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Changing roles in world
agriculture

R. L. Sawyer

Director General
Centro Internacional de la Papa (CIP)
Apartado Postal 5969
Lima, Peru

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Contact Dr. G. William Wolfe, Department of Entomology and Economic Zoology, Cook College. Phone: 201-932-9459

CHANGING ROLES IN WORLD AGRICULTURE

Richard L. Sawyer

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During the past two decades, institutional capabilities for agricultural research and training in both developed and developing countries have changed considerably. A major portion of the backlog of basic research knowledge accumulated in developed countries has been exploited. A number of developing countries are now capable of solving their own production problems. And the system of centers sponsored by the Consultative Group for International Agricultural Research (CGIAR) has entered the scene.

Developed country, public institutions have had decreasing funds for agricultural research while at the same time private corporate funded agricultural research institutions have emerged. Developing countries have experienced a tremendous surge in funding for agriculture both from national budgets and from international agencies.

Both developed and developing countries have seen the CGIAR system utilizing funds which they felt might be better invested in their own institutions. Thus, competition for available funds has emerged. Plans must be developed which will clearly identify and utilize the comparative advantages of the various participants. Otherwise, major confrontations lie ahead, and the various excellent capabilities now available or emerging for agricultural research and development will be dissipated in conflicts over funds and responsibilities.

This paper discusses the changing roles of the three major groups of participants in world agricultural research: developed country, developing country and CGIAR institutions.

Developed Country Agricultural Institutions

Developed country institutions have long been the major producers of basic research on which practical and applied research institutions have depended for solving problems in agriculture. Universities with excellent facilities and professors with large numbers of graduate students producing theses, have provided the flow of basic research on which practical solutions depend.

During the past two decades, funding for agricultural research in public funded institutions has steadily decreased in real terms. Numbers of students interested in agricultural research careers have also decreased. The backlog of basic research knowledge has been reduced considerably through use by emerging developing country institutions and the CGIAR centers.

Numbers of developing country scientists being trained in developed countries have increased tremendously in recent decades, due to rising investments in human capital from both loan and national funds. Approximately half of the graduate students in United States universities presently are from developing countries.

Recently, the term biotechnology has become a new status symbol for research. Corporate funded institutions have emerged which are luring away excellent scientists from universities as agricultural research becomes a sound investment paying good dividends.

Where will these changes lead?

Developing Country Research

Two decades ago, few institutions in the developing world were capable of producing the quality research required for solution of their countries' production problems. Most solutions came from application of northern latitude research results to the needs of tropical climates. Foreign technical assistance records, however, are full of the failures of such applications.

Today a number of national programs in the developing world have excellent research facilities and staff. Many of these countries are solving their production problems and ready to help their less fortunate neighbors. How are such programs going to fit into a world agricultural research and development system?

Funds available for research, and agriculture in general, in developing countries have increased tremendously during the past ten years. Loans for research, extremely scarce in the past, is now a common part of loan packages for agriculture.

A number of countries have utilized large amounts of loan money for training abroad to develop the manpower needed in the institutions on which agricultural improvement depends. As scientists return, critical questions are being asked as to relevancy of their training for third world agricultural problems. In a few cases, linkages have been established, so that thesis research can be done on a developing country problem in a relevant climate while classroom training is in a developed country institution.

Most developing country scientists return to administrative or management positions. Rarely do they get to utilize their scientific training for more than a few months or years in "a hands-on" approach to solving problems. Yet most of them have no exposure to management training, and intensive short courses in executive management are usually unavailable in developing countries. The great need for management training is recognized by agricultural leaders in almost every developing country today. Where will they get this if it is not a part of their graduate training?

The CGIAR System of Centers

The CGIAR system of centers was created in the early 1970's to help with agricultural improvement in the developing world. Help was in two general areas: (1) research on relevant technologies for priority commodities, and (2) training of scientists and transfer of technologies associated with a centers' activities.

The centers were originally thought of as temporary, with their work to be eventually taken over by emerging national programs. Today the centers are considered a necessary component of global agricultural improvement for the foreseeable future. Although financed to help developing countries, much of their work is applicable to all countries.

The IARCs based their initial research on basic results available in developed countries. Today many centers have exhausted the supply of available basic research knowledge in a number of areas and have had to conduct more basic research of their own.

Most center programs tend to be the same as when the center was created. However, since the time centers were started a number of strong developing country programs have emerged which are capable of handling portions of the programs centers have been conducting.

