



# APAARI

## Newsletter

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Asia-Pacific Association of  
Agricultural Research Institutions

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Pathways to strengthened agri-food research and innovation systems in Asia and the Pacific

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Editorial	1	<p><b>Dear APAARI Members, Partners and Stakeholders,</b></p> <p><i>Already before the COVID-19 pandemic, the agri-food systems in Asia-Pacific faced enormous challenges, which have escalated to date and call for a transformation of the region's agri-food systems. Hunger continues to be on the rise, while healthy diets are still unaffordable by many people in the region. Climate change is the key crucial factor affecting agricultural production, in addition to the emergence of new infectious diseases, and continuous unsustainable practices, which result in the loss of biodiversity and the damage to the region's ecosystems.</i></p> <p><i>The deadline for achieving the 17 Sustainable Development Goals (SDGs) is approaching, but achieving the many goals remains out of reach. For this reason, we need to transform our agri-food systems.</i></p> <p><i>The Asia-Pacific Association of Agricultural Research Institutions (APAARI) has been working with its members and partners in the region and internationally. Particularly, in the context of its key projects, it has focused on developing institutional capacities of national agricultural research systems (NARS), higher education institutions, government agencies, as well as non-governmental organizations (NGOs) in the areas of pesticide residue mitigation, phytosanitary development, agroecology, biotechnology and bioresources, and agricultural innovation systems (AIS) among others.</i></p> <p><i>This newsletter features some specific examples of the progress that has been made in the context of these projects, as well as ground-breaking research from NARS, academia and international agricultural research centers, inching towards the realization of some of the key SDGs.</i></p> <p><i>Enjoy the newsletter and let us know how to make it more interesting and responsive to your institutional needs.</i></p>
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## HIGHLIGHTS FROM THE APAARI SECRETARIAT

### The project to Enhance Phytosanitary Trade Compliance in Bangladesh concludes in 2022

*The project on 'Improving Phytosanitary Trade Compliance in Bangladesh' funded by the United States Agency for International Development (USAID) and coordinated by APAARI, completed in September 2022. It marks a milestone in boosting collaboration, capacity development, and awareness for a resilient agricultural trade ecosystem*

The project on 'Improving Phytosanitary Trade Compliance in Bangladesh' funded by USAID and implemented by APAARI started in November 2020 and successfully concluded in September 2022. The project facilitated collaboration among stakeholders, strengthening institutional capacity of the National Plant Protection Organization (NPPO), raising awareness of trade issues in agriculture, and harmonizing regulations for biopesticide registration.

More than 65 stakeholders from diverse sectors, including private, government, academic, and civil society benefited from the project in terms of capacity building in phytosanitary trade compliance.



*APAARI and USDA officials, and Post Bangladesh apprised the Honorable Minister of Agriculture, Government of Bangladesh on the project activities and general agriculture development in Bangladesh*



*Panel discussion on ETV Bangladesh improved public awareness on plant quarantine, phytosanitary issues and agricultural trade development of Bangladesh*

The Department of Agricultural Extension (DAE) under the Ministry of Agriculture served as the main client and regulatory body for phytosanitary trade compliance that the project focused on. Committees were formed within DAE to improve coordination among its wings, along with an interdepartmental committee for long-term harmonization.

A high-level Steering Committee oversaw project implementation, comprising of representatives from various ministries and organizations. This way the project ensured that policy influencers were involved right from the beginning of the project.

The project focused on enhancing stakeholders' capacities in various phytosanitary modules through training sessions, primarily conducted virtually due to the COVID-19 pandemic. A Sanitary and Phytosanitary (SPS) training hub was established to serve as a sustainable tool for knowledge sharing and learning even beyond the life of the project. Furthermore, DAE officials participated in an exposure visit to Thailand to learn about emerging trade opportunities.

A web portal for Sanitary and Phytosanitary (SPS) information management was developed through the project and handed over to DAE for management and maintenance, particularly to populate information on SPS relevant to Bangladesh. Additionally, training was provided to technical and IT officials of DAE to improve their capacity in the portal management.

Significant project efforts went into raising public awareness on Bangladesh' phytosanitary development, particularly through TV, news articles, and Social Media channels. For example, ETV Bangladesh broadcast a panel discussion on phytosanitary trade compliances in Bangla language to enhance awareness of general public on plant quarantine services extended by DAE, the project goals and contributions. The Director General of DAE, as well as the Director of the Plant Quarantine Wing, DAE, and an APAARI representative participated in the programme.

Several press releases in local Bangla and English newspapers were published. An SPS WhatsApp group was created for exchanging information among all the stakeholders, and it is very active.

The project also improved Bangladesh's overall plant health system through training on laboratory practices and pesticide residue analysis. Workshops and various working groups that include local experts were formed to guide the development of the biopesticide regulatory guidelines, and harmonize the biopesticide regulatory framework.

Overall, the project successfully addressed collaboration gaps, enhanced institutional capacity, increased awareness of trade-related phytosanitary issues, and developed harmonized guidelines for biopesticide registration. The funding agency expressed satisfaction with the project's outcomes and is planning a scoping study for the next phase.



## Inception workshop launches a new project to boost seed trade in the Asia-Pacific Region

***In November 2022, stakeholders from the Asia-Pacific region convened in an inception workshop to inaugurate a pioneering project aimed at fortifying seed trade across borders. Spearheaded by APAARI and funded by the Standards and Trade Development Facility (STDF), the initiative seeks to bolster phytosanitary compliances and foster robust public-private partnerships, promising a new dawn of collaboration and prosperity in the regional agricultural landscape.***

In an inaugural meeting convened in Bangkok, stakeholders from across the Asia-Pacific region initiated a pioneering endeavor to bolster seed trade. The workshop held on 17 November 2022, marked the commencement of the STDF-funded project titled 'Strengthening Phytosanitary Compliances and Public-Private Partnerships to Boost Seed Trade for the Asia Pacific Region'.

Under the leadership of Dr. Ravi Khetarpal, Executive Secretary of APAARI, and Dr. Shivendra Bajaj, Project Lead, the participants included representatives from NPPOs, private sector entities, and regional fora. Ms. Catalina Pulido, Economic Affairs Officer, STDF, stressed the project's significance, acknowledging its role in addressing critical phytosanitary issues and fostering regional collaboration.

