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Increasing dairy farms in the suburbs of the Mongolian capital(Ulaanbaatar, Mongolia)
(Photo by H.Komiyama)

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JIRCAS
JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES

Roles of the New "Nekken", Tropical Agriculture Research Front of JIRCAS

"Nekken" is the Japanese abbreviated designation for the old "Tropical Agriculture Research Center" (TARC). Many people who used to work in the institute still remember the word with nostalgia. Many foreign scientists may also remember "TARC". I used to belong to TARC twice in the past when I was dispatched to Malaysia and the Philippines. The words "Nekken" or "TARC" had not been used since 1993 when the institute was re-organized as the Japan International Center for Agricultural Sciences (JIRCAS). The word "Nekken" came back in 2006 as the new Japanese abbreviated name for the "Tropical Agriculture Research Front" (TARF) into which the Okinawa Branch of JIRCAS was re-organized that year.

The new "Nekken" is an important place, not only in JIRCAS but also for all the agricultural communities in Japan and in developing countries. We use the words "Research Front" in the new name of the Okinawa Branch of JIRCAS because TARF is the forefront base for research activities of tropical agriculture. Okinawa Prefecture belongs to the sub-tropical climatic region, where TARF is located as the sole national agriculture research institute in the area. I believe that TARF is the real research front of tropical agriculture because it has excellent technical and administrative support systems. TARF also possesses well-serviced experimental fields, one of the most sophisticated and biggest lysimeter systems and well-equipped facilities for plant gene recombination experiments.

With these support staff and facilities at TARF, scientists are currently carrying out five research projects: 1) Development of environmental management technology for sustainable crop production in tropical and subtropical island (Soil and Water Management Project Team), 2) Development of the stress-tolerant Vigna legumes in tropical and subtropical regions (Stress-tolerant Vigna Project Team), 3) Development of breeding materials to diversify sugar-cane utilization (Sugarcane Improvement Project Team), 4) Development of techniques for low tree height-cultivation and year-round production of tropical fruits, such as durian, mangosteen, etc. in Southeast Asia (Tropical Fruits Production Project Team), and 5) Development of management techniques for the citrus greening disease in severely affected areas (Citrus Greening Disease Management Project Team).

TARF has distinct advantages in using genetic resources for the breeding programs of various crops because of its subtropical climate. For example, we have advantages in sugarcane breeding because the plant flowers at TARF. The breeding program for commercial sugar production in Japan is being carried out at Tanegashima Island in Kyushu District by the National Agricultural Research Center for Kyushu-Okinawa Region (KONARC). That island is under the temperate region although it is close to the subtropical region, and sugarcane plants can not flower there. Therefore, sugarcane breeders have to come to TARF in Okinawa for crossing every year (usually in November to December). The Sugarcane Improvement Project Team of TARF has ongoing collaboration with KONARC on sugarcane breeding using its wild relatives, such as *Saccharum spontaneum* and *Erianthus* species. High potentials of biomass productivity of these genetic resources are expected in the breeding program.

TARF is also a suitable place for studies of rice breeding because double cropping of rice is possible in Okinawa. Rice breeders can select the appropriate cropping time twice a year and shorten the breeding period of each variety. Rapid generation advancement of wheat breeding materials is also being carried out. Wheat is planted here in the winter season and harvested seeds are sent to the wheat breeding station in Hokkaido, the coldest region during the summer season. In the future, TARF may accept breeding materials of other important crops, such as soybean,etc. TARF also possesses various kinds of tropical fruit trees which are attractive to the visitors. Tropical fruits are very important plants in developing countries which are target beneficiaries of JIRCAS research.

TARF is suitable, not only for breeding, but also for various studies including plant genetics and physiology. TARF has many greenhouses and laboratories for biotechnological experiments. Genetic studies using DNA markers are possible, and rice geneticists are now working on drought tolerance and salt tolerance in rice. Experimental materials can be developed rapidly with the combination of rapid generation advancement and marker-assisted selection (MAS). TARF has some collaboration with other rice scientists on the selection of near-isogenic lines with the use of MAS. Some of the greenhouses can also be used as isolation greenhouses for transgenic plants. Genes for tolerance to abiotic stresses are being introduced into rice. Tolerance to heat or drought stress in Vigna legumes are also being studied.

