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Newsletter

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Salt Bush (*Atriplex halimus*) Plantation in Steppe, Syria.
(Photo by S. Takahata)

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FOR INTERNATIONAL COLLABORATION

TARC
TROPICAL AGRICULTURE RESEARCH CENTER

A Wider Scope for International Research Cooperation

Director General, Masashi Kobayashi

Coming back to TARC from the Hokkaido National Agricultural Experiment Station where I served as Deputy Director General for two years and a half, I was strongly impressed by the substantial changes in the orientation of international cooperation in agricultural research worldwide and the progress of TARC research activities made during my absence.

In the international scene, a growing concern over the global environment has motivated approaches from various sectors. During the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June this year, emphasis was placed on the need for global efforts to cope with environmental issues, including the changes in the world climate. It was obvious that both the developed and developing countries recognized the importance of concerted efforts to conserve environmental resources, including water, soil, natural vegetation such as tropical forests as well as germplasm of major crops. A remarkable achievement of this convention is the fact that the agreement on biological diversity was signed by more than 150 countries, the majority of them being developing countries. It is also worth noticing that the scope of international cooperation in agricultural research tends to be wider and that collaborative activities are not only aimed at agricultural development in limited areas but also take into account global aspects. Indeed there is a growing awareness that sustainable agriculture is closely linked to the preservation of the environment, on the one hand, and to the conclusion of trade agreements on commodities, on the other hand, which both involve a global approach. Finally, the end of the "cold war" and removal of "East-West barriers" are also affecting international collaboration programs.

These trends inevitably call for the broadening of the scope of activities and expansion of the geographical areas hitherto covered by the Center in its international collaboration programs. In recent years, TARC had already undergone a significant transformation from its original objectives. A greater emphasis was placed on basic research in collaboration with institutes overseas through the activities of the Eco-Physiology Research Division along with a strong commitment to global as well as regional environmental issues through the establishment of the Marginal Land Research Division. The TARC Visiting Research Fellowship Program aimed at the undertaking of cooperative advanced studies with invited researchers at the Okinawa Branch of the Center also started this year. In addition, TARC is working out plans to place more emphasis on disciplines and fields which had received comparatively little attention so far, such as forestry, post-harvest technology, economic analysis, and even fisheries may be included in the activities in future. The geographical areas for international collaboration programs will not be centered on the tropics as before. In fact TARC has already been engaged in several very productive cooperative research programs with institutions located in the subtropical areas or areas extending in the temperate zone, such as IAPAR in Brazil, ICARDA in Syria and various institutes in China and Pakistan. In future, cooperation with organizations located in countries at higher latitudes such as Mongolia or higher altitudes such as the Andean countries may be initiated.

Dr. Masashi Kobayashi

Born in Niigata in 1936. Graduated from Faculty of Agriculture, Tokyo University, 1960. Doctor of Agriculture, Tokyo University, 1971. Started his career at MAFF as Researcher, Sweet Potato Breeding Lab., Chugoku Nat'l Agri. Exp. Station, 1960-74. Head, Sweet Potato Breeding Lab., Kyushu Nat'l Agri. Station, 1974-80. Head, 4th Genetics Lab. (Cell Engineering), Nat'l Inst. of Agri. Sciences, 1980-83. Head, Cell Breeding Lab., 1983-85. Councillor for Res. and Dev., Agriculture, Forestry and Fisheries Res. Council Secretariat, MAFF, 1985-88. Director, Planning and Coordination Div., TARC., 1988-90. Deputy Director-General, Hokkaido Nat'l Agri. Exp. Station, 1990-92. Director-General, TARC since August 1, 1992.

To fulfill its new responsibilities, TARC is currently considering to reorganize its structure so as to increase the number of programs of cooperation as well as upgrade their quality.

The Former Director General, Dr. Tsuru received an Award from the Ministry of Agriculture of the People's Republic of China

It has been twenty years since the diplomatic relations between China and Japan were restored.

The meeting of the Japan-China Agricultural Science and Technology Exchange Group has been held each year since its inauguration in 1981. Within this framework, the Japan-China Agricultural Collaborative Research Program was established in 1981 and TARC has been the key institution for the implementation of collaborative research covering fields such as forecasting and monitoring of insect pest incidence, breeding of high-yielding rice varieties with tolerances to cold and diseases, development of techniques for sustainable production of vegetables, etc. The achievements in the breeding of rice varieties carried out at Yunnan Academy of Agricultural Sciences were published in the China Agricultural Yearbook in 1991.

On September 28, 1992, Dr. Shinya Tsuru, former Director General of TARC received an award from the Ministry of Agriculture of the People's Republic of China on account of his outstanding contribution to the development of collaborative research in the field of agriculture between China and Japan.

