



APAARI

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EDITORIAL

Asia-Pacific Association of Agricultural Research Institutions (APAARI) is slowly emerging as an institution to foster closer linkages among the apex agricultural research management organizations in the region. Already 17 National Agricultural Councils/Apex Institutions have joined APAARI, whereas International Centres such as IRRI, CIMMYT, ICRISAT, IIMI, IPGRI, AIT and AVRDC have also become Associate Members.

Besides publication of APAARI Newsletter, which often covers important issues relating to regional meetings, conferences, programmes and organizations, this Association has recently published three success stories and has exchanged several valuable publications and FAO documents to a large number of agricultural institutions in the region. Regular meetings on relevant agricultural research and management topics are being organized each year in order to sensitize the policy makers for added support to agricultural research and also to provide a neutral forum for the exchange of information and experiences among NARS leaders.

The Third General Assembly of APAARI is proposed to be held in December, 1994 when an expert consultation on the subject entitled "NARS vision towards future challenges and opportunities for sustained and enhanced productivity and food security" will specifically be organized to crystalize views concerning new research and technology paradigm for achieving the required agricultural sustainability in the region.

In order to serve its mandate effectively, APAARI also wishes to have a "Future Perspective Plan" worked out. Already the process has started and a brainstorming session has taken place. Obviously, there is an apparent need to prioritize as well as systematize the activities in order to have better visibility of APAARI. Accordingly, inputs from all concerned with agricultural research in the region would be helpful in evolving a meaningful strategy for the future. Your valuable suggestions are, therefore, solicited.

Editors

REGIONAL EXPERT CONSULTATIONS

REGIONAL EXPERT CONSULTATION ON PRODUCTION OF PULSE CROPS



Regional Expert Consultation on Production of Pulse Crops was held at the Indian Agricultural Research Institute, New Delhi, India from 1-6 April, 1994.

Experts from 15 countries, namely, Australia, Bangladesh, China, India, Indonesia, Iran, Laos, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam participated in the Consultation, besides representatives from ICRISAT, ICARDA, AVRDC, the officials from the Indian Council of Agricultural Research (ICAR) and the senior scientists from Indian Agricultural Research Institute (IARI). The Meeting was opened by the Agriculture Minister, Hon'ble Dr. Balram Jakhar and chaired by Mr. A.Z.M. Obaidullah Khan, ADG/RR, FAO RAPA. FAOR India and other officials from FAO also participated.

The Consultation emphasized the importance of pulse crops towards both "Household Nutrition Security" and the "Sustainable Agriculture". Pulses have not kept pace with growth rates in other crops and needed much more concerted efforts to improve both the production and productivity to remove existing malnutrition in the region, being the major source of protein for the people. The Consultation felt that productivity of pulses could be enhanced substantially through concerted efforts and required regional collaboration. Further, the Consultation realized that considerable variation exists for technology generation and adoption in the region. It was also realized that for pulse crops, further advancements are likely through the intensification of both horizontal and vertical expansion since scope exists for both.

The Consultation, adopted the following major recommendations:

A) GENERAL AND POLICY ISSUES:

- i) Appropriate national policies conducive for the future growth of pulses need to be devised at an accelerated pace keeping in view their long term goals, especially in view of "Household Nutrition Security" and "Sustainable Agriculture" in the region.
- ii) Appreciating the role that pulses would continue to play as a major source of protein for the millions of people in this region, the Consultation felt that greater attention for their development be paid so that a number of these pulses do not remain "orphan commodities" in future. Also future targets for plant protein needs to be worked out on realistic basis in order to devise appropriate strategies.
- iii) The Consultation realized that greater support for research and development (R&D) by the national governments was critical at the present juncture and hence urgent remedial measures were needed to improve the situation.
- iv) In view of their specific adaptability in marginal rainfed areas as well as difficult agro-ecological situations, the Consultation felt that pulses would not only provide

balanced nutrition to the resource poor people but would also enable them to have their socio-economic condition improved, besides their role towards sustainability, including improvement in both soil nutrition and soil health. Hence, their production need to be encouraged in the future.

- v) The Consultation felt that except for major pulse crops, often correct statistics is not available for minor pulses. Collection of proper data would help promote production of pulses in the region. Similarly, statistics on mixed cropping would give more realistic picture about their production and area coverage.

B) RESEARCHABLE ASPECTS:

- i) The Consultation felt that while research support is quite strong in some of the countries, majority of the developing countries need further strengthening of research activities in pulses. Therefore, Consultation urged that each member country may review existing support for R&D and ensure needed support in the future.
- ii) For ensuring higher production of pulses, the Consultation felt that future thrust be given in the following areas:
 - Thrust on varietal improvement including hybrid technology (ex. pigeonpea) and new plant types
 - Plant biotechnology for biotic and abiotic stress resistance and also for value addition of pulses
 - Integrated Plant Nutrition System (IPNS) and Integrated Pest Management (IPM) approaches
 - Research on farming systems involving pulses as an integral component for sustainability
 - Concerted thrust towards research on under-utilized food legumes of economic importance
 - Research aiming at production technology for promoting pulses as niche crop in cereal-cereal systems and in non-traditional areas
- iii) In order to derive benefit of available technology in the region, Consultation realized the need for regional linkages in the field of varietal testing, germplasm exchange, training and dissemination of available information. FAO and CG Centres could play major role in this context. Establishment of FLCGNET and other sub-networks on different crops of considerable importance in the region by FAO and other CG Centres is a welcome development. Consultation endorsed strongly this approach for the regional collaboration.
- iv) For basic and strategic research, the Consultation realized that additional research and training support by the concerned CG Centres such as ICRISAT, ICARDA, and IITA, and also by AVRDC would enable NARS to meet future challenges effectively. Hence, all these centres may consider providing additional need

based support on crops under their mandate.

c) DEVELOPMENT ISSUES:

- i) Many countries in the region have relatively little coverage under High Yielding Varieties (HYVs). The Consultation, therefore, emphasized that an aggressive approach to promote high yielding varieties and technology would help in improving the situation.
- ii) Availability of quality seed could be improved substantially through the promotion and incentives to both the Public and Private Seed Sectors. Accordingly, the Consultation felt an urgent need for required support to the seed sector to improve further seed availability of HYVs.
- iii) It was also felt that available technology, if properly transferred from lab-to-land, considerable improvement in productivity could be achieved. Hence, Consultation recommended that Mission oriented programmes in pulses be initiated by the pulses growing countries in the region.
- iv) The Consultation noticed that input use in many countries is minimal or negligible. Whereas, some inputs like improved seed, rhizobium culture, application of starter dose of N fertilizer, weedicides, and IPM could help improve the productivity, even application of one supplemental irrigation could help considerably. Therefore, extension efforts are needed to promote further the use of these critical inputs.
- v) There is considerable scope for taking pulses to new areas. In order to have a success in this direction, specific research and development efforts are necessary. Therefore, Consultation recommended that each member country may examine the possibilities for area expansion in order to devise suitable strategies in the future.
- vi) Pulses are being used in Asia-Pacific in the form of a variety of food products. Promotion of various food uses is, therefore, necessary. Consultation felt that publication and dissemination of available information in this regard would encourage further the use of pulses and thereby ensure "Nutritional Security" for the people in the region.