When the CGIAR system started, there was little organized representation of developing country needs. Even today within the CGIAR system, developing country representation is often more token than real. However, developing countries are becoming organized and their ability to speak collectively with force on decisions influencing their programs is emerging rapidly. A genuine approach to involve them in a collegial way in the activities of each center and of the overall system must be realized soon.

The CGIAR system grew at a time when bilateral funding available for agricultural research and development programs for developing countries -- especially for the poorest of the poor nations was more than adequate. However, during the past five years many of the older centers have encountered funding problems and financing

for the system as a whole is not keeping pace with inflation and providing the funds necessary to finish the development of newer centers. Older centers continue to try to grow, and would probably mortgage whatever funding flexibility there is within the system if given the chance.

Looking Ahead

Eventually each of the three major producers of research must identify and concentrate their efforts on those components for which they have a long term comparative advantage. The Centers up until now have played an intermediary role addressing problems of developing countries and drawing on the agricultural research capabilities in developed nations. Now, the CGIAR centers are finding a permanent role for themselves in world agriculture and their role as middle men may need to change. Some of the things they have accumulated during the past 20 years may need to be handed over to emerging national programs in developing countries. Some basic research may need to be contracted with developed country institutions to be done in a more cost effective way than centers can. Centers might thus be moving back to addressing those components of world agriculture for which they will have a continuing comparative advantage. In this way, the system might find the funding necessary to address additional priority needs within present levels of funding.

Let me look ahead from a center's viewpoint, utilizing CIP as an example, and strategies we have in place to actively involve developed and developing countries with our program in a way which may be useful for planning ahead for world agriculture.

The International Potato Center is located in the center of origin of the potato. Less than 1% of the genetic variability held in CIP's collection has been utilized by potato breeders in the world up until now to create the varieties of today. CIP's major long term comparative advantage is to maintain, exploit, and distribute genetic material in the collection.

Until a sufficient number of national programs with potato breeding capabilities have emerged to develop their own varieties, CIP is distributing potential varieties from developed countries and also providing potential varieties from its own breeding and genetics program. CIP however, does not breed varieties but provides parental material with components of resistance to any country in the world desiring and capable of utilizing it.

A number of programs in the developed world have programs which can be tapped for some specific developing country needs faster and more cost effectively than can CIP. Utilizing core funds, CIP has contracted up-stream research with several universities

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in the United States, Canada, the Netherlands and elsewhere to exploit specific cultivated species and certain wild species for the needs of the developing world. In the process, these contracts are exploiting the material for their country or state needs.

CIP is unique in the CGIAR system in the utilization of core funds for research in the developed world. It might be more cost effective for other centers to contract some research needs with developed or developing country institutions where staff and facilities are already in place and thus maintain the center's flexibility for downstream research, transfer and training activities.

When CIP started, a large amount of the training activities were production oriented. During the past 10 years potato research capabilities have emerged and been strengthened in almost all regions of the world where potatoes are grown. Production training is now conducted by national scientists. Training by CIP scientists is confined to specialized courses on such subjects as tissue culture, virus research, biological control and population breeding.

CIP's contract and planning conference strategies for involving potato scientists around the world in potato improvement activities have been recognized as examples which might have a much wider application in agricultural development. These two strategies have built a network of potato scientists around the world working together in team approaches to solving major problems of potato production today. A brief summary of three CIP strategies which might be utilized in a global system are as follows:

1. Research contracts

Research contracts provide CIP with low-cost access to available scientific expertise and research facilities throughout the world. Contracts motivate researchers to work on priority problems of developing countries, and provide operating funds necessary to conduct needed research. Contracts allow CIP staff members to establish personal working relationships with leading scientists around the world, and permit flexibility for changing research priorities without incurring major changes in headquarters staff and facilities.

Research contracts provide operating funds for labor, expendable supplies, and travel, but not for salaries of scientific staff nor major equipment.

In the early years, contracts with breeding programs in

North America quickly gave CIP access to world class breeding programs and genetic material to distribute to developing countries. Over time, an increasing number of contracts are with developing country institutions. In 1983 CIP had 21 active research contracts with research institutions in nine developing countries and 14 contracts in seven developed countries.

2. Planning Conferences

Institutions and scientists from throughout the world participate in evaluating and planning through periodic planning conferences for each of CIP's priority research areas. To date, 273 scientists from 41 countries have participated in 27 planning conferences. The conferences, which review progress and recommend future research, have three functions:

- . Provide CIP with an objective external review and guidance by international experts.
- . Establish informal networks of scientists which function for years after the conference, providing a useful mechanism for exchange of research information.
- . Stimulate participating scientists to re-orient their own research to help solve key problems identified at the conference.

