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A large swarm of locusts flying out in uncountable numbers (Mauritania)
(Photo by Koutaro Maeno)

In This Issue

JIRCAS
JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES

Insect Research at JIRCAS: Toward Stable Agricultural Production

Stable Agricultural Production is one of the four research programs of JIRCAS under the Fourth Medium to Long-Term Plan as approved by the Ministry of Agriculture, Forestry, and Fisheries (MAFF), Japan. It is well known that agricultural potential in developing regions, including Africa, has not been fully realized because of adverse environments that impose abiotic stresses (e.g., low fertility and droughts) and biotic stresses (e.g., pests and diseases) on plant growth and development. Therefore, ensuring food and nutrition security is a challenge.

This program aims to enhance agricultural productivity and improve nutrition in developing countries through development of technologies for stable production of agricultural products in the tropics and other adverse environments. It is composed of four research projects, including the "Pest and Disease Control" project, which aims to develop technologies for the control of migratory plant pests and transboundary diseases.

In June 2016, the MAFF issued a report titled "The Future Direction of International Research." It described Japan's "Responses to Global Issues and Stable Food Production in Developing Regions" including "Researches for the Control of Migratory Pests and Transboundary Diseases," which indicated the need to commit to research activities that focus on pest control and disease prevention.

Migratory pests and transboundary infectious diseases, such as foot-and-mouth disease and the highly pathogenic avian influenza, have been spreading across borders. Diseases and pests have become a threat to trade and food security not only of the country of origin but also of neighboring countries, thereby affecting the regional economy. Prevention of epidemics requires multilateral cooperation, hence the importance of international efforts. Proper and accurate control is therefore necessary in particular against rice planthoppers. These insect pests of rice are known to fly from abroad, with some of them reported to have acquired pesticide resistance. As one of the measures, we will carry out research for the control of pests and diseases in cooperation with research institutes overseas. We will also exchange information on the development of a control plan and validation method based on research results. As a transboundary pest, desert locusts have become a major problem abroad, with outbreaks occurring and causing serious damage in Africa.

Although some insects are considered pests, there are also some that are useful, including insects that can be used as natural enemies to control the pests, as well as domesticated insects such as silkworm and bees. Unutilized insect resources are also being studied for potential uses. Integrated pest management techniques that effectively control pests while maintaining the ecosystem, i.e., by using the pests' natural enemies and keeping pesticide use at a minimum, are needed even in developing regions. Our research projects at JIRCAS have been promoting the use of natural enemies to control the pests. In addition, studies utilizing insects as animal feed are also being conducted under the "Value-adding Technologies" program.

In this issue of the newsletter focusing on insect research at JIRCAS, we introduce the pest control studies that are being carried out under the "Pest and Disease Control" project of the "Stable Agricultural Production" program. First, our project leader presents an overview of the pest research project. Then, our project researchers introduce the new researches on rice planthoppers and desert locusts as well as on leafhoppers that transmit sugarcane white leaf disease. In addition, from the aspect of insect utilization, researches on using natural enemies as a pest control method and studies on utilizing insects as animal feed are also introduced. I hope these articles help the readers recognize the importance of insect research at JIRCAS.

Kazuo Nakashima
Program Director
Stable Agricultural Production

“Pest and Disease Control” Project and Research on Plant Pests

“Pest and Disease Control” Project

An increase in crop production is required to satisfy the food demand of an increasing global population. However, crop growth is reduced by biotic factors such as insects, diseases, and weeds. If no control measures are applied, insects, diseases, and weeds account for about 20%, 20%, and 30% of yield loss, respectively. Although farmers try to reduce the loss by using resistant varieties and pesticides, yield loss due to insects, diseases, and weeds still occurs at about 10% each.

Pesticides are not often used when pesticide prices are high and/or when farm products are selling low. Although pesticides are very effective in reducing damage by pests and diseases, insects and pathogens occasionally develop resistance to the pesticides when used repeatedly. Hence, we have to design and develop sustainable and low-cost methods to control pests and diseases.

There are four projects under the “Stable Crop Production” program. The other three projects aim to develop technologies that would mitigate non-biological stresses such as drought and low fertility. On the other hand, the “Pest and Disease Control” project (full title: “Development of technologies for the control of migratory plant pests and transboundary diseases”) aims to develop technologies to mitigate damage by biological stresses, pests, and diseases.