Participants attending the Regional Expert Consultation on Production of Pulse Crops

REGIONAL EXPERT CONSULTATION ON HYBRID SEED DEVELOPMENT

A Regional Expert Consultation on Hybrid Seed Production, Development and Security of Major Cereal Crops in the Asia-Pacific Region was held at FAO RAPA, Bangkok, Thailand from 9-12 November, 1993



Participants attending the Regional Expert Consultation on Hybrid Seed Development

A total of 43 participants attended the Consultation. Eleven experts, one each from 11 major rice, maize, sorghum and pearl millet growing countries (Bangladesh, China, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines,

Republic of Korea, Thailand and Vietnam) participated. Besides one representative from each of the three CG centres - CIMMYT, ICRISAT and IRRI and one representative of each of the four seed associations of the region, namely, Australia, Bangladesh, India and Thailand were in attendance. In addition, 13 observers, five resource personnel and three officials of FAO RAPA and one from FAO Headquarters attended the deliberations.

The Consultation emphasized the importance of hybrid research and development in improving productivity and production of rice, maize, sorghum and pearl millet in the Asia-Pacific region. It recognized that the available level of technology is capable of increasing yield *per se*, considerably. However, limited availability of quality seed in the region was realized as the biggest constraint.

Scope of developing/introducing two-line rice hybrids and single-cross maize hybrids appeared to be vast. Possibility of exploiting apomictic genes in rice for having single line hybrids was considered a distant goal which needed concerted efforts and research work in the field of biotechnology.

Need for developing early maturing and durable downy mildew resistant parental lines and hybrids of pearl millet was realized. Similarly, development of sorghum hybrids with in-built tolerance/ resistance to shoot fly, charcoal rot, grain mold and terminal drought was emphasized.

Diversification of male sterility systems, in general, for minimizing the risk in hybrid cultivation due to on-slaught of diseases and pests was considered vital. In case of rice it was felt that reduction in the cost of hybrid seed production and improvement in grain quality would be necessary for large scale adoption of rice hybrids in the region.

The Consultation felt that leading role of CG centres with strong basic and strategic research support to NARS would be needed with an accelerated thrust on hybrids.

It was felt that the conductance of the regional trials on hybrids is an immediate requirement to provide needed access to available hybrid technology in the region. In this endeavour, role of CG centres and FAO for initiating/strengthening regional hybrid trials was recommended.

It was recognized that an effective *sui generis* system of protection of plant varieties suiting to the national re-

quirements in the foreseeable future would be desirable for accelerated parental line and hybrid development in the region. It would also enable the private sector to introduce their best hybrids.

The Consultation felt that harmonization and standardization of seed certification and quality law enforcement rules, regulations and procedures in the region would help in promoting quality seed production and its availability. The initiative of FAO to establish an Asia-Pacific Seed Association was appreciated and was considered timely to provide much needed support for the development of seed industry in the region.

Strengthening of research and seed production, processing, storage, quality law enforcement and marketing infrastructure in most of the countries was found highly inadequate. Hence, it was recommended that national governments may be requested to assess their needs and systems and may initiate appropriate action to bridge this gap.

The Consultation recognized that the hybrid seed availability was quite low in most of the countries. It also recognized the important role that private sector can play to improve this situation.

The Consultation recorded its appreciation for the initiative taken by the FAO in organizing this important Consultation which is likely to accelerate further the hybrid research and development activities in the region.

REGIONAL EXPERT CONSULTATION ON THE ASIAN SOYBEAN NETWORK (RECASON)

The Regional Expert Consultation on the Asian Soybean Network was held at FAO/RAPA, Bangkok, and as a satellite workshop of the Fifth World Soybean Research Conference in Chaing Mai, Thailand, during 20-26 February 1994. Thirteen experts from Australia, China, India, Indonesia, Korea, Lao PDR, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam, together with eleven experts from AVRDC, CGPRT Centre, INTSOY, and FAO participated in the Consultation.



Participants attending the Regional Expert Consultation on the Asian Soybean Network

The Consultation took note of the increase in production of soybean in most member countries. It also took note of the role played by the regional and international institutions (AVRDC, CGPRT Centre, FAO and INTSOY) in supporting the Asian Soybean Network. Among these, FAO is in a position to provide immediate logistic support to the Network through its regular programme activities, its associated association (APAARI), project (RAS/89/040), and network (FLCGNET). The Consultation was of the opinion that other regional and international agencies could also be approached to provide support for soybean development.

The Consultation agreed to conduct international or regional varietal trials of promising cultivars and also on-farm trials. It encouraged the use of IPM strategies, the compilation and exchange of information on farm machinery, tools and processing equipments, the organization of training courses, study tours etc., and the publication of a newsletter.

The Consultation also recommended that the FAO/RAPA may continue providing the logistic support during the initial stages of the Network's operation and appoint Steering Committee to implement the workplan. It was also suggested that the Network should seek ways and means to hold the Second International Congress on Soybean Processing and Utilization and the Consultation further desired to have regular meetings of RECASON in future.

FAO SPONSORED REGIONAL ASSOCIATIONS

Presently, there are three Regional Associations located at the FAO Regional office for Asia and the Pacific (RAPA), Bangkok. Besides APAARI, FAO is also sponsoring the following two Associations:

- i) Asia and Pacific Regional Agricultural Credit Association (APRACA)
- ii) Association of Food Marketing Institutions in Asia and Pacific (AFMA)

A brief account of their objectives and activities is provided here:

I. ASIA AND PACIFIC REGIONAL AGRICULTURAL CREDIT ASSOCIATION (APRACA)



The association was established in 1977 with FAO sponsorship for stimulating the exchange of information and experts to conduct training programmes in agricultural banking. The membership of APRACA now stands at 53 agricultural credit and banking institutions from 20 countries. In the spirit of Technical Cooperation among Developing Countries (TCDC), the association has been conducting regional- and country- level training programmes for personnel of member institutions, organizing in-service staff exchanges, and study tours on agricultural development programmes. Seminars on agricultural credit and small farmer development such as crop insurance, credit guarantee and rural savings mobilization have also been arranged by APRACA. Major activities of the Association during 1992-93 were

various meetings of administrative nature (e.g. General Assembly, Executive Committee Meetings, Managing Directors Meetings), staff planning workshop and other workshops on rural finance programme. APRACA also organized over 20 training courses for banking and financial institutions. APRACA Newsletter (quarterly) and Asia-Pacific Rural Finance Journal (quarterly) are the important publications being brought out by the Association.

II. ASSOCIATION OF FOOD MARKETING INSTITUTIONS IN ASIA AND PACIFIC (AFMA)



FAO Regional Office sponsored the formation of Association of Food Marketing Agencies in Asia and the Pacific (AFMA) in 1983 with a view to promote TCDC in the field of food marketing. Twenty-eight food and marketing institutions of 12 countries are currently members of this Association. The AFMA arranges training of senior level policy makers and middle level managerial and technical staff on various policies, programmes, management and technical aspects of food marketing systems. It has also helped the member institutions to establish a machinery for systematic interchange of information and experiences regarding various aspects of food marketing activities. Major activities of AFMA during 1992-93 were: 4 Marketing Trainings one each in Thailand, Pakistan, India and Philippines, one study tour of Chinese officers to the Republic of Korea, and publication of Food Marketing Newsletter (quarterly) and a proceedings of one regional workshop.