A summary of the speech of Dr. Tsuru delivered on the occasion of the ceremony held in Beijing for the bestowing of the award is presented below:

"I consider it a great honor to have been selected as recipient of the Award from the Ministry of Agriculture of the People's Republic of China for the joint activities carried out by the TARC researchers and their Chinese counterparts in various research institutes in China. Last year in 1991, the Japan-China Agricultural Collaborative Research Program just celebrated the tenth anniversary of its establishment.

In the past ten years, both the Chinese and Japanese organizations made utmost efforts to promote collaborative research and develop new technologies through the exchange of researchers and administrators. The main research achievements include the rice breeding program implemented at Yunnan Academy of Agricultural Sciences and the program for the development of heat-tolerant vegetable varieties at Shanghai and Guangzhou Academies of Agricultural Sciences, respectively.

This year in 1992, a new collaborative research program entitled "Ecological Studies on Long-Distance migratory Insect Pests of Rice in the Monsoon Area of East Asia" was initiated with the China Rice Research Institute. In addition, starting from October 1992, TARC will implement the Visiting Research Fellowship Program which places emphasis on advanced basic research for the conservation of the global environment and optimum utilization of biological resources mainly in the tropics and subtropics. This year a researcher from Yunnan Academy of Agricultural Sciences was selected to participate in the Program among a large number of applicants and he plans to carry out studies on the development of rice varieties tolerant to salinity through the use of biotechnological methods.

We will do our utmost efforts to further promote the Japan-China Agricultural Collaborative Research Program toward the 21st Century. (continues to p.7)

Organization of the Tropical Agriculture Research Center *145 staff (106 scientists) 1 Dec. 1992*

Director General *Dr. M. Kobayashi*

- Planning and Coordination Division *Dr. N. Nakaya, Director* (7)
  Planning of the research projects, overseas research implementation, liaison and coordination of cooperating institutions both in Japan and overseas, organization of international symposia, invitation of counterpart researchers and senior research administrators from overseas.
- Research Information Division (since 1985) *Dr. Y. Ohno, Director* (12)
  Compilation of information on tropical agriculture through survey missions and document analyses to file databases necessary for project organization and evaluation, coordinated by Senior Research Coordinators. Publication, documentation, library and audio-visual services.
- Research Division I (since 1970) *Dr. T. Yamaguchi, Director* (31)
  Implementation of overseas research projects under agreements with counterpart institutions and IARCs, covering a wide range of disciplines including agronomy, crop breeding, physiology, ecology, plant protection, soil science, water management, animal health and production, forestry/agroforestry, food technology and others.
- Research Division II (since 1975) *Dr. K. Kawashima, Director* (9)
  Large scale programs for the promotion of farm production systems in tropical countries integrating a wide range of techniques developed under joint research with counterparts. Comprehensive studies aiming at integrated development of agriculture, animal husbandry and forestry.
- Eco-Physiology Research Division (since 1987) *Dr. N. Murata, Director* (12)
  Basic studies on physiology and genetics underlying agricultural productivity in the tropics. Studies on the functions of crop plants, livestock and their microbial symbionts adapted to tropical/subtropical climate.
- Marginal Land Research Division (since 1988) *Dr. M. Araragi, Director* (12)
  Studies on the structure and functions of agro-environmental resources, land and water in the marginal areas of the tropics/subtropics in particular, aiming to promote the utilization of such resources and areas under constraints for agriculture, animal husbandry and forestry.
- Okinawa Branch (since 1970) *Dr. M. Nara, Director* (34)
  Experimental research to solve problems relating to agriculture in the tropical zone, including crop improvement and protection, agronomy, soil management and tropical fruits production, under the subtropical climate of the Ryukyu Islands, and to link such research results to the research pursued overseas.
  Visiting research fellowship program starts.
- Administration Division *Mr. N. Shindo, Director* (21)

"Celebration for the commemoration of the Inauguration of the TARC Visiting Research Fellowship Program (TARC-VRF Program)"

The TARC-VRF Program will start this coming October, with the participation of 10 foreign researchers with high qualifications. The introduction of the program, the objectives and the research themes have been described in the TARC Newsletter Vol.2 (3), (4) and Vol.3 (1), respectively.

The deadline for the application was last May, and 134 researchers from 26 countries applied for this program. The final preparations and arrangements for the reception of the successful 10 candidates are proceeding actively.

The celebration for the commemoration of the inauguration of the TARC-VRF program was held at the TARC Okinawa Branch, on Ishigaki island, during a period of three days (on 14, 15 and 16th of July). The celebration consisted of three parts as follows: 1) The commemoration ceremony for the completion of the building when the "International Collaboration Laboratories" were set up and the celebration party on 14th of July, 2) A forum to celebrate the inauguration of this program and the reception at the Hotel Nikko Yaeyama, on 15th of July, 3) A field trip to observe agriculture under subtropical conditions on Ishigaki island, on 16th of July.

The outline of these events is reported as follows:

1) Commemoration Ceremony and Celebration Party for the Completion of the facilities for the TARC-VRF Program.