Central to the project's objectives is the collaboration between APAARI – the key implementing partner – and technical associates from the private sector, which includes the Asia and Pacific Seed Alliance (APSA), CropLife Asia, International Seed Federation (ISF) and American Seed Trade Association (ASTA). Dr. Bajaj outlined the project's outputs, emphasizing the importance of capacity evaluation, portal development, and capacity building on relevant International Standards for Phytosanitary Measures (ISPMs).

The meeting discussed the hosting of key project activities (e.g. final gap assessments and portal development), with the Philippines and Vietnam



Stakeholders unite in Bangkok to launch a transformative project aimed at enhancing seed trade and regional cooperation

volunteering. The formation of National Teams and Advisory Committees, entrusted with overseeing project implementation and providing technical guidance, was also underscored during the meeting.

Moreover, participants deliberated on concrete strategies to amplify women's participation and address environmental concerns within the project framework. Insights from Bangladesh, Cambodia and Nepal underscored the need for nuanced approaches tailored to diverse legislative landscapes and emphasized the need to foster trust between public and private sectors to facilitate seamless trade processes.

In a forward-looking approach, APAARI delineated knowledge management and capacity development strategies, highlighting the integration of technical and functional skills to spur innovation in agricultural systems.

As the meeting concluded, Ms. Pulido reiterated STDF's support and lauded the active engagement of participants. Notable mention was made of the participation of NPPOs from Australia and New Zealand as mentor countries, further accentuating the collaborative ethos driving the project forward.

With timelines set for key follow-up actions, including the formation of National Teams and the organization of webinars, stakeholders departed with a renewed commitment to advancing seed trade and strengthening regional cooperation in phytosanitary compliance in Asia-Pacific.



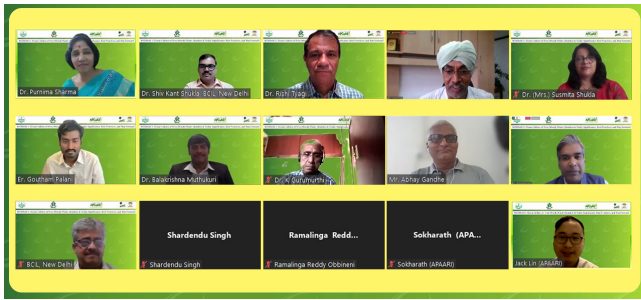
## Branching out: Unveiling the potential of plant tissue culture in agricultural advancement

***In collaboration with the Biotech Consortium India Limited (BCIL), APAARI organized webinars to shed light on the transformative power of plant tissue culture, from revolutionizing the propagation of tree species to enhancing the diversity of ornamental plants, heralding a new era in agricultural innovation.***

In a bid to harness the potential of plant tissue culture for agricultural advancement, a series of webinars titled 'Popularizing Plant Tissue Culture in the Asia-Pacific and African Countries towards Realizing its Potential' was organized in 2022. This initiative, conducted in collaboration with BCIL, aimed to disseminate knowledge and best practices regarding the tissue culture of economically important crops in the Asia-Pacific region, thereby enhancing income and improving livelihoods, particularly for smallholder farmers. Each webinar in this series focused on distinct aspects of plant tissue culture.

### **Significance, good practices, and way forward for tissue culture of tree/woody plants**

The third webinar held on 29 July 2022 focused on the significance of tissue culture for tree and woody



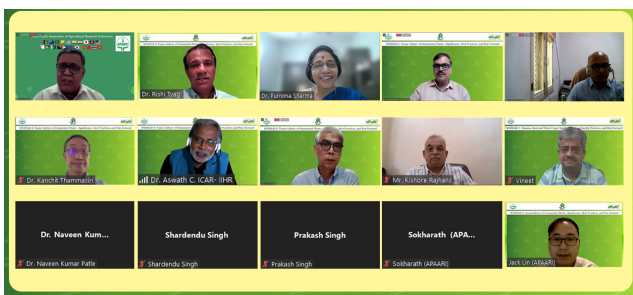
Participants in the third webinar focused on tissue culture of tree/woody plants (bamboo and teak)

plants, specifically bamboo and teak. Bamboo, revered since ancient times for its multifarious applications including furniture, construction, and food, has witnessed a surge in contemporary industrial uses, such as in construction, textiles, and energy production.

Similarly, teak holds a pivotal role in industries requiring weather-resistant materials due to its high tensile strength and tight grain. However, conventional seed-based propagation of teak presents challenges, making tissue culture a viable alternative for large-scale cultivation.

Mr. Charanjit Singh, Additional Secretary at the Ministry of Rural Development, Government of India, chaired the webinar, which attracted 915 registered participants. Industry experts shared success stories from leading companies, emphasizing the need for quality practices in producing virus-free tissue culture plants of bamboo and teak. Notably, 397 participants from 30 countries in the Asia-Pacific and Africa regions actively engaged in discussions, showcasing the global interest in leveraging tissue culture for tree and woody plants

### Significance, good practices, and way forward for tissue culture of ornamental plants



Participants in the fourth webinar focused on the tissue culture of ornamental plants

Shifting the focus to ornamental plants and floriculture, the fourth and final webinar was held on 26 August 2022. It underscored the importance of tissue culture in rapid propagation, selection, and breeding of ornamental varieties. Traditional seeding methods and conventional asexual reproduction, although prevalent, present limitations, making

tissue culture technology an indispensable tool for enhancing productivity and diversity in ornamental plant cultivation.

Dr. Naveen Kumar Patle, Additional Commissioner (Horticulture) at the Ministry of Agriculture and Farmers Welfare, Government of India, chaired the webinar, which attracted 686 registered participants. Experts elucidated the journey from research to commercialization, presenting insights from the Asia-Pacific and Indian perspectives. Success stories from industry leaders highlighted the potential of tissue culture in revolutionizing ornamental plant production.

