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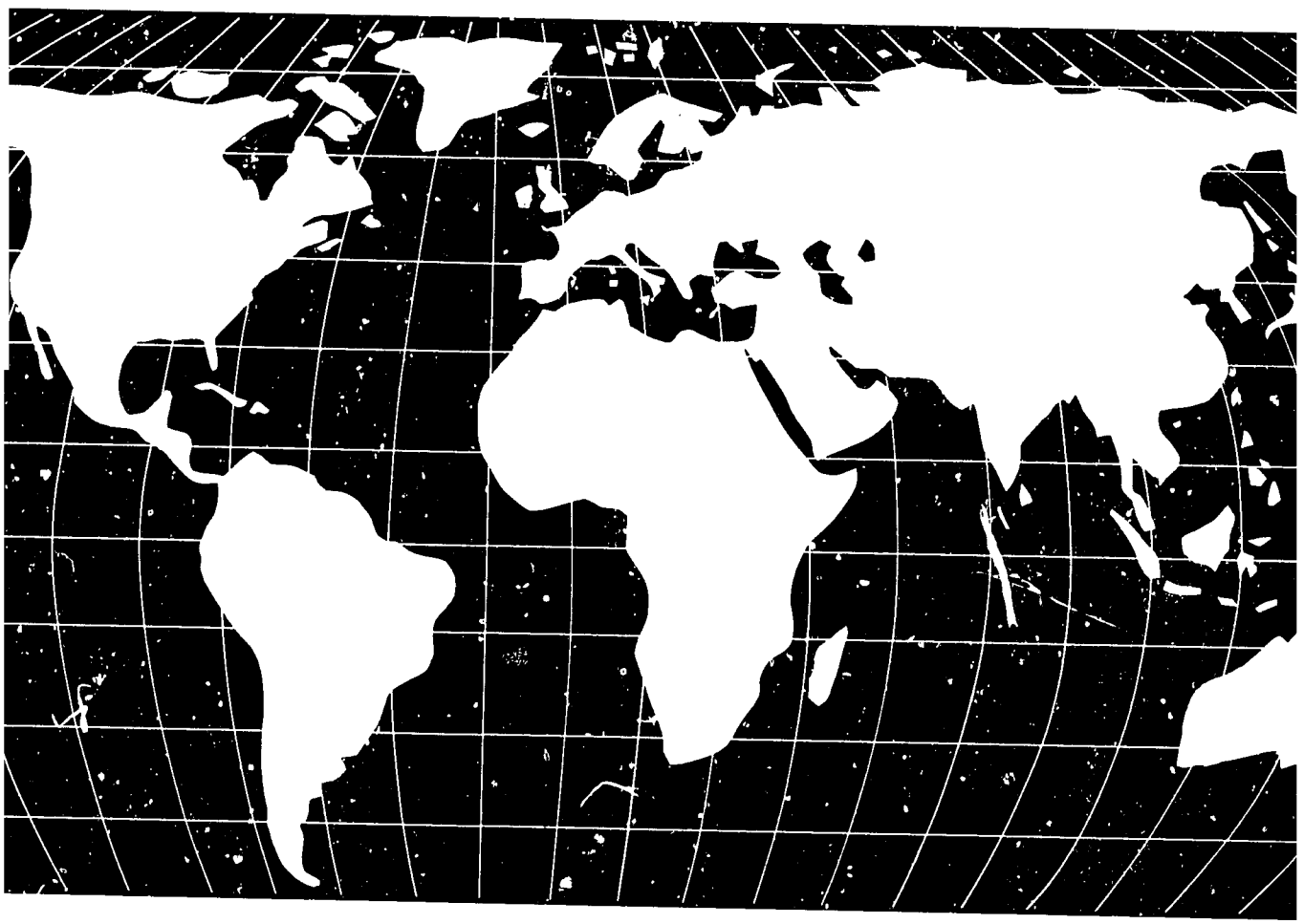

INTERNATIONAL AGRICULTURAL DEVELOPMENT SERVICE

Transplanting rice in Indonesia.

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1982

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INTERNATIONAL AGRICULTURAL DEVELOPMENT SERVICE

Report/1981

Preface

The International Agricultural Development Service helps developing nations to raise output of crops and livestock and to increase rural incomes. It offers assistance in agricultural planning, strengthening research systems, training personnel, and implementing production programs. In addition, through meetings and publications, IADS attempts to increase understanding of development problems and ways to resolve them.

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 an autonomous, nonpolitical and nonprofit organization, exempt under Section 501(c)(3) of the U.S. Internal Revenue Code.

During its sixth year, 1981, IADS's contractual services expanded with the signing of new contracts in Bangladesh and Nepal, plus the awarding of an "indefinite quantity contract" from the U.S. Agency for International Development. In Nepal, in addition, the existing IADS contract was extended.

In 1981 about 40 resident specialists supplied by IADS were working for national agencies in Bangladesh, Botswana, Ecuador, Indonesia, and Nepal. IADS also provided about 50 short-term consultants to 13 countries.

Details of these and other IADS activities are given in this report. This year's essays were written by Albert H. Moseman, ("Technology-based agricultural development"), Bill C. Wright ("Elements of successful national crop research projects"), and Charles K. Mann and Malcolm F. McPherson ("Improving food policy").

IADS welcomes comments on this report and inquiries about its activities.

A. Colin McClung, *president*

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Vernon Johnson of the U.S. Agency for International Development addressing IADS trustees, staff, and guests in November.

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Shiro Samoto, plant breeder
Kenneth Sayre, cropping systems agronomist
Marlin G. Van Der Veen, agricultural economist

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

*On part-time assignment from the Rockefeller Foundation.

** Assigned under IADS subcontract with Agro-Science Environmental Institute, USA.

Technology-based Agricultural Development

(facing) Water hyacinth, which is suitable for feeding to livestock, growing in an experimental plot in China.

A national research and development capability, with scientists familiar with the constraints and characteristics of the different farming areas, is essential if there is to be a continuous infusion of improved technology for sustained increases in production.

The Green Revolution of the mid-1960's earned respect for technology-based agricultural development. During the previous decade and a half, developing nations and international assistance agencies had concentrated on transferring varieties and methods from developed countries and on organizing community development programs. But by the 1960's it was evident that technology introduced from temperate climates frequently was not suited for tropical climates. Community development programs were disappointing because they tended only to reshuffle resources and did not inject new income or rewards for participating villages.

Although the Green Revolution emerged suddenly, and attracted immediate international attention, its component factors had evolved over several decades. Adaptive research, capable national institutions, and attention to the interacting components of agricultural development were particularly important, as can be illustrated by the spread of modern wheats.

"It has become apparent that continued effectiveness of the international centers requires both suitable mechanisms to transfer newly created technology to the developing countries, and strong national research systems to absorb and complement the centers' work."
Eduardo Venezian

Adaptive research. The acclaimed modern varieties of wheat were the product of many years of adaptive research prior to their appearance in India in the mid-1960's. The Norin varieties, the genetic base for the modern varieties, were produced in the national research program of Japan during the 1930's. Following their introduction into the United States after World War II, they were used by plant breeders in the cooperative federal-state research program to produce Gaines and other varieties adapted to the Pacific Northwest in the early 1950's.

The basic Norin germ plasm, including Gaines and other varieties and selections from the Pacific Northwest, was used in the cooperative program of the government of Mexico and the Rockefeller Foundation—in crosses with indigenous Mexican varieties—to produce the semi-dwarf varieties Lerma Roja, Penjamo, and others in the late 1950's.

In 1963 the "Mexican wheats" were introduced into field trials in India. Substantial information on their potentials and weaknesses was gathered before large imports of seed were made from Mexico in 1965. They had been tested through the national research system of the Indian Agricultural Research Institute and Indian Council of Agricultural Research to assess their adaptation and determine appropriate production practices.

The Mexican wheats furnished the vehicle for the further transfer of the inherent Norin germ plasm base and were promptly crossed with Indian wheats to produce varieties with the grain color, disease resistance, and other characteristics important in India.

The process of adaptive research—the modification of the basic qualities of the wheat varieties to meet the growing conditions in the U.S. Pacific Northwest, Mexico, and India—was an orderly sequence extending from the 1940's through the 1960's.

National institutional capabilities. The development of high yielding wheat varieties, adapted to local growing conditions and requirements, was relatively rapid in the Pacific Northwest of the USA, Mexico, and India. It took less than 10 years in each location because each country had an institutional research capability. Subsequent efforts

to "extend" the new varieties in other countries met with varying degrees of success. An intensive wheat production program in Pakistan suffered a severe setback in 1978 because of widespread damage from rust. The Mexican varieties were introduced into Turkey in 1967 but had only a short term impact because of their susceptibility to stripe rust and septoria leaf blotch. Both Pakistan and Turkey lacked the indigenous research capabilities in the mid-1960's to add disease resistance and fit the high yield potential to local growing conditions.

Much has been written about the performance of the new varieties of wheat and rice in Asia, Africa, and Latin America. Special attention is often given to situations where the performance of introduced varieties is below par. But this should be expected if the introduction is primarily an *extension* of technology without modification of the materials and production practices to suit local agroclimatic factors. Such modifications must be made through adaptive research on the site. And a national research and development capability, with scientists familiar with the constraints and characteristics of the different farming areas, is essential if there is to be a continuous infusion of improved technology for sustained increases in production.

Interacting components of agricultural development. The advent of the Green Revolution coincided with growing understanding of development processes emerging from studies of technical assistance programs during the preceding years. *Getting Agriculture Moving*, by A. T. Mosher, received particular recognition for the identification of the numerous interacting factors in agricultural and rural development. These factors—research for improved technology, production inputs, extension and education, incentives for farmers, markets, production credit, and other elements—are critical interdependent components of technology-based agricultural development.

It is important for leaders of emerging nations and personnel of technical assistance organizations to be aware of the complexities of the development process to prevent excessive emphasis on a few of the components and neglect of the rest. This paper is concerned with the devel-

opment of national research capability, which is a vital component, but it, too, must accommodate and interact with the others.

* * *

The strengthening of the institutional research structure for sustaining technology-based agricultural development must take into account a substantial number of issues. Five, however, are critical: confidence of national government leaders, organization and operations, facilities, manpower development and training, and types of research and development programs.

Confidence of government leaders. Most emerging nations have little tradition of technology in agricultural development. In the colonial period, research was largely in the hands of expatriate scientists who concentrated on export commodities. Because research was not integrated into the governmental structures that the newly independent nations inherited, there has been little opportunity for administrative and political leaders to develop familiarity with research and development processes.

Leaders of new nations often feel that science and technology is too costly and is appropriate only for wealthy nations. The view that technology can be borrowed from agriculturally advanced nations still prevails in spite of the experience of the 1950–1965 period.

It is often helpful for an external agency to take initiatives in encouraging the building of a technology-based agricultural development system. But such initiatives must enlist the interest and support of national leaders if the institution-building process is to be sustained long enough to ensure establishment of a good working system. Promoting technology-based agricultural development, and demonstrating the need for sustained support, can be facilitated by arranging for government leaders, particularly in the ministry of agriculture and in the national planning commission, to visit other new nations where established agricultural research and development systems are beginning to function effectively.

Wheat production in Bangladesh has doubled in the last 5 years.

Researchers testing a manual tool for making holes to facilitate planting wheat in untilled fields following the rice harvest.

Organization and operations. To direct attention more constructively to development, adjustment and adaptation may be necessary in the role government plays in the research and development process, in the organization structure for carrying out research, education, and extension, and in administrative policies and procedures. But this can usually be achieved more successfully through modifications in existing organizations and policies than by attempting to implant an alien institutional or operational structure.

The injection of a particular form of organization or operation—of an extension service, of a combined education, research, and extension unit, or any other specific institutional form that has worked in another nation—is unlikely to succeed unless the new nation has similar social and economic conditions, and is at a similar stage in a progressive development process. The transplanting of precise institutional structures from agriculturally advanced nations is usually no more successful than the transfer of biological specimens of agricultural practices.

Some international assistance agencies have promoted the establishment of autonomous or semi-autonomous bodies for agricultural research to free scientists from constricting government administrative procedures. A drawback of such bodies is that they tend to be isolated from the participation, understanding, and support of government leaders. The research and development organization should be linked to the ministries of agriculture, rural development, and finance by having officials of such ministries participate in the governing boards and scientific councils of the organization that are directly involved in budget planning, personnel management, and overall program development and evaluation. The understanding by government leaders of how research works, what it does, and where it fits into the development process is essential to the stability of the system.

The research and development system should be organized to serve national needs with competent scientists at the national, regional, and local levels. The leaders of the system must be responsive to national goals and capable of assessing potentials and limitations not only of re-

search and development but also of the resources needed to achieve production objectives. They must gain the confidence and respect of other government officials to ensure a full and continuous interchange of viewpoints and judgments. The function of research scientists at the national headquarters is to provide conceptual and operational leadership for the total system and to interact with leaders of the related development functions including extension, input supplies, etc. The central headquarters also is the focal point for the design and integration of the total national programs, for budget planning, personnel management, information and publications, and other services.

The growing interest in area development programs, and in farming-systems research and development, has emphasized the importance of regional research centers as critical units within a national system. The appropriate number and size of the regional centers will depend upon the agroclimatic variations or types of farming areas in the country. The regional centers focus on the development and evaluation of technology for various types of farming enterprises of the area. This involves participation in national and regional commodity improvement programs as well as other problem-oriented research relevant to the region—with the regional station putting together combinations of technology to maximize productivity of land, labor, water, and other resources in the region. The regional station also can serve as the headquarters for training activities and for regional meetings that bring together persons involved in research, extension, input sources, etc.

The regional research and development operations furnish the base for active participation of research scientists in farm field trials, for agro-economic evaluation of new technology to determine whether it is feasible for introduction, and for ensuring that scientists stay abreast of the changing problems and constraints faced by local farmers.

While regional research and development centers are perhaps the most important units in the system, they cannot operate independently. They must interact with the national headquarters, with other regional centers that have similar common interests, and with the extensive local ac-

Food shortages, 1981

Countries reported to have experienced a shortfall in basic food supplies below usual consumption requirements, caused by crop failures, interruption in imports, or disruption of internal distribution at some time during 1981.

Country	Population (millions)
Africa	
Angola	6.7
Cape Verde	0.3
Chad	4.5
Comoros	0.3
Ethiopia	33.0
Ghana	12.0
Guinea	5.0
Kenya	16.0
Madagascar	8.7
Mauritania	1.6
Morocco	21.0
Mozambique	10.0
Somalia	3.6
Tanzania	19.0
Uganda	14.0
Zambia	5.8
Asia	
Kampuchea	6.0
Vietnam	53.0
Yemen PDR	1.9

Classifying and packing eggs in Ecuador.

In the IADS-INCAP contract, work on poultry focuses on Puellaro, a highland village where small farmers are moving into commercial poultry production.

tivities concerned with agricultural improvements throughout the country.

Facilities. Among the facilities necessary for the optimum functioning of a national research and development system are a central headquarters, regional centers, and local testing and service stations.

In many advanced nations the existing institutional structure for agricultural research and development has evolved over a century or more in response to changing needs. The U.S. Department of Agriculture, for example, was established in 1862 with research as its most prominent function. Twenty-five years later, in 1887, the Hatch Act provided federal support for experimentation throughout the United States. This reflected the realization that the haphazard, trial-and-error process for introducing improved farming practices was not only ponderous and uncertain but also placed undue risk-taking burdens on farmers. It was almost another quarter of a century, in 1914, that special support was provided to strengthen programs for extension of improved technology to farmers.

The pressure for rapid development in new nations does not permit this slow evolutionary approach. Consequently, it is important to conceive and design the research and development system in its entirety. While it is necessary to establish priorities and to develop the system in stages, an overall plan will ensure that no areas of the country are continuously neglected.

A national experiment station network, with facilities for development and evaluation of improved technology for a wide variety of farming areas, can accommodate regional and national programs for improved production of food crops and other commodities, and for work on soil and water management, disease and insect control, and other factors wherever such problems are critical. The orderly and systematic development of improved technology must proceed through disciplined evaluation under known and replicable conditions, followed by farm field testing to determine its biophysical suitability and economic feasibility.

