, China.

Professor Fucheng Lin
President of Zhejiang Academy of Agricultural Sciences



Hiroyuki Konuma (Ph.D.)
Executive Director GIAPSA, Japan,
Chairman of International Organizing Committee

Ms. Lao Hongwu, General Secretary of ZAAS, China,
Professor Kasem Soyong, President of AATSEA, Thailand,
Distinguished guests, speakers, participants, ladies and gentlemen,

On behalf of the International Organizing Committee and the International Advisory Committee, I have a great pleasure and an honor to welcome you all to the 13th International Conference on Integration of Science and Technology for Sustainable Development.

In this occasion, I wish to express our special gratitude and appreciation to the Zhenjiang Academy of Agricultural Science (ZAAS) for hosting this important international conference here in Hangzhou. We are very pleased that the conference is very well organized and attracted many participants around the globe.

Our special thanks go to the members of the Local Organizing Committee, headed by Professor Fucheng Lin, Director of the Zhenjiang Academy of Agricultural Science (ZAAS) and his able colleagues and staff for their dedicated efforts and hard works in organizing this important gathering.

Today, I am very pleased to meet many participants attending this conference. I would like to extend my deep appreciation to each of more than 200 senior and young scientists from 13 countries who registered and participated either physically onsite or online. I wish to look forward to your valuable contributions and deliberations during this conference.

Dr. Kasem Soyong, we all know that this conference could not happen without your incredible dedication, leadership and passion. Your ability to inspire and engage us has made a significant impact on the successful organization of this conference. I wish to express my sincere gratitude and heartfelt appreciation to you, Dr Kasem Soyong.

I also wish to acknowledge with a special gratitude to the members of the organizing and advisory committee, and to all co-organizers and co-sponsors for their valuable support and collaboration.

Ladies and gentlemen,

Achievement of Sustainable Development Goals (SDGs) by the year 2030 has faced serious challenges in recent past. Now, we have only 5 years left to attain the global goals and, yet the progress has been very slow in some of key important goals and targets, including the goal 2 to end hunger, food insecurity and all forms of malnutrition by 2030. The United Nations (UN) has estimated that 8.2 percent of the global population may have faced hunger in the year 2024 which was slightly improved from that of 8.5 percent in 2023 and 8.7 percent in 2022, yet still far from the goal to attain zero hunger by 2030.

To meet the challenge, importance of food and agriculture sector is obviously clear, and science and technology must play vital roles in advancing modern agriculture and agri-food systems.

At the same time, we need additional efforts in sharing research results and learning from others. We must raise public awareness on the potential benefits of science and technology innovation. We should also advocate their risks and negative consequences. We need to promote dialogue and transformative partnerships actively with all researchers and stakeholders including private sector and civil society. And we are here for these purposes.

Before closing, I sincerely hope that your active participation and deliberation in various sessions, would lead to successful outcomes of the 13th 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

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 Gentlemen,

Association of Agricultural Technology in Southeast Asia (AATSEA) is non-profitable organization which established in 2011. AATSEA has been supported and accepted the membership, especially the members of senior and young scientists from many countries e.g. Thailand, Vietnam, Indonesia, Philippines, Malaysia, Laos, Myanmar, Cambodia, India, Pakistan, Bangladesh, Sri Lanka, Finland, China, Russia, Estonia, Egypt, Turkey, Iran, Japan, Republic of Korea, UK, USA, Germany, Boswana, Uganda, Nigeria etc.

AATSEA activities have been performed as follows: -

1. International Journal of Agricultural Technology (IJAT) since 2005 which indexed in SJR-Scopus, CABI, CAS, ACI and TCI.
2. AATSEA is active in a variety of training programs for sustainable development in agriculture especially modern organic agriculture.
3. The International Conference on Integration of Science and Technology for Sustainable Development (I-C-I-S-T) has started to organize since 2012; as said in Thailand (2012, 2013), Laos (2014), Vietnam (2015), Myanmar (2016), Philippines (2017), Indonesia (2018), China (2019), Thailand (2020 and 2021), India (2022-23), Thailand (2024) and China (2025)
4. Offering AATSEA Outstanding Leadership Awards in Agriculture
5. Offering AATSEA Scholarships for training research scholars, Masteral and Doctoral degrees in Modern Organic Agriculture
6. AATSEA has built up a Research Laboratory in Biotechnology for modern organic agriculture.
7. AATSEA has built up a Model of Modern Organic Farm and Training Center

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

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

1. Egypt: National Research Center (NRC), Cairo, 27 November 2018
 2. India:
 - 2.1 Periva University, Salem, 13 November 2019
 - 2.2 Sathyabama Institute of Science and Technology, Ippaiar Nagar, Chennai, 3 March 2021
 - 2.3 PADMAVANI Arts and Science College for Woman (Autonomous), Department of Life Sciences (Biology, Biotechnology, Microbiology, Zoology) 11 July 2025
 - 2.4 SRM Institute of Science and Technology Tiruchirapalli, SRM Nagar, Tiruchirapalli, Tamil Nadu, India (11 July 2025)
 3. Indonesia: Bengkulu University, Bengkulu (5 April 2021).
 4. Thailand
 - 4.1 Rachmangala University of Technology Tawon-ok (MUTTO), 26 November 2020
 - 4.2 Northern Institute of Vocational Education on 29 January 2021
 - 4.3 Rambhai Barni Rajabhat University (Thailand), 2021
 - 4.4 Earthsafe Foundation for organic certification, 13 October 2022
 5. Japan: General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA) in 2021
 6. Philippines: CATHOLIC MING YUAN COLLEGE, Negros, Philippines in 2025
 - 6.1 Catanduanes State University (18 May 2013)
 - 6.2 Arora State College of Technology (23 July 2025)
 7. Republic of Korea (South Korea)
 - 7.1 JAN153 Biotech Inc., Buk-gu, Gwangju, South Korea (Jin-Cheol Kim)
 - 7.2 EcoBizNet Inc., Gangwon-do, South Korea (Jeong-Sub Cho)
 - 7.3 MICROZYME Inc., Jeollanam-do, South Korea (Young Kun Shim)
 - 7.4 GLOBAL AGRO Co. Ltd., Seoul, South Korea (Donglion Kim)
 8. Vietnam
 - 8.1 Danang Biotechnology Center, Danang (DBC), Vietnam (18 November 2024)
 - 8.2 Vietnam Federation of Agriculture and Rural Development Association (VFARDA) 17 October 2025
 - 8.3 Institute of Scientific Research and Applications, Hanoi Pedagogical University 2 (HPU2), Vietnam, 18 October 2025
 9. Uganda: UGANDA Buddhist Center, Uganda (2 July 2025)
 10. Laos Plant Protection Center and Clean Agriculture Standard Center, Lao PDR (8 July 2025)
 11. China: Zhejiang Academy of Agricultural Sciences (ZAAS), Hangzhou, China (11 May 2023)
March 19, 2025, Framework Agreement for Jointly Constructing Laboratory
 - 11.1 AATSEA and Ningxia Xianzhiyuan Supply Chain Technology Co. Ltd., China, Arab State-China Economic and Trade Cooperation Center
 - 11.2 AATSEA and Hebei Kangxin Plant Capsule Co. Ltd., Arab State-China Economic and Trade Cooperation Center
 - 11.3 AATSEA and Institute of Chemistry Henan Academy of Sciences, Hebei Kangxin Plant Capsule, Arab State-China Economic and Trade Cooperation Center
- By years, I would like to give my special thanks to co-organizers: King Mongkut's Institute of Technology Ladkrabang (KMUTL, 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), 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) and others.

The 13th International Conference on Integration of Science and Technology for Sustainable Development 2025 (13th ICIST 2025) with the theme “Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture” during 30 October to 1 November 2025 held at Zhejiang Academy of Agricultural Sciences (ZAAS), Hangzhou, China.

Today, it is organizing one day conference in 31 October 2025 at ZAAS, Hangzhou, China with a total of 160 papers for presentation in 10 parallel sessions, and 9 Keynote speakers from 18 countries; Bangladesh, Botswana, China, Egypt, Finland, India, Indonesia, Iran, Japan, Laos, Philippines, Russia, Republic of Korea, Singapore, Sri Lanka, Thailand, Vietnam and USA. The conference is included a post conference program to visit research station of ZAAS, Hangzhou on 1 November 2025.

Furthermore, I would like to acknowledge with sincerely thanks to all committees, members, co-organizers and all participants to help our conference successful and special congratulates to all AATSEA Awardees to deserve the individual to contribute their experience with sacrifice work to build up the environment and the society. I deserve to thank the AATSEA committee and members, advisory committee, International and local organizing committee, to make this conference completely success.

If there is anything wrong and error management during the conference. I would like to apologize and take responsible to all mistakes. I will be very appreciated to accept all comments, recommendation, and suggestion to improve in the next conference.

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

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

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

Best Regards,

Prof. Dr. Kasem Soyong
AATSEA President



Ref. No.03.1/2025

Date: 24 March 2025

Title: The organizing committee for the 13thICIST2025

To Whom it may concerns:

AATSEA will organize the 13th International Conference on Integration of Science and Technology for Sustainable Development 2025 (13th ICIST 2025) with the theme “Soil, water and environmental conservation, biological diversity, food security/ safety and sustainable agriculture” during 30 October to 1 November 2025 at Zhejiang Academy of Agricultural Science (ZAAS), Hangzhou, P.R. China, Hangzhou, China.

Withthis, the organizers are **Zhejiang Academy of Agricultural Sciences (ZAAS)**, Hangzhou, P.R. China, **Association of Agricultural Technology in Southeast Asia (AATSEA)**, King Mongkut’s Institute of Technology Ladkrabang (KMUTL, Thailand), Sathyabama Institute of Science and Technology, Chennai, India , Rajamangala University of Technology Tawan-ok (RMUTTO, Thailand), University of Bengkulu (Indonesia), 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), CAPS (Circular Agricultural Production System), (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

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. (Turkey)	Prof. Dr. Thangadurai Devarajan (India)
Prof. Dr. John C. Moreki (Botswana)	Prof. Dr. Lalitha S. (India)
Dr. Hoang Pham (Vietnam)	Prof. Dr. Retro Augustina Ekaputri (Indonesia)
Dr. Samantha Chadranath karunarathna (Sri Lanka)	Dr. TSSK Patro (India)
Assoc Prof. Dr. Kampon Sriwatanakul (Thailand)	Prof. Zainal Mukhtar (Indonesia)
Prof. Dr. Wafaa Haggag (Egypt)	Prof. Dr. Pakkpong Pongsuk (Thailand)
Assoc. Prof. Dr. Rungtawan Yomla (Thailand)	Prof. Dr. Dwatmadji (Indonesia)

Assoc. Prof. Dr. Komkhae Pilasombut (Thailand)	Prof. Dr. Tatik Suteky (Indonesia)
Dwi Wahyuni Ganefianti (Indonesia)	Prof. Dr. Nanik Setyowati, (Indonesia)
Prof. Dr. Fahrurrozi Ferrozine (Indonesia)	Dr. Sigit Sudjarmiko (Indonesia)
Prof. Dr. TSSK Patro (India)	Dr. Nithya, Periya (India)
Prof. Dr. Zainal Mukhtar (Indonesia)	Assoc. Prof. Dr. Anurag Poearim (Thailand)
Asst. Prof. Dr. V. GopiKrishnan (India)	Prof. R. Sarada Jayalakshmi (India)
Dr. Shikh Tanvee Hossain (IFOAM-ASIA)	Maxim Mikaheal (Russia)

International Organizing Committee

Chairman: Prof. Dr. Hiroyuki Konuma (President of GIAPSA, Japan)

Vice-chairman: Prof. Dr. Kasem Soyong (AATSEA), Prof. Dr. Fucheng Lin (China), Assoc. Dr. Komsan Maleesi (President, KMITL), Asst. Prof. Waigoon Thongaram (RBRU, Thailand), Asst. Prof. Dr. Terdsak Puramongkon (RMUTTO, Thailand), Prof. Dr. Retro Augustina Ekaputri (University of Bengkulu, Indonesia), Prof. Dr. Mamdouh Moawad (Egypt), Prof. Dr. Lalitha S. (India), Asst. Prof. Dr. V. GopiKrishnan (India)

Committee

Prof. Dr. Moammar Dayoub (Finland)	Prof. Dr. Okigbo, Raphael (Nigeria)
Prof. Dr. Jin-Cheol Kim (Korea)	Dr. Somlit Vilavong (Laos)
Prof. Dr. John Moreki (Botswana)	Dr. Hoang Pham (Vietnam)
Prof. Dr. Nanik Setyowati (Indonesia)	Prof. Dr. Younes Rezaee Danesh (Turkey)
Beletskiy Sergey (Russia)	Dr. Jiaojiao Song (China)
Dr. Md. Asaduzzaman Sarker (Bangladesh)	Maxim Mitrokhin (Russia)
Prof. Dr. P. Krupakar, Associate (India)	Prof. Dr. M. Radhakrishnan (India)
Asst. Prof. Dr. T. Rajasekar (India)	

Local Organizing Committee

Chairman: Prof. Fucheng Lin, Director, ZAAS

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

Committee

ZAAS staff:

Prof. Guojing Li (ZAAS)
Prof. Yuwei Yuan (ZAAS)
Mr. Jianqiang Yao (ZAAS)
Prof. Junfeng Xu (ZAAS)
Ms. Liping Sun (ZAAS)
Ms. Jixiang Huang (ZAAS)
Prof. Jiaoyu Wang (ZAAS)
Prof. Hongxing Xu (ZAAS)
Ms. Xiaowen Chen (ZAAS)
Dr. Jiandong Bao (ZAAS)

Dr. Zifang Shen (ZAAS)

Dr. Qi Zheng (ZAAS)

Mr. Guoqiang Wang (ZAAS)

Mr. Xiaolei Xia (ZAAS)

Mr. Dong Yang (ZAAS)

AATSEA staff:

Prof. Dr. Pakkapong Pongsuk (KMITL)

Assoc. Prof. Dr. Rungtawan Yomla (KMITL)

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

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

Dr. Rungrat Vareeket (AATSEA)

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

Vice-General Secretariat:

Prof. Dr. Yuwei Yuan (ZAAS)

Ms. Xiaowen Chen (ZAAS)

Master of Ceremony (MC): Ms. Xiaowen Chen (ZAAS), Mr. James Kennard Jacob (Philippines)

Financial management: Dr. Rungrat Vareeket (AATSEA), Ms. Benyapha Thongsri (Thailand), Mr. Xiaolei Xia (ZAAS)

Registration: Dr. Rungrat Vareeket (AATSEA), Ms. Benyapha Thongsri (Thailand), Dr. Jiaoyu Wang (ZAAS), MS. Xiaowen Chen (ZAAS), Dr. Zifang Shen (ZAAS)

Accommodation (Hotel and Local transportation): Dr. Jiandong Bao (ZAAS), Dr. Yanli Wang (ZAAS), Ms. Xueqin Mao (ZAAS), Mr. Guoqiang Wang (ZAAS)

Food & Coffee break, Reception: Dr. Jiaojiao Song (AATSEA, China), Prof. Hongxing Xu (ZAAS), Dr. Jiandong Bao (ZAAS), Mr. Xiaolei Xia (ZAAS)

Scientific program & Book of abstracts: Prof. Dr. Kasem Soyong (Thailand), Dr. Jiaojiao Song (China)

Proceedings (Full manuscripts): Dr. Jiaojiao Song (China), Dr. Rungrat Vareeket (Thailand)

Souvenirs and Award plaque: Prof. Jiaoyu Wang (ZAAS, China), Mr. Dong Yang (ZAAS, China)

Audiovisual, Photographer, IT and Session Convenors: Prof. Hongxing Xu (ZAAS), Ms. Xueqin Mao (ZAAS), Mr. Dong Yang (ZAAS), Mr. Akkharat Jantub (Thailand), Ms. Benyapha Thongsri (Thailand)

I hereby hope that the 13th ICIST 2025 conference are appointed and hopefully the conference will completely manage upon your help and well co-operated.



Prof. Dr. FuCheng Lin
Director, ZAAS, China



Prof. Dr. Kasem Soyong
President, AATSEA

Biodata of AATSEA Outstanding Awardees

Prof. Dr. Fu-Cheng Lin
(China)
Lifetime Achievement Award



Personal Information

Name: Lin Fu-cheng

Titles: Professor, PhD Supervisor,
President of Zhejiang Academy of
Agricultural Sciences

Email: fuchenglin@zju.edu.cn



Educational Background

1983.09 to 1987.07 BSc, the Department of Plant Protection, Zhejiang University (formerly known as Zhejiang Agricultural University),

1987.09 to 1990.07 MSc, Plant Protection Department, Zhejiang University (formerly known as Zhejiang Agricultural University)

1995.09 to 1999.06 PhD in plant pathology, Zhejiang University

Work Experience

1990.08 to 1993.11 Assistant Professor, Department of Plant Protection, Zhejiang Agricultural University

1993.12 to 1998.11 Lecturer, Department of Plant Protection, Zhejiang Agricultural University

1998.12 to 2001.11 Associate Professor, School of Agriculture and Biotechnology, Zhejiang University

2001.11 to 2003.11 Associate Professor, School of Life Sciences, Zhejiang University

2003.12 to 2004.11 Professor, School of Life Sciences, Zhejiang University

2011.01 to 2015.12 Director of the National Tobacco Gene Center

2013.03 to present Adjunct Professor of Zhejiang Agriculture and Forestry University

2004.12-Present Professor, Ph.D. Supervisor, School of Agriculture and Biotechnology, Zhejiang University

2017.05 to 2020.02 Director of Agricultural Experiment Station of Zhejiang University

2017.05 to 2020.02 Director of the Management Committee of Zhejiang University Agricultural Science and Technology Park

2020.03 to 2021.04 Deputy Secretary and Executive Vice-President of Zhejiang Academy of Agricultural Sciences

2020.06-present Adjunct Professor of China Jiliang University

2021.04-present President of Zhejiang Academy of Agricultural Sciences

International Experience

1999.10 to 2001.9 Visiting Scholar, University of Exeter, the UK

Prof. Lin is a Zhejiang Provincial Top-Level Expert, Qiusi Distinguished Professor at Zhejiang University, Fellow of the Chinese Society of Plant Pathology, Executive Director and President of the Zhejiang Society of Plant Pathology, and Executive Director of the Chinese Society for Biochemistry and Molecular Biology. He is also the recipient of the National Science Fund for Distinguished Young Scholars, and the Special Government Allowances.

He has published 256 SCI-indexed papers in journals such as *Cell Host & Microbe*, *Autophagy*, *Molecular Plant*, *mBio*, and *New Phytologist*, with a total of 18,033 citations (H-index 41). Additionally, he holds 147 authorized invention patents. As the leading contributor, he has been conferred with the first-class prizes of Zhejiang Provincial Natural Science Award, Zhejiang Provincial Technical Invention Award, and Chinese Productivity Promotion (Innovation and Development) Award. He is the recipient of one second-class Natural Science Award of Higher Education Outstanding Scientific Research Output Award and one third-class Zhejiang Provincial Award for Scientific and Technological Progress. He also serves as chief scientist of the National Key R&D Program and the Zhejiang Major Program for New Cultivars Breeding. He has led the research of a project funded by the National Natural Science Foundation (NSFC) of China, one National Outstanding Youth Fund project, one National 863 Program project, and more than a dozen research projects at the national or provincial level. He is the chief editor of *Acta Agriculturae Zhejiangensis* and *International Journal of Agricultural Technology* and is on the editorial board of several international academic journals. In addition, he also serves as an expert in the evaluation panels for the NSFC, MOST Major Program, the U.S. NSF, the UK BBSRC funds, and the National Science and Technology Achievement Awards.

**Prof. Dr John Moreki
(Boswana)
Lifetime Achievement Award**

Name: John Cassius Moreki

Titles: Distinguished Professor, PhD,
Chairman of Botswana Society of Livestock
Science and Production, Botswana
University of Agriculture and Natural
Resources, and Pebble Hills University

Email: jmoreki@buan.ac.bw



John Cassius Moreki is a distinguished academic and agricultural expert based in Botswana, renowned for his significant contributions to animal science, particularly in poultry nutrition and livestock management. Prof. Moreki teaches courses in Monogastric Nutrition, Poultry Production, Ostrich Production, and Applied Poultry Production at both undergraduate and postgraduate levels at the Botswana University of Agriculture and Natural Resources (BUAN). In addition, he supervises undergraduate and postgraduate research projects. Furthermore, he teaches short courses in poultry production at the university's Centre of In-service and Continuing Education.

He holds a Ph.D. in Animal Science, specializing in poultry nutrition, from the University of the Free State (South Africa). He also earned a Master of Applied Science in Agriculture from the University of Melbourne (Australia) and a Bachelor of Science in Agriculture from the University of Botswana. His educational journey began with a Diploma in Agriculture, laying a robust foundation for his future academic and professional pursuits. Prof. Moreki is deeply committed to community service and outreach. With a career spanning over three decades, he has dedicated his professional life to advancing agricultural practices and enhancing food security in Botswana and Southern Africa. John has played a pivotal role in the development of the poultry industry in Botswana.

A prolific researcher, Prof. Moreki has authored 142 peer-reviewed articles in refereed journal with a total of 2201 citations (h-index 26, and i-10 index of 61). Prof. Moreki serves on the editorial boards of various journals, international journals, such as the Online Journal of Feed Research, International Journal of Agricultural Technology and Journal of World's Poultry Research.

Prof. Moreki's extensive experience in government includes multiple appointments as Deputy Permanent Secretary (Technical Services) and Acting Permanent Secretary in the Ministry of Agricultural Development and Food Security, where he provided strategic leadership and policy direction. His roles involved managing major agricultural projects and contributing to the formulation of policies that promote sustainable farming practices. His career is marked by a profound commitment to advancing agricultural science and education. His expertise, leadership, and passion for sustainable development continue to inspire students, colleagues, and the broader community.

**Mr. Ji-Guo Xing
(China)
Policy Making and Governance Award**



Mr. Xing Jiguo, Chairman of Arab-China Economic and Trade Cooperation and Innovation Center, Director of China-Arab Youth Pioneer Park Management Committee, Director of China-Arab Technology and Culture Transfer Center, etc.

He is a member of the 12th All-China Youth Federation, member of China Zhi-Gong party Central Overseas Liaison Committee (Hong Kong, Macao and Taiwan Liaison Committee), member of European and American Alumni Association, vice chairman of international cooperation alliance of agricultural equipment (capacity), director of Beijing Overseas Friendship Association, member of the Standing Committee of the Returned Overseas Chinese Federation of Ningxia Hui Autonomous Region, and project leader of the Chinese Medicine Acupuncture Foreign Aid Training Course of the International Department of Science and Technology.

Personally, he has worked in Tsinghua University for 12 years and worked in the National Development and Reform Commission for 16 years. He is a familiar with the country's overseas investment policies who have mastered and experienced a large number of overseas investment projects, and have accumulated rich overseas investment experience. He has made a remarkable contributions for promoting economic, trade and technical cooperation between China and Arab countries and ASEAN countries, and promoting the development of China-Arab and ASEAN relations.

He has individually transferred the Central Inspector Group for 8 times to conduct supervision and investigation on hot issues of social concern such as national environmental protection, coal and vehicle reform. He is served as a distinguished expert in the Youth Entrepreneurship Competition of the Central Committee of the Communist Youth League, Innovating China, doing business in big Countries, a visiting professor in Tsinghua University, Beijing University of Posts and Telecommunications, Beijing Union University, Shanghai Jiaotong University and other universities, a student tutor, and an innovation and entrepreneurship tutor in Beijing Haigui Association for Science and Technology.

He have been made a remarkable achievements in many fields. In the agricultural field, he has supported potato planted in large areas for the Kingdom of Hacim, Jordan, and the glycerol production and agricultural irrigation in Agadir, Morocco, and rice planting production in Suez Canal, space breeding and advanced energy technology for Thailand to help agricultural development, and cassava export for Cambodia. Moreover, he has supported advanced technology for sand prevention and control for the United Arab Emirates, etc. He has made a positive contributions for technology transfer and application in agriculture and ecological management related fields in the League of Arab States and ASEAN countries.

In promoting economic and trade cooperation and technical exchanges between China and Arab countries and ASEAN countries, it has built a bridge for international exchanges and cooperation, and promotes an economic and trade cooperation between China and Arab countries, advocates the

youth entrepreneurship cooperation between China and Arab countries, promotes scientific and technological innovation and personnel training, and practices the public welfare undertakings, initiates regional innovation and standardization cooperation organizations, and promotes overseas joint laboratory construction, enterprise economic and trade exchanges, project cooperation, sister city docking, foreign aid training of ministries and commissions, forum exhibitions, and overseas brand promotion. It has undertaken 16 national, provincial and ministerial-level "Belt and Road" related projects. Undertaking 21 foreign aid training courses of national ministries and commissions, involving nearly 1,000 people from more than 20 countries; Independently hosted 9 sub-forums of the 6th China-Arab Expo, more than 230 pre-promotion conferences abroad, the 3rd World Frontier Science and Technology Conference (sub-forum of China International Trade Fair), participated in the 3rd National Belt and Road International Cooperation Summit Forum and signed 4 agreements, organized the 23rd Belt and Road Technology Transfer and International Cooperation Innovation Forum, and was concluded by 6 sister cities, which is opened to 22 Arab countries. More than 130 ministerial consultants and more than 800 overseas cooperative ministries and agencies are hired to hold four large-scale exhibitions in Egypt, Jordan, Morocco and Sudan, and more than 1,620 projects are signed on a large scale, at the amount of US\$ 135 billion.

He has done a lot of fruitful work in serving China-Arab Expo and China International Fair for Trade in Services, and achieved a number of pragmatic achievements. He has established a good exchange service network with Arab countries and ASEAN countries, which has been widely recognized by the government, enterprises and business circles in Arab countries and affirmed by the relevant leaders of national ministries and commissions. He has won the support of Moroccan Prime Minister Ahnouch, Jordanian Prime Minister Omar Razaz, Thai Acting Prime Minister Putang, etc. Premier Li Keqiang, Vice Chairman Li Yuanchao, Minister Wan Gang, Minister Shi Taifeng of the Standing Committee of the Central Committee, Yuan Jiajun and other national, provincial and ministerial leaders at home and abroad who had met for more than 260 times. His working achievements were written into the achievements of the national "Belt and Road" construction many times. As an outstanding representative of the national youth, he has visited the China youth delegation organized by the Central Committee of the Communist Youth League for many times. development of the great motherland.

With outstanding performance in foreign liaison work, he was awarded the title of "Advanced Individual in China Zhi-Gong Party's Central Liaison Work with Foreign Countries", the Special Contribution Award of Moroccan China-Arab Countries for Science and Technology Cooperation, the Outstanding Contribution Award of Thailand's Ministry of Health Charter for International Cooperation in Traditional Chinese Medicine, the Leadership Award for Asia-Pacific Economic Development awarded by Malaysian Presidential Palace, the Seventh National Moral Model Nomination Award, the 2020 National Social Contribution Model Award, the National Good Youth, and the 12th China Young Outstanding Volunteer. Central-level commendations such as the CCTV Public Welfare Award, the China Young E-commerce Pioneer Award. The "Revolutionary Cultural Relics Protection Ambassador" at the former site of Yan 'an Revolution have reflected his positive role in promoting exchanges and cooperation in the "Belt and Road" initiative.

Ms Bei Zhang
(China)
Business and Entrepreneurship Award



ALOR VALLEY Cultural and Tourism Group Co., Ltd.
十里芳菲文旅集团有限公司

President
董事长

Zhejiang Entrepreneurs Association
浙商总会

Managing Director
常务理事

Cultural And Creative Industries Committee, Zhejiang Entrepreneurs Association
浙商总会文化创意产业委员会

Chairman
主席

Young Creative Fund of Tibet Development Fund
援藏基金会青年文创专项基金

Executive Director
执行主任

[ALOR VALLEY][Blossom Hill]
「十里芳菲」「花间堂」

Founder
创始人

Zhejiang University
浙江大学

Expert supervisor for MBA
MBA 研究生专家导师

Jiangxi University of Finance and Economics
江西财经大学

Expert supervisor for Master
硕士研究生专家导师

Since 2003, Ms. Bei Zhang built the boutique hotel operation template, Manhattan Bund Business Hotel, in The Bund, and becomes the pioneer of the boutique hotel in China's hotel industry.

In 2008, she founded the chain resort hotel brand, [Blossom Hill]. Over the past 10 years, from the humanistic and aesthetic inn in Lijiang to the boutique resort, she has established the destination hotel in the tourist destination with the core concept of spreading Chinese style happiness philosophy, and pioneered a cultural resort hotel in the first place. [Blossom Hill] has been settled in more than 20 leisure resort destinations in Yunnan, Sichuan, Beijing, Zhejiang, Jiangsu, etc., becoming the model of Chinese boutique hotel. She creates the [Aesthetics of Blossom Hill], which focuses on the “the order of the home+inspired by nature”, praises and spreads the local culture through the expression of “beauty in utensils” and “beauty in deeds”, so that people can see the beauty of Chinese culture with lively spirit

and charm that keeps up with the times. It proposes the lifestyle concept of [Life from meaningful to interesting], leading an upgrade of the hotel industry from function to experience.

In 2016, she co-founded China Meisu Association and served as the president, to upgrade and create the non-standard accommodation one-stop business service platform.

In 2017, she established ALOR VALLEY Cultural and Tourism Group Co., Ltd., created the resort brand of [ALOR VALLEY]. She continues to create the exciting lifestyle and spiritual space with independent spirit and harmony in diversity, reshapes the holiday service new experience, and defines the meaning of new tourism, new retail and new aesthetics.

She was the pioneer of the [New Life Aesthetics] concept 「新生活美学」理念开辟者. In 2018, she was served the 3rd Global Zhejiang Entrepreneurs Golden Award “第三届全球浙商金奖”. She

was awarded “**2020 Top Ten Brand Women in China 2020 中国十大品牌女性**”, 《Harvard

Business Review》2023 Ram Charan Management Practice Award —Outstanding Award 《哈佛商

业评论》2023 拉姆·查兰管理实践奖—杰出奖. And she initiated the "**Future Rural Industry Alliance**" in the year 2024 to promote the green agriculture and build green eco-system for sustainable development of Agricultural Tourism.

Prof. Dr. Ruilin Zhao
(China)
Education and Research Award



Affiliation: State Key Laboratory of Microbial Diversity and Innovative Utilization,
Institute of Microbiology, Chinese Academy of Sciences

No. 3 1st Beichen West Rd., Chaoyang District, Beijing 100101, P. R.China

Research interests: the diversity, systematics, and evolutionary genomics of macrofungi, as well as bioinformatics research and germplasm innovation of important edible fungi

Tel: 86-13321190760; 010-64806163 (O)

Email: zhaorl@im.ac.cn

http://www.mycolab.org.cn/templates/T_second/index.aspx?nodeid=491

https://www.researchgate.net/profile/Rui_Lin_Zhao

Education Background

Oct.2004 – Aug.2008, Ph. D. student on Technology in Plant Pathology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand

Sept.2000-Jul.2003, Master of Science in Forestry (Forest pathology)

Southwest Forestry University, Kunming, Yunnan, PR China

Sept.1994-Jul.1998, Bachelor of Science in Forestry (Forest Conservation)

Southwest Forestry University, Kunming, Yunnan, PR China

Working and Research Experience

2015 Jan. – now Prof., Principle Investigator on Systematic and biological research of agaric mushrooms, Institutes of Microbiology, Chines Academy of Sciences, Beijing, China.

2009-2014 Assoc. Prof. in Mycology, at Southwest Forestry University, Kunming, Yunnan Province, China.

2013-2014, visiting scholar, University of Toronto, Canada

2012 March-April, visiting scholar, Instituto Nacional de Reforma Agraria (INRA), France

2010 June-July, visiting scholar, Mai Fah Luang University, Thailand

2008 – 2009, Lecturer, Southwest Forestry University, Kunming, China. 2008 Jan., National Botanic Garden of Belgium (BR), Brussels, Belgium. 2008 Aug.- Dec., Visiting research scholar at San Francisco State University, San Francisco, California, the USA.

2007 Feb.-April, Research Assistant at The University of Hong Kong.

2006 Jan.-May, Research Assistant at The University of Hong Kong.

2004 Dec.-2005 June, Research Assistant at The University of Hong Kong.

2003-2004y Assistant Teacher, Southwest Forestry University, Kunming, China

Professor RuiLin Zhao is currently professional appointment as Vice Chairperson of Committee of Fungal Diversity and Systematics, Mycological Society of China; Executive President of Postharvest and Processing Industry Branch for Edible Fungi, Mycological Society of China; Vice President of Agaricus Bisporus Industry Branch, Mycological Society of China; Vice Chair of Academic Committee, National R&D Center for Edible Fungus Processing Technology; Academic Committee Member of National-Local Joint Engineering Research Center for Economical Fungi Research and Utilization (NDRC).

She has been invited to be the Editorial Board Membership for many Scientific journals, such as Fungal Diversity, Mycosphere, Food Science and Human Wellness, IMA Fungus, Mycology, Journal of Systematics and Evolution, Mycological Progress, Journal of Systematics and Evolution, Mycosystema. And she also has over 120 SCI-indexed publications. Among these, 15 were published in Q1 journals in the past five years, with 5 recognized as ESI Highly Cited Papers, IF score over 267. She has presided over several national projects: **1)** National Key R&D Program of China project "Accurate identification and innovative utilization of germplasm resources of edible mushrooms suitable for factory cultivation" 十四五国家重点研发计划项目, 适宜工厂化栽培的食用菌种质资源精准鉴定与创新利用, 2022YFD1200605; **2)** The Science and Technology Fundamental Resources Investigation Program, Ministry of Science and Technology of China, (Grant No. 2023FY101303) 科技基础资源调查专项, 《中国孢子植物志》编研项目之《中国真菌志 蘑菇属》编研, 2023FY101303; **3)** National Key R&D Program of China project "Edible mushroom resources exploitation and the key technology development in efficient processing", 2018.7-2021.6, person in charge 十三五国家重点研发计划项目, 食用菌资源开发和高效加工关键技术研究, 项目编号: 2018YFD0400200; **4)** Major international (Regional) Joint Research Project "Macrofungi diversity research from the Lancang-Mekong Watershed and surrounding areas" from National Natural Science Foundation of China and Thailand Research Foundation (No. 31961143010), person in charge 国家自然科学基金(泰国研究基金会)国际合作项目, 澜沧江-湄公河流域及周边大型真菌多样性研究, 项目号 31961143010; **5)** Project "The phylogeography and population genomics study on domestication traits of *Agaricus bisporus*" from National Natural Science Foundation of China (No. 31970010), person in charge. 国家自然科学基金面上项目, 双孢蘑菇的起源分化及驯化相关性状的基因组学研究, 项目号 31970010; **6)** Project "Systematics researches on the genus *Agaricus* from China" from National Natural Science Foundation of China (No. 31470152), person in charge. 国家自然科学基金面上项目, 31470152, 中国蘑菇属(*Agaricus*)真菌系统学研究, 2015/01-2018/12; **7)** Project "Systematics and DNA Barcoding researches on the genus *Agaricus* and allied genera from Hengduan Mountain Area of China" from National Natural Science Foundation of China (No. 31360014), person in charge. 国家自然科学基金地区项目, 31360014, 横断山地区蘑菇属及相关属系统分类学和 DNA 条形码研究, 2014/01-2017/12; **8)** Project "Biodiversity of the genus *Agaricus* from Southwest of China" from National Natural Science Foundation of China (No. 31000013), person in charge. 国家自然科学基金青年项目, 31000013, 西南地区野生蘑菇属真菌物种多样性研究, 2011/01-2013/1.

**Prof. Dr. Nanik Setyowati
(Indonesia)
Education and Research Award**



Affiliation: University of Bengkulu, Indonesia; **Email:** nsetyowati@unib.ac.id

H-index	:	10
WoS	:	https://publons.com/researcher/5254385/nanik-setyowati/
Scopus	:	https://www.scopus.com/authid/detail.uri?authorId=57189367022
SINTA	:	https://sinta.kemdikbud.go.id/authors/profile/5975697
ORCID	:	http://orcid.org/0000-0002-0768-9125
Researchgate ID	:	https://www.researchgate.net/profile/Nanik_Setyowati/stats
Google Scholar	:	https://scholar.google.com/citations?user=RG8CtjsAAAAJ&hl=en

Professor Nanik Setyowati has been a full-time faculty member in the Faculty of Agriculture, Universitas Bengkulu, Indonesia since 1984, dedicating more than forty years of tireless service and commitment. She has long been recognized as an outstanding lecturer for undergraduate, master's, and doctoral students, inspiring them through her motivating teaching and dedicated supervision. She is also widely regarded as a highly resourceful academic, continually encouraging young scientists to achieve international recognition.

Notably, Professor Setyowati most productive the entire Universitas Bengkulu ni terms of Scopus-indexed publications, with 54 papers, and Google Scholar-indexed works, with 198 publications. Her prolific research output reflects her genuine commitment to bridging theory with practice, particularly in advancing the organic agriculture movement. Since 2020, she has consistently secured research grants from the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia to develop technologies in organic agriculture. Professor Nanik Setyowati has also published five books, primarily aimed at promoting the development of organic agriculture among scientists, students, and farmers. In addition to her publications, she has actively provided services to numerous farming communities, strengthening the link between academic research and field applications. Her unwavering commitment to the advancement of organic agriculture in Indonesia has earned her widespread recognition. She is actively involved in both national and international scientific communities and has delivered numerous keynoted and invited lectures on topics related to organic agriculture at major conferences. Furthermore, she contributes significantly ot scholarly communication by serving as a reviewer and editorial board member for several international scientific journals.