In this project, we will conduct research focusing on five types of pests and diseases over a five-year period (from FY 2016 to 2020). The Ministry of Agriculture, Forestry and Fisheries had already formulated a plan titled “Research on control of transboundary animal diseases/pests and diseases.” According to the research plan, we will conduct research on rice planthoppers (which migrate overseas to Japan and cause damage) and on the desert locust (which form large swarms that migrate across Africa, eating all vegetation along its path). We will continue the three research studies that were conducted during the previous medium-term plan, i.e., the sugarcane white leaf disease, which is transmitted by grasshoppers and considered the most important disease affecting sugarcane production in Southeast Asia; rice blast, an important airborne disease affecting rice production; and soybean rust, which has recently invaded the American continent, the largest soybean-producing area. In this study, we will also develop control technologies and resistant cultivars or lines. Research strategies against plant pests shall include the identification of control measures based on the ecology of the pests and the development of effective pest control techniques. Research strategies against plant diseases, on the other hand, shall include an understanding of pathogenic diversities in the target area (consisting of several countries) through research networks, and the development of durably resistant cultivars by incorporating field resistance genes and by pyramiding resistance genes.

Pest Control Study in the “Pest and Disease Control” Project

Research on rice planthoppers in Vietnam

In this research, we will make observations about the population of planthoppers, their resistance to insecticides, and the agricultural activities related to rice cultivation. We will elucidate the factors that influence the reduction of planthopper populations in northern and central Vietnam, i.e., the areas where planthoppers that migrate to Japan originate.

Research on desert locust

In this research, we will observe the environmental factors that cause the phase change (from solitarious to gregarious) in locusts in the field in Mauritania. On the basis of the results, we will develop effective preventive control measures before the locusts transform into the gregarious phase.

Research on sugarcane white leaf disease

In the previous medium-term, we found that planting disease-free seed canes is important in reducing the occurrence of plant diseases in the field and that vector grasshoppers move only a short distance. In this medium to long-term project, we will combine the results of our studies to develop an integrated pest management technique to produce healthy seed canes.

Masayasu Kato
Biological Resources and Post-harvest Division

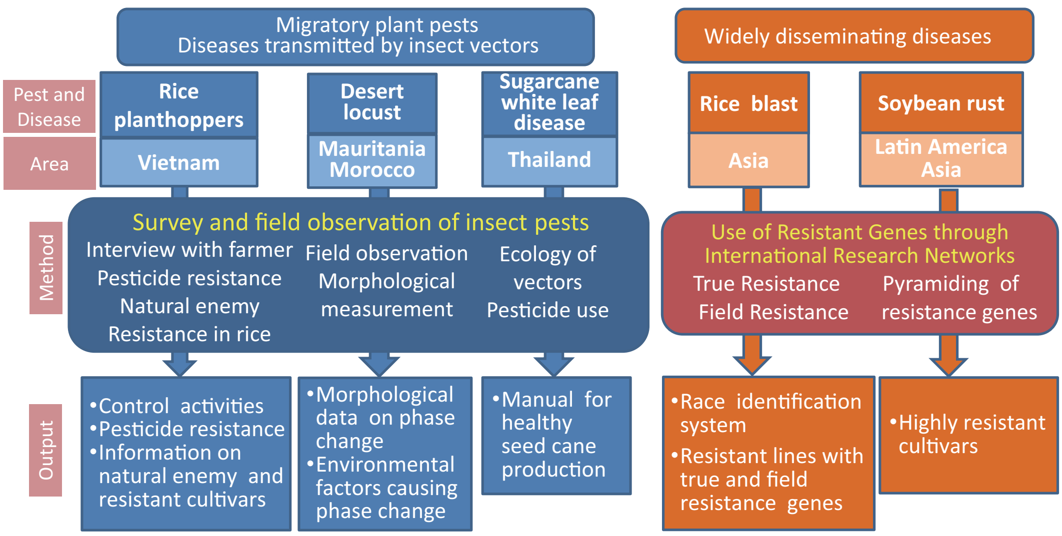


Fig. 1. Outline of the “Development of technologies for the control of migratory plant pests and transboundary diseases (Pest and Disease Control)” project

Rice Planthoppers in Vietnam

The rice planthopper, an insect pest that spreads in Asia via transboundary migration, is known as a very serious menace to rice plants. It sucks sap from the phloem of rice plants and causes plants to dry up and die when an outbreak occurs (called a 'hopper-burn' because it dries up and kills a certain area of the paddy field). Virus diseases transmitted by planthoppers also inhibit the growth of infected plants.

Photo 1. Brown planthoppers infesting on the stems of rice plants. (Photo taken in Cambodia)

