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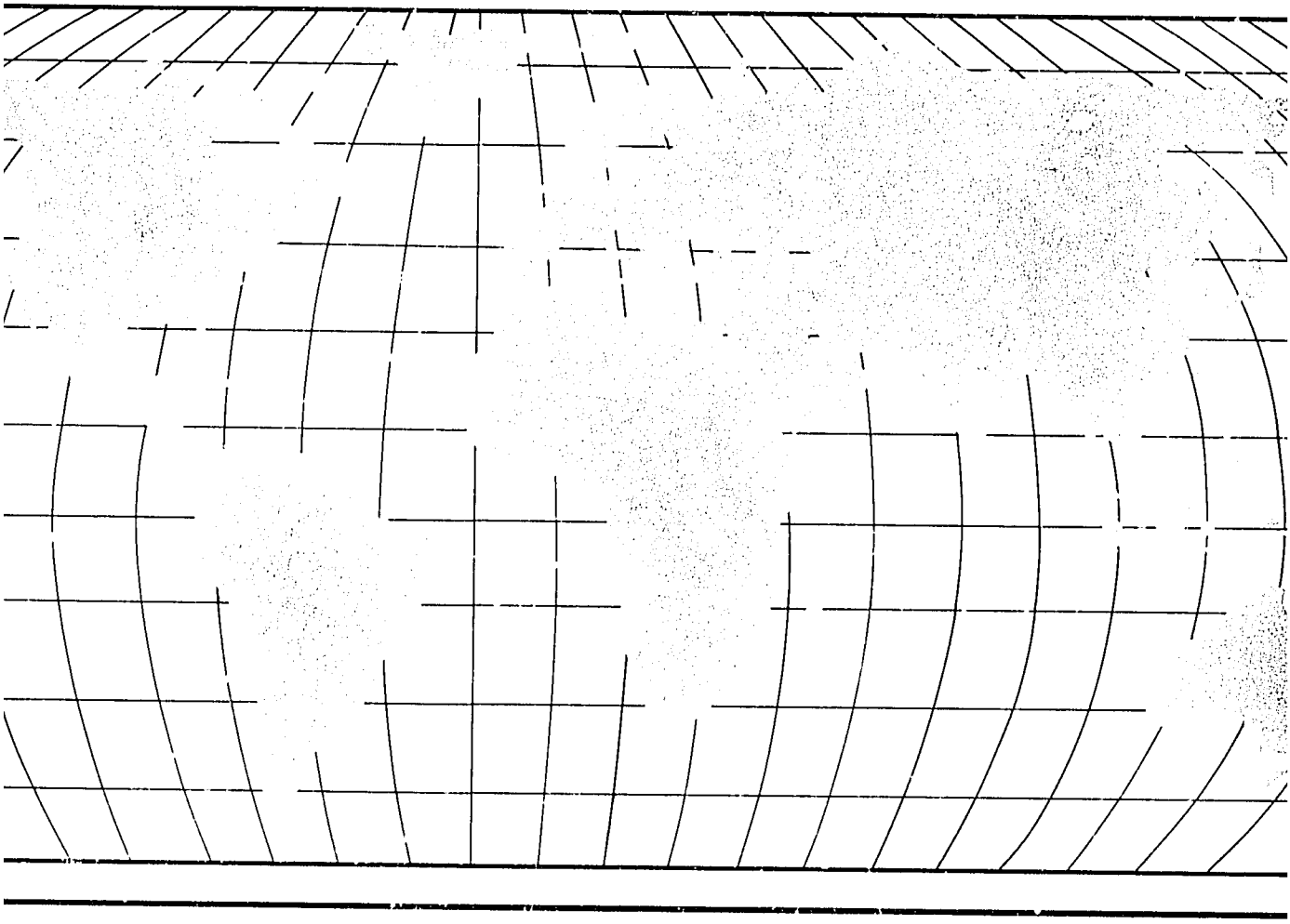

INTERNATIONAL AGRICULTURAL DEVELOPMENT SERVICE

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1983

International Agricultural Development Service
1611 North Kent Street, Arlington, Virginia 22209
Tel. (703) 525-9430. Telex 248589. Cable IADSERVIS ARLINGTONVIRGINIA

INTERNATIONAL AGRICULTURAL DEVELOPMENT SERVICE

Report/1982

Preface

Among the more significant events of 1982, the International Agricultural Development Service relocated its headquarters, signed a contract for work in Egypt, and substantially expanded its activities in Bangladesh.

IADS, an autonomous, nonpolitical, nonprofit organization dedicated to helping developing nations raise output of crops and livestock and increase rural incomes, offers assistance in agricultural planning, strengthening research systems, training personnel, and implementing production programs. To increase understanding of development problems and their resolution, IADS organizes meetings and develops publications on critical issues.

IADS may receive funds from any source to assist any nation or to support developing nations collectively through programs of research, training, and information exchange. IADS is exempt from U.S. taxes under Section 501(c)(3) of the Internal Revenue Code.

During the year, over 40 resident specialists supplied by IADS were working for national agencies in Bangladesh, Botswana, Ecuador, Indonesia, and Nepal. In addition, IADS provided over 80 short-term consultants to 20 developing countries.

Details of these and other IADS activities are given in this report. This year's essays were written by Eliseu Alves, president of EMBRAPA ("Brazil's program for the development of agricultural researchers") and Edwin B. Oyer and Francis C. Byrnes ("Implementing a staff development program in a national agricultural research system"). Oyer is director of international agriculture programs, Cornell University, and from 1977 to 1982 headed the IADS team working with Indonesia's Agency for Agricultural Research and Development. Byrnes is IADS program officer for training and conferences.

We welcome comments on this report and inquiries about the activities of IADS.

A. Colin McClung, *president*

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The first trustees' meeting in the new IADS headquarters.

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Bangladesh

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Dorsey F. Davy, training specialist
Robert W. Drew, associate production agronomist
Russell D. Frazier, agronomist
Jan L. Gerards, water management specialist
David Gisselquist, water management extension specialist
Brook A. Greene, agricultural economist
A. K. Kaul, crop specialist
Timothy G. Kelley, associate production agronomist
R. N. Mallick, associate production agronomist
A. Hugo Manzano, farming systems specialist
Sam Portch, soil fertility specialist
Raphael Semmes, administration specialist
D. N. Sharma, farm development specialist
Lyle C. Sikka, potato specialist
Leopoldo M. Villegas, associate production agronomist

Botswana

Kristian Oland, director, agricultural research

Ecuador

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Saul Camacho,* specialist in fruits
Richard A. Figoni, rice improvement specialist
Paul J. Kretchmer, food legumes specialist

Indonesia

National agricultural research
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Edwin B. Oyer,* project specialist
Emiterio V. Aggasid, civil works specialist
Ernesto B. Farre, financial officer
Alfredo C. Nebab, procurement specialist
Romeo T. Opena,* vegetable breeding specialist
C. Geoffrey Swenson, production economist

Sumatra agricultural research
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Aroon Jugsujinda, soil and water management specialist
Douglas H. Perry, agricultural economist
Genaro D. Revilleza,* administrative officer
P. S. Srinivasan, administrative officer
Ulrich Scholz, agricultural geographer
Jack D. Traywick, farm development specialist

Nepal

Integrated cereals project
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Inocencio C. Bolo, production agronomist
Wayne H. Freeman, advisor
Kenneth D. Sayre, cropping systems agronomist
Shiro Samoto,* plant breeder
Marlin G. Van Der Veen, agricultural economist

Seed project
S. S. Bal, project supervisor
Peter G. Rood, field supervisor

* Left during the year.

**On part-time assignment from the Rockefeller Foundation.

Brazil's Program for Development of Agricultural Researchers

(facing) A trial of maize intercropped with soybeans.

Brazil regards the application of science and technology to agriculture as a major means of achieving economic and social progress. In the 10 years since the reorganization of the national agricultural research system, marked by the founding of EMBRAPA, agricultural science has become a powerful, productive force in Brazilian society. Major research projects have been carried out and discoveries of world importance have been made.

EMBRAPA aims to change the focus of the relationship between advanced and developing countries from "technology transfer" to "science transfer." It is attempting, after appropriate selection and training of future scientists, to create challenging and rewarding career opportunities in agricultural and related research in Brazil. Only by retaining a large fraction of its best people can a developing country like Brazil build an agricultural research system that will develop the technologies fundamental to the economic growth and stability of the agricultural sector.

Initial base of human resources. The demand for research in Brazil has grown enormously because of the country's high rates of economic growth, rapid urbanization, and increasingly diversified economy, because of expanding opportunities to sell agricultural products on the international market, and because of a better understanding of the role of science in modern society. These factors have also affected the character of this demand so that now, more than ever, research work requires increasingly sophisticated skills. Brazil therefore needs well-trained researchers capable of grasping innovations from abroad and adapting them to its circumstances. The great advantage in this policy is that a substantial part of the cost of the original research does not have to be borne by Brazil. On the other hand, in view of Brazil's diverse environmental conditions, which differ from those of the developed countries in many ways, generating appropriate knowledge that transcends mere adaptation is a component of prime importance in agricultural research programs.

A decade ago, the quality and quantity of researchers was inadequate for the demand. Brazil had only 3,361 full-time and part-time research workers in agriculture. Of these, a third were in the Ministry of Agriculture and the remainder were in universities, state governments, private businesses, and other ministries. While it is difficult to measure their capabilities precisely, one indication is graduate work. In 1972, of the 872 scientists employed by the Ministry of

EMBRAPA: Staff growth

Year	Research workers	Support personnel	Administrative personnel	Total
1973	12	7	47	66
1974	872	2125	993	3990
1975	1037	2356	1416	4809
1976	1328	2666	1709	5703
1977	1311	2678	696	5685
1978	1336	2954	1744	6034
1979	1448	3191	1935	6574
1980	1553	3314	1902	6669
1981	1576	3340	1948	6864
1982	1578	3338	1996	6912

Source: DRH—EMBRAPA

Agriculture, only three held Ph.D.'s and only 93 had completed graduate courses at the master's degree level.

Creation of EMBRAPA. When EMBRAPA began functioning early in 1973, the human resources devoted to research activities available within the network of the Ministry of Agriculture did not present a bright picture. Consequently, EMBRAPA gave the creation of an aggressive training program highest priority. To ensure the success of the program, a policy of promotion by merit was created to reward talent and work in accordance with the standards of domestic and international markets. An intensive recruitment campaign was undertaken to attract to EMBRAPA young people and experienced technicians of talent, and thus build a research staff capable of confronting the great challenge of Brazil's agricultural development. At the same time, through agreements with international agencies, EMBRAPA acquired the valuable assistance of technicians from other countries. They added their experience to that of Brazilians in order to solve the problems of Brazilian agriculture and advance knowledge of tropical and subtropical agriculture.

A large proportion of EMBRAPA's research staff was sent to graduate school under the auspices of the organization. The proportion of researchers holding or working

EMBRAPA: Costs per research worker

Year	Research workers no.	Salaries fringe benefits, and other expenses $ millions	Cost per research worker* $
1974	872	6.8	7,779
1975	1037	12.0	11,600
1976	1328	23.6	17,742
1977	1311	26.4	20,100
1978	1336	33.2	24,883
1979	1448	34.0	23,492
1980	1573	45.0	28,653
1981	1576	48.3	30,656
1982	1578	58.3	36,973

*Salary is about 55 percent of the cost.

Source: DRH—EMBRAPA

on advanced degrees (M.S. or Ph.D.) rose from less than 10 percent at the end of 1973 to 46 percent by early 1976.

Principles and objectives of the graduate program. The following are the guiding principles used to develop and implement the graduate training program of EMBRAPA.

1. Researchers should be trained in a way that helps the EMBRAPA system attain its objectives. In particular this has meant taking steps to rapidly alleviate the shortage of researchers, not only for EMBRAPA, but also for other agricultural institutions.

2. The training program should be adjusted to the professional life cycle of the researcher. For some researchers, this cycle begins at the university, when they first accept research fellowships. For the majority, however, the initial step occurs when they first join a research institution. The cycle can follow various routes for the person who is beginning a career as a researcher, but there are three primary sequences differing in how periods of training and of research work are combined. The starting point is the university.

Investment in human resources in relation to the total EMBRAPA budget

Year	Total budget $ millions	Investment in human resources* Value $ millions	Investment in human resources* Proportion of total budget %
1974	26.3	7.1	27
1975	56.0	13.6	24
1976	80.8	24.5	30
1977	98.1	26.8	27
1978	125.6	24.7	20
1979	154.1	23.4	15
1980	157.5	25.8	16
1981	183.0	32.3	18
1982	220.0	36.4	17
Total	1,101.4	214.6	20

*Includes salary indirect cost, substitution at a cost equal to salary and indirect cost plus direct education expenses like scholarship, fees, and transportation.

Source: DRH—EMBRAPA

Farmers harvesting rice.

(a) After completing bachelor's level training, the future scientist joins the research institution and works for up to 3 years. He then takes about 1½ years for master's level training and returns to work for at least 3 years. At this point he returns to school to pursue a doctoral degree, which is completed in about 3½ years. He then rejoins the research institution. In this sequence, the minimum time between entering the research institution and achieving a doctoral degree is 10 years.

(b) Immediately on joining the research institution, the scientist is sent for master's degree studies, which take about 1½ years to complete. The scientist does at least 3 years of full-time work and then begins studies leading to a doctoral degree—another 3½ years—after which he returns to work. The time from entry into the organization until completion of the doctoral degree is at least 8 years.

(c) Immediately on joining the research institution, the scientist is sent to work on a master's degree followed by a doctoral degree. He then begins full-time work. The time from entry until completion of the doctoral degree is 5 years.

Sequences *b* and *c* should both be limited to highly promising candidates who have already shown a strong inclination for research.

Apart from these three sequences, there are innumerable possibilities tending to prolong the time needed for

EMBRAPA: Cost of graduate and continuing training

	Graduate training		Continuing training	
Year	No.	$/person	No.	$/person
1974	381	17,232	491	869
1975	474	26,562	563	1,109
1976	575	39,495	753	1,348
1977	457	49,407	854	3,657
1978	295	57,270	1,041	4,654
1979	324	55,494	1,124	3,166
1980	316	67,436	1,257	1,984
1981	320	70,065	1,256	5,854
1982	350	83,401	1,228	3,316

Source: DRH—EMBRAPA

the researcher to attain the top rung from the training point of view.

4. Not every researcher will reach the doctoral level or its equivalent. Some individuals lack the ability, interest, or the will to achieve this goal. Nevertheless, these researchers are useful for the many less complex tasks and they can thus save the time of better trained researchers.

5. It is necessary to train research administrators and leaders. Without leaders and administrators, the implementation of research tasks becomes extremely difficult or even impossible.

6. The university is the fundamental base of all training, and needs to be stimulated and supported.

7. Since society is investing in the researcher and since the researcher himself reaps some of the benefits from this investment, it is proper to demand adequate performance in graduate and other studies, as well as in the professional career that follows.

8. Along with the acquisition of specialized knowledge, it is important that the researcher gain a comprehensive vision of the Brazilian development model so that he will be able to choose his research projects within the context of this model.

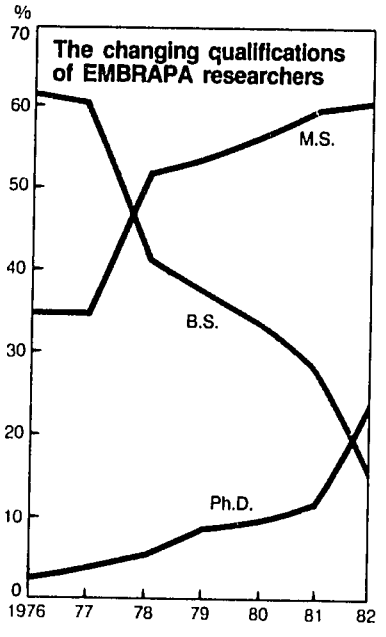
Beyond this orientation, it is important to foster in the researcher a sense of the mission of the research organization and the system, so that he will understand its intentions and objectives, its philosophy and manner of confronting problems, and, in this way, feeling like an integral part of the system, he will collaborate enthusiastically and decisively in the tasks shared by all.

9. Since long training periods cause disruptions in relation to the work environment, an effort should be made to ease the difficulties in adapting that the scientist may have on return from training.

10. Creativity should be encouraged as a fundamental principle of training. The researcher's most noble and most difficult task is to formulate relevant questions. Training that emphasizes methodology and theory is of value in this respect to the degree to which it is heterodox and challenging, and is injurious when it is dogmatic, ritualistic, tradi-

About EMBRAPA

Empresa Brasileira de Pesquisa Agropecuaria (Brazilian Agricultural Research Corporation) was organized in 1972 to direct, control, and execute agricultural research activities for the purpose of producing technology for the development of national agricultural production; to assist the federal executive branch, and its entities, in technical and administrative matters related to the agricultural sector; to stimulate and promote the decentralization of research activities to the benefit of state and local interests; to provide technical coordination of research projects, the execution of which involves the technical-administrative services of other federal agencies; to maintain close contact and coordination with the Brazilian Technical Assistance and Rural Extension Corporation (EMBRATER) to diffuse research results and technology; and to plan, program, and budget research activities to reflect the guidelines and policies established by government.



tional, repetitive, and based excessively on textbooks and formal classes.