The facilities for the national headquarters and re-

gional centers deserve priority attention as these require more specialized and elaborate installations than facilities to serve local areas or communities. In most countries many so-called research stations are primarily seed farms or livestock-breeding stations. A few of these can be selected to continue for seed production or plant propagation, and for propagation of animal breeding stock. They would provide for localized testing and evaluation of improved technology and would serve as the focal point for extending farm field trials.

Recently interest in on-farm testing has been rising, but often there is insufficient understanding of what is involved. Frequently the tests placed in farmers' fields differ little from ones at experiment stations where they could have been run under more carefully controlled conditions. On-farm trials are not a substitute for experiment station tests. Rather they should serve to elaborate and expand the information obtained at the station. They are particularly useful for evaluating how new technology meshes with existing farm practices. In doing so, the researcher must be alert in determining if failure of a technology to fit to farm conditions is due to an inherent flaw in the technology or if it is an artifact of experimental methods. On-farm trials may also identify aspects of the farming system that would benefit by further research at the station or in the laboratory.

During the past decade many research and development facilities have been overbuilt. Elaborate structures that are costly to erect and to maintain are a major reason government leaders question whether they can afford a technology-based agricultural development system. Donor agencies must become more concerned about this.

Manpower development and training. It is important to estimate manpower needs for a national research and development system during the early stages of planning. Examination of the kinds of scientists required in each discipline for each major program—for a commodity, problem, or subject area, etc.—ensures attention to each of the interacting constraints. The integrated multidisciplinary research team has proved to be an effective approach

not only in crop improvement but also in developing better production practices and in conducting the protective research necessary to guard against destructive outbreaks of pests and diseases.

The regional dispersal of scientists can be projected by determining the kinds of research necessary to serve the farming practices or systems of the area, taking into account the nature of the constraints or problems involved with each commodity or production factor. There is a tendency for leaders of national commodity improvement programs, and also the external supporters of such programs, to want a complete multidisciplinary team of highly trained scientists for each such program. But developing nations cannot afford either the training or the continuous salary support for such full teams. The manpower assessment must address geographic requirements as well as individual program needs. A strong multidisciplinary team at each regional research station would be able to work on a number of commodities, problems, or subject areas, and could integrate the work of the station in a manner that best serves the farming systems of the area

Highly trained personnel are required to lead national programs and major regional research activities. There is a tendency in developing countries to produce excessive numbers of Ph.D. holders relative to the number of research personnel with master's or bachelor's degrees, or even training as technicians. This fosters research elitism, shifting the focus from problems confronting farmers to fundamental studies of current international interest. While it is not feasible to establish any discrete ratio, a pattern of one Ph.D. to two master's degree holders to four bachelor's degree holders has been effective in some countries. A ratio of 1:3:6 might be considered where the shortage of trained manpower is severe, as it is in many African nations.

Practical field research experience is essential, not only prior to selection of individuals for degree training but also throughout graduate education and training. This experience makes it easier to identify persons with an aptitude for, and commitment to, research, and in addition ensures that the individual will rapidly increase his understanding of the research process as he progresses toward higher

degrees. The principal reason for supporting doctoral training is to provide competent leadership for the analyses of problems and the conceptualization of research programs to resolve them.

The cost of training, particularly for advanced degrees in the USA and Europe, has escalated markedly. But much training can be conducted within the developing country, including field and laboratory experience, workshops and conferences at the national level, and, in many cases, training to the master's degree level. Supplementing national training with local and international workshops tends to meet the needs of the majority of scientists. Some developing nations that have high quality doctoral programs are now training young scientists from other countries. That in combination with Ph.D. and post-doctoral training on a more limited basis in USA and Europe can help keep training costs under control.

Creating a manpower utilization plan will help ensure that scientists returning from studies are placed in positions where they can achieve maximum productivity from their training. This requires coordinated development of the total system, with attention to the specific research program, facilities, manpower development, and operations. Scientific manpower, the most important component in the system, is also the most costly one, and potentially the most wasteful if it is not used effectively.

The retention of scientists in the system is a problem in most developing nations. Salary incentives are important but other factors, including adequate facilities, funds for operation, equipment and supplies, vehicles for travel and transport, training opportunities, and freedom from excessive administrative constraints also are relevant.

Types of research and development programs. Most persons familiar with postwar technical assistance programs believe that new technology is an essential component in the agricultural development process. Nevertheless programs continue to be developed on narrowly defined bases—on a commodity, on a geographic area, on a subject area such as irrigation or land development, on seed production, etc.—with disregard for the interactions that fos-

"We now need a pattern of governmental operations geared to a rapidly changing society and providing for the efficient operation of a wide variety of developmental activities, including a productive set of agricultural support activities. We need styles of administration and operating procedures that emphasize creative innovation rather than maintaining the status quo."
A. T. Mosher

ter development. This situation stems in part from the desire of agriculturists within developing nations to maintain their identities as leaders of specific programs. It also reflects the desire of assistance agencies to support clearly defined projects that can be monitored and assessed for progress in order to justify their expenditures.

It is still not uncommon to find one unit of a technical or economic assistance agency helping to set up a national research capability, while a second unit of the agency is assisting an extension or area development program, with each activity totally separate from the other. Developing nations cannot afford duplication of facilities and effort. This is particularly true in those situations where national extension programs, developed within the last 5 years, indicate that they are not able to serve farmers effectively because of the lack of new varieties or other materials and practices and therefore are setting up their own "adaptive research" facilities throughout the country. It would be unfortunate if lessons presumably learned in the 1950-1965 period have to be relearned by the assistance agencies in the 1980's, at the expense of the developing nations.

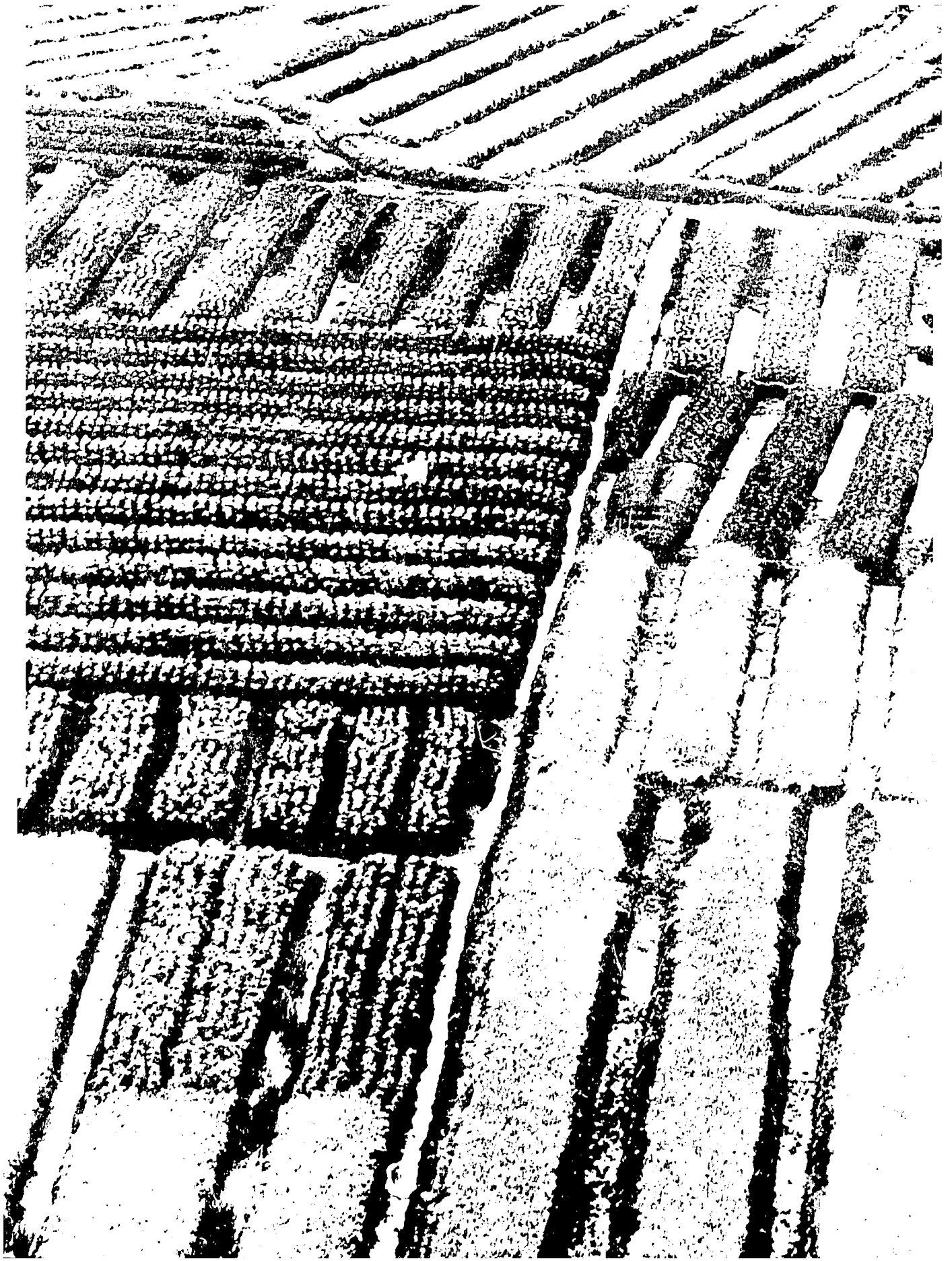
While technology-based agricultural development systems must recognize the interactions and complementarities of the several components, it is not necessary that one national organization or a single external assistance agency control or embrace all activities. Rather, with better mutual understanding on the part of the leaders of the various organizations or institutions of the need to take initiatives, they can reach out in furnishing the kinds of linkages essential to make the system work.

Just as past community development programs lacking technology for increasing productivity were of limited value, area development programs of the 1980's, without improved technology inputs, can be expected to have limited value. Likewise research programs conducted without concern for other components—particularly production inputs, credit, markets, extension, and education programs—will have little impact. We should not return to the former excessive emphasis on a single development factor. Rather we should vigorously strengthen the individual components—research, production inputs, credit re-

sources, or extension—but with the awareness that each is only one of the essential cogs in the development process.

A national system for technology-based development needs a national headquarters to facilitate the interaction of leaders of all the component programs, and to take continuing initiative in maintaining contacts with national political leaders so that all functions and activities relate to national development goals. The regional research and development centers provide for improvement of farming systems for a given region, for technical inputs into area development schemes, and facilities where research, extension, training, and provision of inputs can converge.

We have known for more than 15 years the importance of the interactions of the components of development. It would seem highly desirable to put this knowledge to practice in the design and operation of national development programs in the 1980's.—A.H.M.



Elements of Successful National Crop Research Projects

(facing) An intensive cropping pattern in Sumatra involving vegetables and rice.

The development of sound agricultural practices for the outer islands of Indonesia requires expanded research activities.

A profound reorientation of agricultural research has taken place in many developing countries during the past 20 years. To accelerate the output of research results, developing countries are shifting from the traditional organization of research by disciplines (plant breeding, soils research, entomological research, etc.) to coordinated commodity research projects. India, for example, launched a national, coordinated maize project in 1957. Its success led India to reorganize research on other topics. By 1965 India had established a system of "All-India" coordinated schemes for rice, wheat, sorghum, maize, millet, and other crops and program areas. India's annual production of food grains rose from a plateau of about 80 to 85 million tons in the mid-1960's to 130 to 140 million tons in recent years, in no small part because of this new form of agricultural research.

In Turkey, research from a national multidisciplinary wheat project, established in 1970, triggered the growth of

wheat production from about 10 million tons annually to more than 17 million tons. Turkey now has more than 10 coordinated crop research projects.

Mexico, Indonesia, the Philippines, Malaysia, Bangladesh, Botswana, and Guatemala are among the other nations which have successfully implemented such projects.

A coordinated, national, multidisciplinary research project is a powerful means for producing technology that can raise yields and rural incomes. There are four essential elements of an effective project:

- Research is carried out in all areas of the country where the crop is important
- A nationally respected scientist leads the project
- All scientific disciplines important to the development of new technology for the crop are encompassed
- Production problems are the focus of the project

A multidisciplinary research project, by focusing scarce scientific talent on a country's priority crops, raises the payoff from research. Moreover, coordinated research projects, in which scientists at all research locations participate in planning experiments and investigations, reduce duplication of efforts.

In coordinated research projects the emphasis is placed on developing technology for higher and more efficient production and on solving problems that limit yield increases. In other words, the project focus is on production-oriented research.

Finally, a national crop research project can be the impetus for holding regular meetings of all project scientists and other key scientists involved with research on the crop. By inviting other persons, such as marketing economists, agricultural extension officials, national planners, and seed production specialists, and including some of them on the program, the annual meeting of the research project can serve as a national forum for spreading and discussing the latest information on the commodity.

Cooperation among institutions. The most successful coordinated research projects include all scientists in the nation who are engaged in research on the subject,

irrespective of their organizational affiliation. For example, in the All-India coordinated schemes, the participants are from the Indian Council for Agricultural Research, the departments of agriculture of the individual states, and the state agricultural universities. The Indian Council for Agricultural Research and the state institutions execute a memorandum of understanding that spells out how cooperating institutions will participate in the coordinated research project and that specifies the amount of funding or other support to be supplied by each.

Research in a coordinated research project is largely of an applied or adaptive nature because its principal goal is to increase crop production. In countries with urgent problems and limited scientific resources, establishment of coordinated research projects means research of a more fundamental nature receives lower priority. Nevertheless, it may be appropriate for university faculties to conduct some fundamental studies, and thesis research of graduate students could be oriented in this direction.

Research in a national crop research project. Generally a national crop research project has two broad responsibilities: varietal development and improvement of crop management practices. Varietal development usually requires a multidisciplinary plant breeding team to produce crop varieties that:

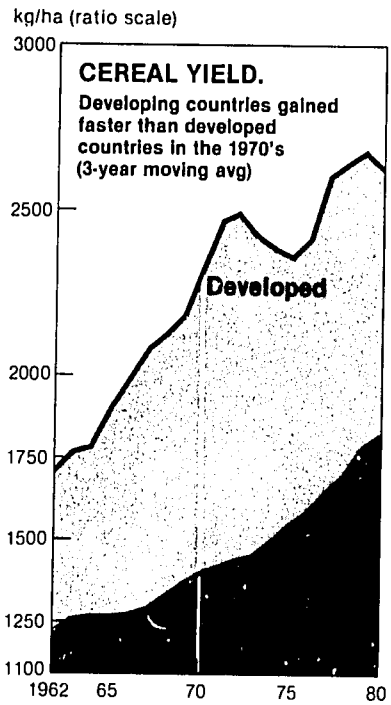
- yield well
- have resistance to most important diseases and insects
- are adapted to the ecology of the region for which they are intended and fit the farmers' cropping systems
- perform dependably under poor as well as good growing conditions
- have good quality, as judged by the consumer
- can be stored satisfactorily

Crop management research should produce:

- improved agronomic practices, such as seedbed preparation, seeding dates and rates, fertilizer rates and methods of application, etc.
- improved weed control techniques

In some low-lying areas of Thailand, only deep-water varieties of rice can be grown.

The orderly and systematic development of improved technology must proceed through disciplined evaluation under known and replicable conditions, followed by farm field testing to determine its biophysical suitability and economic feasibility.



- improved practices for preventing losses caused by insects and diseases
- improved methods of harvesting and storing

The technology—proven combinations of varieties, methods, and inputs—should focus on the problems farmers face, be economically feasible for farmers, and be acceptable to them.

The varietal development component. Because new varieties should have the capacity for high yields, resistance to the important diseases and insects, and good eating (or processing) quality, their development can be done best by a multidisciplinary team composed, typically, of plant breeders, plant pathologists, entomologists, and quality specialists.

In a newly organized research project, the varietal improvement team assembles varieties, breeding lines, and other sources of germ plasm from all over the world. (Mature breeding programs try to utilize as wide a diversity of germ plasm as possible.) The introduced varieties and breeding lines are usually grown in trials throughout the country to test their yielding ability, insect and disease resistance, quality, and other characteristics. Outstanding performers among the introductions can be considered for early release to farmers. At the same time, the varietal improvement team can begin to take steps to overcome any weaknesses found in such releases.