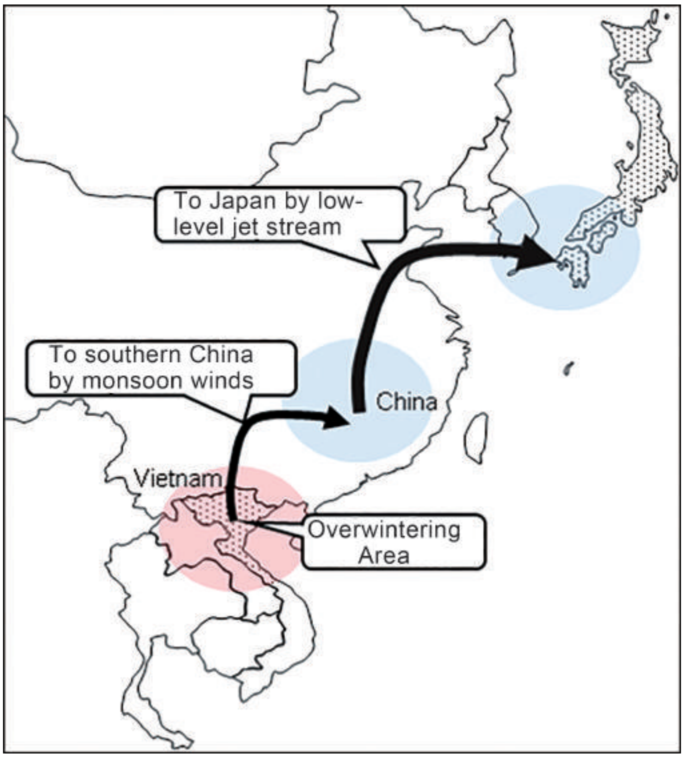


Fig. 1. Migration route of planthoppers from the northern part of Vietnam to Japan

The outbreak induces yield loss and sometimes lead to food shortages like the 'Kyoho famine' of the Edo period in Japan.

Based on numerous research and studies, 'brown planthopper' and 'white-backed planthopper' cannot overwinter in Japan, thus they migrate every year with the low-level jet streams via East Asian countries like China and Korea. The northern part of Vietnam is considered as the migration origin. In this region, rice plants that remain during winter season enhance the planthoppers' chance to survive because the average minimum temperature is only about 15 ºC. There are two cropping seasons, winter-spring and summer-autumn. The planthoppers move to the southern part of China in March-April, at the end of the winter-spring season, and reach Japan in June-July. It has been reported that the number of planthoppers in the northern part of Vietnam correlated with the number of migration to Japan. Recently, planthoppers have developed resistance to insecticides while tolerant rice varieties in some regions have become less tolerant to planthoppers, thus necessitating cooperation among Asian countries to come up with an effective control strategy against planthoppers.

JIRCAS has started studying planthoppers in Vietnam as a new research topic under its Fourth Medium to Long-Term Plan. The project aims to obtain fundamental information on insecticide resistance, tolerant rice varieties, and natural enemies in central and northern Vietnam where planthoppers can survive throughout the year. Because of the high population density of brown planthoppers in southern Vietnam, there is also plenty of information about the pests, in contrast to the central and northern regions where data is scarce. However, the number of white-backed planthoppers increased due to the increase in the cultivation of Chinese hybrid varieties in the regions since the 2000s. Moreover, the virus disease carried by white-backed planthoppers was observed at the end of the decade, thus the need for pest control strategies. In the beginning, we visited both local governmental and research institutions related to agriculture in Vietnam to get information about previous researches/projects that focused on planthoppers. Based on the existing information in Vietnam and Japan, we are going to find suitable control measures against planthoppers for the benefit of farmers and the environment via surveys in rural areas in Vietnam.

Mizuki Matsukawa
Crop, Livestock and Environment Division

Development of a Preventive Control Plan for the Desert Locust, *Schistocerca gregaria*

The desert locust, *Schistocerca gregaria*, is one of the most destructive pests in the world. Sometimes, desert locust populations grow explosively, forming swarms and causing locust plagues (Cover Photo and Photo 1). A plague can affect up to 20% of the Earth's surface across Africa, the Middle East, and Southwest Asia, with over 65 countries at risk of swarms and invasions. Desert locusts can potentially damage the livelihoods of a tenth of the world's population. In West Africa alone, economic damage is estimated at more than USD400 million.

The locust changes behavioural, morphological, and physiological characteristics in response to its population density. This phenomenon is known as phase polyphenism.

Photo 1. Desert locust swarm (Mauritania)

Photo 2. Last instar nymphs of the desert locust (Mauritania)

Locusts growing at a low density occur in a solitarious phase, whereas locusts growing at a high population density occur in a gregarious phase. Gregarization is very much linked with locust outbreaks. When nymphs of the locust become gregarious, they change body colours from green to yellow and black (Photo 2), and the adults change from brown to red or yellow. Gregarized locusts form a massive group, migrate over 100 km per day, and consume agricultural crops. Their reproductive and flight performance increases when they become gregarious. Consequently, the population size and invasion area dramatically increase. Therefore, understanding the mechanism of phase polyphenism and the process of gregarization in the desert locust has been thought to be the most important key to solving locust problems. There have been numerous studies conducted under laboratory conditions, especially in Europe during the last century. However, the mechanism and the process as mentioned above have yet to be elucidated, probably because only a few studies have been carried out in the field. Gathering field information about the ecological aspects of the locust in nature is therefore essential because this organism is sensitive to changes in population density and its surroundings. JIRCAS has started collaborative studies with the Mauritanian National Anti-Locust Centre (CNLA) in 2016 to better understand the ecology and behaviour of the desert locust in the field.