The ceremony to commemorate the completion of the main building (480 m^2 in floor space) was held with a total of 150 participants. After the opening address from Dr. TSURU, Director General (D.G.) of TARC, the report on the construction of the facilities from the Agric. Forest. and Fisheries Res. Council, Ministry of Agric. Forest. and Fisheries Japan (AFF Res. Council, MAFF Japan) and Okinawa General Bureau, Okinawa Development Agency (OGB, OGA) was presented. Many congratulatory telegrams, from Mr. IE, Minister, President of OGA, were read and the addresses from Dr. KAINUMA, Secretary of AFF Res. Council, MAFF Japan, Representative of OGB, Governor of Okinawa Prefecture, President of Ryukyu Univ. and Mayor of Ishigaki were presented, respectively. The celebration party which started with "Kagami-biraki" (opening of a barrel of sake) was extremely lively.

2) The Memorial Forum and the Reception

During the forum entitled "The Ryukyu Islands: Linking the present to the future", four lectures were delivered in the presence of Dr. OYA, Prof. of Ryukyu Univ. as chairman and Dr. OHNO, Director of Res. Information Div. of TARC as the program director as follows:

1) "Environment and geological formation of Ryukyu Islands" by Dr. KIZAKI (President of Okinawa International Association for Mangroves), 2) "Cultural Exchange Across the Ocean" by Mr. ISHIGAKI (Superintendent of Ishigaki Citizens' Hall), 3) "Food culture in Okinawa and the subtropical region" by Ms. NISHIOO (Principal of Nishioo Food Academy) and 4) "World agriculture and the Ryukyu Islands" by Dr. HAYASHI (a member of CGIAR-TAC).

After the forum, a reception was organized with an address and toast, then speeches of congratulation were given by Mr. SAITO (former President of AFF Res. Council, MAFF Japan), Dr. BERNARDO from the Philippines (Deputy D.G. of IRRI), Dr. MANWAN from Indonesia (D.G. of CRIFC, Indonesia), Dr. MUKAI (D.G. of Kyushu National Agric. Exp. Stat.) and Dr. YOKOTA (D.G. of Okinawa Prefectural Agric. Exp. Stat.). Thereafter traditional Ishigaki folk dances were performed during the reception.

3) Field Trip

A field trip by bus was organized for about 30 participants. Some fields of sugarcane and pineapple (main crops in Ishigaki island), cattle farms, "Sukuhara" multipurpose dam and a pine-apple cannery were inspected. We are now looking forward with great anticipation to receiving at the Okinawa Branch the successful candidates selected for the Program.

≪Soils, Fertilizers and Plant Nutrition≫

Decomposition characteristics of tropical peat soils

*S. Murayama and Zahari Abu Bakar**

Peat soils cover a wide area, 2.4 million hectares, in Malaysia. In spite of the constraints on crop growth, there has been an increasing demand to develop peat soil swamps for agriculture, since peat soils occur fairly extensively near the coastal lowlands which are also the most developed and populated areas in Malaysia. The area of peat soils for agricultural use in Peninsular Malaysia increased from 179,000 ha in 1966 to 314,000 ha in 1984. The soil originates from partially decomposed plant biomass and inherits the intrinsic nature of biomass, i.e., the decomposition by microorganisms. Because more than 98 percent of the soil consists of organic matter, the decomposition of peatland leads to surface subsidence, which is certainly a major constraint on peatland agriculture. In addition, the decomposition results in the emission of carbonaceous gases like carbon dioxide and methane which play an important role in the global greenhouse effect. Studies on microbial decomposition of tropical peat soils have been carried out at MARDI (Malaysian Agricultural Research and Development Institute) Jalan Kebun Station since 1990, under the collaborative project between TARC and MARDI.

Kinetic analysis of aerobic microbial decomposition of peat soil organic matter demonstrated that the labile fraction of tropical peat soil was very small, accounting for less than 1 percent, and that decomposition took place based on a single compartment exponential decay model; $Y_t = Y_0 \exp(-kt)$, where Y_t is the residual amount at time t, Y_0 is the initial amount, k is the decomposition rate constant ($time^{-1}$). The k values for the aerobic decomposition at 35°C ranged from 0.24 to 3.88(10^{-4} $\cdot day^{-1}$) which is equivalent to an annual decomposition rate of 0.88~13.2 percent. The decomposition rate was well correlated with the soil pH: the higher the pH. the higher the decomposition rate. Peat soil with a smaller C/N ratio, and/or higher ash content tended to decompose at a higher rate.

The CO_2 flux from the soil surface which is another index of the decomposition of peat soil organic matter was determined under *in situ* conditions. The CO_2 flux ranged from 5.8 to 30.3 $mmole \cdot m^{-2} \cdot h^{-1}$, equivalent to 0.7~3.6 Kg Carbon ($ha^{-1} \cdot h^{-1}$). The CO_2 flux tended to increase with the increase of the soil pH and/or ash content. Annual CO_2 emission from Peninsular Malaysia peatland was calculated based on the following assumption: $1.96 \cdot 10^6$ ton Carbon, equivalent to 0.0039 percent of CO_2 emission from global soil organic matter decomposition.