11. Because graduate courses impose sacrifices on the researcher and the researcher's family, they require financial compensation during and after the training period.

12. Given the high cost of graduate courses, EMBRAPA and the universities must cooperate closely so that graduate programs and subjects of theses fit the interest of one institution as much as of the other. This joint effort will result in better trained researchers who are therefore more capable of solving agricultural problems.

13. Given the complexity of the research task and the high cost of training, the selection system must be rigorous to facilitate the discovery of individuals with vocations and talents for research, while eliminating those not suited to this type of work.

Results of graduate training programs. Under normal conditions, graduate programs should follow a sequence that begins with the entry of the recent college graduate into EMBRAPA, to work for 2 or 3 years with the aim of demonstrating potential, capacity for adapting to the work, and a vocation for certain scientific areas. After this period, researchers with potential are sent for a master's studies, being able, sometimes (depending on institutional needs and individual capability), to continue directly for a doctorate or, instead, to return to work, acquire more experience, and be considered for doctoral studies.

Since EMBRAPA did not face normal conditions in its first years this sequence was rarely followed. Brazil did not have enough technicians with advanced degrees to meet the needs of EMBRAPA and of other agricultural research institutions.

Therefore the strategy selected was to closely evaluate the existing research staff; those judged capable were designated for graduate programs in Brazil and abroad. An aggressive recruitment campaign was launched in the universities and elsewhere to attract capable young people to EMBRAPA. Most were sent directly into graduate programs or else underwent an "adaptation period" of one year in the research units and then entered graduate pro-

grams. The program that was implemented assured, for the next 3 years, an average annual return of 250 researchers with master's degrees.

The early program was weak at the doctoral level mainly because few candidates were ready for more advanced studies. Later, training at the doctoral level was emphasized.

Doctoral-level graduate training. Education at the doctoral level is expensive and requires time: approximately 3½ years beyond the master's program in good universities in Brazil and abroad. Researchers who have had advanced training have a critical role in the work of EMBRAPA. They are better qualified to recognize technologies that are relevant to Brazilian problems and to adapt them to local environment. They have at their disposal the best methodological tools—knowledge of experimental theories and techniques that gives them greater capacity for identifying problems and finding solutions. And, in scientific interchange, wherein professional respect is the main component, it is scientists who have advanced degrees who are in a position to seek help wherever in the world it can be found and, conversely, to offer help when necessary. The essence of scientific interchange is the give and take. When one of these is absent, scientific interchange will not occur with the intensity desirable for Brazil. Furthermore as a result of the knowledge they have, these scientists are bound to play an important role in the leadership, training, and follow-up of the work of young researchers who constitute the large majority of EMBRAPA's scientific staff at present.

While the presence of highly trained researchers is essential to EMBRAPA, there were many difficulties in locating the human and financial resources needed to make this training possible.

The selection of disciplines in which researchers will do doctoral work is critical for building a staff that has a broad outlook that is responsive to the principal interests of EMBRAPA. It is convenient to classify the needed Ph.D.'s into three groups:

- Ph.D.'s who will work only in the central office. Planning,

business administration, mathematical programming, etc. are among the fields of specializations of this group.

- Ph.D.'s who will work in the central office and in the national centers. A broad range of specialized disciplines is included here, generally related to subjects that form various components of the agricultural sciences. Examples of specialized training of this group are poultry diseases, genetic engineering, economic entomology, etc.
- Ph.D.'s who will be placed mainly in the central office, national centers, and other research units. These research workers will be trained in a general approach to a specialized field. In reality, the researcher in this category would be called "production researcher." Examples of training areas of this group are animal husbandry, poultry science, pasture improvement, grain production, etc.

Continuing master's level training. The emphasis on sending EMBRAPA researchers for master's degrees has abated, but on a reduced scale the program continues in order to have replacements for the vacancies that occur through retirement, death, or departure from EMBRAPA. Maintaining a level of 100 technicians studying for master's degrees, corresponds to a departure rate of 50 per year, which fulfills EMBRAPA's needs. This number guarantees a replacement rate on the order of 3.2 percent a year, which is satisfactory at this stage when the majority of EMBRAPA researchers are young.

Depreciation of human capital. Graduate training is EMBRAPA's major investment in human capital. Unfortunately human capital can depreciate, and the Brazilian environment has elements conducive to high rates of depreciation: the tendency for salaries to level off, the lack of competitiveness (because there are few researchers with advanced training and few posts aside from the public sector), bureaucratic shackles, the lack of competent assistants capable of turning out the work, and, finally, the lack of tradition in the areas of research administration and leadership. These are some of the many factors that may jeopardize the heavy investments EMBRAPA makes, which are aimed at acquiring researchers with high productivity.

The laborious work of separating jute fibers.

The depreciation of human capital has two dimensions: one absolute and the other relative. The absolute dimension relates to the loss of knowledge as a result of forgetting. The other dimension, without doubt the more important, is of a relative nature. It is the stagnation or slow progress made in relation to the scientific world, which develops at an accelerating rate. That is, instead of reducing the knowledge differential that exists between what he knows and the boundary of scientific knowledge, the researcher allows the differential to grow. Too many individuals gain substantial knowledge only during graduate school; they learn little in the remainder of their lives, which means that a high relative rate of depreciation of human capital occurs.

The urge to learn new things is spurred by the imbalance that the human being feels between what he knows and what he should know. Factors that make evident the perception of the imbalance and that tend to keep the "state of imbalance" permanent must be introduced into the research organization to motivate researchers to continually broaden their knowledge. The salary scale created, the graduate courses, the evaluation system based on the idea of recognizing merit and talent are measures that tend, to a certain extent, to perpetuate the "state of imbalance." The limited competitiveness that exists, principally among the more advanced level of researchers, the tendency to be intolerant with individuals who question procedures and technique, the lack of graduate students who would stimulate their advisor in the search for knowledge, the difficulties of traveling to meet researchers from other institutions and countries, and the limited international readership of EMBRAPA's publications (because of language)—all contribute to destroying the differential which must exist between what the researcher knows and what he himself feels he ought to know.

There are several measures that can stimulate high rates of learning after graduate training:

Fostering competitive spirit

Competition can occur between research centers, between EMBRAPA state and federal research units and state

enterprises, the universities, and the private sector. This competition should be established on healthy terms, not as an unwholesome rivalry. Here the role of the administrator is fundamental, stimulating the interinstitutional environment when it is apathetic and lacking motivation, cooling things down when the temperature reaches dangerous levels, which jeopardize interinstitutional relations.

Competition can also occur among technicians. The system of evaluation, which restricts promotion to a small group of researchers only, will spur competition. Yet, it is clear that there is a risk of discouraging those who are not promoted. It is therefore necessary to take care to avoid injustice and to provide opportunities for redress to those who think they have been unfairly treated. Self-evaluation needs to be encouraged. This technique has the advantage of focusing the technician's dissatisfaction on himself rather than on his fellow workers' advancement.

Gaining public recognition

The role that everyone plays in the building of a model institution, which contributes significantly to the improvement of national agriculture, should be spotlighted. It is important that farmers, high officials, and the general public recognize the role scientists play in augmenting productivity. Even young scientists beginning their careers should be given opportunities for contact with political leaders, governors, ministers, renowned scientists, and, when possible, with the president of the country. Efforts should be made to create a favorable image in the press and the media, including even seeking to publicize researchers who are at the forefront of the action, citing their names and the work they are doing.

Maintaining a salary scale that rewards work and talent

Ways should be found to keep the salaries of talented scientists from leveling off. Individuals who question scientific norms and procedures may be very creative and their existence in the research organization should, therefore, be protected. A portion of the research budget, though no more than 10 percent, should be devoted to fostering innovative projects, which may not withstand strict scrutiny if judged by the prevalent criteria.

Maintaining a dynamic evaluation system

All technicians should participate in the development of the evaluation system and in its implementation, as well. Patronage practices should be suppressed. Leaders of the national research system need to be alert for administrators who feel their positions are threatened by talented technicians and who seek to maintain control by discouraging creativity.

Creating opportunities for professional recognition

Scientists should be encouraged to publish their work in national and foreign scientific journals and to make contacts with the local press. They should participate in congresses and make contacts with renowned scientists. Meetings between researchers concerned with practical applications and those dealing with standard and related areas should be organized. There should be meetings between plant breeders and geneticists, between social scientists and biologists. In other words, intensive communication should be maintained not only within research units but also among all units. Such meetings might be held on an annual basis and scientists outside the national research system should be invited to participate.

Periodically evaluating the work of the research units

Committees including scientists from the private sector, from universities, and from abroad should be established to evaluate research units (not to be confused with evaluation of individual researchers).

Promoting the training of research administrators

Executive training should be of a theoretical and practical nature. Continual exchange of experience should be fostered between administrators of the various research units and also among these administrators and those of other institutions, public or private, within Brazil and abroad.

Stimulating participation in extension activities and frequent contact with farmers

The greater the participation of farmers in research institutions, the greater the likelihood that researchers will

A Nepalese farm woman preparing mustard seed, which will be pressed for cooking oil.

be motivated to work and that they will not become alienated from the reality that they must transform.

Creating a formal system of courses and seminars in the research units

The objective is to simulate a micro-university, thereby guaranteeing the students' attendance. Courses, conducted once a week, might be organized so as to prepare college-educated technicians for master's degree studies and master's level technicians for doctoral studies. A system offering certificates should be established.

Equipping libraries

Bibliographic exchange should be facilitated. Reference facilities should have work rooms of an adequate size. Bureaucratic procedures should be minimized.

Participation in all phases of research activities

On-the-job training of technical support personnel can be promoted through full participation of research scientists in all research-related activities. Scientists should participate in all field and laboratory work, for contact between them and field technicians, experimental materials, machines, and equipment is important. Otherwise, an "office aristocracy" will be created—individuals who feel field work is demeaning, regarding it as incompatible with their doctoral title. Nothing more harmful can take place. This attitude inhibits the development of the capacity for observation, a fundamental component of all research work.

Familiarity with social and economic realities

Stimulating a more comprehensive understanding of rural problems is a major task for research administrators. Familiarity with the social and economic realities plays an important part in the development of the scientist and stimulates him to work on relevant problems.

Special courses

Opportunities for periodic training in organizations such as international research centers, universities, and private businesses should be given.

Investment in human resources

From 1974 to 1982, EMBRAPA's total research employment was 10,859 man-years, and, of this total, one third was spent in full-time graduate training or short-term courses, seminars, educational trips, and similar activities that are considered continuing training. During their studies, the research personnel had full salary, and that, added to fringe benefits, education allowance, and other expenses amounted to US$215 million or 20 percent of the total EMBRAPA budget during the 1974–1982 period. This estimate was calculated by considering the theoretical cost of filling the post of each research worker in training with a substitute of similar level. In other words, the direct and indirect costs of each research worker in training was multiplied by two. This assumption might be questioned, yet it reflects the opportunity cost of having a research worker with an M.S. and some years of experience outside the research institution for 4 to 5 years without directly contributing to research. On the other hand, one can argue that if the thesis is related to on-going research at the researcher's institution, it could contribute as much as his work there. (It should be mentioned that in addition to the EMBRAPA staff in both graduate and continuing training, the program also included 738 individuals from other research institution in graduate training and 2102 participants in continuing training.)

As the number of research workers in EMBRAPA has grown—from about 900 in 1974 to nearly 1600 in 1982, the cost per research worker has risen from $7,800 to $37,000. Even though salary for the same scale of classification did not increase during the period in real terms, the rising average cost indicates the shift to higher pay scales based on graduate education and merit of individual research workers. The average annual per-person cost of graduate training has increased from $17,000 in 1974 to $83,000 in 1982, as a result of shifting emphasis from M.S. to Ph.D. level training and the increasing educational level and corresponding salary of research staff. These figures give some idea of the cost of investment in human resources that is involved in a program of an institution that undertakes, as

EMBRAPA did, to change the composition of its research staff from more than 90 percent bachelor's level researchers to 60 percent master's level and only 25 percent bachelor's level in a relatively short time.—*Eliseu Roberto de Andrade Alves*

"Knowledge is our most powerful engine of production."
Alfred Marshall

Implementing a Staff Development Program in a National Agricultural Research System

(facing) **Indonesian researchers visiting a regional experiment station.**

Educators and development administrators frequently ask two related questions when planning and undertaking staff development programs:

- What marks a successful program?
- What makes a program successful?

Five years ago the Indonesian Agency for Agricultural Research and Development (AARD) launched a massive staff development program to upgrade the ranks of professional personnel in AARD and its 12 component institutes. Now, some 600 fellowships later, the experience has produced data, information, and insights that provide some answers to such questions.

AARD was then a new organization in the Ministry of Agriculture, established to coordinate national agricultural research. This previously had been done by under five commodity-oriented directorates-general and the research institute for estate (plantation) crops.

With a loan from the World Bank to supplement its own funds, the government of Indonesia contracted with

IADS to provide technical and management assistance to AARD in the development of four commodity research programs on a national scale, in a fellowship program including long-term and short-term training in Indonesia and abroad, and in the development of civil works.

Some indicators of success. When contract activities began in 1977, the system had 569 professionals with some university education, but there were few research workers with advanced degrees—less than 10 had doctoral degrees, and less than 50 others had master's degrees.

Two years earlier, a project-appraisal team organized by the World Bank estimated that a personnel development program consisting of 133 fellowships would meet the needs of the project in staffing the four commodity centers plus some assistance to AARD's other units. Soon after the project began, AARD decided to expand the program. By using all available resources, domestic and external, almost 500 long-term and short-term fellowships were awarded during the life of the project. Most of these fellowships were for degree-level education. In addition, an English training program was organized for 190 individuals to improve their language proficiency and thus broaden the base for selection of fellows for graduate studies.

Fortunately, several universities in Indonesia offered advanced degrees (primarily the M.S.) in agriculture, and their capability for preparing scientists at the post-graduate level increased rapidly during the project implementation period. The universities are Bogor Agricultural University, the University of Gajah Mada at Yogyakarta, and Padjadjaran University at Bandung. In addition, advanced degrees are awarded in the technical sciences at Bandung Institute of Technology and in the social sciences at the University of Indonesia in Jakarta.

To date, all students completing their studies have returned to duty posts in AARD. Among the persons who registered for the advanced degrees, there was some attrition. Yet, of the 66 fellows who went abroad, only 5, or less than 10 percent, failed to achieve their degree objective. Of the 356 local fellowships processed, 64 did not receive degrees. While this represents an attrition rate of 18 per cent,

those who withdrew or failed used only 5 percent of the total of 9,881 local fellowship-months accrued. This is an enviable record for any training program.

The IADS staff in Indonesia directly assisted the local long-term fellowship program until March 1980. After that time the local fellowship program was managed entirely by the AARD personnel and represents an example of technology transfer to local counterparts. The political and administrative wills of the AARD leadership and staff were significant factors in this accomplishment.

Fellows enrolled in long-term academic programs abroad pursued degrees in 14 areas: plant breeding, 11; agronomy and horticulture, 9; agricultural economics, 7; fisheries, 6; rubber technology and chemistry, 5; entomology, 4; forest products, 4; plant pathology, 3; communication, 3; animal science, soil science, postharvest technology, and statistics, 2 each; and nematology, 1.

Efforts in Indonesia concentrated not only on selection but placement of each fellow in an institution where he or she could obtain the courses, laboratory work, and related experience to best meet the educational objectives. As a result, the 66 fellows were enrolled in 30 institutions in eight countries (Philippines, United States, United Kingdom, Canada, Belgium, France, Australia, and India).

AARD: Fellowships awarded compared with the number originally projected

		Projected in appraisal report	Actual April '77 to June '82
Long-term Fellowships (registration)			
Local	B.S.	—	10
	M.S.	21	310
	Ph.D.	—	36
Abroad	Diploma	—	1
	M.S.	43	32
	Ph.D.	25	33
Other Fellowships			
Short-term, abroad		44	73
Local, English training		—	190
Total		133	685

Six institutions enrolled three or more fellows each: University of Philippines at Los Banos, 12; University of Minnesota, 10; North Carolina State University, 5; and Cornell University, University of Wisconsin, and University of Washington, 3 each.

Indicative of the wide range of degree opportunities in Indonesia is the distribution of 356 enrollments in 22 fields: agronomy, 70; entomology, 24; agricultural economics, 20; soil science, 17; phytopathology, 11; natural resource management, 10; agricultural mechanization, 8; animal science, 8; food science, 6; forest products, 6; reproductive biology, 5; biology, 4; statistics, 4; agroclimatology, 3; library science, 3; microbiology, 3; agricultural communication, 2; biopathology, 2; veterinary science, 2; and public administration, chemistry, and weed science, 1 each.

The first doctoral degree recipient returned to Indonesia in May 1981. He had already been assigned as director at an experiment station where construction was not yet completed and he had to become thoroughly immersed in administration. The second returnee arrived in June 1981 and is director of research at the same station. Neither the field development nor the laboratory equipment at this station was complete at project end so they did not have an adequate time to demonstrate either productivity or performance.

The message here is that it is unrealistic to try and train doctoral degree holders in a 5-year project—one of the reasons the succeeding project, which began in 1982, is an 8-year one for fellowships.