The preventive approach seeks to monitor and spray locust breeding areas as gregarizing populations of the locust are identified. However, this is difficult in practice as many of the principal breeding zones are located in remote areas and are difficult to reach. We shall keep studying the locust and aim for efficient and sustainable control measures with due consideration to environmental well-being. For example, gregarized locusts tend to aggregate together and lay eggs as a group. If we can understand this behavior, we can control locusts efficiently using only small amounts of pesticides. Furthermore, if we can understand the process of gregarization, we can predict locust outbreaks. Based on these studies, we will try to develop a preventive control system with the CNLA in Mauritania.

Koutaro Maeno
Crop, Livestock and Environment Division

Vector Insects of Sugarcane White Leaf Disease

Thailand is the second largest sugar-exporting country worldwide and is the largest supplier to Japan. However, Sugarcane White Leaf Disease (SCWLD) is a serious problem facing sugar production in the country. SCWLD-infected sugarcane shows whitening and dies after a certain incubation period. In recent years, SCWLD has become a major limiting factor in sugarcane production in various areas of Thailand, even though it was endemic only to a few areas several decades ago (Photo 1). SCWLD had also spread to neighboring countries, prompting JIRCAS to launch a collaborative research project with its counterparts in Thailand, from the 3rd Medium-term Plan (FY 2011-2015) to the current 4th Medium to Long-term Plan (FY 2016-2020). The purpose of the research, therefore, is the development of an Integrated Pest Management (IPM) system to prevent SCWLD.

There is currently no cure for SCWLD. Hence, spread suppression methodology is the primary technique employed in developing the IPM system. Sugarcane is reproduced by vegetative propagation (i.e., new buds emerge from the planted seed cane). If there is latent infection of the seed cane by SCWLD, the next cane growing from it is also infected. Therefore, we decided to develop healthy seedlings by applying meristem-tip culture techniques. Then, we distributed the products to the farmers after propagating the seedlings in the field.

Sugarcane can grow only 8-10 times within one generation. Thus, a healthy seedling should propagate in the field at least three times to provide enough amounts to farmers. We understand that SCWLD are transmitted to the propagation fields by two vector insects, *Matsumuratettix hiroglyphicus* and *Yamatotettix flavovittatus* (Photo 2); therefore, we should establish control methods against the vectors. We studied the weak points of the vectors during the 3rd Medium-term Plan, and we found that the dominant vector is *M. hiroglyphicus*. In addition, our results suggested that: 1) the movement range of the vectors can reach up to several hundred meters and that these insects do not move frequently and 2) some pesticides showed high vector insect mortality. Based on these results, we assumed that if we develop a large propagation field and treat it with a reasonable amount of pesticide, we can produce healthy seed canes at the inner part of the field even as the seed canes along the edges are exposed to high risk of SCWLD infection.

Under the 4th Medium to Long-term Plan, we will carry out experiments to verify this hypothesis and study rational pesticide use. In addition, we will develop methods for evaluating the resistance of sugarcane varieties and related species against vector insects in order to breed resistant varieties. An IPM system against SCWLD will be developed based on our study, and this IPM system will be our contribution toward sustainable sugar production in SCWLD-infested areas.

Youichi Kobori
Tropical Agriculture Research Front

Photo 1. A farm field infected with SCWLD (Thailand)

Photo 2. The vector insects of SCWLD.
Left: *Matsumuratettix hiroglyphicus* (body length: 4mm)
Right: *Yamatotettix flavovittatus* (body length: 5-6mm)

Parasitic Strategy of Tachinid Flies Attacking Herbivorous Insects

Dipteran (flies) and hymenopteran (wasps) parasitoids have unique lifestyle features. Their larvae live in or on the body of a single host individual during its development, feed on the host, and kill it eventually, hence the term 'parasitoid.' These parasitoids are often used as natural enemies of agricultural and forest pests, and are considered to be important biological control agents. For example, it is known that some tachinid species have effectively managed sugarcane stem borers for about 50 years in Central and South America. The family Tachinidae, with 10,000 described species, is the largest family among dipteran parasitoids. Yet, little information is available on its ecology and physiology, probably because rearing tachinid is relatively difficult in the laboratory. Fortunately, we have succeeded in breeding tachinid flies and are currently maintaining colonies (of 6 species with different oviposition strategies) for research at our laboratory in JIRCAS.

Tachinid flies find host insects with cues of plants' odors and colors.

How do tachinid females in the field find host insects for oviposition? The tachinid fly *Exorista japonica* is common in agricultural lands, and they lay white eggs on the cuticle of a caterpillar. We found that tachinid females recognize the odor (emitted from corn leaves damaged by caterpillars) and the green color of plants. This fly, apparently, exploits such cues for finding host caterpillars. Microtype tachinids, on the other hand, lay small eggs of about 0.2 mm on foliage rather than on the host insects, and the eggs ingested with the food hatch inside the host's gut. This type of tachinid fly seems to be sensitive to changes in odor components emitted by plants. For example, species with short-lived eggs prefer the odors that plants emit just after being damaged by caterpillars, as compared to species with long-lived eggs. Each tachinid species employs a different host location strategy to exploit semiochemicals coming from plant-herbivore interaction as cues in order to increase their parasitization success.

