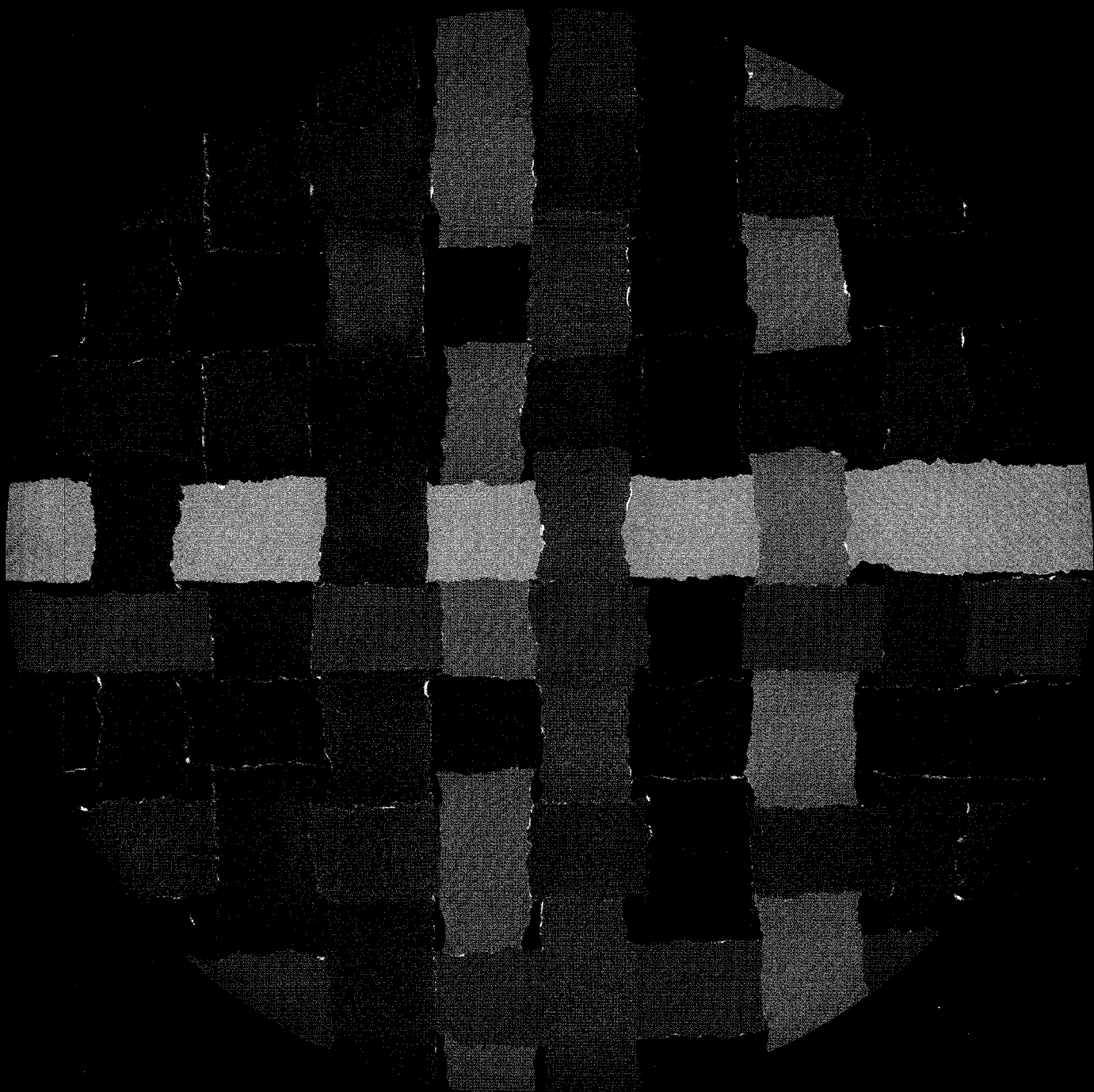
CGIAR ANNUAL REPORT 1992



Consultative Group on International Agricultural Research

Consultative Group on International Agricultural Research

CGIAR ANNUAL REPORT 1992

Published by the Consultative Group on International Agricultural Research, CGIAR Secretariat, 1818 H Street, N.W., Washington, DC 20433, United States. Telephone (1-202) 473-8951. Fax (1-202) 334-8750. September 1993. ISSN 0257-3156.

Introduction

While each of the centers in the CGIAR system publishes its own annual record of effort and achievement, this annual report compiled by the CGIAR Secretariat looks across the 18-center system as a whole.

Many events in the period under review took place against a background of change in the international economic and political environment, as well as within the CGIAR. The significance of some major changes is examined below.

Assumptions on which ODA programs were based through several "development decades" came under great pressure. The dynamics of development were questioned and sometimes transformed. Consequently, many traditional donors found it increasingly difficult to maintain their ODA contributions at expected levels. Donors were under pressure to support economic reform in Europe. They also faced domestic calls for belt-tightening and for priority attention to the problems at home. Some donors were said to be afflicted by "aid fatigue."

Despite the pressures, poverty alleviation—at home and abroad—was a constant, and remained an item of unfinished business on the development agenda. Poverty alleviation is, however, perceived as more complex than earlier understood, partly because of its interaction with a range of environmental considerations that did not previously feature in the development picture.

Some of these considerations had been woven together before in the report of the Brundtland Commission. Unlike its predecessors, the Pearson Commission and the Willy Brandt Commission, the Brundtland Commission took a new approach, arguing for *sustainable* development in which the imperatives of economic growth and of environmental protection should be harmonized. If this was not done, the Commission's report warned, growth would be irrevocably curtailed because the natural resources on which growth depends would have been damaged or destroyed.

In 1992, this approach received formal endorsement during planning for and at the United Nations Conference on the Environment and Development or UNCED, popularly known as the Earth Summit. The CGIAR was recognized at UNCED as an intergovernmental organization affiliated with the UN system, and was represented by a single delegation.

A major outcome of UNCED was Agenda 21, a program of action based on the environment/development linkage. Agenda 21 focused strongly on poverty alleviation, acknowledged the linkage that exists between agricultural productivity and environmental protection, and drew attention to the role of scientific research as a means of achieving UNCED's agreed objectives. The CGIAR therefore launched an exploration of how the system should respond to the challenge of integrating UNCED-related research with continuing programs at CGIAR centers.

Even before the adoption of Agenda 21 by the international community, the CGIAR had acknowledged the need to integrate growth with environmental protection. Consequently, increasing attention was paid at CGIAR centers to programs dealing with sustainable productivity, agricultural policy, capacity building, integrated pest management, and the conservation of genetic resources.

Integrating this range of emphases with other important considerations, the CGIAR adopted a comprehensive set of priorities arranged by activity, region, production sector, and commodity that will guide the evolution of the system's programs over the next decade. These priorities call for an increased deployment of resources on the conservation and management of natural resources including germplasm conservation and on socioeconomic, public policy, and public management research.

CGIAR

In its approach to poverty alleviation, the well-known and successful emphasis of the CGIAR on creating technology to increase the productivity of food crops is now matched by an equal emphasis on research that helps to protect the natural resources on which productivity depends.

These various strands are presented in the reports that follow. They include accounts of the substance of research in CGIAR centers, analysis of policy decisions, a retrospective of and a follow-up to UNCED, and a financial report. They demonstrate the CGIAR system's capacity to adapt its program and structure to changing needs, internationally and nationally, and to contribute to the goal of sustainable development.

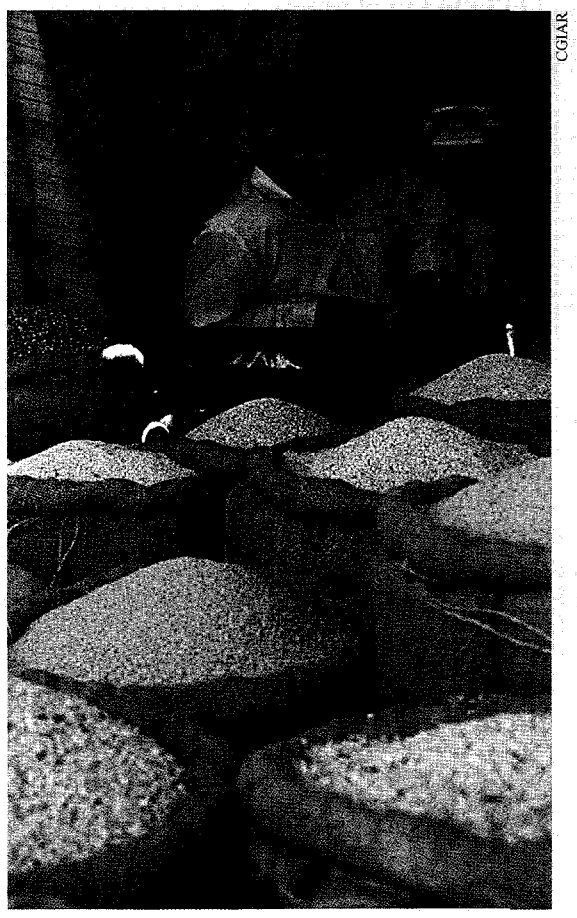
Alexander von der Osten
Executive Secretary

The Consultative Group on International Agricultural Research (CGIAR)

The Consultative Group on International Agricultural Research (CGIAR) is an informal association of 41 public and private sector donors that supports a network of 18 international agricultural research centers. The Group was established in 1971.

CGIAR centers have trained more than 45,000 agricultural scientists during the past 22 years. The types of training provided ranged from mid-level regional courses to post-doctoral programs at CGIAR centers. Many scientists from developing countries who were trained at CGIAR centers form the nucleus of and provide leadership to national agricultural research systems in their own countries.

The international centers supported by the CGIAR are part of a global agricultural research system. The CGIAR functions as a guarantor to developing countries, ensuring that international scientific capacity is brought to bear on the problems of the world's disadvantaged peoples.


CGIAR

Programs carried out by CGIAR-supported centers fall into six broad categories:

- **Productivity Research**
  Creating or adopting new technologies (such as the "dwarf" varieties of wheat and rice that brought about Asia's and Latin America's green revolution) to increase productivity on farmers' fields
- **Management of Natural Resources**
  Protecting and preserving the productivity of natural resources on which agriculture depends
- **Improving the Policy Environment**
  Assisting developing countries to formulate and carry out effective food, agriculture, and research policy
- **Institution Building**
  Strengthening national agricultural research systems in developing countries
- **Germplasm Conservation**
  Conserving germplasm and making it available to all regions and countries
- **Building Linkages**
  Helping to create or strengthen linkages between developing country institutions and other components of the global agricultural system

Food productivity in developing countries has increased through the combined efforts of the CGIAR centers and their associates in developing countries. The same efforts have brought about a range of other benefits, such as increased farm income, reduced prices of food, better food distribution systems, better nutrition, more rational policies, and stronger institutions.

CGIAR Centers

IRRI

International Rice Germplasm Center staff seal collected seeds in tin containers for long-term storage: cold-storage rooms will keep seeds viable for almost 100 years.

CIAT
Centro Internacional de Agricultura Tropical Apartado Aereo 6713, Cali, Colombia. Founded 1967. To contribute to the alleviation of hunger and poverty in tropical countries by applying science to the generation of technology that will lead to lasting increases in agricultural output while preserving the natural resource base. Research in germplasm development in beans, cassava, tropical forages, and rice for Latin America; and research in resource management in humid agro-ecosystems in tropical America: hillsides, forest margins, and savannas.

CIFOR
Center for International Forestry Research P.O. Box 161, Bogor 16001, Indonesia. Founded 1993. To promote the sustained well-being of people in developing countries, particularly in the tropics, through collaborative strategic and applied research in forest systems and forestry, and by promoting the adoption of improved technologies and management practices.