THE ASIA AND PACIFIC SEED ASSOCIATION (APSA)

The Food and Agriculture Organization of the United Nations (FAO) has recently taken steps to establish a regional Asia and Pacific Seed Association (APSA). The Association will have as its members both from public and private seed enterprises, engaged in seed or seed-related activities. The purpose of the association is to provide a forum to discuss seed policy issues, improve the dissemination and sharing of information on seed technology and marketing, facilitate training, and articulate seed producers' needs to breeders and research institutions. The association will also strengthen seed sectors' links to international organizations such as FAO, FIS and ISTA.

The recommendation to organize the Asia and Pacific Seed Association (APSA) was made in a regional conference held in Bangkok, in June 1992, in which 45 seedsmen from the public and private sectors participated. A preparatory group has since drafted APSA's constitution, work programme and budget.

Financial support of US\$ 2 million, for the period 1994-98, is being provided by the Danish International

Development Agency (DANIDA). It is presumed that APSA would be self-sustaining by the end of 1998.

The foundation meeting for APSA will be held in Chiangmai, Thailand from 27-29 September 1994. On 27-28 September, a regional conference ASEAN SEED 94 will also be held in Chiang Mai on issues relating to "Trends in Asian Seed Markets" and "Biotechnologies for Developing Countries" in which about 150 delegates representing public and private seed sector are expected to participate. Formal launching of APSA will take place on 29 September, 1994.

Further information concerning membership of APSA as well as ASEAN SEED 94 can be obtained from:

Mr. Mogens Lemonius
Chief Technical Adviser
FAO Regional Office for Asia and the Pacific
Phra Atit Road, Bangkok 10200
Thailand

Phone: +66 2 5797545
Fax: 5614834 or 2800445.

INGER NETWORK

Genetic diversity is the basic raw material for the growth and sustenance of the human race. The genetic diversity created by nature and the genetic recombinants added by plant breeders form the basis of varietal improvement. Germplasm sharing, followed by testing and acclimatization play a key role in this process. Realizing the need to freely exchange and evaluate elite rice germplasm for different rice-growing environments, International Rice Research Institute (IRRI) established a Network called the International Rice Testing Programme (IRTP) in January, 1975, with funding from the United Nations Development Programme (UNDP). In 1989, the International Rice Testing Programme (IRTP) was renamed as the International Network for Genetic Evaluation of Rice (INGER). Its main objectives are:

- To make the world's elite rice germplasm available to all rice scientists for direct use or in crosses within breeding programmes.
- To provide rice scientists with an opportunity to assess the performance of their own advanced breeding lines over a range of climatic, cultural, soil, pathogen, and insect pest conditions.
- To identify genetic sources of resistance to major biotic stresses and tolerance for abiotic stresses.
- To monitor and evaluate the genetic variation of pathogens and insect pests.
- To serve as a center for information exchange on how varietal characteristics interact with diverse rice-growing environments.
- To promote cooperation and interaction among rice scientists.

PARTICIPATION IN INGER

About 1,000 rice scientists from NARS in about 75 countries in Asia, Africa, and Latin America currently participate in this network. Other international agricultural research centers (IARCs), such as CIAT, IITA, and WARDA also participate. The best breeding lines and varieties developed are combined into a series of observational and yield nurseries for evaluation in about 800 locations.

Global thinking with regional focus

INGER has a regional focus and a global perspective. Latin America and Caribbean (LAC) countries are supported through the INGER-LAC Coordinator's Office located at CIAT, while African countries are supported through the INGER-Africa Office located at IITA. The global programme looks after Asia, its major client, in addition to supporting these two regions and other areas.

Type of nurseries

Two types of nurseries are maintained -- ecosystem-oriented and stress-oriented. Ecosystem-oriented nurseries focus on the rainfed upland, rainfed lowland, irrigated, and flood-prone environments. For each ecosystem, there are observational nurseries, where many breeding lines are evaluated and there are yield nurseries, where a few lines

are evaluated in replicated trials. The stress-oriented nurseries focus on major biotic (insect pests, diseases) and abiotic (temperature, moisture, soil) stresses. New nurseries for temperate rice, basmati-type aromatic rice, extra early rice, strongly photoperiod-sensitive rice, and hybrid rice are being considered.

IMPACT OF INGER

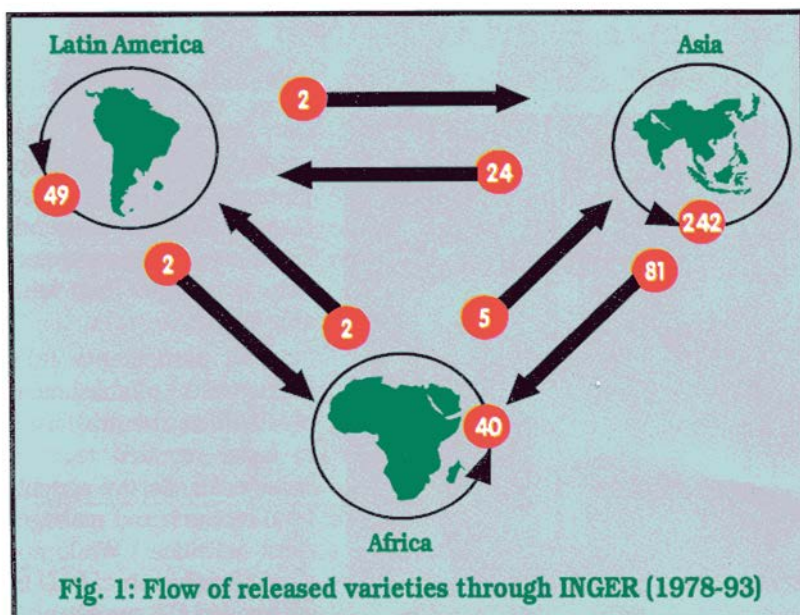
Genetic diversity: promotion and utilization

From 1975 to 1993, more than 38,000 test entries were evaluated through INGER. Of these, 290 have been released as varieties in 57 countries in Asia, Africa and Latin America. These lines originated from the breeding programmes of 31 countries and from those of IRRI, IITA, and CIAT. Germplasm has moved not only from one continent to the other but also within a continent, from one country to another (Fig. 1). Some of these countries have no diplomatic relations with each other but INGER's political neutrality helped overcome these barriers.

More than 3,000 breeding lines and varieties distributed through INGER have been used by national programmes to improve the productivity of local varieties, thus contributing significantly to increased rice production in many countries. Similarly, IRRI and other IARCs working with rice had easy access to NARS breeding materials.

Worldwide germplasm exchange accelerates development of improved varieties and broadens genetic diversity. Evenson and Gollin (1993 unpubl.) aptly described INGER's key role in the process:

- A 1992 study of germplasm dispersal examined data on rice varieties released in 18 countries from 1965 to 1990. Of 1,709 modern varieties released, 390 were borrowed -- developed in one country and released in another. IRRI provided 75% of the borrowed varieties. Most of the varieties borrowed were made available through INGER.
- Of the varieties released, some 75% have at least one borrowed parent, more than 45% have at least one parent from IRRI, and more than 3% have at least one parent from another country. About 80% of parental borrowings have been chosen from INGER nurseries.
- The diversity of the varietal pedigree has increased -- only 3 varieties released before 1965 had more than 4 ancestors, 222 varieties released during 1986-91 could be traced to 5 or more ancestors, and 72 had more than 15 ancestors.
- The share of ancestors delivered through IRRI lines continues to grow: IRRI provided more than half of the ancestors for varieties during 1965-74 and nearly three-fourths of the ancestors for varieties released during 1981-90. The average number of land races and other progenitors was considerably higher for materials with IRRI ancestors than for those without. IRRI materials represent a significant source of germplasm and genetic diversity in the varieties for which they were ancestors or parents.