Ideally, the plant breeding program is organized so that most of the crossing or hybridization is done at just a few experiment stations, each of which represents a major ecological zone of the country. The breeding stations send other research stations collections of seed of experimental lines to be planted as observation nurseries (small amounts of seed of many lines) and yield trials (fewer lines, but sufficient seed for replicated plots).

Genetically segregating lines (F_2-F_3) may also be supplied to other research stations enabling scientists to select the germ plasm best adapted at their location. These selections are further improved locally, multiplied, and put into local yield trials. Lines that do well in local yield trials or national yield trials can be considered for release to farmers

as named varieties. As lines in the yield trials become candidates for variety release, the seed of these lines should be multiplied and made available for agronomic studies and for other research activities. The best lines from the local yield trials are then put into national yield trials.

If plant pathologists and entomologists work with the plant breeders, varieties produced are more likely to be resistant to important diseases and insects. The pathologists conduct surveys to establish where diseases occur; collect and store disease inoculum for inoculating the breeding nurseries so that resistant lines can be identified; make disease readings in the field and select resistant lines; and, sometimes, develop breeding lines in which genes for disease resistance are accumulated.

Entomologists periodically conduct surveys throughout the country to identify insect pests and to estimate damage caused by major ones. They devise techniques for screening breeding lines for insect resistance and, with the plant breeders and pathologists, select insect-resistant lines. They also help plan the crossing program to ensure that insect-resistant parental material is included. Pathologists and entomologists also study epidemiology and host-pest relationships to furnish understandings of disease and pest control.

Lines in the breeding program are also tested for acceptance by consumers. Among the factors that may be assessed are seed size and color, cooking or processing quality, milling characteristics, oil content, protein content, and storage life.

The crop management component. The aim of the crop research project is to develop ways to increase production per unit area and raise incomes for farmers. This requires, in addition to superior varieties, better techniques for managing the crop from preparation for planting through storage. A team of agronomists and other scientists are responsible for determining suitable practices for seedbed preparation, seeding dates and rates, fertilizer usage, weed control, insect management, irrigation practices (if applicable), and techniques for harvesting and storage. Depending on the crop, various specialists may be required. For

example, if a project focuses on a legume, microbiologists should be a part of the research team to study the distribution of native rhizobia, to develop improved strains of the nitrogen-fixing bacteria, and to devise techniques for inoculating seed where necessary.

Much of the crop management work can be conducted on research stations where large or complex experiments can be precisely controlled and carefully monitored. Studies of seeding dates and rates, irrigation practices, and the initial research on weed and insect control are appropriate for experiment stations. But a significant proportion of the research must be carried out in farmers' fields, particularly tests of a variety's suitability for a cropping system and studies of fertilizer practices because soils vary from location to location and past fertilizer use strongly influences a soil's response. Only in farmers' fields do the broad range of physical, economic, and social influences on crop production become apparent. While it is difficult to control experimental variation in farmers' fields, it is important to maintain scientific rigor and the quality of the experimental techniques.

Crop management research can be conducted as a component of a national crop research project, as a component of a cropping systems (or farming systems) research project, or partly in both kinds of research projects. In cropping systems research, scientists study an individual crop as a component of the sequence of crops grown by the farmer. Each of the "All-India" coordinated crop research schemes incorporates crop management research. In Senegal's new research organization the national crop research projects are essentially plant breeding projects, and almost all the crop management research is done by farming systems research teams located in each of the country's major ecological zones.

Even if cropping systems research teams have been organized, it is desirable, if there are sufficient scientific personnel, to place agronomists in each national crop research project so that management practices can be determined for breeding lines that are likely to be released as varieties. A breeding line's response to a management practice may determine whether it is suitable for release.

"National agricultural research systems in many African countries are not structured to simplify the transfer of information. Not only must information be transferred from the research centers to extension workers, but also to policy makers. In addition, the general public needs to be informed of research results and how they can be used to raise the standard of living of the local population."
Joseph Menyonga

The introduction of improved seeds and other inputs in Nepal is hampered by the difficulty and cost of carrying bulky goods over long distances.

Nepalese government technicians checking a field of wheat that a farmer is producing for seed.

For example, a line with low seedling vigor might escape detection in breeding plots where seeds are planted shallower than they are in farmers' fields.

Crop management studies, whether conducted in a crop research project or by a farming systems research team, must address the real problems of the farmer, and all crop management research must be finally tested on farmers' fields in farmers' cropping systems. Surveys of farming communities made jointly by social scientists and biological scientists will expose farming constraints and needs. This information is fed back into the research system to focus attention on farmers' high priority problems. Economists and other social scientists evaluate the suitability of prospective recommendations for the farmer's economic and social circumstances. They also carry out research to determine what influences farmers' willingness or reluctance to adopt new recommendations. These studies are essential for guiding research.

Having social scientists work side by side with other agricultural scientists in a commodity research project has two important advantages. First, the social scientists will be abreast of research findings. When they analyze technology, it will be today's technology, not yesterday's. Second, when biologists and other scientists help conduct economic and social studies, they will understand and respect the findings.

The role of the coordinator. Coordination in research does not mean a program imposed on compliant associates by a domineering leader. Rather, it means directing and integrating research—on a crop or a problem—to ensure a balanced focus on the problems that the farmer faces. Simply, it means "organized cooperation." The person responsible for coordination sees that the research planned by the team is carried out on a timely basis and with high standards. The coordinator must be a scientist but, because his role as coordinator requires priority attention, his direct involvement in research may be limited.

A good research project coordinator characteristically is a scientist of high professional standing who is respected by his co-workers and is capable of inspiring

them. Much of the coordinator's activities are directed toward solving the problems encountered by scientists in the research program—supplies, transport, funds, etc. Consequently he must travel to all research sites frequently to evaluate progress, to give advice, to encourage the scientists, and to help remove obstacles to their efforts. Perhaps most important, the coordinator must be impartial. He must not give preference to any research station (the headquarters' station, for example) or scientific discipline in funding, recognition, or attention. He should fairly represent each scientist, each scientific discipline, and each research station in the entire project.

An important consequence of the coordinated approach to crop research is that improvements in the quality of the research are stimulated by the comparison of results of different research stations on a common format and the visits of the coordinating staff and project scientists to the various stations. Individual researchers can benefit greatly from the coordinator's advice and by visiting other experiment stations to see research in progress. A constructive competitive spirit often develops. Individual scientists compare their results with those of the most skilled and experienced researchers, and attempt to elevate the quality of their own research efforts to match the standards set by the best scientists in the project. The quality, and therefore the usefulness, of experimentation can be materially enhanced as a result of this pooling of experience and exposure.

The coordinator should be thoroughly acquainted with all research in all disciplines of the project. As well as conveying information from center to center, he gathers information from international research institutes, other international sources, and programs of other countries, and transmits this knowledge to the appropriate researchers in the project. The coordinator studies all the elements that restrict agricultural production—whether biological limitations or problems of inputs, storage, transportation, or marketing—and advises agencies of government about bottlenecks they need to eliminate. In short, the coordinator should be the country's best informed individual on the commodity he represents, providing information to admin-

Characteristics of a well-run coordinated crop research project

1. The coordinator, or leader, is a respected, professionally competent, unbiased scientist.
2. The research is production oriented—its goal is to develop technology for raising yields per hectare and increasing rural income.
3. All scientific specialties necessary to develop a complete and economically sound technology are represented in the project.
4. Research has been initiated in each major agro-ecological zone in which the crop is important, or is expected to have high potential.
5. The coordinating staff visits the various experimental locations involved in the project during the growing season to offer assistance, advice, and encouragement and to gain a first-hand knowledge of the research in progress.
6. The research is planned by the scientists assigned to the project.
7. All the project scientists from various experimental centers meet in an annual workshop to review results, make recommendations, and plan the next year's research.
8. The annual workshop is a national forum at which all aspects of commodity research and production are discussed.
9. Research findings are being made known to administrators, planners, the extension service, and farmers.
10. The project integrates the efforts of all scientists working with the commodity, whether they are formally a part of the project or not.
11. The project develops strong links with international research institutes and other national research programs.

istrators, planners, politicians, and other policy makers, as well as to scientists.

Another responsibility of the coordinator is to compile and organize the research information produced by the project in all disciplines (varietal improvement, cultural management, pest control, etc.), and publish it in an annual progress report. A parallel duty is calling and organizing the annual workshop of all the researchers in the team.

Ideally, the coordinator should be responsible for assembling the annual budget for the project. To do this he requests budget proposals from researchers at each station, assembles them into a unified budget for the entire national project, and submits the budget to the appropriate authority in the research organization.

Because research management on the national level is a heavy burden, the coordinator cannot be deeply involved in experiments. But if the coordinator conducts research, it will help him stay abreast of his field and enhance his stature among his colleagues. Just how much research, if any, a coordinator can effectively do must be judged on a case-by-case basis.

Finally, the location of the coordinator's office is important. There are two main considerations: it should be in a region of the country where the crop in question is important and it should be accessible to decision makers in the research organization and in other government agencies.

The annual workshop. The annual workshop is the heart of a productive research project. At the workshop the project scientists review the past year's research in all disciplines, formulate recommendations based on the results of that research, and plan future research. It is important that *all* scientists assigned to the project attend. At the workshop they become fully informed about the project's activities and participate in planning the research. Team spirit is built. Other scientists (from universities, for example) who conduct research on the crop should be invited to attend the annual workshop, too. Before the annual workshop, the coordinator compiles the year's research results, and sends them to all scientists so that they can study the data in advance.

"Since the Second World War, the world has had fewer famines and fewer people affected by famines than at any other period in history. We have seen agricultural yields go up in developing countries—even a little faster than the population—but we still don't have an adequate understanding of the role of business and industry in this process, and such an understanding is desperately needed."
Sterling Wortman

The chief goals of the workshop are to review past research, to recommend the release of new varieties or crop management practices based on research to the extension service and to farmers, and to plan the future research program. The agenda for a 4-day meeting might be:

First day

Entire group meets to review, in general, the year's research results. This review is given by the coordinator and senior scientists from each discipline. National authorities report on factors influencing national production of the crop, such as supplies of inputs (fertilizer, insecticide, herbicide, etc.), marketing, storage, and other topics.

Second and third day

The scientists meet by specialty—breeding, agronomy, pathology, etc.—to review the research data in detail and to plan the next year's research. If possible, recommendations for the release of varieties and practices for farmers are formulated.

Fourth day

All the scientists meet to hear and discuss the research planned in the disciplinary sessions. Everyone is encouraged to comment on any research plan or recommendation.

If the workshop can be held at different research sites from time to time, project scientists will have opportunities to become familiar with the conditions under which the crop is grown throughout the country. This broadens their experience and increases their value to the country as a whole.

The annual workshop should be the occasion for bringing all national scientists who conduct research on the crop, regardless of institutional affiliation, together with national authorities on the most important subjects that influence crop production. In this way the annual workshop can become a focal point for gathering information on the state of the crop nationally, and thus is likely to influence government policy.—B.C.W.

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Improving Food Policy

(facing) Meeting of a village farmers' association.

Crop management studies, whether conducted in a crop research project or by a farming systems research team, must address the real problems of the farmer.

The efforts of low-income countries to improve their food systems—the interrelated activities by which food is produced, distributed, and consumed—are hindered by three common policy making weaknesses. First, government policies are often inconsistent. For example, a policy of low urban food prices to reduce the rate of increase of urban wages reduces the incentive for farmers to invest in more productive technologies. This policy retards the growth of the food supply, expands food imports and ultimately raises food prices.

Second, the people who work on the problems of the food system frequently lack relevant knowledge. Policy makers are often poorly informed about the technical limitations and potential of the agricultural sector; agricultural scientists tend to be unaware of the concerns and constraints of policy makers; and planners have difficulty relating analyses of individual farms and households to national food, agricultural, and other policies.

Third, the efforts of the people who are trying to improve the food systems are fragmented. For instance, the

food-related activities of government ministries, universities, and agricultural research stations are often poorly coordinated. And even among government departments that share responsibility for the food system, attention is rarely given to ways of integrating their efforts.

These problems can be reduced by improving the ability of persons concerned with food policy in low-income countries to recognize, analyze, and deal with the problems of their food systems and by developing methods that make it easier for them to coordinate their efforts and learn from each other. In other words, one solution to these problems is to improve the capacity of key individuals responsible for the food system and to improve communication among them.

Who is involved. Improving food systems through changes in food policy involves two groups, policy makers and people who are decisive for the outcome of policy. The composition of each group varies from issue to issue, and over time. Indeed a first step in improving capacity is being able to recognize, for each issue and each period, who belongs in each group.

Policymakers. With respect to the food system, policy makers are individuals whose institutional affiliation or influence (however exercised) enables them to make decisions that affect particular food issues. They comprise government and other officials in formal "policy" positions, including their advisors, and individuals or groups who actively influence the policy decisions of these officials. For example, the policy makers for the issue of food security include officials and advisors from the ministries of agriculture (who are responsible for increasing domestic food production), trade (monitoring food import requirements and handling the logistics involved), finance (arranging funding to achieve a "desired" degree of food security), and industry (guaranteeing food supplies to avoid food-induced wage inflation), health (maintaining the nutritional status of "vulnerable" social groups), and the office of the president or prime minister (avoiding the political consequences of food shortages).

Individuals and groups who actively influence the

policy decisions of any of these officials might include farmers (who wish to minimize competition from imported food), various construction and transport groups (who store and move the food reserves), physicians and paramedical staff (who improve—or guarantee—national food consumption standards), urban employer groups (who wish to avoid the wage effects of food price increases), and various groups of "concerned" citizens (who modify or monitor the changes in government involvement in the food system that a food security policy would imply).

Not all of these groups will be involved in every issue nor will they have the same influence. And in certain countries some of the groups will not exist. The point is that identifiable officials and individuals determine specific policies that affect the performance of the food system.

People decisive for policy. People who are decisive for policy include individuals and groups whose active or tacit support is required for a particular food policy decision to succeed. These individuals and groups do not decide how to deal with a specific food issue, but they have the power to modify the outcome of a course of action that the policy makers have decided upon.

On food security, the individuals and groups who are decisive for policy include officials and their subordinates from various government departments who are responsible for implementing policy decisions related to food security; domestic farmers who may respond to the policy by changing their product mix giving relatively more or less emphasis to food production; merchants who may change their food storage and distribution behavior; and consumers who may modify their consumption patterns in response to the change in government policy.

Distinguishing between policy makers and people who are decisive for the outcome of each policy serves several purposes. First, it emphasizes that not all individuals and groups are equally concerned about all food issues. Nor are they equally influential. Policy makers and their advisors who realize this are less likely to be overwhelmed (and thus unable to act purposefully) by the perception of interdependence in the food system. While it is indeed a system (a set of interrelated activities), the degree of interrelated-

"Because most of the resources that can be made available for research are often allocated by politicians in positions of power, leaders of agricultural research systems must learn not only how to deal with politicians but also how to influence them. Politics can be a hindrance, but it should and can be regarded, as well as used, as a facilitator and a means of innovation."
Jose D. Drilon, Jr.

ness is not uniform, nor equally significant, among all of the activities.

Second, the distinction highlights the "key" questions and concerns of each group and the capacity of the local personnel to recognize, analyze, and deal with them. Thus it helps to identify areas in which improving capacity can directly improve the food system.

Third, distinguishing between the two groups reveals the principal individuals and group representatives whose efforts should be co-ordinated if implementable policies are to be formulated. This shows where improved communication can help the performance of the food system.

Capacity. Individuals draw upon three types of capacity in making policy: strategic, technical, and administrative. Strategic capacity is the ability to define problems clearly and to formulate a coherent set of objectives for themselves or their institutions. Technical capacity refers to knowledge of specific disciplines, such as agronomy, plant breeding, or agricultural economics in order to analyze relevant problems. Administrative capacity is the ability to coordinate the activities of diverse groups of people, such as research workers, project directors, and farmers, to achieve particular objectives.

Capacity can be improved by adding depth to an individual's skills in his or her discipline. An economist might be provided training in econometrics, or an agronomist might be given advanced training in soil physics. Often, however, the problem is not lack of capacity in an individual's own discipline, but insufficient understanding of other relevant disciplines. Broadening the range of skills of a specialist is another way to improve capacity. For example an economist might be provided with training in basic agronomic principles, or an agronomist might be given training in the fundamentals of economic analysis.

