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Newsletter

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Selective and clear-cutting of Dipterocarp forest in Malaysia. (Photo by S. Sakurai, FFPRI)

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FOR INTERNATIONAL COLLABORATION

TARC
TROPICAL AGRICULTURE RESEARCH CENTER

Plant Protection and Agricultural Chemicals in the Developing Countries

Toshihiro Kajiwara

The world population has already exceeded 5 billion and is now growing rapidly at a rate of approximately 100 million per year. UNFPA's projection points to a figure of 10 billion people in the year 2050. Is it possible to produce and supply enough food to sustain the expanding population? Food production remains the most serious issue in the coming century. How to increase food production on the limited land area of the earth requires full mobilization of mankind's knowledge or wisdom.

To increase food production, the expansion of the acreage under cultivation may be one of the strategies. This strategy however, will be limited by problems associated with the deterioration of the environment and with the difficulty to secure funds for development. Other strategies therefore, should focus on how to increase the productivity of the present cultivated land.

For this purpose, minimizing crop losses during the production process as well as breeding super high-yielding crops using new technology is essential. Major losses in world food production are due to the occurrence of pests (diseases, insect pests and weeds). For example, yield losses of cereals due to pests account for 35% of the potential production (Walker, 1975).

Cereal production in the world in 1991 was estimated at about 1.7 billion ton. Based on the above-mentioned crop loss rate, the total losses of cereals amount to about 910 million ton in the world.

Energy consumption per capita per day is about 2,500 kcal, and food consumption per capita accounts for about 300 kg calculated in terms of cereals on an average per year. The above-mentioned total loss, 910 million ton is equivalent to the amount of food required to cover the needs of 3 billion people per year.

It may be pointed out that such a calculation is groundless, because it is not based on experimental results but only in projections. However, the results of "the experiments on crop losses due to diseases and insect pests without the use of agricultural chemicals (pesticides)", which were carried out in several areas in Japan from 1991 to 1992 under the auspices of the Japan Plant Protection Association, showed almost the same rate. These data indicate that plant protection plays an essential role in securing the supply of food in the world.

To alleviate the crop losses due to pests, the utilization of crop resistance will be of paramount importance. International Agriculture Research Institutes and National Institutes of each country have therefore, focused their programs on the breeding of crops resistant to major pests. Through such efforts, some successful results have been obtained. Recently, new varieties resistant to several virus diseases have been released by gene transfer.

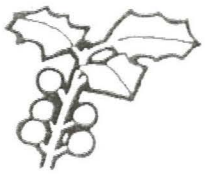
However, it may not be possible to develop crop varieties resistant to all kinds of diseases and insect pests at the same time. Resistance genes to some diseases such as rice sheath blight have not yet been identified in spite of many efforts. Also the varieties may easily lose their resistance due to the appearance of new races or biotypes of pathogens/insects, as in the case of blast, potato late blight and brown planthoppers.

It is generally recognized that agricultural chemicals (pesticides) have played an important role in controlling diseases, insect pests and weeds. Especially, after World War II, the development of highly effective pesticides contributed to the stabilization of food production. On the other hand, toxicity, the presence of residues and other undesirable effects in the environment have been associated with the use of pesticides, as depicted in the "Silent Spring" by Rachel L. Carson.

To alleviate these shortcomings, the pesticides are now being produced after being subjected to thorough tests and inspection in relation to their efficacy as well as to their metabolic effects in human and animals, including acute and chronic toxicity, mutagenicity, carcinogenicity, embryotoxicity, skeletal anomalies, etc. In spite of these efforts, criticism of pesticides stating that pesticides are useless and harmful and that their use is criminal seems to be still prevalent emotionally but not scientifically in the world.

Is it possible to produce and supply enough food in the world without the use of pesticides? The answer is no. In the developing countries particularly, the occurrence of pests often seriously curtails food production. We have observed some evidences that crop yield became double by effective and judicious application of pesticides. Farmers in the developing countries avoid the use of pesticides mainly for economical reasons. Although research on integrated pest management involving the use of resistant crop varieties, improvement of cultural practices, enhancement of the potential of natural enemies, etc. should be actively promoted, it is also recognized that agricultural chemicals are one of the most effective materials for controlling pests. From the viewpoint of securing enough food for mankind in the coming century, collaborative research should be promoted on how to use effectively, safely and economically agricultural chemicals in parallel with ecological studies on pests in the developing countries.