INGER Nursery

Donors for resistance and tolerance

The INGER observational nurseries have helped identify major sources of resistance to diseases and pests and tolerance for various abiotic stresses. Many donors for these traits are now available. These have been used by plant breeders to confer resistance to local varieties. These donors are valuable because they are instrumental in protecting the crop, stabilizing yield, reducing pesticide use, and protecting the environment and human health.

Less developed countries have been the primary beneficiary of INGER. Countries such as Cambodia, Myanmar, and Vietnam (where research infrastructure is lacking or even non-existent) greatly benefited from breeding lines developed in other institutions. A case in point is Cambodia. Because of the civil war, its scientific capability is almost nonexistent. Almost all rices cultivated in the country are unimproved. IR8, the Green Revolution rice variety, did not even reach Cambodia. On the contrary, during 1988 to 1993, a total of 12 varieties were released; 10 of these came directly from INGER nurseries. The newly released varieties have spread to more than 50,000 ha in a short span of time and the country is looking forward to attain self-sufficiency.

AARINENA - ANOTHER REGIONAL ASSOCIATION

Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) was established in 1983 based on recommendations of the FAO Regional Conferences. AARINENA has membership of national agricultural research institutions from 17 countries, besides three international and regional organizations, namely: Arab Centre for Studies of Arid Zones and Drylands (ACSAD), Arab Organization for Agricultural

Development (AOAD), and International Centre for Agricultural Research in the Dry Areas (ICARDA). The first issue of AARINENA Newsletter, published in February, 1994, covers details about objectives and activities of this Association. For more details, please contact Dr. Ibrahim Y. Hamdan, Interim Secretary, FAO Regional office for the Near East (RNEA), P.O. Box 2223, Cairo, Egypt. (Tel: 349718; Fax: 3495981)

Sustainability

A broad genetic base of farmers' varieties ensures reduced susceptibility to pests and diseases. In fact, the origin of 1,709 modern varieties can be traced to 11,592 cultivars used to develop pest resistance. Use of varieties that are highly resistant to pests and diseases precludes application of harmful pesticides, and thus ensures human health and environmental protection.

Varietal releases

Varietal release as a consequence of germplasm exchange had significantly contributed to increases in production in several rice-growing countries. For the last 18 years, 290 INGER-provided lines have been released as 454 varieties in 57 countries of Asia, Africa, and Latin America. In Vietnam, China, and Indonesia, more than 60% of the

total rice area is planted to breeding lines distributed by INGER. More than 10 million hectares in China are planted to materials derived from crosses made with INGER entries. These varieties are cultivated in about 65 million ha annually in the world.

Economic impact

Evenson and Gollin (1993 unpubl.) estimated the economic value of each released variety to be US\$ 2.5 million. The value of modern varieties in the indica rice region in 1990 was estimated to be US\$ 3.5 billion.

Impact on less developed countries

APAARI PERSPECTIVE PLAN MEETING

An APAARI Perspective Plan Meeting was organized at FAO RAPA, Bangkok on 3-4 May, 1994, based on the suggestions made by the Executive Committee in its last meeting held in November, 1993. The objective of the meeting was to have a brainstorming session to work out APAARI's future perspective plan.

The participants in the meeting were: from FAO: Mr. A.Z.M. Obaidullah Khan, Dr. R.B. Singh, Dr. R.S. Paroda, Mr. F.J. Dent, Dr. M. Sasaki, Dr. C.T.S. Nair, Dr. B.K. Nandi, Dr. Narong Chomchalow, Mr. P.A. Hicks and Prof. C.Y. Shen; from ICRISAT: Dr. Y.L. Nene and Dr. C.L.L. Gowda; from CIMMYT: Dr. Carlos de Leon; from AIT: Dr. S.H. Upasena. Besides, four resource persons, namely Dr. Md. Sharif bin Ahmad, Director General, MARDI, Malaysia, Dr. Montri Rumakorn, Director General, Department of Agriculture, Thailand, Dr. William D.



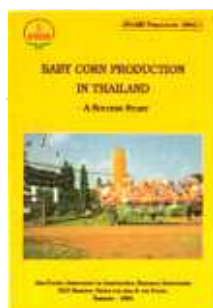
Participants attending the APAARI Perspective Plan Meeting

Dar, Director, Bureau of Agricultural Research, Philippines and Dr. H.K. Jain, Ex-Deputy Director General, ISNAR, were invited to participate and offer their valuable inputs.

All participants fully supported the establishment of APAARI as a neutral forum to foster required regional linkages for effective agricultural research and management activities. While ap-

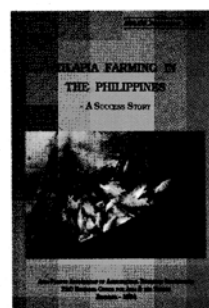
NEW APAARI PUBLICATIONS

APAARI has recently published the following three success stories:

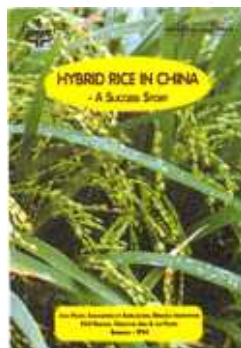


Baby Corn Production in Thailand
- A Success Story
(APAARI Publication: 1994/1)

Tilapia Farmings in the Philippines
- A Success Story
(APAARI Publication: 1994/2)



Hybrid Rice in China - A Success Story
(APAARI Publication: 1994/3)



For copies, please write to the APAARI Secretariat.

TECHNICAL COOPERATION ON SOYBEAN

In order to promote the required technical cooperation and linkages on soybean, a visit of Prof. Wang Lianzheng, President, Chinese Academy of Agricultural Sciences (CAAS), a well known soybean breeder, was organized jointly by FAO RAPA and APAARI to Bangladesh, Indonesia and Vietnam during November, 1993 - February, 1994 in order to provide technical expertise and also to explore the possibilities of promoting the required research cooperation with China.

Prof. Wang has strongly suggested the exchange of germplasm and varieties, besides promoting soybean research activities, including training programmes in soybean production, processing and utilization aspects. He has also assured full cooperation of CAAS to the concerned institutions in these countries.

Under a regional project on food legumes and course grains (RAS/89/040), it is planned to organize a training on soybean production and processing at CAAS, Beijing, China during 1994, whereas another training on soybean production will be held at the National Research Centre on Soybean (NRCS), Indore, India in 1995.

During 1993, FAO RAPA arranged for the seeds of four promising varieties from India for testing in Bangladesh at



Prof. Wang visiting a farmer's field in Bangladesh

the request of Prof. Mohd. Yunus, Chairman, Grameen Bank. Based on good performance, Grameen Bank, Bangladesh desired to have 10 tons seed of variety PK 472 from India, which FAO Regional Office arranged through the Seeds Division, Ministry of Agriculture, Government of India. The seeds are being supplied by the Terai Seeds Corporation, Pantnagar, Uttar Pradesh, India.

