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Global Research Wins a Cigar—Spelled CGIAR

By Dana G. Dalrymple

Whether there will be enough food in the future in the developing nations depends in part on what is accomplished in agricultural research. Yields must be increased if food production is to keep up with or preferably exceed population growth, and if food costs are to be kept down. An increase in yields requires new and improved agricultural technologies. The main source of these technologies is organized agricultural research.

As important as research is to providing enough food, it has long been relatively neglected in the developing nations. Through most of history, increases in food production were principally obtained by enlarging the cultivated area. But as population expanded, the relative availability of land fell. Increased production had to come, in the main, from greater yields—a much more difficult task.

While some agricultural research had been carried out in many developing nations since the turn of the century, most of it was sponsored by colonial powers and directed to export crops. Research on food crops for domestic consumption received comparatively little attention. This neglect largely continued until the middle of the 20th century. With the breakup of colonial empires, and population growth, greater attention was given to expanding domestic food production.

At first, many assistance officials thought all that was needed was to

transfer agricultural technology from developed nations. It was presumed the main need was for an organization to disseminate technology (an extension or outreach service). Experience soon demonstrated that this alone wouldn't work; technology developed for temperate zones was seldom usable in more tropical regions. Moreover, farm size, structure, and resources were quite different.

The only satisfactory answer was to devise agricultural technology specifically for the developing countries. This in turn meant establishing indigenous agricultural experiment/research stations. Scattered efforts to do so through the mid-1960's often had mixed results. Even where some excellent colleges of agriculture were developed, the research function played a relatively modest role. Few realized what it took to get a meaningful research program underway. Still, some promising beginnings were made, both at the national and international level.

Emergence of System

By the late 1960's, the various research activities began to bear fruit. They also began to coalesce into what was to become the framework of an international agricultural research system focused upon food needs of the developing nations.

There were three major components to this system:

- 1) international agricultural research centers (IARC's),
- 2) national research systems in



Agricultural research — a necessity to improved crop yields — has long been neglected in most developing countries.

developing nations, and
3) national systems in developed nations.

The IARC's were located in developing nations and usually served as the centerpiece of the system. They generated new and improved technology, drawing upon appropriate work elsewhere for use in the developing nations. While some of this technology could be used directly, generally it required further development and adaptation to local conditions. National research systems in developing nations were needed for this purpose. National systems in developed nations were a source of background information and more basic knowledge.

The three components of the system were, and are, bound together by informal agricultural research net-

works. These networks are often sponsored by the IARC's and in part may be an outgrowth of their international variety testing trials. They often center on commodities, but may be broader in orientation. An example is the spring wheat research network. The centers provide improved germplasm (varieties) for testing, and report on the results. From this activity, other information activities have been taken on such as publishing international newsletters, sponsoring conferences, and the like. The centers also organize training programs.

A significant result of the existence of the international system is that the research worker focusing on improving developing nation production is no longer alone. The workers can draw, as appropriate, upon a world-wide body of knowledge and collaborators. This can make their work much more efficient and productive. A synergistic effect is involved (the whole is greater than the sum of the parts).

13 Centers and Programs

The IARC's play a key role in this system. As of 1981, there were 13 international centers and programs sponsored by the Consultative Group on International Agricultural Research (CGIAR) and several other international centers outside of this group. Together, they cover nearly all the major food commodities and ecological zones in the developing world.

While a wide range of activities are represented by these centers and programs, they do share certain common characteristics. These relate principally to their international character: they are sponsored by a

International Agricultural Research Centers and Programs Sponsored by the CGIAR*, 1981

Center and Program	Location	Established
Center:		
International Rice Research Institute	Philippines	1960
International Maize and Wheat Improvement Center	Mexico	1966
International Institute of Tropical Agriculture	Nigeria	1967
International Center for Tropical Agriculture	Colombia	1968
International Potato Center	Peru	1972
International Crops Research Institute for the Semi-Arid Tropics	India	1972
International Center for Research in Animal Diseases	Kenya	1974
International Livestock Center for Africa	Ethiopia	1974
International Center for Agricultural Research in the Dry Areas (desert areas)	Lebanon, Syria	1976
International Food Policy Research Institute	United States	1975
Program:		
West African Rice Development Association	Liberia	1971
International Board for Plant Genetic Resources	Italy	1973
International Service for National Agricultural Research	Netherlands	1979

*Consultative Group on International Agricultural Research.

number of donors of different types from around the world, and they have an international board of directors plus an international staff.