Annual surface subsidence (h cm) of arable peatland caused by decomposition of peat soil organic matter was calculated based on a newly developed mathematical model; $h = 105.12 \cdot \alpha \cdot d^{-1} \cdot \theta^{-1}$, where α is the CO_2 flux ($mmole \cdot cm^{-2} \cdot h^{-1}$), d is the bulk density ($g \cdot cm^{-3}$), θ is the carbon content of peat soil. By using the model, the annual subsidence (h) of a field of MARDI Jalan Kebun Station was found to be 1.55 cm, when the α value was 0.00203, the d value was 0.250 and the θ value was 0.551. The subsidence associated with the decomposition of peat material accounts for a substantial proportion, 52 percent, of the whole annual subsidence (3 cm) of this site.

Amendment of the strong acidity of peat soil is a prerequisite for peatland agriculture; however, the amendment by liming using ground magnesium limestone was found to stimulate the decomposition of the peat material based an aerobic incubation-kinetic analysis, and the measurement of the CO_2 flux in field experiments aimed at maize (*masmadu*) cultivation using different levels of liming and NPK treatments.

Since the utilization of peatland for agriculture inevitably enhances the loss by decomposition of peat soil material, the concept of "LISA" (Low Input Sustainable Agriculture) will be particularly meaningful for peatland agriculture to preserve the peat soil resources for future generation.

* MARDI H.Q. Serdang, Selangor

Measurement of CO_2 flux from peat soil surface (photo by S. Murayama)

Annual surface subsidence of 3 cm has been observed since 1958 at Jalan Kebun (photo by S. Murayama)

≪Soils, Fertilizers and Plant Nutrition≫

Evaluation of legume species for use as green manure in the subtropics in Japan

H. Nakano, H. Nakagawa, M. Matsuoka, T. Terauchi, A. Sugimoto, Y. Owaki, K. Shibano and T. Momonoki

The Nansei islands are situated in the subtropical zone of Japan. Rotation with green manure crops must be practiced in cropping systems of upland crops, including sugarcane and vegetables in order to avoid the deterioration of the physical and chemical properties of the soil and protect fields against soil erosion in these islands. Presently sunhemp (*Crotalaria juncea*) is widely cultivated as a green manure crop in the cropping system of sugarcane planted in summer.

In order to identify legume species more adaptable to the soil and environmental conditions of the Japanese subtropical region than sunhemp, the researchers of the plant breeding laboratory screened legume species whose germplasm had been collected mainly during former TARC explorations organized in tropical and subtropical countries. Among twenty three tropical and two temperate leguminous species, pigeon pea (*Cajanus cajan*, TARC Okinawa branch plant germplasm collection number OK6248, introduced from Brazil), soybean (*Glycine max*, OK6264, local variety collected in Miyakojima, Nansei islands) and phasey bean (*Macroptilium lathyroides*, OK5662 introduced

from Colombia) showed a large biomass in a preliminary test in 1987, subsequent screening tests in 1988 and 1989 and final evaluations in 1990 and 1991.

These plants were well established in a field due to vigorous early development following germination even under drought conditions. Moreover they were tolerant against strong wind during typhoons in summer and they were not severely damaged by insects in field tests conducted during a period of six years. Especially pigeon pea and soybean could be easily ploughed into soil using a tractor. These three species grew thick, showing that they were suitable as cover crops against soil erosion caused by heavy rainfall.

Especially pigeon pea showed a high adaptability to the soils widely distributed in the subtropical islands, that is, acid red soil, acid yellow soil and basic calcareous soil derived from coral in the Nansei islands. Pigeon pea exhibited a larger biomass than sunhemp in these kinds of soil, especially in acid red soil. It was found that pigeon pea could well reduce the uptake of toxic manganese released from acid red soil. The ability of inhibiting the manganese uptake may account for the superiority of pigeon pea to sunhemp in the widely distributed acid soils in the Nansei islands.

Varietal tests for the pigeon pea germplasm introduced from ICRISAT showed that later maturing varieties displayed a larger biomass in August when green manure was ploughed into soil prior to sugarcane planting. Furthermore, it was also observed that some improved soybean varieties bred for grain use in Thailand and Indonesia showed a larger biomass as green manure than the local varieties of the Nansei islands. Consequently this introduced germplasm will be substituted for sunhemp which is cultivated in the sugarcane cropping systems practiced in the Japanese subtropical islands.