THE NEW GEP

Representatives from more than 80 countries reached an agreement on March 16, 1994 in Geneva to restructure and replenish the Global Environment Facility (GEF). The agreement is considered to be the first major financial accomplishment since Rio and represents a unique and practical combination of ideas befitting a mechanism for international cooperation and to play a crucial role in support of the Climate Change and Biodiversity Conventions.

The new GEF has been replenished with pledges from 26 countries, including eight developing countries, totalling over \$ 2 billion, which can be regarded as a truly significant effort by the international community in its commitment to global environmental protection.

The GEF will have an Assembly, a Council, and a Secretariat with 32 members. Implementation of GEF will be the responsibility of the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and the World Bank. The Secretariat will be supported administratively by the World Bank.

NEW ASSOCIATE MEMBERS OF APAARI

Besides IRRI, IIMI and ICRISAT, following CG Centres and International Institutions have also joined APAARI as Associate Members:

1. Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), Mexico,
2. International Plant Genetic Resources Institute (IPGRI), Rome
3. Asian Vegetable Research and Development Center (AVRDC), Taiwan
4. Asian Institute of Technology (AIT), Bangkok

APAARI, while welcoming them, wishes to work in their close collaboration to strengthen further the National Agricultural Research Systems (NARS) in the Asia-Pacific region.

Already linkages have been established with CIMMYT through Tropical Asian Maize Network (TAMNET), and with ICRISAT through Food Legumes and Coarse Grains Network (FLCGNET) and Cereals and Legumes Asia Network (CLAN). Similarly, APAARI plans to work with IRRI towards establishing a working group on hybrid rice in the region.

FACTS

The biotechnology industry in the United States produced pharmaceuticals, diagnostic tests and agricultural products worth almost US\$ 2,000 million in 1990.

A genetically engineered tomato, a biotechnology whole food developed by Calgene, Inc., having an extended shelf life and better flavour, has been approved by FDA and USDA for commercialization. These tomatoes are already in supermarkets in the Midwest and California.

AN INSTITUTE PROFILE

On November 10, 1972, a national research coordinating agency was formed to consolidate research and make it a vital force in the country's development. It started as the Philippine Council for Agricultural Research (PCAR). Its mandate was gradually broadened to cover natural resources and PCAR was renamed Philippine Council for Agriculture and Resources Research (PCARR). The development function was added and the name was changed to the Philippine Council for Agriculture Resources Research and Development, and eventually to the present Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD).



The Headquarters of the Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development

THE PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTRY, AND NATURAL RESOURCES RESEARCH AND DEVELOPMENT

PCARRD

THE PHILIPPINES

Technology (DOST). Being a repository of R & D information in agriculture, forestry, and natural resources, it packages and disseminates matured technologies for development.

Top management consists of the Executive Director and Deputy Executive Directors for R & D and for institution development and resource management. The PCARRD Directorate is composed of Directors who head the following Divisions: Crops, Livestock, Farm Resources and Systems, Forestry, Socioeconomics, Applied Communication, Planning and Development, Finance and Administration, Institution Development, Management Information Services, and Technology Outreach and Promotion. The Environment R & D Program was recently created to handle concerns on environmental pro-

I. WHAT PCARRD IS

PCARRD is a sectoral planning, coordinating, and monitoring council under the Department of Science and Technology, conservation, and utilization (see Figure 1 for PCARRD organizational structure).

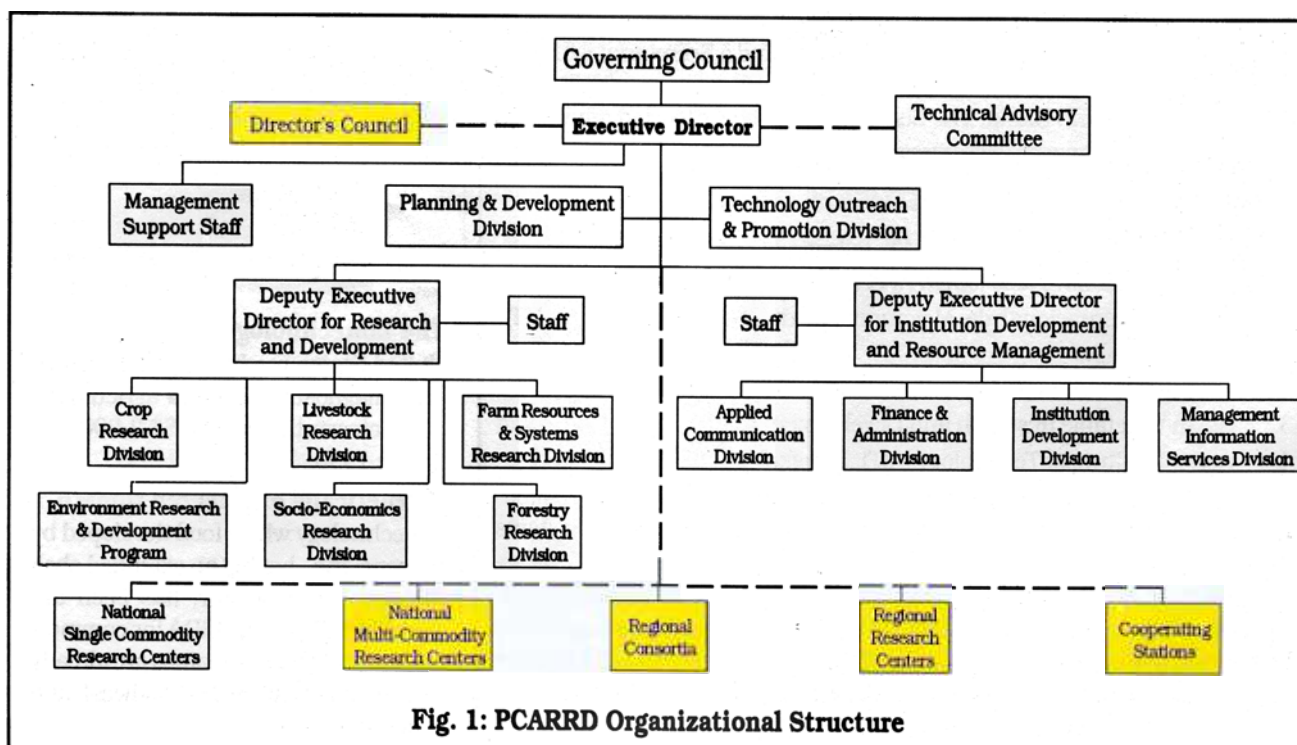


Fig. 1: PCARRD Organizational Structure

II. HOW PCARRD PERFORMS ITS FUNCTIONS

PCARRD functions through: the Governing Council (GC); Technical Advisory Committee (TAC); Secretariat; Regional R & D Consortia; National Commodity R & D Teams; Sectoral R & D Clusters; and the National R & D Experts' Pool.

The GC is PCARRD's policy-making body composed of heads or their duly authorized representatives of line agencies, the National Economic and Development Authority, the academy, and the private sector. Its composition assures the pooling of research expertise for policy-making and an adequate response by various sectors and end users to research needs.

The TAC assists the PCARRD Executive Director in ensuring the quality, competence, and effectiveness of the national research and development programmes. It defines and recommends national priorities for R & D in crops, livestock, farm resources and systems, forestry, and socio-economics.

Composed of the technical and administrative personnel, the Secretariat implements policies and guidelines enunciated by the GC.

The Regional R & D Consortia serve as the mechanism for priority setting, planning, monitoring, and evaluation of R & D projects, and technology dissemination at the regional level. At present, there are 13 regional consortia.