Many of the M.S. degree holders were admitted to the Ph.D. program in Indonesia so the reliable data for productivity/performance are not in yet.

As indicated elsewhere, the program administrators took pains to assure that thesis research was relevant to Indonesian conditions and in every case it is believed the persons who have returned are continuing work in their study disciplines but not in the same problems—including those with heavy administrative loads.

To date, there has been little development of scientist-to-scientist networks. There initially was hope of arranging

for a number of the advisors of returning Ph.D.'s to come as short-term consultants after the fellows returned. But this did not happen. Most fellows were older and mature and did not feel the need to have their professor come to help them in their own country. Additionally, they would experience difficulty and possibly embarrassment in developing linkages if much money would be required to maintain such a network. Operational funds were too scarce. Linkages with the International Rice Research Institute did develop, but on an institutional rather than personal basis.

Only one of the fellows studying abroad conducted thesis research in Indonesia. This model does not work well within a national program when funded from loans. If funds are a grant from an outside donor, the approach will be well accepted. Some of the problems relate to family support and maintenance in the absence of the fellow.

Extensive use of local universities for advanced degree training has advantages and disadvantages. Enrollment in local universities helps to develop linkages between the institutions and the research system, facilitates thesis research on local problems, and helps in the development of the universities. Costs also are lower; the costs of in-country degrees being about $4,000 a year for a M.S. and about $5,000 a year for a Ph.D. as compared with $13,000 to $23,000 a year, respectively, abroad.

An obvious disadvantage, given the number of degree candidates and the few degree-granting institutions, is the possibility of "inbreeding" in disciplinary concepts and methods.

Factors contributing to success. How did accomplishment in numbers and quality so greatly exceed projection? The principal factors were the strong commitment of the AARD officials to staff development, the cooperation of the World Bank officials in approving adjustments and amendments to the basic agreement, the presence of IADS and AARD personnel at the project site who firmly believed that staff development was the first essential step in building AARD, and an able fellowship officer at IADS headquarters in the United States to handle details after project fellows arrived at their study posts.

As staff development through fellowships is a crucial activity for agricultural research organization in most developing nations, several aspects of AARD's program are analyzed.

Selection of candidates

Fellowships were awarded to staff members of the several research institutes of AARD on the basis of screening. Directors of the research institutes proposed candidates who then were screened by the AARD's Manpower Development Committee on the basis of such factors as demonstrated academic ability, job performance, and commitment to research and development. IADS personnel did not participate in the selection. The low rates of attrition speak well for the quality of the AARD's selection process.

Each person accepting a fellowship abroad was required to agreement to return to an assigned position after graduate study and serve in that position for a specified period related to the length of the fellowship.

English-language training

Indonesians usually study English or another foreign language in school, but they have little opportunity to practice. While foreign-language ability was not a requirement for fellowship selection, it soon became apparent that assistance to fellows in enhancing their English capability was essential for their admission to universities abroad. Of the 66 Indonesians who went abroad, 65 enrolled in Asian, European, or North American universities where instruction is in English, and English-language competency is required for admission.

In Bogor there were several expatriates experienced in teaching English as a second language. They accumulated materials for and organized a comprehensive, intensive English course to prepare the fellowship candidates for the TOEFL (Test of English as a Foreign Language) or other examinations. In 4 years, they conducted 12 intensive sessions of 10 weeks for a total of 190 persons. While it was not possible to produce accomplished English-speakers in 10 weeks, the students achieved a 50 to 60 point increase in TOEFL scores as a result of this training.

The urgent pace of land preparation in Asia.

Each English-language session was timed to end just before a TOEFL examination was to be given in Jakarta, and scores were forwarded to selected universities directly from the Educational Testing Service for students planning to study in the USA. The British Council and Australian Embassy in Jakarta offered a language testing service for their countries, as did some other embassies.

Submitting applications

Obtaining materials for fellows and counseling them on their applications to universities was a most time-consuming task. Each fellow was asked to get multiple copies of the college record so that he or she might apply to two or three universities. The time taken to counsel fellows on selecting universities, departments, or fields of study, paid off: only 3 of the 66 fellows changed departments or universities during their study periods.

Pre-departure preparation and orientation

AARD staff handled all local government requirements such as obtaining passports and exit permits. IADS staff in the United States and in the field followed the progress of the applications and issued the required letters of financial responsibility and forms for requesting visas for the study post country.

AARD set all stipend and allowance rates with assistance from IADS specialists. These support levels were reviewed and usually revised annually. Before departure each fellow was provided with a 1-month stipend, 3-month book allowance, a relocation allowance, and travel funds. Air tickets were provided in economy class and the university was informed of the fellow's arrival time and flight number. AARD also provided a research allowance; funds for travel to scientific meetings, thesis preparation, tuition, and fees; health insurance; a modest allowance for surface shipment of books purchased while abroad; and, for doctoral fellows, a family allowance for a spouse and up to two children.

In the final year, the project provided additional funds for selected, expensive books and supplies and started self-insuring for dental and eye care. Return air fare and travel

allowances completed the fellowship package.

Because this was the first foreign trip for many of the participants, they were briefed on checking luggage, on changing flights and airports, and on arrival procedures, including instructions for proceeding to the university if they were not met at the airport. The IADS specialist also provided a pre-departure orientation on such points as choosing a faculty advisor, seeking and utilizing the university support services to international students, and selecting housing.

Service and monitoring at study post

Each fellow was instructed to contact the fellowship officer at IADS headquarters soon after arrival at the study post to provide instructions for mailing stipends and allowances. Most contact while at the study post was with the IADS headquarters' fellowship officer who visited each fellow at least once and sent interim reports and academic grades to the field for monitoring progress.

To maintain contact with the home institution of the fellows, an annual progress report was sent to the directors of each institute. In addition the thesis research proposal of each fellow was approved by his institute's director before the research allowance was authorized. While helping to ensure that thesis research topics were germane to Indonesian problems, this mechanism also served as a communication link with the home institution.

The IADS specialist in the field also suggested specialized courses that would be useful to fellows on their return. For example, when AARD established a computer facility, each fellow was urged to take a computer course in order to be conversant with computer operations on his return. Similarly, because many of the returning fellows were likely to assume administrative or managerial positions soon after their return, they were encouraged to take a course in research management or public administration.

While the roles of the AARD and IADS staff in the fellowship program are emphasized here, these roles were only means to an end—that being the accumulation of knowledge, the development of the curious mind, and the stimulation of a thirst for knowledge. These promote the

personal discipline necessary for research achievements. The key to successful graduate education is the relationship between student and professor. Professors in universities in developed countries around the world make a great contribution to the development of indigenous capability in national research programs of developing countries.

In retrospect. Professional educators currently view educational and training programs in terms of the efficiencies obtained: (a) the extent to which the selected students actually complete their studies and graduate or receive the desired certificate or diploma, and (b) the extent to which the trained students return and are employed in posts in which they use a significant portion of their training.

At this stage, formal evaluation of the Indonesian program would result in a high value for efficiency of completion. It is expected that the high level will hold for those fellows whose programs are not scheduled to finish until 1984 or, in a few cases, in 1985.

But at present it is more difficult to assess to what extent the training of a particular individual is maximized in his first or subsequent assignments on return. This suggests the need, in the future, to give more attention to such issues as the problem of re-entry, follow-up, and formal evaluation.

The re-entry problem. There were 69 candidates for doctoral degrees under the project, 36 at universities in Indonesia and 33 abroad. Putting aside any possible differences in the quality and methodology of graduate education in foreign countries, as contrasted with that available at home, the possible prestige of taking an advanced degree abroad must be balanced against the personal sacrifices made to achieve that objective. Separation from family and friends, absence from the home institution for long periods with possible loss of perquisites and promotion, effort and stress associated with learning a second language, and adapting to new social and educational cultures are a few of the hardships encountered.

Little was done in this program to assist fellows in re-entry to their home environment after completing pro-

grams abroad. The AARD-IADS project programmed 28 months for obtaining the M.S., 40 months for the Ph.D., and 60 months for the M.S./Ph.D. fellowships abroad.

After 4 to 5 years abroad, several of the returning fellows were assigned the responsibility of directing their home research institute. A number of others were assigned to new locations because crop or disciplinary responsibilities had been shifted in their absence.

These circumstances are inevitable in a growing research organization. Nevertheless, it is now evident that more might be done to help returning trainees adjust to changes so that they might apply what they have learned in the situation more rapidly and effectively. They change as individuals and their task environment changes significantly during their absence. This area deserves more attention in all programs that involve education outside the home country.

Follow-up and evaluation. Institution-building takes time. Although the educational institutions of Indonesia are making great strides, it likely will be some years before they can provide the full array of educational services the nation requires. Therefore, the need to utilize foreign universities likely will continue for the foreseeable future. This makes it important that employing institutions learn from the returning fellows, by asking, both immediately after their return and again at a later date (perhaps 3 years into their assignments), how they judge their education had prepared them for their responsibilities, what the shortcomings were, and where adequate emphasis was placed.

The AARD-IADS project offers an excellent opportunity for such a comparative evaluation and it is hoped that some institutions or individual will recognize the challenge and opportunities to gain information potentially useful to universities and sponsors in guiding their future planning and programming.—*Edwin B. Oyer* and *Francis C. Byrnes*

IADS in 1982

(facing)
A wheat cake vendor in a village market

In 1982 IADS implemented plans laid during the past several years. The headquarters' offices were transferred from New York to the Washington, D.C. area, and major changes were made in the staffing and structure of the headquarters' group. At the same time, operational programs have continued at an accelerated pace and a new wholly owned, for-profit subsidiary has been created, which is ready to enter into contractual arrangements for service to developing countries.

Relocation and reorganization

The possible relocation of IADS headquarters was discussed first during IADS's formative years when it appeared that location *per se* could have some bearing on the recognition of the organization as an international one in the eyes of the international donor community. Subsequently, in 1980, an intensive study of four locations was

Consultants arranged through IADS in 1982

Bangladesh
Randolph Barker, *project review*
Steven A. Breth, *publications*
Robert L. Cushing, *planning*
David Gisselquist, *irrigation*
Richard R. Harwood, *cropping systems research*
David W. James, *research review*
Loyd Johnson, *irrigation*
Gilbert Levine, *water management*
Sam Portch, *soil fertility*

Belize
Jerome H. Maner, *livestock evaluation*

Dominican Republic
Francis C. Byrnes, *organization development*
Jairo A. Cano, *communication and training*

Ecuador
D. C. Elfving, *fruits*
Edward H. Glass, *fruit pest control*
Dennis Gonsalves, *fruit pathology*
Larry K. Hiller, *vegetable crops*

Egypt
John B. Claar, *agriculture planning*
Raymond A. Dennison, *agriculture planning*
Kenneth R. Farrell, *agriculture planning*
Francille M. Firebaugh, *agriculture planning*
James B. Fitch, *price policy*
Carl Gotsch, *agriculture planning*
Floyd F. Hedlund, *agriculture planning*
Omer J. Kelley, *agriculture planning*
Roy L. Lovvorn, *agriculture planning*
Albert H. Moseman, *agriculture planning*
Arthur T. Mosher, *agriculture planning*
William R. Pritchard, *agriculture planning*
M. B. Russell, *agriculture planning*
Edward Schuh, *agriculture planning*
H. H. Stonaker, *agriculture planning*
E. T. York, *agriculture planning*

Haiti
Jerome H. Maner, *swine industry*

Honduras
Thomas Bloch, *agriculture sector evaluation*

continued

triggered by an invitation to consider relocation to a university campus. The Board of Trustees reviewed the study and decided that for the time being it was advantageous to continue in facilities of the Rockefeller Foundation.

The situation changed in 1981 when the foundation expressed the view that greater independence for IADS, including relocation, would be in the best interest of both organizations. The study of four potential locations—Cornell University, the North Carolina Research Triangle, the Washington, D.C. area, and Manhattan—done the previous year was extremely valuable to IADS in achieving a rapid and beneficial response to the foundation's expression of position.

At the May 1981 meeting of the Board it was possible for management to recommend the Washington, D.C. area and to cite a number of distinct advantages of this location. A resolution was passed authorizing the move. A small interim office was opened in the Washington, D.C. area later in 1981 and a search for appropriate long-term space was begun.

Early in 1982, IADS signed a contract to rent offices in Rosslyn, an area of Arlington, Virginia, across the Potomac River from Washington, D.C. The new headquarters' opened on July 1.

IADS Operations, Inc.

Steps were taken to create a for-profit corporation, IADS Operations, Inc., which is wholly owned by IADS and authorized to undertake a wide range of activities designed to support agricultural development directly. Profits accrued by IADS Operations will pass to IADS, the parent organization, which will use them to provide donated services to developing countries. IADS Operations, Inc., was registered on February 17, 1982. It can undertake projects jointly with, or for, private enterprises, and may at times operate with more flexibility than a nonprofit organization.

Eventually it might be desirable for IADS Operations, Inc. to hire full-time staff directly and to rent space on its own or possibly it would sublet such space from IADS.

New and ongoing programs

Program activities in direct support of countries have continued to move strongly ahead. These are all contract funded as they have largely been since the founding of IADS. The current portfolio of signed, operational contracts totals $43 million.

IADS's activities in Bangladesh are larger than those in any other country. The project total amounts to over $22 million, or about half of our total portfolio. In 1982 the IADS project in support of agricultural research, which is funded by the U.S. Agency for International Development, was expanded by $5 million to increase research on water management in the farming systems of the country. This project is now the largest USAID-funded agricultural research project anywhere in the world.

The Bangladesh project is notable for more than size. It follows on the heels of a major program of construction and equipping physical facilities and it approaches the strengthening of agricultural research from several angles. The project recognizes the shortage of trained people by calling for an unusually large input of technical assistance and large amounts of overseas training. It also calls for much local training and it permits a number of local sabbatical programs that will bring Bangladesh's university professors directly into the national agricultural research system. Finally, substantial funds are set aside to support local "contract research." This research will be done by Bangladeshi scientists in local institutions using funds controlled by the Bangladesh Agricultural Research Council (BARC). This will facilitate BARC's mandated coordination role by giving it more direct influence on the work of various institutes, which have traditionally been independent or semi-autonomous.

There is a high degree of collaboration among donor agencies in Bangladesh. In fact IADS has at times been instrumental in fostering collaboration. Major World Bank investments in Bangladesh agricultural research have generally meshed well with those of USAID. Joint review teams have been appointed to evaluate World Bank and USAID

Consultants, *continued*

Robert W. Etheredge, *agriculture sector evaluation*
Gustavo A. Gomez, *agriculture sector evaluation*
Reggie J. Laird, *agriculture sector evaluation*
Vinton Plath, *agriculture sector evaluation*
Jackson A. Rigney, *agriculture sector evaluation*
Robert K. Waugh, *agriculture sector evaluation*

Indonesia
Francis C. Byrnes, *agricultural education*
H. D. Catling, *deepwater rice*
Hans Delavier, *sugarcane*
Derk Hille Ris Lambers, *deepwater rice*
Albert H. Moseman, *report preparation*
Robert B. Rathbone, *communication*
S.V.S. Shastry, *upland rice*

Japan
Jerome H. Maner, *high-lysine maize*

Nepal
Steven A. Breth, *seeding*
Kiranmani Dikshit, *extension communication*
Dwight C. Finfrock, *station development*
Wayne H. Freeman, *research review*
Frank D. Gorrez, Jr., *agronomy*
Robert G. Griffiths, *seed analysis*
Richard R. Harwood, *cropping systems*
John M. Hill, *management*
Dharma N. Koirala, *monitoring and evaluation*
Warren J. Leatham, *irrigation engineering*
Paul R. Mezynski, *seed technology*
Fred E. Nichols, *seed processing equipment*
Eduardo Perdon, *agricultural extension*
M. Kalim Qamar, *extension communication*
Ishwari R. Regmi, *agronomy*
Bobby Renfro, *maize diseases*
Hal R. Taylor, *extension communication*
Clyde E. Wassom, *maize*

People's Republic of China
Jerome H. Maner, *high-lysine maize*

continued

Consultants, *continued*

Philippines
Joseph R. Bookmyer, *training*
William R. Young, *training*

Poland
Jerome H. Maner, *livestock*

St. Vincent
Leon F. Hesser, *project identification*

Senegal
Pierre P. Antoine, *agricultural education*
Guy B. Baird, *agricultural education*

Sudan
Kenneth Turk, *project evaluation*

Thailand
Francis C. Byrnes, *agricultural education*
Robert F. Chandler, Jr., *rainfed agriculture*
Murray D. Dawson, *rainfed agriculture*
Arturo A. Gomez, *rainfed agriculture*
J. K. McDermott, *rainfed agriculture*
Arthur T. Mosher, *rainfed agriculture*

Venezuela
Dale D. Harpstead, *maize improvement*
Reggie J. Laird, *maize improvement*
Robert C. Vogel, *agricultural credit*
Robert K. Waugh, *livestock improvement*

Zaire
Alan D. Redding, *private consultant*
Everett L. Headrick, *private consultant*

IADS services to USAID

Objectives: To provide the U.S. Agency for International Development with short-term advisory services in agricultural development, including the fields of agricultural economics, planning, crop production, soil management and irrigation, fisheries, livestock, agribusiness, development of institutional services, and appropriate technology.