Communication. Communication—the process of information exchange—can be important to the improvement of the food system. No individual has all of the information needed to determine how a given policy decision will affect various objectives or the interest of different

The appropriate number and size of regional research centers will depend upon the agroclimatic variations or types of farming areas in the country.

In China, lotus is a starchy food staple for numerous people. The leaves can be used as animal feed.

groups. Improved communication helps policy makers by expanding the range of information and perspectives available to them. Moreover, because the "policy makers" usually are located in a variety of organizations, improved communication raises the likelihood that their decisions will be mutually consistent. And finally those who are decisive for policy are more likely to support a policy if they perceive that their views and interests have been given due consideration. Improved communication helps ensure this by facilitating a two way flow of information between them and the policy makers.

Improving capacity and communication. Deepening or broadening the capacity of individuals who work on food policy problems has little value unless they have a context for using their improved capacity. Such a context can be provided by the individuals working together to develop frameworks (or basic structures) that highlight the key elements of the food system. Such frameworks help the relevant individuals organize their knowledge about the food system and more importantly, it provides them with a means of assimilating new information as it becomes available.

Two types of frameworks are useful. The first reveals the mutual dependence among key policy variables in the national economy. It helps policy makers and analysts to understand how policy decisions affect the food system, how the welfare of various groups is changed by alternative policies, and how the consequences of different objectives complement or contradict one another.

The second type of framework is exemplified by the fundamental principles of disciplines relevant to the food system. Most technical specialists use a few basic principles to structure their analysis of practical problems. For example, the principle of limiting factors is fundamental to the way agronomists think about most crop problems. The principle of opportunity cost underlies most economic analyses. Using the first type of framework to organize knowledge of these key principles (the second type of framework) places them in context that can help policymakers integrate new information and guide their deci-

"Farmers, who are the reason for all the research fuss, are almost always the last to be asked what they need."
Joseph C. Madamba

sions and the actions derived from these decisions. The key element in learning these principles and developing a framework within which they can be applied is a dialogue among policymakers and between policymakers and scientists familiar with the food system. In this way, improved communication becomes an integral part of the learning (or capacity development) process.

An example of a technique that explicitly uses frameworks and communication to improve strategic, technical, and administrative capacity is the case method. It is effective because it requires active participation and it allows participants to see how to apply their new knowledge in their own work. A case method seminar such as those organized by CIMMYT in several countries can bring together, for a particular food issue, both the policymakers and those who are decisive for policy. A skilled case leader can help the participants to develop a framework for discussing the issue, and to realize that together they often possess, or can identify, the knowledge needed to resolve the issue. The process tends to improve communication among individuals working on similar problems, whatever their institutional affiliation. It also helps to develop a sense of group cohesiveness and an awareness of local sources of expertise.

The case method is only one of many ways for improving capacity and communication with the objective of improving the food systems of low-income countries. Others include workshops, short-term courses, and longer-term efforts to develop the staff and curricula of research and teaching institutions. Powerful and inexpensive new communication and analytical technology, such as video tapes, micro-computers and audio cassettes, can also play an important role. But whatever methods are used, they will be most effective if based on the principle of improving the performance of the food system by building local capacity to recognize, analyze, and deal with food issues in a setting which encourages policy makers and those who are decisive for policy to communicate.—C.K.M. and M.F.M.

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IADS in 1981

(facing) Shifting sand dunes are a threat to date palms in northern Sinai.

The most important crops in the Sinai peninsula are date palms, vegetables, fruits, and barley.

The year 1981 was a momentous one for IADS. Some basic decisions have been made about future programs and the headquarters' location. And the foundation has been developed on which to implement these decisions.

In a review of priority program areas, the following were identified as having greatest future importance and potential for IADS:

- Support to national agricultural research and training programs.
- Analyses of development opportunities.
- Participation in national commodity production programs.
- Support to agricultural development programs in defined areas.
- Participation of private industry in agricultural development.

To permit IADS to seek and undertake a broader range of development-related assignments, the Board of Trustees

IADS DIRECT SERVICES TO DEVELOPING NATIONS 1981

	Review of development opportunities	Assistance in project preparation	Appraisal for assistance agencies	Advisory or consultation	Programming advanced scholarships	Agr. sector planning	Implementing area development projects	Implementing agr. research projects	Implementing production programs	Procurement
BANGLADESH		●			●			●		●
BOTSWANA								●		
COSTA RICA				●						
DOMINICAN REP				●						
ECUADOR							●	●		
EGYPT		●		●		●				
HONDURAS			●	●						
INDONESIA					●			●		
JAMAICA		●								
MALAWI			●							
NEPAL				●	●		●	●	●	●
SWAZILAND				●						
TOGO			●							
VENEZUELA		●								

approved in principle an expansion in the spectrum of expertise in the headquarters staff. The long-term plan for new headquarters' posts involves areas such as public policy, small-scale industry, soil and water engineering, marketing, animal production, and development management. The aim would be to broaden institutional capability without reducing IADS's current strength in technology development and transfer. IADS's capabilities will be further extended by the appointment, as senior associates, of outstanding specialists in credit, marketing, land use, pesticides, fertilizers, seeds, rural roads, range management, land tenure, water resources, and other specialized areas.

The new location for IADS headquarters will be the Washington, D.C. area, which will afford opportunities for the IADS staff to interact on a continuing basis with representatives of other development organizations. IADS rented a small office in Arlington, Virginia, for the interim before relocating the whole headquarters group from New York.

The contractual program of IADS has moved ahead strongly. By the end of 1981 the portfolio of contracts had a value of nearly $40 million. This contrasts with a total contractual business of about $10 million over the first 5 years of IADS's existence.

The success of IADS's current efforts can be measured in ways other than total contractual value. Perhaps one of the most convincing is that three contracts signed or brought to final negotiation in 1981 are renewals in countries where the nature of IADS's contributions has been demonstrated. The major new project in Bangladesh is the second phase of a program in which IADS has worked for the past 3 years. The contract was awarded to IADS after open bidding by all interested parties. This was also the case in the Indonesian national agricultural research project in which a contract to provide services for 5 more years is in the final stages of negotiation. The Nepal integrated cereals project was extended without open bidding because it was an integral extension of work in which IADS was already involved and key parties were satisfied with IADS's performance.

Contracts for several new undertakings were signed or in negotiation during 1981. A relatively small contract in

Consultants arranged through IADS in 1981

Bangladesh
M. Afzal, *cropping systems*
F. Haworth, *research planning*
L. F. Hesser, *research planning*
A. B. Joshi, *research planning*
M. B. Russell, *research planning*

Costa Rica
G. B. Baird, *national agr. research*

Dominican Republic
F. C. Byrnes, *organization development*

Ecuador
J. Cock, *cassava review*
A. A. Cook, *fruit pathology*
C. Dominguez, *cassava review*
D. C. Elfving, *fruit research*
E. H. Glass, *fruit entomology*
G. Gomez, *cassava review*
L. K. Hiller, *vegetable crops*
D. Leihner, *cassava review*
J. Toro, *cassava review*

Egypt
I. Asmon, *agr. economics*
S. Davis, *soil and water development*
L. F. Hesser, *agr. economics*
R. W. Richardson, *agronomy*
R. S. Temple, *animal production*

Honduras
G. B. Baird, *agr. assessment; national agr. research*

Indonesia
F. C. Byrnes, *communications training*
S. T. Cooper, *personnel development*
R. W. Cummings, Jr., *transmigration*
H. J. Delavier, *sugar*
S. M. Katz, *financial administration*
Ching Ming Kuo, *fisheries*
K. O. Rachie, *crop research*
J. B. D. Robinson, *coffee and cocoa research*
U. Scholz, *agr. economics*
H. R. Taylor, *communications training*
J. A. Varley, *laboratory facilities*
B. M. Waddle, *cotton*
W. B. Ward, *communications*
B. C. Wright, *soybean research*
M. Wulfe, *biological energy sources*

continued

Consultants, *continued*

Jamaica
L. F. Hesse, *research planning*

Malawi
M. D. Thorne, *research review*

Nepal
D. C. Finfrock, *station development*
F. D. Gorrez, *agronomy*
J. F. Harrington, *vegetable seed production*
P. F. Kaplan, *seed production and distribution*
P. Koostra, *seed project*
D. L. R. Neeley, *statistics training*
E. R. Perdon, *seed training*
P. G. Rood, *seed production*

Swaziland
J. F. Harrington, *seed production*

Togo
H. M. Jones, *project evaluation*

Venezuela
G. B. Baird, *research planning*

IADS services to the 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/sector planning, crop production, soil management and irrigation, fisheries/aquaculture, 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 the USAID and IADS.

Egypt represents a "first" in which IADS is involved in agricultural planning. In Nepal, IADS now has four projects with the addition of two contracts to provide assistance in research and extension in different regions, with funding from UNDP. They call for repeated short-term assignments by several specialists over a 3-year period. The experienced IADS staff members already in Nepal will be of great help in executing this contract.

An Indefinite Quantity Contract with the U.S. Agency for International Development was awarded after keen competition among many agencies. The contract identifies IADS are pre-qualified to take on certain kinds of surveys, studies, planning sessions, and evaluations for USAID and its missions abroad without additional bidding. This can make it possible for work to be done on a timely basis and offers a unusual opportunity to participate in development work at an early stage.

It is apparent that the strength of IADS remains in the research field, but we are finding opportunities to move into related fields. The challenge for IADS is to maintain strength in research as it develops capabilities in other areas.

The following pages summarize the country-related and indirect-service activities of 1981.

BANGLADESH

In 5 years the population of Bangladesh will reach 100 million, from 90 million at present. During the past two decades demand for food has risen faster than increases in production of rice, which constitutes over 90 percent of the country's cereal output. Bangladesh is taking steps to accelerate its agricultural progress, as indicated by the doubling of fertilizer distribution since 1976. Nevertheless, the target of food self-sufficiency by 1985, . set out in the second 5-year plan, will require immense efforts in research and development.

Wheat is the brightest statistic. Production has doubled in the last 5 years. Wheat is grown on 600,000 hectares and yields average 3600 kg/ha. The advances in wheat are based on modern varieties and improved technology.

IADS contract

During 1981 the contract under which IADS works in Bangladesh was completed and a new contract—Agriculture Research Project, Phase II—was negotiated and signed. The objectives under Phase II are to increase the effectiveness of the agriculture research system and to accelerate the generation of improved technology.

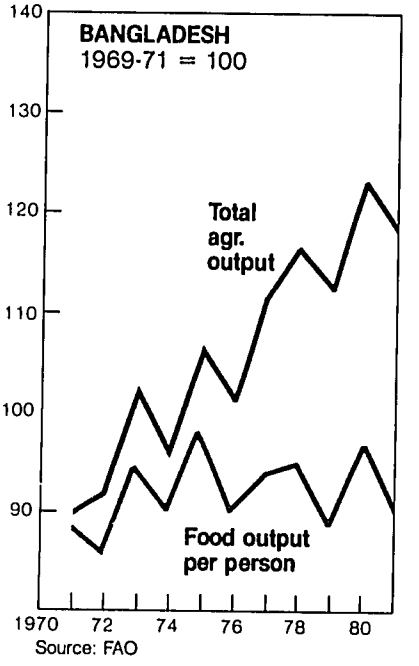
A more effective research system will be established by developing core research programs within a framework of farming-systems research. Scientists in multidisciplinary teams will work with farmers and extension workers to identify constraints as a basis for further research and to conduct on-farm trials supported by experiment station research. In addition, projects will be initiated to demonstrate improved technologies to farmers and to train extension workers. The impact of the projects on adoption will be closely monitored.

The contract, with funds from the U.S. Agency for International Development, will provide technical expertise in the form of resident specialists and short-term consultants. In addition, funds will support contract research, sabbatical studies, local research scholarships, and short-term and long-term training abroad. The foreign exchange costs of laboratory, field, and office equipment and supplies in support of the activities will be funded out of the project.

Resident specialists working under the Phase II contract during 1981 were Murray D. Dawson, project supervisor; D. N. Sharma, agricultural engineer; A. H. Manzano, farming-systems specialist. Other specialists will join the IADS Bangladesh team during 1982.

Research highlights

During 1981 a series of field experiments involving irrigation and fertilizer treatments were conducted by agronomists. The trials led to improved recommendations to farmers for growing wheat, maize, potatoes, oilseed crops, and grain legumes. IADS specialists provided advice on program planning, experiment design, data recording, and reporting.



Bangladesh research planning team

F. Haworth, *ISNAR*
L. F. Hesser, *IADS*
A. B. Joshi, *ISNAR*
M. B. Russell, *private consultant*

IADS services to Bangladesh

National agricultural research

Objectives: During phase I, which was completed in July 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 and in improving the organization and administration of agricultural research. The purpose of phase II is to help BARC increase the effectiveness of the national agricultural research system for development of appropriate agricultural technologies for Bangladesh farmers by building capabilities for on-farm research, by strengthening research in selected disciplinary and multidisciplinary programs, and by improving coordination of research by different institutions.

Magnitude: The phase I contract, at a cost of US$1.7 million, provided 13 man-years of senior specialists (in residence, and as consultants). The contract was effective November 1977 and completed in July 1981. The estimated cost of the phase II contract is US$16.8 million. The contract is for 5 years effective July 1981 and provides for 74 man-years of professional services, 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 and consultant engineer

Objectives: Under separate contracts, two specialists are provided to assist BARC programs. In collaboration with the International Potato Center, IADS provides a potato specialist to work with the Bangladesh Agricultural Research Institute in research and training. Under

continued

The IADS agronomists contributed to the planning and implemention of the National Coordinated Cropping Systems Project. Long-term cropping-systems experiments together with component agronomic studies have been initiated to support on-farm field trials.

Significant results are being obtained in soil and water research. BARC is coordinating fertilizer studies by 10 institutes in order to accelerate the development of reliable fertilizer recommendations. Aside from the expected response to nitrogen, these studies are revealing that sulfur is frequently deficient for cereals, grain legumes, and oilseed crops. These crops often respond as strongly to applied sulfur as to applied phosphorus. Zinc, too, is commonly deficient.

Irrigation schedules are being developed for major crops and soils. Investigations of seasonal changes in the moisture profile of various soils are yielding information that, in combination with rainfall data, will provide a basis for establishing feasible cropping patterns for different areas of the country.

At the potato center, researchers identified pest-resistant and high-yielding strains, successfully produced potatoes from true seed, and developed improved growing practices and methods for post-harvest handling. Chemicals that inhibit the sprouting of stored potatoes are being distributed to farmers.

Agricultural economists conducted farm surveys and developed cost-and-return data for six crops. Economists also began base-line studies for use in selecting representative sites for cropping systems research. A number of Bangladeshi scientists received training in use of computers, data processing and analysis, and interpretation of data.

At the central and regional experiment stations, land development including leveling, drainage, and design of underground irrigation systems has continued. Experiment station personnel are learning to repair and maintain farm machinery as well as developing skills in land development.

All specialists assigned by IADS work with administrators, scientists, and other government personnel to help improve national research planning, program coordina-

tion, project preparation, and monitoring and evaluation of research. Coordinated research projects, which bring together scientists from various research institutes, have been started on such topics as grain legume improvement, water management and irrigation, and cropping systems.

Research review

Under a contract with the Bangladesh Agricultural Research Council, IADS formed a four-person team in cooperation with the International Service for National Agricultural Research to review agricultural research in Bangladesh and its requirements for continued development. The team, headed by a IADS program officer examined the network of research stations, research activities, extension work, personnel training, and the financial support for research. It also prepared a proposal for inclusion in the World Bank's extension and research project in Bangladesh.

BOTSWANA

The recent outbreak of foot and mouth disease has been brought under control and beef from Botswana is on world markets once again. As a result prices are favorable for livestock growers. Foot-and-mouth vaccine is being produced in Botswana for domestic use and export. Production of the vaccine is possible because Botswana has one of the world's largest slaughterhouses, which can assure supplies of tongue epithelium, a basic material for production of the virus.

Good rainfall during 1981 benefited both cereal crops and range conditions. Even in good years, cereal output is below needs, however.

Horticultural research was reorganized to place more emphasis on market gardening. The opportunities for producing such vegetables as leaf cabbage and Swiss chard for export are being investigated.