CIMMYT
Centro Internacional de Mejoramiento de Maiz y Trigo Lisboa 27, P.O. Box 6-641, Mexico 06600, D.F., Mexico. Founded 1966. To help the poor by increasing the productivity of resources committed to maize and wheat in developing countries while protecting the environment, through agricultural research and in concert with national research systems.

CIP
Centro Internacional de la Papa Apartado 5969, Lima, Peru. Founded 1970. To contribute to increased food production, the generation of sustainable and environmentally sensitive agricultural systems, and improved human welfare by conducting coordinated, multidisciplinary research programs on potato and sweetpotato, carrying out worldwide collaborative research and training, catalyzing collaboration among countries in solving common problems, and helping scientists worldwide to respond flexibly and successfully to changing demands in agriculture.

IBPGR
International Board for Plant Genetic Resources Via delle Sette Chiese 142, 00145 Rome, Italy. Founded 1974. To encourage, support, and engage in activities to strengthen the conservation and use of plant genetic resources worldwide, with special emphasis on developing countries, by undertaking research and training and by providing scientific and technical information.

ICARDA
International Center for Agricultural Research in the Dry Areas P.O. Box 5466, Aleppo, Syria. Founded 1975. To meet the challenge posed by a harsh, stressful, and variable environment in which the productivity of winter rainfed agricultural systems must be increased to higher sustainable levels; in which soil degradation must be arrested and, possibly, reversed; and in which water use efficiency and the quality of the fragile environment need to be ensured.

ICLARM
International Center for Living Aquatic Resources Management MC P.O. Box 2631, Makati Central Post Office, 0718 Makati, Manila, Philippines. Founded 1977. To improve production and management of aquatic resources for sustainable benefits of present and future generations of low-income users (producers and consumers) in developing countries through international research and related activities and in partnership with national agricultural research systems by improving the biological, socioeconomic, and institutional management mechanisms for sustainable use of aquatic resource systems, by devising and improving production systems that will provide increasing yet sustainable yields, and by strengthening national programs to ensure sustainable development of aquatic resources.


WARDA

ICRAF
International Centre for Research in Agroforestry P.O. Box 30677, Nairobi, Kenya. Founded 1977. To mitigate tropical deforestation, land depletion, and rural poverty through improved agroforestry systems.

ICRISAT
International Crops Research Institute for the Semi-Arid Tropics Patancheru P.O., Andhra Pradesh 502 324, India. Founded 1972. To conduct research leading to enhanced sustainable food production in the harsh conditions of the semi-arid tropics. ICRISAT's main crops (sorghum, finger millet, pearl millet, chickpea, pigeonpea, and groundnut) are not generally known in the world's more favorable agricultural regions, but they are vital to life for the one-sixth of the world's population that lives in the semi-arid tropics. ICRISAT research is conducted in partnership with the national agricultural systems. It encompasses the management of the region's limited natural resources to increase the productivity, stability, and sustainability of these and other crops.

IFPRI
International Food Policy Research Institute 1200 Seventeenth Street, N.W., Washington, DC 20036-3006, USA. Founded 1975. To focus on identifying and analyzing policies for meeting food needs of developing countries, particularly the poorer groups within those countries. Research covers ways to achieve sustainable food production and land use, improve food consumption and income levels of the poor, enhance the links between agriculture and other sectors of the economy, and improve trade and macroeconomic conditions.

IIMI
International Irrigation Management Institute P.O. Box 2075, Colombo, Sri Lanka. Founded 1984. To strengthen the development, dissemination, and adoption of lasting improvements in the performance of irrigated agriculture in developing countries.

IITA
International Institute of Tropical Agriculture
PMB 5320, Ibadan, Nigeria. Founded 1967. To contribute to sustainable and increasing food production in the humid and subhumid tropics and thereby to improve the well-being of low-income people by conducting international agricultural research and outreach activities in partnership with African national agricultural research systems, particularly on maize, cassava, cowpea, plantain, soybean, and yam.

ILCA
International Livestock Centre for Africa
P.O. Box 5689, Addis Ababa, Ethiopia. Founded 1974. To strengthen the ability of national agricultural research systems to conduct technical and policy research in livestock-related fields, to develop technical packages for increasing livestock production and the contribution of livestock to sustainable agricultural production and income, and to contribute to scientific knowledge in a way conducive to solutions to livestock production problems.

ILRAD
International Laboratory for Research on Animal Diseases P.O. Box 30709, Nairobi, Kenya. Founded 1973. To serve as a world center for research on ways and means of conquering, as quickly as possible, major animal diseases (trypanosomiasis and tick-borne diseases) that seriously limit livestock industries in Africa and in many other parts of the world.

INIBAP
International Network for the Improvement of Banana and Plantain Parc Scientifique Agropolis, Bat 7-Boulevard de la Lironde, 34980 Montferrier-sur-Lez, France. Founded 1984. To increase the productivity and stability of banana and plantain grown on smallholdings by initiating, encouraging, supporting, conducting, and coordinating research; by strengthening national and regional programs and facilitating the interchange of improved and disease-free genetic material; by coordinating and supporting the collection and exchange of documentation and information; and by coordinating and supporting training for researchers and technicians from developing countries.


IITA/Benson Fadare

Pollinating cowpea flower in Nigeria.

IRRI
International Rice Research Institute
P.O. Box 933, 1099 Manila, Philippines. Founded 1960. To improve the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes, by generating and disseminating rice-related knowledge and technology of short- and long-term environmental, social, and economic benefit and by helping to enhance national rice research.

ISNAR
International Service for National Agricultural Research P.O. Box 93375, 2509 AJ The Hague, The Netherlands. Founded 1979. To help developing countries bring about sustained improvements in the performance of their national agricultural research systems and organizations. ISNAR does this by supporting their efforts in institutional development, promoting appropriate policies and funding for agricultural research, developing or adapting improved research management techniques, and generating and disseminating relevant knowledge and information.

WARDA
West Africa Rice Development Association
01 B.P. 2551, Bouake 01, Côte d'Ivoire. Founded 1970. To conduct and promote research to improve the technical and economic options available to smallholder farm families in the upland/inland-swamp continuum, the Sahel, and the mangrove swamp environments by developing improved rice varieties and production methods, by reducing post-harvest losses, by assessing and increasing the acceptability and impact of new technology, and by investigating issues affecting technology adoption and analyzing national policy options.

The Year in Review

CGIAR

The year 1992 was a benchmark year for the CGIAR system, setting it firmly on a course of change. A set of priorities and strategies was endorsed that reflects a new long-term vision for the system and new approaches to doing business. The CGIAR, which broadened its mandate to encompass more agricultural commodities and both fisheries and forestry, including the creation of a new international forestry center, completed its expansion from 13 to 18 international centers. Driving these changes is the Group's determination to focus the international centers squarely on finding environmentally sound solutions to the problem of producing more food for the planet's growing human family. The CGIAR reaffirmed this strategic commitment through its involvement in the Earth Summit (see page 24).

Yet official development assistance (ODA) for agriculture continues to shrink, even as the task of agricultural scientists is made more complex, with added overlays of concern for natural resource conservation, family welfare, equity, including gender equity, and improved utilization of agricultural, forestry, and fishery products.

From 1986–87 to 1990, the share of agriculture in overseas development assistance fell from 12.1 percent to 7.5 percent. The share in ODA flows for international agricultural research, which was 0.63 percent in 1986, dropped to 0.54 percent in 1990 and 0.50 percent in 1991.

Thus, the implications of current and projected constraints in ODA were a recurring theme during the year. Since 1991, grants to the CGIAR have declined. The present assessment is for a further contraction in 1993 and onward. This is partly the result of an economic climate characterized by volatile exchange rates, rising numbers of claimants for development aid, and public demands for reducing government spending. The latter, at a national level, has led to reduced public funding of research programs. Internationally, many aid-supported

The annual report for 1991 included highlights of the impact of research conducted by the CGIAR centers that made presentations at International Centers Week. The work of the remaining centers—other than CIFOR, which had not been established in 1992—is covered in this report.

ICRISAT: Finding the Best Millet for Rajasthan and Beyond

The area of pearl millet sown to three ICRISAT-derived cultivars in India is estimated at around 3.5 million hectares, or about one-third of the total. These cultivars have resistance to downy mildew disease. Conservative estimates indicate that the use of these cultivars results in more than US$54 million worth of extra food each year.

One of these cultivars also has been released by Zambia, and another by Namibia, where it is called Okashana 1. In the devastating drought in southern Africa of 1991–92, Okashana 1 produced twice as much per hectare as did local varieties. The additional grain contributed US$250,000 to the national economy, and improved basic food security in northern Namibia.

However, these improved varieties of pearl millet do not thrive everywhere in the semi-arid tropics. For some areas they are too late-maturing, or too susceptible to heat at the seedling stage, or do not produce the type of fodder the farmers need. For example, the hot, dry millet-growing areas of Rajasthan are similar to those found in large parts of the millet-growing areas of Sub-Saharan Africa, where stress levels are high, yield levels are very low, and crop-livestock interactions are crucial to farming systems. In these situations, local millet landraces can out-yield released cultivars.

ICRISAT breeders are developing varieties tailored to these stress conditions. Scientists at research stations in Rajasthan and neighboring areas have now joined ICRISAT in collaborative variety development projects, using crosses of local materials with improved breeding stocks of African origin. These efforts have had rapid success. Rajasthan authorities have released a variety, RCB-IC 9, and a hybrid, RHB 30; others are well on their way to farmers' fields. Farmers have been encouraged to experiment with new varieties in their own fields, and their experiences and reactions are fed back into the breeding program.

Initial results indicate that low soil fertility is the most important overall constraint to production, and that poor farmers, especially women, have strong preferences for early-maturing varieties. Having sufficient food to subsist is more important than providing livestock fodder. In western Rajasthan, where heat and drought are particularly severe, seedling establishment is more important than in less extreme environments. Breeding materials identified in this study are being used to map the genes for heat tolerance in collaborative research with a laboratory in the United Kingdom.

Farmers and government and nongovernment organizations are active collaborators in the project and are directly involved in the formulation of new priorities for study, and in the development and exchange of technology. In this way, impact is immediately identified and extended, and policy adjustments are possible.

Pearl millet is the staple food of large numbers of people in some of the most unfavorable environments of the semi-arid tropics. This work is demonstrating that new varieties can be tailored to specific environmental niches and to farmer preferences in these marginal areas. The innovative methodologies involved in this work are likely to result in increased relevance and adaptability of research results in a wide range of agricultural practices.

ICRISAT

Women farmers selecting the pearl millet types they prefer from collaborative breeding trials in Rajasthan.

IFPRI: Meeting Tomorrow's Food, Poverty, and Environmental Challenges

Much of IFPRI's work since 1975 has focused on policies to promote technological change, increase food production, and ensure that the poor benefit from agricultural growth. IFPRI's work on helping to create the right policy environment for equitable agricultural growth has been widely accepted as an important complement to the technology development work of other CGIAR centers.

The same challenges are relevant for the future, given a projected doubling of developing country food needs by 2030. But as policymakers in developing countries continue to center their attention on agricultural development as a way to stimulate economic growth and reduce poverty, they are now faced with a third urgent issue—protecting the natural resource base. In many agroecological systems, the demands on this resource base arising from population growth, poverty, and increased urban competition have reached the point where resources are being degraded and further increases in agricultural production and improved rural livelihoods will be difficult to achieve without resolving natural resource management issues. This is not just a problem in low-potential agricultural regions, it has also become an important constraint for some of the best irrigated lands.

IFPRI has created a research division to address this new challenge and to better integrate IFPRI's work on increasing food production with concerns about the sustainable management of natural resources. Director General Per Pinstrup-Andersen notes that "Over the next five years, IFPRI will put a major emphasis on understanding the relationship between natural resource management and technological change." This approach calls for the development of technologies that meet the goals of agricultural and economic growth and sustainability, and policies that encourage farmers to use these technologies.