Her tenacity is truly remarkable, and she has made significant contributions to the advancement of research and higher education, not only within the Faculty of Agriculture at Universitas Bengkulu, but also beyond.

Prof. Dr. Renato G. Reyes
(Philippines)
Education and Research Award



Dr. Renato Gutierrez Reyes, is the current President of Aurora State College of Technology (ASCOT) in Aurora, Philippines. He earned his Doctor of Philosophy in Forest Science from Tokyo University of Agriculture, Japan in 1999 through the scholarship program of the Japanese Government Ministry of Education, Culture and Sports. With his passion and strong determination to succeed, he simultaneously earned two Master of Science degrees in 1990 in the field of Crop Protection from Central Luzon State University (CLSU), Science City of Munoz, Nueva Ecija, Philippines and in Biology from De La Salle University, Manila while performing his task as an instructor and at the same time the Project Manager of the Spawn and Mushroom Project of CLSU. His Bachelor of Science in Agriculture degree, where he graduated Cum Laude from CLSU laid down his strong professional foundation as a university professor, scientist, development worker and specialist on mushroom science and biotechnology. With all his noteworthy professional achievement, he continued to gain academic and scientific acclaim through the years as a JSPS BRIDGE Fellow at Tokyo University of Agriculture in September 2022, Fulbright Senior Research Fellow at Michigan State University in the USA and ISTIC-UNESCO Fellow on Technopreneurship in Malaysia both in 2012, JASSO Post - Doctoral Research Fellow at the Takasaki University of Health and Welfare, Gunma, Japan in 2009, InWent Training Fellow on modern industrial biotechnology at the Technical University of Braunschweig and the German Research Center for Biotechnology, Federal Republic of Germany in 2005 and as a JSPS Postdoctoral Research Fellow at Tokyo University of Agriculture in 2000. In 2022, he was one of the four scientists from the ASEAN region i.e. two Malaysians and one Thai who was awarded the 2022-2023 SEARCA Professorial Chair in Mycology by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture.

As a scientist, Dr. Reyes with a *h*-index of 24 and *i10*-index of 69 is the leading mushroomologist in the country based from the 2025 AD Scientific Index. At the turn of the 21st century, Dr. Reyes initiated and promoted the advancement of mushroom research and development in the Philippines focusing on the domestication and development of practical, economical and innovative production technologies that utilized locally available materials while harnessing the Philippine wild mushroom genetic resources for national patrimony. Dr. Reyes generated novel findings in the development of production technologies for the Philippine wild edible and medicinal mushrooms where most of his peers in the international scientific community cited his works as can be seen on his google scholar and scopus profiles. With his 38 years of proactive engagement in mushroom research and development, Dr. Reyes promoted the utilization of rice straw for mushroom and crop production through his concept of zero rice wastes technology for mushroom cultivation. This zero rice waste technology that is continuously being adopted by the mushroom growers in the Philippines created a paradigm shift in the cultivation of ligninolytic mushrooms i.e. from sawdust-based formulation to rice

straw – based. His innovative technology discouraged rice farmers to burn rice straw after harvest and opened the door of economic opportunities by utilizing rice straw as main substrate for the efficient production of mushrooms. As a result, the Philippine mushroom industry composed mostly of small scale farmers not only grow *Volvariella* but also other mushrooms such as *Pleurotus*, *Ganoderma* and other specialty mushrooms.

In 2007, Dr. Reyes being a pioneer in mykopharming and mykomining conceptualized an innovative approach on mushroom cultivation via mushroom pharming in the Philippines i.e. cultivation of medicinal mushrooms for nutrition and climate change sensitive agriculture. The Philippine government through the Philippine Council for Health Research and Development of the Department of Science and Technology noticed his research initiative and supported his mykopharming activities via its Drug Discovery Center. He was commissioned by the Bureau of Agriculture and Fisheries Standards of the Department of Agriculture as co-chairperson in drafting the Philippine National Standard for the cultivation of mushrooms. He also developed production technology of *Collybia reinakeana*, a virtually unknown medicinal and edible mushroom in the Philippines.

To date, Dr. Reyes being a scientist-inventor generated 15 utility models on the production of mushroom-based beta glucan using coconut water as a culture medium and the different processes of cultivating Philippine edible mushrooms and mushroom-based food products.

In his time, Dr. Reyes already made significant contributions to the teaching profession especially in the area of mushroom science and biotechnology. Dr. Reyes' researches have been noticed by critics and won several recognitions and awards making him one of the most sought-after presenters on local, national and international conferences. He has published 154 journal articles, 72 scientific proceedings from which 23 have been recognized nationally and internationally as best scientific papers and posters, 4 chapters in a book and 4 books. His first book entitled *Mushroom Science and Technology in Central Luzon, Philippines for the 21st century* was named as the 2001 Outstanding Monograph by the National Academy of Science and Technology. His two books entitled *Cultivation of Edible Mushrooms in the Philippines* in 2006 and *Practical Guide on Mushroom Growing in the Tropics* in 2009 continuously serve as reference guides for mushroom growers and entrepreneurs. He bagged the 2006 Regional CHED's HEI Best Research Program for his research work on wild edible mushrooms of Central Luzon, a pioneering in-depth scientific work on mushroom in the region. In 2019, Dr. Reyes was awarded the Crop Science Society of the Philippines Achievement Award in Teaching. He was bestowed the 2021 Outstanding Filipino JSPS Fellow by the Japan Society for the Promotion of Science (JSPS) and the 2007 Golden Grain Award in Science and Technology, the most prestigious award bestowed by the CLSU Alumni Association to its outstanding alumni who have created significant marks in their chosen field of specialization. Prior to his stint as College President, Dr. Reyes was the Vice President for Academic Affairs and Director of the International Affairs Office of Central Luzon State University (CLSU). He also served as the Dean of the College of Arts and Sciences of CLSU.

In his presidency at Aurora State College of Technology (ASCOT), President Reyes envisions ASCOT as a globally recognized comprehensive inclusive higher education institution anchoring on the local culture of Aurora in particular and the Philippines in general that promotes conservation and restoration science.

**Mr. Souliya Souvandouane
(Lao PDR)
Special Community Service Award**



**Occupation
and contact**

Director of Plant Protection Center
Department of Agriculture
Agricultural Management Division, PO box 811
souliyadoa@gmail.com

Education

Master in Agriculture, Major in Agronomy

Experiences

Former Senior plant quarantine inspector, Director of Agricultural Regulatory Division, former Director of Clean Agriculture Standard Division which provide service on pest control, pesticide and fertilizer inspection, pesticide residue monitoring, supporting technical market access and facilitation of good agriculture practice and organic certification.

National coordinator for STDF PG 619 Safer spices: boosting food safety and market access for the peppercorn value chain in Viet Nam, Lao PDR and Cambodia with aims to increase the competitiveness and sustainability of the regional peppercorn industry in terms of consistent supply of high-quality safe peppercorn from small-scale farmer driven value-chains. This will be achieved by developing harmonised code of practices (CoP) for food safety and hygiene requirements of peppercorn and improving its compliance by smallholders, which will result in increased sales to premium international markets such as the EU, USA, and achieve positive impacts on the livelihoods of rural households.

This is restored the food manufacturing industry confidence in peppercorn sourced from the region. The project will apply an innovative approach of Participatory Guarantee System (PGS) towards capacity development of smallholders for adoption of Code of Practices (CoP). Promote local community for organic agriculture and organic certification in Lao PDR in co-operation with Association of Agricultural Technology in Southeast Asia e.g. supporting organic cacao production in Lao PDR.

Publication:

<https://www.saferspice.org/Background.asp>
https://www.saferspice.org/Videos/PGS&CoP_Interviews_LaoPDR.m4v



**The 13th International Conference on Integration of Science and Technology for
Sustainable Development 2025 (13th ICIST 2025)
30 October to 1 November 2025
Zhejiang Academy of Agricultural Sciences (ZAAS), Hangzhou, P.R. China**

PROGRAM AGENDA

Thursday 30 October 2025

13:00-16:00 Registrations

Friday 31 October 2025, Conference Day

Venue: Zhejiang Academy of Agricultural Sciences (ZAAS), Hangzhou, P.R. China,

Master of Ceremony (MC): ZAAS: Ms. Xiaowen Chen (China)

AATSEA – Dr. James Kennard S. Jacob (Philippines)

08:00 a.m. - 08:30 a.m. Guests Registration

08:30 a.m. - 09:00 a.m.

Welcoming Address: Ms. Lao, Hong-Wu (General Secretary of ZAAS, China)

Opening Remarks: Prof. Dr. Hiroyuki Konuma (President of GIAPSA)

Presentation of AATSEA Outstanding Awards by Prof. Dr. Kasem Soyong

1	Prof. Fu-Cheng Lin (China)	Lifetime achievement award
2	Prof. Dr John Moreki (Boswana)	Lifetime achievement award
3	Mr. Ji-Guo Xing (China)	Policy Making and Governance
4	Ms. Bei Zhang (China)	Business and Entrepreneurship
5	Prof. Dr. Rui-Lin Zhao (China)	Education and Research
6	Prof. Dr. Nanik Setyowati (Indonesia)	Education and Research
7	Prof. Dr. Renato G. Reyes (Philippines)	Education and Research
8	Mr. Souliya Souvandouane (Lao PDR)	Special Community Service

Presentation of AATSEA Best Recognition Awards

1	Prof. Dr. Juokslahti Tapio	Finland
2	Dr. Shaikh Tanveer Hossain	Bangladesh
3	Assoc. Prof. Dr. Kampon Sriwatanakul	Thailand
4	Prof. Dr. Younes Rezaee Danesh	Turkey
5	Prof Dr. Md. Asaduzzaman Sarker	Bangladesh
6	Dr. Samantha Chadranath karunarathna	Sri Lanka
7	Dr. Hoang Pham	Vietnam
8	Dr. James Kennard S. Jacob	Philippines
9	Prof. Dr. Jin-Cheol Kim	South Korea

10	Prof. Valeria Bianciotto	Italy
11	Prof. Dr. Sigit Sudjarmiko	Indonesia
12	Asst. Prof. Dr. Gopikrishnan Venugopal	India
13	Prof. Dr. Lalitha Sundaram	India
14	Dr. Govindaraj Dev Kumar	USA

Awarding the plaque to the co-organizers

	Representative	Organization
1	Assoc. Prof. Dr. Indra Cahyadinata	University of Bengkulu, Indonesia
2	Prof. Dr. Hiroyuki Konuma	General Incorporated Association for the Promotion of Self-reliance in Asia (GIAPSA), Japan
3	Asst. Prof. Dr. Terdsak Puramongkon	Rajamangala University of Technology Tawan-ok (RMUTTO), Thailand
4	Prof. Dr. Lalitha, Sundaram	Periyar University, Salem, India
5	Prof. Zainal Muktamar	Circular Agricultural Production System (CAPS), Indonesia
6	Asst. Prof. Dr. Gopikrishnan, Venugopal	Sathyabama Institute of Science and Technology, Chennai, India
7	Prof. Dr. Pakkapong Pongsuk	King Mongkut's Institute of Technology Ladkrabang (KMUTL, Thailand)
8	Prof. Dr. Nagia Farag Ali	National Research Center, Cairo (Egypt)
9	Prof. Dr. Yuan, Yu-Wei	Zhejiang Academy of Agricultural Sciences (ZAAS), Hangzhou, P.R. China

Felicitations: Prof. Dr. Kasem Soyong (President of AATSEA, Thailand)

Motivational Song: Prof. Kasem Soyong and Team

09:00 a.m. – 09:15 a.m. Photo session

09:15 a.m. – 12:30 p.m. Keynote Lectures

SCIENTIFIC SESSIONS

KEYNOTE LECTURES

Chairpersons

Prof. Dr. Yuan, Yu-Wei (China), Asst. Prof. Dr. Venugopal Gopikrishnan (India)

List of Keynote Lectures

Time	Name	Titles
9:15-9:35	Prof. Dr. Sheng-Yang He Duke University, Durham, USA	Climate impact on plant-pathogen interactions
9:35-9:55	Prof. Dr. Naweel Isaak Naqvi Temasek Life Sciences Laboratory, Singapore	Harnessing microbiomes for sustainable crop improvement and climate mitigation
9:55-10:15	Prof. Dr. Tapio Juokselahti	Industrial production of <i>Trichoderma reesei</i> enzymes by liquid state

	Adjunct Professor in Helsinki University, Finland	Fermentation and their early application in animal feeds in P.R. China
10:15-10:30	COFFEE BREAK	
10:30-10:50	Prof. Dr. Kampon Sriwatanakul Chairman of Thailand National Charter of Health. Former Vice President for Research and Foreign Relations, Mahidol University, Thailand	Innovative organic products for health and wellness
10:50-11:10	Prof. Dr. Ruilin Zhao State Key Laboratory of Microbial Diversity and Innovative Utilization, Institute of Microbiology, Chinese Academy of Sciences, Beijing, China	Genetic improvement of high protein content strain of <i>Agaricus bisporus</i> driven by agricultural waste recycling
11:10-11:30	Prof. Dr. Hiroyuki Konuma President of GIAPSA, Japan	Towards sustainable rural community: lessons learned from a pilot intervention at an Akha tribal community (Mae Chan Tai Village) in Northern Thailand
11:30-11:50	Prof. Dr. Mohammad Chozin Department of Crop Production, University of Bengkulu, Bengkulu - 38121, Indonesia	Crop breeding for organic production
11:50-12:10	Dr. Shaikh Tanveer Hossain Director, IFOAM-ASIA, Bangladesh	Green agricultural policies and strategies in Asia
12:10-12:30	Prof. Dr. Fu-Cheng Lin Zhejiang Academy of Agricultural Science (ZAAS), Hangzhou, P.R. China	Biocontrol rice blast disease
12:30-13:30	LUNCH	

13th International Conference on Integration of Science and Technology for Sustainable Development 2025 (13th ICIST 2025)

Session 1: Modern Organic Agriculture

Session 2 : Plant Biotechnology

Session 3: Plant Protection

Session 4: Microbial Biotechnology

Session 5: Soil, Water and Environment

Session 6: Animal Biotechnology, Fisheries Sciences

Session 7: Food Security, Food Safety

Session 8: Food Science and Postharvest Technology

Session 9: Agricultural Development

Session 10: Advanced Agricultural Technology, Smart Farms and AI

ORAL PRESENTATIONS – SESSION DETAILS

Session 1 (Building 3 Lecture Hall 1, First Floor): Modern Organic Agriculture

S. No	Time	Chairpersons : Chair : Asst. Prof. Dr. Lalitha S.(India) Co-chairs : Prof. Dr. Jin-Cheol Kim (South Korea), Prof. Sigit Sudjarmiko (Indonesia)
1	13:30-13:45	Prof. Dr. Jin-Cheol Kim (IS): Identification of the antifungal metabolites, eurocidins, isolated from <i>Streptomyces</i> sp. JCK-8368 and optimization of their production
2	13:45-14:00	Prof. Sigit Sudjarmiko (IS): Synergistic effects of <i>Chaetomium globosum</i> and <i>Trichoderma viridae</i> against chili anthracnose
3	14:00-14:15	Prof. Fahrurrozi (IS): Organic biostimulant from <i>Sargassum polycystum</i> promotes vegetative growth and yield in sweet corn (<i>Zea mays</i> L.)
4	14:15-14:30	Lalitha S. (IS): Amphiphilic Glycolipids from <i>Pseudomonas aeruginosa</i> PAS2: Dual Role in Plant Growth Promotion and Heavy Metal Detoxification
5	14:30-14:45	Bancha Wiangsamut: Efficiency of a solar-powered automated drip irrigation system in enhancing yield and quality of durian and mangosteen in Eastern Thailand
6	14:45-15:00	Kartika Utami: The molecular and chemical profiling of ageratum conyzoides as organic fertilizer: A comprehensive nuclear study
7	15:00 -15:15	Sridhar Dharman: Harnessing halotolerant rhizobacteria to improve oil quality and mineral nutrition in sesame under saline condition
8	15:15-15:30	Bancha Wiangsamut: Economic viability and water footprint analysis of a solar-powered automated drip irrigation system in durian and mangosteen cultivation
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Prof. Dr. Kasem Soyong (IS): Modern organic agriculture and organic certification from farm to table for sustainable agriculture
10	16:00-16:15	Mr. Souliya Souvandouane (IS): Organic agriculture in Lao PDR
11	16:15-16:30	Prof. Dr. Pakkapon Pongsuk (IS): Promoting the production and utilization of rice straw pellet organic fertilizer among rice farmers in Nong Phak Nak Subdistrict, Sam Chuk District, Suphan Buri Province
12	16:30-16:45	Marlin Marlin: The effect of liquid organic fertilizer on the growth of <i>Dendrobium</i> sp. in acclimatization period
13	16:45-17:00	Sathya C.: Synergistic effect of arsenic tolerant rhizobacteria on legume growth and biochemical defense under toxic conditions
14	17:00-17:15	Yudhi Harini Bertham: Enhancing macronutrient uptake and growth of soybean in coastal areas through integrated biofertilizer applications
15	17:15-17:30	Md. Ruhul Momin: Effectiveness of climate-resilient and organic farming adaptation strategies in saline-prone areas of Bangladesh
	17:45	Closing Ceremony

Session 2 (Building 3 Lecture Hall 2, First Floor) : Plant Biotechnology

S. No	Time	Chairpersons : Chair : Prof. Dr. Tapio Juokslahti (Finland) Co-chairs : Prof. Nanik Setyowati (Indonesia), Putri Mian Hairani (Indonesia)
1	13:30-13:45	Prof. Nanik Setyowati (IS): Increasing phosphorus uptake and sweet corn yield through <i>Azolla pinnata</i> compost and lime application in Ultisols
2	13:45-14:00	Chachpon Tebdoie: Calcium phosphate enhances biomass, pigment and some secondary compounds accumulation in <i>Cannabis sativa</i> L. callus cultures
3	14:00-14:15	Atra Romeida: Characterization of morphological variation in wild Orchids of Kepahiang Regency, Bengkulu Province
4	14:15-14:30	Pornjarus Singhavorachai: Optimization of protoplast isolation from <i>Cannabis sativa</i> L. 'Hang Kra Rog'
5	14:30-14:45	Yuli Widiyastuti: Wilting and drying technique effect the antimalarial chemical content of <i>Artemisia annua</i>
6	14:45-15:00	Supattra Poeaim: Influence of leaf type, genotype, and location on bioactivities and assessment of genetic diversity in teak (<i>Tectona grandis</i> L. f.)
7	15:00 -15:15	Thararat Pongcha-Umdee: Effects of harvesting intervals on the growth, yield, and crude protein of <i>Morus alba</i> cv. 'Buriram 60'
8	15:15-15:30	Tonrak Touyjaroon: Evaluation of combination fertilizer application on growth, yield, and crude protein of <i>Morus alba</i> cv. Sakhon Nakhon in Thailand
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Anurug Poeaim: Study on the regeneration of sausage tree (<i>Kigelia africana</i>) by tissue culture
10	16:00-16:15	Putri Mian Hairani: Enhancing ground nut (<i>Arachis hypogaea</i> L.) growth and yield using oil palm bunch ash and urea fertilizer in ultisols
11	16:15-16:30	Phatchayamon Bhuriphatyothin: Effect of paclobutrazol application on growth, flowering, and vegetative leaf anatomy of potted Chrysanthemum (<i>Dendranthema grandiflora</i>)
12	16:30-16:45	Usman Siswanto: Characterization of morphology, physicochemical, and antioxidant activity of edible portion of Jackfruit (<i>Artocarpus heterophyllus</i> Lam.)
13	16:45-17:00	Sutinee Supreeworakij: Effect of ethyl methanesulfonate on growth and morphology of <i>Doritis pulcherrima</i> Lindl.
14	17:00-17:15	Hesti Pujiwati: Comparative study of different cultivation systems of black soybean on Ultisol land
15	17:15-17:30	Patcharapan Saengarun: Effects of cultivar, culture medium, and plasma treatment on callus induction in <i>Capsicum</i> spp. through <i>In vitro</i>
16	17:30-17:45	Catur Herison: Aluminum tolerance screening of cayenne pepper (<i>Capsicum annuum</i> L.) genotypes at the seedling stage under nutrient solution stress
	17:45	Closing Ceremony

Session 3 (Building 1 Room1047, First Floor) : Plant Protection

S. No	Time	Chairpersons : Chair : Prof. Mohammad Chozin (Indonesia) Co-chairs :Assoc. Prof. Dr. Anurug Poeaim (Thailand), Sempurna Ginting (Indonesia)
1	13:30-13:45	Prof. Mohammad Chozin (IS): Potential use of plant extracts as fungicides for controlling blast disease in rice
2	13:45-14:00	Anurug Poeaim: Drought tolerance of <i>Stylosanthes guianensis</i> CIAT 184 by tissue culture
3	14:00-14:15	Sempurna Ginting: Infestation pest on organic sweet corn hybrids in the lowland
4	14:15-14:30	Porntinun Pitisom: Efficacy of mangosteen peel extract combined with phosphonic acid for the <i>In Vivo</i> control of <i>Phytophthora palmivora</i> in durian
5	14:30-14:45	Kanyarat Lueangprasert: Predictive model for optimal ozone condition to control <i>Collectotrichum</i> sp. and maintain quality of Kaew Kamin mango
6	14:45-15:00	Thanaset Thongsaiklaing: Antifungal efficacy of stingless bee honey extracts against a black mould causing pathogen <i>Lasiodiplodia</i> spp.
7	15:00 -15:15	Li-Hui Xu: Biocontrol potential of rhizospheric <i>Bacillus</i> strains against <i>Sclerotinia minor</i> Jagger causing lettuce drop
8	15:15-15:30	Hataichanok Passara: Larvicidal efficacy and morphological abnormalities induced by plant essential oils against housefly (<i>Musca domestica</i> L.)
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Hataichanok Passara: Impact of botanical essential oils on pupation and survival of <i>Musca domestica</i> L.
10	16:00-16:15	Thanaset Thongsaiklaing: Intraspecific variation in the chemical composition of propolis from three stingless bee species
11	16:15-16:30	Rustikawati: Performance and screening of bird pepper genotypes for drought tolerance using PEG
12	16:30-16:45	Siripat Baikaden: The effectiveness of seed coating with microbial bio-fungicide on controlling seed quality and damping-off disease of tomato
13	16:45-17:00	Watcharawit Rassami: Effect of amino acid on growth of durian seedling cv. Monthong under drought condition
14	17:00-17:15	Mohammad Shafiqul Islam: Carrier-free RNA nanostructure for spray-induced gene silencing against <i>Botrytis cinerea</i>
15	17:15-17:30	Bancha Wiangsamut: Effectiveness of <i>Trichoderma asperellum</i> (THR 3) in controlling <i>Sclerotium rolfsii</i> (SC01) causing damping-off disease in durian seedlings
16	17:30-17:45	Angkhana Chuajedton: Investigating antioxidant and antibacterial activity of Thai herbal extracts for development of herbal product
	17:45	Closing Ceremony

Session 4 (Building 1 Room 1049, First Floor): Microbial Biotechnology

S. No	Time	Chairpersons : Chair: Prof. Younes Rezaee Danesh (Turkey) Co-chair: Prof. Valeria Bianciotto (Italy), Dr. Hoang Pham (Vietnam)
1	13:30-13:45	Prof. Valeria Bianciotto (IS): The application of beneficial microorganisms as biofertilizers in soil
2	13:45-14:00	Dr. Hoang Pham (IS): Mushroom spawn production in southern Viet Nam
3	14:00-14:15	Prof. Dr. Murat Tunçtürk (IS): Effects of different forms and doses of bat guano on growth and dual parameters of soybean (<i>Glycine max</i> L.)
4	14:15-14:30	Prof. Younes Rezaee Danesh (IS): Tomato– <i>Rhizoctonia solani</i> Interactions and <i>In Vitro</i> Suppression by <i>Trichoderma</i> Species
5	14:30-14:45	Somphit Sornyotha: Biotechnological production of calcium malate from sugarcane molasses using <i>Acetobacter persici</i> BX1
6	14:45-15:00	Perfecto S. Ramos, Jr.: Bacteria that can tolerate and decontaminate cadmium and lead contaminated rice paddy soil
7	15:00 -15:15	Benyapha Thongsri: Isolation of <i>Pusillimonas caeni</i> and screening for enzymatic production
8	15:15-15:30	Prof. Younes Rezaee Danesh: Tritipyrum: From chromosome engineering to field adaptation in Türkiye
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Dr. Gopi Krishnam (IS): Bioprospecting of fish gut-associated microbes as sustainable probiotic candidates for aquaculture
10	16:00-16:15	Dr. Hongkai Wang (IS): Roles of CcDFR and CcOMT9 in the cyanidin biosynthesis and development of <i>Cordyceps cicadae</i>
11	16:15-16:30	Dr. James Kennard S. Jacob (IS): Sustainable agriculture through marine-derived <i>Penicillium parvum</i> : Antagonism, nutrient solubilization and seed vigor enhancement
12	16:30-16:45	Prof. Younes Rezaee Danesh: Isolation and Identification of Fungi Associated with Walnut Anthracnose Symptoms in Turkey
13	16:45-17:00	Suphochai Khruethuen: A study on the anti- <i>Helicobacter pylori</i> activity of three medicinal plant crude extracts from <i>Cannabis sativa</i> , <i>Mitragyna speciosa</i> and <i>Phyllanthus emblica</i>
14	17:00-17:15	Endang Sulistyowati: <i>In vitro</i> profiles of a diet containing concentrate with rice bran and <i>Arenga pinnata</i> by-product fermented with <i>Pleurotus ostreatus</i>
15	17:15-17:30	Supot Matnork: Analysis of phenolic compounds and antifungal potential of arabica coffee pulp extract using acidified ethanol extraction
	17:45	Closing Ceremony

Session 5 (Building 3 Lecture Hall 3, Second Floor) : Soil, water and Environment

S. No	Time	Chairpersons : Chair : Prof. Zainal Muktamar (Indonesia) Co-chairs: Dr. Marufa Sultana (Bangladesh)
1	13:30-13:45	Prof. Zainal Muktamar (IS): A comparative analysis of carbon dioxide emissions across land uses in Bengkulu City, Indonesia
2	13:45-14:00	Dr. Marufa Sultana (IS): Effect of potassium on the yield of gladiolus in grey terrace soil of gazipur (AEZ 28)
3	14:00-14:15	Siriporn Pradit: A hidden blue carbon sink in Nipa Palm sediment: A pioneer study of the Nipa Palm ecosystem in Trang Province, southern Thailand
4	14:15-14:30	Jor. Pongsapatchanok Chanok: Heavy metal distribution in water, sediments, and aquatic plants from the Middle Songkhla Lagoon: environmental risk and phytoremediation assessment
5	14:30-14:45	Bandi Hermawan: Analysis of peat soil physical properties under different land uses in seluma regency, south sumareta
6	14:45-15:00	Korawitch Keereerak: Depth profiles of microplastic in sediment cores in seagrass and adjacent areas
7	15:00 -15:15	Areena Lantam: Assessment of available phosphorus in planted mangrove sediments in Thailand using the Olsen extraction method
8	15:15-15:30	Ranti Ucreza: Structural analysis of social, ecological, and governance risks in the management of Kerinci Seblat National Park: a case study of Pal VII Village, Rejang Lebong
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Dr. Govindaraj Dev Kumar (IS): Optimizing solar disinfection of contaminated water using Artificial Neural Network
10	16:00-16:15	Phatcharapha Phromnak: Sorption and desorption of potassium in salt-affected soils
11	16:15-16:30	Aulia Rahmawati: RAPD-based genetic diversity analysis for the exploration of <i>Kaempferia parviflora</i> from various accessions
12	16:30-16:45	Wanninee Chankaew: Effects of nitrogen fertilizer on the growth, chemical composition and antioxidant activity of <i>Chara corallina</i>
13	16:45-17:00	Kartika Utami: Humic acid from <i>Melastoma affine</i> D. Don compost enhances key chemical properties of tropical coastal entisols and inceptisols
14	17:00-17:15	Elsa Lolita Putri: The impact of land slope on the soil physical of smallholder coffee plantations in Kayu Manis village, Indonesia
	17:45	Closing Ceremony

Session 6 (Building 3 Room 308,Third Floor): Animal Biotechnology, Fisheries Sciences

S. No	Time	Chairpersons : Chair : Prof. Dr. John Moreki (Boswana) Co-chairs : Prof. Dr. Tatik Suteky (Indonesia)
1	13:30-13:45	Prof. Dr. John Moreki (IS): Malted red sorghum: A promising alternative to maize in poultry feed formulations
2	13:45-14:00	Kanokrat Srikijsamwat: Oregano (<i>Origanum vulgare</i> L.) essential oil as a natural growth promoter in broiler chickens
3	14:00-14:15	Pasin Busayakanit: Effects of thymol–carvacrol combined with organic acids on carcass traits, meat quality, and stress indicators in broilers under enteric disease challenge
4	14:15-14:30	Wanlada Klangnarak: Comparative analysis of freshness between pelagic and demersal marine fish
5	14:30-14:45	Jino Bryle Barangan: In silico structural analysis, classification, and functional annotation of uncharacterized protein from <i>Corbicula fluminea</i>
6	14:45-15:00	Pimpakarn Laongdee: Dorsal fin morphology and phylogenetic insights in bamboo sharks (<i>Chiloscyllium</i> spp.)
7	15:00 -15:15	Krairot Saelim: Modelling ozone-based processes for decontamination of <i>Opisthorchis viverrine</i> in cyprinid fish
8	15:15-15:30	Tatik Suteky: The effect of <i>Curcuma</i> sp. supplementation on blood profile alteration in crossbreed sheep and their relationship with their adaptability
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Dwatmadji: Phytogenic feed additives for improving feed efficiency and lowering ruminants' enteric methane emission on palm oil sludge feed: in vitro study
10	16:00-16:15	Chirasak Phoemachalard: The relationships among slaughter age, final body weight, carcass weight, dressing percent, marbling, and income of crossbred Angus beef
11	16:15-16:30	Parichat Puramongkon: Effect of dietary <i>Moringa oleifera</i> leaf powder on performance and carcass quality in broilers
12	16:30-16:45	Chanpen Uesakulrungrueng: Influence of pretreatment and acid concentration on yield and quality of ossein extracted from chicken femur
	17:45	Closing Ceremony

Session 7 (Building 3 Room 410, Fourth Floor) : Food Security, Food Safety

S. No	Time	Chairpersons : Chair : Prof. Dr. Renato G. Reyes (Philippines) Co-chairs : Dr. Chau-Huynh Pham (Vietnam)
1	13:30-13:45	Dr. Chau-Huynh Pham (IS): Heavy metal bioaccumulation in edible mushrooms: Food safety challenges and mitigation strategies for sustainable production
2	13:45-14:00	Prof. Dr. Renato G. Reyes (IS): Conservation of Philippine mushrooms as a strategy to attain food security and environmental sustainability
3	14:00-14:15	Ongkarn Vanijajiva: Potential of Kimju guava (<i>Psidium guajava</i> L. cv. Kimju) in bakery products for enhancing food security in Nonthaburi Province, Thailand
4	14:15-14:30	Krerkkiat Rothomphiwat: Determinants of food security among employees of Micro, Small, and Medium Enterprises (MSMEs) in Thailand
5	14:30-14:45	Suteera Vatthanakul: Storage quality of Retort-Pouched foods for patients with kidney disease
6	14:45-15:00	Hariz Eko Wibowo: Comparative analysis of FSVA and FSQ methods in measuring food security in Indonesia
7	15:00 -15:15	Komkhae Pilasombut: Enhancing health-oriented Chashu pork: effects of transglutaminase and omega-3 enriched pork belly with improved sliceability and fatty acid profile
8	15:15-15:30	Bootsrapa Leelawat: Development of pudding products from young rice milk supplemented with whey protein and inulin
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Komkhae Pilasombut: Effect of different aging methods and periods on physical and chemical beef qualities from <i>Longissimus thoracis</i>
10	16:00-16:15	Paramee Noonim: Characterization of functional beverage milk kefir and water kefir supplemented with gac fruit (<i>Momordica cochinchinensi</i> Spreng.)
11	16:15-16:30	Wannika Jinakarn: Influencing factors on consumer repurchase decisions for crispy jackfruit of community enterprise, Chonburi province Thailand
	17:45	Closing Ceremony

Session 8 (Building 3 Room 510, Fifth Floor): Food Science and Postharvest Technology

S. No	Time	Chairpersons : Chair : Dr. Samantha Chadranath karunarathna (Sri Lanka) Co-chairs : Dr. Govindaraj Dev Kumar (USA)
1	13:30-13:45	Dr. Samantha Chadranath karunarathna (IS): Deadly mushrooms: no more Mr. Funguy
2	13:45-14:00	Hesti Nur'Aini: Relationship between fruit morphological characteristics and banana flour phytochemistry
3	14:00-14:15	Naruemon Mongkontanawat: Development of low-alcohol durian wine
4	14:15-14:30	Veerasak Uengtrakool: Evaluation of postharvest treatments of chemical agents to control <i>Lasiodiplodia theobromae</i> on Durian (<i>Durio zibethinus</i>) Fruit
5	14:30-14:45	Kannikar Charoensuk: Effect of cryogenic freezing techniques on freezing rate, drip loss and physiochemical quality of frozen durian (<i>Durio zibethinus</i>) meat
6	14:45-15:00	Sureeporn Boonna: Impact of harvesting stages on physicochemical properties, antioxidant activity and enzymatic digestibility of durian flour
7	15:00 -15:15	Atiya Rattanapittayapron: Assessment of antioxidant capacity, total phenolic and flavonoid contents in the agricultural fruit Matad (<i>Dillenia indica</i> L.) for hair care applications
8	15:15-15:30	Boondarika Sumana: Effect of different levels of <i>Chara corallina</i> on the quality of rice seasoning (Furikake)
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Naruemon Mongkontanawat: Development of low-energy snack bars made from native Thai black rice mixed with durian sauce
10	16:00-16:15	Racha Tepsorn: Development and characterization of Gluten-Free bread from optimized Cassava, Chickpea, and Corn composite flours
11	16:15-16:30	Pattama Nitthaisong: Influence of egg size, storage temperature, and storage time on commercial layer egg quality
12	16:30-16:45	Naruemon Mongkontanawat: Development of instant cream soup from durian waste industry
13	16:45-17:00	Suteera Vatthanakul: Development of sour soup with mixed vegetables and egg tofu in retort pouch for patients with kidney disease
14	17:00-17:15	Khanitta Ratprakhon: Rapid determination of dry matter content in Durian cv. Monthong using FT-NIR spectroscopy as an alternative to the AOAC method
15	17:15-17:30	Peamsuk Suvarnakuta: Inactivation kinetics of <i>Heyndrickxia coagulans</i> spores under High-Pressure processing in acidic fruit juice models
16	17:30-17:45	Waritchon Ninlanon: Development of a freeze-dried durian sticky rice product with optimized coconut milk content
	17:45	Closing Ceremony

Session 9 (Building 3 Room 608, Sixth Floor): Agricultural development

S. No	Time	Chairpersons : Chair: Prof Dr. Md. Asaduzzaman Sarker (Bangladesh) Co-chairs: Prof. Dr. Pakkapong Pounsuk (Thailand), Wuri Prameswari (Indonesia)
1	13:30-13:45	Prof Dr. Md. Asaduzzaman Sarker (IS): Extension strategies for promoting organic and natural farming systems in Bangladesh: A path toward sustainable agricultural transformation
2	13:45-14:00	Prof. Dr. Nazim Sekeroglu (IS): Circular economy and environment with zero waste strategies: Sustainable raw material production from crop By-products for cosmetics and pharmaceutical industry
3	14:00-14:15	Lathifah Khairani: Socioeconomic determinants of multidimensional poverty before and during COVID-19 in Bengkulu Province
4	14:15-14:30	Edi Susilo: Impact of water stress and sorghum varieties on flavonoid content and the bioherbicidal potential of water extracts for weed control
5	14:30-14:45	Kanokpatch Kopraserit: Knowledge management for the development of digital marketing for safe shrimp entrepreneurs in Nakhon Pathom Province Thailand
6	14:45-15:00	Eakawut Danaroon: Knowledge, attitudes, and practices regarding alternate wetting and drying (AWD) rice cultivation among farmers in community enterprise groups for large-scale agriculture in Suphan Buri province
7	15:00 -15:15	Jeeranun Khermkhan: Supply chain management for Talung Sweet Santol in Lopburi Province, Thailand
8	15:15-15:30	Neli Definiati: Evaluation of rumen bacteria bioactivator consortium from Bali cattle for enhancing agricultural waste composting
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Prof. Dr. Nazim Sekeroglu (IS): Collection and extraction efficiency of <i>Hypericum perforatum</i> and <i>Capsicum annuum</i> from earthquake affected regions in Turkiye
10	16:00-16:15	Wuri Prameswari: Responses of drought-stressed hot pepper to seaweed extract application: Agronomic and physiological perspectives
11	16:15-16:30	Muhammad Faiz Barchia: Sustainability index on rainfed paddy cultivation in Bengkulu, Indonesia
12	16:30-16:45	Dodi Hardiansyah: Suitability evaluation at lands of converted oil palm plantation for paddy fields in Bengkulu, Indonesia
13	16:45-17:00	Alnopri Alnopri: Performance of agronomic-morphological characters in 19 liberica coffee accessions from Bengkulu Province
14	17:00-17:15	Irma Lisa Sridanti: Exploration and morphological characteristics of Bengkulu Robusta Coffee
15	17:15-17:30	Rojanakorn Jaikham: Determinants of KUML Mung Bean technology adoption among farmers in Post-Rice areas of Suphan Buri Province, Thailand
16	17:30-17:45	Worayut Pucharapun: Supply chain management of Santol: A case study of Santol farmers in Huai Sak subdistrict, Mueang district, Chiang Rai province
	17:45	Closing Ceremony

Session 10 (Building 3 Room 708, Seventh Floor): Advanced Agricultural Technology, Smart Farms and AI

S. No	Time	Chairpersons : Chair : Dr. Gopi Krishnam (India) Co-chairs : Prof. Dr. Nagia Farag Ali (Egypt), Assoc. Prof. Dr. Suneeporn Suwanmaneepong (Thailand)
1	13:30-13:45	Maxim Mitrokhin (IS): AI driven technologies for smart agriculture: perspectives for cooperation
2	13:45-14:00	Nagia Farag Ali (IS): Development of extraction and application of alizarin from <i>Rubia tinctorum</i> roots under supercritical carbon dioxide and its sustainable application to wool dyeing
3	14:00-14:15	Suneeporn Suwanmaneepong: Consumer-driven online marketing strategy development for quality durian: A Rayong Province case study
4	14:15-14:30	Abimanyu Dipo Nusantara: Integrating soybean variety and biofertilizer management to improve nutrient uptake and yield in coastal regions facing climate change
5	14:30-14:45	Akaniyut Thonoi: Determinants influencing the adoption of the Windy.com application among large-scale durian farmers' groups in Rayong province, Thailand
6	14:45-15:00	Anandyawati: Assessing the dynamics of land cover changes in Rejang Lebong and their implications on the sustainability of horticultural land use
7	15:00 -15:15	Piyapol Samnaksakul: Acceptance of good agricultural practices (GAP) by guava farmers in Nong Khang Khok subdistrict, Mueang district, Chonburi, Thailand
8	15:15-15:30	Ridha Rizki Novanda: A socio-entrepreneurship empowerment model for coffee farmers to sustain soil fertility practices
	15:30-15:45	COFFEE BREAK
9	15:45-16:00	Wanarsan Pitak: Designing creative tourism destinations through community needs: A five-zone development model in Saraburi province, Thailand
10	16:00-16:15	Reny Herawati: Exploration of Bengkulu local rice varieties as new germplasm for breeding: insights from agro-morphological traits to blast resistance genes
11	16:15-16:30	Jawanchanok Preesong: Comparative study of nitrogen release from compound fertilizers in silty loam and sandy loam soils
12	16:30-16:45	Muhammad Farid: Application of geoelectrical resistivity method for mapping the soil petrophysical characteristics of agricultural land
13	16:45-17:00	Ongkarn Vanijajiva: Micropropagation and genetic fidelity analysis using SCoT marker in <i>Syzygium cumini</i> (L.) Skeels
14	17:00-17:15	Tipaporn Temprom: Cost structure and profitability analysis of integrated rice-aquaculture farming: A comparative study of landowners and tenants in Chachoengsao province, Thailand
	17:45	Closing Ceremony

Closing Ceremony

17:45-17:55 Best Research Paper Awards given by Prof. Kasem Soyong, President (AATSEA)

17:55-18:05 Certificate to all the Chairpersons by Prof. Kasem Soyong, President (AATSEA)

18:05- 18:25 Closing Remarks

Conclusion remarks for the conference: Prof. Dr. Hiroyuki Konuma, President (GIAPSA)

Closing and thanks for arranging the conference: Prof. Dr. Guo-Jing Li, Vice president (ZAAS)

Welcome to the 14thICIST2026 in Vietnam by Dr. Chau-Huynh Pham, Director (Danang Biotechnology Center)

Felicitation and motivational song: Prof. Kasem Soyong, President (AATSEA)

18:40 Farewell dinner at Vanwarm International Hotel

Saturday 1 November 2025, Study Tour

8:30: Start from Hotel

9:30-11:00: Visit Yang-Du Research Station of ZAAS

11:00: Go to Western Lake

16:00 Back to Hotel

End of program

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Abstracts

KEYNOTE SESSION

Climate impact on plant-pathogen interactions

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Infectious disease outbreaks in plants require not only a genetically susceptible plant and a virulent pathogen, but also conducive environmental conditions. Molecular studies in the past four decades have made major strides in understanding the mechanistic bases of plant resistance and pathogen virulence. However, less effort has been devoted to addressing an increasingly important question - why climatic conditions, such as temperature, humidity and salinity, have a profound effect on host susceptibility and disease development. Moreover, current studies often ignore the potentially pervasive effect a plant's endogenous microbiome may have on host-pathogen interactions. In this talk, I will give an example of interplay between plant, pathogen and environment during *Pseudomonas syringae* infection of host plants. Results suggest that future studies should increasingly consider the multi-dimensional nature of "plant-microbe-environment" interactions, which are likely more reflective of what occur in natural ecosystems.