The National Commodity R & D Teams implement PCARRD's essential functions of formulating national R & D programmes. Each team is composed of researchers, extension agents, farmers, representatives of non-government organizations and the private sector, and economists.

The Sectoral R & D Clusters are formed as part of the agency's streamlining efforts in managing these commodity R & D teams.

Lastly, members of the National R & D Experts' Pool come from the R & D network and the private sector. These experts, who serve on an on-call basis, provide technical expertise in project development, training, and technology transfer.

III. WHO DOES THE R & D WORK

Research and development work is conducted by two separate but closely linked systems: the National Agriculture and Resources Research and Development Network (NARRDN) and the Regional R & D Consortia.

The NARRDN conducts basic and applied research on one or more commodities across a broad range of disciplines. It also packages mature and verified technologies.

Research consortia are formed in the network to enable sharing of resources and complementation of programmes.

IV. WHAT PCARRD HAS DONE

1. Establishment of the NARRDN

PCARRD spearheaded the organization of the NARRDN and provided it with adequate facilities and a strong manpower complement. It transformed four major agricultural centers in four regions of the country into formidable sci-

ence communities.

As the network became a cohesive, relevant, and dynamic research system responsive to national development, wasteful and fragmented research activities were minimized.

2. New Strategies and Initiatives

The bottom-up approach is concerned with grass-root entrepreneurship which directs technology development and provides appropriate interventions and support services. PCARRD has pursued bottom-up strategies of technology delivery through the following mechanisms: (a) Development Support Communication (DSC) for selected technology transfer projects. DSC fosters people's participation in development projects that promote need-based technologies through appropriate communication techniques and channels; and (b) Rural-Based Enterprise Development. This is the old concept of rural enterprise development which incorporates the experiences of the private sector.

3. Fund Generation

Under the provision of Executive Order 128, PCARRD has developed and implemented a fund-generating strategy to support agricultural R & D activities. The development of the NARRDN's research capability requires huge financial and manpower investments which justify PCARRD's fund-generation activities. These activities have paid off in the form of grants and loans obtained from national and international funding institutions.

4. Upgrading Research Capability

Two major projects funded by the United States Agency for International Development (USAID) and the Philippine government have developed the NARRDN's research capability. The Agricultural Research Development Project (ARDP) I and II not only provided recipient centers with facilities, but also equipped them with a strong core of agricultural scientists through the manpower development programme. To date, 728 scholars from different agencies graduated from the BS, MS, and PhD degree programmes.

Likewise, the R & D capability of member institutions was assessed to identify their basic manpower and research requirements.

5. Financial Management

PCARRD instituted measures to improve financial management in research. It published the *Revised Auditing Manual for Research Operations* (RAMRO) and the *Budget Manual for Research Operations in Agriculture and Resources Research* which serve as guides for R & D budget management. In 1992, the *Accounting and Auditing Manual for Research Operations* (AAMRO) was approved to resolve the constraints in the RAMRO. The RAMRO restates provisions of regulations that hinder research management efforts for national development.

6. Leadership

PCARRD provides central leadership in formulating national R & D priorities. It has streamlined R & D operations by standardizing the presentation of R & D proposals based on definite criteria and evaluation of these proposals. PCARRD has the authority to recommend to the Depart-

ment of Budget and Management, research proposals attuned to national priorities.

7. Technology Generation

A significant number of technologies which are technically feasible, economically viable, socially and politically acceptable, and environmentally sound are concrete outputs of the NARRDN. These component technologies fall under crops, farm resources and systems, livestock, forestry, and socioeconomics.

8. Technology Transfer and Commercialization

PCARRD employs a two-pronged strategy in undertaking its technology transfer and commercialization programme, namely: the top-down and bottom-up approach to technology delivery.

The top-down approach involves technologies that address national problems and those with high utilitarian value ready to be picked up by the private sector.

These top-down strategies and mechanisms are the following:

- i) Applied Communication Programme - wherein technologies and information are disseminated to the NARRDN, policymakers, and interested public through publications, press releases, broadcast and audio-visual production, trainings and seminars, and technical assistance.
- ii) Action and Development Programmes - which are largely concentrated on improving the productivity of existing production systems or solving specific problems in target communities.
- iii) Comprehensive Technology Transfer and Commercialization Programme which is an aggressive mode of moving technologies from generators to the clientele. Currently, PCARRD is promoting eight technologies on mango, silage production, rapid composting, small farm reservoir, carabao upgrading, rotary flash paddy dryer, mungbean, and rubber.

9. Awards and Incentives

Furthermore, PCARRD provides incentives to promote efficiency and technological research and development. It has continuously recognized the outstanding achievements of institutions and individuals in research and development through the Tanglaw and Pantas Awards, respectively. It also administers the Los Baños Science Community endowment fund for four other important science and technology (S & T) awards.

10. Information Systems

To sustain its effort at regionalizing R & D management, PCARRD embarked on an institution-development project, the Agricultural Research Management Information System (RMIS). PCARRD and the International Development Research Center (IDRC), its funding agency, consider it a landmark project in information services.

V. WHAT PCARRD HOPES TO ACCOMPLISH

Following the medium-term development plan of the government anchored on the technology-based agro-industrialization approach and private sector leadership, five ma-

for strategies in support of the DOST's Science and Technology Agenda for National Development (STAND) Philippines 2000 shall be undertaken by PCARRD:

1. Transfer and Commercialization of Technologies

To ensure that farmers and the private sector use research findings, programmes shall be redirected towards increased technology commercialization of products and services that have high potential for capturing substantial market shares necessary to sustain a productive population and provide infrastructure for both market and population, or that are crucial to the development of both export and domestic markets.

2. Upgrading R & D Institutional Capability

The organization of an R & D consortium in each of the regions of the country makes possible the coordination of regional programme planning and development and the utilization of resources of member-agencies in conducting R & D activities.

3. Programming R & D

PCARRD aims to safeguard public investments in research for maximum utility and efficiency. In this regard, it hopes to further streamline policies and procedures for coordinating, planning, evaluating, and monitoring R & D programmes.

4. Increasing R & D Participation in Policy-/ Decision-Making

Adoption of technological breakthroughs must operate within a policy environment conducive to growth and equity and promote private sector leadership and technology-based agro-industrialization. A major reorientation of the physical and social infrastructures of targetted agro-industrial areas will address the issue of equity and poverty alleviation.

5. Upgrading R & D Investments

PCARRD will work for a graduated increase in R & D expenditures by sourcing out more funds from the government and encouraging the participation of the private sector in R & D activities and cost-sharing arrangements. Also, it will continue to tap international agencies to augment local resources.

BARC AND NARC JOIN APAARI

Recently, Bangladesh Agricultural Research Council (BARC) and Nepal Agricultural Research Council (NARC) have joined as full members of APAARI, besides earlier membership of 15 National Apex Agricultural Research Organizations in the region.

APAARI welcomes both BARC and NARC as its new members and looks forward to have very fruitful linkages in the future.

FORESTRY RESEARCH SUPPORT PROGRAMME FOR ASIA AND THE PACIFIC (FORSPA)

Forestry Research Support Programme for Asia and the Pacific (FORSPA) was launched in 1992 to provide needed support to the national forestry research systems in the region. This project is being funded by the Asian Development Bank (ADB), the United Nations Development Programme (UNDP) and the FAO. A core budget of US\$ 2.05 million has been provided for 3 years period. FORSPA Secretariat is functioning from FAO RAPA in Bangkok.



sized the importance of these projects and recommended for a follow up phase.