IFPRI's initial focus is on developing conceptual and analytical approaches for analyzing, on a systems basis, the technical, institutional, and policy issues that affect the natural resource management decisions of farmers and rural communities, and then testing these approaches through a small number of in-depth case studies of important ecosystems. Testing alternative approaches to data collection and analysis will be particularly important in order to identify relatively quick and low-cost ways of conducting this kind of natural resource management research. The choice of ecosystems and country sites will be based primarily on their importance to the CGIAR system and the poor and on the scope for close collaboration with other CGIAR and

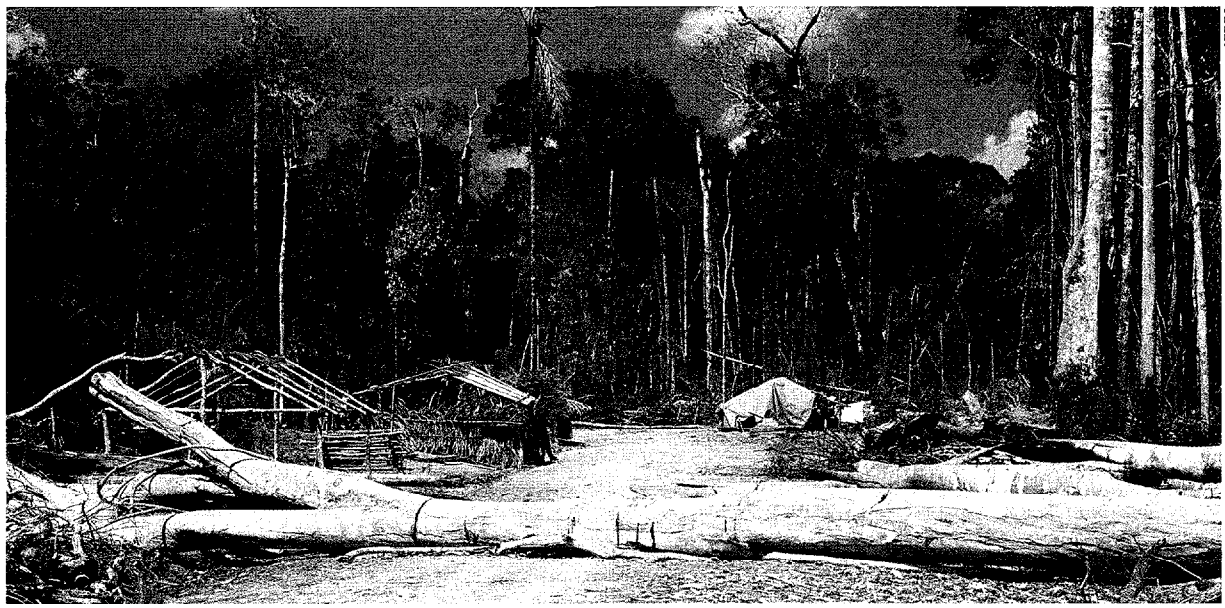
programs are faced with greater uncertainties regarding their funding levels. The CGIAR, as a publicly funded institution, is no exception.

"The CGIAR has to face up to this dilemma," CGIAR Chairman V. Rajagopalan noted in his remarks to assembled representatives of the CGIAR system at their annual meeting (International Centers Week) in October. "We must persuade the international community that continued support for the system should not diminish. To achieve this, we need to ensure that the system remains dynamic, ready to change and evolve as it confronts new challenges."

Although 1992 culminates four years of intensive review and redefinition of policies, the system, in fact, stands on the threshold of even more radical change, as the international centers adapt their individual programs to integrate environmental protection effectively with increased productivity in a climate of financial stringency.

Defining Challenges: Poverty, Environmental Deterioration, and Population Growth

At International Centers Week (ICW92), Don Winkelmann, CIMMYT's director general, summed up the CGIAR's immense task. "Pov-



Farmers and other users of natural resources do not always bear the full costs of their actions. Because they do not own the land or have upstream access to water, they find it profitable to pursue practices that degrade resources, even though this degradation is clearly not in the interest of the community or the nation. These incentive problems are not overcome by technology research alone, but require that the underlying social and institutional problems be redressed.

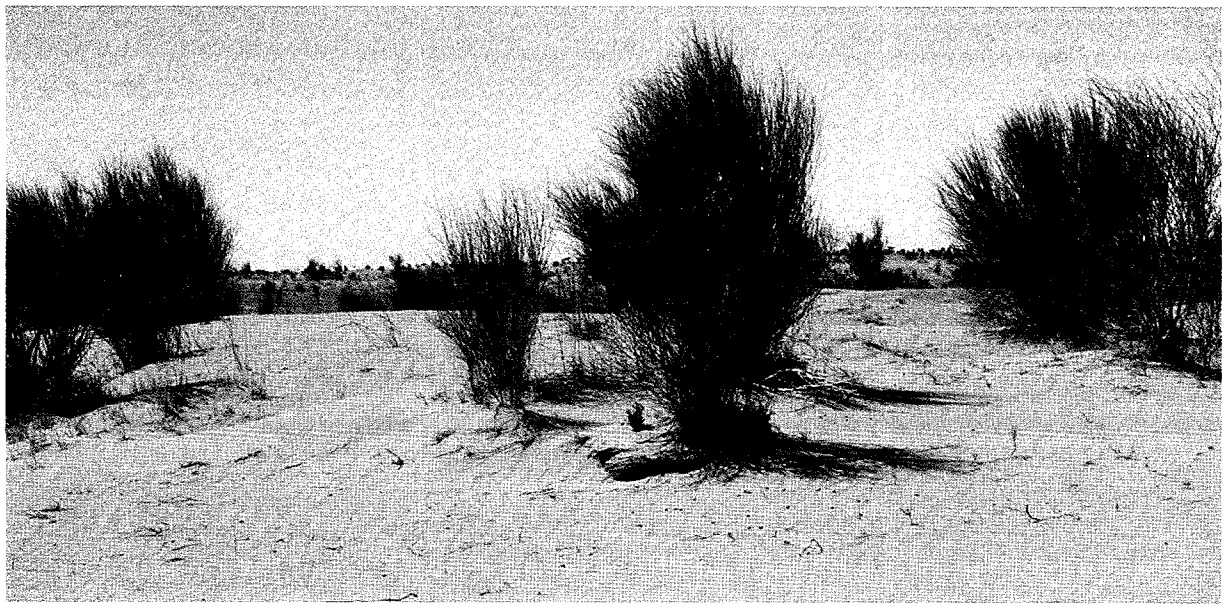
national centers and nongovernmental organizations. IFPRI will also work with a large number of other institutions to develop research methods, to encourage the replication of similar studies, and to exploit synergies in parallel work to obtain broader and more powerful generalizations for policies. Working closely with national research institutions in developing countries and linking them with multidisciplinary teams and research networks will add an important component of institution building to the research.

Through its collaborative research with other centers, IFPRI has begun to identify research priorities for forestry and agroforestry policy, sustainable intensification on fragile rainfed lands, environmental degradation and agricultural productivity in irrigated areas, and property rights and communal action.

erty, environmental deterioration, and population increases are the defining problems of our day," he observed, "with poverty being the pivotal dimension." Poverty is toxic to the environment in that the poor press on fragile lands and forest margins to produce food. Poverty also influences population growth. For poor families, more children still represent additional labor and income security. Population growth, in turn, places ever greater demands on natural resources.

Poverty is also closely associated with famine and food insecurity, as was grimly apparent in Africa's recent famines.

Yet famine in Africa is largely "manmade." It is preventable. These conclusions emerge from a four-year study of famine in Ethiopia and Sudan led by Joachim von Braun, director of IFPRI's Food Consumption and Nutrition Division. In his report, "A Policy Agenda for Famine Prevention in Africa," von Braun suggested that famine results from a complex set of circumstances that erode the capacity of poor households to cope with short-term shocks to the local economy. He further maintained that the inability of these African nations to produce their own food or purchase it has been a major cause of famine, and pointed out that



IIMI/UNEP Photo

long-term solutions for famine prevention in Africa must be tied to agricultural growth and political stability.

Decisions on Priorities, Strategies, And Resources

The CGIAR centers play a central role in contributing toward poverty alleviation by developing technologies that help farm families achieve sustainable food increases on both favorable and less well-endowed lands. To address this challenge even more effectively in the future, members of the Group endorsed a comprehensive set of priorities arranged by region, activity, production sector, and commodity that will guide the evolution of the system's programs over the next decades. The purpose of these priorities, recommended by the Technical Advisory Committee (TAC) of the CGIAR, is to ensure that the policies and operations of the CGIAR system strengthen the connections between productivity research and natural resource management research.

Regions. Rapid population growth rates coupled with declining per capita food production in Sub-Saharan Africa make a compelling case for more long-term strategic and applied research in that region. The fragility of its tropical agroecologies and the slow rate of progress in productivity improvement to date add to the apparent urgency. On the other hand, the sheer population numbers, the narrowing yield gap, and the limited scope for land expansion all argue strongly for a shift in emphasis to Asia. As recommended by TAC, distribution of resources is expected to shift to 40 percent for Africa and 31 percent for Asia by 1998.

Activities. Commodity improvement through germplasm enhancement and breeding, in which the CGIAR has a well-established comparative advantage, will remain a key research activity. However, there will be more emphasis on both the conservation and management of natural resources, reflecting concern for the additional pressure that producing more food will put on the natural resource base. Socioeconomic and public policy research also stand to gain, with research focusing on land use, sustainability, poverty alleviation, and self-reliance in food.

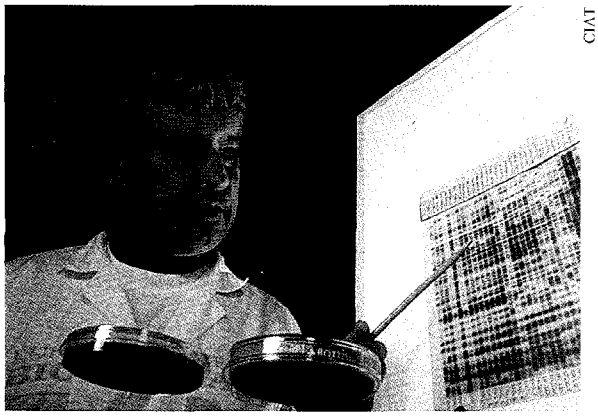
Agroecologies. TAC recommended an emphasis on tropical agroecological zones and the cool subtropics.

Production Sectors. TAC's study indicated that the magnitude of value of production is greatest in agriculture, followed by forestry, then fisheries. However, initiatives in forestry and fisheries should not occur at the expense of agricultural research.

Commodities. In a detailed analysis of priorities for commodities encompassed by the CGIAR, TAC recommended increased emphasis on roots and tubers, oil crops, vegetables, bananas and plantains, and forestry initiatives.

CIAT: Pest Management Strategies

Blast, the world's most widespread disease of rice, is being pinned down by scientists at CIAT and Purdue University. The fungal disease, spread by wind-blown spores, can be controlled by breeding genetic resistance into rice.



CIAT

"Genetic fingerprints" of the blast fungus are the key to controlling the most widespread and damaging disease of rice without costly and environmentally damaging pesticides. By identifying which genes are resistant to which fungal families, this technique enables scientists to breed rice with long-term resistance. Dr. Fernando Correa, CIAT rice pathologist, examines a genetic fingerprint.

But the fungus adapts quickly, within two to three years, to overcome the resistance. Thus, farmers are often forced to control the disease by adjusting farming practices and using costly and dangerous fungicides.