Magnitude: The 2-year contract, which became effective in September 1981 permits USAID to call on IADS for up to $350,000 of services in each year.

Basis: An Indefinite Quantity Contract between USAID and IADS.

activities and in one case the World Bank and the International Potato Center financed a potato seed specialist as an add-on to the USAID-funded IADS research team. In 1982 this effort was extended and expanded when the Australian High Commission made available a grant of $700,000 through the World Bank, which, in turn, contracted with IADS to provide the services. This project now includes training, equipment, etc., but the main feature continues to be provision of the services of a highly qualified potato specialist.

The 2-year Indefinite Quantity Contract (IQC), which IADS signed with USAID has proven to be another highlight. The intent of this type of contract is to pre-qualify specific organizations to provide certain kinds of services to AID missions upon short notice and without elaborate negotiations. Contractors are selected on a competitive basis but then are available to provide services on a "work order" basis much as a qualified supplier might, after making his bid, supply the government with automobile tires or any other commodity.

At present there are about 15 IQC holders in agriculture, and AID missions may turn to any one of them to provide services. Each is allowed to enter into work orders up to a gross cost of $350,000 a year.

Before the first year of the IADS IQC was half over the ceiling of $350,000 had been reached. Most work orders were to provide teams of specialists for agricultural sector studies and planning missions. One was for the U.S. Presidential Mission to Egypt. The mission developed a document "Strategies for Accelerating Agricultural Development," which could well influence Egyptian agricultural policies for years to come.

In addition to Egypt, during 1982 IQC services were provided to Thailand, Sudan, Zaire, Senegal, and Honduras, and IADS organized and managed a major conference for USAID called, "Workshop on Impact of Agricultural Research," which was held in Leesburg, Virginia, USA, and was attended by 100 persons.

The following pages give some specifics concerning current programs.

BANGLADESH

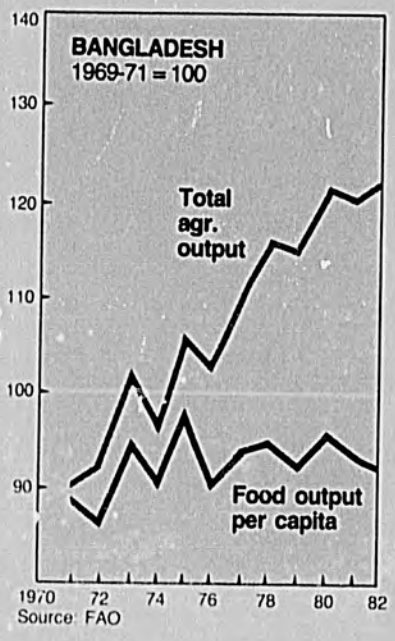
Bangladesh aims to reach self-sufficiency in food by 1985. The country's ability to provide better technology to its farmers will be a critical factor in achieving that goal. Under a contract with the Bangladesh Agricultural Research Council, IADS provides specialists and services that are helping to improve agricultural research in the country.

The member organizations of BARC are mostly research institutes that specialize in individual commodities such as rice, sugar, jute, tea, cotton, and livestock. However, one organization, the Bangladesh Agricultural Research Institute, has multiple crop responsibilities. It does research on such crops as wheat, maize, oilseeds, and legumes.

The Agricultural Research Project, which is now in its second 5-year phase, is supported largely by a grant to Bangladesh from the U.S. Agency for International Development. In 1982, the contract was amended to add three specialist posts and to expand IADS services to include support for water management research. The amended contract provides for 22 resident specialists and about 10 man-years of short-term consultants.

Three specialists assigned by IADS to the project in 1981—Murray Dawson, project supervisor; Hugo Manzano, farming systems specialist; and D. N. Sharma, farm development specialist—were, in 1982, joined by Robert Drew, Tim Kelley, R. N. Mallick, and Leopoldo Villegas, associate production agronomists; Dorsey Davy, training officer; Russell Frazier, agronomist; A. K. Kaul, crop specialist; Sam Portch, soil fertility specialist; L. C. Sikka, potato specialist; Jan Gerards and David Gisselquist, water management specialists; Brook Greene, economist; and Raphael Semmes, administrative specialist.

The project addresses nine program areas. Three of these are general, comprehensive areas—research management, documentation and communications, and farming systems. The other areas are technical—pest control, economics, water and soil management, livestock, and crops. The project also provides training to Bangladesh personnel, and equipment for the research organizations. The pri-



IADS services to Bangladesh

National agricultural research

Objectives: Under a project completed in 1981, IADS assisted the Bangladesh Agricultural Research Council (BARC) and Bangladesh Agricultural Research Institute in research and development related to food crops other than rice. Under the phase II contract, IADS is helping BARC increase the effectiveness of the national agricultural research system for development of appropriate agricultural technologies by raising capabilities for on-farm research, by strengthening research in selected disciplinary and multidisciplinary programs, by improving coordination of research by different institutions, and by improving linkages with non-research agencies.

Magnitude: The estimated cost of the phase II contract is US$21.8 million. The contract is for 5 years effective July 1981. It provides for up to 20 resident specialists for terms of up to 5 years, training of 84 individuals in both degree and non-degree programs, and procurement of research and laboratory equipment.

Basis: Contract between the People's Republic of Bangladesh and IADS.

Funds: USAID grant to Bangladesh.

Murray Dawson, *project supervisor*

Potato specialist

Objectives: Under a separate contract, and in collaboration with the International Potato Center, IADS provides a potato specialist to work with the Bangladesh Agricultural Research Institute in research and training. This effort was initiated in 1981 with World Bank funding.

Magnitude: The total value of the contract is $692,446. The term of the potato specialist began in April 1981 and will end June 30, 1985.

Basis: Contract between the People's Republic of Bangladesh and IADS.

Funds: Australian government grant to Bangladesh.

mary objective of the IADS team is to improve research institute performance by removing unnecessary organizational constraints and developing a system of management for effective utilization of human and material resources.

Significant accomplishments were made in research management, data handling and management, and farming systems in 1982.

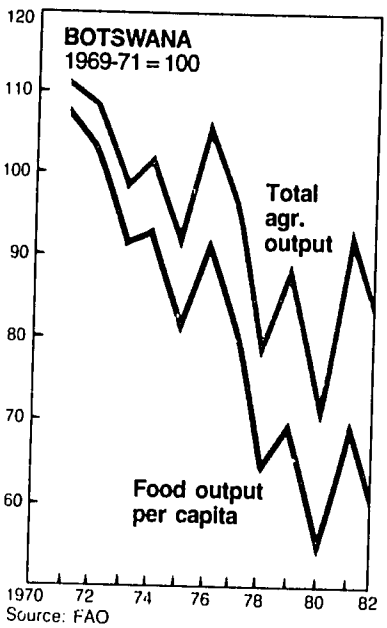
Research management. The Bangladesh Agricultural Research Institute (BARI) developed a 5-year master plan with assistance from a consultant provided through IADS. This general plan will be supplemented with an annual financial plan. Several project specialists have contributed to improved data handling, including improved project design that will result in better data that is easier to analyze.

Station development has continued at the main station of BARI and its four major substations, equipment has been upgraded, facilities have been provided, and water control has been improved, all of which will raise the quality of experimentation. And, through a program of contract research instituted by BARC, many of its member institutes have gained experience in proposal writing, research project assessment and selection, and project evaluation and monitoring.

Data management. IADS personnel have helped develop a 10-day course in simple statistical techniques, which has been given in BARI's four major branch stations, for an audience that includes personnel from other institutes, as well as from extension and other agencies outside of BARC. The course uses data from the cropping systems program and has resulted in changes to improve the efficiency of that program.

IADS specialists assigned to BARI's major branch stations have found that one of the most critical needs is assistance in project design, so that more usable data will result from experiments, and help in handling the data once it is generated. Similarly, greater emphasis on project design has been important in other areas such as soils, in which a simple change in design can lead to a large improvement in the quality of data generated.

Rice in various stages of growth in Indonesia.



Source: FAO

Farming systems. Work continued with the National Coordinated Cropping Systems Program (NCCSP), which involves institutes dealing with agriculture, sugar, and rice, as well as the Mennonite Central Committee and the Bangladesh Water Development Board. The NCCSP works in 16 sites and is financed by several donors. The diagnosis and design phase of this program is finished, and 65 cropping patterns with rice, jute, sugarcane, wheat, mustard, and several legumes are under evaluation.

The IADS agronomists posted at the major branch stations of BARI are primarily engaged in farming-systems research on farms and with extension workers. This type of work provides a way for the needs of farmers to be reflected back into the research programs. In the Chittagong area, for example, work with farmers convinced experiment-station workers that cowpeas deserve more attention.

The agronomists are also helping develop closer relations with extension. They and their BARI colleagues visit farms frequently in the company of extension workers, and they cooperate with extension in the holding of field days. This has an impact on both extension workers and farmers.

Potato program. The potato program is supported by the Australian government and conducted in collaboration with the International Potato Center. Over 2,400 genetic lines were screened in 1982 to find ones with early maturity, high yielding ability in the lowland tropics, and virus resistance. Four hundred lines were selected for further testing. Ten families were tested in true seed studies. The potato program also works in farming systems, post-harvest technology, and basic seed technology. Thirty-five tons of basic seed were provided to the Bangladesh Agricultural Development Corporation for multiplication. A course on seed production for the Asia region was attended by 24 participants from five countries.

BELIZE

An IADS program officer participated in a team organized by Winrock International that analyzed livestock

production in Belize. The team prepared project identification documents for development of future programs to increase production and productivity of livestock.

Belize is self-sufficient in poultry and egg production, and cattle production exceeds domestic demand. Expansion of the beef-cattle industry will require improved production efficiency, as well as improved cattle slaughter, meat processing, and identification of export markets. Increased milk production is needed to reduce the importation of significant quantities of dairy products.

Traditional swine production is insufficient to meet local demands and pork is imported. Large quantities of maize and rice bran are available to supply energy for swine rations, but protein supplements must be imported to provide a balanced ration.

The team recommended programs that would improve management, increase availability of improved breeding stock and protein supplements, expand marketing channels, and give rise to a pork-processing industry. The team also recommended changes in price policies and the easing of restrictions on internal trade and exports, which would raise the efficiency of livestock production.

BOTSWANA

Low rainfall in the 1981/82 season led the government to declare a drought and to implement relief programs of various kinds. While statistics for the year are not yet in, the total harvest was certainly low, and the number of cattle delivered for slaughter may be at record levels.

In crop production, water stored in the soil, partly reflecting the previous season's use, proved to be an important factor in yield. The poor harvest of last year motivated farmers to purchase seeds early for the 1982/83 season and to utilize the very first rains for planting.

Research has undergone a transformation in recent years. Perhaps a fourth of the staff is now engaged in farming-systems research, working in rural areas and in farmers' fields. There is some concern that the pendulum may have swung too far. Botswana will always have a high risk agriculture, and the farming-systems researchers will ex-

IADS services to Botswana

Objectives: To assist the government of Botswana in furnishing leadership to the agricultural research organization. In this unique arrangement, the Norwegian Agency for International Development (NORAD) provides the services of the director of agricultural research for the Botswana Ministry of Agriculture. At the same time, the director is an IADS representative, and IADS furnishes him with supporting services and a small amount of discretionary funds used to support research in Botswana.

Magnitude: NORAD has posted the director of agricultural research for approximately 5 years. IADS provided approximately $7,000 in 1982, in addition to support activities by the IADS headquarters staff.

Basis: The government of Botswana and IADS agreed to cooperate with this project through personal visits and exchange of letters.

Kristian Oland, *representative*

Technician showing Ecuadorian farmers the power of rainfall to erode their soil.

perience many failures. That may mean that many problems will be referred back to the central research station for solution. In this high risk situation, and with many long-term programs to be run by the central research station staff, an excessive proportion of staff may already have been allocated to farming-systems research. It is an area for a balance to be observed.

Research in Botswana is characterized by a close link to development and special attention is given to communal area development. A prominent problem in preliminary meetings between communal people and extension workers is the lack of specific knowledge about the locality. This has prompted researchers to attempt to develop rapid methods for resource surveys, using light aircraft and photographic techniques. The surveys focus on water sources, the status of the rangeland, cattle number and cattle movements, ratio between arable area and grazing area, etc. Useful information may be collected within a few weeks. The surveying techniques have already been developed to such an extent that their applicability in connection with new methods can be tested. The International Livestock Center for Africa supports the communal area survey work.

DOMINICAN REPUBLIC

Plan Sierra

During the year IADS provided two consultants to assist Plan Sierra in organizational development, personnel training, and long-range planning. Plan Sierra, a rural development project, brings governmental and private agencies into close working relationships with each other and rural families.

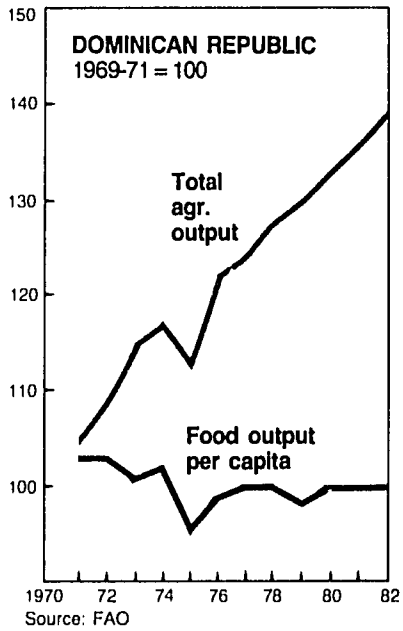
Training activities were expanded with the establishment of facilities at Los Montones where rural men and women are housed and fed while attending short courses of several days' duration. The management of Plan Sierra credits such training activities as being instrumental in helping farmers and homemakers see that their progress depends upon their willingness to work and cooperate rather than asking the government to do things for them.

IADS services to the Dominican Republic

Objectives: To assist the management and staff of Plan Sierra in organizational development, training, and related activities. Plan Sierra, an area development program in a mountainous central region of the Dominican Republic, brings together the government agencies working on health, agriculture, and education. It is administered by the Secretariat of State for Agriculture.

Magnitude: IADS is providing up to 30 days of consultant services a year for a 3-year period, beginning in 1980, at an estimated cost of US$45,000.

Basis: Contract between the Dominican Republic and IADS.



Source: FAO

With the project near the end of its first stage, the Plan Sierra staff is developing a comprehensive 10-year program with an estimated overall investment of $100 million.

The diversified project activities to date have concentrated on helping rural people improve their incomes and standard of living. This work has included coffee plantings and replantings, reforestation of denuded hillsides, improvement of pasture to support livestock, education in nutrition and health services to improve quality of life, and technical assistance and training in support of home crafts, small-scale industries, and mechanical trades.

Agricultural education

An IADS program officer served as a consultant to the staff of the Center for the Administration of Rural Development of the Instituto Superior de Agricultura (ISA). During 1982 the center continued its development of case study materials, implementation of programs, and construction and planning of facilities.

The center staff wrote 13 new cases on problems of administration in the Dominican agricultural sector. These will be used in its educational programs.

A 7-week training course on administration of agricultural projects was successfully carried out. The center staff also participated with the Fund for Multinational Management Education in a seminar, in the Dominican Republic, on the "Design of Projects for Cooperation between Farmers and Agribusiness."

Construction was finished in 1982 on the center's classroom building, which was financed by the W.K. Kellogg Foundation, and construction was begun on the center's office building.

ISA translated and published *A farmer's primer on growing rice* (originally published by the International Rice Research Institute). The Spanish edition, *Guia para el nuevo arrocero*, will be used for training on rice production.

During the year, IADS and ISA signed a contract under which IADS will provide consultants for two years beginning 1983 to assist the Center for Administration of Rural

Development in the areas of organization and personnel development, management, communication, teaching aids and materials, and development of teaching modules.

ECUADOR

The IADS contract with INIAP, the national agricultural research agency, ends February 1983. During the past 3½ years, IADS provided INIAP with seven long-term and ten short-term specialists who collaborated in fruit crops, poultry, grain legumes, rice, biometrics, soils, cassava production, and vegetable crops. Foundations were laid for continuing work by all programs to increase production and productivity of basic food crops, as well as to find innovative ways of helping subsistence farmers.

Poultry The project's poultry research focuses on the highland village of Puellaro. The work is channeled through the newly formed village poultry association, which has facilitated adaptation and validation of improved poultry technology.

Technology generated in the study area is being transferred to other rural development projects in the Sierra (mountain region). Most important, the poultry work has encouraged INIAP animal science programs to increase attention to subsistence farmers.

During 1982 an agreement was signed with SEDRIC (the integrated rural development council), an office of the Presidency of the Republic, under which the poultry team will collaborate in establishing backyard poultry units in one project location in the Sierra and one in the coastal area. Waterfowl production will be a priority activity.

Fruit program Although Ecuador is a major banana-exporting country, other fruit crops could become equally important for trade, but a large research and extension effort is still needed. Total fruit production in the country can be accelerated by increasing the productivity and profitability of existing production units and the area planted.