A tachinid fly that prefers to stay in the gut of the host insect

After invading the host's body, tachinid flies need to break through multiple challenges such as avoiding the immune system of the host, securing oxygen, and ingesting nutrition. The tachinid fly *Compsilura concinnata* attacks almost 200 insect herbivore species. We found that this fly grows in the gut of the host caterpillar throughout the larval period and breathes by attaching itself to the host trachea in the gut. Insects parasitized in the gut have not been found other than those by *C. concinnata*. This unique parasitism is likely to be advantageous for this tachinid fly because it helps the fly evade the host's immune responses and competitors. This strategy may have also contributed to the ability of this species to parasitize a wide range of hosts. The aim of our project, therefore, is to reveal how this tachinid fly adapts to the special environment of the midgut.

Ryoko T. Ichiki
Crop, Livestock and Environment Division

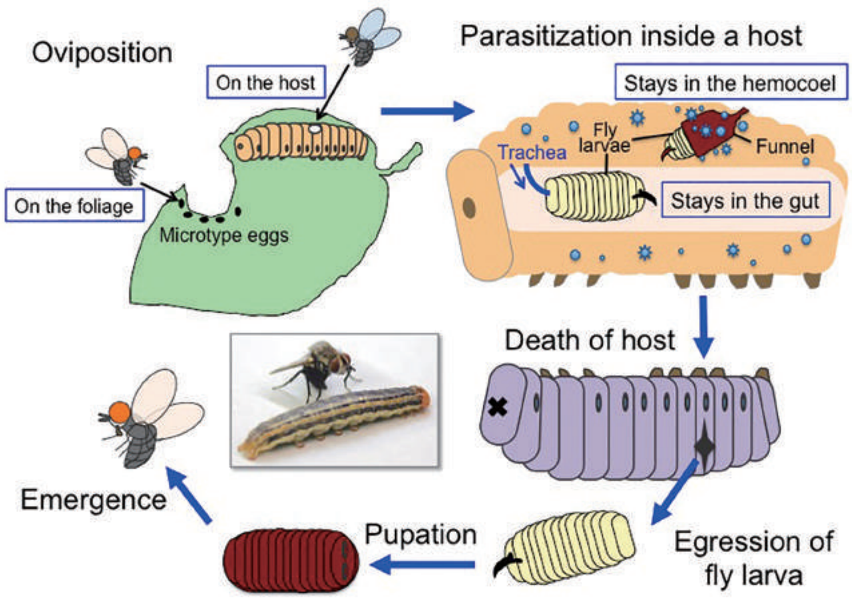


Fig. 1. Life history of tachinid flies

Development of a Resource Circulation System Using Insects

Securing food resources is one of the most important issues that come with an increasing global population. Unfortunately, as many as 17 million tons of food waste are generated every year in Japan. The United Nations Food and Agriculture Organization (FAO) has reported that one-third of all food produced worldwide are wasted or thrown away without being consumed. Additionally, although approximately 90% of livestock excreta is converted into compost, gases with high global warming potential such as methane and nitrous oxide are emitted during the composting process, causing major problems to the environment. Moreover, the price of fishmeal has been rising due to the upgrowth of the world's aquaculture industry, which causes overfishing of fishmeal materials (such as sardines) and the exertion of harmful influences on the marine ecosystem.

Therefore, we are aiming to establish an environment-friendly system, one that is continuous and linked with new resource circulation along natural ecosystems, using an insect species called black soldier fly, *Hermetia illucens* (BSF, Photo 1). This fly is not a pest to humans or animals and is widely distributed worldwide, from tropical to temperate regions including Japan. Since BSF larvae have high digestive abilities and high protein content, it is possible to use them for waste reduction, as feed for fish, and for livestock rearing. Although the first step towards mass production of these potentially beneficial insects has been taken to promote its use in North America and Europe, maintaining a stable supply of larvae (large scale, low cost, and year-round) remains an obstacle. To keep providing a large number of larvae to reduce waste and to feed animals, we need enough number of fertilized eggs to maintain the number of larvae. The only way to collect fertilized eggs is to attract wild females in the field or to rear adults to copulate in an indoor cage. Although it is believed that adults exist in the field in tropical/subtropical regions throughout the year, there are areas with distinct rainy and dry seasons, and adults may not appear depending on the season. In temperate regions, adults cannot be seen when the temperature drops; therefore, it is not possible to collect fertilized eggs from the field during such periods.

Collecting fertilized eggs from adults in a limited indoor space is relatively difficult. It is reportedly necessary to keep adults in large cages (approximately 2-3 m on all sides) that hold approximately 1000 flies in a sunlit greenhouse. Such methods make it costly to maintain suitable temperatures throughout the year. Due to these constraints, only a few studies have been conducted on adults, some people even believe that BSF adults do not feed during their lifetimes.