Nearly all have international status in the country in which they are located (the International Food Policy Research Institute is, as of mid-1981,

an exception). And all have at least a regional, and generally an international, commitment to assist developing nations.

The CGIAR, an informal affiliation of donors of many types, is the principal sponsoring group. Its principal purpose is to stimulate and coordi-



USDA

Workers harvest rice at the International Rice Research Institute in the Philippines, one of the first centers established to generate new and improved technology.

nate funding, and provide general guidance for the IARC's under its aegis. CGIAR was established in 1971 under sponsorship of the World Bank, the United Nations Development Program, and the Food and Agriculture Organization of the United Nations (FAO). It is serviced by a secretariat at the World Bank in Washington, and by a Technical Advisory Committee whose secretariat is located at FAO in Rome. The group is quite informal in nature compared to other international organizations.

As of mid-1981, CGIAR had 33 donor members. These included the international assistance agencies of 20 countries (including 4 developing nations), 4 foundations, 3 international organizations, and 6 regional organizations. Total contributions for core (basic) activities in 1981 were nearly \$140 million. Several new donors are expected to join in 1982.

Donors individually decide which centers and programs they are to sponsor.

The United States, through the Agency for International Development (AID), was a charter member of CGIAR. It has followed a policy of providing about 25 percent of the total core contributions. While this practice has made AID the largest single donor, the U.S. ranks considerably lower in terms of per capita contributions; it has consistently ranked 10th among the 16 or 17 developed nations in recent years.

Besides these core contributions to the centers, AID and other donors also sponsor special research projects in individual developing nations through their bilateral programs. A number of other AID-sponsored research projects are also tied into the international centers in various ways.

What of other food commodities? Man does not live by irrigated wheat and rice alone. Improved technologies developed by the centers for other crops are now finding their way into testing and use. Most are, however, unlikely to equal the extraordinary initial impact of the high-yielding varieties of wheat and rice. This is partly because the research base for other crops is substantially less: very little research has, for instance, been done on cassava (a tropical plant with a fleshy edible root). Also, the potential range of adoption is less: corn varieties, for example, must be developed for specific ecological areas; other crops are planted on more limited areas. The task, therefore, is difficult and often frustrating. Yet a promising start has been made.

Although the clear focus of the international centers and the international research system is on the developing nations, some of their products may also benefit the developed countries. The United States, for example, is now raising substantial areas of semi-dwarf wheat and rice (roughly 31 percent of the wheat area in 1979 and 12 percent of the rice area in 1980). Some varieties were imported from the developing nations and used directly, some were the offspring of developing nation varieties, and virtually all share a common ancestry. As the world's leading user of agricultural technology, the U.S. benefits from an expanded involvement in the international research network.

Three centers which are not members of CGAIR have fairly close ties to it. AID helped establish the first

two (the Asian Vegetable Research and Development Center and the International Fertilizer Development Center) and is a significant contributor to each. It sponsors some projects at the third, the International Center for Insect Physiology and Ecology.

A few other regional research organizations also exist which have no particular ties to CGIAR. One of the most notable is CATIE (Centro Agronomico Tropical de Investigacion y Ensenanza) in Turrialba, Costa Rica.

Accomplishments

What has this comprehensive and imposing system contributed to the developing nations to date? The answer depends in part on the age and mandate of the individual centers. Roughly 10 years are needed to establish a center and get the initial research program underway to the point where improved technology is available for test in country programs. Another 5 years may be required for in-country adaptation and adoption. This is quite rapid compared to the history of most agricultural research systems in developed nations.

