

# JIRCAS Newsletter

*for*

INTERNATIONAL COLLABORATION



JIRCAS International Symposium 2019 (Tsukuba International Congress Center, November 26, 2019)

Special Feature: JIRCAS International Symposium 2019

JIRCAS

JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES

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## International Cooperation to Tackle Transboundary Plant Pests

Crop damage due to fall armyworm (FAW) was first identified and reported in Japan during summer in 2019. FAW, a plant pest originally indigenous to South and North America, has the capacity to fly long-distance. It was first observed in western Africa in early 2016 and rapidly spread across the continent within a year, after which it reached Japan more probably through routes that cut across several countries and regions, including India, Southeast Asia, China, and Taiwan. Despite its small size, FAW is known to be extremely voracious, infesting over 80 different crops and causing food security threats across borders.

Globalization and climate change seem to be among the major drivers behind the accelerating rate by which the threats posed by transboundary plant pests (TPPs) have spread across the world in recent years. In response, international organizations have called for international cooperation to beef up cross-border monitoring systems and develop context-specific intervention packages to tackle TPPs in a more timely and effective manner. At the Meeting of G20 Agricultural Chief Scientists (MACS-G20) hosted by Japan in April this year, the G20 members recognized that TPPs are a serious global threat to food security and the environment. They emphasized the need to share experiences and the latest information on the occurrence and management of major TPPs and the importance of discussing cross-cutting issues through networking among researchers across countries. Moreover, the United Nations has declared the year 2020 as the International Year of Plant Health (IYPH), thus offering a once-in-a-lifetime opportunity to raise global awareness on the importance of tackling TPPs.

JIRCAS, for its part, has implemented international joint research projects to develop technologies to tackle TPPs with the aim of contributing to the Sustainable



Development Goals (SDGs), especially SDG 2 (Ending hunger). JIRCAS hosts an international symposium every year and, in view of the above, the 2019 event was convened under the theme “International research collaboration to tackle transboundary plant pests: Contributions to Sustainable Development Goals.” In parallel to the symposium, Japan’s Ministry of Agriculture, Forestry and Fisheries (MAFF) hosted the “International Workshop on Facilitating International Research Collaboration on Transboundary Plant Pests,” with JIRCAS President IWANAGA Masa participating as the 2019 MACS-G20 Chair and as Chair of the workshop.

This issue of the Newsletter features the 2019 JIRCAS symposium. In keeping with its role in global agriculture, JIRCAS commits itself to implementing international joint research in developing regions while acting as a liaison center in Japan, sharing the latest information through close collaboration with international organizations and platforms such as the Food and Agriculture Organization (FAO), the International Plant Protection Convention (IPPC), and CGIAR.

***HiYAMA Miyuki***

***Director, Research Strategy Office***

# JIRCAS International Symposium 2019

## “International research collaboration to tackle transboundary plant pests: Contributions to Sustainable Development Goals”

### Organized by

Japan International Research Center for Agricultural Sciences (JIRCAS)

Co-organized by

National Agriculture and Food Research Organization (NARO)

In cooperation with

Ministry of Agriculture, Forestry and Fisheries (MAFF)

The Phytopathological Society of Japan

Japanese Society of Applied Entomology and Zoology

Liaison Office in Japan, FAO, UN

Japan Forum on International Agricultural Research for Sustainable Development

**Date** 2019-11-26

**Place** Tsukuba International Congress Center  
2-20-3 Takezono, Tsukuba, Ibaraki 305-0032, Japan

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### Program

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#### Opening

Opening Remarks: IWANAGA Masa (President, JIRCAS, Japan)

Welcome Remarks: SHIMADA Kazuhiko (Deputy Director General, Agriculture, Forestry and Fisheries Research Council Secretariat, MAFF, Japan)

#### Keynote Speeches

Chairperson: NAKASHIMA Kazuo (Program Director, Stable Agricultural Production, JIRCAS, Japan)

1. Jingyuan Xia (Secretary, International Plant Protection Convention Secretariat; IPPC)  
“Recent challenges in fighting against transboundary plant pests and the FAO strategies for helping farmers in dealing with those pests”