Under such circumstances, we developed a rearing procedure for obtaining fertilized eggs in the laboratory using small cages (approximately 25 cm on all sides), lit by 40 W fluorescent lamps and a 20 W light-emitting diode (LED) lamp. However, as the egg fertilization rate with this method is not high enough (about 40% at the moment), we must investigate reproductive behavior to clarify various factors related to copulation and egg production, and consequently improve the fertilization rate. Moreover, if we can find chemical substances that attract adult females in the field to lay eggs during certain seasons when adults are available in the field, we could obtain more larvae for use toward developing and constructing the resource recycling system.

Satoshi Nakamura
Crop, Livestock and Environment Division

Photo 1. Black soldier fly, female (left) and larvae (right)

JIRCAS TODAY

○JIRCAS President Iwanaga meets President Condé of the Republic of Guinea

On August 26, JIRCAS President Masa Iwanaga travelled to Nairobi, Kenya, as a member of the economic mission that accompanied Prime Minister Shinzo Abe to the 6th Tokyo International Conference on African Development (TICAD VI). Dr. Iwanaga held talks with H. E. Professor Alpha Condé, president of the Republic of Guinea, who shared his plans to promote agriculture and strengthen food security mainly through rice cultivation. President Condé also said that exporting rice to neighboring countries is an extremely important policy matter for his nation. Further, he expressed willingness to cooperate with JIRCAS on rice research and acquire relevant state-of-the-art technologies.

Dr. Masa Iwanaga and Guinean President Alpha Condé

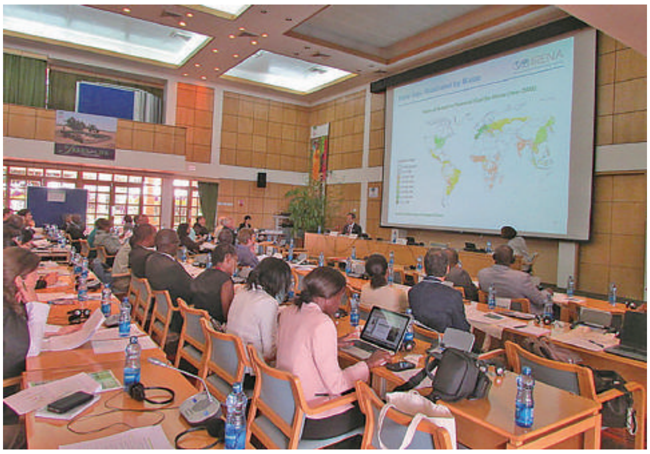
○President Iwanaga attends TICAD VI meeting between Japan and Madagascar

On August 27, JIRCAS President Masa Iwanaga attended the meeting between Prime Minister Shinzo Abe and H. E. Mr. Hery Rajaonarimampianina, president of Madagascar, on the sidelines of the 6th Tokyo International Conference on African Development (TICAD VI) in Nairobi, Republic of Kenya. President Iwanaga explained that JIRCAS has started a joint research on rice with Madagascar. The two leaders in turn expressed hopes to strengthen bilateral relations through scientific and technological exchanges.

Madagascar President Hery Rajaonarimampianina, JIRCAS President Masa Iwanaga, and Japanese Prime Minister Shinzo Abe

○JIRCAS participates at TICAD VI side event organized by Forestry Agency in cooperation with ICRAF

The Forestry Agency of the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan, organized a forest-related TICAD VI side event on August 25-26. It was attended by MAFF Parliamentary Vice-Minister Katsuo Yakura, African ministers and high-ranking government executives, and specialists from JIRCAS, the Japan International Cooperation Agency (JICA), the Japan Aerospace Exploration Agency (JAXA), and international organizations such as the World Agroforestry Centre (ICRAF). Active discussions were held on the main agenda items pertaining to "the future of wood-based energy" and "climate change and forest."



Side event at ICRAF

○President Iwanaga sits as panelist at TICAD VI side event organized by World Bank

On August 26, JIRCAS President Masa Iwanaga participated as a panelist at the high-level discussion on the World Bank-organized side event, themed "Future of Food in Sub-Saharan Africa:

High-level discussion at the TICAD VI side event. (From left: the African Development Bank Governor, JIRCAS President, USAID Director, IFAD Governor, and IFAD Executive Director)

JIRCAS TODAY

Reviewing Progress, Charting Next Steps." Dr. Iwanaga, for his part, stressed the importance of further research and development in agriculture. Among the panelists were representatives of organizations that play a central role in Africa's agricultural development, including the governor of African Development Bank (AfDB), the presidents of the Food and Agriculture Organization (FAO) and International Fund for Agricultural Development (IFAD) of the UN, and the agriculture minister of Rwanda.