Harnessing microbiomes for sustainable crop improvement and climate mitigation

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Mutualistic interaction with soil-borne fungi is a hallmark of a broad range of land plants which rely on such rhizosphere symbioses to assimilate nutrients and/or acquire stress tolerance. Using metagenomics, we identified the rhizosphere mycobiota associated with natural habitats and model plants Arabidopsis, rice, barley, wheat and soybean. Coupled with function-guided assays we isolated 20 beneficial fungal strains that individually or as SynComs enhance seed germination, plant growth, drought tolerance, and/or disease resistance, in addition to significant biomass and yield increase in target crops. Cell biology of the fungus-root interactions revealed 3 novel interfaces and abilities in inducing such robust growth. Comparative metabolomics and biochemical analyses provided molecular insights into cross-kingdom transport of fungus-derived beneficial metabolites, phytohormones (mimics) and assimilated phosphate as important contributing factors for such robust growth in the host. The most significant yield increase (~50%) was observed in plants inoculated with the beneficial fungal endophyte, *Tinctoporellus species* isolate AR8. Mechanistically, AR8 colonized the root cortex/endosphere and channeled the metabolic flux to phenylpropanoids and requisite secondary metabolites to promote plant growth. Mycobiont-induced biosynthesis of auxin improved root growth and provided an intrinsic source for long-distance signaling that enhanced shoot biomass. Chemical complementation and mutant analyses implicated a novel phenylpropanoid-auxin hub that drives such cross-kingdom symbiosis outcomes.

For climate mitigation, we first gained a systemic understanding of the assembly and function of microbiota in the rhizosphere under continuous flooding versus controlled irrigation in rice. Empirical analyses revealed a significant reduction in methane emissions under such controlled irrigation with precise fertigation. Genotypes or varietal differences did not influence such methane flux in rice.

Comparative metagenomics provided deep insights into syntrophic biomes and keystone taxa related to methanogenic, methanotrophic, nitrifying, sulphur-oxidising/reducing activities. Oxygen availability and soil redox potential were identified as key drivers that reshaped the rhizosphere microbiota and associated metabolic functions between the two irrigation regimes, leading up to our integrated science-based mitigation of climate impact.

Industrial production of *Trichoderma reesei* enzymes by liquid state fermentation and their early application in animal feeds in P.R. China

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The Ascomycota fungi fulfil a central role in most land-based ecosystems. They are important decomposers, breaking down organic materials, such as dead leaves and animals, and helping the detritivores (animals that feed on decomposing material) to obtain their nutrients. Ascomycetes, along with other fungi, can break down large molecules such as cellulose or lignin, and thus have important roles in nutrient cycling such as the carbon cycle.

Trichoderma comprises a group of filamentous ascomycetes that are widely used in industrial applications because of their ability to produce extracellular lignocellulose-degrading hydrolases in large amounts. Enzymes secreted by *Trichoderma* have received widespread industrial interest, leading to commercial applications in the textile industry, the food and feed industries, and the pulp and paper industry. *Trichoderma reesei* has the capacity to secrete enzymes in high yields and this property can be exploited when using *Trichoderma reesei* as an industrial host for homologous and heterologous enzyme production.

Trichoderma reesei's potential as a rapid and efficient biomass degrader was first recognized in the 1950s when it was isolated from United States Army textiles during World War II. The microbe secreted cellulases that were degrading cotton-based tents and clothing of service members stationed on the Solomon Islands. In the 1970s, at the time of the first global oil crisis, research interest in *Trichoderma reesei* gained popularity as it was explored as part of the solution to the world's growing dependence on fossil fuels. This early lineage was used as a starting point for both academic research with the goal of understanding secretion and regulation of expression of the complex mixture of enzymes required for cellulosic biomass decay as well as for its development as a host for industrial enzyme production. In 2001, at the onset of the second major oil crisis, research programs focused in microbial cellulases to produce ethanol from biomass led to another surge in the study of *Trichoderma reesei*. In addition to *Trichoderma reesei*'s role in bio-ethanol production, it is used to produce industrial enzymes with a broad range of applications supporting the bio-based economy. To date there are around 243 commercially available enzyme products manufactured by fermentation of microorganisms; 30 of these are made using *Trichoderma reesei* as a host, 21 of which are recombinant products sold for use in food, feed, and technical applications including textiles and pulp and paper.

Keywords: *Trichoderma*, Enzymes, Fermentation

Innovative organic products for health and wellness

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Innovative organic products for health and wellness are rapidly advancing across food, dietary supplements, and personal care, driven by consumer demand and expanding scientific evidence. In the food and beverage sector, probiotic and fermented products are expanding beyond dairy to include plant-based matrices, supported by growing research on gut microbiota modulation and its role in metabolic and inflammatory disorders. Plant-based proteins and dairy alternatives provide essential amino acids while reducing environmental impact, and fiber-rich products derived from sources such as blue corn and sweet potato have demonstrated benefits for digestive health, satiety, and colorectal cancer risk reduction. Functional ingredients including apple cider vinegar, polyphenol-rich botanicals, and green tea extracts are increasingly incorporated into mainstream products for metabolic regulation and antioxidant activity. In supplements, targeted formulations such as ashwagandha for stress and turmeric curcumin for inflammation reflect the shift toward evidence-based, outcome-specific products. Ayurvedic-inspired compounds are being standardized for bioactive content, bridging traditional practices with reproducible clinical outcomes, while specialized formulas including collagen peptides and nutrient-adaptive products for GLP-1 therapy highlight the trend toward personalized nutrition. Beyond ingestion, organic innovations extend to personal and home care. Organic cotton intimate products address dermatological safety and chemical exposure, while clean skincare formulations emphasize plant-based actives with demonstrated efficacy in enhancing barrier integrity, hydration, and anti-aging outcomes. Similarly, non-toxic homecare products provide biodegradable alternatives that support both family safety and ecological sustainability. Together, these developments illustrate how organic innovations integrate health, personalized nutrition, and sustainability, offering broad potential to improve human wellbeing while supporting planetary health.

Keywords: Health, Wellness, Organics

Genetic improvement of high protein content strain of *Agaricus bisporus* driven by agricultural waste recycling

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Agaricus bisporus is the mushroom species with the largest cultivation and yield worldwide, and it has significant economic value. Meanwhile, the raw materials for its cultivation come from the fermentation products of straw and livestock manure, so it is also one of the important ways for the resource utilization of agricultural waste. Protein content is an important nutritional trait of *Agaricus bisporus*, and the protein content of this species is higher than that of most edible fungi. Studying the genetic basis of protein content variation and exploring related excellent gene resources are of great significance for the development of high-protein strains. Based on the population genomics research of over 600 strains worldwide, this study found that the Greek population was enriched with genes related to protein metabolism, amino acid metabolism and carbohydrate metabolism during its local adaptive evolution, and it was identified that the *GLA1* gene was crucial for the formation of the high-protein content trait in this population. Subsequent transcriptomics, WGCNA and O2PLS analyses all re-verified this core

gene related to the protein content variation of *Agaricus bisporus*, and based on this, an overexpression strain of this gene was constructed. This not only reveals the potential connection between population adaptive evolution and carbon metabolism and protein accumulation under natural conditions, but also provides a solid support for improving the quality of edible fungi through gene regulation.

Keywords: Agricultural waste, Mushroom

Towards sustainable rural community: lessons learned from a pilot intervention at an Akha tribal community (Mae Chan Tai Village) in Northern Thailand

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As a part of global efforts to pursue SDG Localization, a pilot project “Community based Sustainable Livelihood Development in Mae Chan Tai Village” was formulated and implemented (2018-2025) at Akha tribal village in Northern Thailand, with a focus to SDG 1 (poverty), SDG 2 (hunger, sustainable agriculture) and SDG 10 (inequality). The pilot project achieved good progress. Mae Chan Tai village community established a community organization (Community Enterprise) which played a key role in bringing all villagers to help each other and working together to pursue their common objectives. The village community has successfully built-up community revolving fund (one of the most important key indicators to measure the sustainability of community-centered self-help effort) with a total of 127,617 baht (approximately 4,000 US dollars) in one year during 2024 which was used for various community activities. Estimated average annual net income of villagers doubled during 2018-2025, reflecting largely significant increase of the farm gate price of Mae Chan Tai arabica coffee beans, which corresponded to sharp appreciation of international coffee markets price, and increased recognition of the quality, taste and value of Mae Chan Tai arabica coffee that draw local buyers to pay higher prices for their superior quality. The living conditions of villagers improved significantly during the period.

Keywords: SDG Localization, Akha hill tribe, Arabica coffee, Sustainable Livelihoods

Crop breeding for organic production

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Organic crop breeding plays an essential role in developing crop varieties that are better suited for organic production system. It particularly emphasizes on improving the plant characteristics such as nutritional quality, pest and disease resistance, environmental stress tolerance, and efficient nutrient uptake—all while avoiding synthetic inputs and promoting ecological balance and biodiversity. The availability of crop varieties that thrive in organic environment would result in a more integrated food chain for organic system, from seed to plate. There are a number of organic crop varieties, ranging from food crops to horticultural crops, that have been developed for use in organic production system. Although there is no unique method for organic crop breeding, what is important is a holistic approach that is in line with the principles of organic agriculture. This implies that conventional breeding methods, participatory breeding, and molecular breeding, but not transgenic breeding, can be adapted

to develop new crop varieties for organic production. There are many challenges ahead that must be faced to produce useful innovations in organic plant breeding. By combining the recently available methods with new technologies, it can produce superior crop varieties that remain productive with healthy and nutritious products, profitable, and environmentally friendly.

Keywords: Ecological balance, Healthy and nutritious food, Organic crop varieties, Organic food chain, Synthetic inputs

Green agricultural policies and strategies in Asia

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Asia's agri-food systems are changing quickly, making a transition to sustainability urgently necessary to maintain social cohesion, environmental preservation, and food security. This study reviews and compares green agricultural (GA) policies and strategies across selected Asian countries, Bhutan, China, Japan, and the Philippines through the lens of the Environmental Performance Index (EPI) and Food Systems Countdown Initiative (FSCI) indicators. It aims to identify effective policies, policy gaps, and replicable best practices for sustainable agricultural development in the region.

Green Agriculture (GA) is defined as a holistic approach to farming that minimizes environmental degradation while ensuring economic viability and social responsibility. It integrates practices such as precision farming, organic production, biodiversity conservation, and waste reduction. The assessment highlights how national initiatives are aligning with global sustainability commitments, carbon neutrality goals, and food system resilience targets.

Japan's MIDORI Strategy promotes precision agriculture, food waste reduction, and biodiversity-friendly systems through the Satoyama and Satoumi concepts, yet faces challenges of aging labor and high technology costs. Bhutan's policy framework, guided by Gross National Happiness (GNH), aspires for 100% organic farming by 2035, balancing ecological integrity with rural livelihoods. The Philippines advances through the Agri-Pinoy framework and the Organic Agriculture Act, promoting climate-resilient, community-based farming but struggles with land degradation and resource constraints. China's 14th Five-Year Agriculture Green Development Plan emphasizes ecological restoration, pollution control, and low-carbon food systems showcasing large-scale integration of green certification, precision irrigation, and rural revitalization.

Comparative analysis based on EPI indices indicates Bhutan leading in biodiversity, Japan excelling in air and water quality, and the Philippines and China performing strongly in agricultural productivity. Common challenges include climate variability, fragmented markets for eco-certified products, and limited infrastructure for sustainable distribution.

The study concludes that coherent policy integration, technological innovation, public-private partnerships, and community participation are vital to scaling GA across Asia. Strengthened regional cooperation, green financing, and digital tools can further enhance resilience and competitiveness of sustainable agri-food systems. Green agriculture ultimately serves as a means of achieving inclusive economies, healthier diets, and sustainable rural development across Asia, in addition to being an environmental need.

Biocontrol rice blast disease

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Rice blast, caused by the fungus *Magnaporthe oryzae*, is one of the major threats to global rice production, causing an annual loss of three million tons of rice in China alone. To control rice blast, our group developed three strategies. First, we tried to identify key regulatory elements in pathogenicity-related pathways, focusing mainly on appressorium development and autophagy. We also aimed to identify accurate and efficient drug targets against the rice blast fungus. Second, we isolated many functional endophytic fungi from plants, mainly wild rice. We developed a set of endophytic fungal agents that promote growth, adsorb heavy metals, and enhance disease resistance. We applied these agents to rice and other economic crops, such as vegetables. This resulted in higher disease resistance, yield, and income, as well as lower costs. Third, we created a series of novel rice blast-resistant germplasm using the distant hybridization method, which induces genomic DNA from distantly related species, such as maize and sorghum, into rice via the pollen tube channel. The novel rice germplasm genotype includes high disease resistance, high quality, and high production, providing great materials for rice disease-resistant breeding. These methods provide insight into the green, sustainable, and integrated control of rice blast disease.

SESSION 1: MODERN ORGANIC AGRICULTURE

Identification of the antifungal metabolites, eurocidins, isolated from *Streptomyces* sp. JCK-8368 and optimization of their production

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Pepper (*Capsicum annuum* L.), a major solanaceous crop, suffers significant yield and quality losses due to stem rot disease caused by *Sclerotium rolfsii*, a necrotrophic fungal pathogen. As concerns about chemical fungicides grow and the efficacy of existing control methods becomes limited, biological control offering a sustainable and environmentally friendly alternative has emerged as a promising alternative. In this study, we evaluated the potential of *Streptomyces* sp. JCK-8368 as a biocontrol agent against *Sclerotium rolfsii*. *In vitro* assays revealed that JCK-8368 exhibited chitinase and siderophore activities and showed broad-spectrum antifungal activity against multiple phytopathogenic fungi, as assessed by MIC, dual culture, and VOC tests. To identify the agar-diffusible antifungal metabolites, the culture filtrate of JCK-8368 was extracted and purified to obtain refined fractions. Subsequent HPLC and ESI-MS analyses identified eurocidin C, D, and E as major antifungal compounds. To enhance the yield of the compounds, liquid culture conditions were optimized using a combination of one-factor-at-a-time (OFAT), Plackett–Burman Design (PBD), and Central Composite Design (CCD). Under optimized conditions, the production of antifungal compounds was increased by approximately 11.1-fold compared to the conventional TSB medium. The control efficacy of JCK-8368 against pepper stem rot was further validated on pepper seedlings under greenhouse conditions. When applied via soil drenching at a 5-fold dilution, the TSB-grown culture broth achieved 76.3% disease control, whereas the optimized culture broth and its SC formulation exhibited higher control efficacies of 89.5% and 86.8% at 5-fold and 50-fold dilutions, respectively. These findings suggest that *Streptomyces* sp. JCK-8368 has strong potential as a practical and environmentally friendly biocontrol agent against *Sclerotium rolfsii* in pepper cultivation.

Keywords: Biological control, Plant pathogen

Synergistic effects of *Chaetomium globosum* and *Trichoderma viridae* against chili anthracnose

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This study evaluated the efficacy of *Chaetomium globosum* and *Trichoderma viridae* against *Colletotrichum acutatum*, the causal agent of chili anthracnose. The research was conducted at the Laboratory of Agronomy and Plant Protection, Faculty of Agriculture, University of Bengkulu,

Indonesia, and field trial was carried out in Lubuk Linggau District, South Sumatra Province of Indonesia. The study was divided into three stages: Firstly, the rejuvenation of *Chaetomium globosum* and *Trichoderma viridae* fungi, and isolation and characterization of the pathogenic fungus *Colletotrichum acutatum*. Secondly, the multiple cultures were tested, as were the antagonistic fungi's mechanisms of resistance to the disease *Colletotrichum acutatum*. Thirdly, field trials were carried out to evaluate the synergistic effect of antagonistic fungi in suppressing chili anthracnose. The results demonstrated that *Trichoderma viridae* and *Chaetomium globosum* inhibited *Colletotrichum acutatum* by 90.30% and 88.20%, respectively, primarily via competition for nutrients/space and parasitism, with no observed antibiosis. the field trials revealed that both fungi significantly reduced anthracnose severity. *Trichoderma viridae* applications at 1, 2, and 3 g/L decreased disease incidence by 80.68%, 91.16%, and 92.27%, respectively, while *Chaetomium globosum* reduced it by 87.61–92.65%. Both exceeded synthetic fungicide Antracol (83.48–89.37% reduction) as a controlled treatment. Attack intensity followed a similar trend, with *Trichoderma viridae* (95.12–97.46% suppression) and *Chaetomium globosum* (92.76–96.83%) surpassing Antracol (89.95–93.80%). Additionally, *Trichoderma viridae* and *Chaetomium globosum* enhanced salicylic acid levels in chili plants, suggesting induced systemic resistance. These findings highlight the potential of antagonistic fungi as sustainable biocontrol agents, offering effective anthracnose management while reducing chemical residues.

Keywords: Antagonism, Inhibitory power, *Chaetomium globosum*, *Trichoderma viridae*, *Colletotrichum acutatum*

Organic biostimulant from *Sargassum polycystum* promotes vegetative growth and yield in sweet corn (*Zea mays* L.)

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The use of seaweed extracts of *Sargassum polycystum* as an organic biostimulant in sweet corn production is very promising due to its stimulating bioactive compounds. This study aimed to determine the optimum concentration of seaweed extract on growth and yield of sweet corn. An experiment was arranged in complete randomized block design with four replicates to evaluate the effects of five concentration levels of seaweed extracts, i.e. 0, 5, 10, 15, and 20 %. Results showed that foliar application of seaweed extract linearly increased plant height, stem diameter, plant leaf area, leaf greenness level, length of unhusked cob, diameter of unhusked cob, weight of unhusked cob, sweetness level of sweet corn. Further research should be established on using higher concentration of seaweed extract to determine the optimum concentration for increasing yield of sweet corn. In addition, to have more comprehensive understanding of how seaweed extract improves growth and yield of sweet corn it is suggested to evaluate the biochemical changes in the sweet corn.

Keywords: Biostimulant, *Sargassum polycystum*, Seaweed extracts, Sweet corn

Amphiphilic glycolipids from *Pseudomonas aeruginosa* PAS2: dual role in plant growth promotion and heavy metal detoxification

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A diverse group of microorganisms capable of producing surface-active agents was isolated from soils contaminated with heavy metals and evaluated for their production of amphiphilic metabolites using standard techniques, including the foaming test, emulsification index (E24), and emulsification activity assays. Among the screened strains, PAS2—a Gram-negative bacterium—displayed the most promising activity and was chosen for in-depth analysis. Molecular identification via 16S rDNA sequencing confirmed the organism as *Pseudomonas aeruginosa*. PCR amplification verified the presence of the rhlB and rhlC genes, which are responsible for the biosynthesis of glycolipid-type biosurfactants containing mono- and di-rhamnose units, commonly known as rhamnolipids. To improve the production of these rhamnose-based biosurfactants, culture parameters such as the types and concentrations of carbon and nitrogen sources, pH, incubation duration, and inoculum size were systematically optimized. Structural characterization of the extracted amphiphilic compounds using NMR and GC-MS confirmed their composition as rhamnolipids, a class of glycolipids with surface-active properties. When applied to cowpea (*Vigna unguiculata*) under pot culture conditions, these microbial biosurfactants not only promoted plant growth but also effectively decreased the absorption and accumulation of heavy metals in plant tissues.

Keywords: Microorganisms, Rhamnolipids, Glycolipids, Amphiphilic

Efficiency of a solar-powered automated drip irrigation system in enhancing yield and quality of durian and mangosteen in Eastern Thailand

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This research evaluated the efficiency of a solar-powered automated drip irrigation system (SPADIS) in improving the yield and quality of durian and mangosteen during their initial fruiting stage. SPADIS was compared with the conventional sprinkler emitter irrigation system (CSEIS), commonly used by local farmers in Pluang Subdistrict, Khao Kitchakut District, Chanthaburi Province, Thailand. The experiment was conducted in two orchards over a two-year period (2023–2024). Results showed that SPADIS significantly increased total fruit weight per tree and improved the proportion of Grade A produce for both crops. In 2024, durian trees irrigated with SPADIS yielded an average of 88 kg/tree, while mangosteen yielded 52 kg/tree, both exceeding the conventional pressure irrigation system. SPADIS also improved internal fruit quality, with durian reaching 33.5 °Brix and mangosteen reaching 19.5 °Brix, both higher than the control group. These findings highlight SPADIS as a promising

innovation to increase productivity and quality of economic fruit crops, while reducing labor dependency and promoting precision agriculture in Eastern Thailand.

Keywords: Automated drip irrigation, Durian, Mangosteen, Precision agriculture, Quality, Solar power, Yield

The molecular and chemical profiling of *ageratum conyzoides* as organic fertilizer: a comprehensive nuclear study

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The limited information about the available chemical substances from *Ageratum conyzoides* still be interesting discussion among organic application into soil. In this study, the compost of *Ageratum conyzoides* underwent comprehensive characterization using Nuclear Magnetic Resonance (NMR). The aromaticity degree calculated from ¹³C NMR spectroscopy showed that detected band indicative of aliphatic groups (C-H at 2925 cm⁻¹); aromatic groups (C=C at 1620 cm⁻¹); phenolic groups (at 1404-1419 cm⁻¹); and carbonyl groups (at 1225 -1223 cm⁻¹) in humic acid. The dominant organic compound was bis (tert-butyldimethylsilyl) carbonat, which varied from 6,90% to 25,68% in humic substances extract. The highest mass fraction of malonic acid amid was in the humic extract, it varied from 12,44% to 26,84%. Significant amounts of aromatic group were identified in humic compost. The observation in nuclear resonance indices that compost consistently revealed these findings offer a foundational framework for assessing maturity and for the judicious application of matured compost as organic fertilizers into soil systems.

Keyword: *Ageratum conyzoides*, Elemental, Chemical profiling, Organic fertilizer

Harnessing halotolerant rhizobacteria to improve oil quality and mineral nutrition in sesame under saline condition

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The present study was conducted to assess the effect of plant growth-promoting rhizobacteria (PGPR), *Pseudomonas toyotomiensis*, *Bacillus subtilis*, and *Bacillus cereus*, on sesame (*Sesamum indicum* L., TMV7) grown in saline soil. PGPR-inoculated plants showed significant improvements in growth and seed quality compared to untreated controls. Flame photometric analysis revealed reduced sodium (Na⁺) and enhanced potassium (K⁺) uptake in inoculated plants, improving ion homeostasis. Moisture and ash contents were optimized, with roasted seed moisture decreasing to 3.14% and ash content increasing to 4.25%. Protein and carbohydrate contents were elevated, reaching 1.55 mg/g and 57.62 mg/g, respectively. Total dietary fiber (8.52%), soluble (3.10%), and insoluble (5.42%) fiber fractions were also enhanced. Lipid content increased to 48.6%, and mineral analysis showed significant increases in Fe (5.65 mg/g), Zn (2.34 mg/g), and Mg (6.14 mg/g) in treated seeds. Tocopherol analysis via HPLC indicated higher levels of α- (22.5 mg/100g), γ- (18.9 mg/100g), and δ-tocopherols (6.3 mg/100g). GC-

based fatty acid profiling showed increased linoleic acid and oleic acid content. HPLC analysis confirmed enhanced sesamin (195.2 mg/100g) and sesamol (8.8 mg/100g) levels in PGPR-treated plant seeds. Overall, PGPR inoculation significantly improved sesame seed nutritional quality and stress tolerance under saline conditions.

Keywords: PGPR, *Sesamum indicum* L., Nutritional quality, Fatty acid profile, Vitamin E

Economic viability and water footprint analysis of a solar-powered automated drip irrigation system in durian and mangosteen cultivation

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This study evaluated the economic viability and water footprint reduction of a solar-powered automated drip irrigation system (SPADIS) compared with a conventional sprinkler emitter irrigation system (CSEIS) for durian and mangosteen cultivation in farmer-managed plots in Chanthaburi Province, Thailand (2023-2024). Although SPADIS required a higher initial installation cost (approximately 52,500 THB/rai versus 17,000 THB/rai for the conventional system), its annual operating costs were substantially lower (approximately 3,000-3,600 THB/rai/year compared with 10,800-11,700 THB/rai/year), primarily due to savings in electricity and fuel. Payback analysis indicated that the investment could be recovered within 2 years and 9 months, reflecting both increased revenue from higher yields and reduced operating expenses. Moreover, SPADIS significantly reduced the water footprint, achieving 0.38 m³/kg for durian and 0.33 m³/kg for mangosteen in 2024—values considerably lower than those observed under the conventional system. Overall, these findings demonstrate that SPADIS is a cost-effective investment that enhances both farm profitability and sustainable water use in agriculture.

Keywords: Economic viability, Water footprint, Automated drip irrigation, Solar power, Costs, Returns, Sustainable agriculture

Modern organic agriculture and organic certification from farm to table for sustainable agriculture

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Association of Agricultural Technology in Southeast Asia (AATSEA) is officially non profitable organization which established in 2011. We have members mostly scientists from many country Thailand, Sri Lanka, Philippines, India, Vietnam, Indonesia, Finland, Nigeria, Turkey, PR China, Cambodia, Estonia EU, Bangladesh, Laos, Myanmar. Organic certification is one activity we have started in 2016 to accredited the organic farmers without charge for organic certified eg Organic coffee in Laos, Organic

rice in Cambodia, Organic tea in Vietnam, Organic Vegetables in Myanmar, Organic tea in China, Organic Vegetables, Fruits, Eggs, Shrimps, Fishes etc. and organic golf course as well in Thailand. In 2022, AATSEA has collaboration with Earthsafe foundation which established by Central TOPS Supermarkets in Thailand for organic certify by Earthsafe powered by AATSEA and AATSEA-RIMOA certified organic farmers can directly deliver to TOPS supermarkets. We have started to evaluate from non-agrochemical production (NAP) in conversion period to Organic Agriculture (OA). Non-agrochemical production (NAP) is defined as the growers stop the using synthetic agrochemicals, including chemical fertilizers and chemical pesticides (fungicides, insecticides, herbicides, etc.) for their productions, including crop and animal production. It is to revitalize the surrounding agroecosystem and surrounding environment, improve soil biodiversity, soil fertility with high organic matter, and proper soil pH for plant growth. NAP products leave low concentrations of toxic chemical residue in the soil, water, and agricultural products at a minimum standard for hazardous to consumers and living organisms in surrounding environments. The growers combine conventional methods to maintain and improve soil fertility, biological activities, biodiversity, soil revitalization and remediation with beneficial microorganisms and apply biological products and natural products as agricultural inputs for their production to maintain the quantity and quality of agricultural products with food security and safety. NAP can be transferred for organic agriculture certification when no toxic agrochemical residues are detected in the soil, water, and agricultural products. Organic agriculture (OA) is defined as a system that relies on the ecosystem and environmental and social impacts by stopping synthetic agrochemical inputs, such as synthetic fertilizers and pesticides, veterinary drugs, and genetically modified seeds/organisms. Synthetic chemicals are replaced in organic agriculture with innovative products, natural products, beneficial microorganisms, biological products, natural substances, and management practices to maintain and increase long-term soil fertility. Organic agriculture promotes and enhances agroecosystem health, biodiversity, biological cycles, soil fertility, and activities. Organic agriculture products 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).

Keywords: Organic agriculture, Non-agrochemical production

Organic development in Lao PDR

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Lao PDR has developed its own "Clean Agriculture Policy" to promote the reduction of agrochemical use. This unique policy recognizes organic scheme and the traditionally lower agrochemical inputs used in the country compared to those surrounding Lao PDR, which could be a competitive advantage for the supply of safe and environment-friendly agricultural products to the ASEAN region and beyond.

The development of organic agriculture began in 2004 as a strategy to transition from subsistence farming practices. In 2013, Lao Organic Standards were adopted from the International Federation of Organic Agriculture Movement (IFOAM) Standards. The ASEAN Economic Community (AEC) was materialized in 2015 which requires harmonized set of standards or guidelines. Lao PDR is at an advantage because it already has organic standards and GAP standards in place. Currently the certifying body, which is based on ISO/IEC17065, has 15 central and local inspectors, 250 farm advisors, 22

(certification) committee members, and 20 farm-based ICS technicians.¹ Certifications have been carried out in 49 certified farms (e.g. 23 single farms and 26 collective farms owned by 155 sub-groups with 2785 families); organic-certified land covered 3327.16 hectares harvesting a total of 7729.78 tons of produces in 10 provinces. 16 farms (or 200 family units) were certified across 1094.76 hectares harvesting 4955.69 tons of produces. As a result, the Lao approach could contribute to improvement of both food safety and income generation of farmers. This suggests that the Lao approach should be taken into consideration by other developing economies where small-scale farmers are in the majority.

Keywords: Clean agriculture, Organics

Promoting the production and utilization of rice straw pellet organic fertilizer among rice farmers in Nong Phak Nak Subdistrict, Sam Chuk District, Suphan Buri Province

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This applied research employed both quantitative and qualitative methodologies to strengthen farmers' capacity in producing and utilizing rice straw pellet organic fertilizer. The study was conducted in three phases. Phase 1, a situational survey, revealed that most farmers had high to very high knowledge of organic fertilizer use in rice cultivation. Of these, 35% used it alongside chemical fertilizer, while 65% did not use it due to a lack of equipment and perceived complexity of production. The main constraint identified was the slow nutrient release compared to chemical fertilizer. Farmers' highest demand for support involved study visits, training, and exhibitions, particularly on producing rice straw pellet organic fertilizer. Phase 2 implemented hands-on training and field trials using a formula of eight parts rice straw, two parts animal manure, 1.5 kg lime, and 1,000 ml soil conditioner, fermented without turning for 1.5 months. This process yielded 700 kg of pellet fertilizer, which proved effective in rice cultivation. Post-training assessment showed significant improvement in farmers' knowledge ($p < 0.01$) and skills in production, application, and adaptation for other crops. Farmers could also effectively transfer their knowledge to peers. Phase 3, conducted six months later, showed that most participants continued producing and using the fertilizer, achieving a 10–15% increase in rice yield, reducing chemical fertilizer use by 30%, and applying the fertilizer successfully to other crops. The practice lowered production costs and enhanced knowledge sharing within the community. Overall, the intervention promoted efficient and sustainable use of local agricultural resources, contributing to improved productivity, environmental conservation, and community self-reliance.

Keywords: Rice straw pellet organic fertilizer, Farmer capacity building, Sustainable agriculture

The effect of liquid organic fertilizer on the growth of *Dendrobium sp.* in acclimatization period

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Acclimatization is a critical phase in orchid micropropagation that can lead to damage and plant failure in ex vitro conditions. In vitro orchid seedlings are highly sensitive to ex vitro environments, particularly to high temperatures that increase evapotranspiration. Special care and handling are necessary to enhance the resilience and survival rate of orchid plants during the acclimatization process. Additionally, proper administration of fertilizers is crucial to ensure plants receive adequate nutrients for healthy growth during acclimatization. The application of liquid organic fertilizer (LOF) during the acclimatization of *Dendrobium* orchids increased plant height and leaf length. The optimal LOF concentration for achieving a plant height of 6.66 cm is 1 ml/L applied at 2-day intervals, while the optimal leaf width of 5.44 cm was achieved with 2 and 3 ml/L applied at 3-day and 4-day intervals, respectively. LOF concentrations significantly affected leaf width, root number, and root length. The optimal LOF concentration for these variables was 2 ml/L. Additionally, the interval of LOF application significantly affected leaf and shoot numbers, with the optimal interval for these two variables being every 2 days. This research provides a significant perspective on using liquid organic fertilizer during the acclimatization stage of tissue culture propagation of orchid plants.

Keywords: Application intervals, Fertilizer concentration, Orchid seedlings plantlet acclimatization

Synergistic effect of arsenic tolerant rhizobacteria on legume growth and biochemical defense under toxic conditions

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This study investigated the isolation, identification, and functional characterization of arsenic-tolerant rhizobacteria from arsenic-contaminated soils in Mettur, an industrially polluted region. Two strains *Pseudomonas alcaliphila* (PAS1) and *Pseudomonas aeruginosa* (PAS2) were isolated based on their high tolerance to arsenic, confirmed through Minimum Inhibitory Concentration (MIC) assays. Both strains were biochemically characterized and screened for key plant growth-promoting (PGPR) traits, including phosphate solubilization, siderophore, ammonia, indole-3-acetic acid (IAA), and hydrogen cyanide (HCN) production, as well as hydrolytic enzyme activities such as amylase and protease. Molecular identification using 16S rRNA gene sequencing confirmed their taxonomic status. Pot culture experiments were conducted on two legume crops, *Cajanus cajan* (pigeon pea) and *Vigna unguiculata* (cowpea), under arsenic stress. Inoculation with PAS1 and PAS2 significantly enhanced plant growth parameters, including shoot and root length, biomass accumulation, and relative water content in both species. Dual inoculation exhibited a synergistic effect, outperforming individual treatments. Biochemical analyses revealed elevated levels of photosynthetic pigments, flavonoids, carbohydrates, proteins, and antioxidant enzymes (peroxidase and catalase), along with a marked reduction in lipid peroxidation (malondialdehyde content), indicating enhanced oxidative stress tolerance. These findings demonstrate the dual efficacy of PAS1 and PAS2 in promoting growth and alleviating arsenic-induced stress in both pigeon pea and cowpea. The study underscores their potential application in microbe-assisted phytoremediation and sustainable agriculture on arsenic-contaminated soils.