In 1982 extension-oriented activities continued in the Pungal-Chingazo Project of CESA (Ecuadorian Corpora-

IADS services to Ecuador

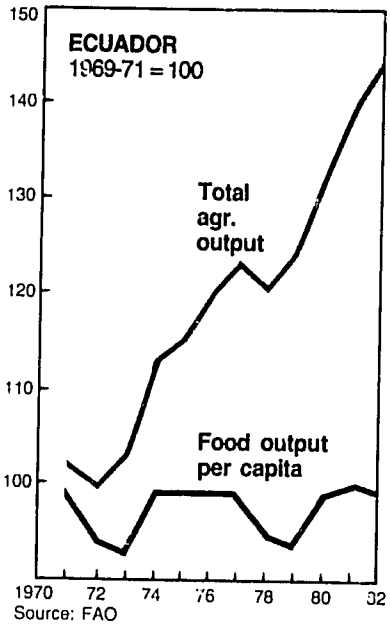
Objectives: To assist INIAP, the national agricultural research institute, in strengthening its research programs in food legumes, rice, fruit and poultry, and to assist the government of Ecuador in a regional project in the Guayas River Basin where rice is the principal crop.

Magnitude: A research contract with INIAP, amounting to US$2,635,000, calls for 402 man-months of specialists (in residence and as consultants) over a 3-year period, beginning May 1979. IADS personnel have worked in Ecuador since 1976 under previous agreements.

Basis: A contract with INIAP for technical assistance.

Funds: Inter-American Development Bank loan to INIAP for contract technical assistance.

Gustavo Morales, *project supervisor*



Source: FAO

tion for Agricultural Services). Farmers responded well to this continuous effort, and adopted fertilization, pruning, and other cultural practices. The nursery initiated last year is supplying disease-free trees to interested farmers.

Food legumes. Several new strains of grain legumes were introduced in 1982 through collaboration with ICARDA and CIAT. Some introductions will be released as commercial varieties in 1983; others are early breeding populations that will be selected for specific characteristics for different ecosystems of Ecuador.

Studies are under way with the poultry team to expand bean production among poultry growers. The availability of chicken manure offered the opportunity of introducing several improved varieties, which have had wide acceptance by the poultry growers. Two undergraduate students are finishing theses on the impact these new varieties have had on farmers in different economic strata.

In the coastal area near Santo Domingo, trials involving lentils and black beans have been run with the collaboration of a large commercial producer of horticultural crops. A collection of new early maturing pea varieties from Washington State University is being evaluated at the INIAP coastal experiment station.

Rice. Genetic variability, the source of improved varietal characters, is being sought through introduction of new materials and through local rice breeding. Crosses involving the most promising material for each of the four rice production systems are continually being made, the segregating progenies of which will be selected for improved types.

Screening of segregating populations and advanced lines under controlled water depths continued. Varieties with submergence tolerance are essential for a large part of Ecuador's rice-growing areas.

Soils. Soil-testing laboratories were developed at several INIAP experiment stations throughout the country. Potato-pasture rotation experiments with rock phosphates, regional fertilization trials with the new INIAP maize vari-

ety 101, studies on water salinity, and minimum tillage trials with maize and soybean are progressing at the different stations.

The pilot projects in soils and water conservation, which were established last year in four provinces, are serving as demonstration centers for the extension of soil and water conservation practices.

Consultants. Consultants who supplied services to INIAP under the contract during the year were Larry Hiller, Washington State University; Edward Glass, Cornell University; Dennis Gonsalves, Cornell University; and Don Elfving, Simcoe Experiment Station, Canada.

During the past 2 years, through the collaboration of AID, CIAT, and Elanco Laboratories, a number of scientists came to Ecuador to participate in seminars, symposiums, and courses organized by the IADS project supervisor: Lyndon Carew, Donald Foss, and Eleanor Schlenker of the University of Vermont; Gary Adams, Donald Corrier, and Ray Loan of Texas A & M University; Ronald Smith, University of Illinois; Guillermo Gomez, CIAT; Raymund Zemjanis, University of Minnesota; Donald Lein, Cornell University; and Omar Patino and Julian Buitrago of Elanco Laboratories.

EGYPT

Food policy

Because consumption of food in Egypt is rising faster than production, imports of agricultural commodities have been increasing rapidly. To narrow the gap between production and consumption, the government of Egypt is taking steps to improve its capacity to analyze important policy issues.

During 1982, IADS was awarded a contract to help strengthen the Agricultural Economics Research Institute (AERI) in the Ministry of Agriculture. Over a 3-year period, IADS and a subcontractor, Gotsch Associates, will provide a number of consultant teams to work with the staff of AERI in analyzing food issues in three areas:

IADS services to Egypt

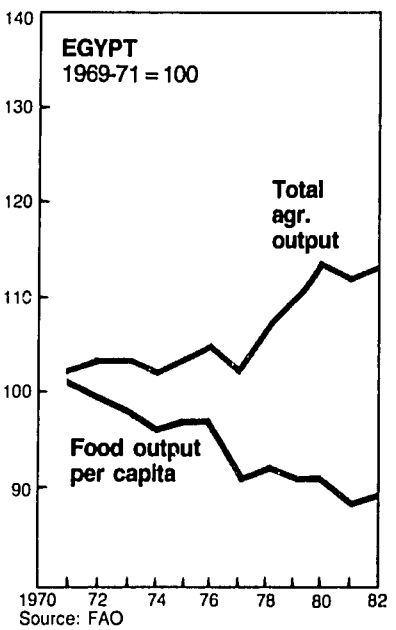
Objectives: To outline strategies for accelerating agricultural development; to assist the Agricultural Economics Research Institute in analyzing agricultural policy issues and, in the process, to strengthen the analytical capacity of AERI.

Magnitude: A contract with the Ministry of Agriculture, Arab Republic of Egypt, amounting to $651,168, calls for 60 months of short-term consultants' time over a 3-year period, beginning June 1982.

Basis: A contract between the Ministry of Agriculture, Arab Republic of Egypt and IADS.

Funds: U.S. Agency for International Development grant to the Arab Republic of Egypt.

Leon F. Hesser, *coordinator*



Source: FAO

U.S. Presidential Mission to Egypt

E. T. York, *University of Florida*
M. B. Russell, *University of Illinois*
Raymond A. Dennison, *private consultant*
H. H. Stonaker, *private consultant*
John B. Claar, *University of Illinois*
Floyd F. Hedlund, *private consultant*
Roy L. Lovvorn, *private consultant*
Omer J. Kelley, *private consultant*
William R. Pritchard, *University of California*
C. Edward Schuh, *University of Minnesota*
Francille M. Firebaugh, *Ohio State University*
Arthur T. Mosher, *private consultant*
Kenneth R. Farrell, *Resources for the Future*
Carl Gotsch, *Stanford University*
Albert H. Moseman, *IADS*

- *Livestock production.* With increasing incomes and continued population growth, Egypt's demand for red meat can be expected to increase. How much meat should be imported and how much produced in country? What are the likely changes in the comparative advantage of producing meat in country associated with possible changes in agricultural policy?
- *The impact of high-yielding varieties.* What changes in farming systems and cropping patterns have resulted from introduction of modern varieties of maize, rice, and wheat, and with what effects on food availabilities and nutrition? What policy changes are needed to ensure that the impact of the new varieties is as favorable as possible?
- *Crop intensification programs.* Increased production of vegetables, such as tomatoes, offers an opportunity to raise the intensity of production, but sharp increases in supplies of perishable commodities, without an increase in demand, would not benefit farmers. What combinations of production and marketing policies might foster higher cropping intensities without causing market gluts?

Agricultural assessment

In 1982, IADS provided a team, designated by U.S. President Reagan as a Presidential Mission, to assess the potential for accelerating development of Egypt's agricultural sector, to review constraints that might inhibit realization of the potential, and to suggest strategies to achieve desired goals. The team, headed by E. T. York, collaborated with senior Egyptian officials to do the analysis. The team's report, "Strategies for Accelerating Agricultural Development," concluded that:

- Potential exists for expanding agricultural output through improved productivity on land already being farmed and, to a lesser extent, through further land reclamation.
- Export markets could be expanded for certain agricultural commodities in which Egypt has a comparative advantage.
- Administered prices, crop quotas, and input quotas act as disincentives to farmers.

- A larger stream of improved technology is needed to continue to raise yields from the high levels already achieved.
- The small amount of arable land coupled with imperfect management of irrigation water is a serious constraint to greater output.
- Overlapping duties and conflicting policies among the various units of government involved in food production harm the agricultural sector.
- Inefficient transportation, processing, distribution, and marketing systems impede the development of Egyptian agriculture.

Recommendations of the mission dealt with minimizing the inhibiting effects of constraints so that more of the productive potential in agriculture can be tapped.

HAITI

An IADS program officer served as a member of a team organized by the Inter-American Development Bank and IICA. The team developed a detailed plan for repopulation of swine in Haiti. Swine are being completely eradicated due to an outbreak of African Swine Fever, a highly contagious, viral disease for which no vaccine exists. The IADS officer was responsible for review of agricultural production in the country and for the development of rations and feeding systems based on local feedstuffs.

Most of the pigs raised in Haiti are backyard scavengers that are fed only crop residues or surplus farm products such as avocados, mangos, and citrus that cannot be marketed during the peak season. After repopulation, most of the 1.2 million pigs in Haiti will continue to be raised under the traditional system. But with appropriate logistic and financial arrangements, many small farmers could use balanced rations to supplement and raise the efficiency of traditional feeds. Wheat bran, a by-product of the milling of imported wheat, is the most abundant energy feedstuff in Haiti. Other widely available feedstuffs are rice bran, soybean meal, and molasses. In combination with small quantities of imported vitamins and minerals, balanced swine rations could be formulated.

Honduras agriculture sector evaluation team

Jackson A. Rigney, *North Carolina State University*
Robert K. Waugh, *private consultant*
Robert W. Etheredge, *private consultant*
Vinton Plath, *private consultant*
Thomas Bloch, *INCAE*
Reggie J. Laird, *Rockefeller Foundation*
Gustavo A. Gomez, *private consultant*

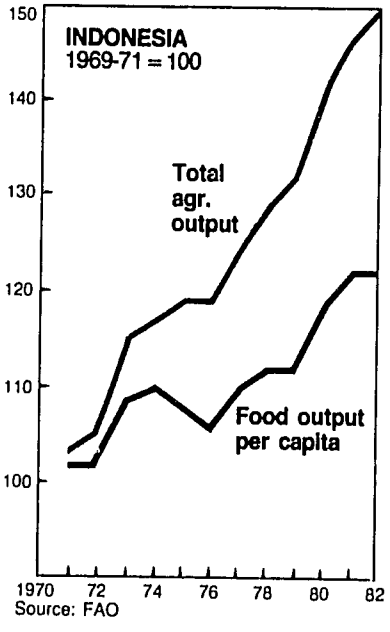
HONDURAS

For the U.S. Agency for International Development, IADS organized a seven-man team to evaluate the agriculture sector program supported under an AID loan. The IADS consultants and Honduran counterparts prepared a report that was submitted to the Minister of Natural Resources and to the USAID mission in Tegucigalpa. The report dealt with institutions concerned with education and training, information, planning, marketing, and delivery of input services, including credit and extension.

The evaluation highlighted the favorable results of support to scholarships and fellowships for advanced degrees. On the other hand, much more attention should be given to in-service training. Because of its potential role, the strategically located Regional University Center on the Atlantic Coast (CURLA) should be strengthened. Good progress has been made in development of the information system of the Ministry of Natural Resources.

INDONESIA

Production of Indonesia's staple food, rice, is expected to reach record levels for the third year in a row in 1982 in spite of a below-normal rainfall on Java and eastern Indonesia. The government's objective is to maintain an emphasis on rice production while increasing efforts aimed at secondry and horticultural crops and livestock—especially small animals. It is promoting the export of agricultural products in both raw and processed form to provide additional foreign exchange. These policies all require a broad range of research activities. In addition, the government's vast transmigration program—aimed at shifting people from overpopulated islands to sparsely populated areas—demands research on long-range farming systems for the new areas and on agricultural practices that will sustain new settlers immediately on arrival.



Source: FAO

National agricultural research

AARD (Agency for Agricultural Research and Development), the national research programming and manage-

Two contract signings that took place during 1982: (above) Sadikin S. W., director general, Indonesian Agency for Agricultural Research and Development, and A. Colin McClung, president of IADS, signing the NAR II contract; (below) Yehia Mohieldin, undersecretary, Ministry of Agriculture, Egypt, and McClung signing a contract for services to the Agricultural Economic Research Institute.

IADS services to Indonesia

National agricultural research

Objectives: Phase I was completed in July 1982. IADS provided the Agency for Agricultural Research and Development (AARD) with technical assistance and services for strengthening national production-oriented research on rubber, vegetables and agricultural economics. IADS also helped with overseas and in-country training. Phase II is designed to complement Phase I. The services to be provided by IADS during Phase II will include administration of training for AARD staff abroad and technical assistance. The latter involves a set of priority research activities concerned with selected commodities including estate and industrial crops, vegetables and fruits, forestry, fisheries, and support for transmigration. Also, technical assistance will be provided to strengthen research management and the institutional framework.

Magnitude The Phase I contract at a cost of US$5.0 million provided 39 man years of specialist services from February 1977 through July 1982. The estimated cost of the Phase II contract is $13.3 million in foreign currency and $1.7 million in local currency. The contract is for five years effective August 1982 and provides for 58 man-years of long-term specialists and consultants, training of 70 persons at the Ph.D. level and 50 persons at the M.S. level, and providing non-degree training for 75 persons.

Basis Contract between Republic of Indonesia and IADS.

Funds World Bank loan to Indonesia and local currency from government of Indonesia.

William Young, *activity project specialist*

Research in Sumatra

Objective To help the Central Research Institute for Food Crops develop and expand nine research stations in impor-

continued

ment organization, which has emphasized development of scientific personnel since its founding 6 years ago, made technology transfer its top priority during the year. This shift reflects the accelerating return of trained staff members from advanced studies both at home and abroad.

AARD published a report in Indonesian of its first 5 years, which was used at two major planning meetings. One was the Ambon consultation in eastern Indonesia. This meeting will help AARD complete plans for creating additional research complexes in the eastern islands and Irian Jaya (Indonesian New Guinea). The report was also used at a meeting that brought together top officials of the Ministry of Agriculture to review accomplishments during the current national plan and to provide research results to serve the designers of policy guidelines for the next 5-year plan, which will begin in 1984.

During 1982, the National Agricultural Research Project (NAR-I), supported by a World Bank loan, came to a close. A new contract with IADS for technical assistance and training support under NAR-II was signed. Preliminary planning and proposal preparation of NAR-III was begun.

Perhaps of greatest significance to AARD was the return to duty of large numbers of AARD scientists, who had been engaged in advanced degree training. Several have been assigned to directorships of research institutions and programs. These returns of the AARD's investment in human capital meshed well with the dedication of three national research centers built under the civil works program of NAR-I: the center for smallholder rubber research and development at Sembawa, South Sumatra, in April, the center for research on horticultural crops at Lembang, West Java, in July, and the center for rice and selected palawija crops at Sukamandi, West Java, in August. The Sumani Research Station for Food Crops in West Sumatra, under the NAR-II program, was inaugurated in April. The national research center for rubber grown on estates, at Sungei Putih, Sumatra, will be dedicated in 1983.

AARD-IADS cooperative program activities continued through 1982 in all areas for which assistance had been requested and contracted. Following negotiations between IADS and officials of the government of Indonesia, a for-

mal contract for NAR-II was signed on July 20, 1982 under which IADS will provide technical assistance and fellowship management services for an additional 5 years.

Implementation of both long- and short-term fellowships abroad under both NAR-I and NAR-II continued and two sessions of English for Agricultural Training were conducted to prepare prospective degree candidates for taking English competence examinations required for entry to graduate schools in the USA.

There were several changes in long-term personnel in 1982. Edwin B. Oyer, the project specialist for the past 5 years, and Romeo T. Opena, research specialist in vegetable breeding departed. William R. Young was appointed acting project specialist.

Agricultural research in Sumatra

The Sumatra Agricultural Research Project was designed to expand and improve a network of agricultural research stations on the island of Sumatra. The mandate of Balittan (the Sumatra agricultural research institute for food crops) includes research on basic food crops and cropping systems for both the intensively cultivated fertile areas and the secondary lands. The former occupy 10 percent of Sumatra's total agricultural area while the latter, depleted red-yellow podsolic soils and swamps or tidal flooded areas along the eastern coast, make up two-thirds of the island.

Sumatra's secondary lands figure prominently in Indonesia's transmigration programs, which are designed to create new opportunities for settlers from the overpopulated islands of Java, Bali, and Madura. However, satisfactory technologies for continuous annual cropping on the secondary lands are not yet available, except perhaps with unacceptably high levels of input use.

Structure of Balittan. Balittan comprises 12 experiment stations formally linked to the headquarters at Sukarami. The USAID contract, under which IADS works, provides developmental support for Sukarami and eight other stations. The focus of the network is on annual food crops: rice (upland, highland, paddy, and tidal swamp), *palawija*

IADS services to Indonesia
continued

tant food-crop production zones of Sumatra.