These genetic and physiological studies could produce experimental materials or breeding resource materials which would be used as research seeds for the next stages of TARF projects. These research seeds would likewise help towards making TARF a real "Research Front" of plant breeding, genetics, and physiology in some important crops.

Tokio Imbe
Director, Tropical Agriculture Research Front, JIRCAS

Tropical Agriculture Research Front Main Building (Ishigaki, Okinawa)

Approaches towards Stabilization of Chinese Food Production and Markets

China has recently experienced noticeable regional gaps between its urban and rural areas: while the coastal areas in the east are rapidly achieving modernization, the development of the central, western and northeastern parts of its inland regions has been delayed. Developing these inland areas is a very important issue for the balanced growth of the entire China, and various policies have been implemented to revitalize the rural economy. However, these underdeveloped regions are strongly affected by the natural environment, and the frequent occurrence of cool weather damage, drought and other meteorological disasters caused by climate changes which seriously restricts the revitalization of food production and farmers' livelihood, together with the sudden changes in policies associated with the market-oriented economic reforms.

The ongoing "Stable Food Supply Systems for Mitigating the Fluctuations of Production and Markets in China" project aims to make an early- warning system to reduce the damages of agricultural weather disaster for the Northeast region, to analyze the destabilizing factors of the rural economy, and to propose a strategy of system change for stabilization. Here we introduce some of our research topics.:

1. Risk control in agricultural management

A management and planning model has been developed for rice farmers in Heilongjiang Province, which is used to test and find out the ideal type of farming organization in the region where the cool weather damage often leads to income reduction of farmers. In Photo 1, an experiment of cool weather damage on the main varieties of rice in the region is shown. To stabilize farmers' incomes, efforts have been made to produce different varieties of rice in the region to reduce the risk of cool weather damage that may affect a specific variety of rice more seriously than the others.

2. Approach/Initiative towards farmer cooperatives

It is believed that organizing farmer cooperatives can effectively reduce the management risk in cases of unfavorable environmental changes and hence is an effective means to stabilize and increase the incomes of the farmers. Comparative studies on the advantages and disadvantages of leading regional farming organizations have been carried out using the Sanjian plain of Heilongjiang Province as a model region. The feasibility of introducing a farmer insurance system to farmer cooperatives has also been studied.

3. Forecasting of rice supply and demand in Heilongjiang province

Heilongjiang Province is one of the main producing regions of japonica rice, and its area of production has been nearly increased fourfold in the past two decades. There are two reasons for this increase: a) rice production is more profitable than other farming products; and b) demand for japonica rice has increased in the southern regions (Photo 2.). Hence with this expansion of rice consumption into other regions, the market influence of Heilongjiang rice has been greatly increased, and its supply has been closely watched by the market. Based on the econometrics method, the supply and demand forecasts for Heilongjiang rice are being analyzed.

Hsiaoping Chien
Research Development Division, JIRCAS

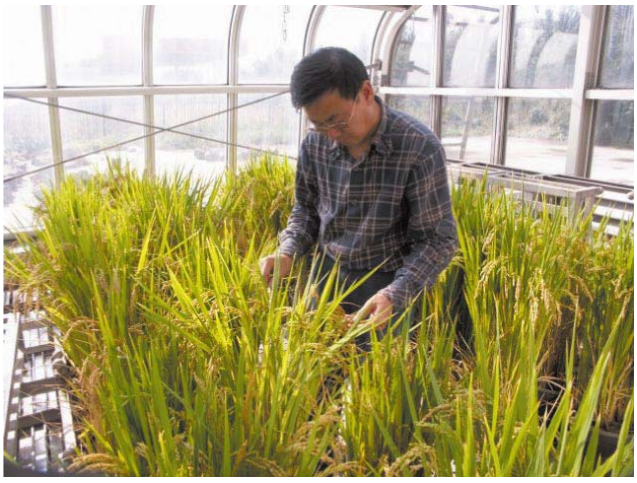


Photo 1. Experiment of cool weather damage

Photo 2. Heilongjiang farmer in Hangzhou rice wholesale market

Development of Technologies for Monitoring Changes in Land Use and Agricultural Production in Developing Regions Using Satellite Remote Sensing Data

In recent years, people have been interested in discussions about the changes of agricultural production in the world caused by global warming. From another viewpoint, we noticed that with current conditions, agricultural production changes a great deal every year depending on various factors. Because such changes exhibit locally different behaviors, the actual conditions of these changes might not be appropriately reflected in the numerical values of statistics compiled by the administrative unit, etc. Then, as an alternative, the use of satellite data is expected to obtain and provide the lacking information of planted acreages and the amount of crop harvests without or in lieu of sufficient ground survey materials or statistics.