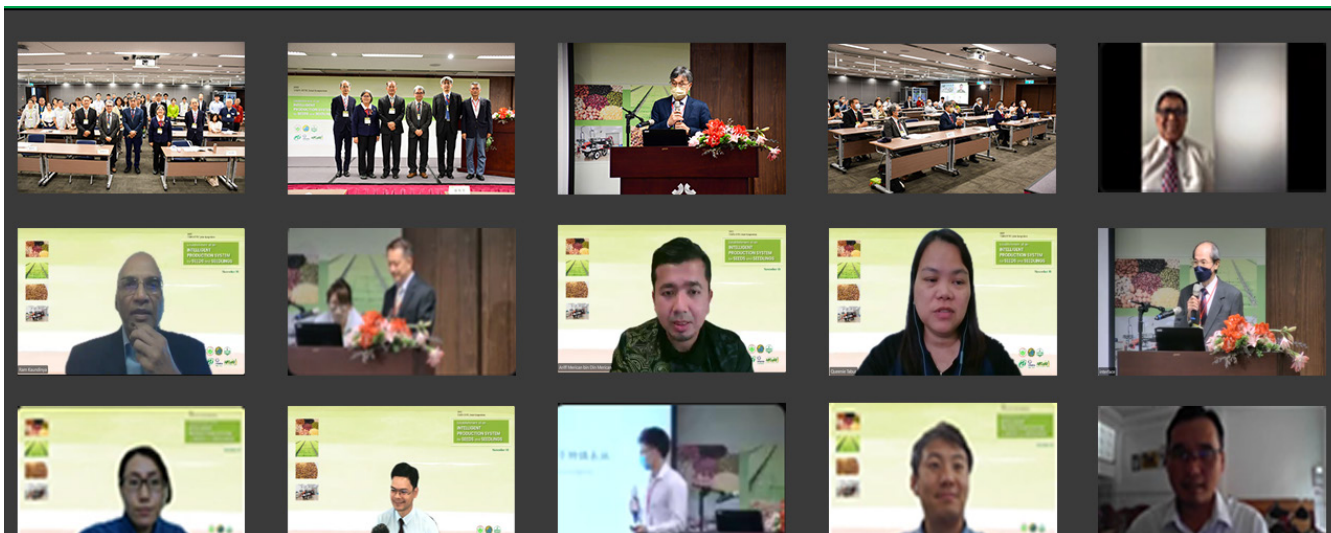
Despite the challenges posed by traditional methods, tissue culture offers a promising avenue for advancing agriculture and horticulture in the Asia-Pacific and African regions. With a concerted effort towards adopting quality practices and leveraging technological innovations, the widespread adoption of tissue culture holds the key to realizing the full potential of plant cultivation, enhancing livelihoods, and fostering sustainable development across the globe.



### Advancing agricultural innovation: Highlights from the International Symposium on Intelligent Production Systems for Seeds and Seedlings

***The International Symposium on Establishment of an Intelligent Production System for Seeds and Seedlings convened virtually in November 2022, drawing together global stakeholders to bridge traditional farming with modern technology. With a focus on collaboration and innovation, the symposium illuminated pathways towards sustainable agriculture in the Asia-Pacific region and beyond.***

The International Symposium on the Establishment of an Intelligent Production System for Seeds and Seedlings was held virtually on 10 November 2022. It marked a significant milestone in the realm of agricultural innovation. Co-organized by the Taiwan Seed Improvement and Propagation Station (TSIPS), the Council of Agriculture (CoA) Taiwan, and the Food and Fertilizer Centre (FFTC) for the Asia-Pacific Region, this symposium aimed to foster industry-government-academic exchanges, strengthen international cooperation, and raise awareness regarding the importance of stable seeds and seedlings production coupled with the latest technological advancements.



*Participants in the webinar focused on intelligent production system for seeds and seedlings*

With a diverse range of stakeholders, including researchers, policymakers, industry leaders, and agricultural enthusiasts, the symposium unfolded into a dynamic platform for knowledge dissemination and collaboration. The overarching themes of the symposium centered around promoting exchanges on intelligent production systems, enhancing international cooperation, and emphasizing the significance of technological innovation in ensuring food security and sustainability.

The event attracted over 200 online participants, showcasing global interest in the topic. APAARI's programme 'Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB) facilitated the participation of 32 representatives from eleven member countries in the Asia-Pacific region. Sessions showcased practical applications and examples, emphasizing the importance of embracing innovation while preserving traditional methods.

The symposium served as a platform for dialogue and exchange, promoting industry understanding of new technologies and fostering partnerships for sustainable agriculture. The event disseminated knowledge, promoted industry recognition of new technologies, and created opportunities for international cooperation in the Asia-Pacific region. By harnessing technology and fostering partnerships, stakeholders can work together towards a more sustainable and resilient future for agriculture in the Asia-Pacific region and beyond.



## Microbial biopesticide training for sustainable agriculture

***A dynamic hands-on training on microbial biopesticide production that took place in October 2022 in Vietnam brought together agricultural professionals from across Asia, developing capacities and collaboration for sustainable pest management solutions.***

A one-week intensive hands-on training on Microbial Biopesticide Production was conducted under the STDF-funded project 'Asia Pesticide Residue Mitigation through the Promotion of Biopesticides and Enhancement of Trade Opportunities'. The training took place from 24-31 October 2022 at the Institute of Agricultural Sciences of Southern Vietnam in Ho Chi Minh City.



*Participants in the microbial biopesticide production training*

Dr. Stefan Jaronski, an Adjunct Professor at Virginia Polytechnic and State University, USA, along with Ms. Martina Spisiakova, Strategy and Innovation Coordinator, and Dr. Sasireka Rajendran, APAARI, facilitated the training. Nineteen participants from Bangladesh, Cambodia, Indonesia, Lao PDR, Sri Lanka,

and Vietnam attended the event.

The training covered all essential steps in the production of fungal biopesticides, including isolation of the fungus, identification of morphology, screening, spore production, inoculation, fermentation process, drying and harvesting of spores, and quality control of spores. Case studies on the application of *Beauveria* and *Metarhizium* spp. were also discussed.

Additionally, the workshop included a visit to the Hi-Tech Agricultural Park in Ho Chi Minh City, Vietnam, which contained different equipment needed for the production of fungal biopesticides.

On the last day of the workshop, participants explored various business models for biopesticide development. They engaged in group discussions and conducted Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of biopesticide production and presented the analysis and reports from each country.

The training provided an opportunity for participants to acquire new knowledge and skills in the production of microbial biopesticides, and beyond – thinking how to bring this production to scale and export. It also served as a platform for networking and sharing experiences among participants from different countries.



## Empowering Asian agri-teams in safer crop management in Cambodia, Indonesia, and Vietnam

***APAARI stands at the forefront of agricultural innovation as it spearheads the pesticide residue decline field training in the context of the project on 'Asia Pesticide Residue Mitigation through the Promotion of Biopesticides and Enhancement of Trade Opportunities'. Such capacity development efforts are equipping teams across Asia with essential skills for safer and sustainable crop management practices.***

In August and September 2022, the project team organized a residue decline field training (Phase 1) for study teams in Cambodia, Indonesia, and Vietnam. Ms. Grace Lennon (Ag Aligned Global, USA) and Dr. Kevin Rice (Entomologist and Director, AHS Jr. Agricultural Research and Extension Center, Virginia Tech, USA) led the training. The training covered subjects, such as documentation of good laboratory practices (GLP), test substance handling,



*Participants in the pesticide residue decline field training*

plot setup, sprayer and speed calibrations, field residue application and sampling methods, proper shipping processes, and field residue notebook documentation.