2. Ulrich Kuhlmann (Executive Director, Global Operations, CABI)  
“CABI’s experiences of transboundary plant pest management: Strengthening plant health systems and the importance of advisory services”

#### Session 1 “Important Transboundary Insect Pests”

Chairperson: KOBORI Youichi (Senior Researcher, Crop, Livestock and Environment Division, JIRCAS, Japan)

1. OTUKA Akira (Unit Leader, Institute of Agricultural Machinery, NARO, Japan)  
“Migration analysis and forecasting of migratory insect pests”

2. SANADA-MORIMURA Sachiyo (Group Leader, Kyushu Okinawa Agricultural Research Center, NARO, Japan) and MATSUKAWA Mizuki (Researcher, Crop, Livestock and Environment Division, JIRCAS, Japan)  
“Development of insecticide application technology to

rice planthoppers that are important transboundary plant pests in Asia”

3. Frédéric Baudron (Principal Scientist, Sustainable Intensification Program, International Maize and Wheat Improvement Center: CIMMYT, Harare, Zimbabwe)  
“Fall armyworm damage in African smallholder maize fields and its impact on yield”

#### Session 2 “Important Migratory Diseases and Quarantine”

Chairperson: FUKUTA Yoshimichi (Senior Researcher, Tropical Agricultural Research Front, JIRCAS, Japan)

1. FUKUTA Yoshimichi (Senior Researcher, Tropical Agricultural Research Front, JIRCAS, Japan)  
“International collaborative research networks for rice blast”

2. Claudia Godoy (Researcher, Embrapa Soybean, Brazil)  
“Invasion of soybean rust and its management, from Brazilian experiences”

3. YOKOI Yukio (Director of WTO, International Affairs Department, MAFF, Japan; former Director of Research Division, Yokohama Plant Protection Station, MAFF, Japan)  
“Plant quarantine and risk management”

#### Panel Discussion

Moderator: KATO Masayasu (Project Leader, Biological Resources and Post-harvest Division, JIRCAS, Japan) and MATSUMURA Masaya (Chief, Department of Research Promotion, Strategic Planning Headquarters, NARO, Japan)

#### Closing

Closing Remarks: KOYAMA Osamu (Vice-President, JIRCAS, Japan)



## Keynote Speeches

Crop damage due to plant pests is estimated to account for 20-40% of attainable yield and has become a serious threat to food security. Climate change and global warming, as well as globalized movement of people and commodities, are the main factors that contribute to the spread of transboundary plant pests, resulting in worsening damage to agricultural productivity. In the keynote session, we invited two prominent scientists who are experts in transboundary plant pests (TPPs), not only in the scientific front, but also in formulating strategies and policies that address the challenges in coordinating measures to keep these pests under control.

The first speaker was Dr. Jingyuan Xia. He is the Secretary to the FAO-based International Plant Protection Convention (IPPC), and his presentation was titled “Recent challenges in fighting against transboundary plant pests and the FAO strategies for helping farmers in dealing with those pests.” Among the most important TPPs, five of them were described in this presentation: locust, fall armyworm, wheat rust, banana *Fusarium* wilt, and bacterium *Xylella fastidiosa*. The FAO, in cooperation with the IPPC, is playing a very important role in helping member countries and farmers in their fight against TPPs in the following five key areas: coordination, prevention, early warning and quick response, monitoring and sustainable management, and capacity development. The International Year of Plant Health 2020

will be a good opportunity to enhance public awareness in TPPs.

The next speaker was Dr. Ulrich Kuhlmann. He is the Executive Director of the Global Operations of CAB International (CABI). CABI is an international, inter-governmental, not-for-profit organization that improves people’s lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment. Dr. Kuhlmann delivered his presentation titled “CABI’s experiences of transboundary plant pest management: Strengthening plant health systems and the importance of advisory services.” He introduced CABI’s experiences of TPP management, including the CABI programs such as Plantwise. Plantwise aims to provide a data-driven rapid response network connecting farmers with advisors and other support services, enabling early detection, diagnosis, and management of pest problems at farm level. Over the past few years, Plantwise has built the resilience of smallholder farmers in coping with emerging plant health threats, enabling them to produce and earn more while being less dependent on high-risk, pesticide-based plant protection practices. A key focus of Plantwise is to put research into use, translating scientific knowledge into actionable best practice, delivered through simple, practical methodologies that are accessible at community levels. The efficiencies, delivered through digital development and the promotion of equity in accessing services, are additional factors that have helped to strengthen interactions between farmers and local advisory service providers.