Dr. Toshihiro KAJIWARA
Born: March 10, 1929 in Hita-shi, Oita-ken.
Present Position: May, 1991-; Director-General, Japan Plant Protection Association.
Education: B.S. and Ph. D, Faculty of Agriculture, Kyushu University
Career:
April, 1952-October, 1966: Researcher, Plant Pathology Section, Department of Plant Pathology and Entomology, National Institute of Agricultural Sciences, MAF
November, 1966-April, 1977: Chief of 1st Laboratory of Fungal Diseases, Plant Pathology Section, Department of Plant Pathology and Entomology, National Institute of Agricultural Sciences, MAF
April, 1977-October, 1981: Director of Research Division I, Tropical Agriculture Research Center, MAFF
October, 1981-April, 1983: Head of Plant Pathology Section, Department of Plant Pathology and Entomology, National Institute of Agricultural Sciences, MAFF
April, 1983-September, 1985: Research Coordinator-General, National Agriculture Research Center, MAFF
October, 1985-September, 1985: Deputy Director-General, National Agriculture Research Center, MAFF
October, 1986-October, 1988: Director-General, Tropical Agriculture Research Center, MAFF
March, 1989-: Technical Adviser, Association for International Cooperation of Agriculture and Forestry.



TARC International Symposium 1992
Rehabilitation of Degraded Forest Lands in the Tropics — Technical Approach —

The 26th International Symposium on Tropical Agriculture, sponsored by the Tropical Agriculture Research Center (TARC), took place at the Tsukuba Center for Institutes, Tsukuba City, Ibaraki, on September 16 and 17, 1992 in cooperation with the Forestry and Forest Products Research Institute (FFPRI). The subject of the symposium aroused much interest on the part of both the Japanese and foreign researchers, resulting in a large number (more than 150) of participants, including those from private companies or NGOs, and foreign researchers (more than 30) currently staying in Japan, in addition to the delegates (15) from overseas.

The objective of the symposium was to consider future programs for the rehabilitation of degraded forest lands in the tropics by discussing mainly technical problems under various conditions in different countries.

In the opening session, Dr. M. Kobayashi, Director General of TARC, gave the inaugural address, followed by the welcome addresses by Dr. K. Kainuma, Director General of the Secretariat of the Agriculture, Forestry and Fisheries Research Council, and Dr. M. Katsuta, Director General of FFPRI. The symposium started with the plenary-session during which reports from the international organizations were presented as follows: (1) Problems facing tropical forests: the FAO's response (M. Kashio, FAO), (2) The development and role of the Center for International Forestry Research (CIFOR) (I. Bevege, ACIAR: Australian Centre for International Agricultural Research), and (3) ITTO and the rehabilitation of degraded forest lands in the tropics (E. Ze Meka, ITTO: International Tropical Timber Organization).

The Country Reports, formerly included in the previous symposia, were omitted in the program of the present symposium, while a larger number of Technical Reports were presented during three sessions centered on the following themes: (1) Degraded forests and their environment, (2) Agroforestry and (3) Plantation trials on degraded forest lands. Delegates from eight countries (Philippines, Malaysia, Indonesia, Thailand, Papua New Guinea, China, India, and Japan) in addition to an international organization (ICRAF) presented eighteen technical reports. Drs. L. U. Udarbe (Malaysia) and P. A. Sanchez (ICRAF) gave key note presentations in the first two sessions, respectively. In Session (1), the presentations were mainly focused on the recovery of degraded vegetation under various conditions such as arid zone in India, lands abandoned after tin mining in Malaysia, grasslands and denuded lands in the Philippines. Session (2) covered the management of the light climate, the use of nitrogen-fixing trees in agroforestry systems, an evaluation of a traditional fallow system in the Philippines and agroforestry trials in Thailand. In Session (3), plantation trials in PNG, China, Kenya and Malaysia, as well as insect pest and disease problems in the monoculture plantation system in Indonesia and Peru-Amazon area were introduced.

At the end of the symposium general comments were delivered mainly by the delegates of international organizations, which can be summarized as follows;

(1) It is important to determine how to improve various types of degraded lands. To achieve this objective, research should involve the development of criteria for the classification of degraded lands by analyzing the consequences of degradation.
(2) Socio-economic factors and policies should be considered and the objectives of management for rehabilitation should be defined along with conceptual and methodological issues in relation to the research projects undertaken.
(3) It is desirable to carry out research on a multidisciplinary basis involving the participation of social scientists or experts in other fields.
(4) Logged-over forests must be considered as degraded forests and should be rehabilitated as early as possible to avoid further degradation.
(5) The question of sustainability on a temporal scale in the development of degraded lands must be given due attention.

The proceedings of the symposium will be published as Tropical Agriculture Research Series (TARS) No 26 in the near future by TARC. (Toshiya Ikeda)

TARC Research Highlights
(continued from p.5)

≪Information Science≫ Devolopment of Tropical Agriculture Research Optiocal Disk Information System (TRODIS)

*Mitsuo Suzuki and Daisuke Suzuki**

1. Introduction

Since the Tropical Agriculture Research Center is an organization which carries out collaborative research overseas, it is necessary to understand the characteristics and problems of agriculture in the respective countries.