Farming-systems research is receiving considerable attention. Sweden, UK and USA are supporting regional farming-systems projects.

IADS services to Bangladesh
continued

another contract IADS has provided a consultant engineer to help BARI improve the facilities and operations of three regional experiment stations.

Magnitude: The total value of the two contracts is $93,000. The term of the potato specialist began in April 1981 and will end in June 1982. This specialist has worked with IADS in Bangladesh, under a prior contract, since April 1980. The consulting engineer's services were provided from December 1980 through May 1981.

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

Funds: World Bank loan to Bangladesh.

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 US$1,000 in 1981, 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.

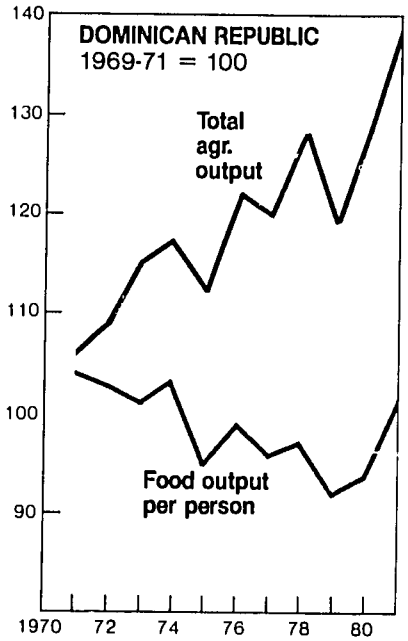
Kristian Oland, *representative*

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

COSTA RICA

An IADS staff member served on a three-person team organized by the International Service for National Agricultural Research that advised the government of Costa Rica on improvement in its national agricultural research system.

DOMINICAN REPUBLIC

IADS continued to serve as a consultant to Plan Sierra, a rural development project covering a 2000-square kilometer mountainous area in the Dominican Republic. This project brings governmental and private agencies into close working relationships with each other and with rural families. Project work focuses on coffee plantings and replantings, reforestation, pasture improvement, nutrition education, health services, and technical assistance to home crafts and small-scale industries.

In 1981, through direct consulting arrangements, IADS helped ISA, a private agricultural college, to plan and establish a number of projects.

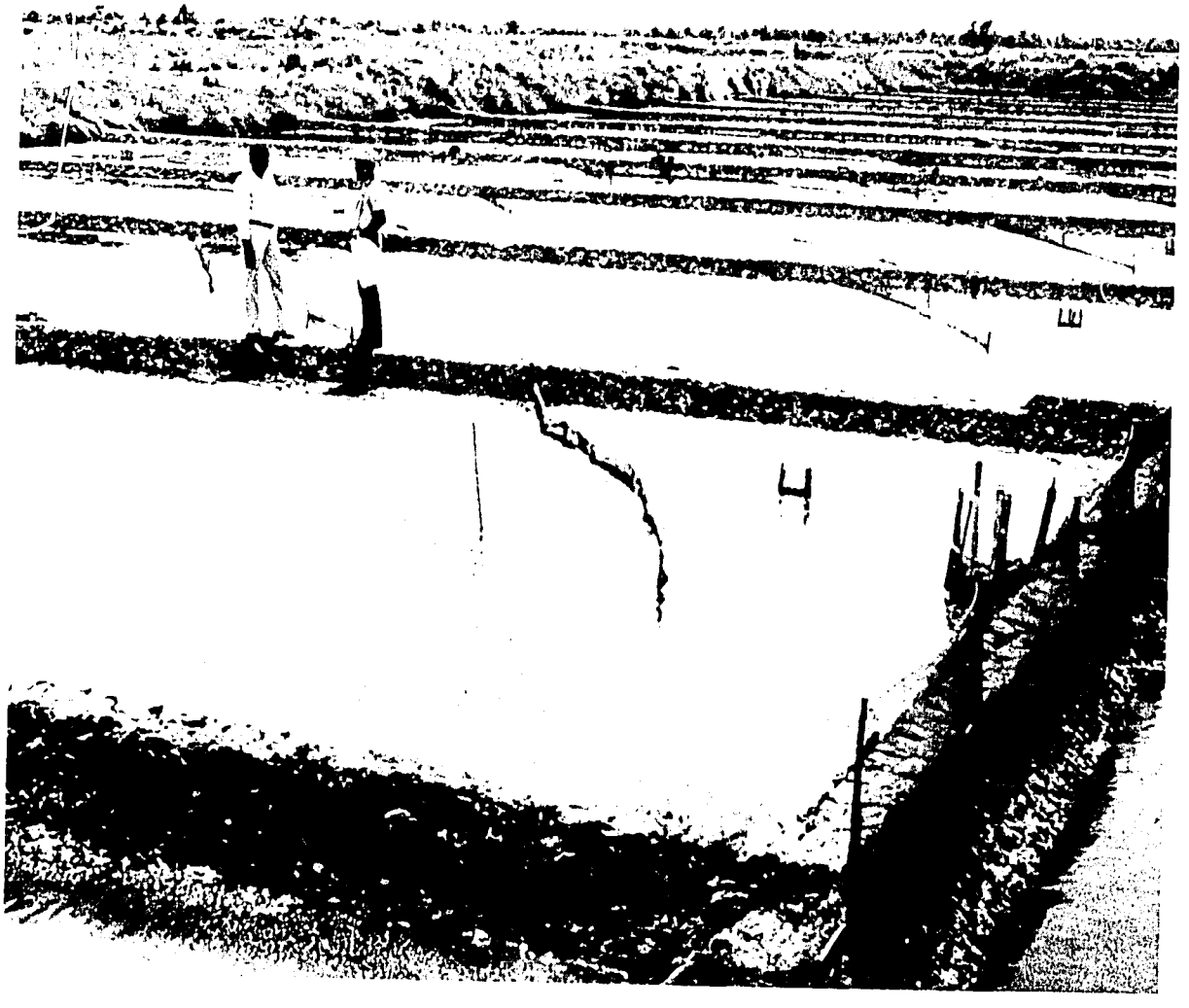
Plans initiated in 1978 culminated in 1981 with the funding at ISA of a Center for the Administration of Rural Development. This center, will provide short courses and seminars, in-service and pre-service, for public and private officials working in agricultural and rural development.

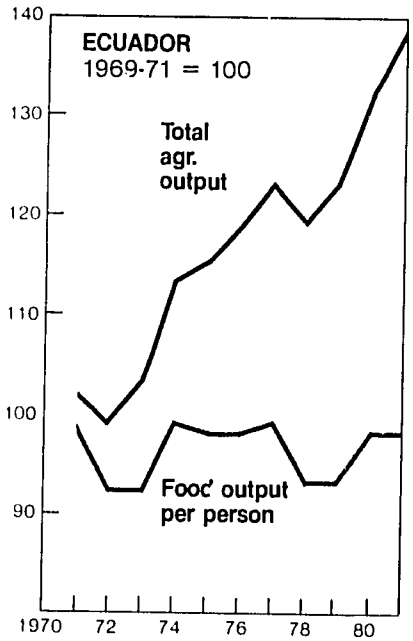
Construction and operations, budgeted at $5 million over the next 5 years, are being supported by the government, the U.S. Agency for International Development, the W. K. Kellogg Foundation, the Fulbright Scholarship Program, and The Rockefeller Foundation.

The IADS consultant also worked with the ISA staff on a number of institutional development projects: ways to cooperate with the extension activities of the government, development of a women's program at ISA, design of a rural development curriculum, in-service training for the ISA staff, and a short course on science and technology for policy makers in agriculture.

Practical field research experience is essential, not only prior to selection of individuals for degree training, but also throughout graduate education and training.

Reclamation of strongly acid soils for fish ponds is the master's thesis research of Alie Poernomo, right, an IADS fellow from Indonesia who is studying at the University of the Philippines College of Fisheries under Prof. V. P. Singh, left.





Source: FAO

Ecuador cassava review team

J. Cock, *CIAT*
C. Dominguez, *CIAT*
G. Gomez, *CIAT*
D. Leihner, *CIAT*
J. Toro, *CIAT*

ECUADOR

Ecuador's production of basic crops such as rice, maize, wheat, and potatoes increased significantly in 1981. For the first time in a decade, the country had maize and rice available for export.

IADS provides five specialists who work on poultry, fruit crops, food legumes, rice, and soils under a contract with INIAP, the national agricultural research agency. Paul Kretchmer, food legumes specialist, and Richard Figoni, rice improvement specialist, joined during the year.

Poultry. Work on poultry focuses on Puellaro, a highland village where small farmers (2- to 5-hectare holdings) are moving into commercial poultry production. Instruction on poultry management techniques is now being channelled through the newly formed village poultry association. The association is producing poultry rations and making veterinary medicines available to its members.

Farms are being closely monitored to identify problems in production and marketing of poultry. The food legume program of INIAP is introducing new varieties of beans, the principal crop in the area.

Fruit. Dwarf rootstocks of apple and peach and other temperate species are being introduced from abroad to speed up the production of improved varieties. At present most nurseries produce rootstocks from imported seeds, which is a slow process.

For subtropical trees such as avocado and citrus, the main problem, in addition to the slow pace of propagation, is infection that occurs in the nursery. New propagation techniques are being tested to remedy these problems.

The Tumbaco station, which is at 2,350 meters altitude, appears to have the world's highest-elevation collection of citrus. The yields and physiology of the 20 species in the collection are being studied.

In the Upper Amazon basin, native fruit trees are being assessed. Fruit has an important potential ecological and economic role as settlers move into the region. Trials are under way with *Cariodendrom orinocense*, a native species of nut similar to macademia.

Food legumes. Ecuador's major food legumes are dry beans (*Phaseolus*), peas, fava beans, and lentils. Yields are lower than in other Latin American countries and the area planted has been decreasing in recent years. Local and imported germ plasm is being evaluated and breeding programs have been started in collaboration with two international centers, ICARDA and CIAT.

To facilitate the traditional bean-maize intercrop, varieties of early climbing dry beans were selected that are compatible with INIAP's recommended early, short maize variety, INIAP 101.

Studies are under way with the poultry program to expand bean production by poultry growers. The availability of chicken manure offers an opportunity to introduce improved bean varieties, which are highly responsive to good soil fertility. Farmer demonstrations are being conducted in which new varieties are tested with various levels of chicken manure.

Rice. IADS participation in the Samborondon Rice Project, aimed at improving water control in part of Ecuador's Guayas River Basin, was completed, and an IADS specialist was assigned to assist INIAP's rice improvement program. Breeding and selection are under way to develop varieties for the diverse situations in which rice is grown in Ecuador: upland, irrigated, deep water, and *poza verana* (low areas with water left by receding seasonal flood waters). Experiment station land is being modified for deep-water screening.

Soils. The IADS soils specialist provides support to the seven INIAP soils sections at experiment stations throughout the country. The studies under way range from fertilizer trials, to minimum tillage, to phosphorus sources for a potato-pasture rotation, to soil conservation techniques.

Consultants. During 1981, several consultants went to Ecuador to assist INIAP in areas of research covered under its contract with IADS.

Five specialists from CIAT assisted in a study to assess

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 and acting representative*

IADS services to Egypt

Objectives: To help the government of Egypt prepare a long-term plan for agricultural development in Sinai. Under a subcontract from a private consulting firm, which is preparing a development plan for the economy of the region, IADS was retained to plan agricultural development. The work began in 1980 and was scheduled to be completed in 1982.

Magnitude: IADS furnished approximately 12 months of headquarters' staff and consultants' time at a cost of $130,000.

Basis: IADS is a sub-contractor

Leon F. Hesser, *IADS team leader*

the potential of cassava in Ecuador and examine the possibilities of increasing its production. This team was led by James Cock and included Dietrich Leihner, Julio César Toro, Guillermo Gómez, and Carlos Dominguez.

Dr. Larry Hiller, Washington State University, assisted in developing plans for strengthening vegetable crop research.

Dr. Edward H. Glass, New York State Agricultural Experiment Station, Geneva, New York, spent several weeks in Ecuador to identify principal insect pests of fruit crops and to assist in planning research for their control.

Dr. D. C. Elfving, Ministry of Agriculture, Ontario, Canada, provided assistance in identification of priority problems in production of temperate climate fruits and in design of a research program to address these problems.

Dr. A. A. Cook, University of Florida, provided help in the identification of the major pathogens of tropical fruits and in the design of a responsive research program.

Several consultants provided by other agencies and institutions helped in poultry symposiums, courses, and seminars.

EGYPT

IADS is preparing the agricultural portion of a long-term development plan for the Sinai region under a subcontract with Dames and Moore, a private consulting firm. Support for this effort is from the U.S. Agency for International Development.

During 1981, a team of five IADS consultants assessed the agricultural prospects in Sinai, and outlined several projects and activities that would contribute to the overall development of the region.

Agriculture in Sinai. The agriculture of Sinai consists basically of traditional agriculture—primarily nomadic or semi-nomadic herding, plus a small amount of rainfed farming—and nontraditional, or irrigated, crop production.

The largest concentration of crop production is near El Arish, on the Mediterranean coast, where about 1000

hectares are irrigated. Irrigation is by the basin technique, but some farmers are shifting to drip irrigation, which uses water more efficiently. Olives are the dominant crop. About one fifth of the area is in vegetable production. Fruit and some barley are also produced.

A second area of irrigated crop production is being developed, east of Bitter Lakes, using water from the Nile, which is brought across the Suez Canal in large pipes. Within the next decade production could be several times that of El Arish.

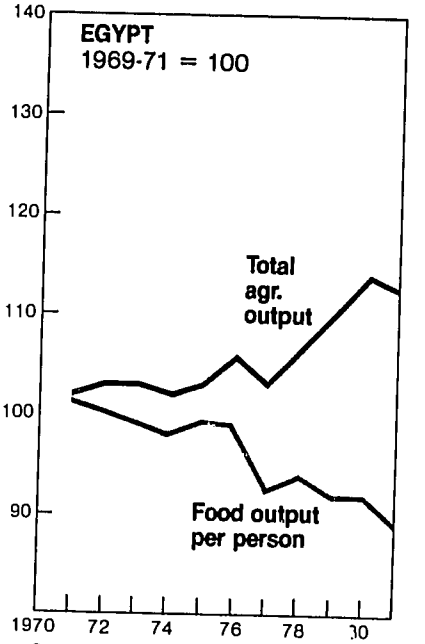
Aside from these two areas, many small, almost garden-like, plots exist throughout the Sinai which, in total, may produce as much as the area around El Arish. The most important crops are date palms, vegetables, fruits, and barley.

Livestock—goats, camels, and sheep—is of relatively high importance, especially to the Bedouin.

Prospects. The main constraint to expanding the agricultural area in Sinai is the lack of sufficient water of adequate quality. Rainfed agriculture is almost exclusively limited to the extreme northeast where average annual rainfall is 200 to 300 mm. Water from shallow wells is slightly saline at best, and is frequently too saline for crops. Little information is available on deep groundwater; exploratory drilling programs are planned to get more information.

Land reclamation using Nile water is technically possible. The chief limiting factor is the poor quality of soils in the areas that would be reasonably accessible to Nile water, causing the prospective returns in Sinai to be lower than returns from areas suitable for reclamation elsewhere in Egypt.

Technically feasible projects. Technically feasible agricultural projects for Sinai center around enhanced olive and date production, some additional land reclamation using well water, with emphasis on production of vegetables for the population centers of Sinai, and marginal improvement of traditional livestock production, through establishment of grazing associations and grazing reserves, animal health clinics, and livestock improvement stations.



Source: FAO

Highly trained personnel are required to lead national programs and major regional research activities.

At a conference on agricultural research and international associations sponsored by IADS and ISNAR, John Monyo of FAO, left, and Joseph Madamba of SEARCA were the co-moderators.

Virtually all of the project possibilities depend for their success upon rapid strengthening of the system of agricultural experimentation and extension for Sinai.

HONDURAS

An IADS program officer served as a member of a World Bank team that carried out a study on the agriculture of Honduras. The IADS officer was responsible for reviewing agricultural research, extension, and seed improvement.

Later in the year, the same IADS officer helped the government and the local mission of the U.S. Agency for International Development review draft legislation that would establish an autonomous institute for agricultural research, extension, and education.