There is a trade-off as a result of the inherent characteristic of satellite data; the time interval of the observation necessarily becomes longer if the spatial resolution being looked into is smaller. Therefore, since an analytical technology has not yet been established, it is not easy to get an adequate grasp of the situation of crop cultivation and production using satellite data for the target sites located in the tropical rainy/moist climatic region where the shapes of the fields and the cropping patterns are complex. From this background, JIRCAS started the research project entitled, "Enhancement of GIS applications for agricultural land information at local to regional scales", in collaboration with the Indonesian Center for Agricultural Land Resources Research and Development (ICALRD), to deal with the target sites characterized by complex and varied agricultural landscapes, and in order to develop new technologies for monitoring the actual conditions of agricultural lands. The following three research subjects have been established under this collaborative research.

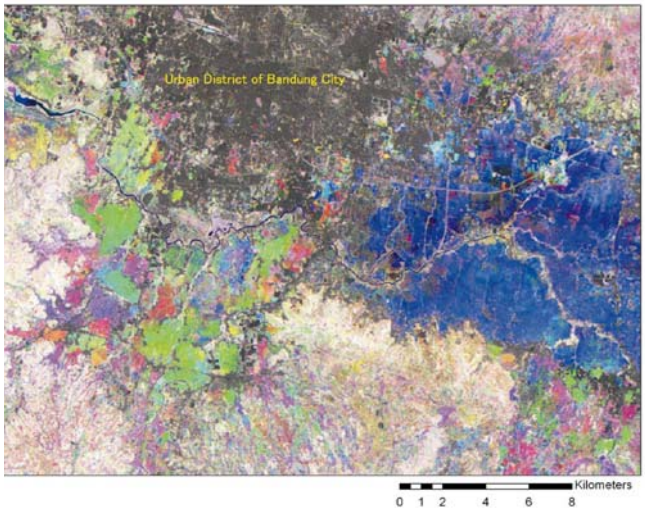
The first subject is "Development of monitoring method for planting time and distribution of major crops". Rice is the most important staple food crop in Indonesia and planted three times a year in a lot of sites in the West Java Province, the major rice-producing area. However, there might show quite different patterns of rice cropping even between adjoining fields. Therefore, if we require the information of planted acreage and the production of rice, it is necessary to observe the state of the ground surface continuously throughout the year over the entire target site. In this research, we would analyze the temporal changes of ground surface conditions by using information obtained from the satellite data. And then, we would specify the planting time schedule of rice with the specific spatial distribution. Moreover, we would try to produce the dataset of cropping distribution of other major crops.

The second subject is "Development of method for estimating the growth condition of plantation crops using newly developed satellite data". While coffee and pepper productions are of great economic significance in Indonesia, smallholder plantation is the dominant form of their farming systems. Due to the small sizes and fragmented nature of their cropland distribution, no up-to-date spatial information about the extent and conditions of these plantation crops has been readily available to date. We are developing new technology to perform current crop inventory and yield estimation of these important crops using data received from new sensors, particularly the ones onboard Japan's Advanced Land Observation Satellite (ALOS).In fact, we set up several test sites in Lampung Province that are located in the southern tip of Sumatra Island, and are studying the relationship between collected field data and remotely sensed data. This should help us improve accuracy in cropland identification and establish a technique that provides timely information on crop conditions.