Thanks to an advanced scientific technique known as "DNA fingerprinting," scientists are now understanding how the fungus overcomes every new resistant rice. The fungal population is grouped into numerous families; 14 have so far been found in Colombia. Certain families attack only certain varieties of rice. In turn, specific rices resist only certain fungal families. Once scientists identify which rice genes are resistant to which fungal families, they can breed those genes into appropriate varieties and so develop truly resistant rices.

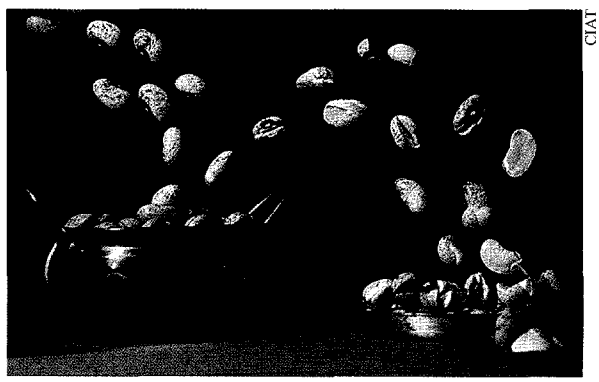
An "atlas" of fungal families found in different regions of the world is now being developed by Purdue University, in collaboration with CIAT and IRRI. The Rockefeller Foundation is sponsoring the research.

Genes from a wild, primitive bean vine, whose tiny seeds were collected in the mountains of Mexico 20 years ago, now offer non-chemical control of the Mexican bean weevil. The pest chews through 25 percent of stored beans in Africa and 15 percent in Latin America. Until recently, pesticides were the only way to protect beans.

Breeding genetic resistance into crops is the cheapest and safest way to control pests, but CIAT scientists, led by Cesar Cardona, entomologist, failed to find weevil resistance among 10,000 cultivated bean types. So they tried wild beans. Triumphant, they watched weevil colonies die out on the seeds of the wild bean vine.

The wild bean's genes for resistance were bred into more than 160 experimental bean lines by CIAT breeder, Julia Kornegay. The resistance has proved stable across Africa and Latin America, and can help 300 million people—among the world's poorest—store beans without pesticide protection, and save millions of dollars annually.

"Wild plants must be collected and securely conserved if we are to develop environmentally safe agriculture," says Masaru Iwanaga, former head of CIAT's Genetic Resources Unit.



CIAT

Ñuñas, or "popping beans," are considered one of the lost crops of the Andes. Prepared like popcorn, this ancient crop is proven for its nutritional value, yet remains almost unknown, unappreciated, and unimproved by modern society.

ILRAD: Efficient Control of Diseases That Constrain Livestock Production

Maintaining good livestock productivity requires accurate and sensitive identification of the agents of livestock diseases. This is equally important for overtly unhealthy animals as well as for animals that may harbor parasitic infection at very low levels, and thus can serve as a reservoir for infection of the herd. Since its inception, ILRAD has continued to develop diagnostic tests for the agents of the vector-borne diseases of livestock—trypanosomiasis and theileriosis.

In the case of trypanosomiasis, direct microscopic examination of blood from a single animal (or after concentration by centrifugation) can detect at best, and after a lot of searching, about 100 trypanosomes per milliliter of blood. ILRAD scientists developed improved monoclonal antibody tests that could detect protein components of disintegrated trypanosomes circulating in the blood of the animal, even when trypanosome parasites could not be detected microscopically. These tests also had the advantage of discriminating among the major groups of pathogenic trypanosomes and allowed many samples to be analyzed simultaneously. ILRAD has validated these tests in conjunction with the International Atomic Energy Agency and selected national tsetse and trypanosomiasis programs in Africa. Further, with staff of laboratories in Asia and Latin America, the tests have proved useful in identifying the major disease-causing trypanosomes found in these regions.

Recently, more refined tests based on the detection of DNA from these parasites have been developed. These tests, in which parasite DNA is recognized by specific sequences of DNA labeled with a marker, or parts of the parasite DNA are multiplied (by the polymerase chain reaction) to produce telltale fingerprints of the different parasites, have reached astonishing levels in discrimination and sensitivity.

Experimentally, amounts of DNA equivalent to that of a single *Trypanosoma congolese* parasite can be specifically detected in a millionfold excess of bovine DNA. These techniques have demonstrated the existence of parasites in smallholder cattle suspected but not otherwise proved to be infected, and can detect the small numbers of trypanosomes in the tsetse fly vectors. These DNA-based assays help define much more pre-

Strategy. The CGIAR's strategy to implement its priorities will involve research of both a global and ecoregional nature. Its global program will concentrate on strategic research on wheat, rice, maize, sorghum, millet, bean, cassava, potato, and sweetpotato, together with fisheries and livestock.

Ecoregional activities will cover strategic and applied research on natural resource management, production systems, and location-specific aspects of commodity improvement in regionally defined agroecological zones.

Resources Allocation

Although the CGIAR's new plan sets goals for 2010, 1998 was selected as the date to establish achievable targets in the medium term. Using 1991 as a base year, TAC assumed no real growth in funding for long-standing activities and some real growth for new activities, particularly forestry and fisheries. This amounted to US$270 million in 1992 values. After translation of relative priorities by activity, production sector, region, and commodity into resource allocation targets at the system level, core resource envelopes were proposed for each center. Centers were requested to develop medium-term plans for the period 1994–1998 based on this expectation of funding.

In the Group's discussion of its new long-term goals, many donors cautioned the system against attempting to do too much, and expecting the centers to do more in net terms while cutting their budgets or holding them constant in real terms. It was agreed that the CGIAR

cisely the existence, causation, and dynamics of livestock trypanosomiasis in different epidemiological settings. They will also allow the accurate assessment of the success and cost effectiveness of particular tsetse and trypanosomiasis control measures in appropriate environmental contexts. To help make these tests available to national control programs, ILRAD scientists have used available chemiluminescent detection procedures, which have proved much quicker, simpler, and less hazardous or costly than use of radioactive chemical development procedures.

ILRAD/David Elsworth

An ILRAD technologist examining DNA sequences for the sensitive identification of trypanosome parasites of cattle.

Similarly sensitive DNA-based tests have been developed for the detection of *Theileria parva* organisms, which cause virulent East Coast fever in cattle. Such tests can be used for the detection of persistent organisms in animals immunized by currently practiced live vaccine procedures for East Coast fever.

Thus, while pursuing research on new methods for the control of livestock diseases, ILRAD's animal disease programs continue to make use of modern technologies to refine tools required both for research and for national livestock disease control programs. The tests will help develop better information and choice in establishing control strategies appropriate to improved livestock health and productivity in particular regions or environments.

should not seek to accomplish more than what its resources and its critical mass of expertise permit, and that rigorous scientific evaluation should be the basis for selecting activities. The CGIAR must remain flexible and open to different approaches.

Review of Livestock Activities

At ICW92, TAC submitted a paper, "Strategies for Livestock Research in the CGIAR," which considered the findings of the external program reviews of ILCA and ILRAD and a livestock study by Winrock International. Summarizing TAC's recommendations, TAC Chairman Alex McCalla noted that almost 20 percent of overall funding and 26 percent of commodity research in the CGIAR is allocated to livestock research. This appears reasonable, given the importance of livestock in developing countries, the demand and supply of livestock products, and the strategic direction the livestock economy is expected to take in the next 25 years.

McCalla suggested that the CGIAR should remain focused on improving productivity of ruminants, particularly cattle, sheep, and goats. TAC also recommended some redistribution of resources from livestock research focused on Africa to a more global program, with primary attention to highland and subhumid zones.

On a global basis, epidemiology and control of animal diseases, genetic research on indigenous breed improvement, particularly disease tolerance, and strategic research on nutrition physiology warrant priority attention. At the ecoregional level, improvement of integrated

INIBAP: Worldwide Importance of Banana and Plantain

Banana and plantain are important staple foods that are critical to the nutritious and economic well-being of millions of people throughout the developing world. They are grown in some 120 countries, the great bulk of them being produced in gardens or backyard-type plots and on small farms.

These crops are useful to small farmers in developing countries. They can be grown in a range of environments: with medium to high rainfall, both upland and lowland, in intercropping systems, and in mixed farming with livestock.

INIBAP's general achievements in 1992 include: facilitating the conservation and dissemination of genetic material; helping to better define research priorities; participating in institution building; contributing to the improvement of the effectiveness of research by permitting wider and easier access to research information; helping to stimulate increased research productivity; and increasing the research capacity of national agricultural research systems (NARS) through the provision of information and training. Several significant achievements include:

• For the first time in more than 45 years of research, successful *Musa* hybrids were produced and accepted for release to producers. Three hybrids, after testing in the preparatory phase of INIBAP's International *Musa* Testing Pro-

INIBAP/David Jones

Rosa Kambuou, curator of the Papua New Guinea Biological Foundation banana and plant collection at Laloki, beside a Banksia *diploid cultivar.*

crop-livestock production systems, particularly development of feed resources, policy issues, and efficient and sustainable management of natural resources, rank high. A working group of seven donor members was set up to further clarify strategic issues and explore institutional options raised in TAC's paper. The working group will report in 1993 when decisions will be made on the livestock priorities and research.

Forestry

During the year, excellent progress was made in establishing the Center for International Forestry Research (CIFOR). Bo Bengtsson of Sweden was appointed chairman of the board of trustees, and Indonesia was selected as the host country. At ICW92, Bengtsson reported that an international board of trustees was in place and in the process of recruiting a director general. The board also drafted a budget and plan of work for 1993.

Initially the center will concentrate on the following areas: forest policy, the biological basis for better conservation and management, techniques for improved conservation and management, utilization of forest resources, information, education, and training. CIFOR's organizational model is a center with a modest management structure and decentralized style of operation, working in close collaboration with existing research institutions. The implementing agency, the Australian Centre for International Agricultural Research (ACIAR), was

gram (IMTP), were cleared for release as resistant to the virulent black Sigatoka disease. Other sites were selected for testing resistance to, or tolerance of, black Sigatoka and *Fusarium* wilt, another widespread devastating disease. Improved germplasm for the IMTP will come from six different breeding programs.

• With 1,032 banana and plantain accessions, the collection of INIBAP's International *Musa* Germplasm Transit Center (ITC) in Leuven, Belgium, became the world's largest *in vitro* collection of *Musa* germplasm.

• INIBAP established a full-time Crop Protection Research Program that began concentrating its efforts on the major disease problems of Sigatoka leafspot, *Fusarium* wilt, and banana bunchy top; other diseases and major pests in the program will include banana nematodes, banana weevil borer, banana bract mosaic virus, and the bacterial diseases (Moko, blood disease, and bugtok).

• INIBAP completed the first phase of the establishment of a trilingual (English, French, and Spanish) information and documentation service (Info/Doc). Info/Doc includes a bibliographic database; a database on researchers, research-in-progress, and research institutions; a question-and-answer service; a bibliographic abstracts journal; a listing of publications; and training of researchers and information personnel database. Also, the first global directory of researchers working on banana and plantain was published in three languages with the assistance of Unión de Países Exportadores de Banano (Panama) and the support of the International Development Research Centre (Canada).

• The first workshop on Biotechnology for Banana and Plantain was held in San José, Costa Rica, in January 1992 with 64 participants from both public and private sectors.

• Other networking achievements include testing of a "Prata" tetraploid banana, produced by the breeding program of Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA) in Brazil; further multiplication of an African cultivar, with high yield precocity at high altitude, for on-farm trials; the taxonomic characterization of the IBPGR Papua New Guinea banana germplasm collection in collaboration with the Queensland Department of Primary Industries (Australia); and sponsorship of a tissue culture course on banana and plantain, where 20 participants from 13 LAC countries were trained in micropropagation, cryopreservation, cell suspension, and principles of molecular and cell biology.

commended for its role in setting up CIFOR. Australia, Canada, Sweden, Switzerland, and the United States agreed to sponsor CIFOR, a procedure required by law for the establishment of a new international center.