Therefore, it is important to compile various documents such as maps, figures, pamphlets, etc. relating to tropical and subtropical agriculture, which are collected by the TARC researchers and research coordinators for information and to classify and input them in the database system.

There is a great deal of information on agricultural research investigations, agricultural conditions, research organizations in developing countries, research on tropical agriculture in advanced countries, general bibliography, maps, etc.

This information is accumulated in the database for text digitizing information with an optical disk file system for convenient retrieving, editing and printing.

It is necessary to construct databases for information on research on tropical agriculture and to maintain the utilization system.

Therefore, it is possible to complete the hardware system without delay and to have access immediately to the constructed database system with the terminal equipment through the network.

The constructed database system is called TRODIS, Tropical Agriculture Research Optical Disk Information System.

2. Composition of the system

The composition of the system is as follows:

(1) Processing unit
32 bits CPU
5.25 inch write-one-type optical disk device
318 MB magnetic disk device
5.25 inch floppy disk device
2 button "mouse"
(2) Display
17 inch vertical monochrome display
(3) Keyboard
JIS keyboard
(4) Image scanner

Maximum sheet size is A3, scanning speed is 2.5 seconds for A4 sheer size, digitizing density is 200 – 400 dots per inch and 64th mono color tone.

(5) Laser printer

Maximum print sheet size is A3, digitizing density is 200 – 4 dots per second and 2 tray cassettes.

3. Items for retrieval

Fourteen items are prepared for retrieving the data in this system, such as 1) Title, 2) Sub-title, 3) Free keyword, 4) Research field (special research field), 5) Organization classification (data generation organization). 6) Crops, 7) Name of country, 8) Type of reference like magazine, book or pamphlet, etc. 9) Reference name, volume, title and page, 10) Publishing organization of office name, 11) Name of editor or author, 12) Affiliated organization, 13) Date of issue and 14) Research site or regional name

4.Use of TRODIS

It is necessary to prepare a special terminal as hardware or/and the software for personal-computer to access and use TRODIS through the network system in each laboratory or institute.

* National Agriculture Research Center

≪Plant Disease≫

Manual for Practical Detection of Ten Viruses of Rice in Plants and Insects

Toshiro Omura[1], Koichi Ishikawa[1], Hiroyuki Hibino[1], Tsuneo Tsuchizaki[2], Yoshiyuki Takahashi[3] and Kenichiro Shohara[3]

Ten insect-borne rice viruses have been identified in Asia. The detection of viruses in viruliferous insects as well as in infected plants is important to analyze the virus epidemiology and develop measures of control of these virus diseases.

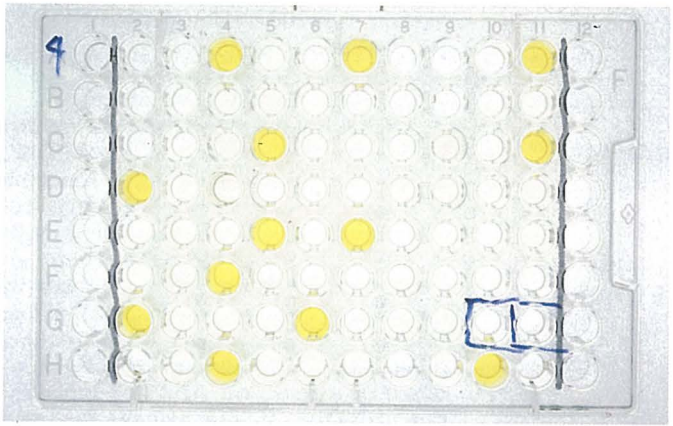
We compared the following methods, enzyme-linked immunosorbent assay (ELISA), simplified ELISA, latex flocculation test (LF), and passive hemagglutination test (PHA) for practical detection of the viruses in rice plants and viruliferous insects in terms of sensitivity, applicability, reliability and cost. Based on these analyses, we developed manuals for the detection of each rice virus in infected rice plants and viruliferous insects.

Antisera against rice dwarf virus (RDV), rice gall dwarf virus (RGDV), rice black-streaked dwarf virus (RBSDV), rice ragged stunt virus (RRSV), rice tungro bacilliform virus (RTBV), rice tungro spherical virus (RTSV), rice waika virus (RWV), rice transitory yellowing virus (RTYV), rice grassy stunt virus (RGSV) and rice stripe virus (RSV) have been produced.

Using these antisera all the viruses mentioned above were detected by ELISA and simplified ELISA from infected plants. Furthermore, these two methods enabled to detect individual viruliferous insects with persistent transmission.