The two speakers underlined the premise of this symposium, particularly in undertaking immediate actions towards prevention, early warning and response, monitoring, and capacity development, and in pursuing international cooperation in promoting research that actually reaches farmers.



Chair: Dr. NAKASHIMA Kazuo (JIRCAS, Japan)



Dr. Jingyuan Xia (IPPC, Italy)



Dr. Ulrich Kuhlmann (CABI, Switzerland)

## Session 1

# Important Transboundary Insect Pests

In this session, three lectures were given on two well-known transboundary insect pests: fall armyworm (FAW) and rice planthoppers (RPHs).

First, Dr. OTUKA Akira, Unit Leader, Institute of Agricultural Machinery, National Agriculture and Food Resources Organization (NARO), Japan, gave a lecture titled “Migration analysis and forecasting of migratory insect pests.” FAW, *Spodoptera frugiperda*, is a serious pest of maize and several other crops. It has been rapidly spreading worldwide in recent years and became invasive in Japan in 2019. In this lecture, Dr. Otuka reported his research results on flight analysis and migration forecasting of FAW in Asia. Specifically, he described the rapid spread of FAW in China, the sources of migration to Taiwan, Korea, and Japan, and the estimated flight altitudes of migrating insects. He said that FAW adults can fly 100 km or more within one day, but when migrating longer distances they appear to be affected by strong winds generated by low pressures and similar weather phenomena. The frequency of FAW migrations to Japan in 2020 might be significantly affected by the number of wintering populations in southern China, which are suspected to be sources of FAW. Dr. Otuka suggested that collaboration among countries, including shared monitoring of FAW populations, is required to reduce the risk and suppress this pest species.

Second, Dr. SANADA-MORIMURA Sachiyo, Group Leader, Kyushu Okinawa Agricultural Research Center, NARO, Japan, and Dr. MATSUKAWA Mizuki, Researcher,

Crop, Livestock and Environment Division, JIRCAS, Japan, gave a lecture titled “Development of insecticide application technology to rice planthoppers that are important transboundary plant pests in Asia.” They opened by describing the ecology of brown planthopper and white-backed planthopper, and the damage they inflict to growing crops. Both RPHs, therefore, are important transboundary insect pests in Asia, including Japan. They reported the results of research on RPHs conducted by NARO and JIRCAS. There is a concern that RPHs will eventually develop resistance against the currently effective, popular insecticides, and that pesticide resistance would probably trigger an outbreak. Thus, NARO and JIRCAS plan to collaborate on international research directed at pesticide resistance management in Asia.

Third, Dr. Frédéric Baudron, Principal Scientist, Sustainable Intensification Program, International Maize and Wheat Improvement Center (CIMMYT), Zimbabwe, gave a lecture titled “Fall armyworm damage in African smallholder maize fields and its impact on yield.” He began his lecture by presenting the invasion status of FAW to Africa and Asia, and then reporting on the results of his research with collaborators. Based on their studies, they found that several agronomic practices appear to decrease FAW infestation in smallholder conditions, including legume intercropping, conservation agriculture, and organic amendments. He discussed that these practices increase the abundance of natural enemies, which may be the reason for the impact on FAW. This kind of environmental engineering approach can be a suitable pest management strategy for smallholder farmers. In addition, they found differences in the susceptibility of a maize variety to FAW infestation. The results suggest huge potential for selecting crops with genetic resistance against FAW.

To sum up, the lectures and subsequent discussions confirmed the importance of international collaboration for conducting research and establishing shared standards that would serve as a benchmark for comparing results among countries, towards improved control of transboundary pests.