Improving Developing Country Representation

Several events during the year reflected efforts to improve the way in which the CGIAR accommodates the views of developing countries. A working group examined the linkage between the CGIAR's regional representatives and national programs in the regions they represent. A donor survey conducted by the working group revealed that a high proportion of donors is convinced that a stronger effort should be made to engage national programs in consultations and to bring views emerging from these consultations to CGIAR meetings.

On the basis of the working group's report, it was agreed that regional representatives will continue to be selected through conferences of the United Nations Food and Agriculture Organization (FAO) and that together with FAO, the CGIAR Secretariat will work with national agricultural research systems (NARS) on strengthening their role in identifying candidates for regional representatives. Regional representatives should also attend yearly meetings of directors of NARS, thereby providing a link between NARS constituencies and the decision-making process of the CGIAR.

ICLARM: Entry into the CGIAR

The International Center for Living Aquatic Resources Management (ICLARM) joined the CGIAR in May. Given the requirements for joining the Group, the center was in the midst of intensive planning work during the year. A Strategic Plan was finalized in March, and following admission to the CGIAR, Mid-Term Planning occupied the latter half of the year. ICLARM's 1992 research program titles reflect its pre-CGIAR foci: Coastal Area Management, Capture Fisheries Management, and Aquaculture.

The Coastal Area Management Program came to a climax in 1992 with publication of coastal management plans by the six countries involved in the program's main project—the coordinating role of the ASEAN Coastal Resources Management Project. Some of the plans have already been accepted by the respective national governments and have become part of their national planning.

In capture fisheries management, development of tools for fisheries managers continued. Fishbase, the electronic encyclopedia of fish being developed by ICLARM, FAO, and collaborators, reached a milestone with distribution of the first version of this software. When finalized, this product will replace many textbooks and will be used in fisheries and other institutions worldwide. A second version of Ecopath II, a software tool already widely used worldwide to describe trophic flows through ecosystems, was released and distributed. Finally, the prominence of the social sciences in ICLARM's fisheries research was reestablished during 1992, with new studies in economics, bioeconomic modeling, and comanagement (management shared between government and communities) of fisheries.

In aquaculture, ICLARM completed its role as aquaculture research partner in a major USAID/Bangladesh agricultural project. New small-scale aquaculture enterprises were adopted by thousands of resource-poor farmers. The "super" tilapia, a new purebred tropical fish strain, became a reality when growth trials of the new strain across a wide range of environments showed 60 percent better growth than other available strains. Distribution to farmers

In June, the directors general of 15 centers and the leaders of 46 NARS in Africa met for two days to discuss how to strengthen collaboration among their institutions in both productivity and environmentally related issues. Initial emphasis will be on pooling resources and enhanced cooperation in biotechnology, information management, and ecoregional research.

To allow for more substantive discussion of problems in regions where the international centers are working, the opening day of ICW92 was devoted to three simultaneous panel sessions examining the needs and means for international agricultural research in African semi-arid tropics, Asian humid tropics, and Latin American humid tropics. Presentations by five expert panelists were followed by in-depth discussions.

Five current trends reinforce the need for more effective representation by NARS in the CGIAR, making these various initiatives especially timely and relevant:

- The increased regional emphasis in the way the CGIAR sets its priorities;
- The need to act on the ecoregional concept approved by the CGIAR for effective research on natural resource management;
- The growing recognition among developing countries and donors alike that regionally organized research is a cost-effective way to use limited financial and human resources;
- The recognition by an important number of donors that the CGIAR should be more demand driven in formulating its policies and priorities; and
- The need by CGIAR members for acknowledgment from developing countries that they benefit from, appreciate, and support international agricultural research in the CGIAR centers.

will begin in 1993 after further selection. Integration of aquaculture and agriculture sustained household incomes and food supplies even during a severe drought in Malawi, as was found in 1992 by the ICLARM-German Agency for Technical Cooperation (GTZ) project there.

New research programs, based on the resource systems approach of ICLARM's Strategic Plan, will begin in 1993 in three priority systems: inland aquatic resources, coastal resources, and coral reef resources. These new programs narrow the focus of the center's research and allow the development of common and complementary methods and approaches across the programs. The new research programs build on the foundations of the previous programs.

A complementary National Research Support Program will also be created to channel training activities and to provide assistance to NARS in research planning and research management.

The new goal of ICLARM, which replaces its previous broad mandate of global research, is: improved production and management of fisheries resources for sustainable benefits of present and future generations of low-income users in developing countries.

ICLARM

The science of applied fish genetics and breeding has just begun, 40 years behind plant and animal breeders. ICLARM and its collaborators have taken a lead role in developing a new breed of tilapia that grows 60 percent faster than conventional breeds.

Genetic Resources and Intellectual Property Rights

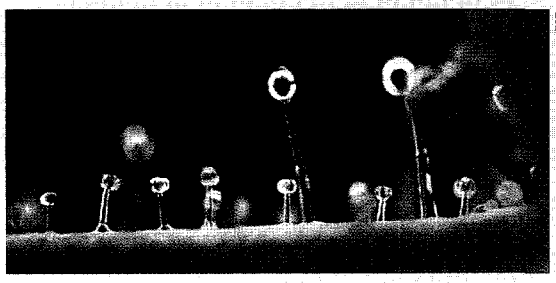
In another area of vital concern to the CGIAR, the Group adopted a working document on genetic resources and intellectual property rights at its Mid-Term Meeting in May. Initiated by a joint TAC-Center Directors Committee, the document represents current practices and broadly held views within the CGIAR system. Adoption of the working document was the most recent in a series of steps taken by the CGIAR to deal with the issues involved. It was formulated in consultation with many diverse organizations including donors, nongovernmental organizations (NGOs), centers, and developing countries.

In preparation for the CGIAR's participation at the United Nations Conference on Environment and Development (UNCED) in June, a 14-member committee drafted a statement on plant genetic resources and intellectual property rights, using the working document as a basis. The statement was developed to reaffirm the Group's sensitivity to these issues, offer guidance to delegations from CGIAR member countries at UNCED, and serve as the basis for continued discussion. A more definitive system-wide policy is premature at present. Consultations continue with all participants involved, including NARS, NGOs, advanced laboratories, and private companies. Intellectual property rights is an extremely complex and sensitive issue of overriding importance to the future development of the CGIAR system. In response to a proposal from a group of NGOs, center directors are currently analyzing plant breeders' rights and the use of material transfer agreements in the exchange of plant genetic resources.

CIP Wins Baudouin Award, Ochoa Wins OAS Prize

The 1992 CGIAR King Baudouin Award was given to CIP for its integrated pest management (IPM) work the same week that CIP plant taxonomist Carlos Ochoa was awarded the Bernardo Houssay Inter-American Science Prize "for his important contributions and his continuous exemplary work in the genetic preservation of potato, recognizing the importance to maintain genetic banks as a preservation tool of the genetic heritage, as well as for the discovery of new wild species and the development of new varieties of this kind."

During 1991 and much of 1992, news of CIP's success in controlling pests without harmful insecticides made major headlines. The story was carried on the front page of *The Wall Street Journal* in March and in much of the European press. The new hairy varieties were winning friends by doing something unique in the plant world. For the first time, farmers could plant a commercial quality edible potato that would actually trap and kill insects (most pest-resistant potatoes carry high levels of glycoalkaloids that render them inedible to humans as well as insects). Thanks to sticky hairs on the stems and leaves, the hairy tubers—as they were incorrectly labeled by some reporters—relieved farmers of much of the burden of applying insecticides.



CIP

Insect-killing glandular potato trichomes.

In the developing world, the annual cost of potato insecticides exceeds US$30 million, a figure that scientists say could triple by the end of the century. According to project scientists, use of the new cultivars was equivalent to a single spray of insecticide worth about US$750 per hectare. Worldwide, more insecticides are used to control insect pests on potatoes than on any other food crop.

The hairy potato is one part of a larger IPM program developed at CIP in recent years. The new cultivars must be used in conjunction with other pest control practices that help to maintain a biological balance in farmers' fields. CIP's practices in IPM are currently used in a variety of distinct production environments.

In the early 1980s, a CIP-inspired campaign in North Africa resulted in the banning of an insecticide dust on market potatoes in Tunisia and the substitution of biological insecticides and safe synthetic compounds. In Mexico,

Gender Equity

Gender equity remains a subject of ongoing concern within the CGIAR system. Continued progress was made during the year to integrate gender equity in both the centers' research and management agendas. In October, before ICW92, a second gender workshop for senior managers was held for executives from six centers, bringing the total to 15 directors general and 30 other senior managers who have attended these awareness-raising workshops.

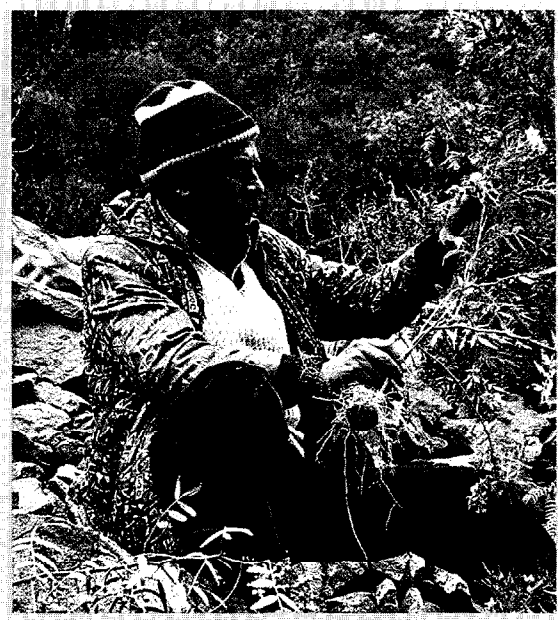
At the workshop, findings of the report entitled, "Status of Internationally Recruited Women in the International Agricultural Research Centers of the CGIAR," were discussed. The report analyzed the number of women among international staff in relation to their availability in these disciplines, and constraints and opportunities for employment of spouses in the international centers. In general, the numbers of internationally recruited women at the centers compare favorably with those of other similar employers. The report documents an increasing number of women hired as evidence of the centers' commitment to strengthening the recruitment of qualified women. ISNAR has been awarded a modest grant to examine gender staffing in NARS.

Most of the centers have requested additional

large potato farmers are using sex pheromones that cut insecticide use by 85 percent. In Peru and Colombia, parasitic wasps introduced by CIP are providing excellent control across an extensive area of the Andes' potato belt.

The development of these IPM technologies was preceded by the rescue of the wild potatoes and traditional farmers' varieties by CIP plant taxonomist Carlos Ochoa. Ochoa, one of Peru's most successful potato breeders, mounted a one-man campaign to save the potato in the 1950s. He joined CIP shortly after its establishment in 1971.

Ochoa's discoveries include more than 30 percent of all known wild species and the rescue of several hundred landraces. They represent one of the main elements of the center's world potato collection, a genebank containing 100 wild species and some 5,000 cultivated potatoes. Most important, the collection holds a vast number of accessions, many of them as yet uncharacterized, that carry genes for insect, disease, and drought stress resistance, as well as high yields and other characteristics needed for future crop production. Despite the large number of potatoes that exist in nature, just a handful are grown on a large scale. "This narrow genetic base," according to Hubert Zandstra, CIP Director General, "puts our food supply at risk.



CIP

Carlos Ochoa, plant explorer.

That's why Ochoa's collecting expeditions have been so widely recognized."