To facilitate exchange of information, researchers from different countries working on similar problems are brought together in small groups to share experience and to draw up common programmes.

OBJECTIVES:

The following are the objectives of FORSPA:

- to strengthen national research capabilities in the developing countries of the Asia-Pacific Region.
- to promote technology transfer (from lab to land) through effective dissemination of research results to users.
- to enhance collective self reliance of forest research institutions (FRIs) through networking.
- to increase the access of FRIs to updated and comprehensive information services.
- to provide the FRIs a window of opportunity to forge links with global forestry research.

ACHIEVEMENTS:

Major achievements are described in brief as follows:

1. Field Research

To complement the ongoing efforts of forestry research institutes, universities and NGOs, FORSPA has supported 27 field research projects in 12 countries under the following themes:

- Upland watershed management
- Reforestation of degraded lands and problem soils
- Ecosystem conservation & maintenance of biodiversity
- Improving sustainability of plantation forestry
- Promoting community participation in forestry development

Task forces comprising of specialists in the subjects have selected these out of 227 proposals received from institutions in the Region.

Three of the projects have been completed and results disseminated. Others are nearing completion. A review mission in October-November, 1993 empha-

2. Research Information System

FORSPA in collaboration with the Center for Agriculture and Biosciences International (CABI) has initiated a research information system, whose achievements hitherto include:

- 12 CD ROM work stations have been installed in forestry research institutions in Bangladesh, China, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Thailand and Vietnam. Work station operators have been trained in the use of CD ROM technology. Prepaid document delivery vouchers have been provided to these institutions to procure publications. Access to CD ROM technology has resulted in a quantum jump in information availability.
- Twenty forestry research institutions are being provided with Forestry Abstracts.
- INFO-FORSPA, the FORSPA newsletter, published quarterly, providing updates relevant to researchers and research managers.
- FORSPA has produced 12 technical documents, 21 occasional papers and 6 joint publications which have been widely disseminated in the Region.
- Data bases pertaining to gray literature, forestry researchers, international assistance to forestry and social science research institutions have been developed. Directories on Forestry Researchers and International Assistance to Forestry have been published.

3. Seminars and Workshops

The FORSPA has so far organized the following Workshops and Seminars besides funding support for 26 researchers for participation in international meetings:

- FORSPA Pre-implementation Seminar, Malaysia, January 1992
- Regional Expert Consultation on Forestry Policy De-



Recording of Forestry Research Data

velopments and Research Implications in the Asia Pacific, October 1992

- Regional Seminar on Research Priorities in Forestry in the South Pacific, Papua New Guinea, November 1992
- International Seminar on Forestry Research Management, India, March 1993
- Training Course in Research Methods, Western Samoa, July 1993
- IUFRO Symposium on Impact of Diseases and Insect Pests in Tropical Forests, India, November 1993
- FORSPA has taken the major responsibility for organizing the IUFRO, FORSPA, CIFOR, FAO/RAPA Workshop on Barriers to the Application of Forestry Research Results scheduled during 24 to 28 October 1994

4. Links with International Research Systems

Close links have been established with regional and international research organizations and networks, especially IUFRO, CIFOR, ACIAR, APAN, FORTIP, F/FRED, IDRC/INBAR, RECOFTC, NFT, ETERN, Asean-Canada Tree Seed Centre, etc. Close contacts have strengthened complementarities in research and avoided duplication of efforts.

5. FORSPA Publications

INFO FORSPA is a quarterly Newsletter published by CAB International, Asia Regional office, Kuala Lumpur, Malaysia. Besides, following useful publications have been brought out by FORSPA since 1992:

Reports/Proceedings

- Forestry Research in the Asia-Pacific (1992)
- Pre-Implementation Seminar: Proceedings (1992)
- Directory of Forestry Research Professionals in the Asia-Pacific (1992)
- Teak in Asia (1993)
- Indigenous People and Rattan, Case Studies from the Philippines (1993)
- Bamboo in Asia and the Pacific: Proceedings (1993)
- Voices of the South-Pacific (1993)
- Current Research on Artificial Regeneration of Dipterocarps (1993)
- Forestry Research Management: Proceedings (1994)
- Prominent Findings of Forestry Research in Malaysia (1993)
- Prominent Findings of Forestry Research in India (1993)
- Asian Tree Pests: an Overview (1994)

Occasional Papers

- Strategies for Promoting Forestry Research (1992)
- FORSPA Funded Research Projects (1992)
- Internationally-Aided Forestry Projects - Asia-Pacific Region (1992)
- People's Rights to Forest Resources: India. (1992)
- How to Organize Forestry Research with Scarce Resources. (1992)
- Forestry Research: Japan (1992)
- Role of Rubberwood in Forestry: Malaysian Experi-

ence (1993)

- Forestry Research: Malaysia (1993)
- Forestry Policy Research Issues (1993)
- Forestry Research: Indonesia (1993)
- Forestry Research: China (1993)
- Forestry Research: Philippines (1993)
- Forestry Research: India (1993)
- Forestry Research: Thailand (1993)
- Extending Research Results-How ? (1993)
- Forestry Research: Pakistan (1993)
- Forestry Research: Nepal (1993)
- Forestry Research: Selected Countries of the South Pacific (1993)
- Research Results: A Selection of Annotated References of Teak (*Tectona Grandis* L.f.) (1993)
- Research Results: Inoculation of Forest Trees: The Use of Rhizobium, Frankia and Mycorrhiza (1993)
- Forestry Research: Myanmar (1993)

Others

- Acacia mangium: Growing and Utilization (1993)
- Selection and Management of Nitrogen-fixing Trees (1994)
- Chinese Forestry Selected Abstracts, Vol. 4 No. 1 to 4 (1993)

FORSPA is guided for its operations by an Advisory Group of 12 eminent foresters. FORSPA Secretariat is headed by Dr. C.T.S. Nair, Senior Programme Adviser, who could be approached for any additional information.



Nobody knows how many species are disappearing (or being generated) on the earth: probably fewer than 10 percent of species have been given a scientific name.

Several thousand plant species have been used for human food in history, but now only about 150 are cultivated and no more than three supply almost 60 percent of the calories and protein derived from plants.

A 13.7 km² area of La Selva forest in Costa Rica contains almost 1,500 plant species - more than all those found in the United Kingdom's 243, 500 km².

Since the beginning of this century about 75 percent of the genetic diversity among agricultural crops has been lost.

Deforestation of closed tropical rain forests could account for the loss of as many as 100 species every day.

In Europe, half of the livestock breeds that existed at the beginning of the century have become extinct and a third of the remaining 770 breeds are in danger. Almost 20 percent of breeds in the developing world are at risk.

CONCEPTS OF THE AGRIS AND CARIS SYSTEMS

The basic concepts of the AGRIS (International Information System for the Agricultural Science & Technology) and CARIS (Current Agricultural Research Information System) systems are the cooperation and exchange of information. Each AGRIS/CARIS participating centre contributes the data for which it is responsible and in return receives access to the world-wide databases compiled by the Processing Units of the AGRIS/CARIS Coordinating Centre.

The cooperative nature of AGRIS is its greatest strength as it encourages the input of the full range of national publications. Similarly, for CARIS, national input of research projects serves as a catalyst for a country to better organize its agricultural information and to maximize its cooperation among researchers both within and outside its borders.