Keywords: Malondialdehyde, *Cajanus cajan*, *Vigna unguiculata*, *Pseudomonas alcaliphila*, *Pseudomonas aeruginosa*

Enhancing macronutrient uptake and growth of soybean in coastal areas through integrated biofertilizer applications

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Coastal soils are often constrained by low fertility, salinity stress, and nutrient imbalances, limiting soybean (*Glycine max* L.) productivity. This study investigated the effects of integrated biofertilizer applications on nutrient uptake and growth performance of three soybean cultivars in coastal agroecosystems. The field experiment was conducted from May to August 2025 in Pasar Pedati Village, Central Bengkulu, using a split-plot design with cultivars (Anjasmore, Dering I, and DEGA) as main plots and five nutrient input treatments as subplots: recommended inorganic fertilizer; arbuscular mycorrhizal fungi (AMF) + Bradyrhizobium + potassium-solubilizing bacteria + bioenzyme; Bradyrhizobium + phosphate-solubilizing bacteria + potassium-solubilizing bacteria + bioenzyme; Bradyrhizobium + potassium-solubilizing bacteria + humic acid; and Bradyrhizobium + phosphate-solubilizing bacteria + potassium-solubilizing bacteria + humic acid. Results show that integrating soybean cultivars with microbial- and bioenzyme-based biofertilizers significantly enhanced soil quality, plant growth, and macronutrient uptake compared to inorganic fertilizers. Anjasmore showed the highest biomass and nutrient accumulation, while Dega I and Dering I had moderate responses. Biofertilizer treatments increased soil pH, tissue N, P, and K, and overall nutrient use efficiency. These results highlight the potential of combining superior cultivars with biofertilizers to sustainably improve soybean growth and reduce reliance on inorganic inputs.

Keywords: Soybean, Coastal soils, Biofertilizer, Nutrient uptake

Effectiveness of climate-resilient and organic farming adaptation strategies in saline-prone areas of Bangladesh

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Bangladesh is facing tremendous challenges as a result of climate change, particularly in its coastal regions that are prone to salinity intrusion, where frequent floods, cyclones, and other extreme weather events have a considerable influence on agricultural output and food security. This study investigates the effectiveness of climate-resilient adaptation strategies advocated by the Christian Commission for Development in Bangladesh (CCDB), with an emphasis on incorporating organic farming practices. The research was conducted in four villages across two upazilas in the coastal districts of Barguna and Bagerhat, involving 150 households practicing at least two adaptation strategies. Key adaptation measures examined include the use of salt-tolerant rice varieties, homestead gardening, climate change coping training, vermi-comp. ost application, and irrigation. Results indicate that training on coping with climate change was the most widely adopted and perceived as the most effective strategy. Socioeconomic factors such as education level, extension media contact, and support from governmental and non-governmental organizations significantly influenced the success of these strategies. Notably, vermi-compost use highlights the role of organic farming in enhancing soil fertility

and crop resilience under saline conditions. Barriers to adoption included insufficient support, time constraints, and lack of training offers. The research highlights the significance of integrating climate-resilient methods with organic farming practices, such as vermicomposting, to enhance sustainability and resilience in agriculture affected by salinity. Recommendations encompass enhancing extension services, providing consistent farmer training, and promoting increased institutional support to facilitate the implementation of these integrated adaptation strategies. This combined method not only lessens the bad effects of climate change, but it also supports long-term agricultural growth, which makes it easier for coastal communities in Bangladesh that are vulnerable to losing their jobs to make a living.

Keywords: Climate change, Agricultural adaptation, Organic farming, Bangladesh

SESSION 2: PLANT BIOTECHNOLOGY

Increasing phosphorus uptake and sweet corn yield through *Azolla pinnata* compost and lime application in Ultisols

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Azolla compost significantly increased total soil organic carbon (TSOC) by 27% and soil pH by 20.6% at 15 tons/ha compared to unfertilized soil, but comparable with 10 ton/ha. Phosphorus uptake by sweet corn was more than doubled with the application of *Azolla* compost at 10 tons/ha as compared to unfertilized soil, accompanied by increases in shoot dry weight and unhusked ear weight by 1.23 times and 81.9%, respectively. In general, the application of *Azolla* compost at a rate of 10 ton/ha is sufficient to increase productivity of sweet corn in Ultisols. While calcium carbonate application significantly improved soil pH and P tissue concentration, it had no effect on TSOC, phosphorus uptake, shoot weight, or unhusked ear weight. These findings provide valuable insights for optimizing sweet corn fertilization in Ultisols.

Keywords: Soil organic carbon, Soil pH improvement, Phosphorus uptake efficiency, Sweet corn productivity, Sustainable soil amendment

Calcium phosphate enhances biomass, pigment and some secondary compounds accumulation in *Cannabis sativa* L. callus cultures

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The application of calcium phosphate ($\text{Ca}_3(\text{PO}_4)_2$) on cannabis callus cultures for 7 days resulted in a significant increase in both fresh and dry weights across the range of 800–2000 mg/L, with no statistical differences between concentrations. However, higher calcium phosphate concentrations led to a reduction in Chlorophyll a, Chlorophyll b, total chlorophyll, total pigments, and DPPH radical scavenging activity. In contrast, treated with 800 and 1600 mg/L calcium phosphate significantly increased the levels of total phenolics and carotenoids, while total flavonoid content increased proportionally with the concentration of calcium phosphate in the cultures. These findings suggested that calcium phosphate can influence the biosynthesis of secondary metabolites in cannabis callus cultures.

Keywords: Cannabis, Callus, Calcium phosphate, Secondary compound

Characterization of morphological variation in wild orchids of Kepahiang Regency, Bengkulu Province

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Wild orchids, as natural genetic resources, are needed to create superior commercial varieties. Orchids from nature play an important role for use as a parent crosses. Morphological characterization of natural orchids is fundamental, especially for orchids found in their natural habitat, to determine the exact species. This study aimed to obtain a complete morphological characterization and phylogenetic tree to determine genetic kinship and natural grouping of 30 orchid accessions from Kepahiang Regency, Bengkulu Province, Indonesia. Morphological characterization was conducted by using the Descriptor and Characterization list issued by the Floriculture Research Center, Department of Agriculture (BALITHI-DEPTAN). Morphological binary data were analyzed using the program NTSYS - pc (Numerical Taxonomy and Multivariate Analysis) version 2.02i. Clustering method used dice coefficients of Similarity for Qualitative Data (SIMQUAL) and Sequential Agglomerative Hierarchical and Nested (SAHN) - Unweighted pair - group method arithmetic average (UPGMA). A dendrogram based on an analysis of 66 morphological characters was found, and the coefficient of similarity between natural orchid species ranged from 0.29 to 0.71. Orchid species of the same genus were clustered in a specific form. The correlation matrix of the morphological marker reaches a goodness of fit (r) of 0.88. This value proves that the grouping based on morphological characterization of species of orchids can be categorized accordingly and can be used as a reference for determining the parent cross.

Keywords: Accession, Characterization, Genetic resources, Orchid, Phylogenetic

Optimization of protoplast isolation from *Cannabis sativa* L. ‘Hang Kra Rog’

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Protoplast isolation is a critical technique in plant biotechnology, enabling genetic transformation, somatic hybridization, and cell fusion studies. This study aimed to optimize the enzymatic conditions for efficient protoplast isolation from cannabis *Cannabis sativa* L. ‘Hang Kra Rog’ leaves. Various concentrations and types of cellulase (RS and R-10), macerozyme, mannitol, and enzymatic incubation times were systematically investigated. The results showed that 2.0% Cellulase R-10 combined with 0.3% Macerozyme and 0.4 M mannitol, with an incubation time of 16 hours, yielded the highest number of viable protoplasts (4.51×10^6 cells/g fresh weight) with viability exceeding 95%. These findings provided a robust and reproducible protocol for isolating viable protoplasts from cannabis leaves, facilitating further cellular and molecular studies in cannabis biotechnology.

Keywords: *Cannabis sativa* L., Cellulase, Macerozyme, Mannitol, Protoplast isolation

Wilting and drying technique effect the antimalarial chemical content of *Artemisia annua*

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Artemisia annua is a plant that produce artemisinin, a compound used to treat malaria. It has been naturalized in Indonesia since 2000. Since it introduced to Indonesia, many studies have been conducted dealing with the adaptation, cultivation and genetic improvement, but the study of post-harvest handling of *Artemisia annua* was still limited. This study aimed to determine the appropriate of postharvest handling technique to maintain the artemisinin content of *A. annua* leaves. The postharvest method employed in this study involves wilting and drying technique to achieve the optimum artemisinin content in *A. annua* leaves from different harvest periods. The study's results showed that 24 hours of wilting time and an air-drying method yielded the highest artemisinin level of 0.57%, along with a 1.1% essential oil level from the third harvest period. The wilting time and drying technique influenced the drying shrinkage level, flavonoid, artemisinin, and essential oil content of *A. annua* at different harvest periods.

Keywords: *Artemisia annua*, Drying, wilting, Artemisinin

Influence of leaf type, genotype, and location on bioactivities and assessment of genetic diversity in teak (*Tectona grandis* L. f.)

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This study evaluated factors influencing the biological activities of extracts from teak (*Tectona grandis* L. f.) leaves and assessed genetic diversity among selected germplasm. Fresh and fallen leaves from five plus trees, Chiang Mai, Phrae, Sukhothai, Lampang, and Khon Kaen, grown at two locations, Thongphaphum and Phitsanulok Silviculture Research Stations, were analyzed. Methanol extracts were tested for antibacterial, anti-tyrosinase, and anti-inflammatory activities, while genetic diversity was determined using sequence-related amplified polymorphism (SRAP) markers. Leaf type, tree genotype and planting location significantly influenced antibacterial activity, with the Phrae plus tree from Thongphaphum showing the highest inhibition against the tested microorganisms. Sequential extraction of Phrae plus tree leaves with hexane and dichloromethane yielded fractions with potent antibacterial activity, suggesting potential for new antibacterial agents. The SRAP analysis showed similarity coefficients ranging from 0.67 to 1.00, indicating relatively low to moderate genetic diversity among the studied samples, with some pairs exhibiting nearly identical genetic profiles. These findings highlighted the influence of genetic background and environmental factors on teak bioactivities and provide a basis for germplasm selection in product development.

Keywords: Antibacterial activity, Bioactivity, Genetic diversity, SRAP markers, Teak

Effects of harvesting intervals on the growth, yield, and crude protein of *Morus alba* cv. Buriram 60¹

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This study evaluated the effects of four harvesting intervals 45, 60, 75, and 90 days on the growth, yield, and crude protein content of the Buriram 60 mulberry variety. Growth parameters (plant height, stem diameter, leaf greenness (SPAD), and leaf area), yield components (branch length, leaves per branch, and weight of 50 leaves per plant), crude protein content, and dry leaf yield were evaluated. The results indicated that the 90-days harvesting interval significantly increased plant height, SPAD value, stem diameter, leaf area, branch length, and 50 leaf weight per plant, producing the highest dry leaf yield (4,178.06 kg ha⁻¹). In the other hand, the 75 day harvesting interval produced higher leaf area and leaves per branch including higher crude protein content. A strong positive correlation was found between SPAD value and 50 leaf weight per plant at the 90 day interval. Therefore, the harvest at 90 day is optimal for maximizing biomass yield, while the harvest at 75 day enhances leaf nutritional quality. The selection of an appropriate harvesting interval is therefore a critical management practice influencing both the yield and quality of mulberry leaves for silkworm production.

Keywords: Mulberry, Crop cutting, Management, Plant growth

Evaluation of combination fertilizer application on growth, yield, and crude protein of *Morus alba* cv. Sakhon Nakhon in Thailand

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This study aimed to evaluate the growth, yield, and crude protein content of *Morus alba* cv. Sakhon Nakhon in response to the combination fertilizer application in Thailand. At the first cutting, application of chemical fertilizer only (T3) treatments promoted superior plant height and stem diameter. The application of T4 (chemical fertilizer 13.63 kg ha⁻¹ with bio-fertilizer) maximized leaf area, and both treatments produced the highest dry matter yield. T3 also yielded the highest crude protein content (18.21%). At the second cutting, T5 (chemical fertilizer (6.81 kg ha⁻¹) with bio-fertilizer) exhibited fresh and dry biomass yields. Indicating that T4 and T5 consistently enhanced key yield components, including branch length, leaf number, and 50 leaf weight. These results suggested that fertilizer regimes represented by T4 and T5 are most effective for improving mulberry vegetative growth and yield performance, while T3 may be more suitable for enhancing nutritive value.

Keywords: Mulberry, Bio-fertilizer, Crude protein content

Study on the regeneration of sausage tree (*Kigelia africana*) by tissue culture

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This study investigated the regeneration of sausage tree (*Kigelia africana*) using tissue culture techniques, focusing on callus induction, shoot regeneration from seeds, and root induction from shoot explants. Seeds were cultured on solid MS medium supplemented with various concentrations of BA (0.5, 1, 2, 3, and 5 mg L⁻¹) for 10 weeks. Callus formation was observed at all BA concentrations, with the largest mean callus volume (5214.17 mm³) and highest induction rate (80%) achieved at 5 mg L⁻¹. Shoot regeneration occurred across all BA treatments, with the highest number of shoots (45 shoots; 86.54%) obtained on medium containing 1 mg L⁻¹ BA. Root induction was studied using shoot segments derived from seed-induced shoots cultured on MS medium supplemented with IAA, NAA, or IBA for 4 weeks. IAA at 0.5 mg L⁻¹ induced roots in 33.33% of explants with an average root length of 6.68 mm. NAA at 2 mg L⁻¹ promoted the highest root induction (70.83%), though roots were shorter, while 1 mg L⁻¹ NAA produced fewer roots but with greater length (7.00 mm). IBA at 3 mg L⁻¹ induced rooting in 33.33% of explants with an average root length of 3.78 mm and also stimulated callus formation, with the largest callus volume observed at 2 mg L⁻¹. These results demonstrated that BA is effective for callus and shoot induction, while IAA, NAA, and IBA promote root formation with distinct responses depending on concentration. The optimized protocols provide a foundation for *in vitro* propagation, mass multiplication, and conservation of *K. africana*, with potential applications in biotechnology and secondary metabolite production.

Keywords: Plant regeneration, Root induction, Shoot induction, Sausage tree

Enhancing ground nut (*arachis hypogaea* L.) growth and yield using oil palm bunch ash and urea fertilizer in ultisolss

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This study aimed to determine the optimal combination of oil palm empty fruit bunch (EFB) ash and Urea for ground nut growth and yield, to identify the best EFB ash dosage, and to determine the optimal Urea dosage for ground nut growth and yield. This study used a factorial Randomized Complete Block Design arranged factorially using 2 factors as a treatment i.e. Oil Palm Empty Fruit Bunch (EFB) Ash (0, 2, 4, 6 ton ha⁻¹) and Urea fertilizer (0, 25, 50, 75 kg ha⁻¹). The results showed that there were interaction significantly influenced the number of pods per plant, dry seed weight per plot, and 100-seed weight. Individually, EFB ash significantly affected plant height, flowering age, root nodules, leaf greenness, and pod yield parameters, while Urea significantly influenced plant height, flowering age, root nodules, leaf greenness, and dry pod weight per plot. The optimal treatment combination was 50 kg ha⁻¹ Urea with 6 ton ha⁻¹ EFB ash, producing the highest dry seed weight (269 g per plot). The best individual dosages were 4 ton ha⁻¹ EFB ash for overall plant development and 50 kg ha⁻¹ Urea for maximizing nodulation and yield components.

Keywords: Soil conditioner, Sustainable agriculture, Oil palm waste, Plant productivity

Effect of paclobutrazol application on growth, flowering, and vegetative leaf anatomy of potted *Chrysanthemum grandiflora*

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This study investigated the effects of paclobutrazol (PBZ) applied by soil drenching at concentrations of 0–400 ppm on *Dendranthema grandiflora*. The results demonstrated that PBZ at concentrations of 100–400 ppm significantly affected several morphological traits. Plant height was reduced by 30%–70%, and canopy size decreased to 50%, resulting in a lower compactness index. While the number of lateral branches increased from 3–4 branch/plant in the control to 6–7 branch/plant in PBZ-treated plants. Morphological changes, including darker green and thicker leaves, led to anatomical studies, which revealed a 69%–73% increase in palisade and spongy mesophyll tissue thickness and nearly double the stomatal density at higher PBZ concentrations. These changes corresponded with a marked reduction in the fresh and dry weight of stems and leaves, indicating growth retardation. Conversely, root development was enhanced, with significant increase in both fresh and dry root mass.

Keywords: Dry weight, Fresh weight, Leaf cytology, Morphological traits, Plant growth retardant

Characterization of morphology, physicochemical, and antioxidant activity of edible portion of jackfruit (*Artocarpus heterophyllus* Lam.)

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Results indicated that average of fruit length, width of fruit, fruit diameter, weight of fruit, fruit firmness, weight of flake, weight of seed, fruit thickness, soluble solids concentration, total number of seeds, number of seed per kilogram, and flavonoid were 43 g, 24.9 g, 17.8 cm, 10.4 kg, 10.68 kgf/cm², 389.11 g, 112.78 g, 0.48 cm, 16.22 %Brix, 58, 16, 3.62 µg QEg/mL, respectively. Dendrogram plot showed that 9 measured accessions were divided into 4 clusters with similarity index of 0.326 %. Cluster I consisted of Palak Siring, Kaban Agung, and Tanjung Alam. Cluster 2 was composed of Tanjung Mulia, Padang Sialang, and Pasar Bawah. Cluster III covered Sukamerindu, Tanjung Jaya and Surabaya. The highest index of morphology similarity was found between Palak Siring accession and Kaban Agung accession with similarity index 0.02 %. This study is proceeded by evaluating jackfruit accession from Kabupaten Muko-muko, Kabupaten Seluma, and Kota Bengkulu.

Keywords: Biodiversity, Chemical compound, Environmental destruction, Mitigation, Quality

Effect of ethyl methanesulfonate on growth and morphology of *Doritis pulcherrima* Lindl.

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This study evaluated the effects of culture medium, plant growth regulators, and chemical mutagenesis on the growth and morphology of *Doritis pulcherrima* Lindl. The research consisted of three experiments. In the first experiment, a 3×2 factorial completely randomized design was used to evaluate 3 medium types (MS, ½MS, and VW) and 2 types of breeding (self and cross-pollinated). The ½MS medium yielded the highest germination rates 74.82–76.88% at 8 weeks, while the VW medium promoted superior seedling development at 12 weeks. The second experiment evaluated seedling responses on VW medium supplemented with 150 ml/l coconut water, 20 g/l sucrose, 2 g/l activated charcoal, and various concentrations of BA and NAA. Results showed that 0.5 mg/l BA and 1 mg/l NAA promoted the greatest seedling growth, with increased leaf number, leaf length, plant height, and root development. In the third experiment, protocorm-like bodies were treated with EMS at 0, 0.5, and 1.0% for 60 or 90 minutes. Survival declined with increasing concentration and time, with LD₅₀ values of 0.82% at 60 minutes and 0.54% at 90 minutes. Chlorophyll a, Chlorophyll b, and carotenoids were not significantly affected, but stomatal size changed. Stomatal width and length increased under 1.0% EMS, while density decreased from 220.17 to 149.47 stomata/mm². EMS treatment for 90 minutes showed an increased density relative to 60 min. RAPD analysis using 10 primers revealed high polymorphism indicating EMS induced genetic variation. Cluster analysis divided 22 samples into 9 groups at a similarity coefficient of 0.89, confirming genetic diversity despite no visible morphological changes.

Keywords: Plant tissue culture, Orchid, EMS, Mutation and RAPD marker

Comparative study of different cultivation systems of black soybean on Ultisol land

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The study demonstrated that soybean growth and yield under water-saturated conditions differed significantly from those under conventional cultivation systems. In addition, root physiology and anatomy of soybeans grown under water-saturated conditions also showed significant differences compared to those under conventional systems. The average plant height of soybeans under water-saturated conditions was 47.67 cm, compared to 40.13 cm under conventional conditions. Similarly, the number of soybean pods was higher under water-saturated conditions (121.40 g) than under conventional systems (84.13 g). The dry shoot weight and dry root weight were also significantly greater under water-saturated conditions (24.07 g and 5.07 g, respectively) than under conventional conditions (16.93 g and 1.70 g, respectively). These findings highlighted the importance of water-saturated cultivation systems for enhancing soybean growth and yield on Ultisol land.

Keywords: Agro-physiological, Black soybean, Ultisol land, Water-saturated systems, Conventional systems

Effects of cultivar, culture medium, and plasma treatment on callus induction in *Capsicum* spp. through *In vitro*

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Four chili pepper cultivars were successfully germinated on MS medium under *In vitro* conditions. PEP12 cultivar showed the highest germination speed and rate throughout all weeks, while ANT4 cultivar had a low germination rate in the 2nd week but an increased rate in the 3rd week. PEP6 cultivar had the lowest germination rate in the 3rd week, and YS cultivar had a moderate germination rate in all weeks. Callus derived from the hypocotyl of ANT4 on MS medium supplemented with 2 mg/L 2,4-D and 0.5 mg/L kinetin showed the highest callus induction efficiency (67.38 mm²). The callus induction experiment using air plasma jet treatments on PEP12 and YS revealed that PEP12 exposed to plasma for 9 seconds exhibited the highest callus growth rate at both the 2nd and 4th weeks. In contrast, YS consistently showed lower growth than PEP12 under all conditions. However, plasma treatments, even at the maximum exposure of 12 s, did not result in significant differences compared to the control group, indicating that plasma had only a minimal impact on callus growth, with most observed variations attributable to cultivar effects.

Keywords: Callus, Chili pepper, Plasma treatment, Tissue culture, Callus induction

Aluminum tolerance screening of cayenne pepper (*Capsicum annuum* L.) genotypes at the seedling stage under nutrient solution stress

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Averaging the concentration that inhibit 75% growth (IC₇₅) the result of orthogonal polynomial regression analysis on plant height, root length, root fresh weight, root dry weight, shoot fresh weight and shoot dry weight yielded an IC₇₅ threshold of ~1600 ppm AlCl₃·6H₂O (≈ 179 ppm Al³⁺ or ≈ 6630 μM Al³⁺), which we propose as the critical concentration for effective hydroponic screening. The (STI) analysis on the data collected from IC₇₅ hydroponic evaluation on 41 cayenne pepper genotype provided a robust classification into five tolerance groups, ranging from highly tolerant (HT) to highly sensitive (HS), thereby offering a clear picture of genotypic diversity in response to aluminum stress. At the whole-plant level, the highly tolerant (HT) group was represented by 'CMK Lolay' and 'Tanggo', with average STI values above 0.40. These genotypes consistently expressed resilience across multiple traits, suggesting that they possess both morphological and physiological mechanisms conferring aluminum tolerance. A slightly lower but still strong level of tolerance was observed in the tolerant (T) group, which included 'Dumay', 'Seulawah Aceh', 'Awe Aceh', 'Iggo', 'Kawat', 'Laris', 'Perintis', 'Landung', and 'PBC396'. The rest genotype were consider medium tolerant (MT), sensitive (S) and highly sensitive (HS). The HT and T group suggest potential genetic resources for breeding Al-tolerant cultivars. However, further field validation under acidic soil conditions is recommended.

Keywords: Acid stress, Hot pepper, IC₇₅, Selection, STI

SESSION 3: PLANT PROTECTION

Potential use of plant extracts as fungicides for controlling blast disease in rice

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Blast disease, caused by the infection of *Pyricularia oryzae*, is a very destructive rice plant disease and can result in crop failure. With the content of secondary metabolites that are antifungal, several types of plant materials can be developed as environmentally friendly and safe fungicides. Five of the 29 plant extracts tested had more than 50% inhibition against the growth of *P. oryzae*, namely ginger rhizome (50.34%), bay leaf (55.62%), aromatic ginger rhizomes (56.88%), dogfruit shell (60.13%), and garlic bulb (64.07%). Applying the five plant extracts as fungicides with a concentration of 30% was able to reduce leaf blast incidence by 44.74% to 57.90% and panicle neck blast by 51.72% to 69.97%, as well as leaf blast severity by 62.02% to 82.18% and panicle neck blast by 52.90% to 85.05%. In terms of plant productivity, the reduced disease incidence and severity caused rice blast had also reduced the empty grain and maintained both grain size and grain yield.

Keywords: Botanical fungicide, Disease incidence, Disease severity, Efficacy, Leaf blast, Neck blast

Drought tolerance of *Stylosanthes guianensis* CIAT 184 by tissue culture

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The multiple shoots induction of *Stylosanthes guianensis* CIAT 184 was cultured on MS medium supplemented with 3 mg/l TDZ. The percentage of shoot induction was 100%, the average shoots was 36.80 per seed, and the average height of shoots was 0.76 cm. The shoots were transferred to rooting on MS medium supplemented with 0.3 mg/l IAA. The percentage of root induction was 40% and the average number of roots was 6.50 per shoot. Physical gamma rays induced the mutation. Seeds were irradiated with 0, 5, 10, 15, 20, 25, 30 and 50 Krad. The results showed that *S. guianensis* CIAT 184 irradiated at 44.38 Krad gave 50 % (GR₅₀₍₃₀₎) and 50% LD₅₀₍₃₀₎ were 38.06 Krad. The drought tolerance of seeds supplemented with 0, 5, 10, 15 and 20% of PEG-6000. The GR₅₀ was 17.73 % at 2 weeks, and the LD₅₀ was 14.86 % and 11.83 % for 4 and 12 weeks, respectively.

Keywords: Drought tolerance, Mutation, Regeneration, *Stylosanthes guianensis* CIAT 184

Infestation pest on organic sweet corn hybrids in the lowland

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Organic sweet corn still challenges, especially related to pest attacks. Farmers' pest control efforts currently use chemical pesticides that are not environmentally friendly. Integrated pest control techniques are increasingly developing along with increasing awareness of the importance of environmental friendly sustainable agriculture. One component of integrated pest control is the use of pest-resistant varieties. The results showed that of the 17 sweet corn hybrid varieties evaluated, the variety with the highest level of attack (susceptibility) to *O. furnacalis*, *H. armigera*, and *S. frugiperda* was Caps15 x Caps22. The highest *O. furnacalis* attack found in Caps15 x Caps22 was 33% and significantly different from the comparison varieties Paragon and Bonanza, and the highest *H. armigera* attack found in the same variety Caps15 x Caps22 was 31%, but not significantly different from the comparison varieties Paragon and Bonanza, as well as the highest scoring *S. frugiperda* attack was found in the same variety. The highest yield was 16.05 tons/ha, the diameter of the cob with husk was 300.93 mm and the weight of the cob with husk was 56.73 g on Caps15 x Caps23 and was not significantly different from the comparison variety Paragon with a yield of 17.87 tons/ha, the diameter of the cob with husk was 335.06 mm and the weight of the cob with husk was 57.3 g.

Keywords: Attack, Hybrid corn, Pests, Resistance, Varieties

Efficacy of mangosteen peel extract combined with phosphonic acid for the *In Vivo* control of *Phytophthora palmivora* in durian

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The efficacy of mangosteen peel extract (MPE) combined with phosphonic acid (PA) for controlling *Phytophthora palmivora*, the causal agent of durian trunk canker and root rot, was evaluated in vivo on both leaves and seedlings of durian (*Durio zibethinus*). The study assessed lesion diameter and disease inhibition percentage at 7 and 14 days after application. Results showed that PA alone significantly reduced lesion size and achieved the highest disease inhibition on both leaves (0.61 cm, 71.58%) and seedlings (4.08 cm, 35.91%) at 14 days. The combination of MPE with PA at 10,000 ppm yielded comparable efficacy on leaves (0.93 cm, 57.93%), with no significant difference from PA alone. Moderate inhibition levels were observed with MPE at 1,000 and 100 ppm combined with PA, while 10 ppm MPE showed reduced efficacy. On seedlings, higher concentrations of MPE ($\geq 1,000$ ppm) did not improve control and were associated with increased lesion size, suggesting possible phytotoxic effects. The commercial MEP product provided the lowest efficacy across treatments. These results confirmed that phosphonic acid is found to be effective against *P. palmivora* and that its efficacy can be enhanced through combination with mangosteen peel extract at optimal concentrations. However, its use at inappropriate doses may reduce its effectiveness.

Keywords: Biopesticide, *Durio zibethinus*, Natural fungicide, *Phytophthora* root rot

Predictive model for optimal ozone condition to control *Colletotrichum* sp. and maintain quality of Kaew Kamin mango

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To study the effect of aqueous ozone treatment on inhibition of *Colletotrichum* sp. in Kaew Kamin mangoes (*in vivo*). Design and optimization of the corrosion inhibition have been performed using response surface methodology (RSM). A two-factor, five-level central composite design (CCD) was implemented. Two input factors in the CCD analysis were zone dosage and reaction time. The parameters tested were disease incidence of anthracnose in Kaew Kamin mangoes. Based on statistical analysis, the optimum conditions obtained using RSM were a 25,000 mg/hr ozone and treatment time of 30 min. At the optimum condition, the shelf-life of Kaew Kamin mangoes was longer under the 21 days at 25±2°C. Application of the optimized ozone treatment condition, when compared to the untreated control, demonstrated a significant effect in preserving postharvest quality of the fruit. Specifically, the treatment effectively delayed weight loss, maintained alteration in peel and induced adaptaion in pulp color attributes (L*, a*, b*, chroma, and hue values), and maintained fruit firmness, titratable acidity, and cellular membrane integrity as indicated by lower electrolyte leakage. Conversely, no significant differences were observed in total soluble solids, ascorbic acid, and total phenolic contents, and antioxidant capacity between treated and untreated samples.

Keywords: Kaew Kamin mango, Ozone, *Colletotrichum* sp.

Antifungal efficacy of stingless bee honey extracts against a black mould causing pathogen *Lasiodiplodia* spp.

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Black mould disease on the peel of Tan Yong Mas longkong fruit grown in Naradhiwat Province has been a major cause of its low market price, as the black patches on the fruit make them undesirable to consumers. This research aimed to isolate and identify the fungal species on the surface of Tan Yong Mas longkong and to test the efficacy of stingless bee honey extracts in inhibiting the fungal growth. Fungal species causing the black sooty mould were isolated from fruit peels and subjected to molecular genetic analysis. The nucleotide sequences were found to be 100% identical to the fungus *Lasiodiplodia iranensis*. Results from testing the antifungal properties of stingless bee honey extracts showed that the

extract from the *H. itama* species exhibited the highest inhibitory effect, followed by *T. pagdeni*, *G. thoracica*, and *T. fuscobalteata*. The average inhibition values were 21.43 ± 1.27 , 18.54 ± 1.50 , 17.51 ± 1.76 , and 17.18 ± 0.91 mm., respectively.

Keywords: *Lasiodiplodia* spp., Stingless bee honey, *Aglaia dookkoo*

Biocontrol Potential of rhizospheric *Bacillus* strains against *Sclerotinia minor* Jagger causing lettuce drop

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Phytopathogenic *Sclerotinia minor* Jagger causes lettuce drop, a destructive soil-borne disease. As potential biocontrol agents for this disease, 2 of 31 bacterial strains isolated from soil samples from fields containing *S. minor* Jagger were identified using in vitro antagonistic assays against *S. minor* Jagger. Bioactivity experiments showed that Bac20 had higher inhibitory activity against *S. minor* Jagger than Bac45. Based on 16S rRNA sequences and phylogenetic analysis of a combination of sequences from *gyrA*, *rpoB*, *purH*, *polC*, and *groEL*, Bac20 and Bac45 were identified as *Bacillus velezensis* and *Bacillus subtilis*, respectively. Lipopeptide compounds produced by each strain were identified using matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) analysis. Both strains produced three types of lipopeptides, namely surfactins, iturins, and fengycins, whereas Bac20 showed the strongest intensity in its production of iturins, more than that of Bac45. Bac20 inhibited oxalic acid formation in early-stage lettuce leaves infected with *S. minor* Jagger, delaying pathogen infestation. Greenhouse experiments for controlling lettuce drop demonstrated that inoculation with Bac20 controlled lettuce drop by 71.7%. In conclusion, this study revealed that *B. velezensis* Bac20 has high potential for use as a biocontrol agent for controlling the lettuce drop caused by *S. minor* Jagger.

Keywords: Antagonism, *Bacillus*, Biocontrol, Lettuce drop, *Sclerotinia minor* Jagger

Larvicidal efficacy and morphological abnormalities induced by plant essential oils against housefly (*Musca domestica* L.)

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This study investigated the larvicidal potential of nanoemulsified essential oils from medicinal plants at a 1% concentration against *Musca domestica* (housefly). Among the tested formulations, the nanoemulsion of star anise (*Illicium verum*) essential oil exhibited the highest efficacy in disrupting larval development. The results showed that the lowest complete pupation rate was 43.67%, indicating a significant inhibition of normal metamorphosis. Additionally, 56.33% of third-instar larvae were classified as malformed larvae (ML), dying before pupation and exhibiting severe morphological and physiological abnormalities. These findings suggest that the star anise nanoemulsion interferes with key developmental pathways, preventing larvae from reaching the pupal stage. Due to its high effectiveness and plant-based origin, this nanoformulation offers a promising, environmentally friendly alternative to conventional chemical insecticides. It has potential for further development into a natural larvicidal agent for use in integrated pest management (IPM) strategies targeting housefly populations. Future research should explore the underlying mechanisms of action and assess the efficacy and safety of this nanoemulsion under real-world conditions to support its application in sustainable vector control.

Keywords: Botanical insecticide, Housefly, Larvicidal, Morphological abnormalities, Plant essential oils

Impact of botanical essential oils on pupation and survival of *Musca domestica* L.

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This study aimed to assess the biological activity of essential oils extracted from selected medicinal plants at concentrations of 1%, 5%, and 10% on the pupal stage of *Musca domestica*, focusing on mortality and developmental abnormalities. Among the tested botanical extracts, *Illicium verum* (star anise) essential oil at 10% demonstrated the highest efficacy in disrupting normal pupal development. Only 65.00% of individuals successfully emerged as fully developed adults after a 10-day exposure period. A notable proportion exhibited transitional deformities, particularly malformed pupal-adult intermediates, indicating interference with metamorphic progression. In comparison, cypermethrin, a commonly applied synthetic insecticide at the same concentration, resulted in a lower mortality rate of 39.67% under identical experimental conditions. The superior performance of star anise oil highlights its potential as a plant-derived alternative for insect control. These findings suggested that the incorporation of such natural products into integrated pest management strategies may reduce dependence on conventional synthetic chemicals.

Keywords: Botanical essential oil, Insecticidal activity, Mortality, *Musca domestica*, Pupation

Intraspecific variation in the chemical composition of propolis from three stingless bee species

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Stingless bee propolis, a resinous material harvested by stingless bees (Hymenoptera: Apidae: Meliponini) from various plant sources, is of considerable scientific significance owing to its bioactive constituents and related pharmacological attributes. This research aimed to examine the bioactive components in propolis extracts from three commercially cultivated stingless bee species: *H. itama*, *T. pagdeni*, and *G. thoracica*, sourced from the Bacho area of Narathiwat province. The extracts were prepared using the Ultrasound-Assisted Extraction (UAE) method. Liquid Chromatography–Tandem Mass Spectrometry with Quadrupole Time-of-Flight, functioning in both positive and negative ion modes, was employed to identify the chemicals. Experimental findings revealed a variation in the number of identified compounds among the species. *T. pagdeni* propolis contained the highest number of compounds (119), followed by *H. itama* (107). With 86 compounds, *G. thoracica* propolis had the fewest. These results indicate distinct chemical profiles among the propolis of the three species studied.

Keywords: Chemical composition, Stingless bee propolis, Ultrasound-assisted extraction

Performance and screening of bird pepper genotypes for drought tolerance using PEG

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Bird pepper is an important vegetable crop used both fresh and processed as a food flavoring. In Indonesia, the demand for Bird pepper during religious holidays often exceeds availability, which causes a sharp increase in prices. Production increases are limited by water limitations, especially in marginal lands. This study aimed to evaluate twenty-three bird pepper accessions subjected to drought stress using polyethylene glycol (PEG). The study used a split plot design with the main plot being PEG concentration and the subplot being bird pepper genotypes. PEG concentrations consisted of 0 (control), 6% PEG, and 12% PEG. Growth parameters observed included plant height, number of leaves, leaf area, leaf greenness, root length, root volume, fresh shoot weight, dry shoot weight, fresh root weight, and dry root weight. Bird pepper performance was evaluated by analysis of variance and further tested with LSD, $\alpha = 5\%$. The level of genotype tolerance to drought was calculated using the stress tolerance index (STI) formula. The results of the study showed that genotypes A07, A15, A20, A28, and A41 were classified as tolerant plants that have the potential to be donor parents in breeding programs for drought tolerance.

Keywords: Chili, Drought, Hydroponic, STI

The effectiveness of seed coating with Microbial Biofungicide on controlling seed quality and damping-off disease of tomato

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Microbial seed coatings did not significantly influence germination percentage, germination index, or germination speed under laboratory conditions. Whereas, seeds coated with *Trichoderma asperellum* and *Bacillus subtilis* consistently demonstrated improved seedling emergence and vigor in greenhouse conditions. With respect to disease suppression, coatings—particularly those containing *T. asperellum*—consistently reduced both the incidence and severity of damping-off disease caused by *Pythium torulosum*. The lowest disease incidence (30.50%) and severity (17.43%) were observed in seedlings from *T. asperellum*-coated seeds. These findings highlighted the potential of antagonistic microbial coatings to promote seedling health, and provided a sustainable strategy for managing soilborne diseases. This approach is offered a promising complement or alternative to chemical control methods in commercial tomato seedling production.