Indeed, the microenvironments in which many of these species grow are now threatened, and many have disappeared. The habitat for one drought-tolerant wild potato is now part of Lima's largest slum; another species, found on a Colombian volcano, disappeared in the 1970s when the volcano erupted after a 400-year hiatus. Ochoa had collected what is now the only known living sample of this species.

training and/or reviews of their research portfolios to identify where gender might be relevant. In 1993, the Group will reconsider its commitment to a Gender Strategy Paper, when more centers will have more experiences on which to base a position.

King Baudouin Award

The biennial CGIAR King Baudouin Award was presented to CIP in recognition of outstanding work in the area of integrated pest management and host plant resistance in potato, which has led to safer, more sustainable solutions to insect pest problems (see box above).

In 1980, the CGIAR won the King Baudouin Prize for International Development, a prize established in commemoration of the first 25 years of the late Belgian monarch's reign. The original prize of US$50,000 is held in trust. The CGIAR King Baudouin Award has ranged from US$6,000 to US$15,000 from earnings accrued. Winners are selected by members of CGIAR's Technical Advisory Committee.

Previous recipients of the award include IRRI for IR36; CIAT for resistance to the Bean Golden Mosaic virus; IITA for resistance to the Maize Streak virus; CIMMYT for developing Veery S; and CIAT and IITA jointly for classical biological control of the cassava mealybug.

IBPGR: Coconut Genetic Resources

Coconut is often called "the tree of life" in developing countries because it provides more than 100 discrete products, including food, drink, fuel, livestock feed, fiber, and building materials. Coconut is believed to have originated in the Western Pacific, but it is now a pan-tropical crop grown on approximately 11.6 million hectares in 86 countries.

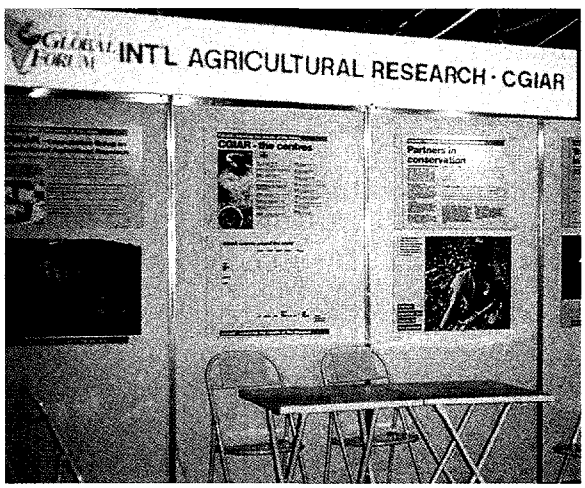
In 1986, the CGIAR recognized coconut as "the oil crop most in need of international research" and since that time has been working toward the formation of an international coconut network. The network aims to set global research priorities and share the results among its members as a means to counteract the "start-stop" approach that has characterized coconut research until now.

In October 1991, an International Coconut Workshop, held in Indonesia, recommended the establishment of a Coconut Genetic Resources Network to be managed by IBPGR. Initial activities involved the establishment, with the support of the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (France), of an international coconut genetic resources database and the employment of a consultant, with financial support from the Overseas Development Administration (United Kingdom), to build on the recommendations of the workshop. The consultant visited donors and scientists, and attended several conferences. His conclusions and recommendations constituted a working document for the first meeting of the Steering Committee of the Network.

The Steering Committee meeting was held in December 1992 at the IBPGR office in Singapore. The committee and representatives from donor and collaborating organizations considered organizational aspects of the new Network, to be known as COGENT. Participants gave high priority to continuing the development of an international database of coconut collections.

Task forces were constituted to monitor other high priority areas, including development of a collecting and conservation strategy and the practical use of genetic markers to measure coconut diversity; improved use through multilocation trials; standardization of breeding techniques; seed production; development of guidelines for safe movement of germplasm; and studies of diversity in coconut for physiological traits including drought resistance, salt tolerance, and compatibility for intercropping. Needs for training, publications, and public awareness were identified. IBPGR was asked to give high priority to hiring a full-time coconut coordinator to help ensure that these activities can be carried out as quickly as possible.

Presently IBPGR is in the process of employing the network coordinator, whose activities will significantly boost the planned program activities. In addition to support from the United Kingdom and France to the Network, the Asian Development Bank has indicated its willingness to make a substantial contribution to the Network activities in Asia and the Pacific from 1994 on. The German Agency for Technical Cooperation (GTZ) is prepared to support activities related to coconut germplasm evaluation and use through the Bureau for the Development of Research on Tropical Perennial Oil Crops (BUROTROP). Recently, IBPGR and BUROTROP concluded a Memorandum of Understanding for cooperation on the activities of COGENT.



IBPGR/Ruth Raymond

This exhibition booth at the NGO Global Forum was part of IBGPR's public information materials prepared for the Earth Summit. *(See details, page 25.)*

International Nutrition Conference

Delegates from 150 countries met in Rome in December 1992 to attend the FAO/WHO International Conference on Nutrition (ICN). This was the first intergovernmental conference at which food, nutrition, and health were considered both globally and politically.

IFPRI's Director General Per Pinstrup-Andersen represented the CGIAR at ICN. In his plenary statement, Pinstrup-Andersen noted that the research of the CGIAR centers and NARS has resulted in large productivity gains, improved production practices, and better food policy for poor farmers and consumers. But he warned that today's ample food supplies may not reflect the future. "We are currently benefiting from the foresight of people who invested in agricultural research and agricultural development during the 1960s and 1970s," he said. "Decreases in these investments in developing countries during the 1980s indicate that such foresight may no longer prevail...and opportunities for alleviating poverty and malnutrition will be missed."

IFPRI played a significant role in defining the issues for the conference through discussion of the importance of agricultural research for enhancing food security and nutrition at the ICN Preparatory Committee Meeting in Geneva in August, and through preparation of two background papers, "Improving Household Food Security" and "Agriculture/Nutrition Linkages: Implications for Policy and Research." Specific strategies were suggested in the World Declaration and Plan of Action for Nutrition adopted at the conference.

IFPRI

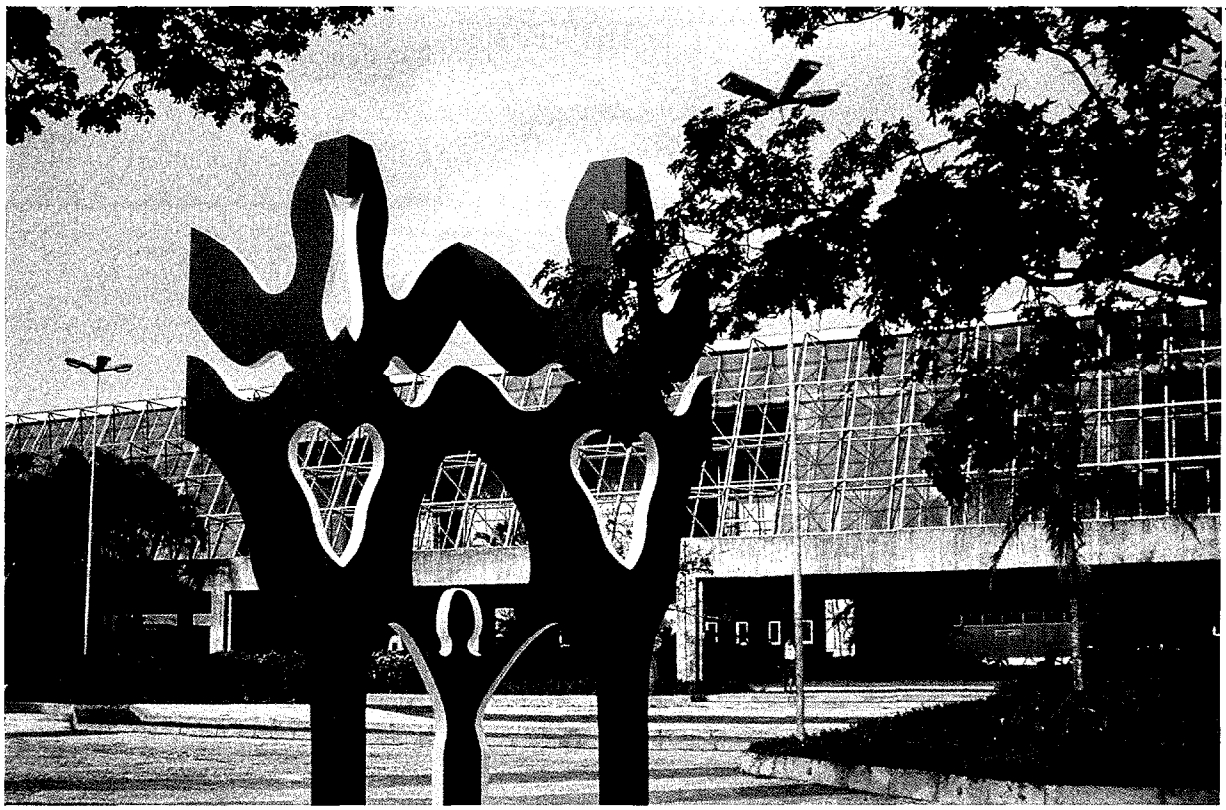
Women's literacy class in Bangladesh. IFPRI's research suggests that a woman's level of education benefits her child's nutritional well-being.

The declaration states that governments should direct additional investment for agricultural research to:

- Promote environmentally sound and economically viable farming systems to increase crop production and maintain soil quality;
- Develop safer biotechnologies for animal and plant breeding and facilitate the exchange of these new advances related to nutrition;
- Develop techniques that decrease post-harvest losses and improve food processing, storage, and marketing;
- Develop and disseminate technologies that respond to women's needs and ease their workload;
- Incorporate farmer and consumer needs into extension services;
- Improve training methods locally, nationally, and internationally to ensure dissemination of new technologies;
- Develop technologies for small-scale and poor farmers, particularly those with poor quality or fragile land;
- Develop technologies for small-scale agriculture and techniques for traditional household food production; and
- Address seasonal nutrition problems through diversified food production, including fruits, vegetables, livestock, and aquaculture.

Other results of the conference included greater international attention to nutrition; better recognition of the need to deal with nutrition issues through an approach in which agricultural development plays a critical role; an acknowledgment that mobilization of grassroots processes can bring together different agencies, ministries, and NGOs to address nutrition deficiencies in low-income countries; and identification of a narrow set of goals to be addressed first.

Focus: Sustaining the Earth And Its Peoples



IBPGR/Ruth Raymond

For nearly two weeks in mid-June 1992, the world turned away from almost all other preoccupations to watch the unfolding of an unprecedented event in Rio de Janeiro. There, a large representation of governments as well as a formidable collection of NGOs gathered to define the means by which the needs of the Earth and the peoples who inhabit it can be creatively harmonized. In formal terms, the event was a United Nations megameeting: the United Nations Conference on Environment and Development (UNCED), an event decreed by a UN General Assembly resolution. In more popular terms, the event was known as the Earth Summit, an appropriate description, given the levels of representation, the diversity, and the concerns that characterized it.

Some 110 heads of state and government were present. Numerous intergovernmental organizations, including the CGIAR, were represented. So were around 1,000 NGOs, in the Global Forum that sought to ensure that a grassroots perspective was clearly articulated. The strength of NGO participation was not accidental. From the beginning of preparations for the Earth Summit, UNCED Secretary-General Maurice F. Strong had said, "When Government leaders go to Rio, they need to know what people want. The power of the people will be behind the leaders at the Summit. Whatever happens at the Summit will depend on the people at its base everywhere."

The purpose of the conference, thus, was to provide a setting in which representatives of the human family could plan course corrections of past practices, to strengthen their present and secure their future. The mood at Rio, among its diverse participants, was captured by U.S. Vice President Al Gore when he said, "All seemed to share a deeper understanding—a recognition

that we are all part of something much larger than ourselves, a family related only distantly by blood but intimately by commitment to each other's common future."