Local soybean varieties exhibiting lodging (foreground) and erect varieties (background) from Thailand used as green manure (photo by H. Nakano)

≪Soils, Fertilizers and Plant Nutrition≫

Analysis of nitrogen transformation in soils without tillage in Brazil by using the ^{15}N-ammonium isotope dilution method

T. Nishio, T. Fujimoto, and Julio Nakagawa

In the upland fields of the southeastern districts of Brazil, no-tillage cropping systems have been introduced to stabilize the production of upland crops and to prevent soil erosion. However, it is generally recognized that nutrients and organic matter in the soil tend to accumulate in large amounts in the surface layer of the soil not subjected to tillage. These changes in the distribution of the nutrients and organic matter are considered to affect the nutrient supply to crops, especially in the case of nitrogen. Absorption of nitrogen by crops is closely related to N transformation in soil. Thus, we analyzed the N transformation rates in soils without tillage by using the ^{15}N-ammonium isotope dilution technique, and compared the rates in the soils which were subjected to tillage by conventional methods. We tried to determine how the N transformation in soil varied spatially and temporally by the introduction of no-tillage cropping.

Table 1. Nitrogen transformation rates in soils without tillage*

Location	Plots	Depth (cm)	N transformation rates mineralization (μg N g^{-1} d^{-1})	immobilization (μg N g^{-1} d^{-1})	nitrification (μg N g^{-1} d^{-1})	Organic N (mg N g^{-1})
Botucatu	conventional	0– 5	6.5	4.5	7.9	1.9
		5–20	8.3	5.9	7.7	1.89
	no-tillage	0– 5	21.1	19.2	17.2	2.17
		5–20	3.0	3.5	4.5	1.74
São Gotardo	conventional	0– 5	6.8	6.4	6.6	1.45
		5–20	6.3	5.7	5.2	1.56
	no-tillage (4 years)	0– 5	8.6	7.8	7.0	1.89
		5–20	2.4	3.7	1.9	1.36
	no-tillage (10 years)	0– 5	11.4	9.4	7.9	2.68
		5–20	1.8	3.2	1.9	1.45

* The amount of $(^{15}NH_4)_2SO_4$ (21.1 atom% ^{15}N) added to soils was 20 μgN g^{-1}
The soils were incubated at 25°C (Botucatu) and 22°C (São Gotardo).

This study was conducted as a joint project between the State University UNESP and TARC. Soils were collected from the fields which were located in Botucatu (São Paulo State), São Manuel (São Paulo State), and São Gotardo (Minas Gerais State). The soils in the experimental fields are classified as terra rossa (Botucatu), sandy latosol (São Manuel), and yellow latosol (São Gotardo), respectively. In each field, wheat and soybean were cultivated in the plots without tillage and adjacent conventional plots. No-tillage cropping was continued for 6 years in the plots of Botucatu and São Manuel, and for 4 and 10 years in São Gotardo. Fertilizer application and cultivation methods were identical in both the plots without tillage and the conventional plots except for the tillage method.

The rates of N transformation determined by the ^{15}N-ammonium isotope dilution method (i.e. rates of mineralization, immobilization, and nitrification) are shown in Table 1. The rates in the plots without tillage were remarkably high in the surface layer (0–5 cm), but decreased rapidly in the subsurface layer (5–20 cm). In the case of the conventional plots, the rates in the subsurface layer were almost identical with those in the surface layer. Although the same trend was observed in the distribution of organic matter, the relative difference between the surface and the subsurface layers was much less conspicuous in comparison with the N transformation rates. The results obtained in the soils of São Manuel were the same as those for the Botucatu soils.

In the São Gotardo soils, the N mineralization rate and organic N content in the surface layer increased with the increase in the duration of the period of no-tillage cropping. However, in the subsurface layer, the N mineralization rate decrease rapidly, while the organic N content did not decrease significantly.

In the soils not subjected to tillage the enhancement of N transformation in the surface layer and decrease in the subsurface layer were remarkable. However, these changes were quantitatively inconsistent with those in the distribution of organic matter. These findings indicated that the ratio of easily decomposable organic N to the total N increased in the surface layer and decreased in the subsurface layer. It is suggested that the N transformation rates could be used as an index for the capacity of soils to supply nitrogen. The results of our study clarified one aspect of the changes in N dynamics in soil associated with no-tillage cropping.

Profile of New Advisers to TARC

Dr. Tsutomu Takigawa

Born in 1924. Graduated from Faculty of Agriculture, Tokyo University in 1948. Joined MAFF in 1948. Received Doctorate Degree from Tokyo University (1977). Research field: Agricultural Economics, especially agrarian reform in Asia. Lecturer, Tokyo University and Waseda University (1967). Part-time lecturer, Tokyo University of Foreign Studies (1969). Professor, Tsukuba University (1979). Professor, Nihon University (since 1988) and Director General of Regional Research Institute of Agriculture in the Pacific Basin (since 1989). Publication: A Note on the Agrarian Reform in the Philippines under the New Society, 1974.