Keywords: Seed treatment, Seed germination, *Trichoderma asperellum*, *Bacillus subtilis*, *Pythium* sp., Damping-off

Effect of amino acid on growth of durian seedling cv. Monthong under drought condition

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The present study aimed to investigate the effect of amino acid on growth of durian seedling cv. Monthong under drought condition. The experiment was designed as a Completely Randomized Design (CRD) with 5 treatments and 5 replications. Each replication consisted of 1 durian seedling. The treatments consisted of a control (water only) and four amino acid concentrations: 500, 1000, 1500, and 2000 ppm. All seedlings were watered at five-day intervals to simulate drought conditions and the data of soil moisture was recorded. The experiment was conducted from November 2024 to January 2025 at The Learning Center for Agricultural Practices Based on the Philosophy of Sufficiency Economy, Faculty of Agricultural Technology, Rambhai Barni Rajabhat University, Chanthaburi Province, Thailand. Growth parameters including trunk diameter, plant height, leaf number, leaf dry weight, and chlorophyll content were recorded throughout the experimental period. Soil pH and soil nutrient concentrations (nitrogen, phosphorus, and potassium) were analyzed at the end of the experiment.

Results showed that moderate concentrations of amino acids (500–1000 ppm) significantly improved soil pH, promoted leaf development, increased dry leaf biomass, and enhanced nutrient uptake efficiency compared to controls. Treatments at higher concentrations offered no further benefit and sometimes decreased performance. Amino acid supplementation did not significantly affect trunk diameter or height, but did increase plant resilience, especially in new leaf formation and chlorophyll content. The findings support that foliar amino acid application is a promising strategy for enhancing drought tolerance, seedling establishment, and productivity in durian cultivation under water-limited conditions. These insights provided practical guidance for durian growers using biostimulants to optimize plant health and survival during dry periods.

Keywords: Durian, Amino acid, Growth, Drought

Carrier-free RNA nanostructure for spray-induced gene silencing against *Botrytis cinerea*

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Spray-induced gene silencing (SIGS), which utilizes exogenously applied double-stranded RNA (dsRNA) to activate RNA interference (RNAi), offers a promising non-transgenic approach for crop protection. However, its practical application remains limited by the intrinsic instability of RNA molecules and the low absorption efficiency of plant tissues, resulting in weak and short-lived gene silencing. To address these challenges, we developed RNA nanoparticles (RNA NPs) as efficient effectors for inducing RNAi in both plants and fungal pathogens. Using RNA structural motifs such as hairpin-loop, kissing-loop, and penta-U motifs, multiple small interfering RNAs (siRNAs) were assembled into a long single-stranded RNA (lssRNA) molecule. The lssRNA, synthesized *in vivo* in *Escherichia coli*, spontaneously self-assembled into stable RNA nanostructures through local base pairing. A specific construct, termed RNA-pen, was biosynthesized *in vivo* and formulated for foliar application. Distinct RNA-pen bands confirmed successful induction and structural integrity, while time-course analyses demonstrated efficient absorption by host tissues. Upon inoculation with *Botrytis cinerea* mycelia or spores, RNA-pen-treated plants exhibited significantly reduced disease symptoms across multiple host species, outperforming conventional dsRNA treatments. Overall, this study establishes RNA-pen as a stable and highly efficient RNA-based nanomaterial, providing a new framework for developing next-generation RNA biopesticides and reinforcing the potential of SIGS as a sustainable strategy for controlling gray mold and other fungal pathogens.

Keywords: Antifungal RNA, In-vivo production, Host absorption, Gray mold, SIGS

Effectiveness of *Trichoderma asperellum* (THR3) in controlling *Sclerotium rolfii* (SC01) causing damping-off disease in durian seedlings

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Damping-off disease in durian (*Durio pinangianus*) seedlings presents a significant challenge to durian cultivation, especially in eastern Thailand, where it contributes to substantial seedling mortality and facilitates disease transmission during transplantation. This study investigated the biocontrol potential of *Trichoderma asperellum* (THR3) against *Sclerotium rolfii*, the primary pathogen associated with the disease. Fungal isolates recovered from symptomatic seedlings were initially identified as *Sclerotium* spp. based on morphological features, and were subsequently confirmed as *S. rolfii*

(designated as SCO1, SCO2, and SCO3) through molecular analysis. Among the three isolates, SCO1 exhibited the highest virulence in pathogenicity tests, resulting in 100% disease incidence. In dual-culture experiments, *T. asperellum* (THR3) inhibited SCO1 mycelial growth by 88.7%. Furthermore, *in vivo* trials demonstrated a 52% reduction in disease severity when THR3 was applied against SCO1. Further biocontrol trials validated its ability to suppress disease development across all isolates. These findings underscore the capability of *T. asperellum* (THR3) as a potent, environmentally friendly biocontrol agent for addressing damping-off in durian seedlings, offering a promising alternative to chemical fungicides in eastern Thailand.

Keywords: Damping-off, Durian seedlings, Durian tree, *Sclerotium rolfsii*, *Trichoderma asperellum*

Investigating antioxidant and antibacterial activity of thai herbal extracts for development of herbal product

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Several Thai herbal plants are traditionally used as ingredients in analgesic products. This study aimed to investigate the antioxidant and antibacterial activities of five such plants: turmeric (*Curcuma longa* L.) roots, ginger (*Zingiber officinale* Roscoe) roots, Plai (*Zingiber cassumunar*) roots, Crinum Lily (*Crinum asiaticum* L.) leaves, and Indian Mulberry (*Morinda citrifolia* L.) leaves. The plant materials were dried in a hot air oven at 45°C to a constant weight and ground into a fine powder. Crude extracts were obtained using 95% ethanol, which was subsequently removed with a rotary evaporator. The antioxidant properties of the extracts were evaluated using DPPH, ABTS, and FRAP assays, total phenolic contents (TPC) and total flavonoids contents (TFC). The results revealed that the turmeric and ginger extracts demonstrated the highest antioxidant efficacy in the DPPH assay, with IC₅₀ = 0.57±0.01 mg/mL and 0.61±0.01 mg/mL, respectively. In addition, the ABTS assay showed that turmeric and ginger extracts had IC₅₀ = 0.22±0.00 and 0.23±0.00 mg/mL, respectively, when compared to the other extracts. In terms of ferric reducing power, the turmeric and ginger extracts also yielded significant FRAP values at 105.85±1.99 and 137.94±3.11 mg TE/g sample, respectively. Notably, the turmeric extract exhibited the highest phytochemical content, with TPC of 63.07 mg GAE/g sample and TFC of 555.94 mg QE/g sample. For the antibacterial screening against *Staphylococcus aureus*, the turmeric extract showed the most potent activity, producing an inhibition zone of 7.33±0.29 mm. These results indicated that five herbal extracts had antioxidant and antibacterial properties, suggesting their potential as active ingredients in the development of products for muscle pain relief.

Keywords: Plant extract, Antioxidant activity, Antibacterial activity

SESSION 4: MICROBIAL BIOTECHNOLOGY

The application of beneficial microorganisms as biofertilizers in soil

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The soil microbiome plays a pivotal role in sustainable agriculture by supporting soil health, nutrient cycling, and crop resilience. Among microbial resources, arbuscular mycorrhizal fungi (AMF) are of particular interest due to their widespread symbiotic associations with most terrestrial plants and their ability to enhance nutrient uptake, drought tolerance, and disease resistance. AMF, together with other beneficial microbes such as rhizobacteria and free-living nitrogen fixers, are being developed as bioinoculants to reduce dependence on synthetic fertilizers and pesticides, offering eco-friendly and cost-effective alternatives for crop production. However, while promising results have been consistently observed in controlled conditions, the performance of microbial inoculants—especially AMF—under field conditions remains highly variable, with many commercial formulations showing poor establishment and limited yield benefits. Interactions between AMF and other microbes, such as well as the integration of agricultural practices, highlight the potential of microbial consortia and diversified management strategies to improve soil microbial diversity, crop performance, and ecosystem services. Studies combining microbial community profiling with agronomic outcomes are essential to advance the reliable use of microbial technologies in sustainable intensification of agriculture. In this presentation will be illustrated some examples of pot and field applications of biofertilizer-based inoculants.

Mushroom spawn production in southern Viet Nam

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Edible and medicinal mushrooms have been recognized as a national strategic product of Viet Nam since 2012, with development targets extending to 2030. The Mekong Delta currently represents the country's primary mushroom-producing region, contributing over 80,000 tons annually as of 2018. The dominant cultivated species include the straw mushroom (*Volvariella volvacea*), oyster mushrooms (*Pleurotus* spp.), wood ear (*Auricularia* spp.), shiitake (*Lentinula edodes*), and lingzhi (*Ganoderma lucidum*). Except for the straw mushroom, most species are cultivated under semi-controlled conditions using nylon-bag substrates composed mainly of rubber-tree sawdust. More than 70% of spawn-production facilities are operated by private entities (households, cooperatives, and enterprises), whereas the remainder are managed by governmental or research institutions. Total of 140 mushroom spawn in southern Viet Nam (from Da Nang Province to Ca Mau Province) were investigated. A total of 66 cultivars belonging to the five principal species are currently used nationwide, including approximately 25% imported strains, 10% isolated from natural habitats, over 50% isolated from market-available products, and less than 10% inherited from traditional cultivation lines. Most spawn producers (71 of 80 units) involved in mushroom cultivation. Secondary spawn is generally propagated on rubber-tree sawdust, whereas straw is applied exclusively for *V. volvacea*. Primary spawn is produced using grain ($\approx 40\%$), wooden sticks ($\approx 50\%$), agar medium ($\approx 10\%$), and a minor proportion

of liquid culture for *Cordyceps* species. Spawn production in southern Viet Nam remains constrained by limited technological capacity, instability of cultivars, increasing substrate costs, and frequent pest and mold infestations. The present study also documented market demands and performance characteristics of both conventional and newly developed cultivars, providing baseline data for future improvements in Viet Nam's mushroom industry.

Keywords: Mushroom cultivation, Mushroom spawn, Southern Viet Nam, Cultivars

Effects of different forms and doses of bat guano on growth and dualix parameters of soybean (*Glycine max* L.)

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Soybean (*Glycine max* L.), an annual legume belonging to the Fabaceae family, originates from East Asian countries such as Korea and China and is among the most important oilseed crops cultivated worldwide. In Turkey, soybean and its by-products are widely processed in various industrial sectors, with approximately 250–300 different global applications. Organic farming practices, by minimizing the use of chemical fertilizers and pesticides, provide a sustainable and environmentally friendly agricultural approach. In this context, bat guano (Bat), with its rich nutrient content and natural origin, holds a significant place in organic farming. The present study aimed to determine the effects of different forms and doses of Bat on the morphological growth parameters and Dualix indices of the soybean variety "Kristal" (*Glycine max* L.) grown under controlled climate chamber conditions (8/16 h dark/light photoperiod, 25 °C temperature, and 65% relative humidity). In the experiment, liquid, powder, and granular forms of Bat were applied at 0% (control), 1%, 2%, and 4% concentrations. The parameters measured included plant length, dry biomass, root length, root dry weight, nitrogen balance index (NBI), and flavonoid content. The highest and lowest values in the interaction between bat form and dose in the obtained results were 28.83–35.67 cm for plant length, 0.56–1.22 g for stem dry weight, 19.67–34.67 cm for root length, 0.23–0.45 g for root dry weight, 24.07–69.77 for NBI dx and 0.56–0.90 dx for flavonoids. The findings suggest that the use of organic fertilizers such as bat may contribute to the optimization of nutrient management and the advancement of sustainable agricultural practices.

Keywords: Bat, Organic fertilizer, Dualix indices, Sustainable agriculture

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Tomato–*Rhizoctonia solani* Interactions and *In Vitro* Suppression by *Trichoderma* Species

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Species of *Trichoderma* are among the most effective fungal antagonists employed in biological control strategies and are naturally distributed across diverse soils and habitats enriched with organic matter. Their suppressive potential against plant pathogens arises from multiple mechanisms, including

mycoparasitism, antibiotic secretion, competition for resources, and stimulation of plant growth. In the present work, the response of four tomato cultivars (Rio Grande, Joker, H-2274, and Falkon) to infection by *Rhizoctonia solani* was assessed to determine cultivar susceptibility. In parallel, antagonistic interactions between three *Trichoderma* isolates (*T. harzianum*, *T. viride*, and *T. asperellum*) and *R. solani* were examined under laboratory conditions. Five complementary bioassays were employed, comprising two dual culture techniques, a volatile metabolite test, and two liquid metabolite assays. Results demonstrated that *T. harzianum* and *T. viride* consistently achieved the strongest inhibition of *R. solani* mycelial growth across all experimental setups. Pathogenicity assays further indicated that the cultivars Rio Grande and H-2274 were the most susceptible to *R. solani*. These findings highlight the potential of *T. harzianum* and *T. viride* as promising candidates for further evaluation under controlled conditions for the protection of vulnerable tomato cultivars against *R. solani*.

Keywords: *Trichoderma*, antagonism, Tomato, Soilborne diseases, *Rhizoctonia solani*, Biocontrol fungi, Cultivar susceptibility

Biotechnological production of calcium malate from sugarcane molasses using *Acetobacter persici* BX1

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The study investigated the production of calcium malate (a calcium salt of malic acid) by *Acetobacter persici* BX1 using sugarcane molasses as a low-cost carbon source. The bacterium was cultivated in calcium malate production medium containing glucose, fructose, or sucrose, which are essential sugar constituents of molasses. *A. persici* BX1 was capable of utilizing all three sugars; however, glucose supported the highest calcium malate production. Subsequent analysis of untreated and pretreated molasses demonstrated that acid pretreatment with sulfuric acid yielded the highest calcium malate concentration at 22.90 ± 0.25 g/L. Under optimized conditions, employing sulfuric acid-pretreated molasses with an initial sugar concentration of 250 g/L as the sole carbon source without additional nitrogen supplementation, *A. persici* BX1 produced up to 36.07 ± 0.32 g/L of calcium malate within 96 hours. The strain consumed 24.31% of the initial sugars and reached a maximum production rate of 0.88 ± 0.02 g/L/h during the first 24 hours. These results demonstrated the potential of sugarcane molasses as an effective and economical substrate for calcium malate production by *A. persici* BX1.

Keywords: *Acetobacter persici* BX1, Acid pretreatment, Bioproduction, Calcium malate, Sugarcane molasses

Bacteria that can tolerate and decontaminate cadmium and lead contaminated rice paddy soil

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One of the current issues in rice-growing regions is heavy metals contaminated rice paddy. The environment and the health of people, animals, plants, and crops are negatively impacted by high levels of cadmium (Cd) and lead (Pb). The present study isolated, and identified potential microbial remediators from the rice growing area contaminated with heavy metals at Sitio Namangonan, Guiset Norte, San Manuel, Pangasinan, Luzon Island, Philippines. The bacterial isolates were molecularly identified using 16S ribosomal RNA gene sequencing, the Basic Local Alignment Search Tool (BLAST), and performed evolutionary analyses using MEGA 11. The soil sample contained 0.42 mg/kg cadmium and 57.80 mg/kg lead. Five species of bacteria (BI-1, BI-2, BI-3, BI-4, and BI-5) namely: *Priestia flexa* BI-1, *Priestia megaterium* BI-2, *Stenotrophomonas maltophilia* BI-3; *Priestia megaterium* BI-4; and *Priestia megaterium* BI-5 with 98.94%, 98.47%, 92.53%, 84.21%, and 99.67% similarity, respectively, were isolated from the soil contaminated with cadmium and lead. Furthermore, *Priestia megaterium* BI-2, *Stenotrophomonas maltophilia* BI-3, *Priestia megaterium* BI-4, and *Priestia megaterium* BI-5 are tolerant to up to 1000 mg/kg cadmium concentration while *Priestia flexa* BI-1 is identified as non-tolerant to cadmium contamination. Moreover, *Priestia megaterium* BI-2, *Stenotrophomonas maltophilia* BI-3, *Priestia megaterium* BI-4, and *Priestia megaterium* BI-5 can resist 1000 mg/kg lead concentration. Hence, the bacterial isolates are heavy metal tolerant in rice paddy soil contaminated with cadmium and lead. These bacterial isolates could also decontaminate rice paddy soil contaminated with cadmium and lead.

Keywords: Cadmium-resistant bacteria, Lead-resistant bacteria, Contaminated soil, Molecular identification

Isolation of *Pusillimonas caeni* and screening for enzymatic production

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Isolate S002-07 was isolated from sandy soil, Chumphon province, Thailand. It was morphological and molecular genetic identified as *Pusillimonas caeni* which used *Rhodopseudomona paralustris* as outgroup which similarity of 100% in phylogenetic tree. This isolate is expressed the potential enzymatic activity of protease, cellulase, lipase, amylase, hemicellulose and ligninase in different level of enzymatic activities. It found that isolate S002-07 showed the highest ligninase activity, and followed by protease, lipase, cellulase, amylase and hemicellulase. This isolate will be further tested siderophore production for bioremediation using to decrease heavy metals. The other bacterial isolates are also under investigating for their biological properties to develop bioremediation and bio-stimulants for plant growth.

Keywords: Bioremediation, Bio-stimulant, Enzymes

Tritipyrum: From chromosome engineering to field adaptation in Türkiye

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The creation of novel cereals through chromosome engineering offers new avenues for resilient production in stress-prone environments. Tritipyrum—the third synthetic amphiploid cereal within the Triticeae—was developed in the 1990s in the United Kingdom by crossing *Triticum durum* with *Thinopyrum bessarabicum*, a wild relative notable for high salinity tolerance and other abiotic-stress traits. Its development follows two earlier man-made cereals: Triticale (wheat × rye), cultivated for ~150 years and valued for combining rye resilience with wheat grain quality, and Tritordeum (wheat × *Hordeum chilense*), created ~70 years ago and commercialized for its favorable end-use properties. After the initial cytogenetic and laboratory phases in the UK, Tritipyrum underwent field testing and broader evaluation in Iran, Germany, China, and Türkiye. These studies have explored agronomic performance, cytogenetic stability, and adaptation to edaphic and climatic constraints. In Türkiye, recent work has prioritized cold-environment adaptation, particularly in Van province, where multi-site field trials under low temperatures have shown promising establishment, growth, and grain production. Parallel assessments across distinct agroecological zones indicate notable tolerance to salinity and drought, underscoring Tritipyrum's potential for cultivation on marginal lands and its role in diversifying cereal production systems. Taken together, current evidence positions Tritipyrum as a strategically important, stress-resilient cereal that can complement existing crops while contributing to regional food security. To unlock its full value, continued research should refine agronomic packages for different environments, quantify end-use quality, and leverage Tritipyrum in breeding pipelines as a donor of stress-tolerance alleles.

Keywords: Tritipyrum, Amphiploid cereal, Chromosome engineering, Türkiye, Cold adaptation, Salinity tolerance

Bioprospecting of fish gut-associated microbes as sustainable probiotic candidates for aquaculture

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The overuse of antibiotics in aquaculture has raised critical concerns regarding antimicrobial resistance and environmental sustainability. This study investigated the probiotic potential of indigenous gut-associated bacteria from Barramundi (*Lates calcarifer*) as natural alternatives to antibiotics for improving fish health and aquaculture productivity.

Gut samples from marine fish collected along Chennai's coastal waters were homogenized, serially diluted, and cultured on selective media (MRS, starch casein agar, nutrient agar) supplemented with seawater. Twenty bacterial isolates were screened for antagonistic activity against six fish pathogens,

extracellular enzyme production, siderophore synthesis, and key probiotic characteristics, including acid tolerance, bile salt resistance, cell surface hydrophobicity, and auto-aggregation ability.

Two isolates, K5 and K8, demonstrated strong probiotic potential. Both exhibited significant antagonistic activity against *Staphylococcus aureus*, *Aeromonas salmonicida*, and *Aeromonas caviae*, with inhibition zones ranging from 15–18 mm. These bacteria produce multiple digestive enzymes (amylase, protease, lipase, cellulase) and synthesize siderophores effectively. Strain K8 showed superior gastrointestinal resilience, surviving at pH 2 and 3% ox bile, whereas K5 displayed greater hydrophobicity, suggesting better adhesion capacity. Both gram-negative strains exhibited considerable auto-aggregation (up to 56.68% at 24 h) and antioxidant activity, supporting their probiotic candidacy. Strain K8 was identified as *Bacillus* sp. through V3 V4 16S rRNA sequencing.

These findings demonstrate that native fish gut bacteria possess valuable probiotic properties for aquaculture applications. The isolated strains show promise for enhancing nutrient absorption, pathogen inhibition, and overall gut health in farmed fish. This research contributes to the development of sustainable, antibiotic-free solutions for aquaculture, although in vivo validation studies are necessary to confirm their practical efficacy in commercial farming systems.

Keywords: Probiotic bacteria, Aquaculture sustainability, Gut microbiota, Pathogen antagonism, Enzyme production

Roles of CcDFR and CcOMT9 in the cyanidin biosynthesis and development of *Cordyceps cicadae*

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Cordyceps cicadae is a traditional Chinese medicinal fungus known for its rich production of bioactive substances, particularly cyanidin, an anthocyanin commonly found in plants with notable anti-inflammatory, antitumor, antiviral, and antibacterial properties. This study revealed two key genes, CcDFR and CcOMT9, affecting cyanidin biosynthesis in *C. cicadae*. The roles of these genes in cyanidin production, growth, and development were elucidated through the gene knockout method, phenotypic analysis, transcriptomics, and metabolomics. CcDFR deletion led to reduced cyanidin-3-O-glucoside (C3G), suppressed expression of cyanidin biosynthesis genes, impaired synnemata formation, decreased polysaccharide and adenosine content, and diminished chitinase activity. Meanwhile, the Δ CcOMT9 mutant exhibited an increase in C3G production, promoted expression of cyanidin biosynthesis genes and rising bioactive compounds, suppressed RNA methylation, and led to phenylalanine accumulation with no effect on fruiting body formation. We revealed a distinct anthocyanin biosynthesis pathway in *C. cicadae* and identified two genes with opposite functions, laying the foundation for future genetic modification of cyanidin-producing strains using modern biological techniques. This will shorten the production period of this valuable compound, facilitating the industrial-scale production of cyanidin.

Keywords: *Cordyceps cicadae*, Cyanidin-3-O-glucoside, Growth and development, Bioactive substance, Gene function

Sustainable agriculture through marine-derived *Penicillium parvum*: Antagonism, nutrient solubilization, and seed vigor enhancement

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With the increasing demand for sustainable agricultural solutions, marine algicolous fungi (MAF) offer promising alternatives to synthetic pesticides and fertilizers. This study investigates the biocontrol and plant growth-promoting potential of *Penicillium parvum*, isolated from the red alga *Acrochaetium sp.* Morphological and molecular analyses confirmed its identity as a producer of bioactive secondary metabolites.

Antagonistic bioassays demonstrated that *P. parvum* exhibited strong inhibitory activity against *Fusarium oxysporum*, suggesting the production of antifungal metabolites. Bioassay-guided fractionation validated its antifungal properties, while a seed germination assay revealed a 92% germination rate in treated hemp seeds, significantly higher than the 68% in controls. The increased Seed Vigor Index suggests that fungal metabolites enhance seedling development through hormone-like effects or improved nutrient availability. Additionally, *P. parvum* exhibited notable mineral solubilization capabilities, with a zinc assimilation index of 19.87 and a phosphate solubilization index of 84.73, highlighting its potential as a biofertilizer. Metabolite and volatile compound analyses further characterize its bioactive profile, reinforcing its role in sustainable agriculture by reducing dependence on chemical fertilizers while maintaining soil health.

Isolation and identification of fungi associated with walnut anthracnose symptoms in Turkey

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Walnut (*Juglans regia* L.) anthracnose is an emerging constraint in Türkiye, yet region-wide data on the associated fungal pathogens remain limited. We conducted systematic surveys across 3 provinces in Eastern Anatolia (Hakkari, Van and Bitlis). Orchards with ≥ 50 trees were prioritized and symptomatic leaves, shoots, and fruits were sampled by random selection from trees exhibiting typical anthracnose symptoms. In total, 42 candidate samples were collected and processed using direct-tissue and spore-suspension isolations onto potato dextrose agar (PDA), oatmeal agar (OMA), and water agar (WA). Morphological characterization (mycelial features; acervuli, conidia; asci, ascospores; and microconidia where present) was performed using standard identification keys, and colony growth rates and cultural traits were recorded. A total of 30 isolates were recovered and identified morphologically as *Ophiognomonia leptostyla* (Fr.) Sogonov. Molecular confirmation employed PCR amplification of the internal transcribed spacer (ITS; primers ITS1/ITS4) and translation elongation factor 1- α (TEF1- α ; EF1- α /TEF primer pair), followed by sequencing and phylogenetic analysis to assess relationships among the isolates. The concordance between morphology and multilocus sequence data supports *O. leptostyla* as the predominant species associated with anthracnose symptoms in the surveyed regions. These findings provide the first coordinated snapshot of the etiological agent across major walnut-growing zones in Eastern Anatolia and establish a baseline for epidemiological studies, resistance screening, and integrated disease management tailored to local conditions.

Keywords: *Ophiognomonia leptostyla*; *Juglans regia*; ITS rDNA; TEF1- α ; disease survey; fungal identification.

This study was a part of project supported by the TÜBİTAK, Türkiye (Project No. 222N041).

A study on the anti-*Helicobacter pylori* activity of three medicinal plant crude extracts from *Cannabis sativa*, *Mitragyna speciosa* and *Phyllanthus emblica*

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In the present study, medicinal plant crude extracts were prepared from cannabis (*C. sativa* L., 'Red chili'), kratom (*Mitragyna speciosa*), and Indian gooseberry (*Phyllanthus emblica*) using four different solvents including ethanol, methanol, isopropanol, and water. The methanolic crude extracts had the highest weight and percentage yield, whereas the aqueous crude extracts exhibited the lowest values. The antimicrobial activity of these extracts against three *Helicobacter pylori* strains (ATCC 43504, 2888, and BK364) was evaluated using the spot-on-lawn method. The obtained results indicate that all medicinal plant crude extracts had an inhibitory effect against all tested *H. pylori* strains. The methanolic and ethanolic extracts of *Cannabis sativa* inhibited *H. pylori* strains ATCC 43504, 2888, and BK364 at the minimum inhibitory concentration (MIC) values ranging from 0.02-0.05 mg/mL. Additionally, a synergistic effect between *Cannabis sativa*, *Mitragyna speciosa*, and *Phyllanthus emblica* was investigated using the checkerboard assay. The synergistic interaction was observed between the *Cannabis sativa*, *Mitragyna speciosa*, and *Phyllanthus emblica* extracts, with a fractional inhibitory concentration index (FICI) of 2, indicating an indifferent effect when combined. Furthermore, the scanning electron microscopy (SEM) investigation revealed that the *H. pylori* cells were damaged after treatment with methanolic crude extracts of cannabis for 120 minutes.

Keywords: Medicinal plant crude extracts, *Helicobacter pylori*, Synergistic effect, Scanning electron microscopy

In vitro* profiles of a diet containing concentrate with rice bran and *Arenga pinnata* by-product fermented with *Pleurotus ostreatus

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This study aimed to evaluate the substitution of rice bran and fermented *A. pinnata* by-product (Aren sago dregs), as well as forage and tofu dregs, on rumen fermentability (pH, NH₃, total VFA), digestibility (IVDMD and IVOMD), rumen microbial populations, partial VFA, methane gas, microbial population and protein synthesis *in vitro* with dairy goat rumen fluid. The study employed a Completely Randomised Design (4 x 4) with 4 treatments and 4 replications. The treatments were FRSC-0: Ration

with 0% fermented rice bran-Aren sago dregs; FRSC-5: Ration with 5% fermented rice bran- Aren sago dregs; FRSC-10: Ration with 10% fermented rice bran- Aren sago dregs; FRSC-15: Ration with 15% fermented rice bran- Aren sago dregs. Data were analysed using the ANOVA method in SPSS version 26 and Duncan's Multiple Range Test for further tests for any significant differences. The results showed that the ration containing concentrate with Fermented rice bran and Sago Dregs had a significant effect ($p < 0.05$) on pH and IVDMD. There were no significant effects ($p > 0.05$) on NH_3 , VFA, IVOMD levels, protozoa population levels, total bacteria, partial VFA, and methane gas. However, the addition of ration with concentrate containing 10% rice bran and Aren sago dregs fermented by Oyster mushroom (*Pleurotus ostreatus*) increased microbial protein synthesis by about 9.35 mg mL^{-1} – 15.82 mg/L . Feeding a diet containing 15% fermented rice bran- Aren sago dregs can be tolerated and is optimal, as the digestibility values of dry matter, organic matter, total VFA, and NH_3 concentrations are within normal limits.

Keywords: Aren dregs, Rumen fermentability, *P. ostreatus*

Analysis of phenolic compounds and antifungal potential of arabica coffee pulp extract using acidified ethanol extraction

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Coffee pulp is a waste product from coffee bean production. It has an effect on the environment and emits disagreeable scents that disturb people in the area. Due to these problems, several research investigations have used coffee pulp for studying bioactive compounds, in order to value added for these waste product. The purpose of this study was to extract coffee fruit pulp and investigate its effectiveness in inhibiting green mold fungus that grows on citrus fruits postharvest. However, the efficiency of coffee pulp extract depends on various factors including the extraction solvent. In the present study coffee pulp powder was extracted with 70% ethanol + 1% hydrochloric acid (HCl) at 45°C for 60 min. The total phenolic content (TPC), total flavonoid content (TFC), total tannin content (TTC), antioxidant activity, caffeine content, and chlorogenic acid content of the crude extract was analyzed. Coffee pulp extract at a concentration of 0.1 g/mL was used in the antifungal assay on green mold infected in tangerine fruits for a range of immersion times, including 1, 3, 5, and 10 min. The result indicated that coffee pulp extract had rich in chlorogenic acid and caffeine contents and effectively suppressed mycelial growth of the pathogenic fungus. As a result, coffee fruit pulp extract is effectively inhibited the growth of postharvest fungal pathogens in tangerine fruits. The usage of coffee fruit pulp extract may be an alternate disease control strategy that reduces the consumption of fungicides, consequently protecting the growers and customers.

Keywords: Tangerine, *Penicillium digitatum*, Chlorogenic acid, Caffeine, Ultrasound-assisted extraction

SESSION 5: SOIL, WATER AND ENVIRONMENT

A Comparative analysis of carbon dioxide emissions across land uses in Bengkulu City, Indonesia

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The study found that CO₂ emissions varied across different land uses over six observation periods, with the most pronounced fluctuations occurring in agricultural areas. Forest soils released the highest levels of CO₂ but also supported the greatest accumulation of carbon through higher dry litter biomass, dry bottom plant biomass, and soil organic carbon. Specifically, dry litter biomass in forested areas was 250% and 167% higher than in home yards and palm oil plantations, respectively. Additionally, forest soils exhibited superior quality, contributing the highest soil total nitrogen (N), available phosphorus (P), exchangeable potassium (K), cation exchange capacity (CEC), and pH, while maintaining the lowest bulk density. Compared to palm oil plantations, forest soils had 49.1% more organic carbon, 258.4% more available P, and 36.4% more exchangeable K. However, total soil nitrogen did not significantly differ between forests and palm oil plantations. Microbial populations were also relatively consistent across all land use types. Further research is needed to assess the carbon balance of each land use type to better understand their potential as carbon sinks or sources.

Keywords: Carbon flux, Forest floor, Soil quality, Soil organic carbon

Effect of potassium on the yield of gladiolus in grey terrace soil of gazipur (AEZ 28)

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A field experiment was conducted on Gladiolus (var. BARI Gladiolus-3) in Grey Terrace Soil of Bangladesh Agricultural Research Institute (BARI), Gazipur (AEZ-28) ((24° 00' N, 90° 25' E and 8.4 m) during the rabi season of 2013-2014 to find out the optimum dose of potassium for corm, cormel and flower production of gladiolus. There were five treatments comprising five levels of K (0, 40, 80, 120 and 160 kg K ha⁻¹). Muriate of potash was used as K source. The treatments were arranged in a randomized complete block design with three replications. Results showed that increasing K fertilization substantially augmented plant growth, heaviest and largest corm and cormel, longest spike and rachis, number of florets per spike, cormel and flower stick production in gladiolus. The highest level of K (160 kg K ha⁻¹) application significantly produced the highest corm number (1.89), and also the highest number (14.20) and yield of cormel (8.24 t ha⁻¹) in gladiolus. It was also found that 160 kg K ha⁻¹ application significantly increased spike (98.00 cm) and rachis length (48.13 cm), florets number per spike (12.4). The highest yield of flower stick (17.32 t ha⁻¹) was found with the highest level of K application (160 kg K ha⁻¹). The lowest yield of gladiolus corm, cormel and flower production were observed in K control treatment. K uptake by gladiolus was increased with increased K levels. Hence, 160 kg K ha⁻¹ along with blanket dose of N₉₀P₃₀S₁₀Zn₃B₁ kg ha⁻¹ + Cowdung 5 tha⁻¹ was found optimum for gladiolus production in Grey Terrace soil of Gazipur (AEZ 28).

Keywords: Gladiolus, Potassium fertilizer, Yield and quality

A hidden blue carbon sink in Nipa Palm sediment: A pioneer study of the Nipa Palm ecosystem in Trang Province, southern Thailand

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This pioneering study on Nipa palm mangroves demonstrated their importance as carbon sinks. In this work, sediment cores from a Nipa palm mangrove forest in the Trang River estuary, Thailand, a mangrove ecosystem that has gotten little attention, are utilised to investigate the dynamics of total organic carbon (TOC), total nitrogen (TN), soil organic carbon (SOC), and perform grain size analysis. Three sediment cores (KT01, KT02, and KT03; depths 76–82 cm) were analysed at 2 cm sediment intervals to determine their TOC, TN, C/N ratios, SOC stocks, and grain size. The findings indicate that the SOC stock of the three cores ranged between about 322–355 Mg C_{org} ha⁻¹. The surface enrichment at KT01 (depths 0–10 cm) had much greater TOC (5.73–9.04%) whereas TN was similar throughout the whole depth for 3 cores (0.21–0.58%). A key observation was that surface (0–10 cm deep) TN was 33–37% of the total TN, highlighting active nitrogen cycling near the root zone. The C/N ratio tended to fluctuate (14–24) with depth, indicating mixing between vascular plant debris and vascular land plants except at the layer 0–2 cm deep of KT 02 indicating it was sourced from algae. The vertical distribution of TOC and TN tended to decrease with depth at KT0. It is noteworthy that carbon burial was suggested by mid-depth SOC maxima (depths 48–58 cm), whereas the deeper layers (depths 60–82 cm) retained approximately 30 % of total SOC. The grain size analysis of three sediment cores indicated that all samples were within the silt size fraction, mainly very fine silt, with no presence of sand or clay-sized particles. The information obtained from this pioneer study offers baseline data for future comparison to other mangrove varieties.

Keywords: Climate change, Organic matter, Mangrove, Andaman Sea, Tidal cycle

Heavy metal distribution in water, sediments, and aquatic plants from the Middle Songkhla Lagoon: environmental risk and phytoremediation assessment

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This study investigated the distribution of aluminum (Al), arsenic (As), and lead (Pb) in water, sediments, and two dominant aquatic plants—morning glory (*Ipomoea aquatica*) and water mimosa (*Neptunia oleracea*)—from the middle part of Songkhla Lagoon. Heavy metal concentrations in water and sediments were below national and international standards, indicating low contamination risk. Both concentrations of As and Pb in sediment had severe enrichment (EF > 15) at all stations, suggesting anthropogenic inputs. In contrast, geo-accumulation index (I_{geo}) values were negative, indicating

unpolluted sediments and showing two-index differential sensitivity. In aquatic plants, heavy metals were mainly accumulated in roots, with significantly lower concentrations found in stems and leaves, especially for As and Pb. Morning glory showed greater root uptake of As and Pb than water mimosa, making it a better candidate for bioindication. Despite root accumulation, translocation factors (TF) and bioaccumulation factors (BAF) were close to zero for all stations and metals, confirming that metals did not effectively move into edible aerial tissues. This pathway from sediment to root, but not to leaf or stem, suggests that the edible parts of these plants remain relatively safe for consumption under current conditions. Low contamination levels in water and sediment, limited metal transfer to upward plant parts, and environmental parameters (e.g., sediment pH, organic carbon, and particle size) support these species, particularly morning glory for rhizo-filtration and safe, sustainable use in brackish aquatic environments.

Keywords: Water mimosa, Morning glory, Climate change, Arsenic, Lead

Analysis of peat soil physical properties under different land uses in Seluma Regency, South Sumatera

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Unlike the soil in general, peat soil has unique physical characteristics influenced by land use. This study aimed to analyze the physical properties of peat soil under different land uses in Seluma Regency, South Sumareta and their relationship with the topsoil (0-20 cm) and subsoil (20-40 cm) layers. The studied land uses included rubber plantations, oil palm plantations, paddy fields, and shrubland. The analyzed variables included bulk density, total pore space, water content, permeability, organic C-content, peat maturity, and thickness. The results showed that rubber plantations had the lowest bulk density (0.35 ton/m³) and the highest permeability (87.87 cm/hour), while paddy fields had the highest bulk density (0.66 ton/m³) and the lowest permeability (5.87 cm/hour). The highest total pore space was found in rubber plantations (74.56%), whereas paddy fields had the lowest pore space in the subsoil (56.02%). Water content was highest in the subsoil of rubber plantations (38.46%) and lowest in shrubland (22.22%). The highest organic C-content was observed in rubber plantations (33.68%), while the lowest was in paddy fields (9.6%). Oil palm plantations and paddy fields had more mature peat (sapric), whereas rubber plantations and shrubland maintained more natural peat conditions. Analysis using Partial Least Squares Structural Equation Modeling, demonstrated that land use significantly affects peat soil's physical properties, particularly bulk density, total pore space, permeability, and water content. Land conversion influences peat subsidence and decomposition, highlighting the need for sustainable management to prevent land degradation and maintain ecosystem balance.