**Chairperson:**  
**Dr. KOBORI Youichi**  
(JIRCAS, Japan)



**Dr. OTUKA Akira**  
(NARO, Japan)



**Dr. SANADA-MORIMURA Sachiyo**  
(NARO, Japan)



**Dr. MATSUKAWA Mizuki**  
(JIRCAS, Japan)



**Dr. Frédéric Baudron**  
(CIMMYT, Zimbabwe)

**KOBORI Youichi**  
*Crop, Livestock and Environment Division*

## Session 1

# Development of insecticide application technology to rice planthoppers that are important transboundary plant pests in Asia

Rice planthoppers, the brown planthopper (BPH) *Nilaparvata lugens* and the white-backed planthopper (WBPH) *Sogatella furcifera*, are migratory insect pests of rice in Asia. These species migrate yearly from the central and the northern parts of Vietnam to the southern part of China and the western part of Japan. They increase drastically in their immigrated areas and cause serious damage to rice. They are known to develop resistance to various insecticides, which is one of the most important factors causing serious crop damage around Asia in recent years. In 2003, the development of resistance in BPH against imidacloprid, one of the popular insecticides, was first reported in Thailand, and similar findings were noted in other Asian countries within a few years. Therefore, insecticide resistance management is urgently required in order to control rice planthoppers. In the presentation, Dr. SANADA-MORIMURA Sachiyo, Group Leader, Kyushu Okinawa Agricultural Research Center, NARO, and I introduced the research projects of NARO and JIRCAS to develop insect pest management strategies against rice planthoppers in Asia.

NARO has been monitoring the susceptibilities of rice planthoppers to various insecticides (e.g., organic phosphate, carbamate, pyrethroid, phenylpyrazole, and neonicotinoid) using Japanese populations since 1990. Comparing the fluctuation of insecticide-resistance development in many BPH populations in Southeast and East Asia revealed that the trends in insecticide resistance development have synchronized among BPH in northern Vietnam, southern China, and western Japan, but not in southern Vietnam. It showed the importance of monitoring insecticide susceptibility over a long period throughout Asia, not only in immigrated areas but also in areas of emigration. NARO has developed a new method for monitoring insecticide susceptibility and created a general manual, and has been promoting its use in other Asian countries such as Vietnam.

JIRCAS has been conducting research on a project titled “Population dynamics of rice planthoppers and relationship with agricultural activities in Vietnam” since 2016. In order to establish an Integrated Pest Management (IPM) system

to control rice planthoppers in Vietnam, we examined the population dynamics of rice planthoppers and their natural enemies, and the insecticide resistance of rice planthoppers. We estimated the immigration period and routes using meteorological information and the number of planthoppers caught daily by air traps installed in Vietnam. In order to implement insecticide resistance management, we did a survey on insecticide usage in farmers’ fields, which revealed that the farmers used several types of insecticides including those containing ingredients for which the rice planthoppers were reported to have developed resistance. We set up the monitoring system at the Plant Protection Research Institute in Vietnam and have started monitoring insecticide susceptibility in Vietnamese rice planthopper populations.

There is some concern that rice planthoppers would eventually develop strong resistance against currently effective insecticides and trigger outbreaks in the near future. International research collaborations on insecticide resistance, population dynamics, and migration are thus expected to find solutions for managing insecticide resistance of rice planthoppers in Southeast and East Asia.

**MATSUKAWA Mizuki**

*Crop, Livestock and Environment Division*



**Dr. MATSUKAWA Mizuki of JIRCAS (left) and Dr. SANADA-MORIMURA Sachiyo of NARO (right)**



## Session 2

### Important Migratory Diseases and Quarantine

Three presentations related to two important transboundary diseases and plant quarantine were carried out in this session. First, Dr. FUKUTA Yoshimichi (Senior Researcher, JIRCAS-TARF, Japan) described the JIRCAS research project on international collaborative research network for rice blast that is being conducted in Asia and Africa. This was followed by Dr. Claudia Vieira Godoy (Researcher, Embrapa Soybean, Brazil), who discussed the invasion of soybean rust and its management in Brazil. Lastly, Dr. YOKOI Yukio (Director for WTO, International Affairs Department, MAFF, Japan, and former Director, Research Division, Yokohama Plant Protection Station, MAFF, Japan) reported on plant quarantine and risk management.