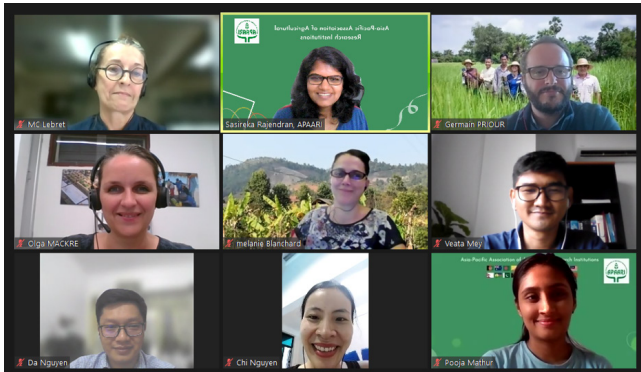
The residue decline field training is crucial for ensuring crop and consumer safety. It is important to recognize that pesticides can leave long-lasting residues, even after harvest. The training offered hands-on experience to study teams in the proper handling of pesticides, ensuring the safety and efficacy of the products used. Such training holds particular significance for developing countries like Cambodia, Indonesia, and Vietnam, which often encounter substantial challenges regarding food safety and exports.

Overall, the project seeks to advocate the use of biopesticides as a safer and more environmentally friendly alternative to chemical pesticides. The project team remains dedicated to providing continuous support and training to study teams, equipping them with the knowledge and skills necessary to promote safe and sustainable agricultural practices in their respective countries.



## Cultivating collaboration for agricultural progress through agroecology

***APAARI promotes innovative efforts to foster communication, outreach and collaboration, and thereby driving agricultural advancement through the Agroecology and Safe Food System Transition (ASSET) project. It helps to bring stakeholders together to share ideas, tackle challenges, and propel sustainable solutions in agroecology.***



Participants in one of the ASSET's Community of Practice events

The ASSET project has been making significant strides in achieving its objectives since its inception in 2021. APAARI has regularly participated in the project Steering Committee meetings with donors and stakeholders to review the progress, identify challenges, and propose solutions.

The APAARI project team also published two issues of newsletters, serving as platforms for disseminating project activities and outcomes to stakeholders. The newsletters received positive feedback from the project partners. To promote effective communication among project team members, APAARI organized regular internal communication meetings, which have helped foster collaboration and teamwork among the team members.

In addition, APAARI also organized a virtual Community of Practice networking event on 10 November 2022 to create a platform for sharing of ideas, knowledge and experiences. The event was an informal, interactive meeting to touch base on project communication and strengthen relationships within the ASSET community.

Representatives from the Center for Agrarian Systems Research and Development (CASRAD), University of Florence (Italy), Food and Agriculture Organization (FAO-Thailand), Uni4Coop (Cambodia), National Institute of Animal Sciences (Vietnam), International Livestock Research Institute (Vietnam), Mediaseeds (France), and Institute of Technology of Cambodia (ITC - Cambodia) participated in the event and interacted with project partners.



## Designing a unique project on One-Health to combat aflatoxin contamination in Asia

**APAARI secures a grant from STDF to lead a pioneering effort in integrating One Health principles to tackle aflatoxin contamination across Asia, forging partnerships and fostering innovation for a safer, healthier, and food secure future.**

At the end of 2022, APAARI announced its successful acquisition of a project preparation grant (PPG) from STDF. This grant, titled 'Managing Aflatoxin Contamination in Asia using One Health', marks a significant step towards addressing aflatoxin contamination in the region through an integrated approach.

Scheduled to commence implementation from January 2023, the project will be executed in collaboration with key partners including the International Institute of Tropical Agriculture (IITA), the International Livestock Research Institute (ILRI), the Centre for Agriculture and Bioscience International (CABI), and the University of Minnesota. Notably, this initiative represents the first of its kind to incorporate the One Health framework in addressing aflatoxin management in Asia.

APAARI will lead the project's activities, which involves conducting consultations, establishing technical linkages with country partners and experts, conducting assessments, and preparing briefing papers. Furthermore, the project aims to explore synergies with existing aflatoxin mitigation projects in the region to maximize impact

Aflatoxin contamination poses a significant challenge to food safety and international trade, prompting the Codex Alimentarius Commission, the WTO's standard-setting body, to provide guidance on Maximum Residue Limits (MRLs) for aflatoxins in food and feed. While considerable efforts have been made by experts globally, a comprehensive approach is required to effectively mitigate aflatoxin exposure, particularly in low- and middle-income countries (LMICs) with limited resources.

Recognizing the interconnectedness of human, animal, and environmental health, the project

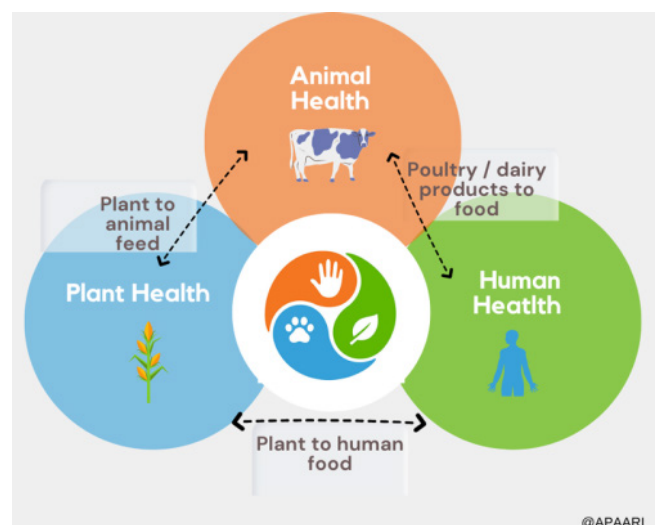


Illustration of aflatoxin interactions between plant, animal and human health



emphasizes a One Health approach to aflatoxin management. By engaging diverse stakeholders from the public and private sectors, the initiative aims to raise awareness and develop economically feasible strategies to mitigate aflatoxin contamination along the value chain.

The ultimate goal of the PPG is to develop a project proposal for STDF, outlining detailed mitigation approaches that address environmental, plant, animal, and human health aspects. By promoting collaboration and innovation, APAARI and its partners are poised to make significant strides in safeguarding public health, enhancing trade, and improving livelihoods across Asia.