Thus, the user can choose one of the serological methods depending on the objective, sample number, laboratory facilities available, and availability of skilled manpower. If coating γ-globulin and conjugate for ELISA, sensitized latex for LF, or sensitized sheep erythrocytes for PHA were supplied, the assays could be used more widely in the Asian countries. The development of practical methods of serodiagnosis of rice viruses will undoubtedly promote the integrated approach to control virus diseases of rice.

1) National Agriculture Research Center, Tsukuba, Ibaraki, Japan, 2) Faculty of Agriculture, University of Tokyo, Bunkyo-ku, Tokyo, Japan, 3) Japan Plant Protection Association, Ushiku, Ibaraki, Japan



Detection of rice stripe virus in viruliferous Laodelphax striatellus by enzyme-linked immunosorbent assay. (Photo by T. Omura)

≪Grassland≫

Use of Seed Pellets of Guineagrass and Tropical Legumes for Pasture Establishment in the Subtropical Okinawa Islands

Hitoshi Nakagawa[1], Norihiro Shimizu[2] and Kazunari Shyoji[3]

Soils distributed in subtropical Okinawa Islands usually designated as Maji soils are chemically and physiologically poor.

Germination rate of Stylo seed pellets put into a red Maji soil without soil covering (Photo by H. Nakagawa)

These soil characteristics in addition to the climatic conditions with annual summer drought and typhoons prevented the establishment of grasslands on these islands. We considered that the use of seed pellets like soybean or maize seeds could alleviate these shortcomings. Therefore, we developed methods to produce seed pellets for 2 guineagrass (*Panicum maximum* Jacq.) cultivars, Natsukaze and Natsuyutaka and 7 tropical legumes, *Macroptilium atropurpureum* cv. Siratro, *Centrosema pubescens* cv. Centro, *Stylosanthes hamata* cv. Erano, *S. scabra* cv. Seca, *Desmodium intortum* cv. Greenleaf, *D. uncinatum* cv. Silverleaf, *Neonotonia wightii* cv. Tinaroo.

The seed pellets of guineagrass and tropical legumes mainly consist of volcanic ash soil. The shape is spherical and the size ranges from 0.8 to 1.5cm in diameter depending on the seeds and purposes. The seed pellets were produced by mixing 3,000g of volcanic ash soil passed through a 1mm mesh net, 300g of clay soils such as bentonite if necessary, 80g of guineagrass seeds (germination rate; 40%) or 25g (Greenleaf) to 110g (Stylo, Siratro, Tinaroo and Centro) of legume seeds, and ca. 1,000ml of water in a mixing machine (Kneader). The mixture was put into another machine (Pelleter) to obtain tight sticks. Then, the sticks were put into a "Marumerizer" (trade name) to obtain spherical pellets on a turning plate. These wet pellets were dried at 40°C for 2 hours. Each guineagrass seed pellet contained 7 to 15 seeds and each legume seed pellet 3 to 6 seeds from which 2 or more seedlings germinated. For the production of seed pellets of tropical legumes, except for Stylo, which are sold without pods, we developed a new method by using seeds soaked in water for 3 to 6 hours to avoid cracking and crushing of the pellets.

The seed pellets rapidly absorbed water and their water content which depended on the surrounding water conditions became maximum within 1 hour. Besides, when the seed pellets were buried in the ground, they absorbed water efficiently from the surrounding soils with a relatively lower water content. That is, the water content of the seed pellets exceeded 20% for 10 days when that of the surrounding soil was about 10% and the seeds in the pellets germinated very well. As a result, the number of germinated plants from seed pellets, exceeded that from the seeds under different water conditions when a similar number of seeds with or without seed pellets was seeded on a red Maji soil. This phenomenon was more obvious for Seca Stylo than for the other cultivars.

The addition of micronutrients, such as molybdenum, zinc, iron, and phosphorus to the seed pellets was possible. The addition of 5g of $NaMoO_4$ in 3.3kg of soil, $2H_2O$, 50g of $Fe_2(SO_4)_3$, and 1.2kg of phosphate to the seed pellets did not affect the

germination rate though the germination rate of the seed pellets after the addition of 100g of $ZnSO_4$ was somewhat lower than that of the control.

Mechanical sowing of seed pellets was carried out by using a Grain Drill Seeder at Okinawa Prefectural Livestock Experiment Station and a linked-belt type seeder at the Okinawa Branch. As it is difficult to transport and sow the seed pellets, the use of the seeding machines listed above may be beneficial.

The use of seed pellets of guineagrass and tropical legumes is very effective for the establishment of grasslands on the drier, chemically and physically poor soils distributed in tropical and subtropical regions.