The third subject is "Estimation of the hazardous conditions of disasters related to land use distribution". In Indonesia, in the case of developed cities, substantial acreage of land used for agricultural purpose in the metropolitan area had been converted into urban land use, and it is said that this caused the increase in the degree of risk from flooding. In addition, land development in sloping areas was presumed to be related to the elevated degree of risk from landslide or soil erosion. In this research, we would analyze the distribution and temporal changes of land use for the study sites in the Jakarta Metropolitan area and the Citarum watershed located in the West Java Province. Then, we will estimate how the conditions of land use distribution influenced the degree of vulnerability or risk from disasters.

Technological development to monitor the actual conditions of land use and agricultural production as mentioned above could be applied towards formulating land use plans. In addition, it could be useful for mitigating the damages from disasters as well as for the efficient utilization of land and water resources at the target sites.

Satoshi Uchida and Akira Hirano
Development Research Division, JIRCAS



Color composite image of 3-temporal Normalized Difference Vegetation Index (NDVI) showing complex patterns of rice cultivation around Bandung City of West Java, Indonesia: Black parts represent urban or water bodies, while white parts represent forests or mixed vegetation. Colored parts exhibit paddy fields as the color tones coincided with the different patterns of rice cultivation.

Can the Trilemma of Food, Water and Environment Be Solved? – Issue Tackled by the JIRCAS Water-Saving Agriculture Project

Water shortage is one of the most serious global issues. The situation of the water issue is forecasted to become more serious due to increasing land demand from the agricultural sector and heavier water demand from both agricultural and non-agricultural sectors. To cope with this, studies of water-saving agriculture have been carried out all over the world. At the International Rice Research Institute (IRRI), research activities have been carried out to improve the water productivity of rice cultivation while maintaining the ideal yield level. The researchers are proposing the AWD (alternate wetting and drying) irrigation technique, characterized by intermittent irrigation application, as one of the most promising techniques for water-saving at irrigated paddy fields. The AWD regime, in which the paddy field is basically irrigated only when the soil moisture content drops to a specific level, is being disseminated to the farmers of developing countries as an irrigation technique which achieves reduction of irrigation water use by 15-30%, while keeping the high yield level which bears comparison with that achieved with continuously flooded irrigation.

AWD management brings frequent alternate wetting and drying to paddy soil. For paddy soil, especially for the microorganisms living in that soil, it causes drastic changes in the environment. Thus, AWD is also expected to bring a change in greenhouse gas (GHG) emissions from the paddy soil. For example, it is estimated that methane (CH_4), which is a strong GHG,whose global warming potential (GWP) relative to carbon dioxide (CO_2) within a 100-year time horizon is approximately 25 times higher(mass basis), has been emitted from rice fields at approximately 9-19% of the total global CH_4 emissions, or 12-26% of the anthropogenic CH_4 sources (base year: 1983-2001). From the viewpoint of GHG (methane) emissions, paddy field emissions as a whole can be considered as one factor which increases global warming, while it can also be stressed that the rice paddy system has a very important multi-functional role for our living environment.

How do the water-saving paddy conditions brought about by the AWD technique affect the GHG emissions? By analogy with the results obtained from the studies of paddies under mid-season drainage management, it can be predicted that CH_4 emissions will be reduced. On the other hand, in exchange for the reduction of CH_4 emissions, the emission of nitrous oxide (N_2O) which tends to emit under relatively wet but not regularly flooded conditions and which is a more powerful GHG than CH_4 (approx. 300 times more than CO_2) may be increased by this water-saving technique. However, few experiments to prove these have been conducted.

The JIRCAS Water-Saving Project (one of the projects funded by the Japanese government) was launched in 2005, taking up the following as two of its objectives: to correctly understand the effect of this kind of water-saving regime on environmental impacts, and to enhance it with new techniques harmonious with the environment. As results obtained from an IRRI experimental field newly equipped with an automated system for continuous GHG-emission monitoring (Photo 1) and from a high cost-performance pot experiment system on which our originality and ingenuity have been exerted, the following are being proved. Under AWD water-saving conditions, CH_4 emissions are likely to be mitigated beyond expectations (when compared with regular flooding conditions, reduced by approximately 70-90%); and the N_2O emissions, which some feared will have an increase in rate, are also likely to be easily mitigated to the level of that found in continuously flooded paddy system, by adjusting the timing of the N fertilizer application and irrigation (Figure 1). A new rice cultivation technique which realizes the mitigation of adverse environmental impacts simultaneously with water-saving and high yield is now in sight.