## NEWS FROM NATIONAL AGRICULTURAL RESEARCH SYSTEMS (NARS)

### Japan International Research Center for Agricultural Sciences (JIRCAS)

#### Advancing sustainability: Highlights from JIRCAS International Symposium 2022

***The Japan International Research Center for Agricultural Sciences (JIRCAS) conducted an international symposium on artisanal fisheries and aquaculture, along with strategic initiatives addressing agricultural challenges in the Asia-Pacific region.***

The JIRCAS International Symposium 2022, titled 'Artisanal Fisheries and Aquaculture in Sustainable Food Systems', was held in a hybrid format at Hitotsubashi University in Tokyo, Japan on 22 November 2022, under the auspices of the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan and the Japan Fisheries Research and Education Agency (FRA).

Against the backdrop of discussions at the 2021 UN Food Systems Summit and the 2022 International Year of Artisanal Fisheries and Aquaculture (IYAF), this symposium focused on the vital role of smallholder fisheries and aquaculture in sustainable food systems. Specifically, it aimed to foster a shared understanding of the current status and challenges in implementing science and technology innovations that align with both sustainability and increased productivity. It also provided a platform for exchanging views on the direction of international joint research.

During the opening session, JIRCAS President Osamu Koyama delivered opening remarks, and Mr. Takashi Koya, Director-General of the Fisheries Agency of Japan, delivered a welcome address. The keynote speeches were presented by Prof. Nobuyuki Yagi from the Graduate School of Agricultural and Life Sciences, University of Tokyo, focusing on the role of fisheries and aquaculture in sustainable food systems, and Dr. Shakuntala Haraksingh Thilsted, Global Lead for Nutrition and Public Health at WorldFish and a winner of the 2021 World Food Prize, addressing the development of holistic and nutrition-sensitive approaches in aquatic food systems.

During Session 1, titled 'The Challenges of Artisanal Fisheries and Aquaculture in Sustainable Food Systems', presentations covered the challenges faced by small-scale fishery and aquaculture in Southeast Asia and Japan, as well as the potential of seaweeds in reducing greenhouse gas emissions. Session 2, themed 'Research and Application to Enhance Sustainability and Productivity of Artisanal Fisheries and Aquaculture', featured case studies on the development and utilization of propagation and aquaculture technologies for bivalves, small native fish species, and black tiger prawns.

JIRCAS reiterated its commitment to contributing to the development and dissemination of sustainable aquaculture technologies in the tropics based



Participants at JIRCAS International Symposium 2022

on ecosystem approaches, in collaboration with domestic and international partners. The programme, video recordings, and proceedings of the symposium are available on the JIRCAS website.

**Source: Ando Shotaro, Representative, Southeast Asia Liaison Office, JIRCAS, [shotaro@affrc.go.jp](mailto:shotaro@affrc.go.jp)**



**Department of Agricultural Research,  
Ministry of Agriculture, Livestock, and  
Irrigation (MAOLI), Myanmar**

### **Cultivating connectivity: Unveiling the impact of ICT adoption among Nay Pyi Taw farmers**

***The transformative impact of Information and Communication Technologies (ICTs) on Nay Pyi Taw farmers in Myanmar, as investigated by the Department of Agricultural Research, Myanmar, encouraged eight townships to explore the sources of agricultural information and the dissemination channels that shape farmers' adoption patterns. With a focus on findings and actionable recommendations, this research sheds light on the dynamic interplay between traditional farming practices and modern ICT adoption in the region.***

In an era where agriculture is increasingly knowledge-intensive, the intersection of traditional practices and modern technology becomes pivotal. Nay Pyi Taw, with its diverse agricultural landscape, serves as a microcosm for this transformation. The Department of Agricultural Research, Myanmar, undertook a comprehensive study to unravel how farmers embrace and utilize ICTs, aiming to empower communities by bridging the information gap.

With challenges, such as a changing climate, declining arable land, and limitations of traditional extension services, the significance of ICTs in agriculture, known as e-agriculture, has risen. Myanmar's ICT sector, undergoing significant changes since the early 2000s, has opened avenues for rural broadband expansion and digital data management. Challenges persist, especially in reaching rural farmers that are heavily reliant on traditional means of communication.

Conducted by the Department of Agricultural Research, the study involved 144 farmers across Nay Pyi Taw's eight townships. Utilizing interviews in 2019, a mixed-method approach, combining descriptive statistics and Chi-square analysis with the Statistical Package for the Social Sciences (SPSS), was

employed. This methodology aimed to capture the intricate relationships influencing farmers' adoption of ICT tools.

The study uncovered compelling correlations between farmers' adoption of ICT tools and demographic factors, knowledge levels, determinants of ICT activities, and usage factors. Notably, gender, computer usage, working experience, and participation in organizations emerged as significant factors shaping ICT adoption. The findings emphasize the dynamic nature of technology integration in agriculture.

Building on the insightful findings, the study proposes actionable recommendations to enhance the effective utilization of ICT tools among Nay Pyi Taw farmers. These include integrating traditional communication methods with modern ICT technology, launching comprehensive training and awareness campaigns, and establishing active real-time customer support. To ensure widespread adoption, the development of secure ICT infrastructure, linkage with knowledge centers, and collaboration with Call Centers are crucial for reaching rural areas.

As Nay Pyi Taw grapples with the challenges and opportunities at the nexus of agriculture and technology, the Department of Agricultural Research's study illuminates the path forward. By emphasizing the findings and recommendations, this research advocates for a concerted effort to blend traditional wisdom with modern solutions, empowering farmers and fostering sustainable agricultural practices.

**Source: Thi Thi Soe Hlaing, Senior Research Assistant, Department of Agricultural Research, Myanmar, [hlaingthithi80@gmail.com](mailto:hlaingthithi80@gmail.com)**



**Department of Agriculture (DA) – Bureau of  
Agricultural Research (BAR) Philippines**

### **Turning waste into value: Revolutionizing dragon fruit peel utilization in the Philippines**

***As dragon fruit production soars in the Philippines, innovative projects led by the Central Luzon State University (CLSU) and partners are transforming dragon fruit peels from waste into valuable commodities, offering local farmers new avenues for income generation and promoting sustainable agriculture.***



*From peel to product: A display of innovative dragon fruit peel creations (Source: BAR)*

With the increasing production of dragon fruit in the Philippines, the Central Luzon State University (CLSU), along with Rare Eagles Forest Marine Development (REFMAD) Farms in Ilocos Norte, and SoaPure Incorporated in San Jose, Nueva Ecija, have embarked on a ground-breaking project titled 'Dragon Fruit (*Hylocereus undatus* and *Hylocereus polyrhizus*) Peel Utilization and Product Development'. This initiative aims to empower local dragon fruit farmers by creating marketable products from dragon fruit peel, thus enhancing their livelihood opportunities.