Distribution of Planning Conference proceedings helps familiarize scientists and policymakers in both developing and developed countries with CIP's principal research areas, progress to date, and future priorities.

3. Collaborative Research Networks

More recently increasing attention has been given to a new CIP strategy, called collaborative research networks.

Many developing countries cannot afford a comprehensive potato research program. For this reason, CIP fosters collaborative research networks in which country programs pool their resources to establish their own integrated research programs. CIP participates as a member in these networks but does not manage them. These are not to be confused with the "nursery networks" established by many international centers for evaluating germplasm.

In initial development of a collaborative network, country leaders assess capabilities of their own and other country research institutes for solving priority problems in the region. Projects are assigned within the network in accordance with each

country's needs, interests, and facilities. This type of network builds national program capabilities and a spirit of confidence and cooperation for mutual benefit. This strategy is particularly useful in small countries with few scientists and limited research facilities.

This type of cooperation makes it unnecessary for each country to mount an extensive potato research program, particularly where the crop is of secondary importance. For CIP the advantage is that for each problem area, CIP scientists can concentrate support in the country which has been assigned a leadership role. Subsequent diffusion of information through training and consultancies is the responsibility of the countries themselves.

Two factors are essential for success of this strategy:

(1) strong coordination, particularly through the formative years of the organization; and

(2) additional external funding to start individual research projects and finance regional activities beyond the scope of national budgets.

Following are some suggested roles that the three major elements involved in agricultural research in the world today should be working towards.

1. Developed Country Institutions

There will be a continuing need for advanced training of large numbers of developing country scientists as loan money is invested in human capital. Brazil and Indonesia are good examples of countries already doing this. These should be on developing country problems and an increasing larger number of professors in teaching and research institutions need to have first-hand understanding of development problems in the countries of their graduate students.

The flow of basic research information from developed country institutions -- on which developing countries and international centers have so long depended -- must be revitalized. Contracts from the CGIAR centers might help catalyze this process. A number of developed countries are setting up special funding programs to link research in their institutions to the basic needs of third world countries. Care should be taken that such programs are based on comparative advantages rather than political opportunities.

2. Developing Countries

Developing country institutions should be stimulated to develop as rapidly as possible the capacity to solve their own production problems. Funding should be made available so that more advanced programs can help their less fortunate neighbors through training, consultancies, and materials in a truly collegial relationship. Networks managed by national programs should be established for sharing information and responsibilities amongst groups of small or poor countries each of which cannot have a complete program for all of their important commodities.

Problems of population and food production will demand most of the available developing country funds and human capital for the foreseeable future. However, a few developing country institutions in each major region of the world must develop the ability to do up stream research and provide advanced degree training in certain disciplines of high priority to tropical agriculture. Direct linkages should be established between such institutions and key advanced training and research institutions in developed countries which have demonstrated a particular interest and ability to contribute to third -world agricultural development.

Developing country institutions should develop the collective capability to critically evaluate programs designed to help them. Their active and critical input in determining what is done for them and how it is to be accomplished is essential to their becoming full partners in a global network.

CGIAR Centers

Centers should quickly focus their programs on those things for which they will have a long term comparative advantage. Among these are:

1. Maintenance, exploitation and distribution of genetic resources for the commodities with which they are working.
2. Certain kinds of basic research which are essential to their particular programs or problems and unique to the agro-ecological growing conditions in which their crops are growing in developing countries.

For example, researching the ability to make wide crosses may be the responsibility of developed country institutions, while researching the practical application with the commodities of a Center could well be the Center's responsibility.

3. Maintaining networks of developing countries and/or involving both developing and developed countries for exchanges of information, materials, consultants and certain kinds of training.

Some centers would have to make major changes to conform to the above guidelines. Portions of present programs would need to be moved to institutions in both developed and developing world. All three elements in the world system for agricultural research system --developed country, developing country, and CGIAR institutions are needed. Reviews and plans based mainly on present needs of each institution are inadequate for the system which will be needed in the future. Planning based on long term comparative advantages must take place now to establish and keep a system vital and changing according to emerging needs and capabilities.

The CGIAR system of centers is utilizing a very small portion of the funds available for agricultural development in the world today. Yet it is playing a very vital role.

Some centers are providing some good examples for bringing the three major components in international agricultural research together in a coordinated way to address some of the priority problems of food production today and for the future.