1) Hiroshima Prefectural Agriculture Research Center: Hachihonmatsu, Higashihiroshima, Hiroshima, Japan
2) National Grassland Research Institute: Nishinasuno, Tochigi, Japan
3) Okinawa Prefectural Livestock Research Station: Nakijin, Kunigami, Okinawa, Japan

≪Crop Production≫

Development of methods for the improvement of seedling establishment in wet seeding rice culture in the Muda area in Malaysia

Hiroyuki Hiraoka, Yutaka Kanetani[1], Hideto Fujii and Ho Nai Kin[2]

The Muda irrigation scheme is the largest rice granary of Malaysia, In the early 1980s, as the labour shortage for transplanting became acute, some farmers in the Muda area adopted direct seeding culture to overcome this constraint. After several attempts, the direct seeded area increased exponentially, reaching 76,900 ha or 85% in the first cropping season and 56,300 ha or 58% in the second cropping season during the three-year period from 1986 to 1988. However, direct seeding culture in the Muda area is associated with various unstable factors compared with transplanting. The objective of this study is to develop methods for the improvement of seedling establishment in wet seeding rice culture which is widely adopted both in the first and second cropping seasons.

Paddy yields in the first cropping season appeared to have decreased along with the spread of direct seeding culture and shortage of irrigation water since 1984. Paddy yields in the second cropping season also decreased or remained stationary with the spread of wet seeding culture compared with the yields obtained in 1980 and 1981 when only transplanting was implemented. Various experiments and field surveys were carried out to identify the optimum planting density for wet seeding culture. Based on the decrease of yield in the plot with less than 100 plants per m^2 and the occurrence of hopperburn caused by brown planthoppers at a high planting density of more than 200/m^2 under standard nitrogen application (80kg/ha), the recommended planting density for stable yield ranged from 100 to 150 plants/m^2.

Furthermore, the yields in the wet-seeded plots were as high as those in the transplanted ones or even higher when the growth of the rice plants was normal.

As for seedling establishment in wet seeding rice culture in the Muda area, the total area of the fields with vacant spots when seedling establishment had failed accounted for 6.0% or more of the entire area, amounting to about 20% of the combined area for site A, and about 35% for site B. The average number of seedlings established at site A was as high as abut 160 plants per m^2 with an average coefficient of variation of 50%. However, about 20% of the fields exhibited a low rate of seedling establishment with an average value of less than 100 plants per m^2 which resulted in a remarkable yield decrease. Low seedling establishment and the presence of vacant spots when seedling establishment had failed were due to poor drainage through shallow ditches made by dragging a gunny sack filled with soil. To improve the drainage conditions in wet seeded fields, the use of ditches formed by tractor wheel ruts developed by Tanaka (1983) and Sawamura (1984 – 1988) was evaluated. We confirmed that this method was very effective for the drainage of the surface water in the fields and for the promotion of seedling establishment. As many farmers were concerned about the increase in unplanted areas, it was suggested that ditches formed by tractor wheel ruts should be constructed at intervals of around 15m.

On the other hand, the method of drainage of surface water by using an Auger-trencher was more effective and could be applied in small unplanted areas. Furthermore, this method may be suitable for fields where the drainage canal and irrigation canal are separated by a large distance such as in the Muda area.

The planting density adopted (100 – 150) and the improved drainage methods for ensuring good seedling establishment in wet seeding culture were recommended to achieve stable and high yields in the Muda area.

[1] Tohoku National Agricultural Experiment Station.
[2] Muda Agricultural Development Authority, Malaysia.

Poor seedling establishment in an ill-drained field (Photo by H. Hiraoka)

Good seedling establishment in a field with ditches formed by tractor wheel ruts (Photo by Hiraoka)

Good seedling establishment in fields with ditches dug by an Auger trencher (Photo by H. Hiraoka)

Profiles of the Research Fellows Selected for the TARC Visiting Research Program 1992.

Since October 1992, ten colleagues from seven different countries have reached the TARC Okinawa Branch, Ishigaki Island, and are conducting collaborative research with us. The research themes were previously described in the Newsletter vol. 3 (1).

Here, the profiles of our foreign colleagues are introduced in the following manner; (1) Age and Sex (2) Nationality (3) Position and Institute (4) Last Academic Position and Degree (5) Present Research Subject at Collaboration Section (6) Family and Hobbies

Yashivir Singh CHAUHAN

(1) 36 yrs, Male (2) Indian (3) Researcher, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Andhra Pradesh, India. (4) Ph. D. from the Indian Agriculture Research Institute. (5) Mechanism of heat tolerance of tropical legumes and cabbage cultivars. (6) Married, one son and a daughter. Watching films.

Ernest OTOO

(1) 40 yrs, Male (2) Ghana (3) Head, Crop Physiology Division, Crops Research Institute, Ghana (4) Dr. of Agriculture from University of Tokyo (5) Cryopreservation of germplasm of Dioscorea spp. through the technique of vitrification (6) Married, two daughters and a son. Soccer, table tennis and music.