Dragon fruit boasts numerous health benefits, including calcium and phosphorus for bone health, high levels of vitamin B for the nervous system, antioxidants for radiant skin, and phytoalbumins that help prevent cancer. Moreover, the project aims to promote zero waste agriculture by utilizing dragon fruit peels and fostering a healthier lifestyle among Filipinos.

REFMAD Farms, the first organic dragon fruit farm spanning 30 hectares, has expressed keen interest in adopting this technology transfer.

"This led to the creation of the Association of Dragon Fruit Growers in the Philippines, which aims to expand dragon fruit farms to 10,000 hectares within five years to meet the demands of the global market, as outlined in the Industry Road Map 2021-2025," stated Edita Dacuycuy, owner of REFMAD Farms.

CLSU and REFMAD Farms collaborated to validate the commercial viability and health benefits of dragon

fruit peel products through rigorous testing methods. Results indicated that both white (*Hylocereus undatus*) and red (*Hylocereus polyrhizus*) dragon fruit peels are rich sources of antioxidants and may possess antimicrobial and anti-inflammatory properties, confirming their potential commercial value.

In collaboration with CLSU's Department of Hospitality and Tourism Management, Dr. Dana Vera Cruz and her team developed a range of innovative products, including energy bars, syrup, body scrub, handicrafts, liquid soap, facial masks, and gummies, all incorporating dragon fruit peel. Additionally, CLSU conducted Training of Trainers sessions to equip project staff with the necessary skills for processing dragon fruit peels, ensuring their suitability for commercial use.

Dr. Cruz emphasized: "Once the technology is transferred, farmers can actually utilize this (the peel) and use it as additional revenue".

The DA-High Value Crops Development Program, through DA-BAR, provided funding assistance to bolster the promotion of innovative products across the region, further supporting the advancement of sustainable agriculture and economic empowerment in the Philippines.

**Source: Rena S. Hermoso Information Officer, Applied Communication Section, Department of Agriculture-Bureau of Agricultural Research, Philippines, rhermoso@bar.gov.ph**



## Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (DOST-PCAARRD)

### DOST-PCAARRD leads crop protection R&D with insect pest detection and control

***SThe fight for global food security receives a significant boost as the Philippines intensifies efforts in agricultural research and development (R&D). Spearheaded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (DOST-PCAARRD), ground-breaking innovations promise effective insect pest detection and control, safeguarding farming productivity and food quality.***

The quest for global food security persists amid the mounting demand for high-quality nutrition. In response, the Philippines is steadfast in its commitment to fortify agricultural production and post-production systems, a mission underscored by relentless R&D efforts in pest management.

Despite the application of existing technologies, the agricultural industry grapples with challenges, such as pesticide resistance and the emergence of new pests, threatening farming productivity and quality in the Philippines. Recognizing these hurdles, DOST-PCAARRD has emerged as a frontrunner, driving innovations to address these pressing concerns.

### Advancements in pest detection and control



*Research on detection technologies for Queen pineapple pests has yielded promising outcomes in the Philippines (Source: PCAARRD)*

Detection stands as a pivotal component in early pest management, crucial for safeguarding crop health and productivity. Notably, research on detection technologies for Queen Pineapple pests has yielded promising outcomes in the Philippines.

Researchers from the Camarines Norte State College, under Dr. Arlene C. Alegre's guidance, have developed cutting-edge software capable of identifying and classifying common Queen Pineapple pests. Leveraging a database of over 50,000 images, the software offers tailored crop protection strategies, empowering farmers in pest management.

Moreover, efforts extend beyond detection, with ongoing research targeting the fast identification of pineapple mealybug wilt disease (PMWD), a major threat to pineapple cultivation.

### Revolutionizing crop infestation control



*Nanopesticides in onions are effective against armyworm populations (Source: PCAARRD)*

In a significant stride towards sustainable agriculture, Filipino scientists have pioneered alternative methods for combating crop infestations, prioritizing product safety and quality.

Addressing the surge in onion prices attributed to onion armyworm infestation, researchers from Central Luzon State University, led by Dr. Danila Paragas, have developed nanopesticides. These novel formulations, comprising plant extracts and nanoparticles, exhibit promising efficacy against armyworm populations, offering a beacon of hope for onion farmers.

Similarly, strategies to combat the Spanish plum (Spondias purpurea Blanco) Sineguelas leaf beetle (SLB) menace are underway. Through the utilization of the white muscardine fungus (*Beauveria bassiana*), researchers aim to mitigate SLB infestation, with prospects of mass production for widespread dissemination.

### Pledging towards agricultural innovation



*Sineguelas leaf beetle (Source: PCAARRD)*

Looking ahead, DOST-PCAARRD remains committed to nurturing agricultural innovations to benefit Filipino farmers. With a vision of equipping farmers with scientific tools and knowledge, the council endeavors to secure food sustainability and resilience in the face of evolving agricultural challenges.

**Source: Dr Reynaldo V. Ebor, Executive Director, PCAARRD, [r.ebor@pcaarrd.dost.gov.ph](mailto:r.ebor@pcaarrd.dost.gov.ph)**



## NEWS FROM HIGHER EDUCATION INSTITUTIONS

**University of Agricultural Sciences, Dharwad, India**

### Genomics-assisted breeding for improved resistance to late leaf spot disease in groundnut (*Arachis hypogaea* L.)

***Revolutionizing groundnut cultivation, genomics-assisted breeding unveils Improved JL 24 and Super TMV 2—resilient varieties with heightened resistance to late leaf spot disease, offering enhanced yields and sustainable farming solutions in India***

Groundnut (*Arachis hypogaea* L.) serves as a crucial legume oilseed and food crop, valued for its nutrient-rich composition including oil, proteins, fibers, polyphenols, antioxidants, vitamins, and minerals, earning it the title "poor man's almond." However, the prevalence of late leaf spot (LLS) caused by *Phaeoisariopsis personata* presents a significant challenge, resulting in considerable yield losses (up to 50%) and diminished fodder quality.