Photo 1. The field plots for an AWD water-saving rice cultivation experiment at 32 days after transplanting. This shows the condition under the first water stress after a 3-week flooding condition following transplanting. Box-shaped objects near the top of this photo are gas-collecting chambers to monitor GHG emission rates from 18 target plots. Each chamber roof is closed every 2 hours automatically and its chamber air is circulated through a tube which connects the chamber and an analytical laboratory adjoining the field. By determining the changes in the concentrations of methane, nitrous oxide and carbon dioxide in the chamber air, the emission rate of each GHG at each period is calculated. (IRRI, Los Baños, Laguna, Philippines; March 2, 2007; Yasukazu Hosen)

Yasukazu Hosen
Crop Production and Environment Division, JIRCAS

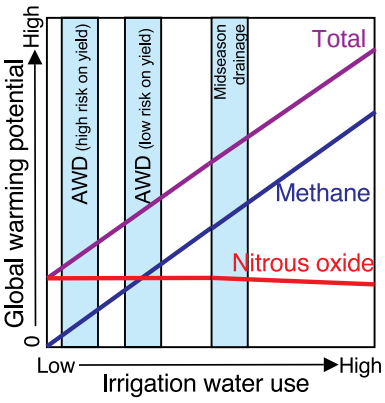


Fig. 1. The diagram of the relationship between irrigation water use at the paddy field and global warming potential of the field caused by the emissions of greenhouse gases (Estimated under conditions with 4 t ha-1 dry straw incorporation; the values around the AWD regimes (left part of the figure) are those under the best treatment or application management as estimated from the currently available results obtained from the JIRCAS Water-Saving Project). The methane emissions from AWD water-saving paddy system are likely to be much more reduced than the estimation (48% reduction) indicated by the latest Intergovernmental Panel on Climate Change or IPCC Guidelines (IPCC-NGGIP, 2006). And the nitrous oxide emissions, which some feared will likely increase in rate, are also likely to be easily mitigated to the same level of the emissions from continuously flooded paddy systems, by adjusting the timing of N fertilizer application and irrigation.

The Treasures Discovered in the Caves of Northern Laos

The collaborative research on fishery resources and aquaculture with the Living Aquatic Resources Research Center (LARReC) in Lao PDR has already started one year ago. At present, I am studying the indigenous prawn inhabiting the rivers of northern Laos. This prawn has a unique habit wherein the adults migrate upstream from the main river to the tributary cave streams. Most especially during the rainy season, since countless prawn floods into the cave streams, the fishermen catch the prawn by setting traps made of bamboo in the cave streams, being a traditional prawn fishery technique in northern Laos.

In recent years, the catch of the prawn has decreased gradually. Moreover, its biological and ecological characteristics are not yet known. Therefore, I have been conducting ecological research on the prawn by going for monthly visits to the Na Pho Village, Luang Prabang Province. The Na Pho Village, without any electricity, water supply and toilet facilities is a mountain village where time passes slowly. I sometimes sense a richness to this lifestyle.

The breeding of freshwater prawns usually consist of three phases such as coupling, brooding of eggs by the females and hatching. Therefore, sampling of the oviferous females becomes the key to revealing the breeding ecology of the prawn. However, I could not catch any oviferous female at all. On the basis of my speculation that the site for the brooding of eggs and hatching is in the cave streams, I carried out the research by looking for larvae drifting from the cave streams for 24 hours continuously as the alternative strategy.

This research activity needed firm teamwork among the staff and villagers because the activity was attended by many dangers. After a sufficient preparatory meeting with the staff and villagers, I started the research activity by setting up the drift net in the cave stream at 8:30 in the morning ,but the larvae of the prawn did not drift from the inside of the cave streams that easily. I feared that my speculation was far from the truth when the sun began sinking in the west. The logistic support staff carried the soup of squash and pork and sticky rice as our dinner by the small wooden boat while the sunset tinted the mountain.