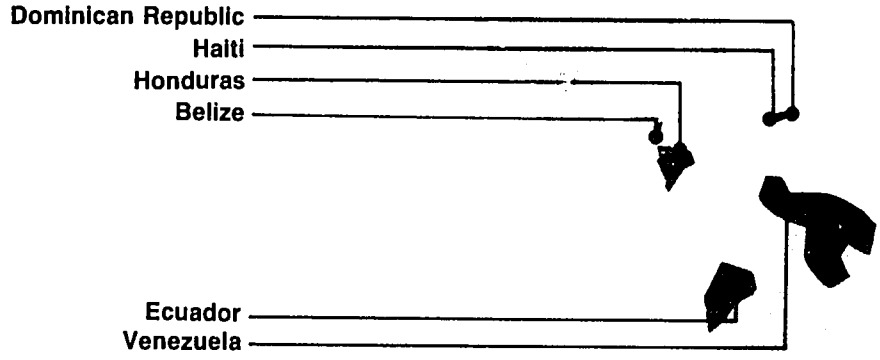
Magnitude: A US$2.5 million contract provides 21 man-years of professional assistance from October 1979 through April 1984 and consultant services for 24 man-months. Sixty fellowships for study in Indonesia and abroad plus non-degree training and conferences will cost an additional $1.2 million.

Basis: Contract between the Republic of Indonesia and IADS.

Funds: USAID grant and loan to the Republic of Indonesia; local currency from the government of Indonesia.

Kenneth O. Rachie, *project specialist*

DEVELOPING COUNTRIES SERVED BY IADS, 1982



Organizations contracting with IADS in 1982

Bangladesh
- Bangladesh Agricultural Research Council
- World Bank

Belize
- Winrock International

Botswana
- Department of Agricultural Research

Dominican Republic
- Government of Dominican Republic

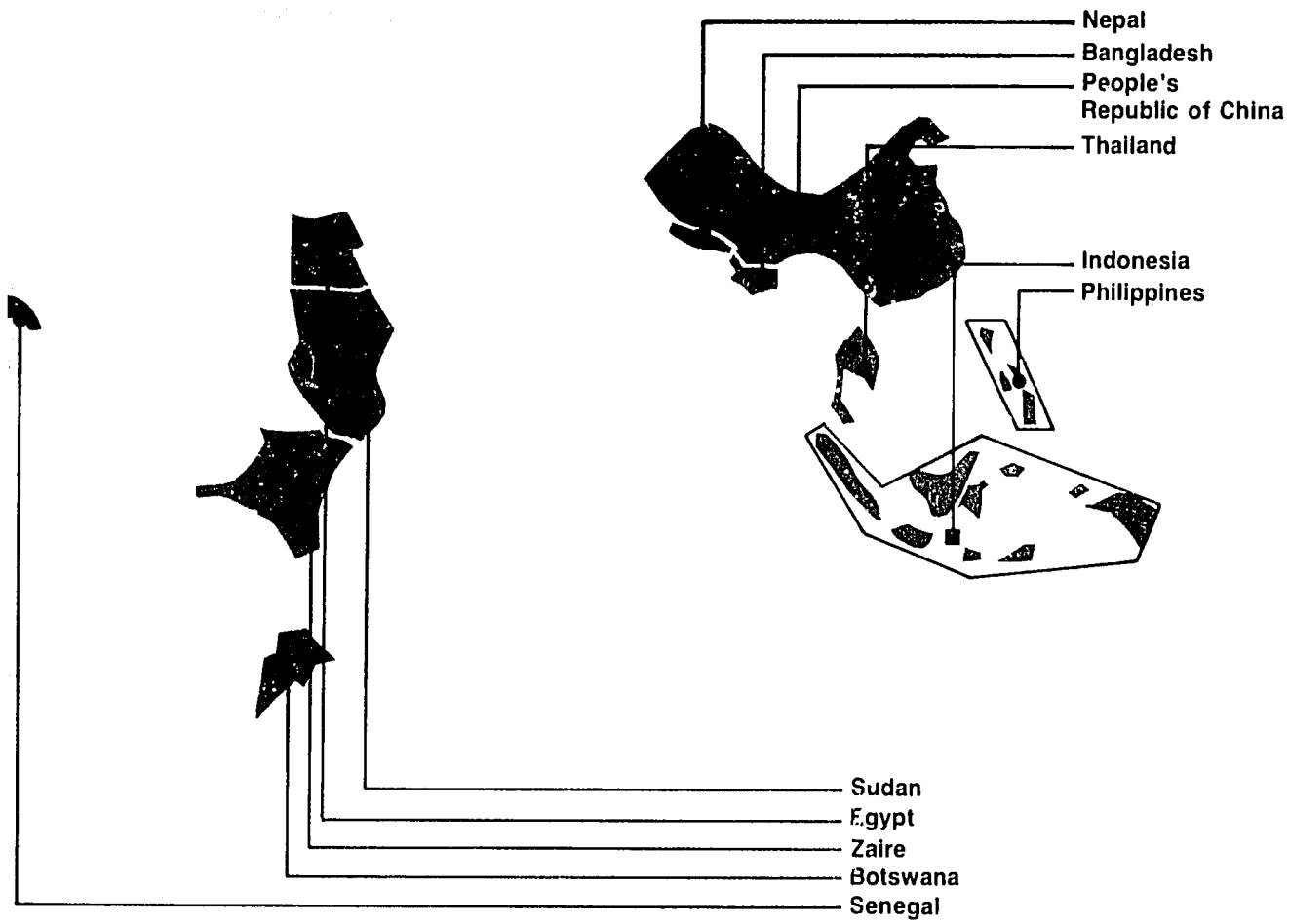
Ecuador
- Instituto Nacional de Investigaciones Agropecuarias

Egypt
- Government of Egypt
- Dames and Moore
- U.S. Agency for International Development

Haiti
- Inter-American Institute for Cooperation of Agriculture

Honduras
- U.S. Agency for International Development

Indonesia
- Agency for Agricultural Research and Development
- Central Research Institute for Food Crops
- Asian Development Bank



Nepal
- Agriculture Inputs Corporation
- Department of Agriculture
- World Bank

People's Republic of China
- CIMMYT

Philippines
- Ministry of Agriculture

Senegal
- U.S. Agency for International Development

Sudan
- U.S. Agency for International Development

Thailand
- U.S. Agency for International Development
- Asian Development Bank

Venezuela
- Banco de Lara
- Fundacion Polar

Zaire
- U.S. Agency for International Development

■ Resident IADS personnel assigned to national programs.

A cabbage grower in the jungles of Sumatra.

crops (maize, sorghum, and wheat), food legumes (soybeans, peanuts, and cowpeas), root and tuber crops (cassava and sweet potatoes), several fruits and vegetables, and cropping systems. The disciplinary sciences involved in the commodity programs include agronomy, plant breeding, plant physiology, plant pathology, entomology, horticulture, and agricultural economics.

Staff changes. Four expatriate specialists were recruited during the year to bring the project staff up to full strength. K. O. Rachie assumed the position of project supervisor and P.S. Srinivasan was appointed administrative officer. Two posts were filled for the first time: soil science, Aroon Jugsujinda, and agricultural economics, Douglas Perry. The other IADS staff members are Jack Traywick, farm development specialist, and Ulrich Scholz, agricultural geographer, who completed his assignment at the end of the year.

Research program. Despite a reorganization of Balittan during the year and the large number of its staff that are in training, a good start has been made on field research at several stations and in farmers' fields. Increasing attention is being given to the long-term research program of Balittan. Several consultants were commissioned to write papers on critical research needs and to recommend experimental approaches to solve major production problems. Papers were prepared on floating rice by H. D. Catling and D. HilleRisLambers, on vegetable research by E. B. Oyer and R. T. Opena, on upland rice by S. V. S. Shastry, on soil and water management by W. H. Patrick Jr. and Aroon Jugsujinda, and on the agro-ecological systems of Sumatra by U. Scholz.

Training. Raising research capability is a paramount objective of the project. During 1982, two individuals completed Ph.D. degrees and six completed master's degrees. Six doctoral candidates and eleven master's candidates are studying in Indonesia or abroad. Forty-three staff members have completed non-degree training and ten others are currently being trained in several aspects of research sup-

port. In addition there are increasing opportunities for in-service training through seminars and participation in research procedures and other support activities.

Research station development. Major construction projects were finished at the Sukarami Central Station, and, with World Bank loan funds plus local counterpart funds, at two other stations. Construction is under way at several stations.

Since only a portion of Government of Indonesia counterpart funds were available for scheduled station development in 1982, construction has been reduced at several locations to facilitate the research program. At Sukarami several old buildings are being renovated to provide more staff housing and research space.

A revised master plan for all station development was presented and discussed in Padang with a group of 35 specialists. Detailed farm development plans, including plot layouts, field roads, water reservoirs, drainage systems, and fencing, are being prepared. Additional soil studies have been made at five stations.

The first equipment order, for tractors, field implements, and seed processing and workshop equipment has been placed. Quotations are being obtained for the second order consisting mainly of laboratory equipment. The central diagnostic laboratory manager has been appointed and will receive 5 months of training in the Netherlands. In addition several new station managers are being appointed, and in-service training is being planned.

Because of the sharp rises in building costs (cement prices have increased 250 percent since the project started) and the uncertainty of sufficient funds for planned station development, a detailed study is being made to find ways to economize on buildings and other developmental expenses, while still providing functional research facilities.

Agricultural education

As a consultant to the Asian Development Bank, an IADS program officer examined agricultural education in

Indonesia. He reviewed plans of the Ministry of Education and Culture to improve agricultural education in the secondary schools under its jurisdiction in relation to the World Bank-financed improvement programs for upgrading other secondary agricultural schools operated under the supervision of the Ministry of Agriculture.

His report included the following conclusions:

- Despite remarkable progress in education in Indonesia since 1945, there is a critical shortage of technical and professional manpower to serve the rapidly expanding agricultural sector.
- Most teachers in secondary agricultural schools lack training, particularly in the sciences basic to agriculture, in agriculture, in how to teach agriculture, and in practical agricultural skills. In most schools, the facilities, instructional materials, and available land are inadequate for teaching practical agricultural skills.
- The Agency for Agricultural Research and Development is melding Indonesia's agricultural research institutes into a system staffed by competent scientists who are producing technology relevant to the nation's needs. Intensive efforts under way will link this system more closely with the institutions responsible for agricultural education and extension.
- Major progress toward meeting the agricultural manpower demands of Indonesia can be made through programs of the two ministries. Overall coordination already exists in BAPPENAS and in other informal mechanisms at lower levels in which both ministries participate in the Indonesian cultural tradition of achieving unity through diversity.

JAPAN

In meeting with Japanese scientists and feed grain importers, an IADS program officer discussed recent advances in high-lysine maize. The officer was part of a team organized by CIMMYT to promote the production and utilization of high-lysine maize.

IADS services to Nepal

Integrated cereals project

Objectives: To provide technical assistance and services to Nepal for strengthening national production-oriented agricultural research and extension activities related to cereal crops and cropping systems.

Magnitude: Estimated contract costs are US$7.7 million for work to be completed by September 30, 1984. IADS will provide up to 52 man-years of specialists (in residence, and as consultants). The training component includes approximately 45 man-years of advanced degree training, and 50 man-years of other training.

Basis: Contract between His Majesty's Government of Nepal and IADS.

Funds: USAID grant to Nepal.

Carl N. Hittle, *project supervisor*

Seed production and input storage

Objective. To establish a labor-intensive system for producing, testing, processing, storing, and distributing seed of major food crops, and for storing and distributing other inputs used in the production of these crops.

Magnitude: The contract is funded for 5 years beginning January 1980 at a total cost of US$2.6 million. It provides for 8 man-years of specialist (resident and short-term) services. Other services include training and procurement of equipment. Ten Nepalese will receive training at the master's degree level and 28 will receive nondegree in-service training abroad.

Basis: Contract between His Majesty's Government of Nepal, acting through the Agriculture Inputs Corporation, and IADS.

Funds: USAID grant to Nepal.

Sharanjit S. Bal, *project supervisor*

continued

NEPAL

Integrated cereals project

During its first 5 years, the Integrated Cereals Project focused on adaptive research aimed at finding combinations of varieties and practices that would best fit the diverse cropping patterns (crop sequences and intercrops) and farming systems used by Nepalese farmers. The research has been conducted in farmers' fields at six sites that are representative of broad agroclimatic zones of Nepal, as well as at experiment stations.

The project began a 3-year extension in 1982. During this period, the emphasis is on helping farmers raise production by applying the new technologies that have been developed. The extension approach centers on cropping patterns rather than on individual crops.

Production blocks—groupings of contiguous fields—are being used as the framework for production programs. Farmers who have neighboring fields are recruited to join the production program. Participants are given management advice keyed to the year-round cropping pattern and help in arranging for delivery of inputs. Pilot production blocks were launched at four locations near cropping systems research sites in 1982. The blocks were established in land devoted to the cropping pattern rice-wheat. In the winter 1981–82, wheat production blocks totaled 62 hectares. Because of the small size of farms and fragmentation of land in Nepal, even small production blocks require participation by large numbers of farmers. At one location, to form a production block of 5.5 hectares, it was necessary to enroll 47 farmers.

The experience in that season demonstrated that the block is a manageable framework within which extension personnel can train farmers, transmit information, advise on irrigation and water management, help arrange for credit and input supplies, and organize the local production of seeds. The block also serves as a conspicuous demonstration that is noticed by other farmers in the vicinity.

Subsequently, during the monsoon season, rice production blocks were organized at the four sites, totaling 200

hectares, and by the end of the year, plans were under way to establish 100 to 200 hectares of wheat production blocks at four out of six sites in winter 1982–83.

In districts that do not have a cropping-systems site, prior to launching production campaigns, one or two years of verification trials are conducted to test the most promising cropping-pattern technology from the cropping-systems research sites. These pre-production verification trials, in addition to confirming the applicability of the technology, enable extension workers to become familiar with the methods involved. Many of the pre-production verification trials are being conducted by personnel of rural development projects. To facilitate involvement of these projects, a manual was prepared entitled *Guidelines for preproduction verification trials of cropping systems recommendations*. The manual explains, step by step, improved technology for up to nine cropping patterns for each of five broad ecological conditions, and how to test those patterns in farmers' fields.

Using the guidelines, personnel of the Rapti Rural Area Development Project ran verification trials in seven locations in five districts. In four of the locations, yields from the improved technology were at least double those from farmers' practices. Marginal benefit-cost ratios for the improved technology at the seven locations ranged from 4.3 to 38.0.

ICP has conducted training sessions for extension personnel in a number of other rural development projects to prepare them for implementing production programs using cropping-systems technology.

Several new varieties were released during the year by the national crop research programs. The maize variety Arun promises to play an important role in cropping patterns that require a variety with early maturity. The release of Triveni wheat will help to widen the genetic base of wheats grown in Nepal. At present one variety that is vulnerable to attacks of leaf rust predominates in the country's wheat land. Two rice varieties, Himali and Kanchen, which were released in 1981 for the Hill region, are being spread through mini-kits and on-farm trials conducted by rice researchers. They are being well-received by farmers.

During 1982, Carl Hittle took over as project supervi-

IADS services to Nepal
continued

Hill food production

Objectives: To provide technical assistance needed to implement the hill food production project, which will improve agricultural extension and on-farm research, livestock development, input supply services, and infrastructure in four districts in the Hill region. The project is supported by the World Bank through an International Development Association credit to Nepal. UNDP has provided a grant for consultants' services through a contract between the World Bank and IADS.

Magnitude: Estimated contract costs are US$586,000. Between December 1981 and June 1985, IADS will provide periodic services by foreign and local consultants, totalling up to 90 man-months.

Basis: Contract between World Bank and IADS

Funds: UNDP grant, with World Bank as the executing agency

Wayne H. Freeman, *advisor*

Agricultural extension and research

Objective: To provide technical assistance to the agricultural extension and research project. The project is designed to strengthen extension services and upgrade applied and adaptive research in eight districts in the Terai (plains).

Magnitude: Estimated contract costs are US$386,000. For work between December 1981 and January 1985, IADS will provide on a periodic basis, up to 35 man-months of consultants.

Basis: Contract between World Bank and IADS

Funds: UNDP grant, with World Bank as the executing agency

Wayne H. Freeman, *advisor*

IADS staff members, S. S. Bal (with camera) and Peter Rood inspecting a mini-seedhouse under construction in Nepal.

sor from Wayne H. Freeman, who remained as advisor to the project, and I. C. Bolo took the new position of production agronomist.

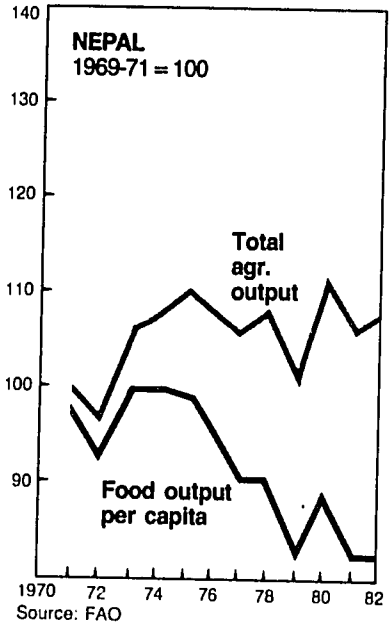
Seed project

Seed program activities in Nepal are carried out by the Department of Agriculture and the Agriculture Inputs Corporation. The former is charged with functions like foundation seed production, quality control, and seed technology research, and the latter is responsible for the production, processing, storage, and distribution of improved seeds. Both organizations receive technical and material support from the Seed Production and Input Storage (SPIS) project to improve their abilities to ensure that good quality seeds are available to farmers. The project personnel also help the Agriculture Inputs Corporation to upgrade fertilizer management skills and to develop input storage and handling facilities in the Hill region, which contains two-thirds of Nepal's population.