While fungicides offer a solution, the environmental and health hazards associated with chemical control underscore the necessity for developing resistant cultivars. Resistance components encompass various phenotypic traits such as longer latent period, reduced lesion density and size, diminished sporulation, and limited leaf damage and defoliation. Despite extensive efforts to elucidate the genetic basis of LLS resistance and breed resistant varieties, success has been hindered by the complex genetic nature of resistance and limited genetic variability.

The advent of genomics-assisted breeding (GAB) has facilitated the mapping of quantitative trait loci (QTL), identification of candidate genes and markers, and subsequent validation. Notably, QTL regions on chromosomes A02 and A03 have demonstrated significant contributions to phenotypic variance. Leveraging these genomic resources, molecular markers now enable efficient selection for LLS resistance, thus enhancing breeding efficacy.

In India, TMV 2 and JL 24 have historically dominated groundnut cultivation due to their wide adaptability and high-quality kernels despite their susceptibility to LLS. To address this vulnerability, marker-assisted backcrossing (MABC) was employed at the University of Agricultural Sciences, Dharwad, India.

The recurrent parent TMV 2 was crossed with the LLS-resistant donor GPBD 4, while JL 24 was crossed with the interspecific derivative donor ICGV 86699, also possessing LLS resistance. Subsequent backcross breeding, aided by foreground selection using LLS-linked markers, yielded LLS-resistant backcross lines DBG 3 and DBG 4 from JL 24 × ICGV 86699 and TMV 2 × GPBD 4 crosses, respectively. Scanning electron microscopy revealed narrower stomatal apertures and reduced sporulation in DBG 3 and DBG 4 compared to their recurrent parents.

Background selection via ddRAD-Sequencing demonstrated nearly 99% recovery of the recurrent parent genome in the backcross lines. Pod and kernel characteristics, test weight, shelling percentage, and quality parameters of DBG 3 and DBG 4 were comparable to their respective recurrent parents.



**JL 24**

**DBG 3**



**TMV 2**

**DBG 4**

Field trials, including multilocation trials, farm trials, and large-scale demonstrations, showcased the superior performance of DBG 3 and DBG 4. DBG 3 exhibited an average yield of 1767 kg/ha, representing a 28% increase over JL 24, while DBG 4 recorded an average yield of 1820 kg/ha, a 30% improvement over TMV 2.

Encouraged by these results, DBG 3 and DBG 4 were approved for kharif (rainy season) cultivation in Zone 8 of Karnataka, India. DBG 3 was designated "Improved JL 24," and DBG 4 was named "Super TMV 2" by the Department of Agriculture and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India, on March 6, 2023.

**Source: Head, Project Planning and Monitoring Cell, Office of the Vice-Chancellor, UAS, Dharwad, India, [ppmc@uasd.in](mailto:ppmc@uasd.in)**



## NEWS FROM INTERNATIONAL AGRICULTURE RESEARCH CENTERS

### Alliance Bioversity International and CIAT (ABC)

#### Scaling up agroecological practices to enhance soil health and crop yield in Northern Vietnam

*In the face of soil degradation and declining yields due to intensive farming, a pioneering initiative in Northern Vietnam showcases the transformative potential of intercropping cassava-cowpea systems. This approach not only rejuvenates soil health but also diversifies farmers' income, offering a sustainable path forward for agriculture in the region.*

In Southeast Asia, farmers practice intensive farming, applying excessive rates of chemical inputs to maximize yields. However, this intensive management results in critical soil degradation, particularly severe soil acidification induced by mineral fertilizer applications with lower nutrient availability. Soil biodiversity loss is also observed, creating new niches for soil-borne pests and diseases (SBPDs).



*Intercropping Cassava and Cowpea in Mau Dong Commune, Yen Bai Province, North Vietnam (Source: ABC)*

Alternative agricultural practices exist to mitigate the consequences of intense management practices, restore soil health, and improve plant tolerance to biotic and abiotic stresses. Intercropping crops with legumes, for instance, has been shown to enhance soil nutrients as well as biological properties.

Similarly, bioinoculants containing microorganisms capable of enhancing nutrient availability and controlling SBPD populations offer promising solutions. However, the adoption of bioinoculants by farmers remains limited due to their generally poor quality.

In Yen Bai province, a mountainous region of Northern Vietnam, cassava (*Manihot esculenta*) is predominantly grown in monocropping intensive systems. Continuous cropping has led to severe soil erosion and a decline in soil health. Cowpea (*Vigna unguiculata* L.) has garnered increasing interest in the region, primarily for domestic consumption. In collaboration with the farmer association of the Mao Dong commune, ABC tested the intercropping system 'cassava-cowpea' with a dual objective: i) to enhance soil health and limit soil erosion, and ii) to diversify farmers' revenues.

The introduction of cowpea proved highly beneficial for soil health after only one cropping season. Positive impacts were observed on soil properties, as well as macro and microfauna, and bacterial communities. Natural nodulation of cowpea was generally low and highly variable across sites. To improve symbiotic nitrogen fixation, native rhizobia were isolated and tested in field trials. Inoculation with selected rhizobia resulted in improved nodulation as well as increased yields.

The introduction of cowpea in cropping systems

received very positive feedback from farmers, resulting in a 3 to 4-fold increase in intercropping farms the following season. Intercropping and inoculation with selected rhizobia strains are promising practices for sustaining farmers' income while restoring soil health and reducing soil erosion. There is also an opportunity to develop high-quality bioinoculants with effective rhizobia for sustaining cowpea production in Vietnam.

This project was funded by the French Agency for Development (ACTAE) and involved several members of the Asia-Pacific Network titled 'Common Microbial Biotechnology Platform' (CMBP – [www.cmbp-network.org](http://www.cmbp-network.org)).

With more than 65 members across 19 countries, CMBP aims to improve understanding of the relationships between soil, plant, and climate to enhance soil health and ecosystem resilience while promoting agroecology and sustainable, environmentally friendly practices. Promoting capacity building, staff or student exchanges, and collaborative projects are also key objectives of the network.

**Source: Didier Lesueur, Senior Soil Microbiologist - Coordinator of the CMBP, Alliance Bioversity International and CIAT, [D.Lesueur@cgiar.org](mailto:D.Lesueur@cgiar.org)**



## NEW APPOINTMENTS

### Dr PL Patil, Vice-Chancellor at the University of Agricultural Sciences, Dharwad, India



Professor PL Patil, with over 35 years of experience, assumes the role of Vice-Chancellor at the University of Agricultural Sciences, Dharwad. Before this, he held the esteemed position of Director of Research at the same institution, where his leadership significantly contributed to the advancement of agricultural research. With a distinguished academic background, including a PhD in Soil Science, Dr. Patil has made substantial scholarly contributions, with over 360 research articles and received numerous awards to his credit. Notably, he received the esteemed Asia Geospatial Excellence Award for his pivotal role in the Sujala-III Project. Additionally, his active participation in various committees underscores his commitment for shaping agricultural research and policy at both regional and national levels.