Patrick A. ALUKO

(1) 44 yrs, Male (2) Nigeria (3) Senior Researcher, Forestry Research Institute of Nigeria (4) Ph. D. from Obafemi Awolowo University (formerly the University of Ife), Nigeria (5) Silvicultural techniques for improved growth of some tropical tree crops through the use of fertilizers, liming and inoculation with selected microorganisms (symbiosis) for sustainable production in acid soils (6) Married, two sons and a daughter. Table and lawn tennis.

HANARIDA SOMANTRI Ida

(1) 41 yrs, Female (2) Indonesian (3) Senior Researcher, Central Research Institute for Food Crops, Bogor, Indonesia (4) Ph. D. from Bogor Institute of Agriculture, Indonesia (5) Salt tolerance in rice genetic resources with emphasis placed on genetic variation and physiological basis for salt tolerance (6) Married, one son and a daughter, Movies.

Brijesh Dutta SHARMA

(1) 32 yrs, Male (2) Indian (3) Senior Researcher, Central Arid Zone Research Institute, India (4) Ph. D. from Govind Ballabh Pant University of Agriculture and Technology, India (5) Effect of mycorrhizal inoculum and line on the availability of phosphorus and plant growth in cowpea-sorghum rotation in acid soils (6) Married, one son. Reading and movies.

Uthai CENPUKDEE

(1) 40 yrs, Male (2) Thai (3) Senior Researcher, Rayong Field Crops Research Center, Dept. of Agriculture, Thailand (4) Ph. D. from University of Queensland, Australia (5) Mechanism of heat tolerance and characterization of heat tolerant Brassica cultivars (6) Married. Lawn tennis.

Iteu Margaret HIDAYAT

(1) 40 yrs, Female (2) Indonesian (3) Senior Researcher, Lembang Horticulture Research Institute, Indonesia (4) Master's degree from Colorado State University, USA (5) Medium-term and long-term conservation of garlic, pineapple and sweet potato germplasm (6) Single, Gardening.

Zhang YAOZHONG

(1) 30 yrs, Male (2) China (3) Researcher, Yunnan Academy of Agricultural Sciences (4) Master's degree from Yunnan University (5) Identification and evaluation of salt-tolerant rice varieties (6) Married, one son. Chinese calligraphy and poems, go.

They will stay until the end of September 1993 on Ishigaki to carry out collaborative research with Japanese scientists in our section.

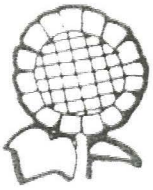
(by Dr. T. SENBOKU, Head of Collaboration Section, TARC Okinawa Branch)

Waree CHAITEP

(1) 42 yrs, Female (2) Thai (3) Senior Researcher, Prae Rice Research Center, Dept. of Agriculture, Thailand (4) Ph. D. from University of New England, Australia (4) Effects of waterlogged conditions and rice residue management on nitrogen mineralization and microbial dynamics under rice-based cropping systems. (6) Married, one daughter. Reading, movies and music.

MD. Obaidul ISLAM

(1) 40 yrs, Male (2) Bangladesh (3) Senior Researcher, Plant Genetic Resources Center, Bangladesh Agriculture Research Institute (4) Ph. D. from Bidhan Chandra Agriculture University, India (5) Development of techniques for long-term conservation of germplasm of Colocasia esculenta (6) Married. one son and a daughter, Swimming and fishing.



Profile of New Director

Naomichi Shindo, Director of Administration Division. Administrator. Born in Tokyo in 1953.

Graduated from Faculty of Law, Tokyo University in 1977.
Since then he has been working at the Food Agency, Agricultural Production Bureau, Agriculture Forestry and Fisheries Research Council, Agricultural Structure Improvement Bureau, Food and Marketing Bureau, Economic Affairs Bureau, Statistics and Information Department of MAFF.
Before he joined TARC in September 1992, he was Senior Deputy Director, International Trade and Tariff Division, International Affairs Department from April 1989 to September 1991 and he worked at the Administration Division, Statistics and Information Department from September 1991.
At the International Affairs Department, he was engaged in GATT tariff negotiations of tropical products.

TARC Internal Research Evaluation Meeting in Tsukuba and Okinawa (IREM)

Agriculture in most of the developing countries is the key activity leading to national development. TARC has contributed to the development of agriculture in various developing countries, by undertaking collaborative research projects with several institutions in these countries. In future TARC plans to upgrade this collaboration both in quality and in quantity.

For this purpose it is essential to evaluate the performance of the researchers based on the results of the studies carried out both in Japan and overseas.

