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Speakers

Russ-Uzi Mayenne A. Ebora

Title : From Policy to Practice: Advancing Biological Control for Sustainable Agriculture in the Philippines

Senior Agriculturist
Pest Management Division
Bureau of Plant Industry (BPI)
Department of Agriculture
Philippines

S. Krishna Sundari

Title : Decoding Plant Stress Responses: Functional Microbiomes, Biopesticides, and Biological Inputs as Tools for Climate-Smart Agriculture

Executive Vice President
Asian PGPR Society for Sustainable Agriculture
&
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Biotechnology Department
Jaypee Institute of Information technology (JUIT), Noida, India

Moderator

Ravi Khetarpal

Executive Director
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Presentation 1: FROM POLICY TO PRACTICE: Advancing Biological Control for Sustainable Agriculture in the Philippines

Speaker: RUSS-UZI MAYENNE A. EBORA, RAgr., M.Sc., Senior Agriculturist, Pest Management Division, Bureau of Plant Industry (BPI), Department of Agriculture,The Philippines

Summary: Ms. Russ-Uzi Mayenne A. Ebora presented the Philippines' policies, institutional arrangements, and ongoing initiatives for promoting biological control agents (BCAs) as part of integrated pest management (IPM). She explained that several government institutions are involved in regulating biopesticides and BCAs, including the Bureau of Plant Industry (BPI), Fertilizer and Pesticide Authority (FPA), Bureau of Agriculture and Fisheries Standards (BAFS), and the National Committee on Biosafety of the Philippines. These institutions oversee product registration, biosecurity, import permits, organic certification, national standards, and environmental and biosafety requirements.

The Philippines has established Regional Crop Protection Centers, BPI research centres, and village laboratories across the country to support pest surveillance, research, and the production and distribution of BCAs. These facilities produce beneficial microorganisms and natural enemies, including *Trichoderma*, entomopathogenic fungi, predators, parasitoids, and insect viruses. BCAs are generally distributed free of charge to farmers and are also used in schools and community agricultural programmes.

Ms. Ebora emphasized that pest surveillance, diagnosis, research, and BCA development are closely connected. Samples collected from the field help researchers identify locally available beneficial organisms that can be studied, multiplied, and applied in pest-management programmes. Digital tools, mobile reporting systems, insect-monitoring devices, and drone technology are increasingly being introduced to improve surveillance and the application of biological products.

Despite the progress achieved, BCA production remains limited and requires greater investment and scaling up. Key priorities include strengthening laboratories, reviving discontinued village laboratories, standardizing locally produced BCAs, expanding research and development, and increasing collaboration with universities, private companies, farmers, and regional partners. She also highlighted the importance of harmonizing BCA production protocols, standards, policies, and regulations across ASEAN countries.

In conclusion, the Philippines has a strong institutional foundation for biological pest management. However, further investment, technological innovation, public–private partnerships, and regional cooperation are essential to expand BCA production and make sustainable pest-management solutions more widely available to farmers.

Presentation 2: Decoding Plant Stress Responses: Functional Microbiomes, Biopesticides, and Biological Inputs as Tools for Climate-Smart Agriculture.

Speaker: Prof. S. Krishna Sundari, Executive Vice President, Asian PGPR Society for Sustainable Agriculture & Professor, Biotechnology Department, Jaypee Institute of Information technology (JIIT), Noida, India

Summary: Prof. S. Krishna Sundari presented the role of plant-associated microorganisms and microbiome-based solutions in strengthening climate-smart and sustainable agriculture. She explained that plants face both abiotic stresses—such as drought, flooding, waterlogging and climate change—and biotic stresses caused by pests and pathogens. Addressing these stresses is essential for maintaining agricultural productivity and ensuring a sufficient supply of safe and nutritious food.

The presentation emphasized that a plant should not be considered an isolated organism but as a "holobiont"—a biological system comprising the plant and the microorganisms living in its rhizosphere, phyllosphere and internal tissues. Plant growth-promoting microorganisms can therefore act as "ecological engineers" by enhancing plant growth, improving soil health, suppressing diseases and increasing resilience to environmental stresses. Future agricultural solutions should move beyond single-microorganism inoculants towards microbiome-based formulations.

Prof. Sundari highlighted the value of integrating laboratory, greenhouse and field research with multi-omics, bioinformatics, artificial intelligence and machine learning. These technologies can help identify functionally important microorganisms, understand plant–microbe interactions, predict disease development and support the design of effective microbial bioformulations.

Research conducted by her laboratory in Uttar Pradesh and Haryana compared forest, organically managed, chemically cultivated and barren soils. The findings indicated that organically cultivated soils were more similar to natural forest soils, with higher organic carbon, improved nutrient properties and greater biological activity. By contrast, chemically cultivated soils showed characteristics closer to those of barren soils.

Greenhouse experiments also compared a neem oil-based biopesticide with the chemical pesticide profenofos. The neem-based treatment supported healthier root architecture, higher chlorophyll levels and improved plant growth, while higher concentrations of the chemical pesticide caused greater plant stress. Based on these studies, the research team developed a Composite Root Architecture Score to evaluate plant responses to different pesticides and biological formulations.

The team also developed experimental myco-bioformulations combining plant extracts with *Trichoderma harzianum*. Formulations containing *Datura* or *Achyranthes* extracts demonstrated promising suppression of important soil-borne pathogens, including *Macrophomina* and *Fusarium*, and may provide alternatives to neem-based products. Further research will validate these formulations and explore whether root architecture and rhizosphere microbiome diversity can predict plant disease and pesticide stress before visible symptoms appear.

In conclusion, Prof. Sundari emphasized that combining soil, plant and microbiome research with advanced digital technologies can support the development of safe, effective and climate-resilient biological solutions. She also invited participants to collaborate with the Asian PGPR Society through its international conference and special journal issues focusing on beneficial microorganisms, biopesticides, biofertilizers, regenerative agriculture and climate resilience.