## NEW APAARI STAFF

### Dr. Shivendra Bajaj, Senior Consultant-Project Manager

Dr. Shivendra Bajaj spearheads an STDF-funded project in collaboration with the partner organizations, aiming to strengthen phytosanitary compliance to boost seed trade and public-private partnership in the Asia Pacific Region. In addition, Dr. Bajaj serves as the Technical Advisor for APSA, overseeing various technical programmes encompassing phytosanitary measures, plant breeding innovations, plant variety protection, and access and benefit sharing of genetic resources. With his rich background spanning over two decades

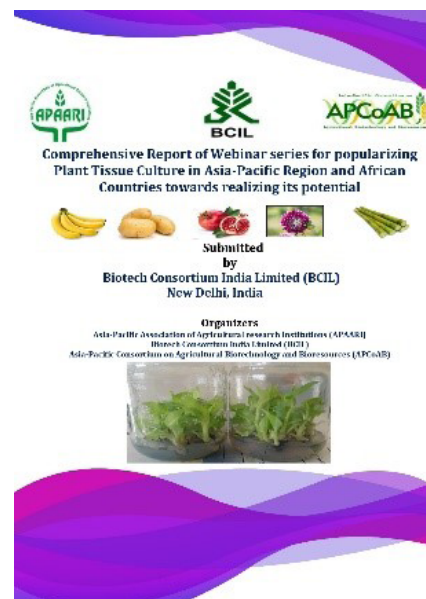


in agricultural biotechnology, regulatory policies, and stakeholder engagement, Dr. Bajaj previously held leadership positions at the Federation of Seed Industry of India and the Alliance for Agri Innovation. He leverages his expertise to engage with key decision-makers, advocating for adopting seed and biotechnology policies, innovative technologies, and breeding applications in agriculture to empower farmers and enhance agricultural outcomes.



## NEW PUBLICATIONS OF APAARI

### Comprehensive Report of Webinar Series for Popularizing Plant Tissue Culture in Asia-Pacific Region and African Countries towards realizing its potential

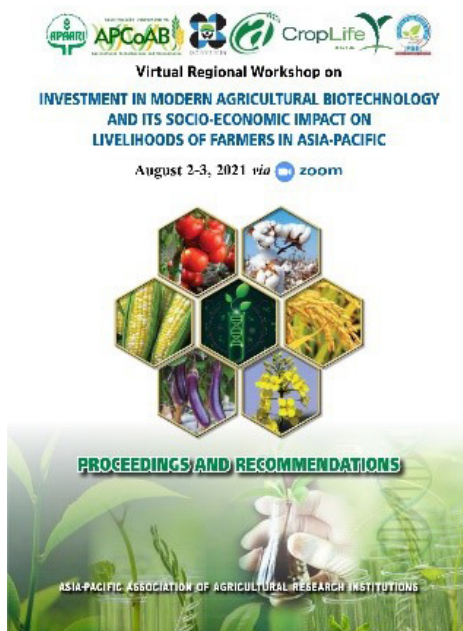


This report was developed comprising the details of four webinars – (a) Tissue Culture of Banana, Root and Tuber Crops; (b) Tissue Culture of Perennial



Fruit/Cash Crops; (c) Tissue Culture of Tree/Woody Plants (Bamboo & Teak); and (d) Tissue Culture of Ornamental Plants. It also includes the webinar proceedings, feedback from participants, outputs and the way forward to create awareness and help build capacity in Asia-Pacific region on these topics. This document can be accessed on: <https://www.apaari.org/comprehensive-report-of-webinar-series-for-popularizing-plant-tissue-culture-in-asia-pacific-region-and-african-countries-towards-realizing-its-potential/>

## Regional Workshop on Investment in Modern Agricultural Biotechnology and its Socio-Economic Impact on Livelihoods of Farmers in Asia-Pacific – Proceedings and Recommendations

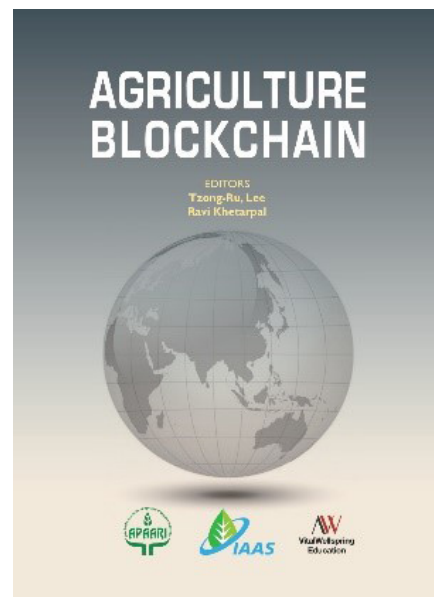


This document covers mainly the proceedings, summary, and key recommendations of Technical Session 1A. Investment Status and Impacts in Modern Agricultural Biotechnology; Technical Session 1B. Case Studies: Investment and Impact; Technical Session 2. Impacts of Enabling Policies for Enhanced Investment; Technical Session 3. Panel Discussion on Scoping Investments in Modern Agricultural Biotechnology, as well as the major recommendations for prioritization of investment areas; innovative partnerships for enhanced investment; and enabling policy development. This document can be accessed on: <https://www.apaari.org/online-workshop-apcoab-regional-workshop-on-investment-in-modern-agricultural-biotechnology-and-its-socio-economic-impact-on-livelihoods-of-farmers-in-asia-pacific/>

## Agriculture Blockchain

Smallholder farming is vital for transitioning to more sustainable agriculture, and it plays a significant role in many developing countries. As another core concept and skill of blockchain technology is the decentralization of the governance of data, production, and agribusiness resources, this decentralization concept should be effectively implemented to ensure the well-being of smallholders from the spirit of “inclusive sharing” in the agricultural value chain.

The book contains five chapters, which are written by scholars from different countries to introduce the perspectives on blockchain technology in agriculture



through cases and applications of it. In addition, it will also strengthen readers’ knowledge of the concept of decentralization. is document can be accessed on: <https://www.apaari.org/agriculture-blockchain/>



## APAARI acknowledges the partnership and support of all the members and stakeholders



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