○President Iwanaga attends 2nd CGIAR System Council Meeting

On September 25-26, the 2nd CGIAR* System Council Meeting was held in Mexico City, with JIRCAS President Masa Iwanaga attending as a representative of the Japanese government. Officers from the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fisheries of Japan also participated.

Following an extensive discussion and detailed review of the activities by donor countries, the 2nd phase of the CGIAR Research Programs (CRPs) was approved for implementation from 2017 for 5 years, and the basic fund allocation policy was defined.

During the meeting, Dr. Iwanaga reported about the TICAD VI meeting held the previous month in Nairobi and the planned side event for the COP22 meeting in November in Morocco. Dr. Juergen Voegele, chair of the CGIAR System Council, expressed his appreciation and acknowledged Japan's contribution to addressing various global issues.

Dr. Masa Iwanaga at the 2nd CGIAR System Council Meeting

*The CGIAR is a global research for development partnership, aiming for a food-secure future through a network of 15 research centers (http://www.cgiar.org/)

○Debrief Meeting on the Collaborative Research for Sugarcane Improvement between JIRCAS and KKFCRC, Thailand

Since 2011, JIRCAS and Khon Kaen Field Crops Research Center (KKFCRC), Department of Agriculture (DOA), Thailand, have been implementing the collaborative research project on sugarcane improvement, entitled "Development of new type of sugarcane with better performance under adverse agricultural environments by using wild relatives (EDITS-Cane Project)," aimed at developing efficient breeding techniques to utilize wild germplasm and sugarcane breeding materials through interspecific and intergeneric hybridizations.

On March 14, a debrief meeting was held to report the outputs of this JIRCAS-KKFCRC Collaborative Research for Sugarcane Improvement. The meeting consisted of two sessions, namely, I) Utilization of *Sacchrum spontaneum* germplasm in sugarcane breeding and II) Utilization of *Erianthus* germplasm for sugarcane improvement.

In Session I, experiences in using *S. spontaneum* germplasm and interspecific hybridization in sugarcane breeding programs were presented by representatives of the EDITS-Cane Project, the Suphan Buri Agriculture Research and Development Center (SBARDC), and the National Agriculture and Food Research Organization (NARO-Japan). Although new promising interspecific hybrid clones were generated by each program and the advantages of using *S. spontaneum* germplasm in sugarcane improvement are well recognized by sugarcane breeders, further

Debrief Meeting between JIRCAS and KKFCRC on the Collaborative Research for Sugarcane Improvement (EDITS-Cane Project)

Attendees of the Debrief Meeting

JIRCAS TODAY

improvements are required to meet the needs and preferences of farmers and current sugar factories.

In Session II, basic information and techniques developed by the EDITS-Cane Project for promoting the utilization of *Erianthus* germplasm were reported, namely, 1) morphological and agronomic traits and genetic diversity of the Thai *Erianthus* germplasm, 2) effective heading control techniques for *Erianthus*, and 3) basic agronomic and cytogenetic characteristics of intergeneric hybrids between sugarcane and *Erianthus* (F_1 & BC_1). After the presentation, remaining problems and future perspectives for the utilization of intergeneric hybrids in sugarcane improvement were discussed.

The debrief meeting enabled Thai and Japanese sugarcane researchers to share the outputs of the EDITS-Cane Project, which focused on the utilization of wild relatives, especially *S. spontaneum* and *Erianthus*, for sugarcane improvement. The participants expressed positive expectations that there will be further development of useful breeding materials in the next phase of the project.

○IRRI-JIRCAS-NARO Joint Symposium: Towards Achieving Sustainable Rice Production in Asia

JIRCAS, together with the International Rice Research Institute (IRRI) and the National Agriculture and Food Research Organization (NARO), organized a joint symposium under the auspices of the Global Rice Science Partnership (GRiSP) on September 7 and 8 at the International Congress Center (Epochal Tsukuba) in Tsukuba, Ibaraki, Japan. The symposium aimed to provide an overview of the current situation in rice research focusing on high temperature tolerance, yield physiology, and pest management.

In his welcome address, Dr. Masa Iwanaga, president of JIRCAS, mentioned that rice is one of the most susceptible crops to global warming, and he emphasized the importance of technological development for high temperature tolerance.

In Session III (Insect Pest Management), a presentation titled ‘Network collaboration on rice blast disease’ was delivered by Dr. Yoshimichi Fukuta, senior researcher of JIRCAS. He summarized the history of Japan-IRRI collaboration since 1986 and introduced the achievements of the international rice blast research network led by JIRCAS.

Participants in the IRRI-JIRCAS-NARO Joint Symposium

Before the symposium, five IRRI staff including Dr. Jacqueline Hughes, deputy director general for research, visited JIRCAS. They paid a courtesy call on Dr. Iwanaga and exchanged opinions about rice science with JIRCAS researchers.