After we finished having our dinner, darkness came quickly. At 5:30 in the afternoon, as flotsam or driftage like the chips of roots, etc., went into the drift net, I held my flashlight close to the objects. Surprisingly, what appeared as driftage were actually the larvae of the prawn. In accordance with my expectation, the prawn eggs are hatched in the cave streams and the hatched larvae stay there till they mature up to post larval stage.

With perfect timing, as the head of the village and the logistic support staff came by boat and brought a Lao whiskey for us, we drank to the success of this research activity. I will never forget the taste of that Lao whisky which I drank that time for the rest of my life.

At about 2:00 early dawn, everybody became hungry again. So the villagers and staff pushed off in the boat into the moonlight to catch fish. After about forty minutes, they brought back ten fishes with sizes suitable for broiling with salt. The taste of the fishes which we ate during that time was especially unforgettable for us. Thus, we overcame our sleepiness till daybreak. During sunrise, the drifting of the larvae stopped simultaneously. The research site where everybody had been exhausted was in an anti-climactic state like the end of a festival.

This research which was both enjoyable and tough for all of us shared interesting knowledge with us, suggesting that the prawn retains several characteristics of the diadromous species, which migrate between the sea and the river, though the prawn will always be a land-locked species. Instead of the sea, the prawn utilizes the cave streams which greatly differ from the river in water quality as its breeding site. This information is so valuable for future studies on the prawn's seed production and natural resource management. Moreover, since I was able to strengthen the bond between the staff and the villagers, I considered that experience as an irreplaceable treasure for me. I think we can overcome every future difficulty on our research activities through our strong bond.

Sayaka Ito
Fisheries Division, JIRCAS

Photo 1. The prawn fishery in the northern area of Lao PDR (Na Pho Village, Luang Prabang Province)

Photo 2. The migration of the juvenile prawn upstream (Na Pho Village, Luang Prabang Province)

Development of Breeding Materials to Diversify Sugarcane Utilization

Recently, global problems with respect to the environment and energy have come up and sustainable countermeasures are constantly sought for to solve these problems especially in agriculture. We have to reduce the emission of "greenhouse effect" gases in order to stop global warming. The recent skyrocketing prices of crude oil and gasoline seriously affect our daily life economically and lead us to recognize the necessity of producing our own sustainable energy sources.

Bio-ethanol production from sugarcane is a good alternative choice for obtaining bio-energy and reducing the emission of "greenhouse effect" gases. When it comes to production efficiency, we have to consider the amount of bio-energy produced per unit of cultivation area and the net amount of bio-energy (output) returned for each unit of energy (input) supplied from outside sources for production. Sugarcane is expected as a good source material to produce bio-ethanol for alternative fuel. Bagasse (sugarcane residue left after the cane juice has been extracted in a sugarcane mill) is directly used as burning fuel for boilers to co-generate self-sufficient electric power and heat in the sugarcane mill and the alcohol production plant. With the use of sugarcane, the net amount of bio-energy produced is eight times the total amount of energy supplied from the outside (Brown, 2006).

Sugarcane is an excellent material for bio-ethanol production; no other crops/plants can compete with it. On top of that, its dead leaves and leaf sheath bundles can be plowed back into the soil of sugarcane fields as organic matters to maintain soil fertility. Thus, the production/utilization of sugarcane is an earth-friendly and sustainable agri-culture/industry.

Sugarcane carrying high photosynthetic capacity in the tropical and subtropical climates is mainly used for sugar production. Most sugarcane breeding programs have been aimed at increasing yield and sugar content, but now it is difficult to improve sugarcane furthermore. We now need a breakthrough for further sugarcane improvement and utilization. Traditional sugarcane breeding for sugar production ended up with narrow genetic backgrounds in modern commercial varieties after gene selection was based mainly on sugar content. The new methods of sugarcane utilization need new types of genetic diversity and selection such as based on fiber contents, drought tolerance, etc. The wild relative species (*Saccharum spontaneum* and *Erianthus arundinaceus*) of sugarcane show better adaptability to a wide range of adverse environments and higher biomass yield potential. These wild species are useful gene sources for sugarcane improvement to overcome the major limiting factors for sugarcane production. The methods of molecular biology and biotechnology have advanced very much in the other important crops, but the methods have not been applied sufficiently towards sugarcane improvement.