Dr. Ken-ichi Hayashi

Born in 1929. Graduated from Faculty of Agriculture, Tokyo University (1953), joined MAFF at Hokuriku Agr. Exp. Sta. and at the National Inst. of Agr'l Sciences. Research on rice, wheat and barley breeding, plant genetic resources and crop physiology (1954–77). Visiting scientist for growth analysis at Rothamsted Exp. Sta. UK (1962–63). FAO Regional Rice Improvement Officer and Executive Secretary to International Rice Commission at Bangkok (1970–73). Research Coordinator on crop breeding and green energy programme at the Research Council, MAFF (1977–79). Joined TARC and became successively Director of two Divisions and DG (1976–86), then became DG of National Inst. of Agrobiological Resources (1986–89). CIAT Board Member (1985–88) and Member of Technical Advisory Committee (TAC) of CGIAR (since 1988). Senior Adviser of Society for Techno-Innovation of Agriculture, Forestry and Fisheries (since 1991).

Mr. Ryozo Matsuyama

Born in 1926. Graduated from Faculty of Agriculture, Hokkaido University. Joined MAFF at Plant and Animal Protection Station in 1949. Director of Extension Division of Agricultural Production Bureau in (1976–1978). Senior Councillor for Technical Affairs (1978–1980). Executive Director of Japan International Cooperation Agency, JICA (1980–1984). Chairman of Japan Agriculture Development and Extension Association (1985–1988). Executive Director of Japan Agricultural Forestry and Fishery Promotion Association, and Adviser of The Institute of Environmental Toxicology (since 1984). Chairman of the Rural Youth Education Development Association (since 1988).

Dr. Kunio Takase

Born in 1926. Graduated from Irrigation Dept., Kyoto University in 1949. Ministry of Agriculture and Forestry (1949–1967) Irrigation Dam Construction, Design, Planning Aichi Irrigation Project, Chicago Representative (1954–59). Dr. of Agriculture from Kyoto University (1969). Asian Development Bank (1967–1986). Director, Irrigation and Rural Development Department, Overseas Economic Cooperation Fund (1974–1978). Director, Economic Research and Technical Appraisal Department, ADB Representative to CGIAR (1982–1986). Executive Director, International Development Center of Japan (IDCJ), since 1986. Governing Board, International Irrigation Management Institute (1982–1989). TAC member, CGPRT (1988–today), Publication: Review of Bank Operation in the Irrigation Sector 1966–1985, Asian Development Bank, 1986.

Dr. Mitsuma Matsui

Born in Tokyo in 1920. Graduated (B. S. 1944, M. S. 1946) and received Doctorate Degree in Forestry (1974) from Forestry Dept., Tokyo University. Forest soil scientist. Engaged in forest soil surveys as senior research staff at the National Forestry and Forest Products Research Institute, MAFF (FFPRI) from 1944 until 1974, and assumed the position of Director, Research Coordination Division (1974–78) and Director General (1978–80), FFPRI. Member of Japan Science Council (1981–85), Scientific Adviser to Japan Forest Technical Association (JAFTA) (since 1980) and Vice President, The Japan Forestry Association (since 1989). Appointed as Member representing the forestry sector in Technical Advisory Committee (TAC), CGIAR in 1990.

Dr. Toshihiko Nishio

Born in 1931. Graduated from Faculty of Agriculture, Tokyo University (M. S. 1956). Research field: Crop Science. Joined MAFF at Shikoku National Agricultural Experiment Station (1956). Received Doctorate Degree in Agriculture from Tokyo University (1976). Senior Researcher of TARC in Malaysia (1969–1971). Head of Crop Production Lab., Kyushu National Agricultural Experiment Station (1976–1978). Director General, Agriculture, Forestry and Fisheries Research Council Secretariat (1989–1990). Executive Director of Bio-Oriented Technology Research Advancement Institution (BRAIN) (since 1991) Publication: Three villages in Malaysia.

Profile of New Directors

Dr. Norio Nakaya, Director of Research Planning and Coordination Division

Soil physicist. Born in Fukui in 1940. Graduated from Faculty of Agriculture, Tokyo University of Education (presently University of Tsukuba.) After working at Kyushu National Agricultural Experiment Station (1965–1970) he became engaged mainly in studies on water pellency of soil at the National Institute of Agricultural Sciences (1970–1983). During this period, he carried out research at the National Center of Agricultural Research at Versailles with a fellowship from the French Government (1976–1977). He joined TARC and was dispatched to Thailand from 1983 to 1986. His main contributions include studies on the improvement of the soil physical properties through the utilization of organic matter in the upland soils of Thailand and his role as TARC Representative in Thailand. Upon returning from Thailand, he was appointed chief of the Research Planning Section of TARC (1986–1990). Thereafter he was appointed director of the Lowland Farming Division, at Hokuriku National Agricultural Experiment Station (1990–1991) and he joined TARC again in January, 1992, to assume the position of Director of the Research Planning and Coordination Division.