Dr. Fukuta opened his lecture by stating that the project on international collaborative research for rice blast began in 2006, with the aim to develop and distribute a differential system. The differential system is a basic tool for clarifying the pathogenicity of blast isolates and resistance in rice cultivars, and can be used for genetic and breeding works and pathological studies. This network is composed of two international organizations, the International Rice Research Institute and Africa Rice Center, and 14 national agricultural research institutes and universities from Asia and Africa (p. 9, Fig. 1). He reported that the genetic diversity of blast isolates and the variation in rice germplasm as well as their relationship, were investigated. Moreover, he said that several countries are testing each of the leading cultivars for genetic improvement and monitoring the pathogenicity of blast isolates. Lastly, he emphasized that collaboration among participating institutes and among scientists from different research areas will become important in establishing a durable protection system against blast disease.

Dr. Godoy, in her presentation, said that soybean rust was first reported in Paraguay in 2001, spreading to the western part of the state of Parana, Brazil, within three years. This has resulted in the adoption of management and regulatory measures to reduce the inoculum density between crop seasons (soybean-free period) and to avoid late sowing of soybean. She mentioned the application of fungicides to maintain the health of resistance cultivars and

early sowing of short-cycle cultivars after the soybean-free period as important strategies in the meantime. She reported that the required fungicides were applied twice or thrice per cultivation season, and that the costs were estimated at US\$ 2.9 billion in 2018/2019. Reduced efficiencies were noted in several fungicides, and the limitations of fungicides were determined. She admitted the difficulty of applying only a single technology to protect against soybean rust, and explained the importance of applying multiple tools and methods, such as the promotion of plant growth and health, cultivation during the season when fungal population is at a low density, rotation of different cultivars, and application of pesticides that do not produce resistant fungal strains.

According to Dr. Yokoi, the session's last speaker, the first plant quarantine office in Japan was established in 1914 at the start of World War I, which means that Japan has over 100 years of plant quarantine system history. He said that the whole plant quarantine issue is anchored on international standards and guidelines, and that countries including Japan have developed their own pest risk analysis guidelines by adding their own perspectives according to the situation and within the national legal framework. He revealed that information on pest distribution and detection, as well as revisions in trade partners' regulations, are routinely collected through various sources, and that the plant quarantine legislative scheme has been continuously developed based on pest risk analysis. He ended by saying that plant quarantine can be further improved against the increasing pest risk through regional/international collaborations and with emerging technologies and innovative approaches.

To conclude, the three presenters were in agreement that international linkages and collaborations, as well as adoption of approaches that employ several tools or technologies, will be important in constructing a durable protection system against plant diseases and in developing a plant quarantine system that reduces pest risks from trade partners.

**FUKUTA Yoshimichi**  
*Tropical Agriculture Research Front*



Session Chair: Dr. FUKUTA Yoshimichi  
(JIRCAS-TARF, Japan)



Dr. Claudia Godoy  
(Embrapa Soybean, Brazil)



Dr. YOKOI Yukio (MAFF, Japan)



## Session 2

# International Collaborative Research Network for Rice Blast

Although blast disease has occurred mainly in temperate areas, it has also been recognized in many tropical regions since the 1970's, becoming one of the most serious diseases of rice in the world. Conditions favoring the occurrence of blast disease could mean no rice harvest. In fact, around 1% of the world's total rice production is lost every year due to blast disease. This article provides a summary of my lecture on this topic under Session 2.

Only a few scientists specialize in blast disease, and efficient protective methods have not been developed yet for the developing regions in the tropics. In these areas, fungicides that are effective against blast disease are expensive, thus many poor farmers cannot buy and apply them to rice. The use of resistant cultivars is therefore the most practical and economical method for controlling blast disease in rice. However, using such cultivars has limited effect owing to the breakdown of resistance genes, with more and more blast fungi overcoming resistance in rice. Because few information was available on the pathogenicity of blast isolates that were distributed in farmers' fields, the relationship between blast isolates and resistance in rice cultivars were not clarified.