Keywords: Land conversion, Organic content, Permeability, Water content

Depth profiles of microplastic in sediment cores in seagrass and adjacent areas

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Seagrass beds are vital biodiversity hotspots, offering habitats for many species of fish and marine organisms. Additionally, they play an essential role in nutrient cycling, sequestering carbon, and mitigating coastal erosion. These ecosystems are facing growing threats from pollution, including microplastics (MPs) contamination (< 5 mm). This study examined vertical distribution of microplastics in sediment cores (depths 0-20 cm) in seagrass beds and adjacent areas at Kalase Bay, located in Trang Province, facing to Andama sea, southern Thailand. Sediment sampling sites were categorized into two habitat types, seagrass and non-seagrass areas. The results reveal the presence of MPs in both seagrass and non-seagrass areas, with higher concentrations found in the surface area (depths 0-5 cm) than the bottom (depths 15-20 cm) at many stations. The main shapes of microplastics were mostly made up of fibers and fragments. The most prominent color consisted of transparent particles, followed by black and blue particles. This result suggests that microplastic was accumulated in the depth profile of sediment at both areas especially at seagrass beds may perform as effective sinks for microplastics, likely due to their root and leaf structures that support MPs trapping, highlighting the need for pollution management and conservation strategies in coastal ecosystems.

Keywords: Climate change, Thailand, Polymers, Blue ecosystem

Assessment of available phosphorus in planted mangrove sediments in Thailand by using the Olsen extraction method

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Phosphorus (P) is an essential macronutrient for plant growth, carbon sequestration, and nutrient cycling within the dynamics of mangrove ecosystems, where its bioavailability is often a limiting factor. One important factor is available P, which represents the P fraction weakly bound to minerals or organic matter that is easily consumed by plants and microbes. This study aimed to assess available P concentrations in two sediment cores from a planted mangrove forest located in southern Thailand. The pH levels of sediment across the sites ranged from 7.13 to 7.90, indicating neutral to slightly alkaline condition, which is suitable for application of the Olsen method to extract P in the sediments. Results showed that available P in sediment samples commonly decreased with increasing depth, which varied from 19.38 ± 0.06 to 47.50 ± 0.06 mg/kg P, with an average value of 28.29 ± 3.80 mg/kg P. To ensure

reliability of the data, the analytical performance of the Olsen extraction method (NaHCO_3 , pH 8.5), coupled with UV-Vis spectrophotometry, was validated. The analytical performance of the method showed excellent linearity ($R^2 = 0.9980$) and robust precision were %RSD 1.23–3.45% for within-day and %RSD 1.24–4.35% for between-day. Accuracy, evaluated through spike recovery ranged from 82% to 99%, indicating that the method is highly reliable. Collectively, these validation metrics indicate the effectiveness of the Olsen method as a quantitative analytical tool to determine the available P in mangrove sediment samples. This research provides critical information on the P status in restored mangrove areas, playing a significant role of enhancing the understanding of nutrient dynamics within these ecosystems and promoting the critical potential of mangroves in supporting plant growth and blue carbon sequestration in coastal environments.

Keywords: Blue carbon; Nutrient, Environment, Restoration of mangrove forest, Spectrophotometry

Structural analysis of social, ecological, and governance factor in the management of Kerinci Seblat National Park : a case study of Pal VII Village, Rejang Lebong

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The management of the Kerinci Seblat National Park (TNKS) conservation area faces serious challenges due to the complexity of social, ecological and governance risks, especially in buffer village areas such as Pal VII Village, Rejang Lebong Regency. This research examines the structure of the risk system that influences the success of TNKS conservation, using a structural analysis approach based on the MICMAC method. Through primary data collected from the community, village officials, and policy makers, as well as secondary data from policy documents and scientific studies, this research identifies fifteen risk variables that are then mapped based on the strength of their influence and dependency. The analysis showed that weak law enforcement, unclear boundaries, and low public awareness are strategic variables that have a broad impact on the conservation management system. Findings also show that social risk is the most pressing threat, followed by ecological and economic pressures. Conversely, weak community participation suggests the need for local capacity-building strategies. This research recommends strengthening adaptive governance systems, integrating local values in conservation policies, and collaborative approaches across stakeholders as the basis for system-based risk mitigation.

Keywords: Collaborative conservation, Social-ecological risk, MICMAC, TNKS, Participatory governance

Optimizing solar disinfection of contaminated water using Artificial Neural Network

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The impact of temperature, UV radiation, and sunlight intensity on the survival of *Escherichia coli*, *E. coli* O157:H7, *Salmonella* Newport, and their antibiotic-resistant (ABR) variants during sunlight exposure was evaluated. Bacteria (8 log CFU/mL) were exposed to natural sunlight for 180 min on

three separate days, with dark controls included. Environmental conditions varied significantly across days, with differences in temperature, UV, and sunlight intensity ($P < 0.05$). Bacterial decline was positively correlated with these factors and varied by species, ABR profile, and day of exposure. *E. coli* populations dropped below detection on two days, yet a portion of cells (up to 67%) remained viable. An artificial neural network model indicated that *Salmonella* was more resistant than *E. coli*, and AMR strains consistently showed higher survival ($P < 0.05$). Sunlight-exposed cells displayed differences in recovery, growth rate, and morphology, including viable but nonculturable states and filament formation. Overall, daily fluctuations in sunlight and UV can markedly influence both bacterial inactivation and recovery potential.

Sorption and desorption of potassium in salt-affected soils

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Potassium (K^+) is an essential macronutrient for plant growth, but elevated sodium (Na^+) levels from seawater intrusion reduce the K/Na ratio by competing with K^+ uptake. High Na^+ concentrations also disrupt K^+ sorption–desorption in soil, lowering K^+ availability and impairing plant nutrient acquisition. This study investigated the influence of four soil salinity classes e.g., non-saline ($EC\ 1.78\ dS\ cm^{-1}$), slightly saline ($3.25\ dS\ cm^{-1}$), moderately saline ($5.33\ dS\ cm^{-1}$), and strongly saline ($10.45\ dS\ cm^{-1}$) on K^+ sorption and desorption. A batch experiment was conducted in laboratory to examine these processes. For sorption, soils were equilibrated with K solutions at 0, 50, 100, 150, 200, 250, and 500 $mg\ K\ L^{-1}$ with three replications, shaken at $25\ ^\circ C$, centrifuged at 5000 rpm for 12 minutes, filtered, and K concentration was measured using an atomic absorption spectrophotometer. Sorption capacity was calculated and predicted using Langmuir and Freundlich models. For desorption, soils from the sorption experiment with treatments of no K addition and 500 $mg\ K\ L^{-1}$ were used. A 0.01 M $CaCl_2$ solution was added, and soils were shaken at $25\ ^\circ C$ for 4, 20, 24, 48, 72, 96, 120, 144, and 168 hours. After shaking, samples were centrifuged at 1000 rpm for 10 minutes, filtered, and K concentration was measured. K desorption was calculated, and release rates were modeled using parabolic diffusion equations. The results showed that the Langmuir model described potassium sorption capacity better than the Freundlich model. Moderately saline soil had the highest sorption capacity ($12.33\ g\ K\ kg^{-1}$), followed by non-saline (10.14), strongly saline (7.71), and slightly saline soils (7.41). In desorption experiments, K release was lower in the treatment without K addition than in the 500 $mg\ K\ L^{-1}$ treatment, with release velocities ranging from 56.89 to 66.48. Overall, salinity reduced K^+ sorption and increased desorption, enhancing leaching and lowering availability to plants.

Keywords: Potassium, Sorption, Desorption, Salt-affected soil

RAPD-based genetic diversity analysis for the exploration of *Kaempferia parviflora* from various accessions

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Kaempferia parviflora, widely recognized for its medicinal value, possesses genetic diversity that remains largely unexplored, particularly across various accessions. This study aimed to analyze the genetic diversity of *K. parviflora* from diverse accessions using RAPD (Random Amplified Polymorphic DNA) markers to support exploration and germplasm conservation efforts. A total of 11 *K. parviflora* accessions were collected from various regions in West Java, Central Java, East Java, and Bali Province, Indonesia. Genomic DNA was extracted and amplified using 5 selected RAPD primers. The analysis revealed a high percentage of polymorphism at 66,7%, indicating a significant level of genetic diversity among the tested accessions. Cluster analysis based on Jaccard's similarity coefficient and UPGMA dendrogram grouped the accessions into 2 main clusters, demonstrating kinship relationships and genetic differences among populations. Specific RAPD primers OPC-8 proved effective in differentiating accessions and identifying specific markers. These findings provide crucial information regarding the genetic diversity patterns of *K. parviflora*, which is highly valuable for breeding programs, selecting superior accessions, and both in situ and ex situ conservation strategies. This data also forms a basis for further exploration to discover genes or alleles responsible for superior traits in this species.

Keywords: *Kaempferia parviflora*, Genetic diversity, Dendrogram, Accessions, Polymorphism

Effects of nitrogen fertilizer on the growth, chemical composition and antioxidant activity of *Chara corallina*

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In this study, the different urea fertilizers were used for investigating the onbiomass production, nutrition value, phytochemical constituents, and antioxidant properties of *Chara corallina* in green house cultivation for 35 days. The results showed nitrogen (N) fertilization can increase the growth performance, total chlorophyll, protein content, lysine, threonine, aspartic acid, glutamic acid, arginine, phenolic content of *Chara corallina*. The alga in four treatments showed significant on chlorophyll, crude protein, amino acid profile. Most of the biochemical compositions in *C. corallina* increased significantly with the increased concentrations of nitrogen. The increasing nitrogen content in the culture system did not affect the phytochemical content of *C. corallina*, because nitrogen is not an essential element in the structure of phenolic, flavonoid and tannin compounds. Urea

supplementation enhanced non-essential amino acids associated with flavor, particularly Glutamic acid and Aspartic acid, with the highest levels observed at 0.15 mg/L urea supplement, improving the nutritional and sensory quality of *C. corallina*. Additionally, nitrogen enrichment increased the antioxidant activity, likely due to elevated chlorophyll content. These findings suggest that optimizing nitrogen supply in algal cultivation can simultaneously enhance both the nutritional value and bioactive properties of *C. corallina*.

Keywords: Fertilizer, Phytochemical, Amino profile, Nitrogen, Freshwater algae

Humic acid from *Melastoma affine* D. Don compost enhances key chemical properties of tropical coastal entisols and inceptisols

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The study demonstrated that the application of humic acid derived from *Melastoma affine* D. Don up to a rate of 4000 mg kg⁻¹ increased total soil organic carbon (TSOC), total soil nitrogen (TSN), exchangeable potassium (K), and cation exchange capacity (CEC) of Entisols and Inceptisols from a tropical coastal area. However, humic acid application had no effect on soil available PO₄ or electrical conductivity (EC) in either soil. In contrast, soil pH decreased significantly with the humic acid application. An application rate of 1000-2000 mg kg⁻¹ was sufficient to improve key soil properties while minimizing further pH reduction. Inceptisols exhibited a greater increase in TSOC than Entisols whereas Entisols showed a stronger response in increasing TSN, K, and CEC than Inceptisols. At 4000 mg kg⁻¹, TSOC increased by 93% in Inceptisols compared to the control, while Entisols showed 68% increase. Additionally, TSN and exchangeable K in Entisols increased by 49 % and 23%, respectively, while in Inceptisols showed no significant change and only a 12.5% increase in K at the same rates. These findings highlight the potential of humic acid derived from *Melastoma* compost to enhance chemical properties coastal soils particularly Entisols and Inceptisols, providing a sustainable strategy for soil improvement

Keywords: Humic acid, *Melastoma* compost, Entisols, Inceptisols, Coastal area

The impact of land slope on the soil physical of smallholder coffee plantations in Kayu Manis Village, Indonesia

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This research aimed to identify the relationship between five classes of land slope, ranging from flat, sloping, slightly steep, steep, to very steep, and the physical properties of soil in coffee plantations of smallholder farmers in Kayu Manis village, Indonesia. This study reveals that the bulk density of the soil in these coffee gardens is not correlated with the slope. It is evident that the gentle slope has the

highest bulk density value of 1.33 g/cm³. However, in contrast, the weight percentage of moisture and percentage volume show an influence from the land slope on the management of coffee gardens by these small farmers. At slopes greater than 45% or in the very steep class, the weight percentage of moisture is highest at 9.16%, and the highest volume percentage of moisture is at 210.26%. The fertility of the coffee plantations managed by smallholder farmers is also affected by the land slope. It is observed that on the flat slope, the soil has high phosphorus content, whereas on the steep slope, the phosphorus level is low. However, the potassium content on the flat slope only has a moderate criteria compared to the other slope classes in that coffee plantation, which have high values. The pH content of the soil, which affects the fertility for coffee cultivation, varies from slightly neutral to slightly acidic, with the lowest value, which is slightly acidic, located on the steep slope. However, this does not affect the organic carbon content of the soil, as all five slope classes have a low criterion.

Keywords: Fertility, Physic, Slope

SESSION 6: ANIMAL BIOTECHNOLOGY, FISHERIES SCIENCES

Malted red sorghum: A promising alternative to maize in poultry feed formulations

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This review evaluated the potential of malted sorghum as a viable alternative to maize in poultry diets. Sorghum ranks as the fifth most important cereal crop globally after wheat, rice, maize, and barley. Africa leads in sorghum production, contributing approximately 46% of global output, while the Americas account for 35%. Sorghum is a staple food for millions of people in approximately 30 countries in Africa and Asia. Compared to maize, sorghum demonstrates superior performance under low rainfall and show high resilience to environmental stressors such as high temperature, drought and waterlogging. These attributes make it a particularly suitable crop for climate-smart agriculture and combating for food insecurity. In many parts of Africa, sorghum production still relies heavily on indigenous seed varieties, with minimal use of commercial fertilisers. In poultry production, feed represents 75 to 85% of the total costs, with cereal grains being the principal energy source in tropical poultry diets. While maize is the dominant crop used, sorghum offers a promising alternative. However, the presence of antinutritional factors (ANFs) such as tannins and the cyanogenic glycoside (dhurrin) limits its use in monogastric diets. One potential solution to mitigate these ANFs is malting, which is used to improve the nutritional quality and digestibility of cereal grains, like sorghum, by reducing ANFs and enhancing nutrient availability. Malting also improves the digestibility and palatability of sorghum-based feeds. In addition, malting increases the availability of amino acids and digestible carbohydrates, which are essential for growth and egg production. Studies found that broiler chicks fed malted sorghum diets exhibited improved body weight gain and feed efficiency compared to those fed intact sorghum, highlighting the value of this processing method in poultry nutrition. In conclusion, malted sorghum presents a nutritionally viable alternative that can replace maize in poultry feed formulations without compromising bird performance.

Keywords: Africa, Antinutritional factors, Digestibility, Malting, Sorghum

Oregano (*Origanum vulgare* L.) essential oil as a natural growth promoter in broiler chickens

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Broiler chickens that were supplemented with oregano essential oil showed better early growth performance compared to those fed a standard diet or the antibiotic salinomycin. During the first 10 days, the chickens receiving oregano essential oil had a highly significantly higher feed intake ($P < 0.01$), with the group receiving 1,000 ppm showing the highest average daily feed intake of 26.62 g/bird,

followed closely by the 2,000 ppm and 4,000 ppm groups, which had average intakes of 25.9 and 25.81 g/bird, respectively. However, the differences among the oregano-supplemented groups were not statistically significant ($P > 0.05$). In contrast, the control and antibiotic groups had lower feed intakes of 23.26 g/bird and 23.23 g/bird, respectively, but there were no significant differences among the oregano-supplemented groups ($P > 0.05$). Additionally, body weights and daily growth rates in all groups receiving oregano were similar to those in the antibiotics group and were significantly higher ($P < 0.01$) compared to the control group. However, no significant differences were observed among the various levels of oregano ($P > 0.05$). Notably, during the same period, the group supplemented with 2,000 ppm of oregano essential oil exhibited a feed conversion ratio (FCR) that was statistically comparable ($P > 0.05$) to the group receiving salinomycin. After the initial 10 days, there were no significant differences in growth performance or carcass traits across all treatment groups ($P > 0.05$). The feed cost per kilogram of meat produced during the starter period for the 1,000ppm oregano group was 25.76 Baht/kg, comparable to the control group at 25.96 Baht/kg and the antibiotic group at 23.85 Baht/kg. These findings suggested that oregano essential oil, particularly at 1,000 ppm, can serve as a cost-effective alternative to antibiotics for enhancing early-stage growth in broiler chickens without negatively impacting overall production costs or carcass quality.

Keywords: Antibiotic alternatives, Feed efficiency, Phytogetic feed additive

Effects of thymol–carvacrol combined with organic acids on carcass traits, meat quality, and stress indicators in broilers under enteric disease challenge

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The effects of a feeding program combining thymol–carvacrol and organic acids were evaluated as an alternative to an antibiotic growth promoter (AGP) in broilers under a coccidial challenge. A total of 750 male Ross 308 chicks were assigned to a negative control (T1), an AGP group with bacitracin methylene disalicylate (T2), or a thymol–carvacrol–organic acid group (T3). Slaughter weight, dressing percentage, retail cut yields, and meat quality traits did not differ among treatments ($P > 0.05$). T2 had the highest number of birds without foot pad lesions, significantly exceeding T1 and comparable to T3, which also outperformed T1 ($P < 0.05$). T2 recorded the fewest mild and severe lesions, while T3 showed a numerical reduction in severe lesions compared with T1. Both T2 and T3 reduced lesion severity relative to T1, with T2 showing the most favorable scores and T3 demonstrating meaningful potential as a non-antibiotic alternative. Thigh meat malondialdehyde (MDA) levels increased during storage ($P < 0.01$), but no treatment effects were observed ($P > 0.05$). Serum MDA and the proportions of lymphocytes, monocytes, eosinophils, and basophils were unaffected; however, heterophil percentage and the heterophil-to-lymphocyte ratio were significantly higher in T1 than in T2 and T3 ($P < 0.01$), indicating reduced physiological stress with both AGP and thymol–carvacrol–organic acid supplementation. Overall, thymol–carvacrol with organic acids-maintained carcass yield and meat quality while mitigating stress responses and improving foot pad health, supporting its potential as a viable alternative to AGPs in broilers under enteric challenge.

Keywords: Phytogetic feed additive, Carcass composition, Meat quality, Lipid oxidation, White blood cell profiling

Comparative analysis of freshness between pelagic and demersal marine fish

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The study investigated the freshness quality of pelagic fish, including eastern little tuna (*Euthynnus affinis*), pickhandle barracuda (*Sphyrna jello*), and white pomfret (*Pampus argenteus*), and demersal fish, including orange spotted grouper (*Epinephelus coioides*), yellowtail fusilier (*Caesio cuning*), and threadfin bream (*Nemipterus japonicus*). Sensory, physicochemical, and microbiological analyses were used to determine the freshness of pelagic and demersal marine fish over a period of four days. Sensory examination of pelagic fish had higher average overall sensory acceptance score (5.93 ± 1.42 points) compared to demersal fish (5.64 ± 1.53 points) ($p < 0.05$). Physicochemical analysis average total volatile basic nitrogen (TVB-N) of pelagic fish was lower than demersal fish ($p < 0.05$), measuring at 11.71 ± 2.40 and 13.26 ± 3.53 mg of nitrogen/100 g, respectively. The average trimethylamine (TMA-N) in pelagic fish exceeded that in demersal fish ($p < 0.05$), registering at 11.15 ± 3.98 and 9.70 ± 1.34 mg of nitrogen/100 g, respectively. Pelagic fish exhibited a higher average pH in muscle compared to demersal fish ($p < 0.05$), measuring at 7.16 ± 0.75 and 6.99 ± 0.20 , respectively. Microbiological examination revealed a statistically significant increase ($p < 0.05$) in the quantity of every microorganism type tested across all fish types over a span of 4 days. Based on our study findings, it can be concluded that pelagic fish tend to retain freshness and sustain longer storage durations in comparison to demersal fish. This may be influenced by factors such as muscle structure, physiological characteristics, and environmental conditions.

Keywords: Freshness quality, Habitat, Marine fish, Storage duration

In silico structural analysis, classification, and functional annotation of uncharacterized protein from *Corbicula fluminea*

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Heat shock protein 70 (HSP70) chaperones are essential molecular machines that facilitate the folding, assembly, and stabilization of numerous client proteins through ATP-dependent cycles of substrate binding and release. An uncharacterized protein sequence from *Corbicula fluminea* was initially annotated to contain domains with potential biotechnological relevance. This study employed in silico approaches using online tools for protein characterization including BLASTp, ExPASy, I-TASSER, EzMol, DeepLoc, SMART, and MEGA 12 software to determine its structural characteristics, classification, and potential functional role. Results revealed the presence of a conserved Pfam HSP70 domain (positions 6–612) and a Pfam MreB_Mbl domain (positions 116–384), along with a low-complexity region (positions 615–646). Subcellular localization prediction indicated a cytoplasmic distribution. Multiple sequence alignment and phylogenetic reconstruction using the Maximum Likelihood method showed that the *C. fluminea* clusters closely with its orthologue from *Corbicula fluminea* (Asian freshwater clam) (*Tellina fluminea*), confirming its taxonomic placement within HSP70 family. Collectively, these results confirm the protein as a member of HSP70 family and provide foundational insights into its structural and functional characteristics, contributing to the understanding of molecular chaperone biology in bivalves and informing future applications in biotechnology.

Keywords: *Corbicula fluminea*, HSP70, Silico analysis, Molecular chaperone, Protein annotation

Dorsal fin morphology and phylogenetic insights in bamboo sharks (*Chiloscyllium* spp.)

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Bamboo sharks (*Chiloscyllium* spp.), a common group of benthic sharks, are frequently caught by coastal fisheries in Thailand. This genus can be misidentified for one another across the genus owing to their similar shapes and color. Inadequate integration of morphological and genetic data hinders evolutionary analysis, and the recently recorded genetic sequences of *C. arabicum* and *C. burmensis* are yet to be examined for their phylogenetic relationships. Therefore, this study aimed to examine the morphological traits of these species, specifically the first dorsal fin, and genetic data to improve species classification and phylogenetic relationships. Morphological analysis revealed that *C. punctatum* can be distinguished from other species by the distinctive concave trailing edge of the first dorsal fin. Two closely related species, *C. hasseltii* and *C. griseum*, showed overlapping shape variations in their first dorsal fins. However, the proportions of the first dorsal fin height/total length and the first dorsal fin inner margin/total length were observed to be significantly different between these two species. This difference can be integrated into the dichotomous key for *Chiloscyllium*. Phylogenetic analysis based on the cytochrome c oxidase I (*COI*) gene was consistent with the morphology of the first dorsal fin, indicating that *C. punctatum* differs from other *Chiloscyllium* species. However, phylogenetic tree based on the NADH dehydrogenase 2 (*ND2*) gene fragments grouped the clade of *C. punctatum* with other clades of *Chiloscyllium*. Most *Chiloscyllium* species formed monophyletic groups based on the two gene fragments, except for *C. hasseltii* and *C. griseum*, which clustered together. This research provides practical knowledge for field-based species identification and accurate classification within the genus *Chiloscyllium*, enhances our understanding of its phylogenetic relationships, and supports the future development of a field guide.

Keywords: Dorsal fin, Geomorphometry, Morphometry, Evolution

Modelling ozone-based process for decontamination of *Opisthorchis viverrine* in cyprinid fish

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Objectives of this study was to develop techniques for disinfection of parasites in fish. Response surface methodology (RSM) was applied to optimize the experimental design for inactivating *Opisthorchis viverrini* (*O. viverrini*) in cyprinid fish. A 5-level-2-factors Central composite Design (CCD) was used. cyprinid fish samples were treated according to an experimental design generated by Design Expert software. The treatments varied in two important process parameters, including ozone dosages (0.10–0.50 ppm) and contact times (10–30 min) with five different levels ($-\alpha$, -1, 0, +1, $+\alpha$) to establish the model. Statistical analysis indicated that the quadratic model with a correlation coefficient (R^2) of 0.9376 was significantly predicted the responses ($p < 0.05$). RSM model showed that optimal condition refers to 0.50 ppm ozone for 20 min, resulting in 100% decontamination of *O. viverrini* metacercariae (OVMC). These findings demonstrate the high efficiency and practical applicability of ozone-based treatment as a food safety intervention to reduce *opisthorchiasis* transmission through cyprinid fish, with potential impact on public health in endemic regions.

Keywords: Response surface methodology, Cyprinid fish, Ozone

The effect of *Curcuma* sp. supplementation on blood profile alteration in crossbreed sheep and their relationship with their adaptability

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Determining the relationship between Curcuma supplementation on blood profile and physiological parameters of different cross-breed sheep was very important to examine their adaptability. Results showed that Curcuma supplementation in different crossbred sheep increases the blood and biochemical parameters. There was a correlation between supplementation and their adaptability.

Keywords: Haemoglobin, Cross dorper, Awassi, Texel

Phytogenic feed additives for improving feed efficiency and lowering ruminants' enteric methane emission on palm oil sludge feed: *In vitro* study

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Research has been done to identify practical strategies to improve the feed efficiency and reduce enteric CH₄ of ruminants fed low quality ingredients. These include techniques involving dietary interventions, rumen manipulation, the use of phytochemical inhibitors or Phytogenic feed additives (PFAs). In this experiment 4 PFAs were used: *Melastoma malabatricum* (extract) (MM), *Carica papaya* (extract) (CP), *Curcuma longa* (CL), and *Curcuma xanthoriza* (CX). The selection of the 4 PFAs is because the secondary metabolic content of the herb has the potential to increase feed efficiency and reduce enteric methane. Eight formulas were made from the 4 available PFAs combinations, as follows: 1) **TT0**: Non fermented POS + 0.05 MM + 0.05 CP + 0.75 CL + 0.75 CZ; **T1**: Fermented POS no PFAs; **T2**: Fermented POS + 0.75 MM + 0.75 CP + 0.75 CL + 0.75 CZ (the PFAs as a powder; **T3**: Fermented

POS +0.1 MM + 0.1 CP +1.5 CL +1.5 CZ ; **T4:** Fermented POS +0.1 MM + 0.1 CP +3 CL; **T5:** Fermented POS +0.1 MM + 0.1 CP +3 CZ ; **T6:** Fermented POS +0.1 MM + 0.1 CP; **T7:** Fermented POS +0.1 MM + 1.5 CL +1.5 CZ; **T8:** Fermented POS + 0.1 CP + 1.5 CL +1.5 CZ. (all unit is in grams). Tilley and Terry method was used to measure the In vitro assays. Result indicated that 4 combinations of PFAs (T0 – T7) used in this research effectively increased IVDMD and IVOMMD percentage on 24-hour incubation time and reduced CH₄ gas emissions.

Keywords: Palm oil sludge, *In vitro*, Cattle, Feed efficiency, Methane

The relationships among slaughter age, final body weight, carcass weight, dressing percent, marbling, and income of crossbred Angus beef

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In 156 crossbred Angus beef cattle, final body weight (FBW) and carcass weight (CW) were highly correlated ($r = 0.964$, $R^2 = 0.930$, $P < 0.001$). Income (THB) showed significant positive correlations with slaughter age ($r = 0.450$, $R^2 = 0.202$, $P < 0.001$), FBW ($r = 0.688$, $R^2 = 0.470$, $P < 0.001$), CW ($r = 0.751$, $R^2 = 0.564$, $P < 0.001$), dressing percentage (DP) ($r = 0.392$, $R^2 = 0.153$, $P < 0.001$), and marbling score ($r = 0.734$, $R^2 = 0.538$, $P < 0.001$), with CW and marbling showing the strongest associations. Slaughter age was positively correlated with FBW ($r = 0.503$, $R^2 = 0.253$, $P < 0.001$) and CW ($r = 0.486$, $R^2 = 0.236$, $P < 0.001$), and weakly correlated with marbling ($r = 0.160$, $R^2 = 0.025$, $P < 0.05$). DP was positively correlated with CW ($r = 0.338$, $R^2 = 0.114$, $P < 0.001$), marbling ($r = 0.280$, $R^2 = 0.078$, $P < 0.001$), and income ($r = 0.392$, $R^2 = 0.153$, $P < 0.001$), but not with slaughter age or FBW. Network analysis confirmed CW, marbling, and FBW as central variables influencing income, highlighting their potential as key production indicators. These findings indicated that optimizing FBW, CW, and marbling could substantially enhance economic returns in crossbred Angus beef systems in Thailand.

Keywords: Production efficiency, Carcass traits, Economic sustainability, Food security, Livestock

Effects of dietary *Moringa oleifera* leaf powder supplementation on growth performance and carcass quality of broiler chickens

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The effects of dietary supplementation of Moringa leaf powder (MLP) as a growth promoter on the growth performance and carcass quality of broilers were investigated. A total of 120 one-day-old Commercial breed broilers of mixed sex were randomly allocated to 3 dietary treatments in 4 replications of 10 birds per pen. Moringa leaf powder were collected from a number of trees from the same village to avoid variations in soil micronutrient content and were grinded to produce MLP. Dietary treatments were as follows: control (0 %), 1 % MOLP and 2 % MLP. Weight gain of broilers was

recorded for determine average daily gain (ADG) and feed conversion ratio (FCR). Diets were fed for 42 days were provided feed and water ad libitum. At 35 days of age, 8 birds per treatment were randomly selected for determination of carcass and organ weights. The result showed that feed intake, ADG and FCR were not significant difference ($p > 0.05$). Carcass quality of broilers was not significant difference ($p > 0.05$). It was concluded that supplementation of Moringa leaf powder up to 1 – 2 % of feed did not impair nutrient utilization efficiency and growth performance.

Keywords: Moringa leaf powder, Broiler, Carcass quality

Influence of pretreatment and acid concentration on yield and quality of ossein extracted from chicken femur

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The research is investigated the extraction of ossein from chicken bones using a chemical method and to evaluate the quality of the extracted ossein. Ossein is an insoluble form of collagen with potential applications in various industries. This study examined the extraction process by assessing the combined effects of two factors: pretreatment method (boiling or soaking in 0.1 M NaOH) and subsequent ossein extraction using two different concentrations of hydrochloric acid (HCl), 0.5 M and 1.0 M, in order to compare extraction yields, ossein quality. The results showed that soaking in 0.1 M NaOH produced a significantly higher yield than boiling ($P < 0.05$). Likewise, extraction with 0.5 M HCl resulted in a higher yield than with 1.0 M HCl ($P < 0.05$). Moreover, an interaction effect was observed between the pretreatment method and the acid concentration, with the highest yield obtained when soaking in 0.1 M NaOH was combined with extraction using 0.5 M HCl. Quality analysis of the extracted ossein confirmed that its main component was protein, especially collagen and that its physical characteristics were suitable for further applications. This study demonstrates that chicken femur, often discarded as waste, can serve as a valuable source of ossein, thereby adding value to this by-product. Furthermore, the findings provide a foundation for future studies on ossein extraction from other types of bones and the exploration of its industrial applications.

Keywords: Collagen, Bone, Extraction, Waste, By-product

SESSION 7: FOOD SECURITY, FOOD SAFETY

Heavy metal bioaccumulation in edible mushrooms: food safety challenges and mitigation strategies for sustainable production

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Edible mushrooms play increasingly important roles in global food security and sustainable agriculture, yet their exceptional capacity for heavy metal bioaccumulation poses significant food safety challenges. This review synthesizes current knowledge on heavy metal accumulation mechanisms in commercially important mushroom species, with particular emphasis on cadmium (Cd) and lead (Pb) dynamics in *Pleurotus* species. Recent research demonstrates that *Pleurotus ostreatus* and *P. florida* exhibit distinct selective uptake mechanisms, with *P. ostreatus* accumulating cadmium concentrations exceeding safety thresholds (0.2 mg/kg) when cultivated on Cd-rich substrates, achieving bioconcentration factors of 2.553-fold accumulation from substrate to fruiting body while showing complete lead exclusion capabilities. Studies on *Hymenopellis radicata* reveal species-specific cadmium hyperaccumulation capacity (~3.7 mg/kg), while molecular identification research on *Pleurotus giganteus* strains confirms species-level metal exclusion characteristics with undetectable levels (<0.05 mg/kg) of all tested heavy metals. Other studies confirm species-specific selective uptake mechanisms, with caps accumulating 1.5-4 times higher metal concentrations than stems. Current European Union Regulation 2023/915 establishes cadmium limits of 0.15 mg/kg for *P. ostreatus* and lead limits of 0.30 mg/kg for major commercial species, yet 22.95% of samples in recent Chinese studies exceeded permissible cadmium levels. Selenium biofortification emerges as the most promising mitigation strategy, reducing cadmium accumulation by 4-89% while enhancing nutritional value. Substrate management through controlled sourcing and composition optimization provides practical solutions for safe mushroom production. This review identifies critical research gaps in mechanistic understanding and proposes integrated approaches combining genetic, nutritional, and environmental strategies to ensure food safety while maintaining the sustainability benefits of mushroom cultivation.

Conservation of Philippine mushrooms as a strategy to attain food security and environmental sustainability

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As the second-largest archipelago in the world, the Philippines is known as a megadiverse country with unique and rich biodiversity that encompasses 75% of the world's biodiversity. With its tropical climatic

conditions, it supports the proliferation of varied flora and fauna including wild mushrooms that grow on forest litters, lawns & gardens. These interesting wild macrofungal flora may be characterized as symbionts, saprophytes and parasites. Some of these interesting species are meant as sources of food and natural products with importance in the nutraceutical and pharmaceutical industries. The proliferation of these important species in the wild is confronted with several challenges including unabated conversion of their natural habitats for residential, commercial and industrial/factories as well as climate change. Thus, our efforts to conserve this interesting flora have been prioritized that led in the rescue of their mycelia, identification and development of practical production technologies primarily for food and medicines. Mushroom production technologies that utilize locally available agro-industrial residues have been generated through research. Several mushroom -based products have been introduced in the local market. Participation of the different stakeholders in the development of the mushroom industry is enhanced through joint research collaboration, active community projects and consultation with government agencies that support food production especially in the village level. Mushroom-based social enterprises have been established.

Determinants of food security among employees of micro, small, and medium enterprises (MSMEs) in Thailand

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This cross-sectional study examined determinants of food security among 175 employees engaged in workplace food-security activities within Thai micro, small, and medium enterprises (MSMEs). Participants were predominantly male (52.0%) and Thai nationals (52.0%), most with education at or below lower secondary level (70.9%), household sizes of 1–3 members (78.3%), and permanent employment (86.3%); median tenure was 5–10 years. Overall food-security status was high ($M = 4.01$, $SD = 0.39$). Multiple linear regression explained 31.6% of the variance in food security ($R^2 = 0.316$, $p < 0.01$). Significant positive predictors included years of employment, permanent job position, monthly income, and amount of savings, whereas higher education and non-Thai nationality/ethnicity were negatively associated with food security. These findings indicate that socio-economic stability, stable employment, sufficient income, and financial reserves a key driver of food security among MSMEs employees in Thailand. The results underscore the potential of targeted workplace interventions and policy measures to strengthen job security and financial resilience in order to improve food-security outcomes and overall workforce well-being.

Keywords: Food security, MSMEs, Sufficiency economy, Self-reliance, Employee

Storage quality of Retort-Pouched foods for patients with kidney disease

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Most kidney-friendly foods available in the market are freshly prepared and remain susceptible to microbial contamination, which leads to rapid spoilage. To address this issue, thermal sterilization is required, using packaging that can withstand high temperatures and pressures. Retort pouches, composed of multilayer plastic films, have been shown to possess high resistance to sterilization processes and enable the extended shelf life of ready-to-eat meals at ambient temperature, and maintaining product quality, including physical, chemical, and sensory attributes, throughout the storage period remains critical. This study investigated the quality and shelf-life of a kidney-friendly sour curry product containing egg white tofu mixed with fish and Chinese cabbage, packed in retort pouches and stored under accelerated conditions at 35, 45, and 55°C for 4 weeks. The results indicated that samples stored at 35°C had the highest values in lightness (L), redness (a), and yellowness (b*) of the curry broth. The total color difference (ΔE) increased throughout the 4-week storage period under accelerated conditions. However, samples stored at 55°C exhibited the highest hardness, cohesiveness, and chewiness values, and no growth of pathogenic or spoilage microorganisms was detected during the entire 4-week storage period under ambient conditions. Sensory evaluation using the difference from the control test revealed that consumers perceived noticeable color changes starting from the 2nd week of storage at 55°C. Therefore, color was identified as the primary indicator of quality deterioration, and the overall color change (ΔE) observed in egg white tofu mixed with fish at week 2 under accelerated storage at 55°C was designated as the product's critical point. This critical point signifies the moment when the quality of the egg white tofu begins to decline significantly, as indicated by consumer perception of color changes. Recognizing this threshold allows for better management of storage conditions to maintain product quality.