Koji Kawashima, PhD., Director of Research Division II

Food Microbiologist: Born in Harbin, China in 1939. Graduated from Hokkaido University in 1962. Since then, he has been engaged in studies on Food Technology carried out mainly at the National Food Research Institute. He visited Malaysia as a member of an IAEA mission for the promotion of "Food Irradiation" program in 1980–81. He participated in a JICA project "Agricultural Products Processing Pilot Plant Project (AP4)" at Bogor Agricultural University, Indonesia, from 1982 to 1983. He joined TARC and was dispatched to Thailand from 1987 to 1990 where he carried out studies on the Quality Preservation of Maize by the Prevention of Aflatoxin Contamination. He returned to the National Food Research Institute, where he held the positions of Director of the Research Planning and Coordination Division from April 1990 to October 1990 and Director of Food Resources Division. In March 1992 he joined TARC again as Director of Research Division II.

TARC in Indonesia **(continued from p.8)**

Collaborative research program between TARC and AFRD on the ecology and methods of control of forest insect pests

Effective control systems to alleviate these problems require information on the basic ecology and bionomics of these insects.

To contribute to the protection of man-made forests by studying the ecology of insect pests, a cooperative research project between TARC and the Agency for Forest Research and Development (AFRD) attached to the Ministry of Forestry of Indonesia was initiated in 1991. The project is being currently carried out at the Forest Research and Development Center (FRDC), the headquarters of the research institutes under AFRD, in Bogor, West Java. The Forest Protection Group in FRDC is carrying out studies on the ecology and control methods of forest insect pests, as well as disease control, weed control and fire control.

The Benakat reforestation area of the Benakat Reforestation Technology Center (known as "BTR Benakat" or "Balai Teknologi Reboisasi Benakat"), a branch of FRDC located in South Sumatra has been selected as the main research site. The BTR forests in Benakat which cover about 3000 ha in total, consist of about 100 stands of 37 tree species, and have been planted for the rehabilitation of alang-alang grasslands since 1980 through the cooperation with JICA at first and later by the BTR members themselves. The main duty of BTR Benakat is to carry out tests to develop techniques and methods suitable for the reforestation of various areas, especially those in Sumatra island.

Experiments for the protection of the trees from insect pests is one of the main activities.

Presently, the major insect pests consist of a stem borer, *Xystrocera festiva* (Coleoptera: Cerambycidae), on "sengon", *Albizia falcataria*, and a shoot borer, *Hypsipyla robusta* (Lepidoptera: Pyralidae), on mahogany, *Swietenia macrophylla* which are the main target insects in this research project.

In Java, plantations of *A. falcataria* are common and have contributed for a period of about ten years to the production of pulp material and light use timber, while boring attacks by *X. festiva* on the trunk have been very destructive. Trees mainly planted for the rehabilitation of forests in critical areas are fast-growing leguminous species, such as *A. falcataria*, *Acacia auriculiformis* and more recently *Acacia mangium*. Recently, as the trees grow, the damage caused by *X. festiva* on *A. falcataria* as well as *A. mangium* and *A. auriculiformis* has become conspicuous. Therefore, the rapid development of appropriate control methods for this insect pest is strongly required. In Benakat, *Acacia mangium* which is the major tree for proper plantations, along with *A. falcataria* and *A. auriculiformis*, is used for making fire belts. *X. festiva* is attacking the elder stands of these trees and spreading to the young stands. We are monitoring the spatio-temporal changes of the population by conducting a census. We have also established an additional research site in the *A. falcataria* plantation managed by the Kediri branch of PERUM PERHUTANI II, East Java, where *X. festiva* has long been a serious problem.

S. macrophylla has a reputation for supplying high quality timber. *H. robusta* extensively attacks young trees by boring into the shoots and damages the trunk shape. As a result the yield of straight timber is decreasing. The reduction of the timber yield due to this pest is considerable in the commercial forests in Java, and attempts to establish plantations of *S. macrophylla* are being curtailed due to this pest in the new forestry areas in the other islands. Both FRDC and BTR Benakat have been implementing several silvicultural methods to control the pest. In this project, further development of silvicultural methods of control is being promoted in an experimental plantation in Benakat.

In addition to the two studies previously listed basic studies on the bionomics of potential insect pests occurring in reforestation areas are also being planned.

The project will continue for three years. The expected outcome of this project is as follows:

1. Detailed knowledge on the biology and population ecology of *X. festiva* and methods of control;
2. Development of silvicultural methods of control of *H. robusta*;
3. Inventory of forest insects with documented information.

These data should contribute to and provide the future framework for integrated insect pest management in Indonesian forestry.

(continued from p.2)

The Former Director General, Dr. Tsuru received an Award from the Ministry of Agriculture of the People's Republic of China

Twentieth anniversary marking the restoration of the diplomatic relations between China and Japan will be celebrated on September 29, 1992. I would like to take this opportunity to emphasize that obviously, the Japan-China Agricultural Collaborative Research Program could not have possibly reached such a high level of development without this historical decision in the normalization of the relations between the two countries. The Tropical Agriculture Research Center is currently in the process of reorganizing its structure to expand its collaborative research activities worldwide. I am convinced that this effort will enable TARC to further contribute to the development of the Japan-China Agricultural Cooperative Research Program in future".