TARC Internal Research Evaluation Meeting (IREM) in which the TARC researchers participate takes place every year for 1 day in the middle of January in Okinawa and for 2 days in early February in Tsukuba. All the research results obtained are reported and plans for the succeeding year are introduced for evaluation and discussion by the TARC researchers present at the Center, including the director-general and directors of research divisions. Researchers who are staying at overseas institutions with long-term assignments when IREM is held, send beforehand a summary of their results and plans to the director of the research division to which they belong.

This summary and the report presented at TARC during their home leave (described later) as well as a quarterly report are presented at IREM by the respective directors. At the same time, research highlights are identified for future publication in the periodicals issued by TARC. On the other hand, the internal research meeting at the Okinawa branch is held with the participation of the directors of the research divisions and/or research coordinators for information from Tsukuba for discussions.

Meetings during which the researchers present their findings on the occasion of their home leave (different from internal research evaluation meeting) have taken place since the TARC researchers were first dispatched overseas more than 22 years ago. Research results are mainly reported for discussion during the meeting with the participation of the researchers and directors of the research divisions of TARC as well as from other institutes to obtain fruitful suggestions, which will be considered for the subsequent dispatching of the researchers.

Collaborative research in Thailand **(continued from p.8)**

the lowest in southern Thailand. On sandy soils, very few kinds of grass species can grow, such as Ruzigrass, Guineagrass, Creeping Signal and Corigrass. Introduction of legume species in these sandy soils is considered to be very important to maintain soil fertility for the persistence of grass species. Without nitrogen and potassium application, the growth of the grasses was very poor. Fertilizer efficiency was found to be very low because nutrients such as nitrogen and potassium were rapidly lost with rainfall from the surface soil and became unavailable to the plants. The use of slow-acting fertilizers and farmyard manure appeared to be effective in sandy soils.

Studies on pasture management technology will be carried cut to contribute to the development of the north-eastern part of Thailand.

2. Virus and virus-like diseases of tropical fruits

The studies were carried out in collaboration with the researchers of the Virology Group, Plant Pathology and Microbiology Division of DOA.

In the tropics, many kinds of fruit trees are widely cultivated. The frequent occurrence of diseases hinders sustainable production and most of them have not yet been clearly defined etiologically and ecologically. Phytopathological studies on virus and virus-like diseases of tropical fruit crops are very important for the development of plant protection methods.

Banana is the most popular fruit crop in Thailand, with an annual production of 600,000 tons. Although several cultivars have been introduced for export, most of the bananas are produced for domestic consumption. In Thailand, there is no record of banana bunchy top virus (BBTV) which is considered to be the most serious disease of banana. Based on the results of field observations, it was found that many banana trees showed symptoms usually associated with virus diseases, namely dark green streaking of leaf vein, streaks or dots on the leaves, yellowing and dwafism. However, the typical symptoms of BBTV consisting of the presence of namely upright and crowded leaves and bunchy plant apex were seldom observed. Therefore attempts were made to apply serological methods for the indexing of BBTV. The results revealed that BBTV could be detected at a high rate from the 2nd and 3rd leaves and roots and thirteen plants out of ninety-seven banana plants showed a positive reaction. Twenty-six samples of banana plants with mosaic symptoms were also tested for the presence of cucumber mosaic virus (CMV) that was the causal agent of banana infectious chlorosis. Nine of the samples showed a positive reaction when the indirect ELISA test was used and 3 out of 9 samples with a positive reaction for CMV were found to be infected also with BBTV.

In addition, research was conducted on citrus greening disease. Citrus trees showing typical greening symptoms were observed at every investigation site. The study on citrus greening diseases is currently conducted by another TARC researcher.

TARC International Symposium 1993 on Plant Genetic Resources in the Tropics in Tsukuba

TARC is pleased to announce that the TARC International Symposium 1993 will be held in Tsukuba, Japan, under the title of "Plant Genetic Resource Management in the Tropics" during the period 25 to 26 August 1993.

It is widely recognized that landraces of various crop species and their wild relatives as plant genetic resources have been very useful for breeding programs. However, they are faced with genetic erosion or even extinction due to the social changes proceeding at a rapid pace worldwide, in particular in the tropical zone. As emphasized during the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992, there is an urgent need to develop appropriate technologies and global strategies for the conservation and use of plant genetic resources. In the symposium, we will discuss in detail various aspects relating to the management of plant genetic resources, with emphasis placed on technical advances.

During the symposium four subjects will be covered as follows: 1) Exploration and Collection, including Country Reports and Organization Strategies, 2) Evaluation and Utilization, 3) Conservation, 4) Data Management, as well as a keynote address on the Role of International Organizations in Global Plant Genetic Management.

Scientific advances and strategic papers on plant genetic resource management will be contributed on behalf of several countries (China, Thailand, Vietnam, Bangladesh, India, Sri Lanka, Chile, etc.) and research organizations (IPGRI, IRRI, CIP, ICARDA, IITA and TARC).