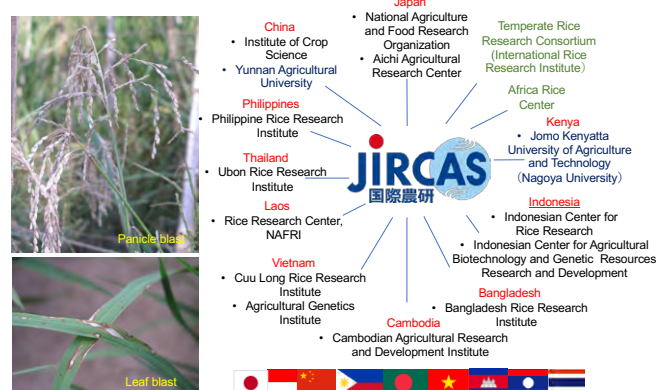
JIRCAS has conducted the research project, titled "Blast Research Network for Stable Rice Production," since 2006 to develop and distribute a basic tool for blast studies called the differential system. The differential system can clarify the pathogenicity of blast isolates in farmers' fields and resistance in rice cultivars, and it is the first step in the development of a durable protection system against the disease. The key materials, which consisted of monogenic lines as differential varieties (DVs) that were used to introduce a single resistance gene into the genetic background of a susceptible cultivar, had been developed by the IRRI-Japan Collaborative Research Project funded by the Ministry of Agriculture, Forestry and Fisheries, Japan. The pathogenicity of blast isolates can be clarified based on the reaction patterns to these DVs for 23 types of resistance genes, by inoculating them with blast isolates.

JIRCAS and IRRI have collaborated on the development and distribution of DVs to agricultural research institutes and universities in Asia and to the Africa Rice Center. The pathogenicity of blast isolates in these regions have been analyzed and the genetic variation in resistance in rice germplasm have also been investigated using blast isolates whose pathogenic mechanisms have been clarified (a.k.a. standard differential blast isolates). Through collaborative research in Asia, West Africa, and Kenya, the genetic diversity of blast isolates and variations in rice germplasm

have been clarified in detail. The variation among blast isolates from Japan is not so high and the pathogenicity was also not so high. On the other hand, those from West Africa, Kenya, and Bangladesh could infect most DVs, while those from Southeast Asia were intermediate. The genetic variation among blast isolates were corresponded with those of rice cultivars, and they were found to co-differentiate with each other.

The differential systems have already been applied in breeding works such as the evaluation and genetic improvement of resistance in leading rice cultivars, and the pathological study for monitoring of blast isolates in farmers' fields in several countries. Based on blast studies using the differential system, the path towards creating a durable protection system against blast disease will be built continuously.

**FUKUTA Yoshimichi**  
*Tropical Agriculture Research Front*



**Fig. 1. International Collaborative Research Network for Rice Blast**  
A total of 16 agricultural research institutes (including IRRI and AfricaRice) and universities are participants in the international network initiated by JIRCAS.



**Dr. FUKUTA Yoshimichi (JIRCAS-TARF, Japan)**

## Panel Discussion

### How to collaborate to tackle transboundary plant pests?

Six speakers were invited to serve as panelists to discuss collaborative approaches in tackling transboundary plant pests (TPPs). Dr. MATSUMURA Masaya and I handled the panel discussion.

First, I outlined the speakers' presentations and summarized the necessity of collaboration on the issue of TPPs and its relation to several specific Sustainable Development Goals (SDGs) such as "No Poverty," "Zero Hunger," "Life on Land," and "Partnership for Goals." After that, Dr. Matsumura took the role of moderator and let the panelists provide their ideas on tackling the issue of TPPs through collaboration. Their main points are as follows:

Dr. Jingyuan Xia stressed that in addition to what I have mentioned, TPPs are also relevant to another SDG, "Climate Action." Taking the fall armyworm as an example, he noted the need to collaborate on studies focusing on area-specific strategies, host preferences, natural enemies, and pesticide resistance.