The focus of the SPIS project is on creating a system of cereal seed production in the Hills. Attempts to supply seed to the Hills from the Terai plains have been beset with problems of logistics, transportation, high cost, and questionable quality. To provide the infrastructure for local seed production, mini-seedhouses and small warehouses are being constructed in remote areas, essential supplies and seed processing equipment are being provided, and seed growers are being trained. In all, 16 mini-seedhouses in remote areas and 12 small warehouses are targeted under the project. To find suitable sites, key-informant baseline surveys at 34 locations have been carried out. By the end of 1982, construction was completed at four sites and equipment was installed. Construction was under way at 10 sites, and contract awarding for nine other sites was in progress. Seed production programs have been launched at nine sites where the mini-seedhouses are finished or are expected to be ready by the time of the wheat harvest.

The first mini-seedhouse went into operation in the winter 1981–82, at a pilot seed-production site in Lamjung district. Nearly 50 farmers grew wheat seed under a pro-

A. N. Bhattarai, head of the Division of Agronomy, Department of Agriculture, Nepal, flanked by Ken Sayre and Bong Bolo of IADS at the 1982 international cropping systems workshop in Bangkok.



Source: FAO

gram organized by the SPIS project. They sold 16 tons of seed to the mini-seedhouse at prices up to 30 percent higher than the market price for ordinary wheat grain. The seed was cleaned, graded, and treated against loose smut at the mini-seedhouse and then stored. For the 1982–83 wheat season, enough good seed was available to plant 160 hectares. The seed was sold to farmers in convenient 10-kilogram cloth bags, which also contained a leaflet of recommendations for better production.

Several promising items of equipment are being investigated for use in seed production programs. To overcome the difficulties of drying maize seed in the monsoon season, a seed dryer that can operate on sunlight or kerosene has been developed. Its drying capacity is 500 kilograms a day. Preliminary studies indicate that the dryer can raise seed temperature 11°C in full sunlight and 6°C in partial sun, which is enough to ensure effective drying. The first unit has been installed in Dhading district. After testing and modification, units will be fabricated locally so each mini-seedhouse has one.

Another idea being tested is operating seed-processing equipment with 8 to 10 kilowatts of electricity generated by a water turbine installed in a mountain stream.

To improve the ability of seed growers to store seed safely themselves, small metal storage bins are being made available. Forty bins of 400-kilogram capacity have been purchased in Kathmandu and will be carried to Lamjung district for distribution to seed growers.

A wide range of training opportunities are available under the SPIS project. Seven seed officers are pursuing master's degrees abroad in seed-related subjects and two other officers are studying for master's degrees in business administration in USA and Philippines. More than a dozen officers have so far been sponsored for non-academic training courses, seminars, and observation tours abroad.

Under the in-country training program for 1982, five sessions of seed production training were attended by 218 farmers. In addition over 100 officials were trained in aspects of seed technology through five training courses. In the training of field staff of the Agriculture Inputs Corporation, special emphasis was placed on the handling and

storage requirements of seed in contrast with those for fertilizer. In all the training courses, a large amount of handouts in Nepali were available.

For more effective implementation of project activities, special staff support was extended to the Agriculture Inputs Corporation by locally recruiting a seed technologist and three overseers. The added personnel have proved helpful in launching seed multiplication at several sites and in ensuring rapid completion of construction work.

Hill food production

The Hill Food Production Project is in its first year. It is intended to increase food production in four Hill districts in western Nepal. IADS has supplied consultants in extension agronomy, irrigation engineering, extension and communication materials, as well as monitoring and evaluation. A total of 32 months of consultants' time has been provided to the project during 1982. Fourteen months of consultation have been supplied by local technicians. The project is using the extension approach developed for the transfer of cropping systems technology. Staff members have undergone training in the methodologies and technologies to make the extension program more effective. Training programs for different levels of technicians have been developed for monthly, bi-monthly, and semi-annual training.

Nine irrigation projects of less than 50 hectares each have been designed and specifications developed in preparation for advertising and construction. Additional sites have been selected for future design and development.

Training materials, including a comprehensive training manual on rice, have been prepared. Similar manuals on maize, wheat, and potatoes are envisaged.

A detailed monitoring and evaluation plan has been developed for periodically measuring the progress of the project.

Agricultural extension and research

The Agricultural Extension and Research Project is initially concentrating in eight districts of the Terai plains.

The project is using the training-and-visit system of extension. The institutional and infrastructure base for this extension system has been established and the project has accepted the cropping-systems approach as a means of reaching farmers. The technologies developed have been included in their training programs.

Consultants have been supplied by IADS for extension, communications materials and training, research station development, and research management. A total of 9.5 months of consultants' time have been used in these areas.

Many small leaflets and flip charts have been developed for use at training centers and for distribution to farmers.

Training programs have been held on the more effective uses of audio-visual materials in the training-and-visit program.

Three research stations were surveyed and plans developed for land shaping. The other two stations have only minor requirements for irrigation. Equipment lists were finalized for increasing the effectiveness and capability of these stations.

Regional stations are being strengthened to provide more location-specific research to solve local problems. The research advisor participated in regional workshops to help plan station research as well as trials in farmers' fields.

PEOPLE'S REPUBLIC OF CHINA

An IADS program officer participated in a team, organized by CIMMYT, which met with Chinese scientists to exchange information on the potential for increasing production of hard-endosperm, high-lysine maize and its use in swine, poultry, and human diets.

Compared with ordinary maize varieties, high-lysine varieties are nutritionally superior because their protein contains double the normal amount of two amino acids, lysine and tryptophan. While early high-lysine varieties had some serious agronomic shortcomings, CIMMYT maize breeders have been able to produce, during the last decade, "quality-protein" maize varieties that are high yielding,

Turning rice to speed drying.

possess resistance to insects and diseases, and have hard kernels.

The meetings were held under the auspices of the Chinese Academy of Agricultural Sciences.

PHILIPPINES

Under an agreement with the Ministry of Agriculture of the Philippines, IADS provided two consultants on training. The consultants assisted with the development of an overall training plan, and established criteria for selection of candidates for training.

POLAND

An IADS program officer participated in a team organized by the Rockefeller Foundation and the Rockefeller Brother's Fund that assessed the agricultural sector of Poland. The purpose was to identify constraints to production, processing, and distribution of food and to recommend ways to raise food availability. The team prepared a report that analyzed agricultural production, research, technology, trade, and public policy, and made recommendations for steps to be taken by the public and private sectors in Poland and by other countries.

Although Poland does not suffer from widespread malnutrition, food shortages exist. Potentially Polish agriculture has a significantly greater production capacity than is now being realized. The principal constraint to quickly alleviating some of the shortages is hard-currency foreign exchange. Many of the agricultural inputs, such as chemical fertilizers, plant protection chemicals, high-protein feedstuffs, vaccines and drugs, and replacement parts for agricultural machinery and food-processing equipment that are essential to increasing the supply of both basic commodities and exports must be imported, but the necessary hard currency or credit is unavailable.

The team recommended that the research and extension system be quickly reoriented to deal with the problems of the private farmers, who account for 80 percent of Poland's agricultural output. The team also recommended the

creation of a policy climate, which would encourage the private farmers to invest in their farms.

Key technical recommendations included the increased production of high-protein feeds needed to supplement rations of locally grown grains, potatoes, and sugar beets. Protein feedstuffs now grown in Poland, such as rapeseed, faba beans, peas, sunflower, and sweet lupine, could replace the protein concentrates that now are being imported. Expanding production of these crops will require agronomic research to develop more productive and nutritious varieties. The team also recommended the development or adaptation of machinery for the production of silage from maize ears. Such machinery would encourage expanded plantings of maize, thus reducing the shortage of feed for cattle and swine. Improvements in processing of products, such as potatoes, meat, and fruits and vegetables, could afford opportunities for increasing exports and earning foreign exchange.

Senegal agricultural education assessment team

Guy B. Baird, *IADS*
Pierre P. Antoine, *Rockefeller Foundation*

ST. VINCENT

For IADS Operations, Inc., a staff member helped the USAID Regional Development Office/Caribbean to identify and outline an agricultural development project for St. Vincent. The project will emphasize improved production and marketing technology for smallholder farming systems.

SENEGAL

At the request of the U.S. Agency for International Development, an IADS program officer and a consultant supplied by IADS spent 2 weeks in Senegal at the Institut National de Développement Rural (INDR), which is Senegal's first 5-year agricultural college. External support to INDR is being provided under a World Bank loan and funds from CCCE (a French source). This support will be complemented by technical assistance from France and Belgium. The IADS specialists prepared a report on the possible role of USAID in assisting the development of INDR. The most urgent needs are curriculum development and establishment of means to involve the major agricultural and rural

First-year students at the Lampang Agricultural College in Thailand live in simple houses, cooking their food in open-air kitchens. Because of rapid growth, all of the college's dormitories have been converted to classrooms and laboratories.

development agencies in the activities of the college. For the long run, raising the teaching capacity of INDR deserves the highest priority.

SUDAN

At the request of USAID, IADS provided a consultant to serve as team leader for an evaluation of the Western Sudan agricultural research project, which is supported both by USAID and the World Bank. The review mission began its assignment late in 1982 and will submit its final report in 1983.

THAILAND

Technology transfer

IADS organized a five-person team, led by an IADS program officer, which visited Thailand to help design a rainfed agricultural intensification project. The team was requested by the U.S. Agency for International Development. Although activities will be concentrated in Northeast Thailand, the project aims at a general strengthening of research and extension, and at improving linkages between them and the farmer. Three Thai consultants worked with the team.

The consultants found that the extension service, which has 5000 officers that work directly with farmers, is generally well-motivated. A major difficulty for extension work is that little new technology is being generated for crops other than rice.

The team recommended the development of a strong corps of specialists in crops, horticulture, soil and water management, plant protection, farm management, livestock, and fisheries, who would link research and extension. The specialists would work with extension officers in providing the best possible information to farmers.

Other important recommendations were to improve the skills and knowledge of extension workers by preparing appropriate manuals and other training materials and by launching an intensive program of in-service training;

Thailand rainfed agriculture project design team

J. K. McDermott, *IADS*
Robert F. Chandler, Jr., *private consultant*
Arthur T. Mosher, *private consultant*
Murray D. Dawson, *IADS*
Arturo A. Gomez, *University of the Philippines at Los Banos*

to expand verification trials, which test the suitability of new practices location by location; and to establish a mechanism for continual program analysis in order to keep track of what is happening in the field and what problems are being encountered.

Agricultural teaching

An IADS program officer served as a member of an Asian Development Bank mission that appraised an agricultural education project in Thailand. He examined the equipment, staff development, and consultant needs of the proposed project, in addition to the overall relationships of the project to the government's strategy for agricultural development.

The proposed project relates directly to agricultural education in the general education program of Thailand in that the government is emphasizing the preparation of secondary school graduates to enter the work force or become self-employed. Agriculture is one of the six vocational options in the lower secondary schools, but it is limited to two periods a week. Half the general secondary schools in Thailand now offer vocational programs at the higher secondary level (grades 10 to 12). In addition about a quarter of the schools offer agricultural courses for students who intend to pursue college degrees. The secondary schools have a severe shortage of qualified agricultural instructors; few teachers have an agricultural science background or possess farming skills. Programs are needed to upgrade teacher competence, to improve teacher preparation, and to develop educational facilities.

The project would help nine diploma-granting colleges and the Bangpra Agricultural Faculty, which awards a B.S. degree in several agricultural disciplines, including education and extension. Some 160 fellowships would be provided for staff, and the physical plants, including irrigation systems and farm equipment, of the institutions would be upgraded. In addition, the project would finance a center for teacher training and curriculum studies to be located adjacent to one of the nine colleges.

VENEZUELA

Maize

Following a proposal made to the Fundación Polar, a Venezuelan foundation, IADS sent two consultants to Venezuela in 1982 to help develop a plan for strengthening the national maize improvement program, with particular attention to the role of the foundation. As part of the preparatory review, the foundation sponsored a workshop involving its own staff, the national maize improvement program, private maize processors, and CIMMYT.

Dairy cattle

In response to a request from the Banco de Lara, IADS sent a livestock specialist to Venezuela to help develop a program to increase the milk production of Carora, a new breed of tropical dairy cattle. The Carora consist of some 6000 animals, and originated as a cross between Brown Swiss and the "Criollo Amarillo" 40 years ago.

Agricultural credit

Also, for the Banco de Lara, IADS provided a specialist to advise it on a contemplated expansion in agricultural lending activities, and on improving its agricultural lending procedures.

ZAIRE

IADS provided the team leader and a project management specialist for a seven-member team that evaluated the North Shaba Integrated Rural Development Project in Zaire, at the request of the U.S. Agency for International Development.

Fellowships

Individuals under programs administered by IADS in 1982, their field of study, and degree pursued.

Indonesia

Univ. of Arkansas (USA)
Mansur Lande, agronomy, Ph.D.
Sugiono Moeljopawiro, plant breeding, Ph.D.

Auburn Univ. (USA)
Sweta Rabegnatar, fisheries, Ph.D.
Fuad Cholik, aquaculture, Ph.D.

Cornell Univ. (USA)
Sultoni Arifin, agr. economics, Ph.D.

Univ. of Florida (USA)
Yoyo Taryo-Adiwiganda, soil science, Ph.D.
Rusli Harahap, forestry, M.S.

Univ. of Georgia (USA)
Akmad Gozali Nataamijaya, poultry science, M.S.

Univ. of Hawaii (USA)
Alimin Djisbar, horticulture, M.S.

Iowa State Univ. (USA)
Budiman Hutabarat, agr. economics, M.S.
Mohammad Anwar Wardhani, agr. economics, Ph.D.

Univ. of Kentucky (USA)
Yusuf Jafarsidik, forest science, M.S.

Louisiana State Univ. (USA)
Muhammad Machmud, plant pathology, Ph.D.
Roberto Soenarjo, plant breeding, Ph.D.

Univ. of Minnesota (USA)
Anggoro Hadi Permadi, plant breeding, Ph.D.
Chairil Rasahan, agr. economics, Ph.D.
Memed Gunawan, agr. economics, M.S.
Soesilowati Hadisoesilo, entomology, M.S.
Muhammad Kosim Kardin, plant pathology, Ph.D.
Achmad Sudjana, agronomy, M.S.
Toga Silitonga, forestry, Ph.D.
Winarno, crop production, Ph.D.

continued

LEADERSHIP DEVELOPMENT

Agricultural research workshop

IADS staff assisted the U.S. Agency for International Development in the planning and managing of the "Workshop on the Impact of Agricultural Research." The workshop was part of a study of AID's activities in agricultural research. The study included a review of AID's project activities in agricultural research and the conduct of impact evaluations of agricultural research projects in Central America, Guatemala, Kenya, Korea, Nepal, Thailand, Tunisia, and West Africa.

Participants in the workshop analyzed the issues and lessons identified in each impact evaluation, discussed how these findings can be used in planning, designing, and implementing technical assistance to research institutions, and made recommendations for future policy in agricultural research.

The workshop was held at the Xerox International Center for Training and Management near Leesburg, Virginia (USA), June 13–17, and was attended by nearly 100 persons. One quarter were from developing countries, one half were from AID/Washington or missions abroad, and the rest were from international organizations, universities, and consulting firms.

A final document summarizing the agricultural research study will be issued by AID. It will synthesize the conclusions reached at the workshop and present policy recommendations, as well as suggestions for planning, designing, and implementing effective research systems.

Projects addressed by the impact evaluations ranged from ones with considerable success to one with serious difficulties. A major conclusion from the impact evaluations was that AID has been effective in fostering innovations in research, in particular in getting researchers into closer partnership with farmers. The studies also underscored that effective agricultural research has a high and measurable economic effect.

The workshop moderator pointed out that several common elements can be discerned in successful agricultural research activities:

- Strong host-government commitment to research. The host government should carefully plan its research agenda. A proliferation of projects may be a symptom of lack of control.
- A long-run perspective. There must be willingness to stay with a strategy. Agricultural research projects need careful monitoring and management, and periodic evaluation.
- Clear policy goals by the host government with respect to the role of agricultural research activities.
- Involvement of all institutions that make up the agricultural research systems, e.g., policy makers, farming community, and international organizations.
- Appropriate policy, in addition to commitment. Proper policies ensure that, when new technology is developed, there will be incentives that foster adoption and inputs that permit adoption. The need for appropriate policy, however, does not absolve the research agenda from being relevant to the existing constraints and imperfections of the economy.

Following the workshop, the participants were asked to evaluate it. On a scale of 1 to 10 (poor to excellent), 87 percent of the respondents rated the workshop at 7 or above.

Agricultural inputs study

For the U.S. Agency for International Development, IADS organized the development of a paper, which discussed major issues pertaining to the supply of agricultural inputs in developing countries. The paper was written by Fletcher Riggs.