Wide Commitment

The CGIAR contributed to that commitment in many ways. From the earliest stages of official preparations for the Earth Summit, IBPGR was a member of the Biodiversity Working Group, set up by the UNCED Secretariat to prepare biodiversity material for the conference agenda. IBPGR was mandated within the CGIAR system to take the lead role in plant genetic resources activities as well as public awareness programs for UNCED. On sustainability issues, CIP was the lead player.

CGIAR centers worked with national delegations in donor and partner countries to assist them in the preparation of agriculture-related documents and presentations for UNCED. The CGIAR was an active participant in the Keystone International Dialogue Series on Plant Genetic Resources, which recommended in its Oslo Plenary Session, a Global Initiative on the Security and Sustainable Use of Plant Genetic Resources. The CGIAR was listed as one possible institutional home for the Global Initiative.

The CGIAR helped to organize the scientific conference in which the agriculture/environment relationship as the basis of future research was set out by the *Bangkok Declaration on Sustainable Agriculture.* The Declaration expresses the resolve of Asian scientists "to recommit ourselves and our institutions to strengthen further the knowledge base that will ensure the protection of land, water resources, and other environmental resources required for agricultural productivity in the future; to seek ways to collaborate in research on pressing problems affecting agricultural sustainability; and to find ways to finance collaborative research, including increased funding from national and international sources."

The CGIAR entered into a dialogue with several NGOs that are active on environmental issues, focusing on where the NGOs and the CGIAR can meet on common ground and how each could use the work of the other.

Conservation of Global Genetic Resources

Plant genetic resources are crucial to the survival of agriculture in a changing climate. They provide new sources of natural variation already adapted to cope with deficient rainfall, temperature, and diseases. Often, the wild relatives of crop species will be the best sources of natural adaptations and the resistance required to sustain productivity.

Within the CGIAR system, IBPGR plays a leadership role in the conservation of plant genetic resources. IBPGR germplasm collections have included more than 140 crop species. They are stored in genebanks by some 450 organizations in 90 different countries, with well over half in developing countries.

IBPGR is now giving increasing attention to the conservation of biological diversity. This will contribute to the implementation of the Global Convention on Biodiversity.

CIAT

A genetic treasury for humanity: seeds of beans, tropical pastures, and in vitro *cassava, on a bed of rice. The past and future are preserved in CIAT's genebank; genes enable scientists to breed crops that can resist diseases and pests, and adapt to climatic and soil stresses. Once lost, genes can never be replaced; the larger the range of genes in the genebank, the more secure the world's future food supply.*

Several activities were undertaken on the public awareness front, beginning at ICW91, when a representative of the UNCED Secretariat participated in the opening day's press briefing.

Research Areas Emphasized in Agenda 21

- Integrated approaches to the planning and management of land resources
- Integrated approaches to improved management and use of water resources
- Conservation of biological diversity and environmentally sound management of biotechnology
- Management of fragile ecosystems, including marine resources and coastal area management
- Combating deforestation
- Policy research and options for policy reform
- Strengthening the scientific research capacity of national institutions

International press briefings involving CGIAR centers, donors, and NGOs were held in Bonn, Berne, and Rome. A CGIAR booklet on sustainability was published in the CGIAR Secretariat series, "Issues in Agriculture," and was widely distributed within the "UNCED community."

IBPGR published a series of 10 fact sheets on issues relevant to biodiversity and plant genetic resources. These took the form of simple nontechnical summaries of key points. The fact sheets, which were distributed to more than 5,000 donors, policymakers, and journalists, covered the following topics: Plant Genetic Resources—The Key To Survival; Plant Genetic Resources—Responding To Environmental Change; Plant Genetic Resources—Vital For Global Development; Conservation Strategies—Towards An Integrated Approach; Plant Genetic Resources—Adding Value Through Training; Information—Vital To Share The Benefits Of Plant Genetic Resources—Research Today To Benefit Tomorrow; CGIAR and Plant Resources; Plant Genetic Resources—IBPGR Preparing For The Future; Plant Genetic Resources—Toward A Global Conservation System.

In addition, IBPGR prepared a number of information materials for distribution at the Earth Summit—a special issue of *Geneflow* focusing on biodiversity and produced in English, Spanish, and Portuguese versions; an updated version of the 1989 booklet, *Partners in Conservation* (plant genetic resources and the CGIAR system); and three posters highlighting genetic resources activities, one of which was produced in collaboration with the Rural Advancement Foundation International (RAFI).

Strong Record

The CGIAR was formally recognized as an intergovernmental organization and invited to be present at the Earth Summit with a single delegation. Representatives from CIAT, IBPGR, and the Secretariat formed the delegation with backing from the entire system. Information booths were maintained both at the premises of the conference and the NGO forum. Two CGIAR press briefings drew encouraging response. Most of all, however, CGIAR involvement in the Earth Summit recommitted the system to participation in the post-UNCED process.

UNCED produced two international conventions, on Biodiversity and on Climate Change; a statement of principles to guide the sustainable management of forests; a broad declaration embodying the rights and responsibilities of nations in the quest for human development; and a specific agenda for action, Agenda 21. UNCED, moreover, provided for the establishment of a global mechanism, the 53-member UN Commission on Sustainable Development, to keep track of the extent to which Agenda 21 is being implemented.

Overall, a major accomplishment of the Earth Summit was that it secured international acceptance of the linkage between development and protection of the environment. The world was enjoined, as a result, to follow the advice of the *1992 World Development Report:* "The key is not to produce less but to produce differently." For international agricultural research, CGIAR Chairman V. Rajagopalan commented, "This is not an option; it is a compulsion."

Agenda 21 points out that agriculture has to meet the challenge of feeding an additional two billion people by the year 2020. Agenda 21 emphasizes, as well, the contribution that scientific research can make toward meeting this challenge (see box, page 26). The CGIAR has long been aware of this connection, and the substantial contributions of all centers, old and new, have been recorded.[1] This record begins with the development of new crop varieties that have produced higher yields without major expansion of land for cultivation. The CGIAR has been and continues to be a leader in the preservation of biodiversity (see box, page 25). Equally important contributions are in such areas as genetic improvement of food resources, integrated pest management, the development of nitrogen-fixing leguminous crops, research on crop mulches, water management, policy research, and many others (see box on right).

These activities are of crucial relevance, and will continue to be at the core of CGIAR programs. Equally, however, the CGIAR is convinced that the full potential of its contribution to Agenda 21 cannot be achieved by doing more of the same.

Ecoregional Approach

The basis of the CGIAR response to the challenge of Agenda 21 is the effort to balance productivity and natural resource management in all CGIAR-supported research. A key element of this response is an ecoregional approach that aims at performing research in and for agroecological zones, regionally defined. An essential characteristic of this approach is the increased exposure of the scientist to the farmer in the field. The goal of ecoregional research is to foster sustainable productivity through appropriate farming practices at the individual and community levels.

Meanwhile, to deal more effectively with natural resource conservation and management issues as part of agricultural development, the CGIAR has brought in new centers and is making significant changes to its structure and mode

[1]See *A CGIAR Response to Agenda 21 Recommendations*, CGIAR Secretariat, October 1992.

Ten CGIAR Contributions to Achieving Agenda 21

- The CGIAR's continued focus on further increasing productivity of lands with good agricultural potential will help to relieve pressure on marginal ecosystems.
- Conservation of germplasm resources will contribute to agricultural sustainability and to preservation of global biodiversity.
- Genetic improvement of crop, livestock, forest, and fishery resources will increase productivity and improve resistance to pests and diseases.
- Research on integrated pest management technologies will help to reduce dependence on chemical pesticides.
- Introduction of nitrogen-fixing leguminous crops and trees into farming systems will help to reduce dependence on artificial fertilizers.
- Research on use of crop mulches will help to contain soil erosion and to improve soil's physical and chemical properties.
- Research on water management will contribute to more efficient and sustainable use of water resources.
- Research on integrated agriculture/aquaculture farming systems will help to increase the productivity of small farms while at the same time improving water management.
- Research on agroforestry farming systems and on the conservation and management of natural forest ecosystems will contribute to the containment of deforestation, to ensure adequate supplies of fodder and fuelwood, and to increase the productivity of both forests and agriculture.
- Socioeconomic policy research will help to develop improved understanding of the underlying causes of environmental degradation and to identify policies that will foster sustainable agriculture and conservation of natural resources.

of operation. These changes are based mainly on the following:

- The need to strengthen CGIAR scientific capability in the area of soil, water, forestry, and fisheries resource management;
- The recognition that natural resource management issues are frequently site specific agroecologically and require more intensive multidisciplinary research focused on high priority regions and with a special emphasis on alleviating rural poverty, all undertaken as part of eco-regional research;
- The importance of interacting with local people and, particularly in marginal ecosystems, building research on traditional knowledge, requires that the CGIAR centers further strengthen their capability to tackle socioeconomic and macroeconomic policy research;
- The recognition of the role that women play in decisionmaking at the farm/household level is making it necessary for the CGIAR to give a greater focus to gender issues; and
- The need to help national research institutions strengthen scientific expertise and institutions in natural resource management.

Above all, the CGIAR has launched a process that will determine how a substantive environmental capacity can be integrated into the programs of all CGIAR centers. These major efforts can enhance CGIAR participation in the post-UNCED process. Their success, however, depends not only on the CGIAR but on the continuing commitment of the international community—a subject that is explored by Maurice Strong and Razali Ismail, Chairman of the Commission on Sustainable Development.

Beyond Rio: Toward a New Global Partnership

by Maurice F. Strong

After the last gavel sounded the end of the Earth Summit in Rio de Janeiro, the unprecedented attention it focused on tomorrow's prospects for our planet rapidly became yesterday's news. It should not be surprising that media attention has turned to here-and-now issues like Bosnia and Somalia and the latest political and economic crises. But this should not obscure the fact that for the two weeks of the Earth Summit and several weeks preceding it, the Earth's future dominated the headlines and prime time news.

One year later, it is still too early to tell what the ultimate results of Rio will be. While the agreements reached on the Declaration of Rio and Agenda 21 had some significant shortcomings, they nevertheless constitute the most comprehensive and far-reaching measures to secure the future of the Earth on which governments have ever agreed. And the fact that these were agreed to by virtually all the nations of the world at the highest political level gives them a unique political authority. But, as I cautioned in my final remarks to the conference, this in no way guarantees their implementation.

All who participated in the conference itself would agree it was a memorable experience. But they are far from unanimous in their judgments as to what it achieved. Those who expected it to yield a quick fix for all the planet's ills were


UNCED

Maurice F. Strong, Secretary-General of the United Nations Conference on Environment and Development (UNCED).

predictably disappointed. So were those who insisted that, because the agreements did not meet all needs and expectations, they should be entirely discounted. It would be as wrong to accept these pessimistic assumptions as it would be to contend that the principal risks of the future of our planet were resolved at Rio. If there is no cause for complacency, neither is there for despair.

The kind of fundamental changes in economic behavior and our industrial system called for at Rio do not come quickly or easily. But the Declaration of Rio and Agenda 21 provide the foundations for the new global partnership that can launch the community onto a new pathway to a more secure and sustainable future.

The blueprint is there—and the bricks and mortar. What is still in doubt is whether the governments of the world will muster the political will and the continuing commitment to build on this foundation of the sustainable mode of life that is essential to the future of our species.

The short-term signs have not been very encouraging. There has clearly been a tendency to lapse back to business as usual, particularly in light of the pressing political and economic concerns with which virtually all governments are preoccupied. The substantial commitment of new financial resources required to enable developing countries to implement Agenda 21 has not been forthcoming. Indeed, even some of the traditionally most generous donors have cut back on their development assistance. And the prospect for replenishment of the Global Environmental Facility at substantially higher levels has not materialized.