Dr. Ulrich Kuhlmann mentioned the huge disconnect between the G20 countries and developing countries. He called upon the G20 countries to share their advanced knowledge in detection, monitoring methods, and control measures more quickly and efficiently to developing countries.

Dr. OTUKA Akira also emphasized the importance of information-sharing. He said it was very good that we have recently been able to quickly obtain information on the Internet on the occurrence of TPPs and pesticide resistance.

Dr. Frédéric Baudron added that based on his experience, Information and Communication Technology (ICT) is very effective in conveying information and research results. He also suggested that capacity development for detection and adoption of control measures against TPPs be included in research and extension.

Dr. Claudia Godoy explained that Embrapa had already started breeding programs before the incursion of soybean rust to Brazil. She said that the breeding activities needed collaboration because the germplasms were introduced as a result of exploring resistant soybean germplasms from Asian countries.

Dr. YOKOI Yukio suggested that we should consider the issue of TPPs not only in terms of biology but also in terms of collaboration with engineering researchers engaged in innovative approaches such as AI (Artificial Intelligence) and IoT (Internet of Things). He said that we should lower

the barriers to information disclosure and think of how to use innovation to our advantage.

A short discussion between panelists and moderators followed. Dr. Xia pointed out that it is important to exchange germplasms in collaborative research activities, and that the International Plant Protection Convention has outlined the method. Dr. Otuka stressed personal connection as the base of collaborative research. Dr. Yokoi talked about a severe conflict he had noted between countries at an international meeting on climate change. He also regarded plant protection as a promising area for collaboration. Regarding the question on how to distribute his results to farmers considering that these were derived from a small number of fields and seasons, Dr. Baudron replied that he has started collecting larger data sets from farmers through ICT. About the application possibilities of social media, Dr. Kuhlmann talked about his experience with the CABI-produced "Plantwise," a program to reduce yield loss. He said that plant doctors have spontaneously started exchanging photos of plant pests and information using ICT, which he thought was fascinating because they did not imagine it when CABI produced the Plantwise program. He cautioned, however, that ICT may not be effective in every country.

Dr. Matsumura closed the panel discussion by acknowledging the panelists and speakers.

**KATO Masayasu**

**Biological Resources and Post-harvest Division**



**Panelists and moderators on stage (From left: Drs. Xia, Kuhlmann, Otuka, Baudron, Godoy, Yokoi, Kato, and Matsumura)**



## 2019 Japan International Award for Young Agricultural Researchers

JIRCAS, in cooperation with the Agriculture, Forestry and Fisheries Research Council (AFFRC) Secretariat, held the 13th commendation ceremony of the Japan International Award for Young Agricultural Researchers (Japan Award) on 26 November 2019 at Convention Hall 200, Tsukuba International Congress Center in Tsukuba City, Ibaraki Prefecture. The Japan Award is given by the Chairman of the AFFRC of the Ministry of Agriculture, Forestry and Fisheries (MAFF) to recognize and honor young foreign researchers (under 40 years old) whose outstanding achievements promote research and development of agricultural, forestry, fishery and other related industries in developing regions.

The awardees and guests were welcomed by Mr. KOBAYASHI Yoshio, chairman of the AFFRC. Congratulatory remarks were delivered by Dr. TAKAHARA Isamu, deputy director general for Science, Technology and Innovation, Cabinet Office; and Mr. YAMADA Hideya, vice president of the Japan International Cooperation Agency (JICA). The selection process was explained by Dr. IWAMOTO Mutsuo, chairperson of the Selection Committee. Mr. Kobayashi read and presented the commendation certificates (AFFRC Chairman's Award), while Dr. IWANAGA Masa, president of JIRCAS, presented the monetary incentives (MOTAI-JIRCAS Award). The three winners delivered lectures on their research achievements following the award ceremony.