Therefore, the project aims at the further development of sugarcane to diversify sugarcane utilization through interspecific and intergeneric hybridization breeding with wild relative species (*S. spontaneum* and *E. arundinaceus*) in Northeast Thailand. Thirty percent of Japan's sugar consumption is imported from Thailand (Seitokogyo-Kaikan, 2006). In Thailand, the main sugarcane production area is moving from the Central district to the Northeast district. But, sandy soil and drought in the dry season limit sustainable sugarcane production in Northeast Thailand. The wild relative species (*S. spontaneum* and *E. arundinaceus*) show higher biomass yield and better adaptability to a wide range of adverse environments. Therefore, these wild relatives are considered to be useful gene sources for sugarcane improvement to overcome the major limiting factors for sugarcane production.

In the collaboration with the Khon Kaen Field Crops Research Center (KKFCRC), Thai Department of Agriculture, we are trying to improve sugarcane for biomass production and resistance to drought condition through interspecific and intergeneric hybridization breeding with the use of *S. spontaneum* and *E. arundinaceus*. High biomass-yielding sugarcane has high potential as a source material for bio-ethanol production and as the key towards improving the sugarcane cultivation system. We are also trying to develop a simple intergeneric hybridization method between sugarcane and *E. arundinaceus.*

Koshun Ishiki
Tropical Agriculture Research Front, JIRCAS

Photo 1. One of the promising high biomass-yielding lines (BC_1 between sugarcane and S. spontaneum) selected in Northeast Thailand.

Photo 2. Instruction about sugarcane crossing technique at the Khon Kaen Field Crops Research Center

CGIAR Annual General Meeting in Beijing

The Consultative Group on International Agricultural Research (CGIAR) held its Annual General Meeting (AGM) at Beijing International Conference Center in Beijing, China from December 3-6, 2007. JIRCAS has been strengthening its partnership with CGIAR as the focal point research institution in Japan. Dr. Iiyama, the President of JIRCAS attended the AGM to exchange opinions with the executives of the CGIAR.

Dr. Iiyama had a talk with Ms. Katherine Sierra, Chair of CGIAR and Dr. Ren Wang, Director of CGIAR Secretariat. CGIAR expressed its gratitude for JIRCAS' strong support for collaborative research projects and other activities of CGIAR in Japan. CGIAR and JIRCAS also affirmed their mutual intentions to strengthen their partnership. In addition, on the occasion of the Tokyo International Conference on African Development (TICAD IV) which will be held in Yokohama in May 2008, JIRCAS and CGIAR will work in closer cooperation to strengthen the presence of international agricultural research in Africa.

In the plenary session, CGIAR's latest activity report was delivered. In the Science Forum, presentations on "Agriculture for Development" and "Agricultural Research in China and Its Impact", etc., were rendered and there were exchanges of opinions among the participants.

JIRCAS exhibited its activities using posters and handouts at a partner booth in the Exhibition Area during the AGM. Information on the 2008 Program of the "Japan International Award for Young Agricultural Researchers" was also provided at the JIRCAS booth.

Masayoshi Saito
Research Planning and Coordination Division, JIRCAS

Dr. Kenji Iiyama had a talk with Ms. Katherine Sierra, Chair of CGIAR.

JIRCAS Exhibited at Thailand's National Science and Technology Fair 2007

The "National Science and Technology Fair (NSTF) 2007", organized by Thailand's Ministry of Science and Technology, was held at Bangkok International Technology Exhibition Center (BITEC) on August 8 to 19, 2007. Since this year is the 120th anniversary of the Japan-Thailand diplomatic relations, 28 organizations from Japan, including JIRCAS, universities, government organizations, etc. exhibited at the fair.

Because many local Thai Elementary, Junior High School and High School students will come and visit the Fair, JIRCAS exhibited nine panels which showed the contents and results of ongoing joint research in Thailand in easy-to-understand Thai language. There was also screening of JIRCAS' introductory video (Thai version) and a water tank display with explanation of the ongoing prawn cultivation experiment.

Tadahiro Hayashi
Research Planning and Coordination Division, JIRCAS

Thai staff of JIRCAS explaining research subjects to visitors

Elementary children listening to explanation on environment-friendly prawn cultivation research

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