INDONESIA

The Indonesian rice crop in 1981 is estimated at 22 million metric tons. For the second year in a row, the harvest exceeded 20 million metric tons, and it thus seems likely that the nation has achieved sustainable self-sufficiency in rice production.

Marked improvement has also been recorded in the production of some of the secondary food crops, such as maize. The existence of local surpluses has underscored the need for improving marketing infrastructure to store and process agricultural products, and transport them from one area of the archipelago to another.

The government is striving to diversify the food crop base while increasing agricultural exports, both as raw and processed materials. The agricultural and industrial sectors are expected to develop in concert, decreasing the economy's dependency on petroleum exports.

Advances by AARD

AARD (Agency for Agricultural Research and Development), the central authority for agricultural research, was established 5 years ago to promote a multidisciplinary ap-

IADS services to Indonesia

National agricultural research

Objectives: To provide the Agency for Agricultural Research and Development with technical assistance and services for strengthening national production-oriented research on rice, rubber, vegetables, and agricultural economics.

Magnitude: The revised contract provides for 30 man-years of specialist services from February 1977 through June 1982 and US$5.0 million in estimated costs. Of this, $2.1 million is allocated for 112 fellowships providing 146 man-years of training.

Basis: Contract between Republic of Indonesia and IADS.

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

Edwin B. Oyer, *project specialist*

Research in Sumatra

Objective: To help the Central Research Institute for Food Crops develop and expand nine research stations in important food-crop production zones of Sumatra.

Magnitude: A U.S.$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.

E. B. Oyer, *acting project specialist*

proach to research. Its objectives were furthered in 1981 by the inclusion of a major animal husbandry research project, which had previously been outside the AARD's jurisdiction. The importance of research guidance in the planning of agricultural development is being recognized, as shown by the involvement of AARD staff members in the preliminary discussions about the nation's next 5-year development plan, which will begin in 1984.

AARD is increasing attention to evaluation of land resources of islands other than Java. As the transmigration of families from Java to the outer islands proceeds, productive land area must be extended, while protecting the environment. The development of sound agricultural practices for the outer islands requires expanded research activities. This expansion is under way with the assistance of loans and grants from bilateral and international assistance agencies. Two projects were initiated in 1981—the second phase of the National Agriculture Research Project, with funds from the World Bank, and the USAID-funded Applied Agricultural Research Project. They will provide facilities in the 10 research complexes and the development of scientific manpower and technical assistance to plan and implement research programs in selected commodity areas to fit the resources of the various agro-climatic areas.

At the invitation of AARD, a team of consultants conducted a review of its first 5 years in program development and its strengths and weaknesses in their implementation. The review will provide a basis for preparing a proposal for a third World Bank loan to begin when the work under the second loan is completed.

Another significant achievement in 1981 was the establishment of guidelines for the development of individual research projects, for the research programs of commodity-oriented research institutes, and for coordinating these activities through the central research institute structure.

AARD-IADS interaction

AARD and IADS completed negotiations for continuing cooperation during the next 5 years. The project is designated NAR-II (National Agricultural Research-II). The

NAR-I contract was extended to mid-1982 in order to provide a smooth transition from the first contract.

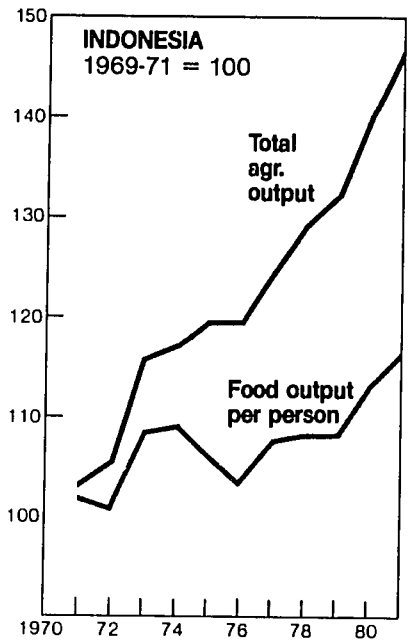
Manpower development continues to be the AARD's first priority. During 1981 the first five Ph.D. recipients from the fellowship program, jointly managed with the IADS, returned home. They are being assigned to leadership positions at AARD research institutions.

The AARD publication program produced a significant 128-page document, *5 Years of Agricultural Research and Development for Indonesia (1976–1980)*, with the assistance of two consultants.

Three new resident specialists were added to the project during 1981: C. G. Swenson, research specialist in agricultural economics with the Center for Agroeconomic Research at Bogor; R. T. Opena, research specialist in plant breeding at the Lembang Research Institute for Food Crops; and A. C. Nebab, procurement specialist. M. E. Marvel completed his assignment as program specialist for vegetables. In addition, IADS provided nine short-term consultants in various areas of expertise and for varying periods of assignment.

The English for Agricultural Training Program ended. It served 173 AARD scientists during 11 sessions of intensive English training conducted during the past 3 years.

IADS assisted in a course in communications skills conducted in English at Bogor. The course was attended by staff from the major agricultural research institutes comprising the AARD network. An IADS headquarters staff member, consultants, and the head of the National Agricultural Library provided instruction in the course.



Source: FAO

Agricultural research in Sumatra

Sumatra, the world's fifth largest island, holds a key position in Indonesia's economy and its transmigration programs. Sumatra has an abundance of natural resources and a low population density. Two-thirds of Indonesian exports originate from Sumatra—oil, timber, tin, rubber, palm oil, and other products.

Despite all the export-product activities, close to 80

"Perhaps the most neglected area of agricultural research is the fate of research results. In many countries the responsibility of the research worker ends when he files his final report, if he does, with the director. Results often are typed and prepared in a mimeographed form. The reports are written in technical language which is not easily understood by extension agents or farmers."
Subhi Qasem

percent of the employed population works in agriculture. Typical farms are 1 to 2 hectares in size. On most of these small farms, a dualistic system is practiced. That is, the farmer uses about half of his land to grow the subsistance commodities, principally rice, and the other half is used for cash crops such as rubber, coffee, coconuts, spices, or other tree crops.

In spite of its great development potential, Sumatra's natural conditions make cultivation of annual crops difficult. A third of Sumatra consists of highly leached, low fertility soils. Another third, mainly along the eastern coast, consists of swamps. Fertile areas constitute about 10 percent of total agricultural land, and are densely populated and intensely farmed.

Some settlement projects in the low fertility regions have collapsed when attempts to introduce continuous cropping failed. Carefully planned research is urgently needed to develop food-crop production systems combined with cash farming systems that maintain an ecological and resource balance and fit the capabilities of indigenous and resettled families.

Advances made in 1981. As part of the restructuring of agricultural research in Indonesia, the organization responsible for research on nonirrigated food crops in Sumatra was renamed the Sumatra Agricultural Research Institute for Food Crops (SARIF). It is one of several institutes under the Central Research Institute for Food Crops. SARIF comprises 12 research stations, which, for the first time, are formally related.

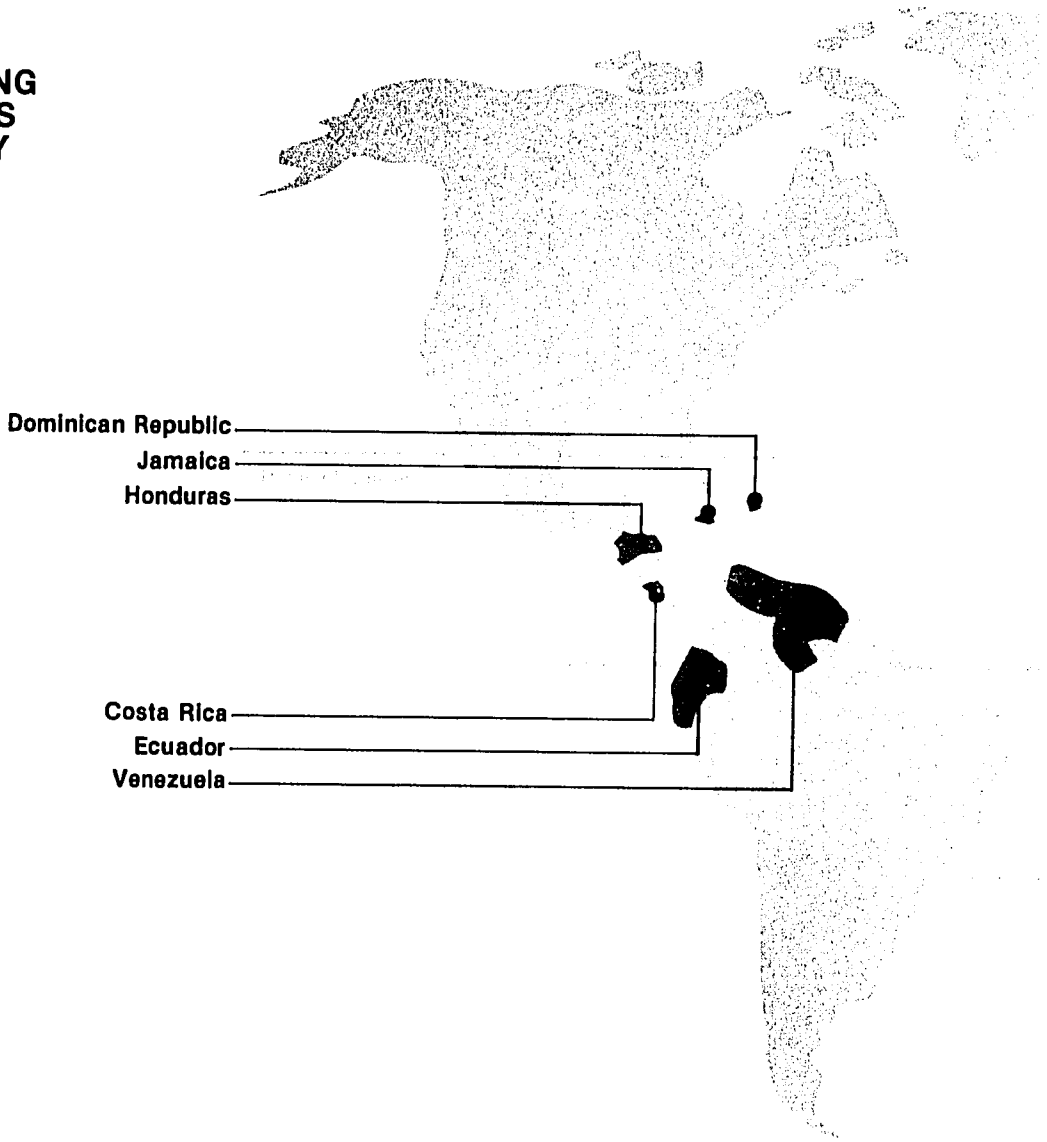
The reorganization facilitates a shift in research aims. Instead of the traditional focus on individual crops, SARIF is emphasizing research to develop technologies for nonirrigated farming systems under the wet tropical conditions of Sumatra.

To support this approach, socio-economic surveys are being made. They provide a basis for delineating major agricultural zones and for setting research priorities for each zone. In each of 16 priority regions, sites are being selected for on-farm research and testing of new technologies.

Because of the scarcity of educational opportunities in rural areas, few individuals with farm backgrounds move up through the educational system.

Vaccinating against foot and mouth disease in Venezuela.

DEVELOPING COUNTRIES SERVED BY IADS, 1981



Organizations contracting with IADS in 1981

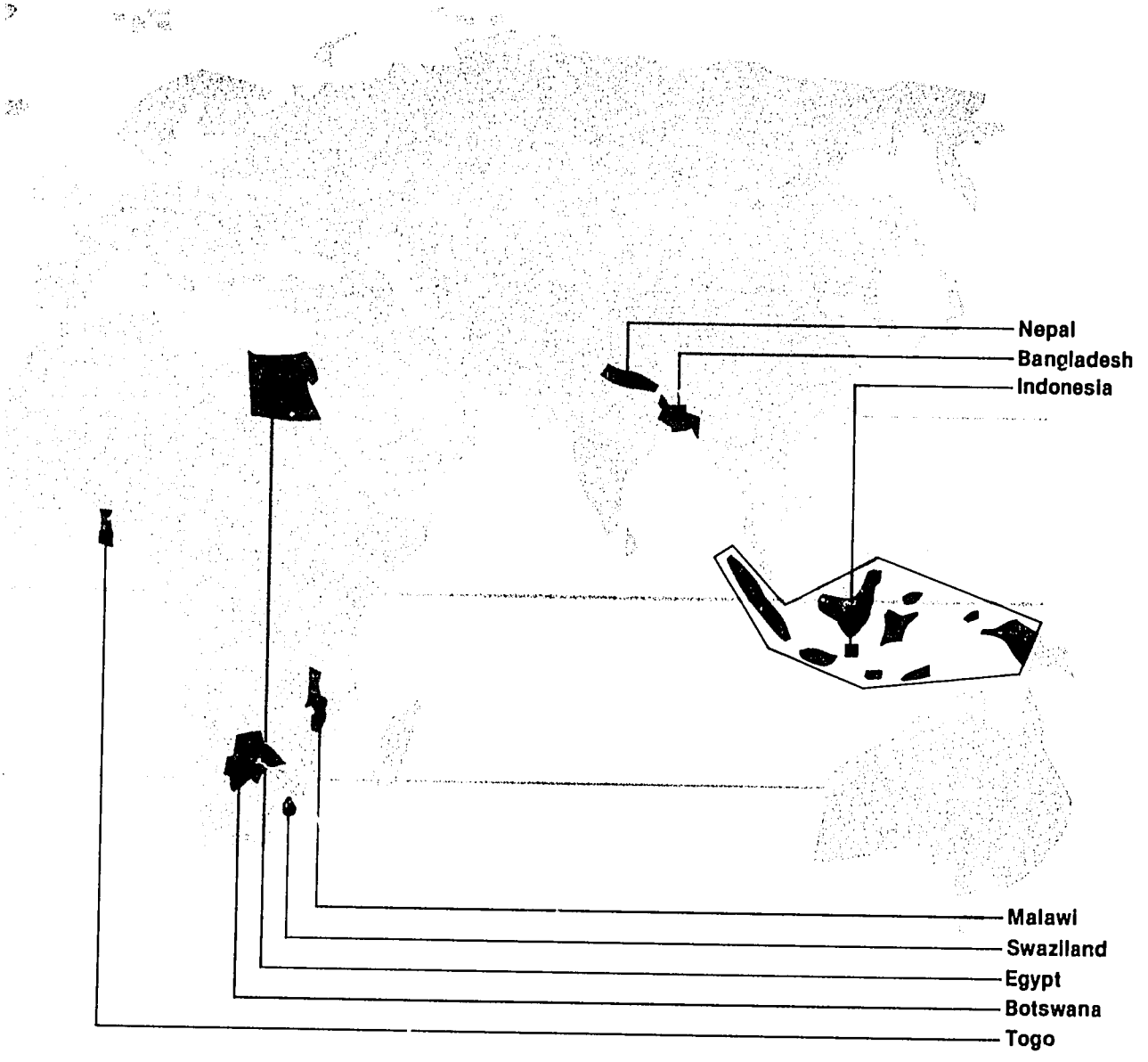
Bangladesh
- Bangladesh Agricultural Research Institute and Bangladesh Agricultural Research Council

Botswana
- Department of Agricultural Research

Costa Rica
- International Service for National Agricultural Research

Dominican Republic
- Instituto Superior de Agricultura

Ecuador
- Instituto Nacional de Investigaciones Agropecuarias



Egypt
- Ministry of Development

Honduras
- World Bank
- U.S. Agency for International Development

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

Jamaica
- U.S. Agency for International Development

Malawi
- U.S. Agency for International Development

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

Swaziland
- FAO

Togo
- U.S. Agency for International Development

Venezuela
- Fundación Polar

■ Resident IADS personnel assigned to national programs.

Training. The capabilities of SARIF are expanding as training programs reach a larger number of individuals. Six staff members have completed their master's degree studies, and five of them are continuing their Ph.D. studies abroad. Seventeen others are working toward advanced degrees at various institutions. In addition several others have benefitted from short-term training courses abroad and through in-service seminars on experimental design, data collection and analysis, and other subjects.

Research station development. At the central headquarters station, Sukarami, several old buildings are being remodelled, new staff housing built, plus roads, water system, electrical generating and supply system, and shaping of field plots. Site plans and preliminary design buildings were completed for seven of the eight stations.