2019 Japan Award commemorative photo



## The 2019 awardees and their research achievements



**Awardee:** Dr. Jacobo ARANGO MEJIA

International Center for Tropical Agriculture (CIAT), Colombia

**Research Achievement:** Research on tropical forage grasses to mitigate greenhouse gas emissions and combat climate change

### Outline of Research Achievements

The mitigation of climate change (CC) is a major and crucial challenge for humanity. This phenomenon has profound effects on agricultural production and food security, and CC effects are projected to become worse. As a young Colombian scientist, Dr. Arango is highly focused on developing tools and technologies to mitigate CC through reduced greenhouse gas emissions. He has conducted strategic research to demonstrate how tropical forages can reduce the environmental footprint of livestock production. One concrete example is the exploitation of the Biological Nitrification Inhibition (BNI) capacity of *Brachiaria* and *Panicum* tropical forage grasses. The BNI concept was conceived by JIRCAS in collaboration with CIAT more than a decade ago. Long-term collaborative research between JIRCAS and CIAT has provided direct evidence for inhibition of soil nitrification by plants via root exudation. The high BNI potential found in these forage grasses increases nitrogen use efficiency and reduces nitrous oxide emissions. A major outcome from his research is the development and application of accurate phenotyping tools for this key BNI trait. Another significant outcome is the development of a feeding strategy/technology through identification of superior diets for cattle, based on a combination of tropical forage grasses and tree legumes. Since these nutritious forages are more efficiently utilized by target animals, methane emissions from enteric fermentation are effectively reduced.



**Awardee:** Ms. MAI Thi Ngan

Vietnam National University of Agriculture, Vietnam

**Research Achievement:** Development of a simple, accurate, and economical diagnostic test and pooled testing system for detection of porcine epidemic diarrhoea virus

### Outline of Research Achievements

There is an adage that says “prevention is better than cure” but the truth is that we do not invest sufficiently in prevention. Prevention is a difficult but important message for the control of transboundary animal diseases (TADs), including porcine epidemic diarrhoea (PED). PED is an emerging and re-emerging epizootic swine disease that causes massive economic losses with high morbidity and mortality in piglets worldwide. In Vietnam, PED was first observed in 2009 and has developed to an endemic stage. PED prevention and control are expected to have a positive impact on food security; thus, early detection of PED virus-infected herd through active surveillance is necessary. However, surveillance is applied only to individuals using the ‘gold standard’ polymerase chain reaction (PCR) method, which is difficult to use for developing countries like Vietnam due to cost and most laboratories in the country being under-equipped and unable to meet the sophisticated requirements for PCR.

To solve this problem, we successfully developed an innovative test for diagnosing PEDV infections. This test, which uses the loop-mediated isothermal amplification (LAMP) method, has high sensitivity and specificity, and is cheap, rapid, and simple. Furthermore, our new system can be used not only on individual animals but also on several animals at once. The system is practical and has high applicability in unequipped laboratories and developing countries. It also supports the design and implementation of large-scale epidemiological surveys and enables active surveillance for the effective control of PED and other diseases.



**Awardee:** Dr. Rebijith KAYATTUKANDY BALAN

Plant Health and Environment Laboratory, Ministry for Primary Industries, New Zealand, India

**Research Achievement:** Molecular approaches in identification, diversity and management of important insect pests in India

### Outline of Research Achievements

The accurate identification and management of insect pests has been a herculean task for several decades. Dr. Rebijith has successfully developed several DNA barcodes and species-specific markers that can identify various insect pests of agricultural crops independent of life stages, color morphs and sex. His exceptional work on molecular diversity has revealed the existence of cryptic species and genetic groups in various insects such as aphids, thrips and whiteflies, and his collaborative research on insecticide resistance status in *Bemisia tabaci* genetic groups has been widely appreciated. Furthermore, Dr. Rebijith demonstrated the utility of RNA interference in the management of *Aphis gossypii*, *B. tabaci*, *Helopeltis antonii*, *Plutella xylostella*, etc. for the first time in India. His work on small RNAs and RNAi has revealed the differentially expressed microRNAs in the juvenile hormone biosynthetic pathway in *Spodoptera*. Lastly, his work on artificial miRNA-mediated gene silencing is the basis behind novel pest management strategies that are being developed.

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