Today, there are 173 AGRIS Centres (149 countries and 24 regional or international centres). Similarly, there are 137 CARIS centres (122 countries and 15 regional or international centres). Of these, 99 are combined AGRIS/

CARIS centres. To date, AGRIS database has accumulated more than 2,000,000 entries. The CARIS global database, which begun in 1979, presently contains more than 30,000 current research project entries.

AGRIS Processing Unit accepts the data input as tape, cartridge, diskette, or typed worksheets. More recently, it has begun accepting data via electronic mail.

Printed materials (including *Agrindex*, standard bibliographies and special request bibliographies), magnetic tapes, and CD-ROM discs are provided to member centres based on their individual technological capacities. With the use of the CD-ROM and a printer, centres are now better able to immediately service their own bibliographic needs.

Finally, the success of AGRIS and CARIS is due to the compatibilities with national, regional and international databases. Further details could be obtained from:

*The Library and Documentation Systems Division
Food and Agriculture Organization of the United Nation
Viale delle Terme di Caracalla
00100 Rome, Italy.*

WORLD BANK CONFERENCE ON ERADICATION OF HUNGER AND POVERTY

In a global conference on hunger organized by the World Bank from November 30 - December 1, 1993 in Washington, D.C., it was concluded that:

Hunger is a poverty issue, not a food supply issue. Hunger and malnutrition are the most devastating problems facing the world's poor. Hence, to eliminate hunger, many of the anti-poverty strategies need to be supported, including a balanced development strategy which supports labour-intensive growth.

World Bank President Lewis Preston stated that the Bank is willing to join other donors in a "Consultative Group" type of organization to mobilize financing for activities to address extreme poverty.

As is well known, the Consultative Group is presently supporting 18 International Centres all over the world, including IRRI, CIMMYT, ICRISAT etc. Hence, formation of a similar group to address the problems of hunger and poverty will go a long way in addressing these problems more effectively in the future.

NEW LEADERSHIP OF THE CGIAR

Dr. Ismail Serageldin, World Bank's Vice-President for Environmentally Sustainable Development becomes the seventh Chairman of the Consultative Group on International Agricultural Research (CGIAR). An alumnus of Cairo University and Harvard, Dr. Serageldin joined the World Bank in 1972.

In his message, he stated that "Increasing the world's supply of food is imperative, but no less important is the need to develop innovative ways of conserving the environment and reducing poverty, both within a sustainable development framework".

CGIAR donors will contribute a range of \$ 295 to \$ 300 million to support the programmes of 18 International Agricultural Research Centres during 1994, CGIAR Executive Secretary Alexander von der Osten announced.

The new role of the CGIAR has recently been outlined in a publication entitled "Challenging Hunger". Copies of this publication can be obtained from the CGIAR Secretariat, 1818 H Street, N.W. Washington, DC 20433, USA.

FAO/TCP ASSISTANCE TO PAPUA NEW GUINEA

Recently, Papua New Guinea, a member of APAARI, has received a technical assistance of US\$ 58,000 under TCP from FAO, Rome towards the establishment of a National Agricultural Research and Development Institute.

INFORMATION ABOUT SOME FUTURE CONFERENCES

1. Title: Second International Scientific Meeting of the Cassava Biotechnology Network (CBN)
 Venue: Central Research Institute for Food Crops (CRIFC), Bogor, Indonesia
 Period: August 21-26, 1994
 Contact: Dr. Ann Marie Thro
 Coordinator, CBN
 Centro Internacional de Agricultura Tropical (CIAT)
 AA 6713, Cali, Colombia, S.A.
 Fax: 57-23-647243
2. Title: The First World Conference of Professionals in Agronomy
 Venue: Santiago, Chile
 Period: September 5-8, 1994
 Contact: Senores
 Primer Congreso Mundial de Profesionales de la Agronomía
 Casilla 14277 Correo 21
 Santiago, Chile
 Fax: 56-2-6722824
3. Title: The Third International Symposium on Integrated Land Use Management for Tropical Agriculture
 Venue: Indonesia
 Period: September 5-16, 1994
 Contact: The Secretariat, C/-INIANSREDEF
 P.O. Box 1093, Bogor 16010
 Indonesia
 Fax: 62-251-333018
4. Title: XVI International Congress of Biochemistry and Molecular Biology
 Venue: New Delhi, India
 Period: September 19-22, 1994
 Contact: Prof. N. Appaji Rao, Secretary General
 IUBMB coongress 1994
 Department of Biochemistry
 Indian Institute of Science
 Bangalore, India
 Fax: 91-812-341683
5. Title: ASEAN SEED 94
 Venue: Orchid Hotel, Chiang Mai, Thailand
 Period: September 27-29, 1994
 Contact: The Secretariat, Asian Seed
 FAO Regional Office, Phra Attit Road
 Bangkok 10200, Thailand
 Fax: 66-2-5614834
6. Title: Second International Crop Science Congress
 Venue: Vigyan Bhawan, New Delhi, India
 Period: November 18-23, 1996
 Contact: Prof. S.K. Sinha
 Organizing Secretary, and Director
 Indian Agricultural Research Institute
 New Delhi 110 012, India
 Fax: 91-11-5752006 or 5740722

RECENT RAPA PUBLICATIONS

Some of the important publications brought out recently by the FAO Regional office for Asia and the Pacific (RAPA) are listed below:

1. Twelfth Session of the FAO Regional Commission on Farm Management for Asia and the Far East (RAPA Publication: 1994/1)
2. Report of Eighteenth Session of the Asia and Pacific Plant Protection Commission (APPPC) (RAPA Publication: 1994/4)
3. Report of the Twenty-Fourth Session of the Indo-Pacific Fishery Commission (IPFC) (RAPA Publication: 1994/7)
4. Sustainability of Rice-Wheat Production Systems in Asia (RAPA Publication: 1994/11)
5. Report of the Regional Expert Consultation on Production of Pulse Crops (RAPA Publication: 1994/12)
6. Underutilized Grain Legumes and Pseudocereals - Their Potentials in Asia (RAPA Publication: 1994/14)
7. Proceedings of the Regional Expert Consultation on the Asian Soybean Network (RAPA Publication: 1994/16)

Note: Copies can be obtained upon request from FAO RAPA, Malivan Mansion, Phra Attit Road, Bangkok 10200, Thailand

PUBLICATIONS ON SUSTAINABILITY

National Research Council has published the following interesting documents relating to Sustainable Agriculture.

1. Alternative Agriculture (ISBN 0-309-03985-1; 1989, 464 pages, 7 x 10, index, paperback, \$28.95)
2. Toward Sustainability - A Plan for Collaborative Research on Agriculture and Natural Resource Management (ISBN 0-309-04540-1; 1991, 164 pages, 6 x 9, index, paperback, \$19.00)
3. Toward Sustainability - Soil and Water Research Priorities for Developing Countries (ISBN 0-309-04641-6; 1991, 76 pages, 6 x 9, paperback, \$9.95)
4. Sustainable Agriculture and the Environment in the Humid Tropics (ISBN 0-309-04749-8; 1993, 720 pages, 6 x 9, index, hardbound, \$49.95)

For copies please write to the National Academy Press, 2101 Constitution Avenue, NW, Lockbox 285, Washington, DC 20055, USA.