Collaborative Research Program of TARC with IIMI

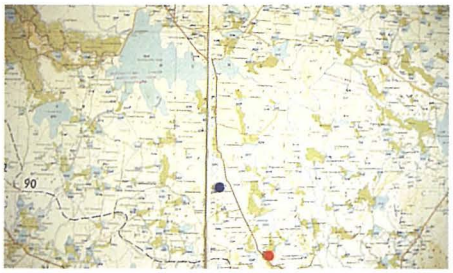
Jun Itakura and M. Samad

In July 1991, TARC initiated a collaborative research project with the International Irrigation Management Institute. (IIMI). IIMI has its Headquarters in Sri Lanka and Field Offices in 10 developing countries in Asia and Africa. It is one of the 17 International Research and Training Centers supported by the Consultative Group on International Agricultural Research (CGIAR). IIMI's mission is to foster the development, dissemination and adoption of lasting improvements in the performance of irrigated agriculture in developing countries.

The joint study with IIMI is focused on small-scale tank irrigation systems in the Dry Zone of Sri Lanka. These systems consist of interconnected storage and regulating reservoirs which fulfill multiple functions of resource management, including irrigation, domestic water supply, water for livestock and subsurface water supply for perennial cropping. Most of these tanks have a very long history which dates back to over 1000 years and were once the backbone of an ancient hydraulic civilization which flourished in that part of the country. From about the 12th century A.D a series of events led to the collapse of the ancient civilizations which resulted in a mass movement of population to what is now identified as the wet zone. Most parts of the dry zone and the ancient irrigation systems were abandoned until about the early part of this century when sporadic attempts were made to restore some of these systems. But most of the efforts were focused primarily on the larger irrigation schemes. Since about the 1970s, various attempts have been made to rehabilitate minor irrigation systems. Large sums of money had been invested both by various international donor agencies and by the Government of Sri Lanka to rehabilitate the small scale irrigation systems. Improving production conditions on the small scale irrigation systems is a key component of the Sri Lanka government's agricultural development policy.

Headquaters of International Irrigation Management Institute (IIMI)

The principal objective of the TARC/IIMI joint project is to carry out research for improving irrigation management in small tank irrigation systems. Unlike most previous studies on small tank irrigation systems in Sri Lanka which considered each tank as a separate entity and ignored the hydrological inter-connections and the socio-economic relationships which prevail among the population dependent on these tanks for their livelihood, this study is based on the fundamental premise that an understanding of the physical and socio-economic conditions of the tank system as a whole is a prerequisite for improving irrigation management.



Interconnected tank irrigation systems in Anuradhapura district (light blue: tank, green: irrigated land)

The project has two principal components: 1) a technical component which is focused on investigating the water balance in the inter-connected tank systems; and 2), a socio-economic component which analyses local tank management functions, by identifying the socio and economic conditions, profitability of agriculture and resource allocation decisions which affect irrigation management within and between tanks and also by assessing the institutional and environmental sustainability of the tank systems for irrigation management.

Field work is being carried out in the Thirappane area which is about 30 kilometers south from the ancient capital city of Anuradhapura in the north-central province of Sri Lanka.

Mr. Jun Itakura, an Engineer, is a TARC researcher working on this project with Dr. M. Samad an Agricultural Economist attached to IIMI.

TARC in Indonesia

Collaborative research program between TARC and AFRD on the ecology and methods of control of forest insect pests

Kazuma Matsumoto

The Indonesian forestry organizations aim at developing silvicultural systems and techniques for sustained yield of useful timber. The conditions of management of man-made forests are somewhat different between Java and other islands. In the densely populated and almost entirely exploited island of Java, a large number of commercial forests small to medium in size have been established. In the other less exploited islands such as Sumatra and Kalimantan, advanced degradation of natural forests has resulted in vast areas which must be rehabilitated as early as possible.

Reforestation area of BTR Bemakat.R(photo by K. Matsumoto)

Larvae of Xystrocera festiva feeding in a group under the bark of Albizia falcataria. (photo by K. Matsumoto)

To implement the rehabilitation of such areas and for establishing commercial forests, afforestation by monoculture of introduced fast-growing trees on a larger scale is being promoted. Insect pest problems have long threatened the commercial forests in Java, and are also becoming conspicuous in the expanding man-made forests in the other islands. Moreover, in the latter forests, outbreaks of a large number of insect pests which have been in a latent state are likely to occur in this new environment in the future. Therefore, we must carefully pay attention to the possible new pest problems which may occur along with the expansion of the afforestation areas and growth of introduced trees.

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A terminal branch of Swietenia macrophylla attacked by Hypsipyla robusta.

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