Professional register

IADS continues to develop and make extensive use of its computer-assisted register of professionals who have expertise and experience in international agriculture and rural development.

During the year, the names of 285 persons were added, bringing the total to nearly 1900. Of these, 1100 have had at least 5 years experience working in developing countries. The academic backgrounds of the individuals in the register are agricultural sciences, 1255; biological sciences, 251; physical sciences, 110; social sciences and eco-

Fellowships, *continued*

Univ. of Nebraska (USA)
Kabul Pamin, agronomy, Ph.D.

North Carolina State Univ. (USA)
Haryatno Dwiprabowo, operations research, M.S.
Abdul Karim Makarim, soil science, M.S.
Nong Alwi, statistics, M.S.
Budi Haryanto, animal science, M.S.
Achmad Suryana, agr. economics, Ph.D.

Ohio State Univ. (USA)
Novianti Sunarlim, agronomy, Ph.D.

Oregon State Univ. (USA)
Asril Darussamin, biochemistry, Ph.D.
Sabam O. Manurung, plant physiology, M.S.

Texas A and M Univ. (USA)
Hasnam, plant breeding, Ph.D.

Univ. of Washington (USA)
Soetarso Priasukmana, forestry, Ph.D.
Djaban Tinambunan, forestry, Ph.D.
Johanes Widodo, fisheries, M.S.

Univ. of Wisconsin (USA)
Ridwan Dereinda, extension, Ph.D.
Setyawati Hadi, forestry, Ph.D.

Univ. of Adelaide (Australia)
Djiman Sitepu, plant pathology, Ph.D.

Dalhousie Univ. (Canada)
Purwito Martosubroto, fisheries, Ph.D.

Institut Agronomique Méditerranéen de Montpellier (France)
Endang Setyawati Thorari, agr. economics, Ph.D.

Univ. of the Philippines at Quezon City
Surya Mansjur, library science, M.S.

Univ. of the Philippines at Leganes
Alie Poernomo Tirtoredjo, fisheries, M.S.

Univ. of Philippines at Los Baños
Rasidin Azwar, agronomy, M.S.
Hasan Basri Iswandi, agronomy, M.S.
Mohamad Soedibyo, horticulture, Ph.D.
Roosmani Soedibyo, horticulture, Ph.D.

continued

Fellowships, *continued*

Sjaifullah, horticulture, Ph.D.
Sunarwidi, horticulture, Ph.D.
Doah Dekok Tarigans, horticulture, Ph.D.
Zulkifli Zaini, botany, Ph.D.

Univ. of Aston (UK)
Eddy Amir, polymer tech., Ph.D.
Suharto Honggokusumo, polymer tech., Ph.D.
Ridha Arizal, polymer tech., M.Sc.

Univ. of Edinburgh (UK)
Hobir, seed technology, M.Sc.

Polytechnic of North London (UK)
Oerip Siswantoro, polymer science, Ph.D.

Univ. of Southampton (UK)
Nana Supriana, entomology, Ph.D.

Nepal

Alabama A and M Univ. (USA)
Ram Sundar Lal Karna, plant pathology, M.S.

Univ. of California, Davis (USA)
Dhruba N. Manandhar, entomology, M.S.
Ram Narayan Sah, soil science, M.S.

Univ. of California, Riverside (USA)
Rajendra Pratap Singh, agribusiness, M. Admin.

Univ. of Florida (USA)
Bimal Kumar Baniya, agronomy, M.S.

Iowa State Univ. (USA)
Maheswar Prasad Bharati, agronomy, Ph.D.

Kansas State Univ. (USA)
Kaushal K. Lal, agronomy, M.S.
Kishor K. Sherchand, agronomy, M.S.
Madhusudan P. Upadhyay, agronomy, M.S.

Mississippi State Univ. (USA)
Chandra Darshan Acharya, seed tech., M.S.

North Dakota State Univ. (USA)
Mauje Lal Jayaswal, plant breeding, M.S.

continued

nomics, 63; and business administration, 155. Sixty percent have doctoral degrees and another 25 percent have master's degrees. More than two-thirds of the registrants are fluent or competent in languages other than English.

The register was established to help IADS identify individuals to serve as long-term or short-term consultants, but it is used by other nonprofit organizations. Among institutions served during the year were the World Bank, Rutgers University, the Cooperative League, and the Academy for Educational Development.

Fellowships

One of the major activities of IADS in professional development is the management, in cooperation with the fellowship office of the Rockefeller Foundation, of advanced degree students funded through contracts that IADS is helping implement.

During 1982, there were 84 students from Indonesia and Nepal enrolled for advanced study. Forty were candidates for doctoral degrees and the rest were working toward master's degrees. The students were studying at 27 institutions located in 6 countries: Australia, Canada, France, Philippines, United Kingdom, and United States.

The most common areas of study are agronomy, agricultural economics, forestry, plant breeding, horticulture, fisheries, plant pathology, polymer technology, seed technology, and soil science.

PUBLICATIONS

Through its development-oriented literature series, IADS seeks to improve understanding of critical issues in agricultural development. The newest book in the series is *Wheat in the Third World*, which was published in 1982. The authors are Haldore Hanson, Norman Borlaug, and Glenn Anderson. All authors have had a long association with CIMMYT, Hanson as director general, Borlaug as director of CIMMYT's wheat program, and Anderson as deputy director and, later, director of CIMMYT's wheat program.

The book is dedicated to Anderson, who died before it was published.

Wheat in the Third World explores the continuing impact of modern wheat varieties in developing countries. It describes the importance of wheat to agriculture and diets in the Third World and explains the origins and characteristics of modern wheats. Wheat improvement programs in a number of developing countries are examined in detail and the elements of a model wheat program are laid out. The book concludes with a discussion of promising areas for future research and a look at the prospects for expansion in wheat supplies during the rest of this century. *Wheat in the Third World* can be purchased from Westview Press, Boulder, Colorado, USA.

Several titles in the development-oriented literature series were republished or translated in various countries in 1982. SEARCA (Southeast Asian Regional Center for Graduate Study and Research in Agriculture) published *Three ways to spur agricultural growth* by A.T. Mosher. IICA (Interamerican Institute for Cooperation of Agriculture) published *Tres formas de acelerar el crecimiento agrícola*, a translation of the Mosher book, and *Tomates*, a translation of *Tomatoes in the Tropics* by Ruben Villareal. CIAT (International Center of Tropical Agriculture) published *Programas de semillas: Guía para su planeación y manejo*, a translation of *Successful seed programs*, edited by Johnson E. Douglas. Tata-McGraw Hill, New Delhi, which published an Asian edition of *Successful seed programs*, sold out its stock and reprinted the book in 1982.

IADS published the fourth edition of *Agricultural assistance sources* during 1982. The publication now covers 20 major international assistance organizations and the bilateral programs of 16 nations. Chapters on the United Nations Environment Programme and the Arab Authority for Agricultural Investment and Development appear for the first time in this edition.

LIAISON

Movement of IADS headquarters to Arlington, Virginia, in mid-year made it easier to accomplish liaison ob-

Fellowships, *continued*

Ohio State Univ. (USA)
Ram C. Munankarmy, agronomy, M.S.

Utah State Univ. (USA)
Jitendra Dhoj Rana, agr. engineering, M.S.

Univ. of Wisconsin, Madison (USA)
Dip Narayan Sah, plant pathology, M.S.
Ganesh Lall Shrestha, seed storage, M.S.

Araneta Univ. (Philippines)
B. R. Shakya, agronomy, M.S.
R. R. Sharma, crop processing, M.S.
C. B. Shrestha, agronomy, M.S.
K. K. Shrestha, weed science, M.S.
M. N. Shrestha, agronomy, M.S.
S. K. Shrestha, seed tech., M.S.

Philippine Christian University
Basu Dev Parajuli, agribusiness, M. Admin.

Univ. of the Philippines at Los Baños
Jagadish Raj Baral, agr. education, Ph.D.
B. B. Mathema, plant breeding, Ph.D.
S. L. Shrestha, cropping systems, M.S.
B. P. Upadhyay, plant breeding, M.S.
Nabin K. Rajbhandari, multiple cropping, M.S.
Basnet Bhola Man Singh, crop production, M.S.

A jute market in Bangladesh.

jectives. The central location a few minutes from downtown Washington, D.C., close to the subway and shuttle bus lines, provided ready access for visitors. It also facilitated interaction of the IADS staff with personnel of other development agencies.

Some 150 guests attended a reception tendered by the Board of Trustees in connection with the annual Board meeting. Attending were staff members of technical assistance, donor, and lending agencies, as well as representatives of developing countries, universities, professional and trade associations, government agencies, and consulting firms.

In its new location, IADS continued its role as an informal broker, providing neutral ground and opportunity for development agency personnel to exchange ideas, and for officials of developing countries to discuss needs and explore assistance opportunities. To this end, IADS makes available such resources as a conference room, temporary offices for visitors, reference library, and communication facilities.

Administrative Developments

(facing) **Upland rice planted on newly cleared land.**

The relocation of the IADS headquarters to Washington, D.C. during 1982 was taken as an opportunity to re-examine and adjust organizational procedures.

A key factor in streamlining our procedures was the employment of an experienced administrative officer who can handle many of the activities that were previously shared by various program officers. The administrative officer has had a key role in establishing office procedures appropriate for an organization such as ours in the Washington area. We are looking into ways to increase office automation using mini-computers and word processors. We are moving cautiously in this area but we have concluded that there are substantial opportunities here to achieve better performance and at the same time to reduce costs.

Trustees

J. George Harrar, Chairman of the IADS Board of Trustees, died in 1982. In recognition of his many contributions, the board adopted the following resolution:

George Harrar was our friend, our colleague, and our inspiration. His professional career was marked by distinguished accomplishments as a teacher, scientist, and administrator.

His efforts led to the development of people, institutions,, and agricultural technology throughout Asia, Latin America, and Africa.

In retirement, he tirelessly and unselfishly continued to guide and support efforts to improve the welfare of people at home and abroad.

He has received the highest recognition and honors for his leadership from many institutions in the United States and abroad.

Clifford C. Hardin was elected Chairman of the Board, and **Clayton K. Yeutter** was elected Vice Chairman. **Guy Camus** resigned from the Board when he was appointed chairman of the Technical Advisory Committee of the Consultative Group on International Agricultural Research.

Headquarters' staff

James C. Moomaw resigned from the IADS staff to take the position of executive director, Near East Foundation. **Will C. Wright** resigned from IADS to remain with the Rockefeller Foundation on leave.

To fill these vacancies, two new program officers were hired: **Jerome H. Maner** and **J. Kenneth McDermott.**

Jim Maner has assumed responsibility for activities of IADS in Latin America and the Caribbean. He has more than 20 years professional experience as an animal scientist and as an administrator working in Latin America.

Ken McDermott is taking charge of certain programs in Asia. He is particularly qualified in training and technology transfer as well as experienced in administrative matters with USAID in the USA and abroad.

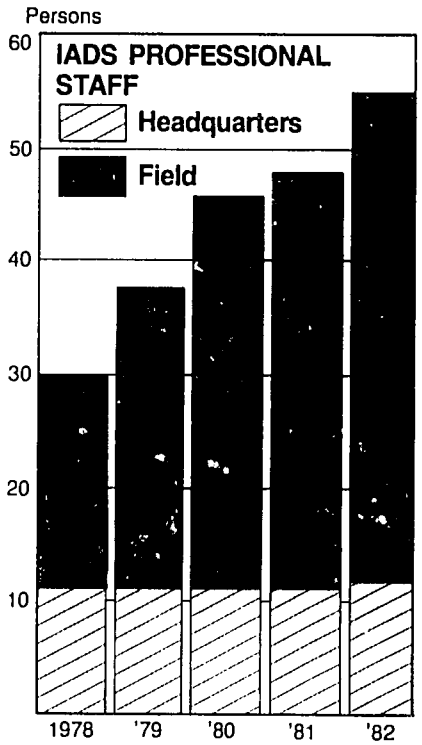
The new post of administrative officer was taken by **Skipwith Calvert**. He was previously the director of administrative services for the American Psychological Association.

Field staff

Sixteen new specialists joined the IADS field staff in 1982 and one staff member, after the completion of his assignment, moved to a new project.

In Bangladesh, **Dorsey Davy** took the post of training specialist. He has taught and held administrative positions at U.S. universities, and was a program specialist with the Ford Foundation in Pakistan. The position of agricultural economist was filled by **Brook Greene**. He has worked in Laos, Thailand, Lebanon, Kenya, and Barbados, and most recently taught economics at the Edinburgh University School of Agriculture. **Raphael Semmes** is the administration specialist. He has worked in Bahrain, Mexico, and Paraguay, and was a country desk officer with the U.S. Peace Corps. **A. K. Kaul** joined the project as crop specialist. He previously had been on a World Bank assignment to the Bangladesh Agricultural Research Institute as a plant breeder. The position of water management specialist was taken by **Jan L. M. H. Gerards**. He has worked in Indonesia for the U.S. Agency for International Development in water management and as planning advisor. The position of agronomist was taken by **Russell D. Frazier**. He previously was the director of operations and facilities at the Kellogg Biological Station of Michigan State University. **Sam Portch** is the soil fertility specialist. He held a comparable responsibility in the IADS project in Ecuador. Four associate production agronomists were appointed: **Timothy Kelley**, who as a Peace Corps volunteer worked with an IADS project in Nepal; **R. N. Mallick**, who has been a cropping systems agronomist with the Department of Agriculture in Nepal; **Robert Drew**, who has worked as a rural development consultant in Indonesia; and **Leopoldo Villegas**, who was a training specialist at the International Rice Research Institute.

William R. Young has been appointed acting project supervisor for the national agricultural research project in Indonesia. He has worked for the Rockefeller Foundation in programs in Thailand, India, and Mexico.



In the Sumatra, Indonesia, project, **K.O. Rachie** has taken the position of project specialist. He has held administrative and scientific posts at three international agricultural research centers on assignment from the Rockefeller Foundation. **Aroon Jugsujinda** joined the project as soil and water management specialist. He had been with the Department of Agriculture of Thailand as a soil scientist. The post of agricultural economist was filled by **Douglas H. Perry**, who has worked in Pakistan, India, and Malaysia. **P. S. Srinivasan** has become the administrative officer. He has held administrative posts for both the Ford Foundation and the Rockefeller Foundation in India.

Carl Hittle joined the Integrated Cereals Project in Nepal as project supervisor. He has worked as a plant breeder for the University of Illinois in India, and in Sri Lanka he led the Intsoy project.

Budgetary procedures

The IADS program is supported by a "core" budget and by "special project" funds. The core budget is calculated to meet the basic costs of maintaining the headquarters group at a level necessary to arrange programs but not to implement them.

This means that basic support is provided along with sufficient funds to travel and otherwise to develop programs. Thus, there are funds for an editorial staff to accept publication responsibilities or for a country program officer to discuss problems and interests with developing country officials. But the editorial group has funds to commission publications only if a donor provides special project funds for the purpose. These would normally be of grant origin. And the country program officer can commit funds only if a special project is arranged for this purpose. Normally, this would be through a contract with the developing country.

The same arrangement exists for any project that may be undertaken. In each, whether the project is a small, grant-funded one or a large, contractual one, all direct costs are charged to the special project concerned, along with a fair share of indirect or overhead costs. If a headquarters'

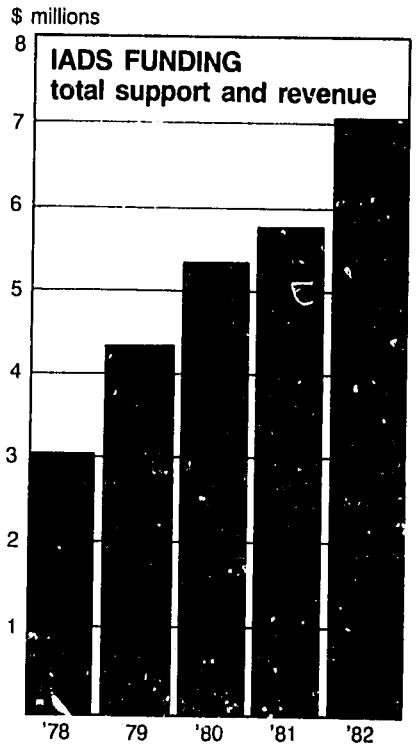
officer undertakes specific work for a special project the time spent is recorded and costs assigned accordingly. The objective is that each special project activity shall be fully self-supporting but with no excess charges.

Funding

During 1982, the major sources of IADS funds were the following:

Contracts and service arrangements:	
Bangladesh Agricultural Research Council	$1,821,000
AARD (Indonesia)	1,401,000
Department of Agriculture (Nepal)	1,009,000
Agriculture Inputs Corp. (Nepal)	557,000
CRIFC (Indonesia)	468,000
U.S. Agency for International Development	444,000
INIAP (Ecuador)	275,000
World Bank-UNDP	253,000
Asian Development Bank	25,000
Ministry of Agriculture (Philippines)	22,000
Fundacion Polar (Venezuela)	17,000
Government of Egypt	16,000
IICA	12,000
Grants	
Rockefeller Foundation	631,000
Other	
Interest income	106,000

Financial statements of IADS are available on request.



The rural countryside of Bangladesh