Keywords: Chronic kidney disease, Retort pouch, Sour curry, Shelf life

Comparative analysis of FSVA and FSQ methods in measuring food security in Indonesia

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Food security is a strategic issue faced by nearly all countries, including Indonesia. As an agrarian country with a large and growing population, Indonesia faces challenges in maintaining the availability, accessibility, and stability of food supplies. According to data from Statistics Indonesia (BPS), as of June 30, 2025, Indonesia's population reached 284 million, an increase of 1.09% compared to the previous year. Meanwhile, the production of staple foods such as rice and corn has fluctuated, with a downward trend in rice production and a slight increase in corn. The imbalance between population growth and food production serves as an important indicator of potential food security risks in the future. According to the Food and Agriculture Organization (FAO), food security comprises four dimensions: availability, access, utilization, and stability. In Indonesia, food security policies focus primarily on availability and access, as outlined in Presidential Regulation No. 81 of 2024. Furthermore, crop diversity is considered to contribute to regional food security levels. This study aims to compare two food security measurement methods: the Food Security and Vulnerability Atlas (FSVA), developed by Indonesia's National Food Agency, and the Food Security Quotient (FSQ). The results show that the FSQ method tends to produce higher estimates compared to FSVA, potentially leading to bias in assessing food security status. These findings highlight the importance of selecting appropriate measurement methods to inform accurate and effective food policy decisions.

Keywords: Household Food Security, FSVA, FSQ

Potential of Kimju guava (*Psidium guajava* L. cv. Kimju) in bakery products for enhancing food security in Nonthaburi Province, Thailand

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This study evaluated the compositional characteristics and polyphenolic content of Kimju guava (*Psidium guajava* L. cv. Kimju) and its potential as a functional ingredient in bakery products developed in Nonthaburi Province, Thailand. The total phenolic content (TPC) was determined using the Folin–Ciocalteu method, yielding values between 185.4 and 242.7 mg gallic acid equivalents (GAE) per 100 g dry weight in guava-enriched bakery samples, significantly higher than the control (74.3 mg GAE/100 g; $p < 0.05$), confirming the fruit's richness in bioactive compounds such as flavonoids and phenolic acids. Sensory evaluation demonstrated strong consumer acceptance, with bread containing 20% guava puree (32 g) and chiffon cake with 60% guava puree (81 g) receiving the highest overall preference scores for color, aroma, texture, and taste. Incorporating guava not only improved the nutritional quality, contributing dietary fiber, vitamin C, and antioxidants, but also enhanced the sensory attributes of bakery products, positioning them as healthier alternatives to conventional formulations. These findings highlight the dual nutritional and economic potential of Kimju guava, supporting its utilization in functional bakery products that can promote food diversification, strengthen local food security, and sustain agricultural economies.

Keywords: *Psidium guajava*, Bread, Chiffon cake, Food security, Thailand

Enhancing health-oriented Chashu pork: Effects of transglutaminase and omega-3 enriched pork belly with improved sliceability and fatty acid profile

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To develop Chashu pork products (marinated braised pork belly for tonkotsu ramen) with improved structural stability after slicing and nutritional quality, two experiments were conducted. In the first part, marinated pork belly was prepared under three conditions: control (without transglutaminase [TG]), application of powdered TG (1% w/w), and application of dissolved TG (1% w/w of TG mixed with 4% w/w of water). The samples were subsequently roasted, braised, and sliced. Results indicated that the powdered TG treatment showed the highest slicing yield, hardness, and gumminess of fat portion ($P < 0.05$). Sensory evaluation further demonstrated superior scores for binding, taste, texture, and overall acceptability compared with the other treatments ($P < 0.05$). The second experiment investigated Chashu pork produced from omega-3 enriched pork compared with pork from animals fed a standard diet (control). Analysis of composition showed that omega-3 pork and its Chashu contained lower fat but higher protein and moisture contents as well as significantly greater omega-3 fatty acids compared with control pork ($P < 0.05$). In addition, these samples demonstrated a higher polyunsaturated fatty acids/saturated fatty acids (PUFA/SFA) ratio ($P < 0.05$), indicating improved lipid nutritional quality. Notably, Chashu from omega-3 pork had approximately 3.8-fold higher omega-3 fatty acids than control Chashu and achieved an omega-6/omega-3 ratio below 4.0, compared with about 19.3 in the control group. Sensory evaluation revealed no significant differences in all tested attributes between treatments ($P > 0.05$). These findings demonstrate that the use of powdered TG improves the sliceability and sensory quality of Chashu pork, while omega-3 pork provides additional nutritional benefits by improving the PUFA/SFA ratio and enhancing omega-3 fatty acids. The approach not only addresses product loss from separation after slicing but also adds value to pork belly by producing a high-quality, health-oriented meat product.

Keywords: Braised pork belly, Cross-linked enzyme, Omega-3 enriched pork, Linolenic acid, Healthy meat

Development of pudding products from young rice milk supplemented with whey protein and inulin

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This study developed a healthy pudding by integrating plant-based milks with a natural non-nutritive sweetener and functional ingredients to enhance both nutritional value and consumer acceptability. Young rice milk and cereal coconut milk blends (100:0–0:100 w/w) were first optimized, with a 50:50 ratio achieving the highest sensory acceptance. Monk fruit (*Siraitia grosvenorii*) extract–sucrose ratios

(100:0–0:100 w/w) were subsequently evaluated, and 25:75 was most preferred. Six whey protein–inulin formulations, namely W8I2, W8I4, W10I2, W10I4, W12I2, and W12I4, were assessed, where W and I represent whey protein (%) and inulin (%) concentrations, respectively. An increase in whey protein concentration was associated with greater hardness and gumminess, while no significant differences were observed in sensory scores ($p > 0.05$), except for the W12I4 formulation. The W12I2 formulation provided 61.04% moisture, 0.66% ash, 12.16% protein, 6.40% fat, and 19.10% total carbohydrates. During refrigerated storage (4 ± 2 °C), hardness and gumminess increased, while microbial quality met community product standards. The novelty of this work lies in the combined use of young rice milk, cereal coconut milk, and monk fruit extract to produce a plant-based, nutritionally enhanced pudding with reduced sugar content, offering a promising alternative for health-conscious consumers and the functional dessert market.

Keywords: Rice milk, Monk fruit, Pudding, Inulin, Whey protein

Effect of different aging methods and periods on physical and chemical beef qualities from *Longissimus thoracis*

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This research aimed to study effect of different methods and aging periods on physical and chemical qualities of beef. Four aging methods were compared: 1) dry aging (DB), 2) dry aging in a bag (DB), 3) wet aging in a vacuum bag (WV), and 4) wet aging in a shrink bag (WS). Aging periods was conducted for 0, 2, and 4 weeks under conditions of 0-4°C temperature, 75-80% relative humidity, and 0.5 m/s air velocity. The results showed that the aging method and aging period significantly ($p < 0.05$) affected to aging loss, trimming loss, and cooking loss. Aging loss and trimming loss of DA and DB beef were higher than those of WV and WS beef ($p < 0.05$). However, cooking loss in WV and WS beef was higher than DA and DB beef. No significant differences ($p > 0.05$) were observed among aging methods in pH, color (L^* , a^* , and b^*), Warner-Bratzler shear force (WBSF), lipid oxidation (TBARS). Prolonged aging time (up to 4 weeks) resulted in more tender meat, while lipid oxidation increased ($p < 0.05$). Additionally, beef color changed significantly with increasing aging time ($p < 0.05$). There were not different in percentage of fat, dry matter, ash, or moisture among aging method. However, DA and AB beef showed higher percentage of protein than WV and WS beef ($p < 0.05$). These findings can be applied to develop for beef industry, particularly small-scale beef retailers and restaurants businesses, could be enhance value of premium grade beef in Thailand.

Keywords: Beef quality, Dry aging, Fat oxidation, Tenderness, Wet aging

Characterization of functional beverage milk kefir and water kefir supplemented with gac fruit (*Momordica cochinchinensis* Spreng.)

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Milk kefir and water kefir are health-promoting beverages that have gained increasing popularity worldwide. This study investigated the incorporation of gac fruit (*Momordica cochinchinensis*), a fruit rich in nutritional value, as a key ingredient in kefir production. Gac fruit was added at ratios of 0:100, 10:90, and 20:80 (w/v) to the main substrate and fermented for 0, 24, and 48 hours. The effects on physicochemical properties (pH, titratable acidity, total soluble solids, alcohol content, viscosity, and color) and microbiological quality (total bacteria, yeast and mold, and probiotic bacterial groups) were evaluated. Results revealed that increasing fermentation time led to decreased pH, increased acidity, reduced Brix and dry matter content, and changes in alcohol production-absent in milk kefir but progressively increasing in water kefir. Viscosity, redness, and yellowness values also increased, while microbial counts of all analyzed groups showed a rising trend. The optimal fermentation condition was found at a 10:90 gac fruit-to-substrate ratio (w/v) for 24 hours, which yielded significant populations of probiotics, including *Lactobacillus* spp. (7.53 and 8.41 log CFU/mL), *Lactococcus* spp. (8.98 and 8.23 log CFU/mL), and *Bifidobacterium* spp. (8.92 and 8.24 log CFU/mL) in milk kefir and water kefir, respectively. These findings suggest that gac-enriched kefir can serve as a promising probiotic beverage with enhanced nutritional and functional properties.

Keywords: Water kefir, Milk kefir, Gac fruit (*Momordica cochinchinensis*), Fermentation, Quality

Influencing factors on consumer repurchase decisions for crispy jackfruit: A case study of a community enterprise in Chonburi province, Thailand

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The study investigated the factors influencing consumer repurchase decisions for crispy jackfruit produced by a community enterprise in Chonburi Province, Thailand. Data were collected from 200 consumers via an online questionnaire. The research framework examined repurchase intention as the dependent variable against a set of independent variables, including demographic characteristics (gender, age, occupation, income) and perceptions of the marketing mix (product, price, place, promotion). Data were analyzed using descriptive statistics and multiple regression analysis. The regression model was statistically significant ($F = 23.625$, $p < 0.001$), explaining 52.8% of the variance in repurchase decisions. The analysis revealed that only two factors had a significant direct impact on repurchase intention: product ($\beta = 0.333$, $p < 0.001$) and price ($\beta = 0.195$, $p = 0.024$). Product factors were the strongest predictor. In contrast, demographic variables and the other marketing mix elements (place and promotion) did not show a statistically significant relationship with repurchase decisions. The findings indicated that for this community enterprise, sustaining a competitive advantage and encouraging repeat purchases depend primarily on maintaining high product quality and ensuring

perceived value in pricing. Marketing strategies should, therefore, prioritize these core elements while leveraging distribution and promotion for initial customer acquisition.

Keywords: Consumer behavior, Repurchase decision, Community enterprise, Marketing mix, Crispy jackfruit

SESSION 8: FOOD SCIENCE AND POSTHARVEST TECHNOLOGY

Deadly mushrooms: no more Mr. Funguy

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Only a small percentage (approximately 1%) of the more than 14,000 known species of macrofungi produce fruitbodies (mushrooms) that are deadly or potentially deadly to humans. Despite this low number of deadly species, hundreds of people worldwide die each year because of ‘mushroom’ poisoning. Insufficient knowledge, unclear taxonomy, rising consumption of fungi, and misleading folklore are all contributing factors to these deaths. The aim of this work is to discuss the 37 macrofungal species known to be fatal. This work has been compiled with the aim of raising awareness about food safety issues related to poisonous mushrooms, as well as increasing the knowledge base on this topic for the general public and the scientific community. This work provides detailed information on the taxonomy, ecology, and distribution of these species. In addition, this serves as a platform to present the most recent information and catalyze further research into the taxonomy, toxicology, ecology, and associated medical treatments for poisonings related to these macrofungi. Furthermore, we discuss methods for preventing future instances of poisoning and the necessity of developing regional-level educational and awareness programs where they would be most beneficial.

Keywords: Amatoxins, Ascocarps, Basidiocarps, Gyromitrin, Muscarine, Mushroom poisoning, Orellanine, virotoxins

Relationship between fruit morphological characteristics and banana flour phytochemistry

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Banana flour is a highly potential functional food because it contains phytochemicals that are beneficial for human health. However, measuring the phytochemical content in banana flour is very laborious and expensive. The purpose of this study was to measure the degree of closeness between the phytochemical characteristics of flour and the morphology of banana fruit. The results showed a close relationship between protein content and peduncle length ($r = -0.46$), antioxidant activity and bract external color ($r = -0.40$), and protein content and immature fruit peel color ($r = -0.46$). Furthermore, the canonical correlation analysis indicated that the aggregate relationship between fruit morphological characteristics and flour phytochemical properties can be represented by the first canonical correlation ($r = 0.92$) with the proportion eigenvalue accounted for 58% of the overall variation. The peduncle length, bract external color, and remains of flower were the most prominent variables in delineating the overall fruit morphological characteristics with $r = 0.45$, -0.59 , and -0.45 , respectively, whilst the protein content served as the most representative variable for the flour phytochemical properties with $r = -0.57$. Therefore, it can be concluded that the flour phytochemical properties of banana fruit, especially protein

content, can be estimated from its morphological appearance of the peduncle length, bract external color, and remains of flower.

Keywords: Antioxidant activity, Functional food, Phytochemical properties, Protein, Vitamin

Development of low-alcohol durian wine

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The unusual durian has undergone fermentation to produce a low-alcohol wine. The objective of this study was used *Saccharomyces cerevisiae* to ferment the low-alcohol wine durian. Our findings indicated that a 1:7 durian pulp-to-water ratio and 1.50% w/v yeast cultures were chosen based on their high ($p \leq 0.05$) generation of ethyl alcohol content. The 25 °Brix low-alcohol durian wine was then selected to meet the necessary criteria to get a significantly ($p \leq 0.05$) high preference score in terms of aroma, taste, and overall acceptability, which were 6.70 ± 0.50 , 7.30 ± 0.55 , and 7.15 ± 0.60 , respectively. The ethyl alcohol concentration, total soluble solids, and pH of the resulting wine were $8.30 \pm 0.11\%$, $11.80 \pm 0.18^\circ\text{Brix}$, and 4.19 ± 0.02 , respectively. Interestingly, the findings of this study suggest that an innovative beverage could be created, combining the unique flavor of durian with reduced alcohol content and minimizing waste pollution for environmental preservation.

Keywords: Low-alcohol, Wine, Durian, Fermentation

Evaluation of postharvest treatments of chemical agents to control *Lasiodiplodia theobromae* on Durian (*Durio zibethinus*) Fruit

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Durian (*Durio zibethinus* L.), a major tropical export fruit prized for its aroma and nutritional quality, is highly vulnerable to postharvest decay caused by *Lasiodiplodia theobromae*. This study assessed the efficacy of five fungicides—carbendazim, pyraclostrobin, difenoconazole + propiconazole (D+P), copper sulfate (tribasic), and prochloraz—against *L. theobromae* under laboratory and storage conditions. A complete randomized design with three replications was applied to *in vitro* PDA cultures and *in vivo* inoculated ‘Monthong’ durian fruits. Mycelial inhibition was monitored over seven days at ambient temperature and under chilling at 4 °C for seven days followed by five days at room temperature. Carbendazim (40 cc / 20 L) and D+P (10–20 cc / 20 L) fully suppressed mycelial growth, maintaining colony diameters below 6 mm. Prochloraz produced moderate inhibition, while copper sulfate and pyraclostrobin showed limited protection, especially after extended storage. Chilling slowed

fungal development in all treatments but did not eliminate infection; systemic fungicides remained essential for durable control. *In vivo* tests confirmed that carbendazim, D+P, and prochloraz significantly reduced lesion diameter and rot incidence, with carbendazim providing the most consistent protection during cold-chain simulation. Overall, systemic benzimidazole and triazole fungicides offered superior, temperature-resilient control of *L. theobromae*, effectively extending shelf life and maintaining postharvest quality of durian. Integrating these fungicides with cold-storage management is provided a practical strategy to reduce fungal decay and economic loss in the durian export industry.

Keywords: *Durio zibethinus*, *Lasiodiplodia theobromae*, Fungicide efficacy, Carbendazim, difenoconazole + propiconazole, Postharvest decay, Cold storage

Effect of cryogenic freezing techniques on freezing rate, drip loss and physiochemical quality of frozen durian (*Durio zibethinus*) meat

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This study investigated the effect of cryogenic freezing technique (CF) at -80°C on the freezing rate, drip loss and the physiochemical quality of durian meat, and compared to the natural convection freezing technique (NC) at -18 °C. Durian meat samples with 2 expected firmness were frozen -80 °C and -18 °C, respectively, and maintained until the core temperature reached -18°C. Then the freezing rate was calculated, and the durian meat samples were analyzed on the various qualities: pH, total soluble solid (TSS), color (L*, a* and b*), firmness, nutrition and microstructure after freezing. Results show that the freezing rate of CF was 3-4 times higher than that of NF. And trends similar pH of CF and NF was constant after freezing for both. No different amount of TTS of CF and NF was observed. The firmness of CF was higher than that of the NF. Color did not influence by both freezing techniques. Drip loss of CF was lower than that of NF. Consistence with the nutritional of the CF was higher than that of the NF. The pore sizes in CF were small and uniform, unlike NF which damaged the microstructure.

Keywords: Cryogenic freezing, Frozen, Durian meat, Microstructure

Impact of harvesting stages on physicochemical properties, antioxidant activity and enzymatic digestibility of durian flour

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The physicochemical, antioxidant, and digestive characteristics of the durian cv. Monthong flesh flour harvested at various maturity stages (90, 95, 100, 105, 110, 115, and 120 days post-full bloom) were examined. The lightness (L*) of durian flour decreased with the harvesting stage, along with the redness (a*), while the yellowness (b*) tended to increase. In addition, the total sugar content also rose with the maturation stage. The amylose content and DPPH antioxidant inhibition levels increased with the harvesting stage but declined at 120 days. Both 110-days and 115-days durian flours were selected for

further study. Rapid Visco Analysis revealed an elevation in peak viscosity, trough viscosity, final viscosity, breakdown, and setback in 115-days durian flour, whereas their pasting temperatures were indifferent for both samples. The 110-days durian flour exhibited a slower glucose release compared to the 115-days durian flour, especially during the initial 60 min of digestion. Furthermore, the granule morphology of both durian flours, as observed by Scanning Electron Microscopy, demonstrated pentagonal, angular, and irregular shapes. The 110-days durian flour had higher levels of protein, fat, crude fiber, and moisture content compared to that from 115- days. This result indicated that harvesting durians at 110 days is optimal for producing durian flour with functional attributes, in terms of antioxidant inhibition and a low glucose release rate, making it suitable as a functional food component.

Keywords: Durian flour, Harvesting stages, Antioxidant, Enzyme digestion

Assessment of antioxidant capacity, total phenolic and flavonoid contents in the agricultural fruit Matad (*Dillenia indica* L.) for hair care applications

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The present study evaluated the phytochemical profile, antioxidant capacity, and formulation stability of *Dillenia indica* L. (Matad) fruit extract, emphasizing its potential in hair care products. Fresh fruits harvested from Koh Kret contained 61.54% moisture. Ethanol maceration of 1921.20 g fresh fruit yielded 738.85 g dried material and 35.48 g extract, resulting in an extraction yield of 1.84% (w/w) on a fresh weight basis. Antioxidant activity, assessed by the DPPH radical scavenging assay, showed a concentration-dependent response. The IC₅₀ values for the extract and ascorbic acid were 2.94 ± 0.12 mg/mL and 0.043 ± 0.003 mg/mL, respectively. Notably, phytochemical analysis confirmed high total phenolic (397.5 ± 4.6 mg gallic acid equivalents/g extract) and flavonoid content (242.0 ± 5.1 mg quercetin equivalents/g extract). These bioactive constituents account for a significant portion of the antioxidant potential. Stability testing further supported product viability. Shampoo and conditioner formulations containing the extract maintained stable organoleptic properties and pH values over 28 days at various storage temperatures. Centrifugation confirmed that conditioners showed no phase separation. Although yields were modest, the high phenolic and flavonoid concentrations, measurable antioxidant capacity, and stable formulations highlight *D. indica* as a promising natural, eco-friendly hair care ingredient. Future studies should assess in vitro and in vivo bioactivity, optimize extraction methods, and conduct consumer acceptance testing to support broader, sustainable cosmetic innovation.

Keywords: *Dillenia indica*, Antioxidant, Phenolic content, Flavonoid content, Koh Kret

Effect of different levels of *Chara corallina* on the quality of rice seasoning (Furikake)

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The results on the amount of *Chara corallina* on the quality of rice seasoning from fish mixed with *Chara corallina* showed that suitable basic formula for protein supplement composed of 60 % dried

fish meat, 10% white sesame, 10% black sesame, 5% soy sauce, 10% chili powder, 3% sugar, 2% salt and 7.5 % *Chara corallina*. Proximate compositions of this product were 3.41% moisture, 4.62% ash, 1.34% fat, 9.10% protein, 12.56% crude fiber and 68.96% total carbohydrate. The Energy and water activity were 545.9 kcal/100g and 0.43, respectively. Overall liking score of developed product was 7.12 ± 0.81 which showed the acceptance of the product. Physical quality found that rice seasoning mixed with 7.5% *Chara corallina* had a brightness value (L^*) of 45.27 ± 0.12 , a red value (a^*) of 5.53 ± 0.16 , and a yellow value (b^*) of 11.48 ± 0.07 . Then rice seasoning from fish and *Chara corallina* was alternative product for consumer who want to consume nutritional added food.

Keywords: Rice seasoning, *Chara corallina*, Furikake

Development of low-energy snack bars made from native Thai black rice mixed with durian sauce

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The objective was to development of low-energy snack bar products made from native Thai black rice mixed with durian sauce. First, durian sauce formulation was determined and then the best formula was selected to investigate the development of snack bars from native Thai black rice mixed with durian sauce. The result indicated that durian sauce with composed of durian pulp: sugar: honey (75: 15: 10) showed high preference scores in terms of color, aroma, taste and overall liking, with average scores of 7.10 ± 0.99 , 7.00 ± 0.66 , 7.20 ± 1.03 and 7.20 ± 1.03 ; respectively. Next, 10% concentration of this durian sauce was the optimum condition in term of the preference scores of aroma, taste, texture, and overall liking from sensory assessments. The chemical composition of develop snack bar, moisture, protein, fat, ash and carbohydrate content were 8.96%, 5.69%, 10.19%, 1.06% and 74.10% w/w, respectively. Second, some properties of developed snack bars were performed compare with the commercial snack bar. Results showed that the developed snack bar mixed with durian sauce and dried fruits exhibited significantly ($p < 0.05$) lower the value of lightness(L^*), redness(a^*), yellowness(b^*), water activity and caloric content with the data 35.83 ± 0.05 , 6.33 ± 0.02 , 1.80 ± 0.02 , 0.36 ± 0.00 and 160.00 ± 0.00 Kcal, respectively. However, the hardness of the developed snack bar was significantly ($p < 0.05$) higher than the commercial snack bar with the value 35.90 ± 0.06 N. Finally, the final 100 consumers acceptance testing was determined, those consumers were moderately satisfied with the product showing the average score of 6.91 ± 0.83 . In conclusion, the developed snack bar interest to provide the health benefit and prolong shelf-life storage due to its low-caloric and water activity levels than those the commercial one.

Keywords: Low-energy snack bar, Native black rice, Durian sauce

Development and characterization of Gluten-Free bread from optimized Cassava, Chickpea, and Corn composite flours

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This research aimed to develop and analyze high-quality, gluten-free bread using a composite flour blend of cassava, chickpea, and corn flours. The study systematically investigated the chemical and physical properties of these flour formulations, including amylose and protein content, whiteness index, and viscosity profiles measured by a Rapid Visco Analyzer (RVA). Physical properties, shelf life, and consumer sensory acceptance of the final bread product were also assessed. A key finding was that flour composition had a significant impact on the bread's physical and sensory attributes. The incorporation of chickpea flour notably enhanced the nutritional profile, while corn flour influenced the bread's color and texture. An optimized blend of cassava, chickpea, and corn flours, supplemented with hydrocolloids and emulsifiers, produced a bread with specific volume, crumb hardness, and springiness comparable to conventional wheat-based bread. In conclusion, this study successfully created a high-quality gluten-free bread from a cassava-based composite flour. The findings provided a valuable foundation for the development of new gluten-free bakery products and contribute to a better understanding of flour interactions in gluten-free systems. This research highlights the potential of using locally sourced cassava flour as a viable, sustainable, and cost-effective alternative to wheat flour, offering a promising solution for the expanding gluten-free market.

Keywords: Gluten-free bread, Cassava flour, Composite flour, Sensory acceptance, Shelf life.

Influence of egg size, storage temperature, and storage time on commercial layer egg quality

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Eggs are a vital protein source rich in nutrients and hold significant cultural importance worldwide. This study investigated the effects of storage time, temperature, and egg size on the quality of Lohmann Brown eggs. A 3×3×3 factorial design with 10 replicates per treatment was used, involving 270 eggs from 64-week-old hens purchased from Luang Suwanvajokkaikij Poultry Farm, Kasetsart University, Thailand. Eggs were stored at three temperature conditions (4°C, 20°C, and 30°C) for 0, 2, and 4 weeks, representing refrigeration, room temperature, and tropical storage conditions, respectively. Egg sizes were classified into three categories based on weight following ACFS Thailand standards. Both internal and external egg quality parameters were evaluated. Results showed that lower storage temperatures better preserved egg quality, with refrigeration reducing deterioration across all egg sizes. Higher storage temperatures accelerated quality decline, notably affecting yolk color, albumen height, and pH. Smaller eggs demonstrated higher retention of freshness during storage, particularly under refrigeration. The interaction between storage conditions and egg size emphasizes the importance of optimized handling practices to maintain egg quality in tropical climates. These findings recommended a shorter storage durations and appropriate temperature control to ensure egg freshness and safety.

Keywords: Eggs, Egg quality, Egg size, Storage time, Storage temperature

Development of instant cream soup from durian waste industry

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This research aimed to investigate the properties of powder derived from the peel and core of durian from five varieties including Monthong, Chanee, Puangmanee, Kan Yao, and Kradum Thong. Then, the significantly ($p < 0.05$) highest antioxidant activity variety was selected to replace potato starch in an instant cream soup product. The results showed that the core powder from the Chanee variety exhibited significantly ($p < 0.05$) highest antioxidant activity, having an IC_{50} value of 3.47 ± 0.07 mg/ml. The durian core powder was then used to substitute for the potato starch portion in the instant soup product. Our result showed that the cream soup with 25.00%w/w durian core substitution was selected in term of high preference score and proportion of durian core powder. The sensory evaluation of the developed product for the overall acceptability score of 7.30 ± 0.68 (moderately liked). The optimal formulation consisted of powdered milk, potato starch, corn oil, durian core powder, sugar, chicken soup powder, salt, pepper, and garlic powder at 59.06%, 19.69%, 8.86%, 6.56%, 2.78%, 1.97%, 0.92%, 0.09%, and 0.09%, respectively. Interestingly, the developed cream soup formulation showed higher antioxidant activity and fiber content, while, the viscosity lower than those the commercial one. Overall, this finding could be used as an alternative ingredient in health oriented instant soup products.

Keywords: Core of durian, Instant soup, Antioxidant activity

Development of sour soup with mixed vegetables and egg tofu in retort pouch for patients with kidney disease

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Patients with chronic kidney disease (CKD) undergoing hemodialysis often suffer from the loss of essential nutrients, including proteins, vitamins, and minerals. A renal-specific diet is therefore required to meet their nutritional needs. However, most renal diet meals available on the market are freshly cooked and still contain spoilage microorganisms, resulting in the need for refrigeration and a limited shelf life. This study aimed to develop a shelf-stable sour soup containing egg white and fish tofu, cabbage, Vitamin C, vitamin B₁, sodium, phosphorus, and potassium for CKD patients by applying thermal sterilization in retort pouches. The optimal sterilization condition was heating at 121°C for 34 minutes, achieving an F_0 value of 5.84 minutes. The L^* (lightness) value of the soup decreased post-sterilization, while a^* (redness) and b^* (yellowness) values increased. Textural properties of the egg tofu showed increases in adhesiveness, chewiness, and bite force. The product's pH was 4.37. Sensory evaluation by 10 CKD patients using a 9-point hedonic scale indicated a slightly positive acceptance level.

Keywords: Chronic kidney disease, Retort pouch, Sour soup

Rapid Determination of dry matter content in Durian cv. Monthong using FT-NIR spectroscopy as an alternative to the AOAC method

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Dry matter and maturity levels are critical quality parameters influencing texture, taste, and processing suitability of durian (*Durio zibethinus* Murr.). The conventional AOAC oven-drying method, although accurate, is time-consuming, requiring approximately 180 minutes per sample. This study aimed to develop a rapid and non-destructive alternative using Fourier Transform Near-Infrared (FT-NIR) spectroscopy. An initial dataset of 200 durian samples analyzed by the AOAC method was used to calibrate the FT-NIR system, enabling the construction of predictive equations replicating AOAC accuracy. Statistical analysis revealed no significant difference between the two methods ($p < 0.05$). The calibrated FT-NIR model was then applied to 3,000 durian samples, achieving prediction accuracy up to 98% relative to AOAC measurements. Analysis time was reduced from 3 hours to under 3 minutes per sample. These results demonstrate that FT-NIR spectroscopy provides a reliable, rapid, and high-throughput method for determining dry matter content and maturity levels, supporting optimal harvest date estimation and offering a practical alternative for quality control in the durian industry.

Keywords: AOAC method, Dry matter content, Durian, FT-NIR spectroscopy, Non-destructive testing

Inactivation kinetics of *Heyndrickxia coagulans* spores under High-Pressure processing in acidic fruit juice models

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High-pressure processing (HPP) is a non-thermal food preservation technique, particularly applied to acidic fruit juices, using pressures exceeding 100 times atmospheric pressure. Although HPP effectively inactivates vegetative pathogenic and spoilage microorganisms, comparable to pasteurization, its efficacy against microbial spores requires further investigation. This study examined the resistance of probiotic spores of *Heyndrickxia coagulans* to HPP, quantifying the process using the Decimal Reduction Time (D_p -value). Experiments were conducted in sucrose solutions adjusted to pH 4.0 and 5.0 as fruit juice models, inoculated with *H. coagulans* spores. Samples were treated at 600 MPa, and results showed a distinct two-step inactivation trend in spore counts, yielding two D_p -values (D_{p600}). At pH 4.0, D_{p600} was 2.99 min for the first 0–3 min and 9.45 min for the subsequent 3–12 min. At pH 5.0, D_{p600} was 2.45 min for the first 0–3 min and 11.98 min for the subsequent 3–12 min. The findings suggest that spores remaining at pH 5.0 exhibit greater resistance to pressure compared to those at pH 4.0. These findings provided key insight into the inactivation kinetics of *H. coagulans* spores under varying pH during HPP, which is vital for developing safer and optimized juice processing methods.

Keywords: HPP, *H. coagulans* spores, D_p -value

Development of a freeze-dried durian sticky rice product with optimized coconut milk content

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Durian sticky rice is a traditional Thai dessert; however, its commercialization is limited by short shelf life and textural instability. Freeze-drying technology offers a promising solution to preserve quality and extend shelf stability. This study investigated the effect of coconut milk concentrations (100, 150, and 200 mL per 300 g rice) on the physicochemical, microbiological, and sensory properties of freeze-dried durian sticky rice. Results revealed no significant differences in color parameters among treatments ($L^* = 81.68\text{--}81.82$, $a^* = -3.66$ to -3.68 , $b^* = 32.67\text{--}33.43$; $p > 0.05$). Water activity and moisture content decreased with increasing coconut milk levels, ranging from 0.48 (1.91%) in the 100 mL formulation to 0.20 (1.51%) in the 200 mL formulation. Texture analysis showed that hardness declined significantly from 287.42 N (100 mL) to 250.81 N (200 mL) ($p \leq 0.05$). Microbiological assessment demonstrated that all samples complied with national safety standards for dried foods ($a_w < 0.86$) and were free from *Escherichia coli* and *Staphylococcus aureus* contamination. Sensory evaluation revealed that the 150 mL coconut milk formulation achieved the highest overall acceptability score (7.24). These findings confirm that coconut milk concentration significantly influences the physicochemical, textural, and sensory properties of freeze-dried durian sticky rice. The 150 mL formulation provided the optimal balance of taste, texture, and consumer acceptability, highlighting its potential as a value-added Thai dessert for global markets.

Keywords: Durian sticky rice, Freeze-drying, Coconut milk

SESSION 9: AGRICULTURAL DEVELOPMENT

Extension strategies for promoting organic and natural farming systems in Bangladesh: A path toward sustainable agricultural transformation

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Bangladesh is experiencing a significant agricultural transformation as it moves toward organic and natural farming systems to address the long-term environmental damage caused by chemical intensive agriculture. This shift represents a crucial effort to restore soil health, ensure ecological balance, and safeguard public health. Despite being in its early stages, with about 12,000 farmers cultivating roughly 7,000 hectares under organic management, the movement marks a promising direction for sustainable agriculture. Organic farming provides effective solutions to multiple threats, including soil degradation, water pollution, biodiversity loss, and human health risks associated with heavy fertilizer and pesticide use. Unlike Western models that are mainly market driven or government led, Bangladesh's organic farming initiatives have been largely propelled by grassroots non-government organizations such as UBINIG with its Nayakrishi Andolon, CDA's community based organic approaches, and PROSHIKA's integration of organic farming within rural development. These initiatives emphasize participatory learning, local knowledge sharing, and resource recycling instead of merely replacing chemical inputs with organic substitutes. Agricultural extension services play a pivotal role in bridging the gap between research and field implementation through participatory demonstrations, farmer field schools, and collaborations between NGOs and the Department of Agricultural Extension. The integration of digital tools such as mobile applications, SMS, radio, and social media has extended the reach of organic knowledge to remote and young farmers. Studies have shown that farmers with greater exposure to extension services and higher levels of education achieve better results in adopting organic methods. The National Agricultural Extension Policy of 2016 supports sustainable practices but still lacks specific measures such as incentives, certification systems, and transition subsidies necessary to scale up organic adoption. Although consumer interest in organic products is growing, high production costs and limited certification accessibility continue to restrict market expansion. Bangladesh's experience illustrates how coordinated efforts among policymakers, extension services, NGOs, and markets can foster climate resilience, reduce production costs, and improve rural livelihoods. This integrated and community centered model demonstrates a practical and replicable pathway toward sustainable agricultural transformation in developing nations.

Keywords: Organic farming, Agricultural extension, Sustainable agriculture, Ecological balance, Climate resilience

Circular economy and environment with zero waste strategies: Sustainable raw material production from crop By-products for cosmetics and pharmaceutical industry

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The growing demand for natural, eco-friendly, and sustainable products in industries such as cosmetics and pharmaceuticals has revealed the urgent need to rediscover alternative raw material resources. Conventional agricultural production practices often result in significant environmental burdens and waste generation, contradicting the principles of a circular economy. This study highlights the huge potential of agricultural crop by-products generated by the agro-industry for sustainable raw material production. These include pulps, peels, seeds, kernels, husks, and stems, which can serve as valuable raw materials within zero-waste strategies. By adopting circular economy approaches, these underutilized natural wastes could be transformed into bioactive compounds, essential oils, natural pigments, and functional ingredients with important applications in cosmetics and pharmaceuticals. Advanced extraction technologies, including green solvents and energy-efficient processes could be used to ensure that the recovery of these natural residues is both sustainable and economically viable. By valorizing crop by-products, we can reduce reliance on finite natural resources, mitigate waste accumulation, and lower greenhouse gas emissions to protect our planet and its limited resources. Our aim is to examine successful case studies of by-product utilization and emphasize the role of policy frameworks, industry-academia collaborations, and consumer awareness in accelerating the transition toward sustainable production systems. In conclusion, we aim to demonstrate that adopting circular economy and zero-waste principles in raw material sourcing can foster innovation, enhance competitiveness, and generate long-term environmental and socio-economic benefits. This approaches not only redefines waste as a resource but also aligns with global sustainability goals, paving the way for a greener and more resilient cosmetics and pharmaceutical industry.

Keywords: Agro-industry, By-products, Circular economy, Natural products, Cosmetics

Socioeconomic determinants of multidimensional poverty before and during COVID-19 in Bengkulu Province

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The purpose of the study was to examine the relationship that exists between the socioeconomic factors that impacted the multidimensionally poor population's percentage before and during COVID-19. The Logit Multinomial Regression Method is used in the study to examine secondary data from SUSENAS 2018 to 2021. During COVID-19, multidimensional poverty rose from 74.7% to 75.4% of population. Pre-COVID-19 multi-dimensional poverty levels were influenced by formal workers, employment locations, educational attainment, disability, and service accessibility, according to research findings. In contrast, during COVID-19, multidimensional poverty levels are influenced by square age, educational attainment, employment locations, formal workforce, and access to services.

Keywords: COVID-19, Multidimensional poverty, Multinomial logit, Socioeconomic determinants

Impact of water stress and sorghum varieties on flavonoid content and the bioherbicidal potential of water extracts for weed control

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The results showed that the Super 1 sorghum variety under drought stress with watering every 4 days produced the highest total flavonoid content (4120.61 µg/g), while the Bioguma variety with watering every 2 days had the lowest total flavonoid content (2859.83 µg/g). A longer drought stress period lead to the higher the flavonoid content. The allelopathic extract sources showed varying levels of effectiveness in inhibiting weed growth. Sorghum aqueous extracts (based on variety and drought stress level) were able to control grass weeds, except *Eleusine indica*, which showed higher tolerance. Sedge was effectively suppressed by extracts from the Super 1 variety under 4- or 5-day stress intervals and the Suri 4 variety with 5-day stress. Broadleaf weeds were effectively controlled by extracts from the Super 1 variety under 4-day drought stress. Sorghum aqueous extracts effectively controlled weeds, with weed control efficiency ranging from 69.19% to 77.52%. The highest weed control efficiency (77.52%) was achieved using extracts from Super 1 under 5-day drought stress and Suri 4 under 4-day stress. Therefore, sorghum aqueous extract demonstrated potential applicability as a bioherbicide for effective weed control. Further testing of extracts from various sorghum varieties under more intense drought stress (more than 5 days) is necessary to determine the optimal allelopathic content for weed management.