Site studies and topographic surveys for all stations, and detailed soil studies of four main stations were carried out.

Complete plans, specifications, and bid documents were prepared for the Phase II construction on three stations, costing about US$1.7 million, to begin in 1982.

Short-term consultants were used on laboratory designs and special station planning.

JAMAICA

An IADS program officer visited Jamaica at the request of the government of Jamaica and the U.S. Agency for International Development to discuss changes in agricultural policy aimed at stimulating food production, especially export crops. The IADS consultant helped complete a project paper for a multi-year Food-for-Peace program, which would help support planned changes in agricultural policies.

MALAWI

At the request of the USAID mission in Malawi, IADS provided a consultant who led a team that evaluated a farming-systems research project.

NEPAL

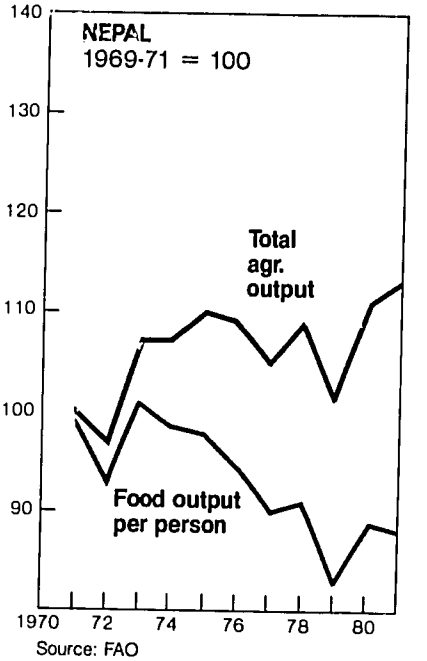
Rainfall was favorable for the 1981 harvests of rice, Nepal's largest crop, and maize. Rice production was expected to be the highest on record. Wheat production was normal despite some damage from leaf rust.

Personnel supplied by IADS take part in two projects in Nepal—the integrated cereals project of the Department of Agriculture and the seed production and input storage project of the Agriculture Inputs Corporation. Contracts for two additional projects were signed in 1981.

In an effort to achieve the agricultural targets of Nepal's current 5-year plan ahead of schedule, 35 government agricultural officers were each assigned responsibility for one or two districts. Within each district, high-potential areas were identified in which extension work and input distribution will be concentrated. The officers will visit the districts three times each crop season to assess problems and, if possible, to help solve them on the spot.

Regional research programs were organized in meetings of regional scientists and national commodity leaders. As a result several trials coordinated by the national commodity programs will be modified to reflect regional prob-

At one of the testing sites of Nepal's integrated cereals program, V. N. Upreti, left, guides M. M. Sainju, Member, Planning Commission, and B. B. Khadka, Secretary, Ministry of Agriculture through the wheat trials.



Source: FAO

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$7.4 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 38 man-years of advanced degree training, and 30 man-years of other training.

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

Funds: USAID grant to Nepal.

Wayne H. Freeman, *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 Input Corporation, and IADS.

Funds: USAID grant to Nepal.

Sharanjit S. Bal, *project supervisor*

continued

lems and needs, particularly on-farm variety trials and minikits (small samples of varieties distributed for farmers' evaluation).

Integrated cereals project

The integrated cereals project, came to the end of its first phase. Since 1976, when it was started, the project emphasis was on developing procedures to integrate research conducted at experiment stations and in farmers' fields, and, in addition, demonstrating at pilot locations, a research and extension methodology for alleviating the problems of small farmers.

The project has focused on developing varieties and methods for the hill areas of Nepal where two thirds of the population lives. Research has been done on individual crops and, at six sites, on cropping systems. The close ties between the crop research and the cropping-systems research has led to development of improved technology (combinations of varieties and practices) for each site. Since the sites were chosen through agro-economic surveys to be representative of different farming regions, the new technologies have potential for widespread application.

The new technologies were developed to fit conditions of the Nepali farmer—limited access to credit, labor shortage at critical periods, and little use of animal or mechanical power. For the first time, Nepal has a scientific base for promoting changes in farming in the Hills.

The specific recommendations vary from one agroclimatic region to another. A typical recommendation might call for shifting to improved varieties in two of the four crops a farmer grows, adopting—for a crop such as wheat—a modified seeding technique that permits lowering the seeding rate while raising yields, and increasing the fertilizer rate—to take advantage of the strong fertilizer responsive of the improved varieties.

During the year the staff of the integrated cereals project participated in an international symposium, "Nepal's experiences in hill agriculture" and a national symposium, "Appropriate technology for hill farming systems."

The project has now entered a second phase, to last 3

years, in which new research and extension methods will be applied at 200 trials in 11 districts primarily in the Hill region. Existing development projects throughout the country will collaborate in conducting trials and applying the procedures. The staff assigned by IADS to the project will be reduced from seven members to four.

Seed project

Porters and mules are the chief means of transport in the Hill region (elevations to 2500 meters), which contains the majority of Nepal's people. The introduction of improved seeds and other inputs is severely hampered by the difficulty and cost of carrying bulky goods over long distances. Nepal's Agriculture Inputs Corporation is addressing the problem by establishing seed production facilities and small warehouses at key locations throughout the Kingdom.

During 1981 surveys were conducted to identify sites where farmers are likely to be able to participate successfully in seed production. The survey gathered information on factors such as default rates in loan repayments, quality of extension services, credit availability, and size of land holdings. For example, in one village, the survey found that 80 percent of the farmers had too little land to devote a portion to production of seed for sale. By the end of the year, more than half of the 16 sites planned for seed production and 12 sites planned for small warehouses had been selected.

At two locations, a seed growers' association was organized and production of improved wheat seed begun. The seed growers' associations are being promoted by the Agriculture Inputs Corporation. The association will provide the institutional base and act as handling and sales agents for the seed growers.

The seed growers in each association will appoint a salaried local co-manager from among the members. Initially the co-manager will work with an official manager of the Agriculture Inputs Corporation in setting up a system of seed production, processing, storage, and distribution, in conjunction with other inputs. When the system is in

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

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

operation, the co-manager will take full charge, although the Agriculture Inputs Corporation will still provide technical support. The association at each site will act as the intermediary in securing loans from local banks for the seed growers. The association will sell the seed to small seed dealers and in some instances to the Agriculture Inputs Corporation, which will supply seed to other regions of the country.

During 1981 three training courses related to the project were held for government and other public officers, and seed growers' courses were held in three villages. Four Nepalese are abroad studying for master's degree with funds provided by the project.

New projects

IADS participation in agricultural research and development programs of Nepal increased with the signing of two new contracts with the World Bank at the end of 1981. IADS will provide consultants to help implement the Hill Food Production Project and the Agricultural Extension and Research Project. The two projects will support the government's long range objective to improve the standard of living of rural people by increasing their agricultural production and incomes. The World Bank is supporting these projects through a credit to Nepal. UNDP has provided a grant for technical assistance for which the World Bank is the executing agency. One IADS consultant began work with the Hill Food Production Project before the year end.

"In most research systems, the transfer of technology to farms is considered an activity so different from research that it should be carried out by groups specialized in transmitting messages or informal education. It is assumed that there is an interaction between those who do research and those who transfer technology, but actually, in most cases, there is no such interaction and sometimes there is actually antagonism."
Luis Marcano

SWAZILAND

IADS provided a consultant to lead a training course on seed technology under the auspices of FAO.

TOGO

IADS furnished an agronomist for a team that evaluated a farmer-training project sponsored by the U.S. Agency

for International Development. The IADS member's primary responsibilities were to assess farm production and management and to examine the adequacy of the center's irrigation system.

VENEZUELA

The Fundacion Polar of Caracas is considering a project to strengthen national maize improvement. At its request, IADS made a proposal for a study of means to develop improved maize varieties and hybrids needed by farmers to increase production, taking into account the grain characteristics important to local consumers.

LEADERSHIP DEVELOPMENT

Vocational education

The scarcity of adequately prepared professionals and sub-professionals continues to be a major obstacle to accelerating agricultural development and production in most developing countries.

Assistance organizations invest millions of dollars in the education of agricultural professionals for public institutions in the developing countries. Most of this aid supports individuals for master's and doctoral degrees, on the appropriate assumption that increasing the capacity of indigenous colleges and universities is basic to national development. Farmer training, as part of long-term projects or in independent non-formal education programs, also is increasing.

But there have been no comparable efforts to increase the educational opportunities necessary to prepare the "sergeants of agriculture"—the huge numbers of teachers, technicians, extension, and community development workers, paraprofessionals, and agricultural tradesmen needed to work directly with farmers and to staff schools, experiment stations, laboratories, production campaigns, and agricultural supply, marketing, and processing firms.

Vocational education in agriculture
Meeting participants
November 4, 1981
Arlington, Virginia

Francis C. Byrnes, IADS
Cynthia Connolly, UNDP
David Gooday, World Bank
Nancy Gray, USAID
Leon F. Hesser, IADS
Bruce Lansdale, American Farm School, Greece
Anne C. Lounsbury, IADS
Robert Maxwell, West Virginia University
A. Colin McClung, IADS
Frank Method, USAID
Orlando Olcese, UNDP
Freddie L. Richards, BIFAD
Roger Simmons, USAID
David Sprague, USAID
Howard Steverson, USAID
John Swallow, USAID
Burton E. Swanson, University of Illinois
Bernard Wood, World Bank

Fellowships

Individuals under programs administered by IADS in 1981, their field of study, and degree pursued.

Indonesia

Univ. of Akron (USA)
Budiman Tirtawidjaja, polymer science, Ph.D.

Univ. of Arkansas (USA)
Mansur Lande, agronomy, Ph.D.

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

Cornell Univ. (USA)
Marsum Dahlan, plant breeding, Ph.D.
Sultoni Arifin, agr. economics, Ph.D.

Univ. of Florida (USA)
Farid Bahar, agronomy, Ph.D.
Yoyo Taryo-Adiwiganda, soil science, Ph.D.

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

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

Iowa State Univ. (USA)
Budiman Hutabarat, agr. economics, M.S.
Sumarno, plant breeding, Ph.D.

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

Michigan State Univ. (USA)
Abdul Madjid, 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.
Tjeppy Soedjana, agr. economics, M.S.
Achmad Sudjana, agronomy, M.S.

continued

The secondary schools in the developing countries that are the principal source of these individuals rarely offer the educational opportunities in agriculture that would help them develop the needed basic skills. Since secondary schools are also the source of university students in agriculture, this lack of intermediate agricultural education also adversely affects the number and orientation of students going on to higher education in agriculture. Given the scarcity of educational opportunities in rural areas, few individuals with farm backgrounds move up through the educational system. Many never get beyond elementary school, and those who do tend to succeed along classical rather than practical lines. As a consequence, most persons qualifying for university education come from towns or cities, and they have not received practical farm training at home nor in school. Yet these are the students who eventually become responsible for the agricultural programs of the country. Thus the lack of agricultural education or orientation at the secondary level affects a country's agricultural institutions at all levels.

There may be value in exploring the "farm school" as a major element in a nation's agricultural development. Such institutions might play a much greater role in preparing people to work directly with farmers.

IADS and representatives of major technical cooperation agencies have discussed ways to generate attention and action among countries and assistance agencies that would improve opportunities for rural youths to obtain vocational education in agriculture. With an emphasis on preparing students to work with farming systems, such a program could provide the context for organizing curricula and syllabuses and preparing materials and methods more relevant to the positions to be filled.

The first step toward identifying a possible long-range program was a meeting with representatives of several assistance organizations. Participants stressed the importance of clearly identifying the target audience for vocational agricultural education. Some advocated concentration on primary as well as secondary students, while others believed it important to provide all sectors of society with an orientation to agriculture.

While all recognized that improved systems of informing and teaching farmers were necessary, there was no general agreement on how these might best be accomplished through training of potential staff members. Differences in view tended to be associated with the educational and field experiences of participants.

The consensus of the meeting was that IADS should focus on identifying those agricultural constraints that seem amenable to resolution through vocational agricultural programs, the principal limiting factors to current problems, and the types of program interventions that seem most feasible and fundable.

With this background, IADS has begun to outline a long-range program and to identify various project possibilities.

Professional register

IADS maintains a computerized register of professionals interested in international agriculture. While established primarily to identify persons for IADS assignments, requests for service from nonprofit organizations in international agriculture are accepted. Other requests are declined as a matter of policy.

There are over 1500 participants in the register. Systematic updating ensures that information is no more than a year old.

Of the current participants:

- 60 percent hold a doctoral degree, and an additional 25 percent have a master's degree.
- More than half have over 5 years of working experience in developing countries.
- two thirds are fluent or competent in languages other than English.

Advanced-degree fellowships

IADS, on request, manages arrangements for foreign advanced degree training for scientists and specialists, under contracts that include training funds. In 1981, IADS handled fellowships associated with contracts in Indonesia

Fellowships, *continued*

Toga Silitonga, forestry, Ph.D.
Winarno, crop production, Ph.D.

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.

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.
Sumpeno Putro, fisheries, Ph.D.
Djaban Tinambunan, fisheries, Ph.D.

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

Univ. of the Philippines at Los Baños
Al Sri Bagyo, agr. economics, M.S.
Rasidin Azwar, agronomy, M.S.
Hasan Basri Iswandi, agronomy, M.S.
Zainal Lamid, agronomy, M.S.
Asmir Rifin, plant breeding, M.S.
Mohamad Soedibyo, horticulture, Ph.D.
Marudin Sianturi, communication, M.S.
Sjaifullah, horticulture, Ph.D.
Sunarwidi, horticulture, Ph.D.
Zulkifli Zaini, botany, Ph.D.

Univ. of the Philippines College of Fisheries
Alie Poernomo Tirtoredjo, fisheries, M.S.

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

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

continued

Fellowships, *continued*

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

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

Catholic Univ. (Belgium)
Haeruddin Taslim, soil fertility, Ph.D.

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

Institut Agronomique Méditerranéen de Montpellier (France)
Endang Setyawati Thorhari, agr. economics, M.S.

Nepal

Univ. of California, Davis (USA)
Ganga P. Deo, soil science
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.

Univ. of Illinois (USA)
Juju Bhai Manandhar, plant pathology

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

Kansas State Univ. (USA)
Ram Sundar Lal Karna, plant pathology, M.S.
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.

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

continued

and Nepal. The fellowship office of the Rockefeller Foundation cooperates with IADS in these efforts. A total of 82 students were enrolled at 35 universities in eight countries outside their homelands in 1981.

PUBLICATIONS

The IADS publications program aims to provide leaders in developing countries with clear, reliable information that can be used to make better decisions about agriculture.

The newest addition to the IADS development-oriented literature series is **Three ways to spur agricultural growth** by A. T. Mosher. This concise book addresses key actions that government leaders can take to accelerate progress in agriculture: mount one or more commodity-production programs, launch farming-district projects, and improve the efficiency of regular agricultural agencies. For commodity production programs, Mosher outlines appropriate research and extension activities. He discusses farming-district projects as a means for testing new methods of government operations. The strengths and weaknesses of both commodity-production programs and farming-district projects are explored. To improve the efficiency of regular agricultural agencies, Mosher advocates finding ways to increase the competence of professional staff members, providing incentives for efficient performance, creating more appropriate organizational patterns, improving agricultural planning, adopting better operating procedures, and using appropriate styles of administration. *Three ways to spur agricultural growth* complements an earlier book developed under IADS auspices, *To feed this world: The challenge and the strategy* by Sterling Wortman and Ralph W. Cummings, Jr.

A review in the United Nations Development Programme publication *Development Forum* called the Mosher book "a profitable read for ministers of agriculture or their bureaucrats."

Reviews of previously published books in the development-oriented literature series continue to appear. The magazine *International Agricultural Development* said of **Tomatoes in the tropics** by Ruben Villareal:

This book is the first to gather together useful data about the production of tomatoes in the tropics and could help persuade decision makers that there is good reason for increasing cultivation of the vegetable.

Small farm development by Richard Harwood was reviewed in the *Geographical Review*, which said, ". . . it is a pleasure to have a book emphasizing the expertise of small farmers."