The two oldest centers, the International Rice Research Institute and the International Maize and Wheat Improvement Center, moved somewhat more rapidly than this general time pattern—partly because they were able to build on a significant research base and partly because their original technologies proved widely adaptable in their basic form.

The area planted to high-yielding wheat and rice varieties (principally semi-dwarf with short straw) developed by these centers and in related national programs is estimated



YOSEF HADAR, WORLD BANK

A Nigerian extension agent checks corn at the Gusau Demonstration Farm, a project financed by a loan from the World Bank.

to have grown from essentially zero acres in 1965/66 to about 135 million acres in the 1976/77 crop year. The latter figure represented slightly over a third of the total area planted to wheat and rice in the developing nations, an unparalleled rate of adoption.

Both the direct and indirect effects are significant. The higher yields made possible through adoption of these varieties and associated cultural practices, particularly increased fertilization, have resulted in an enormous contribution to increased food supplies in the developing nations. The supply increase has meant lower prices to consumers. There have also been important indirect contributions: the shorter growing season of these varieties, for example, has often made it possible to grow an additional crop each season—to carry out multiple cropping.

There have been, however, substantial gaps in the process. The original varieties were largely developed for irrigated conditions. Many important but ecologically less favored zones, such as those with more limited water supplies, often did not benefit. Greater attention is now

given to developing technologies for these regions and to better meet other needs.

Limitations of the System

The international agricultural research network is still relatively young. Both it and its components are still not fully developed, and have some limitations.

The IARC's are generally well organized, well housed, and well staffed. But they are of different ages and have quite different mandates. For these and other reasons, some have moved faster than others in getting organized and getting going. All but the International Center for Research in Animal Diseases are applied research organizations; they are not oriented to basic research. And at the applied end, they must rely on national systems for field testing and further development of the technologies they have generated.

Most developed countries (excluding Communist nations) both belong to CGIAR and have made efforts to increasingly tie their national systems into the international system. A variety of approaches have been

taken and the progress is somewhat uneven. It is an area where the United States could usefully give more attention, both to better help others and for our own benefit.

On the developing country end, a major problem is the limited stage of development of many national systems, especially in Africa. A number of assistance organizations, including the Agency for International Development and the World Bank, have given high priority to improving these systems, but there is a long way to go. And when the research system is established, there is often difficulty in obtaining sufficient funds for its effective operation (a problem also shared in some developed nations).

The importance of stimulating development of national systems has long been recognized by CGIAR, many of whose centers were called upon to assist national systems. The difficulty was to develop an appropriate approach. In the late 1970's, CGIAR established an International Service for National Agricultural Research; it is now becoming operative.

In a related development, the directors of research institutions in the developing nations have organized themselves into an International Federation of Agricultural Research Directors and may be expected to provide further impetus for developing national systems.

Challenges

On balance, a most promising international agricultural research system is emerging. The principal focus is on food crops in developing nations. The various components are somewhat unevenly developed as yet, and linkages among the various

components may be inadequate in some cases. But the significant fact is that the essential elements are in place. The principal need now is for adequate financial nourishment. With it, the system will be able to provide the technological basis for further expansion in food supplies.

Unfortunately, funding may be a problem in the near future. Besides the usual problems of obtaining adequate appropriations for research, inflation has created special difficulties. The costs of running agricultural research establishments, along with many other enterprises, has increased at a far faster rate than the availability of public funding. This is true of both the international centers and the national research stations. Until the supply and demand for funds come into better balance, research will stagnate or decline.

Agricultural research involves a fairly long lead time. If we are concerned about whether there will be enough food in the developing nations in the future, we must be concerned with the state of agricultural research in and for the developing nations. We must build today for tomorrow. Much has been accomplished in recent years, more than at any time in history. The challenge in the next few years will be to maintain and if possible enhance the momentum of the research system we have nearly in hand.

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