Keywords: Bioherbicide, Flavonoid, Weed control, Sorghum water extract, Sustainable agriculture

Knowledge management for the development of digital marketing for safe shrimp entrepreneurs in Nakhon Pathom Province Thailand

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The study is focused on knowledge management for the development of digital marketing among safe shrimp entrepreneurs in Nakhon Pathom Province. The findings reveal that these entrepreneurs were able to effectively adopt digital marketing to expand their marketing channels, enhance customer communication, access new customer segments through social media, and establish a recognizable business identity. These improvements contributed to an average revenue increase of 5% within three months during their participation in the research process. It also generated new insights suggesting that a strategic knowledge for local effective management, in smart specialisation areas ought to be emplacing co-created knowledge developed by involving researcher, experts and entrepreneurs in a collaborative process. It combines theory and practice, moving away from top-down knowledge management models towards participatory and adaptive frameworks. However, on its basis, a knowledge framework in the digital marketing spam will be formed that can be used in other areas and other geographical regions. This body of work is illustrative of a broader move towards local empowerment of entrepreneurs, via digital skills and ongoing collaborative learning, highlighting the case for contextualized, systematic knowledge management as underpinning for enduring competitiveness.

Keywords: Knowledge management, Digital marketing, Safe shrimp entrepreneurs, Thailand

Knowledge, attitudes, and practices regarding Alternate Wetting and Drying (AWD) rice cultivation among farmers in community enterprise groups for large-scale agriculture in Suphan Buri Province, Thailand

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The objectives of this study were to study the socioeconomic characteristics of farmers, to examine farmers' knowledge, attitudes, and practices regarding alternate wetting and drying (AWD) rice cultivation, and to analyse the relationships between farmers' characteristics and AWD practices in rice cultivation. The sample group of participants consisted of farmers who were members of the community enterprise in the large-scale agriculture in Doem Bang Sub-district, Doem Bang Nang Buat District, Suphan Buri Province, Thailand. Data were collected through structured interviews developed by the authors and analysed using descriptive statistics and chi-square statistics. According to the results, farmers' practice levels of AWD in rice cultivation are significantly associated with gender, age, total rice farming area, AWD farming area, and attitude towards AWD ($p < 0.05$). The farming experience and attendance in AWD training demonstrated a marginal significance ($p < 0.1$).

Keywords: Alternate wetting and drying, Rice cultivation, Community enterprise, Knowledge attitudes and practices

Supply chain management for talung sweet santol in Lopburi Province, Thailand

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This research aimed to study general information, supply chain management and problems of Talung sweet santol, a local product of Lopburi Province, Thailand, in Talung Subdistrict, Mueang District, Lopburi Province. Qualitative research was used as the research tool for this study by conducting in-depth interviews and questionnaires with the target group of 20 people. The participants were divided into several groups including government officials, farmers, retailers, wholesalers and consumers. The study found that the upstream of the supply chain includes government agencies, the midstream consists of farmers, and the downstream comprises retailers, wholesalers, and customers. An examination utilizing the SCOR Model uncovered several key issues: 1) Planning: The fluctuating weather each year impacts production, making planning difficult. 2) Procurement: High raw material expenses increase the financial burden on farmers. 3) Manufacturing: Production yields are uncertain, and there is insufficient labor. 4) Delivery: Slow transportation causes product damage. 5) Returns: Customers contact sellers by phone and either ship the product back or bring it to the storefront for an exchange. The researcher offers recommendations to improve the supply chain's efficiency. These involved promoting online marketing and sales channels to boost sales and build a strong brand. Furthermore, there should be support for processing surplus santol to add value and address market gluts. Finally, the adoption of appropriate technology and packaging should be encouraged to mitigate labor issues and reduce product damage during transportation.

Keywords: Supply chain management, Sweet santol, SCOR model

Evaluation of rumen bacteria bioactivator consortium from bali cattle for enhancing agricultural waste composting

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This study investigated the effects of different agricultural waste types and Local Microorganism (LMO) derived from the Rumen Bacteria Bioactivator Consortium (RBBC) on key composting parameters, including cellulose, lignin, pH, carbon (C), nitrogen (N), and the C/N ratio. The agricultural wastes examined were Oil Palm Waste, Coffee Husk Waste, and Melastoma (*Melastoma malabathricum*), with LMO applied at concentrations of 5%, 10%, and 15% to assess its impact on the composting process. By Week 4, significant differences in cellulose and lignin content were observed, with Oil Palm Waste showing the highest levels, followed by Coffee Husk Waste and Melastoma. By Week 8, microbial activity led to notable reductions in cellulose and lignin across all waste types, although Oil Palm Waste still retained the highest levels. The C/N ratio progressively declined, reflecting ongoing microbial decomposition and nitrogen mineralization. At Week 8, Oil Palm Waste exhibited the highest nitrogen content, while both Melastoma and Coffee Husk Waste showed substantial increases in nitrogen availability, indicating efficient nitrogen cycling. LMO concentration did not significantly affect composting parameters such as cellulose, lignin, pH, C, N, C/N ratio, or micronutrient content, suggesting that the RBBC alone was effective in facilitating decomposition. pH values increased across all waste types, with the highest rise observed in Melastoma. Overall, the results demonstrated that although LMO concentration had minimal influence on composting outcomes, the RBBC effectively enhanced microbial activity and the breakdown of lignocellulosic materials. These findings underscored the critical roles of waste type and microbial consortia in successful composting and highlight the potential of RBBC in agricultural waste management.

Keywords: Coffee husk waste, Consortium bioactivator, LMO, Oil palm waste, Waste management

Collection and extraction efficiency of *Hypericum perforatum* and *Capsicum annuum* from earthquake-affected regions in Türkiye

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This project focused on the systematic collection and preparation of soil and plant samples from earthquake-affected regions in Türkiye. Sampling targeted *Hypericum perforatum* and *Capsicum annuum* species, chosen for their ecological and economic importance. Fieldwork was conducted in five provinces severely impacted by the February 6 earthquake (Hatay, Kahramanmaraş, Malatya, Adıyaman, and Gaziantep), with control samples obtained from unaffected regions in Aydın (*H. perforatum*) and Manisa (*C. annuum*). Sampling sites were identified in cooperation with local

authorities and residents, emphasizing locations near collapsed structures and debris transport areas. Soil samples were collected at depths of 1–10 cm within 100 cm of plant roots, and precise GPS coordinates were recorded. The collected plants were dried under controlled, ventilated conditions for 30 days, ground into powder, and processed using a semi-automated Soxhlet apparatus with distilled water as solvent. The resulting extracts were stored at –20°C for subsequent analyses. Extraction yield analysis demonstrated that *H. perforatum* achieved efficiencies between 58.47% and 67.65%, while *C. annuum* extracts were lower, ranging from 41.95% to 50.41%. These differences indicated species-specific variability in extractability under standardized conditions. The results provided a solid baseline for future investigations into the chemical, biological, and environmental properties of the collected materials.

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Responses of drought-stressed hot pepper to seaweed extract application: Agronomic and physiological perspectives

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A significant interaction between field capacity (FC) and seaweed extract (LSE) was observed for total chlorophyll content, with the highest level (4.74 mg/g tissue) in 0% LSE under 75% FC and the lowest (1.73 mg/g tissue) in 3.75% LSE under the same FC. While FC significantly affected growth and physiological traits, it had minimal impact on yield. Fruit weight and length varied slightly across FC levels: 100% FC (2.78 g & 11.79 cm), 75% FC (3.12 g & 13.41 cm), 50% FC (2.63 g & 12.46 cm), and 25% FC (3.12 g & 13.24 cm). In contrast, yield variables based on LSE treatment—fruit weight per plant and number of fruits per plant—showed moderate differences, with 0% LSE producing 17.51 g and 6.37 fruits, 1.25% LSE 19.95 g and 6.61 fruits, 2.5% LSE 17.98 g and 6.61 fruits, 3.75% LSE 22.09 g and 7.11 fruits, and 5% LSE 17.37 g and 6.52 fruits.

Keywords: Agro-physiological, Biostimulant, Field capacity, Hot pepper, Seaweed extracts

Sustainability index on rainfed paddy cultivation in Bengkulu, Indonesia

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Sustainability status on agricultural paddy cultivation determined food security and important to social equity and prosperity, economic development, and environmental services however land use changes accelerated by socio-economical perceptions and ecological constraints put the paddy agricultural activities and sustainability under threaten. Agricultural rice cultivation on rainfed paddy fields in Bengkulu less sustain with index of 40.38. Farmers age getting older with the range of 40- 60 years old

as the poorest attribute with root mean square (RMS) 6.77 determined socio-cultural dimension with sustainability index of 35.01. As a consequence of that, the older farmers were difficult to adapt new technologies such as implementation of certified seeds, fertilizers applied in efficient, and agricultural mechanization systems however they cultivate their land with the motivation and knowledge passed down from previous generations (RMS = 4.13). Also, with the knowledge their hold from the previous generation, implementation recommended planting pattern and period was difficult to adapt by the local farmers (RMS= 3.12) therefore this attribute suppressed the institution and policies dimension on less sustainable (33.01). Low policies support on the agricultural product prices especially on the harvest period could cause the farmers sold their production in low prices (RMS= 3.58) put the economic dimension on less sustainable status with value of 41.46. Rice cultivation usually faces with the pests and diseases attacks causing harvested failure therefore the older farmers controlled their crops with effective pesticides without concerning the pesticides polluted their lands and environment or not. They were no consider whatever synthetic pesticides or bio-pesticides (RMS=3.64) applied however the important ones the crop could be protected from the pest and disease attacks. Last, soil fertility (RMS= 2.06) and soil acidity (RMS= 2.27) put the ecological dimension on less sustainability in rainfed paddy cultivation in Bengkulu.

Keywords: Agricultural input-product price, Farmers getting older, Rainfed paddy cultivation, Sustainability index

Suitability evaluation at lands of converted oil palm plantation for paddy fields in Bengkulu, Indonesia

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Paddy is a crucial agricultural commodity that farmers have been extensively farming in nearly all irrigation regions since it is a staple diet for the Indonesian people. The purpose of this study was to assess and categorize the existing and potential land suitability for paddy fields on 907.61 hectares of converted oil palm at irrigated lowland in Mukomuko District, Bengkulu Province. Actually, good climatic conditions and landscapes of the lands that previously covered oil palm plantation are potential to develop for paddy fields with heaviest limiting factors are plant nutrients availabilities (na) and plant nutrient retention (nr) and the areas classified as S2nanr covering about 453.24 Ha, S2nr about 103.60 Ha, S2na covering of 230.52 Ha, S3na covering about 83.69 Ha and some part of the converted oil palm areas classified as very suitable S1 for paddy cultivation areas which cover of 36.55 Ha. When efforts to improve the potential productivities for paddy cultivation through optimum fertilizers applied and amelioration with lime such as calcite and dolomite, the areas reaching the very suitable class S1 could cover about 834.26 Ha and leaving only 73.35 Ha in S2na class. In short, the former oil palm plantation lands converted to paddy fields are very potential areas for the expansion of cultivation staple foods lands in Indonesia.

Keywords: Converted oil palm lands, Irrigated lowland, Land evaluation, Paddy cultivation

Performance of agronomic-morphological characters in 19 liberica coffee accessions from Bengkulu Province

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Bengkulu Province known as coffee triangle regions, together with Lampung and South Sumatera Province which are robusta coffee production. Liberica coffee is found within robusta coffee plantations. Liberica coffee has advantages: resistance to leaf rust disease, tolerance to coffee berry borer, and as adaptability to peatland environments. The spesific locations and charteristic of Liberica Coffee Bengkulu Province remain unidentified. This study employed a survey method to identified the location and the condition of liberica coffee plantation. Characteritation was carried out based on agronomic and morphological tarits. The result of the study conducted in 19 coffee producing regions revealed the presence of 7 lowland accessions, 5 mid-altitude accessions, and 7 highland accessions. Cultivation patterns consisted of monoculture gardens, intercropping systems, home gardens, and mixed cropping. Agronomic traits showed tree heights ranging from 1.22 to 7.73 meters, with the presence of primary, secondary, and tertiary branches. The weight of 100 marketable coffee fruits ranged from 10.99 to 22.62 grams, with yield percentages between 11.53% and 16.64%. Morphological traits indicated dense, bushy, and elongated conical tree forms with monopodial vegetative growth. Leaf shapes included oblong, elliptical, and ovate forms. Fruit shapes were round, ovate, and elliptical, while seed shapes were predominantly ovate and elliptical. Agronomic clustering revealed three clusters at 70% similarity and ten clusters at 90% similarity. In conclusion: (1) Liberica coffee cultivation in Bengkulu Province occurs across all elevation level, with monoculture gardens as the dominant pattern; (2) Trees are predominantly short with primary and secondary branching, small seed size, and low yield; (3) Tree architecture is monopodial, with leaves mainly oblong, fruits predominantly round, and seeds mostly ovate; (4) Agronomic traits formed ten clusters at 90% similarity and three clusters at 70% similarity.

Keywords: Bengkulu province, Liberica coffee, Agronomy character, Morfology character

Exploration and morphological characteristics of Bengkulu Robusta Coffee

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The results of the exploration of robusta coffee from the mid- and highlands of Bengkulu (700-1200 m above sea level) have produced 24 robusta coffee accessions. All robusta coffee accessions can be characterized because the overall data on the plants (trees, branches, leaves, flowers, fruits, and seeds) can be observed. The results of the morphological characterization of the 24 coffee accessions produced dissimilarity coefficients ranging from 0.0 to 0.25. Based on the dendrogram, the highest dissimilarity coefficient was obtained in group 2 at 0.25, while the lowest was in group 1 at 0.23. Group 1 consisted of 23 accessions, namely SNTR3, SGR, SNTR1, MRD, TJA, LBR, PCU, LNU, BKO, AUG, BRT, THM, TLS, RBP, SHNC, MKR, SBS, CRQ, CRP, SNTR2 TPS CRR, and ERG. The accessions in group one had a dissimilarity of 0.23 (similarity of 0.77). This group had similarities in the angle of

insertion of the primary branches on the main stem (semi-erect) and seed color (brown). Group 2 consisted of only one accession, namely TUR. In group 2, the similar characteristics are leaf shape (obovate), seed color (yellow), and seed shape (elliptical). Group 2 does not share any similarities with group 1 in terms of ripe fruit color (black), whereas group 1 has yellow-orange, orange, and red colors, and flowering on old wood is present, whereas group 1 does not have this characteristic.

Keywords: Robusta, Coffee, Character, Morphology

Determinants of KUML Mung Bean technology adoption among farmers in Post-Rice areas of Suphan Buri Province, Thailand

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This study aimed to examine the socio-economic characteristics of farmers cultivating mung bean with the KUML variety in Suphan Buri Province, to assess their knowledge, attitudes, and adoption of the KUML mung bean cultivation technology, and to analyze the factors influencing their adoption of this technology. Data were collected from 80 members of the Sustainable Agriculture Group in Ban Nong Phak Nak, Sam Chuk District, Suphan Buri Province, who are engaged in the cultivation of KUML mung beans. The results reveal that farmers possess a high level of knowledge (mean = 74.78%), exhibit positive attitudes, and demonstrate the highest adoption of the technology, with average scores of 4.78. Multiple regression analysis showed that statistically significant factors influencing adoption were frequency of contact with agricultural extension officers ($\beta = 0.291$, $p < .05$), knowledge regarding KUML mung bean cultivation ($\beta = 0.215$, $p < .05$), and attitude toward KUML mung bean production ($\beta = 0.347$, $p < .01$). The findings highlighted the crucial role of extension services, knowledge enhancement, and positive farmer attitudes in promoting the adoption of KUML mung bean cultivation technology. Policy recommendations include strengthening agricultural extension systems, developing participatory training programs, and fostering positive perceptions through farmer-to-farmer learning and success stories. The study contributed to the broader understanding of innovation adoption in post-rice cropping systems and provided practical implications for scaling up sustainable mung bean production.

Keywords: Technology adoption, Mung bean cultivation, Post-rice cultivation, Farmers' attitude

Santol supply chain management: A case study of santol farmers in Huai Sak subdistrict, Mueang district, Chiang Rai province

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This study aimed to analyse the supply chain management of santol farmer groups in Huai Sak Subdistrict, Mueang District, Chiang Rai Province, Thailand, under the following research objectives: to map the supply chain, analyse production costs and returns, and evaluate operational efficiency. A mixed-methods approach was employed, combining quantitative data from structured questionnaires administered to 39 santol farmers to obtain qualitative insights from in-depth interviews with 10 key informants. The Supply Chain Operations Reference (SCOR) model provided the analytical framework for assessing the five core processes: Plan, Source, Make, Deliver, and Return. Descriptive statistics, cost-return analysis, and content analysis were used to evaluate performance. The key findings revealed that the supply chain operated at a moderate overall efficiency level (68.90%), with strong performance in reliability (74.81%) and responsiveness (70.32%), indicating effective traditional networks for delivery of quality produce on time. However, a significant weakness was identified in the Return process, which received a low score (2.17) due to a lack of formal protocols and knowledge. The regression analysis explained 42% of supply chain efficiency variance ($R^2 = 0.420$). Two key factors emerged as significant: delivery process efficiency showed a strong positive correlation ($p = 0.041$), while farmers' social media use demonstrated a positive trend ($p < 0.10$) by facilitating rapid information sharing.

Keywords: Supply chain management, Santol farmer, SCOR model, Performance evaluation

SESSION 10: ADVANCED AGRICULTURAL TECHNOLOGY, SMART FARMS AND AI

AI driven technologies for smart agriculture: perspectives for cooperation

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International collaboration in AI based technologies in agriculture is essential factor to increase output and agriculture productivity. AI horizons/ alliance program aimed to increase awareness and accessibility of new agro markets and optimise supply routes in Eurasia. Precision agriculture is commonly used term that enables AI based instruments into practical agriculture works. Precision agriculture in Eurasia is undergoing a transformative wave powered by artificial intelligence (AI) and cross-border innovation. This article examines how AI-driven technologies – including agro-drones for aerial crop monitoring, satellite-based NDVI analysis, image recognition for pest and disease detection, advanced weather forecasting models, and decision support systems – are being deployed across Great Eurasia and Belt and Road Initiative (BRI) countries to boost agricultural productivity and sustainability. A particular focus is given to the Eurasian context: countries like China, Kazakhstan, Uzbekistan, and Russia are leveraging AI to overcome climate and labor challenges, increase yields, and optimize resource use. The AI Horizons Alliance, a Sber-driven consortium, is highlighted as a coordinating body facilitating the exchange of AI technologies and expertise across borders. Real-world case studies demonstrate tangible benefits, such as up to 20% increases in crop yields, and 30% improvements in efficiency, and significant cost savings, achieved through AI-enabled precision farming. The article discusses the collaborative efforts under BRI frameworks, the integration of traditional knowledge with cutting-edge digital tools, and the role of international organizations in guiding this tech-driven agricultural transformation. Challenges – from data sharing to capacity building – are considered alongside prospects for broader adoption. The findings underscore that AI-driven precision agriculture, underpinned by coordinated Eurasian partnerships, holds promise for enhancing food security and sustainable development across the region.

Keywords: Precision Agriculture, Artificial Intelligence, Belt and Road Initiative (BRI), Eurasia, Agro-Drones, NDVI, Image Recognition, Weather Forecasting, Decision Support Systems, Smart Farming, AI Horizons Alliance, Sber.

Development of extraction and application of alizarin from *Rubia tinctorum* roots under supercritical carbon dioxide and its sustainable application to wool dyeing

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Supercritical carbon dioxide is the most widely used supercritical due to its low critical temperature and pressure levels extraction. Alizarin was extracted from madder roots (*Rubia tinctorum*) using supercritical carbon dioxide under different conditions of temperature (30–60 °C), pressure (150–250 bar), extraction time (20–80 min), and flow rate (5–9 mL/min). The alizarin recovery, and its content in *R. tinctorum* extract (RE) under the optimum conditions were 1.34 g/kg roots, and 6.42%, respectively. Using microwave dyeing methods, wool fabrics were dyed at different concentrations, pH and time. Chitosan low molecular weight was used instead of mordent at different concentrations (2-10) g/L. Color and fastness properties of dyed wool fabrics were evaluated for treated and untreated fibers. The mordent used enhanced the dyeing characters and the fastness properties. This study extracted alizarin pigment from *R. tinctorum* using technology as a green alternative to conventional extraction methods. In this study, the effects of extract concentration and chemical and natural mordents on the coloring properties of dyed wool fabrics were evaluated. Furthermore, the dyed wool fabrics were evaluated for their antibacterial properties against different g^{+ve} and g^{-ve} bacteria as well as yeast involving *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, and *Candida albicans*. Consequently, determination of the MIC of the extracts.

Consumer-driven online marketing strategy development for quality durian: A Rayong province case study

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The shift towards digital platforms necessitates consumer-driven marketing strategies for agricultural products. An online marketing framework for durian farmers in Rayong Province, Thailand, was developed by identifying and addressing gaps between consumer expectations and farmer practices. Using a mixed-methods approach, data from 216 consumers and an in-depth case study farmer were analyzed through a 7P marketing mix lens and gap analysis. The results revealed that while the farmer's product quality was well-aligned with expectations, significant gaps existed in service-process dimensions, with price transparency (gap=1.43), order fulfillment (gap=1.37), and customer service (gap=1.31) being the most critical. The study concluded that a strategic pivot from a product-centric to a consumer-driven model is essential. This model is prioritized operational reliability and customer relationship management to build a sustainable competitive advantage in the online marketplace for quality durian in Rayong province, Thailand.

Keywords: Consumer-driven marketing, Agricultural e-commerce, Durian marketing, 7p marketing mix, Gap analysis

Integrating soybean variety and biofertilizer management to improve nutrient uptake and yield in coastal regions facing climate change

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Climate change is increasingly threatened coastal soybean production through rising temperatures, shifting rainfall patterns, and extreme weather events. This study assessed the interaction between soybean varieties and biofertilizer inputs as an adaptive strategy for sustainable production of soybean on coastal soil. Significant interactions were found between soybean variety and fertilizer treatment for N, P, and K uptake; dry weight of effective root nodules; plant dry weight; and root dry weight. variety supplied with biofertilizer AMF + *Bradyrhizobium* + K-solubilizer (P2) exhibited the highest N uptake (0.67 mg), P uptake (0.14 mg), K uptake (0.70 mg), and plant dry weight (36.55 g). However, when Anjasmoro was supplied with fertilizer *Bradyrhizobium* + phosphate solubilizer + K-solubilizer, it showed only moderate P (0.13 mg) and K uptake (0.68 mg), but recorded the highest root dry weight (3.81 g). The study demonstrates that soybean varieties differ in their adaptability to coastal soils, with biofertilizers and bioenzyme outperforming chemical fertilizers. The application of these inputs effectively enhanced growth and yield, highlighting their potential as sustainable strategies for soybean cultivation in coastal environments.

Keywords: AMF, *Bradyrhizobium*, Phosphate solubilizer, Potassium solubilizer

Determinants influencing the adoption of the Windy.com application among large-scale durian farmers' groups in Rayong Province, Thailand

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According to the findings of this study, based on farmers who participated in training and utilised the Windy.com application, the majority of participants were male, aged between 51 and 60 years, with a bachelor's degree and an average household size of 3–4 members. The farmers possessed 1–15 years' experience in durian cultivation, with farm sizes ranging from 1 to 25 rai. The average durian yield was approximately 1,000–2,000 kilograms per rai, with an average market price of 91–120 Baht per kilogram. Participants demonstrated a high level of knowledge ($\mu = 81.20$) and exhibited a positive attitude towards the Windy.com application (mean = 3.91), with the highest attitude score observed in the content dimension ($\mu = 4.08$). Overall, the adoption of the application was rated as high ($\mu = 4.09$), particularly concerning their intention to use it ($\mu = 4.23$) and perceived usefulness ($\mu = 4.06$). Multiple

regression analysis reveals attitude to be the most significant predictor of adoption ($\beta = 0.67$, $p < 0.01$), suggesting that improved attitudes among farmers increased their adoption of the application. Conversely, factors such as farming experience and farm size did not significantly influence adoption ($p > 0.05$). The results imply that promoting positive attitudes and providing effective training can significantly enhance farmers' long-term adoption and utilisation of digital applications.

Keywords: Technology adoption, Durian farming, Farmers' attitudes, Windy.com, Rayong

Assessing the dynamics of land cover changes in Rejang Lebong and their implications on the sustainability of horticultural land use

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Land use and land cover (LULC) changes are a significant global issue, driven by urban expansion and agricultural practices that affect natural ecosystems and environmental stability. This study examines LULC changes in Rejang Lebong Regency using a spatiotemporal approach based on Landsat satellite imagery from 2004, 2014, and 2024. The imagery data used in this study includes Landsat 5 TM (2004), Landsat 8 OLI (2014), and Landsat 9 OLI-2 (2024), complemented by administrative maps of Rejang Lebong Regency. Digital image classification was performed using the Maximum Likelihood Classification (MLC) algorithm, known for its high accuracy in distinguishing land cover classes. The analysis process involved identifying land cover categories, calculating land cover change using error matrices and Kappa coefficient for accuracy assessment, and applying the Hybrid Urban Expansion model to understand spatial dynamics over time. The accuracy assessment of classified maps for 2004, 2014, and 2024 showed significant improvements in both overall accuracy and Kappa values, reaching 96% and 95 in 2024, compared to 93% and 92 in 2014. The assessment highlighted a substantial loss in dry land agriculture (13,524.95 ha, a 25% reduction) and forest areas (9,575.85 ha, 23% loss), driven by land conversion for plantations and settlements. Conversely, settlement areas grew significantly by 1,456.11 ha, reflecting rapid urbanization and population growth. These results underscore the dynamic changes in land use and the need for sustainable land management policies to balance urban development with agricultural and environmental conservation.

Keywords: Horticultural agriculture remote sensing, Maximum Likelihood Classification, Spatial analysis

Acceptance of good agricultural practices (GAP) by guava farmers in Nong Khang Khok subdistrict, Mueang district, Chonburi, Thailand

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This study explored the acceptance of Good Agricultural Practices (GAP) among guava farmers in Nong Khang Khok Subdistrict, Mueang District, Chonburi Province, and identified key factors influencing adoption. Seventy farmers participated, all supported by the Chonburi Provincial Agricultural Office. Descriptive analysis revealed that 61.4% of farmers demonstrated moderate GAP knowledge, while 28.6% showed high knowledge levels. Attitudes toward GAP were generally positive, with a mean score of 4.12 (SD = 0.45). The average GAP adoption score was 16.3 out of 20, indicating a high level of practice acceptance. Multiple regression analysis identified education level ($\beta = 0.312$, $p < 0.01$), knowledge of GAP production ($\beta = 0.284$, $p < 0.05$), and attitude toward compliance ($\beta = 0.367$, $p < 0.01$) as significant predictors of GAP adoption. The model explained 48.2% of the variance in adoption behavior ($R^2 = 0.482$). These findings highlighted the need for targeted training, simplified record-keeping, and gender-sensitive extension strategies to improve GAP adoption. The study provided actionable insights for enhancing safe and sustainable guava production under GAP practices and similar agricultural contexts.

Keywords: GAP, Guava farmers, Acceptance, Agricultural extension

A socio-entrepreneurship empowerment model for coffee farmers to sustain soil fertility practices

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This study is developed a model to empower coffee farmers in Rejang Lebong, Bengkulu, Indonesia, to maintain soil fertility. Farmers here face declining soil fertility from heavy chemical fertilizer use, poor land management, and limited sustainable practices. We used mixed methods, collecting data from 120 selected farmers through structured questionnaires. Data were analyzed with Structural Equation Modeling, Group Model Building, and Causal Loop Diagrams to capture farmer perspectives and system interactions. We found that external support, such as financial access, cooperatives, and government programs, strongly boosts socio-entrepreneurship ($\beta = 0.46$, $p < 0.01$). Farmer capacity, including education, training, and information access, also has a positive effect ($\beta = 0.20$, $p = 0.05$). However, sustaining soil fertility practices alone does not directly drive socio-entrepreneurship. Ecological practices must be paired with social and economic incentives. The model shows feedback loops: socio-entrepreneurship increases youth employment, strengthens farmers, and supports sustainable soil fertility. This research guides policymakers, cooperatives, and NGOs in creating integrated empowerment strategies that combine social innovation, financial access, and environmental care for lasting coffee farming in Indonesia.

Keywords: Socio-entrepreneurship, Soil fertility, Coffee farmers, Sustainability, Casual loop diagram

Designing creative tourism destinations through community needs: a five-zone development model in Saraburi Province, Thailand

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The objectives were to investigate the demand for land use in creative tourism, to design a creative tourism destination; and to evaluate the satisfaction of participants with the final design. Data were collected from 40 participants in the study area: five landowners and their family members, and 35 residents from the surrounding community. The analysis used descriptive statistics to examine data from questionnaires and interviews to determine land use needs and the participants' satisfaction with the design outcomes. The study revealed that landowners and their families strongly wished to create a learning space, establish a restaurant and a cafe, and offer overnight accommodation for tourists. They also expressed a need for event spaces suitable for tourists of all ages, as well as an agricultural area to support these businesses. This analysis produced the design concept of "English Play, Learn and Relax," with the region divided into five distinct zones: A) Parking and Restaurant Area, B) Learning Center and Reception Building, C) Mini Zoo, D) Cafe and Activity Building, and E) Outdoor Accommodation Area. The evaluation assessed the design's effectiveness using a 5-point satisfaction scale. The results

indicated that landowners and their families expressed the highest satisfaction with Zones A, B, and E (mean = 5.0). They also demonstrated high satisfaction with Zones C and D (mean = 4.8). The results of the evaluation involving people in the nearby area revealed that the participants' satisfaction with the design work of Zones A, B, C, D, and E were in the good range, with mean scores of 4.85, 4.94, 4.83, 4.94, and 4.93, respectively.

Keywords: Creative tourism, Landscape design, Learning and recreation space design

Exploration of Bengkulu local rice varieties as new germplasm for breeding: insights from agro-morphological traits to blast resistance genes

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The local rice (landrace) germplasm plays a crucial role in the development of superior rice varieties. The unique advantages of local varieties, such as resistance to environmental stress, are valuable assets that must be preserved to prevent extinction. Therefore, maintaining a collection of local rice germplasm is essential as a genetic resource for breeding new varieties with high yield potential, resistance to pests and diseases, early maturity, and other desirable traits. The research was conducted at the Biotechnology Laboratory and greenhouse of the Department of Crop Production, Faculty of Agriculture, University of Bengkulu, from June to December 2024. The study consisted of two stages: (1) exploration and (2) molecular analysis to detect the presence of blast resistance genes using five specific primer pairs: *Pup1*, *Pita2*, *Pii*, *Pib*, and *Pik*. The exploration identified 30 local rice varieties with diverse agronomic characteristics. Gene identification revealed that all varieties carried the blast resistance genes *Pup1* and *Pib*, while only a few possessed the genes *Pita2*, *Pii*, and *Pik*. Notably, some varieties exhibited multigenic resistance, including Segumai and Tumbur, which have strong potential as new germplasm sources for blast-resistant rice breeding programs.

Keywords: Local rice varieties, Germplasm, Agro-morphological, Blast resistance, Gene

Comparative study of nitrogen release from compound fertilizers in silty loam and sandy loam soils

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Most Thai farmers cultivate field crops on coarse-textured soils that are low in fertility and prone to leaching, resulting in low nitrogen use efficiency. To address this limitation, modern compound fertilizers incorporate ammonium, nitrate, and urea to improve nitrogen release dynamics. This study aimed to compare the release of nitrogen in the forms of ammonium, nitrate, and available nitrogen from three compound fertilizer formulations. A leaching experiment was conducted using soil columns over a period of 12 weeks. The experiment was arranged in a 2 × 4 factorial with two replications.

Factor A was the two soil type: A1) Hin Kong (Hk), classified as a silty loam, and A2) Chanthuk (Cu), classified as a sandy loam. Factor B was the three-fertilizer formulation and no fertilizer added: B1) no fertilizer, B2) 15-5-20, B3) 16-8-8, and B4) 15-7-18, with all three fertilizer treatments applied at 1,000 mg N kg⁻¹. The results indicated that Hk soil exhibited higher ammonium-N and urea-N release than Cu soil, reaching 624 and 54.4 mg N kg⁻¹, respectively. In contrast, Cu soil showed greater nitrate-N release at 364 mg N kg⁻¹. Among the fertilizer treatments, the 15-7-18 formulation resulted in the highest ammonium-N, urea-N release and available nitrogen release, although not significantly different from the 15-5-20 formulation. The 15-5-20 fertilizer formulation had the highest nitrate-N release, with 536 mg N kg⁻¹. These findings suggest that both fertilizer formulation and soil properties, not only soil texture but also factors such as organic matter content, cation exchange capacity, and soil acidity, strongly influence nitrogen release. Selecting an appropriate fertilizer formulation is therefore critical for improving nitrogen use efficiency in coarse textured soils.

Keywords: Nitrogen accumulation, Nitrogen release, Compound fertilizers, Leaching

Application of geoelectrical resistivity method for mapping the soil petrophysical characteristics of agricultural land

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The geoelectric resistivity method is a geophysical method used to determine the electrical properties beneath the earth's surface. In agriculture, this method is very useful for mapping soil petrophysical properties as important information in optimizing crop production. This study aims to develop a map of the spatial variability of soil petrophysical properties based on porosity, permeability, texture, water holding capacity, and cation exchange capacity, from agricultural land. The survey was conducted in a 10-ha agricultural area using 2D electrical resistivity tomography (ERT) to inject electrical current into the subsurface through electrodes and measure the resulting voltage at the other electrodes. Observations were made at a number of measurement points with a constant spacing of 2.5 m x 3 m. The resistivity inversion software RES2DINV was used to automatically invert the apparent resistivity data. A least squares technique was used to obtain the best fit for the resistivity model for each intended soil petrophysical feature.

Keywords: Crop production, Electrical resistivity tomography, Soil properties, Spatial variability

Micropropagation and genetic fidelity analysis using SCoT marker in *Syzygium cumini* (L.) Skeels

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This study optimized in vitro regeneration of *Syzygium cumini* (L.) Skeels and verified clonal fidelity using Start Codon Targeted (SCoT) markers. Nodal explants were cultured on Murashige and Skoog (MS) medium supplemented with cytokinins [6-benzylaminopurine (BAP), kinetin] or auxins [indole-3-acetic acid (IAA), indole-3-butyric acid (IBA), 1-naphthaleneacetic acid (NAA)] at 0–3 mg/L.

Experiments followed a completely randomized design ($n = 5$); data were analyzed by one-way ANOVA and DMRT ($P \leq 0.05$). Cytokinins significantly affected plant height, shoot number, and leaf number. Kinetin at 3 mg/L produced the tallest shoots (2.96 ± 0.21 cm), whereas BAP at 2 mg/L yielded the greatest shoot proliferation and leaf production (9.09 ± 1.02 shoots; 24.25 ± 2.53 leaves per explant). Auxins significantly influenced all growth traits. IAA at 2 mg/L maximized shoot height (4.25 ± 0.42 cm) and supported superior rooting (3.09 ± 0.21 roots; 3.21 ± 0.51 cm root length); IBA at 0.5 mg/L provided comparable rooting responses (2.75 ± 0.50 roots; 2.29 ± 0.40 cm). By contrast, NAA at 2 mg/L suppressed morphogenesis and induced callus. Genetic fidelity of 20 regenerated plantlets was assessed with 20 SCoT primers, generating 162 scorable bands (8.1 bands/primer) across 250–2500 bp; no polymorphism was detected relative to the donor plant, confirming true-to-type regeneration. Collectively, BAP (2 mg/L) was optimal for shoot and leaf proliferation, kinetin (3 mg/L) promotes elongation, and IAA (2 mg/L) enhanced root induction and elongation. The SCoT profiles validate the protocol for large-scale propagation and conservation of *S. cumini*.

Keywords: *Syzygium cumini*, Micropropagation, Plant growth regulators, SCoT, Genetic fidelity

Cost structure and profitability analysis of integrated rice-aquaculture farming: A comparative study of landowners and tenants in Chachoengsao Province, Thailand

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This study involved a comparative analysis of the cost structure and profitability of integrated rice-aquaculture farming between landowners and tenants in Chachoengsao Province, Thailand. Primary data were collected from a census of all 37 integrated rice-aquaculture farmers in the study area during the 2023–2024 production season, comprising nine landowners and 28 tenants. Analytical methods included descriptive statistics, cost-return analysis, and independent samples t-tests. At the farm level, the average total production cost was 6,118 THB per farm (averaging 20.46 rai), with variable costs and fixed costs constituting 65.8% and 34.2% of total expenditure, respectively. Key cost components included seed costs (416 THB per rai), chemical fertilisers (577 THB per rai), and land-related costs (opportunity cost for owners and rental cost for tenants) (1,535 THB per rai). Profitability analysis demonstrated an average yield of 0.81 metric tons per rai sold at 16.16 THB per kilogram, generating a net profit of 12,743 THB per rai with a breakeven point of 233 kilograms per rai. The comparative results revealed no significant differences ($p > 0.05$) in overall productivity metrics between the groups: total production cost per rai ($p = 0.869$), yield per rai ($p = 0.823$), net profit per rai ($p = 0.241$), and revenue per rai ($p = 0.246$). However, significant differences emerged in specific cost components. Landowners invested significantly more in seed costs ($p = 0.029$), whereas tenants incurred higher cash costs ($p = 0.004$) and land rental expenses ($p < 0.001$) but achieved superior market prices ($p = 0.027$).

Keywords: Cost structure analysis, Integrated rice-aquaculture, Land tenure comparison, Economic performance