TARC in Malaysia

Land levelling under direct seeding culture of rice

H. Fujii[1] and M.C. Cho[2]

In the Muda irrigation area in Peninsular Malaysia direct seeding culture of rice has spread rapidly since 1980 and it became the predominant method of rice cultivation, surpassing transplanting in 1986. Direct seeding culture accounted for 90% of the area in the 1st season and 80% in the 2nd season in 1990. Therefore TARC and MADA (Muda Agricultural Development Authority) have been engaged in collaborative research on the promotion of rice double cropping through direct seeding culture since 1988.

Weed control and improvement of seedling establishment are the major constraints on stable direct seeding culture. The improvement of the field surface configuration by land levelling is an important measure for weed control and adequate seedling establishment. If the field surface is uneven, herbicides are not effective in higher areas of the field due to the absence of a water layer. On the other hand, in lower areas, water for puddling remains on the field surface and forms a ponding spot where the water temperatures can easily exceed 40°C. As a result, the seeds do not germinate, leading to vacant spots.

The land levelling performance can be evaluated by the standard deviation (S.D.) of the field surface level surveyed at 10 m grid points. In general a value of 7cm for S.D. is required for manual transplanting, 5cm for mechanical transplanting and a higher degree of field surface levelling is required for direct seeding. However, the degree of field surface levelling required for adequate seedling establishment under direct seeding has not yet been determined.

Land levelling using a tractor with a rear bucket. (Photo by H. Fujii)

In the current study land levelling experiments were carried out by using a mechanical motor grader and tractor in farmers' fields and the difference in the improvement depending on the type of machines was analysed along with the field configuration level required for stable seedling establishment.

The field configuration was improved (S.D. 3.8cm) through land levelling by using a mechanical motor grader coupled with a laser machine control system (LMCS). On the other hand the field surface level was improved (S.D.: 2.2-2.7cm) by using a tractor with a rear bucket in the absence of a laser machine control system. Thus, by using the tractor which is very common in this area, it was possible to reach a S.D. value of 2.5cm without laser machine control system. Furthermore the analysis of the relationship between S.D. and the percentage of vacant spot areas, revealed that in wet direct seeding, adequate seedling establishment, in which the vacant spot area was less than 3%, can be achieved when the S.D. value of the field surface level was 2.5cm and field ditches were provided.

Theoretically a S.D. value of 2.0cm which can be obtained by using a bulldozer coupled with LMCS is suitable. Based on the fact that (1) it is difficult to obtain a S.D. value of 2cm without the use of a laser bulldozer and that (2) by the improvement of the field surface with a S.D. value of 2.5cm a vacant spot area of less than 3% can be attained together with the provision of a field ditch, a S.D. value of 2.5cm for the field surface level is recommended as the standard of land levelling in the Muda area.

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[2] Muda Agricultural Development Authority

Collaborative research activities in Thailand

In Thailand, the collaborative research activities started in 1967. For the past 25 years, more than 90 long-term researchers have carried out collaborative research projects under extremely favorable conditions.

The research areas have covered almost every field except for fisheries. The area and number of long-term researchers dispatched from TARC are indicated as follows: soils and fertilizers 21, plant protection 23, paddy rice 13, upland crops 7, grassland 6, livestock and veterinary science 9, sericulture 3 and others including post-harvest technology and agro-forestry. In addition, about 400 short-term researchers and administrators have visited Thailand to take part in the collaborative research or for investigations and observations.

Seven long-term researchers are currently working at the Soil Science Division, Plant Pathology and Microbiology Division, Entomology and Zoology Division, and Field Crops Research Institute of the Department of Agriculture (DOA), Animal Nutrition Division of the Department of Livestock Development (DLD) and the Faculty of Science of Kasetsart University.

Two long-term researchers successfully completed collaborative research projects last year. In this paper, their research results are briefly outlined.

Banana plant (Kluai Namwa) infected with banana bunchy top virus showing upright and crowded leaves with marginal yellowing. (Photo by J. Imada)

1. Development of technology for pasture management in Thailand

The collaborative research was carried out at Narathiwat Animal Nutrition Research Center, Animal Nutrition Division of DLD located in the southern part of Thailand.

The development of animal husbandry is important in southern Thailand. This objective could be achieved by the increase of the production of forage crops through the establishment of pastures in coconut and para rubber plantations to optimize land utilization. However many problems relating to pasture establishment and management in coconut plantations and native pastures which could be used for the production of high-yielding forage crops, remain to be solved due to the low soil fertility in these areas.

In southern Thailand, sandy soils (Sand Dune Regosols and Ground Water Podosols) are distributed on old beach and sand dunes. Soil analyses have revealed that the nutrient supplying potential of these soils is

(continues to p.7)

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