A review of **Successful seed programs** in *Span* observed:

> . . . this is a book that started with clear objectives and attains them. It will be useful to politicians, administrators, and managers who should all read it. Many agricultural scientists and seed technologists too would benefit from an hour or two's browsing because it will remind them of the facts of life: plant breeding and seed technology are transmuted into agricultural practice only by well-judged political and administrative action.

During 1981, Tata McGraw-Hill, New Delhi published an Asian edition of *Successful seed programs*. All of the books in the development-oriented literature series are being translated into Spanish by various organizations in Latin America. They are scheduled for publication in 1982. IADS is seeking organizations or commercial publishers who would undertake to translate and publish the books in French and other languages.

An occasional paper, **Assessing farmers needs in designing agricultural technology,** written by the economics staff at CIMMYT, was published during the year. It lays out steps in relating the economic and natural circumstances of farmers to a research process that integrates experiment station research, on-farm research, and policy issues.

A new edition of **Agricultural development indicators** came out in 1981. This publication provides data related to the agricultural progress of 139 developing countries. Among the 25 items covered for each country are population growth rate, child mortality, agricultural import ratio, growth in cereal area, yield, and production, and fertilizer use per hectare.

A list of publications developed or issued by IADS is available on request.

Fellowships, *continued*

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 management, M.S.

Univ. of the Philippines at Los Baños
Jagadish Raj Baral, agr. education, Ph.D.
N.K.R. Bhandari, agronomy, M.S.
B.K. Gyawali, entomology, M.S.
B.B. Mathema, plant breeding, Ph.D.
B.B.M. Singh, agronomy, M.S.
K.K. Shrestha, agronomy, M.S.
S.L. Shrestha, cropping systems, M.S.
B.P. Upadhyaya, plant breeding, M.S.

Philippine Christian Univ. (Philippines)
Basu Dev Parajuli, agribusiness, M. Admin.

Seoul National Univ. (South Korea)
Gyan Lal Shrestha, agronomy, M.S.

National agricultural research and international associations
Conference participants, November 30–December 4, 1981

Marcial Abreu, IICA
William Agble, Crops Research Institute, Ghana
Eduardo Alvarez Luna, Mexico
Francis C. Byrnes, IADS
John K. Coulter, World Bank
Santiago Fonseca, ISNAR
V. E. Gale, Industry Council for Development, USA
William Gamble, ISNAR
Alicia Groot, ISNAR
Robert D. Havener, CIMMYT
Hussein Idris, UNDP
Robert Kern, ISNAR
Joseph Madamba, SEARCA
Luis Marcano, Fundacion Servicio para el Agricultor, Venezuela
A. Colin McClung, IADS
Joseph Menyonga, AAASA, Ethiopia
John Monyo, FAO
Byron Mook, ISNAR
Bakir Oteifa, Cairo University, Egypt
Subhi Qasem, University of Jordan
Walter Simons, Industry Council for Development, USA
Eduardo Venezian, Universidad Catolica, Chile
Manuel Villareal Gonzalez, INIA, Mexico
Robin Yarrow, Permanent Secretary for Agriculture and Fisheries, Fiji

LIAISON

Continued interaction with technical cooperation agencies, donors, and developing countries is necessary to identify, obtain, and execute short- and long-term contractual services. Each IADS staff member has specific liaison responsibilities, which supplement the work of a program-development task force charged with the responsibility of systematically seeking contractual opportunities.

In addition, through its activities, IADS facilitates cooperation among developing countries, and, within specific countries, integration of technical cooperation agencies in support of specific projects or objectives.

IADS continued to explore potentials and relationships for drawing upon the experience and expertise of developing countries, industry, and business, and educational and research institutions in carrying out its missions.

In 1981, IADS engaged in one special liaison event—a workshop co-sponsored with the International Service for National Agricultural Research (ISNAR) and in cooperation with the International Federation of Agricultural Research Systems for Development (IFARD). The objectives of the workshop, held November 30 to December 4 at the Bellagio Study and Conference Center, were:

- Increased awareness among participants of the present and potential role of international associations in helping strengthen national agricultural research, and criteria and methods of assessing the activities of these associations in strengthening research.
- Recommendations on ways international associations may help national agricultural research.
- Commitment of participants to provide the continuity of leadership necessary to bring about action on workshop recommendations.

Twenty-four persons participated, including research directors and administrators from 15 developing countries. The program included four regional papers on the critical problems of national agricultural systems and how various associations might contribute to their resolution.

Participants identified several issues as critical for successful national agricultural systems: institutional and

funding stability, research environment, orientation of programs to farmers' needs and problems, program planning, supply of information and materials, program evaluation, linkages to other institutions, management of information, personnel, and finances, manpower planning and development, and provisions for delivery of the research product. They saw possible association activities as including advocacy of research system interests, training, exchange and advisory services, studies, and establishment of standards and criteria.

The workshop proposed an action model for association responses to research system needs, and suggested ways by which research systems can relate more effectively to associations.

Before concluding, participants endorsed the proposed activities of ISNAR and IFARD to increase the availability of opportunities for training in agricultural research management.

A summary report on the workshop is being published by IADS and ISNAR.

প্রদ

Administrative Developments

(facing) Farmers lined up to receive production loans.

Production credit is one of the critical components for technology-based agricultural development.

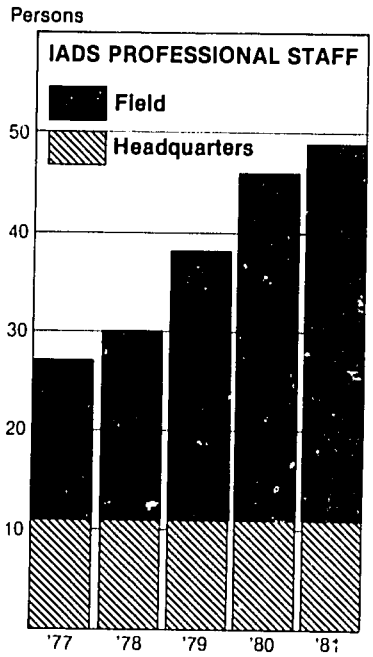
Trustees

The deaths of two IADS trustees, **Sterling Wortman** and **Jose D. Drilon** were profound losses to world agriculture and to IADS. Dr. Wortman, a dedicated and visionary leader, founded IADS and served as its first president. Dr. Drilon made significant contributions to Philippine agriculture as well as being a forceful and effective advocate of closer cooperation among developing countries.

The Board established a new position, Vice Chairman, and elected Clifford M. Hardin to it.

Headquarters' staff

One addition was made to the headquarters' staff in 1981. **Harold M. Jones,** an agricultural engineer and former official with the U.S. Agency for International Development is taking major responsibility for programs in Africa and the Mideast. He also will be concerned with area development projects. **Stephen M. Katz,** who had been IADS financial officer, assumed the duties of comptroller.



Field staff

IADS added eight new specialists to its field staff during 1981. In addition, two staff members moved to new assignments in other IADS projects.

In Nepal, **Inocencio C. Bolo** joined the integrated cereals project as it moves into its extension phase. Bolo has helped develop seed production programs in several Asian countries and has conducted production training courses at the International Rice Research Institute. **S. S. Bal** was appointed supervisor of the seed production and inputs storage project. He was previously an FAO seeds advisor and managing director of India's National Seeds Corporation. **Peter Rood,** a social scientist who taught in Nepalese colleges for several years, is field supervisor of the project.

The national agricultural research project in Indonesia was joined by three new staff members. **C. Geoffrey Swenson,** who had been with the IADS Bangladesh project, took the post of agricultural economist. **Romeo T. Opena,** on leave from the Asian Vegetable Research and Development Center, was appointed vegetable breeding specialist. The post of procurement specialist has been taken by **Alfredo C. Nebab.** He had held executive positions in private industry in Indonesia. In the Sumatra project, **Ulrich Scholz** was appointed agricultural geographer. He previously had done research in Indonesia for the University of Giessen.

In Ecuador, **Richard Figoni** took the post of rice production specialist. He has taught and conducted research in Central America. **Paul Kretchmer,** formerly with the CIAT bean program, became food legume specialist.

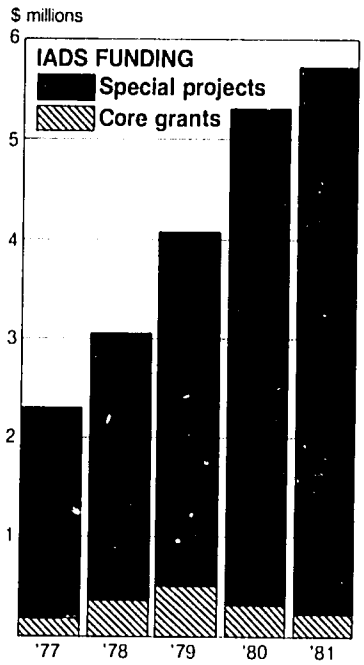
A. Hugo Manzano joined the Bangladesh project as farming systems specialist. He had held a comparable position with the integrated cereals project in Nepal.

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.

It is important for leaders of emerging nations and personnel of technical assistance organizations to be aware of the complexities of the development process to prevent excessive emphasis on a few of the components and neglect of the rest.

Removing a prefabricated concrete irrigation channel from the mold at a factory in India.



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 1981, the major sources of IADS funds were the following:

Contracts and service arrangements	
AARD (Indonesia)	$1,493,000
Department of Agriculture (Nepal)	1,229,000
Bangladesh Agricultural Research Council	635,000
Agriculture Inputs Corp. (Nepal)	421,000
INIAP (Ecuador)	404,000
CRIFC (Indonesia)	395,000
Government of Egypt	103,000
Bangladesh Agricultural Research Institute	46,000
U.S. Agency for International Development	33,000
ISNAR	18,000
World Bank-UNDP (Nepal)	13,000
Grants	
Rockefeller Foundation	770,000
CIMMYT	14,000
Other	
Interest income	244,000

Financial Statements

ARTHUR YOUNG

ARTHUR YOUNG & COMPANY
277 PARK AVENUE
NEW YORK, NEW YORK 10172

The Board of Trustees
International Agricultural
Development Service, Inc.

We have examined the accompanying balance sheet of International Agricultural Development Service, Inc. at December 31, 1981 and 1980 and the related statements of support and revenue, expenses and changes in fund balance and changes in financial position for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As more fully described in Note 3, International Agricultural Development Service, Inc. has material transactions with The Rockefeller Foundation.

In our opinion, the statements mentioned above present fairly the financial position of International Agricultural Development Service, Inc. at December 31, 1981 and 1980 and the results of operations, changes in fund balance and changes in financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis during the period.

Arthur Young & Company

March 23, 1982

BALANCE SHEET

December 31, 1981 and 1980

	1981	*1980*
ASSETS		
Cash (primarily interest bearing accounts)	$ 649,218	$ 797,298
Short-term securities, at cost, which approximates market	675,000	880,000
Accounts receivable including unbilled amounts	1,220,938	1,742,601
Advances	230,788	195,249
Office equipment and furniture, at depreciated cost	22,555	18,726
Total assets	$2,798,499	$3,633,874
LIABILITIES AND FUND BALANCE		
Accounts payable	$ 236,079	$ 201,145
Advances received on contracts	1,400,611	2,180,139
Deferred support—grants (Note 3)	491,195	675,193
Fund balance:		
Designated reserve	648,059	558,671
Undesignated	22,555	18,726
Total fund balance	670,614	577,397
Total liabilities and fund balance	$2,798,499	$3,633,874

See accompanying notes.

STATEMENT OF SUPPORT AND REVENUE, EXPENSES, AND CHANGES IN FUND BALANCE

Years ended December 31, 1981 and 1980

	1981	*1980*
SUPPORT AND REVENUE		
Contracts and service arrangements	$4,817,957	$4,516,112
Grants (Note 3)	783,998	733,363
Investment income	244,437	150,387
Other	5,775	12,158
Total support and revenue	5,852,167	5,412,020
EXPENSES		
Contracts and service arrangements	4,040,303	3,698,468
Non-contract programs and projects:		
Service to individual countries	30,991	190,644
Leadership development	62,737	150,833
Development-oriented literature	83,293	152,993
Liaison and interchange	187,657	130,151
	364,678	624,621
Program support:		
Country programs	511,643	444,023
Communication	118,758	82,269
	630,401	526,292
General administration	723,568	511,320
Total expenses	5,758,950	5,360,701
Excess of support and revenue over expenses	93,217	51,319
Fund balance at beginning of year	577,397	526,078
Fund balance at end of year	$ 670,614	$ 577,397

See accompanying notes.

STATEMENT OF CHANGES IN FINANCIAL POSITION

Years ended December 31, 1981 and 1980

	1981	*1980*
SOURCE OF FUNDS		
Excess of support and revenue over expenses	$ 93,217	$ 51,319
Add: Depreciation	3,678	2,928
Total from operations	96,895	54,247
Securities transactions:		
Proceeds of redemptions	7,580,000	4,517,981
Purchases	(7,375,000)	(4,547,981)
Decrease (increase) in securities	205,000	(30,000)
Decrease (increase) in accounts receivable	521,663	(755,690)
Increase in accounts payable	34,934	8,660
	858,492	(722,783)
APPLICATION OF FUNDS		
Decrease (increase) in advances received on contracts	779,528	(496,665)
Increase (decrease) in advances	35,539	(93,972)
Decrease (increase) in deferred support	183,998	(101,537)
Purchase of office equipment and furniture	7,507	3,459
	1,006,572	(688,715)
(Decrease) in cash	(148,080)	(34,068)
Cash balance at beginning of year	797,298	831,366
Cash balance at end of year	$ 649,218	$ 797,298

See accompanying notes.

NOTES TO FINANCIAL STATEMENTS

December 31, 1981 and 1980

1. Summary of accounting policies

Contract accounting

All contracts provide for reimbursement of costs incurred by the International Agricultural Development Service, Inc. (IADS) up to specific limits and include provision for overhead expenses or management fees. Revenue is recognized as related expenses are incurred. Accounts receivable includes $599,331 of unbilled costs under contracts in 1981 and $929,279 in 1980.

Advances received on contracts

Advances received on contracts are used to finance contract operations. These advances are to be used to offset billings at various stages of each contract. Three contracts require the maintenance of separate bank accounts for advance funds not immediately required for operations. Funds on deposit in these interest-bearing accounts totalled $272,378 at December 31, 1981 and $275,568 at December 31, 1980.

Recognition of grant support

Grant Awards are recorded as receivable and deferred support when formal notifications of such awards are received from grantors. Deferred support is recognized as revenue when program costs and administrative expenses supported by grant funds are incurred.

Designated reserve

The Board of Trustees has identified a portion of fund balance as a designated reserve. Interest income earned on this balance is added to the fund annually. The assets representing this reserve are available to meet temporary cash-flow needs and possible future obligations.

Office equipment and furniture

Office equipment and furniture are depreciated on the straight line basis over the estimated 10-year useful life of the assets.

2. Tax status

The Internal Revenue Service has ruled that IADS is exempt from U.S. federal income tax under Section 501(c)(3) of the Internal Revenue Code and that it will not be treated as a private foundation as defined in Section 509(a) of the Internal Revenue Code.

As a not-for-profit organization, IADS is also exempt from New York State and New York City income, sales, and occupancy taxes.

3. Grant support

During 1981 IADS was awarded grants amounting to $600,000 ($800,000 in 1980) by the Rockefeller Foundation for program and administrative expenses.

The Rockefeller Foundation 1981 grant plus deferred support of $649,362 from 1980 were available for use in 1981. Of these combined grants, $769,633 was spent or committed in 1981 leaving a balance of $479,729 unexpended at December 31, 1981. The Rockefeller Foundation has authorized the use of this amount in 1982; accordingly, it is shown as deferred support in the balance sheet.

Also available in 1981 were $25,831, the balance of a 1979 publication grant from Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT). Of the funds provided by CIMMYT, $14,365 was spent or committed in 1981, leaving $11,466 unexpended, which is available in future years and is shown as deferred support in the balance sheet.

The Rockefeller Foundation provides certain services (primarily personnel and office space) and makes other disbursements (travel, office, and miscellaneous expenses) on behalf of IADS. The foundation charged IADS $930,012 in 1981 and $896,855 in 1980 for these services and expenses. Amounts payable to the Rockefeller Foundation at December 31, 1981 and 1980 were $33,126 and $6,595, respectively.