○BNI International Symposium: BNI (Biological Nitrification Inhibition) - Potential impacts on nitrogen-cycling in global agricultural systems

In March 2015, JIRCAS, as the lead agency in BNI research, hosted the first international conference on BNI and launched the “BNI International Consortium” in collaboration with research agencies belonging to the CGIAR Consortium of International Agricultural Research Centers. On September 14-15, a symposium was held at Tsukuba International Conference Hall (Epochal Tsukuba) to strengthen consortium activities, build domestic and overseas research networks, and further develop research.

The first day of the symposium was made open to the public. This allowed not only BNI researchers but also domestic and international participants who were interested in nitrogen cycle and agricultural environment studies a great opportunity to discuss the usefulness of BNI and deepen their understanding of BNI-related topics.

The second day of the conference was limited only to domestic and foreign researchers engaged in BNI research. There were presentations of research results and an exchange of views on the possible directions of further research and development related to BNI.

At the 2016 BNI Symposium

* The “BNI Consortium” webpage was recently launched (https://www.jircas.go.jp/en/program/program_a/bni) and can be accessed through the JIRCAS website. The webpage seeks to facilitate the flow and sharing of BNI-related information and enable researchers to make further progress in the research field.

JIRCAS TODAY

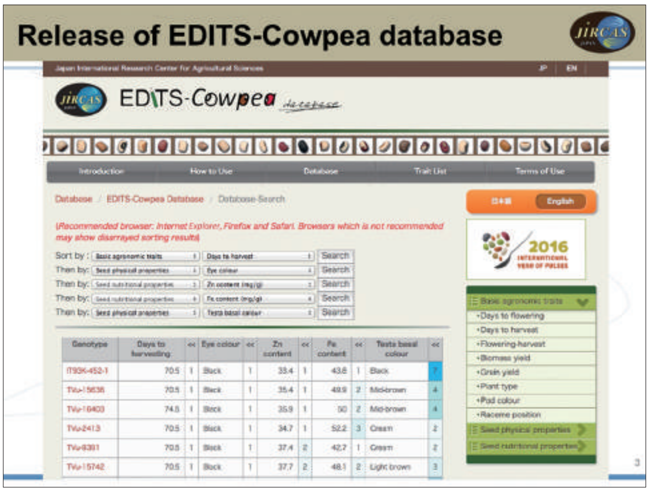
○Cowpea germplasm database focusing on grain quality-related traits is now ready for access

Cowpea [*Vigna unguiculata* (L.) Walp.] holds great potential in providing more nutritionally balanced diets, especially to the poorest people in Africa who cannot afford to buy animal-protein foods.

The "EDITS-Cowpea" project is a JIRCAS initiative implemented to generate fundamental scientific information, thus promoting better utilization of the cowpea's wide genetic diversity in breeding programs and crop production.

Wide variation of cowpea grains (left) and cowpea dishes (right) in West Africa

Based on the information generated through the project, we have created the "EDITS-Cowpea database" (https://www.jircas.go.jp/en/database/edits-cowpea/introduction). This database enables cowpea breeders and scientists to search a total of 240 genotypes including germplasms, breeding lines, and local varieties, using 23 traits in 3 categories for sorting (as of June 2016). Furthermore, a summarized information, including origin, trait list, and images of the selected genotype(s) is available for downloading and printing.



This database enables cowpea breeders to identify genotypes with favorable target traits. (English interface)

By making wider use of this database, we expect to stimulate breeding activities and generate new varieties that conform with the preferences of consumers and the needs of the markets in the region, subsequently resulting to the further strengthening of the crop's role in society.

○JIRCAS President Masa Iwanaga (Main Prize) and Senior Researcher Marcy Nicole Wilder (Sano Touzaburo Special Prize) among "4th Niigata International Food Award" recipients

On November 9, JIRCAS President Masa Iwanaga and Senior Researcher Marcy Nicole Wilder accepted the Main Prize and the Sano Touzaburo Special Prize, respectively, during the "4th Niigata International Food Award" ceremony at the Toki Messe Niigata Convention Center. They also gave commemorative lectures. There were four winners in three categories including the 21st Century Hope Prize.

The Niigata International Food Award, whose basic theme is "Food and Life," honors people whose achievements in the field of food have contributed to saving people's lives, improving livelihoods, and restoring human dignity.

Dr. Iwanaga was awarded for his major international accomplishments related to the conservation and utilization of crop genetic resources, while Dr. Wilder was recognized for the aquaculture method she had developed for juvenile shrimp, a research effort that has received high praise from both industry and academia.

Dr. Masa Iwanaga (winner, Main Prize) and Dr. Marcy Nicole Wilder (winner, Sano Touzaburo Special Prize) display their trophies at the 4th Niigata International Food Award ceremony.

JIRCAS Mail Magazine (English) Registration Guidance

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Information and Public Relations Office
1-1 Ohwashi, Tsukuba, Ibaraki 305-8686, JAPAN
Phone: +81-29-838-6313 Fax: +81-29-838-6316 https://www.jircas.go.jp/

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