The needed increases in resource flows to developing countries will not come in response to pleas for more "foreign aid" in traditional terms. What is required is a redeployment of existing resources in both developing and industrialized countries. The resources are clearly there in the vast amounts of money now being used to subsidize unsustainable practices. What is required is a reorientation of our priorities in utilizing them. We must be prepared to give to securing the future of our planet as a sustainable home for present and future generations the same kind of priority we have always been willing to accord to military security. And many of the best investments we can make in global environmental security will be in developing countries, helping them to revitalize their economies on an environmentally sound and sustainable basis.

One of the more intractable myths surrounding debates over sustainable development is the stubborn notion that integration into our economy of measures to protect the environment would be a recipe for slow growth or no growth. The evidence assembled for the Earth Summit, particularly the report "Changing Course" by the Swiss industrialist Stephen Schmidheiny and the Business Council for Sustainable Development, made it clear not only that this is wrong, but that it could propel us toward disaster both environmentally and economically. Indeed, the main message of Rio was that only through the integration of the environmental dimension into our economic policies and practices at every level can we make the transition to a way of life on our planet that would be secure and sustainable. Far from being a drag on the economy, investment in the environment and eco-efficiency

must be seen as the primary driving forces of the new economy that is emerging as we move into the 21st century. Yet political leaders have been slow to recognize that this also offers the most promising prospects of revitalizing stagnant economies.

The Commission on Sustainable Development established by the United Nations General Assembly in December 1992 has the mandate and opportunity to facilitate action by governments and international organizations on these issues and implementation of the other elements of Agenda 21. However, we cannot leave the follow-up of Rio to our political leaders alone. In a very real sense, leadership must come from the people.

IBPGR/Ruth Raymond

People power will be the primary source of the political will required to induce and support government action in following up and implementing the results of Rio, as it was to the conference itself. I have been profoundly encouraged by the evidence of a literal explosion of grassroots initiatives on the part of people throughout the world, scientists, engineers, architects, industrialists, religious leaders, educators, urban authorities, women, youth, and citizen groups, to name but a few. It is to support and facilitate this process that the Earth Council, a nongovernmental body, has been established, with its headquarters in San José, Costa Rica. It will act as a "people's ombudsman" to monitor implementation of the agreements reached in Rio, to bring to bear objective, expert knowledge and opinion in the public dialogue on these issues and help to amplify the voices of grassroots people, ensuring that their concerns, interest, and experience are fully expressed and taken into account in the policymaking and decision-making processes that affect them. I am confident that this kind of people-based action will infuse the political process with new energies and provide a continuing basis for mobilizing the political will required to ensure governmental action on the Rio agreements.

The industrialized countries must take the lead in the transition to sustainable development mandated by the Earth Summit, the basis for which is set out in Agenda 21. They must reduce the environmental impacts of their own economies, leaving space for developing countries to grow and helping them to do so in ways that minimize their environmental impacts. They must find new and innovative means of providing developing countries with the additional resources they require to deal with the continuing problems of proliferating population growth and pervasive poverty that place intolerable pressures on their environment and resources and undermine the prospects of improved conditions of life for their people.

It would be unrealistic to expect the agreements reached at the Earth Summit to be implemented immediately. Agenda 21 is, after all, an extensive program that could only be carried out over time. But it is imperative that it be given an early and decisive launching. Only time will tell whether the Earth Summit will be seen in the perspective of history as an historic turning point onto a pathway to a more secure and sustainable future for the human community or as a tragic lost, perhaps last, opportunity. What we do or fail to do in this immediate post-Rio period will make the critical difference. We cannot let the promise of Rio remain unfulfilled.

"Agenda 21 Is the Only Option"

—An Interview with Razali Ismail, Chairman of the UN Commission On Sustainable Development

Following several weeks of post-UNCED North-South negotiations, the 47th session of the UN General Assembly resolved late in 1992 to establish the UN Commission on Sustainable Development, as proposed in Agenda 21. The Commission's main functions include the following: to monitor progress in the implementation of Agenda 21; to review whether commitments at UNCED concerning finance and the transfer of technology are being fulfilled; to evaluate reports dealing with the environment and development; to review and act on information from governments, NGOs, scientific organizations, and the private sector about the implementation of Agenda 21; and to recommend policies and actions, based on its monitoring and evaluation, to the UN General Assembly.

The Commission consists of 53 members, and its first chairman is Razali Ismail, a Malaysian professional diplomat who, as Malaysia's Permanent Representative at the United Nations, steered North-South negotiations on the Commission to a successful conclusion. In the following interview, Ambassador Razali comments on UNCED and its aftermath.

Q. Looking back on UNCED, how would you characterize it? Was it mainly an occasion for rhetoric, or did it offer humanity a new vision?

A. Over 100 heads of state or government were present. In a significantly symbolic sense—indicating political endorsement at the highest levels—it was a success. UNCED, at the same time, was a success in terms of the substance that characterized its decisions.

Q. Such as?

A. At Stockholm, when the international community previously considered environmental issues, the emphasis was solely on the environment. The Rio summit, by contrast, acknowledged the nexus between development and the environment. Each affects the other, and both affect the human family. Both, therefore, must be pursued. This marriage of the two issues characterized all decisions at UNCED, and was its greatest success. Agenda 21 is a blueprint for sustainable development. About two-thirds of the Rio Declaration deals with the linkages between the environment and development. It is that approach which makes the Earth Summit an important historical event.

Q. How, then, do you account for the attitude of those who are disappointed by the results of Agenda 21?

A. The results of UNCED were great, but expectations were greater. The South, that is, the underprivileged and disadvantaged, have spent about four decades seeking the wherewithal for sustainable development. They want desperately to move out of abject poverty. They had very high hopes for UNCED, so some of them were disappointed in what they saw as a fudging of political will. But there was also a strong manifestation of political will by many countries to go forward. The South can capitalize on that.

Q. Do you consider Agenda 21 a document that reconciles North-South perspectives?

A. Yes, it is a good document, on paper. It contains both principles and details that have now received global political blessings. But its fulfillment depends on adequate financial resources.

These are not yet forthcoming. Whether in bilateral ODA, in the regional banks, or elsewhere, the emphasis—with a few notable exceptions—is on cutbacks, not on expansion or additionality.

Q. Faced by that reality, is there a chance for Agenda 21 to be fully funded?

A. What is the alternative? We cannot let go of the promise of Agenda 21 because if we do there will be nothing left. We may have to stagger or phase in the implementation of Agenda 21. Whatever mechanism we choose, we should not allow backpedaling on the commitments made at Rio. NGOs have an important role to play in this area.

Q. In what way?

A. They can play an agitational role to remind governments of their responsibilities and to prevent them from getting off the hook. NGOs have sometimes criticized developing country governments and the South must understand that accepting criticism is a sign of maturity. However, without additional resources, major countries of the South will go their own way, and there will be a great risk that some practices followed in the search for rapid development will be unsustainable. This is the message that NGOs can press home. Also, the NGOs in the North must continue to pressure for changes there in terms of consumption and production patterns, for example.

Q. What about the Commission on Sustainable Development?

A. The Commission is a tangible result of UNCED. It has so many responsibilities that it looks as if too many eggs are in the basket. But it can meet its responsibilities if it nurtures its role gently.

Two prerequisites are required for its success. First, the Commission should not be hijacked by any one pressure group or power group. Second, it should not conduct business in an accusatory fashion. If it proceeds along these lines, functioning in a steadily constructive fashion, it will realize its potential as catalyst and facilitator, capable of raising the resources for environmentally friendly development. Remember, the alternative is more status quo and everyone going separate ways.

CGIAR Finances—1992

Highlights

Each year the CGIAR Secretariat reports on the CGIAR's financial performance in the preceding year, based on centers' audited financial statements. The "CGIAR 1992 Financial Report," available from the CGIAR Secretariat and summarized here, provides comprehensive financial information for all 18 centers. This includes the 13 "pre-expansion" centers and five new or "expansion" centers that joined the CGIAR in 1991 and 1992. Four of the new centers, ICLARM, ICRAF, IIMI, and INIBAP, were operating organizations. CIFOR did not operate as a legal entity in 1992; however, funds provided by donors for forestry activities were recorded as contributions to CIFOR.

Financial resources (grants and other income) available to the 18 centers in 1992 totaled $335 million. Of these total resources, $326 million was applied for centers' program activities, including depreciation, and $9 million was allocated to reserves in the form of operating, capital, and other similar funds. A total of $299.4 million was available for the 13 pre-expansion centers (3 percent below the 1991 level of $309.5 million), and $35.4 million for the five expansion centers.

Recent changes in CGIAR accounting policy have resulted in financial reporting which adheres closely to Generally Accepted Accounting Principles (GAAP). Therefore, the financial statements are yielding data that are comparable across centers and are meaningful in a broader sense, since they can also be compared with other nonprofit organizations. A significant aspect of this change was the 1991 decision to adopt depreciation accounting. Accordingly, expenditure reporting is now similar to what has been the norm in most nonprofit organizations in recent years.

1992 Funding

Core Grants. The bulk of grant funding to the CGIAR (78 percent) continues to be for the core component of centers' programs, which represents the CGIAR's essential research activities. Again in 1992, uncertainties clouded funding prospects, and estimates of 1992 core program support had to be revised several times. Based on centers' medium-term plans, core funding of $311 million was initially approved for the 13 pre-expansion centers. At ICW91 in October, donors' indications of grant support totaled only about $254 million for 17 centers ($229 million for pre-expansion centers and $25 million for expansion centers). A special committee was appointed to balance expected supply with demand. In January 1992, the global estimate of grant resources for core programs was further reduced to $251 million, based on additional information from donors. Centers adjusted their budgets accordingly. In May 1992, ICLARM formally joined the CGIAR. ICLARM's estimate of 1992 core program support was $4 million, thereby increasing the system's expectation of total core funding for 1992 to $255 million. Actual funding for 1992, however, amounted to only $247.3 million, with $220.4 million going to the pre-expansion centers and $26.9 million to the five expansion centers (Table 1). An advance of nearly $2 million from the World Bank's 1993 allocation to the CGIAR was required to deal with a late unexpected shortfall

Note: All dollar amounts are in US$. Totals in text and illustrations are computer-rounded.

Table 1. CGIAR Core Funding by Center, 1990–1992 (in US$ millions)

	1990	*1991*	*1992*
Pre-expansion Centers			
CIAT	27.7	27.9	26.9
CIMMYT	27.1	26.6	26.1
CIP	16.9	17.1	15.3
IBPGR	7.0	8.1	9.0
ICARDA	18.7	19.5	17.9
ICRISAT	31.5	29.4	27.3
IFPRI	9.1	8.9	8.3
IITA	22.5	22.4	21.7
ILCA	20.2	19.4	15.8
ILRAD	13.6	13.5	12.6
IRRI	29.8	29.8	28.6
ISNAR	7.0	7.6	7.0
WARDA	6.2	6.7	5.8
Subtotal Pre-expansion	**237.4**	**236.7**	**222.3**
Less advance from 1993			-1.9
Total Pre-expansion	**237.4**	**236.7**	**220.4**
Percent Change	5%	-1%	-7%
Expansion Centers			
CIFOR			3.2
ICLARM			4.5
ICRAF			11.1
IIMI			6.4
INIBAP			1.8
Subtotal Expansion			**26.9**
Total CGIAR	**237.4**	**236.7**	**247.3**
Net Flow From Stabilization Fund	-2.5	-4.7	
Total Core Grants From Donors	**234.9**	**231.9**	**247.3**
Memo:			
1. Complementary Grants (previously recorded)	51.4	51.6	71.4
2. Adjustment for Capital Programs (1990, 1991)	1.6	7.5	
3. Total Grant Funding	287.9	291.0	318.7

(due mainly to exchange rate losses), but this is not considered core funding for 1992 and is not included in the $247.3 million total.

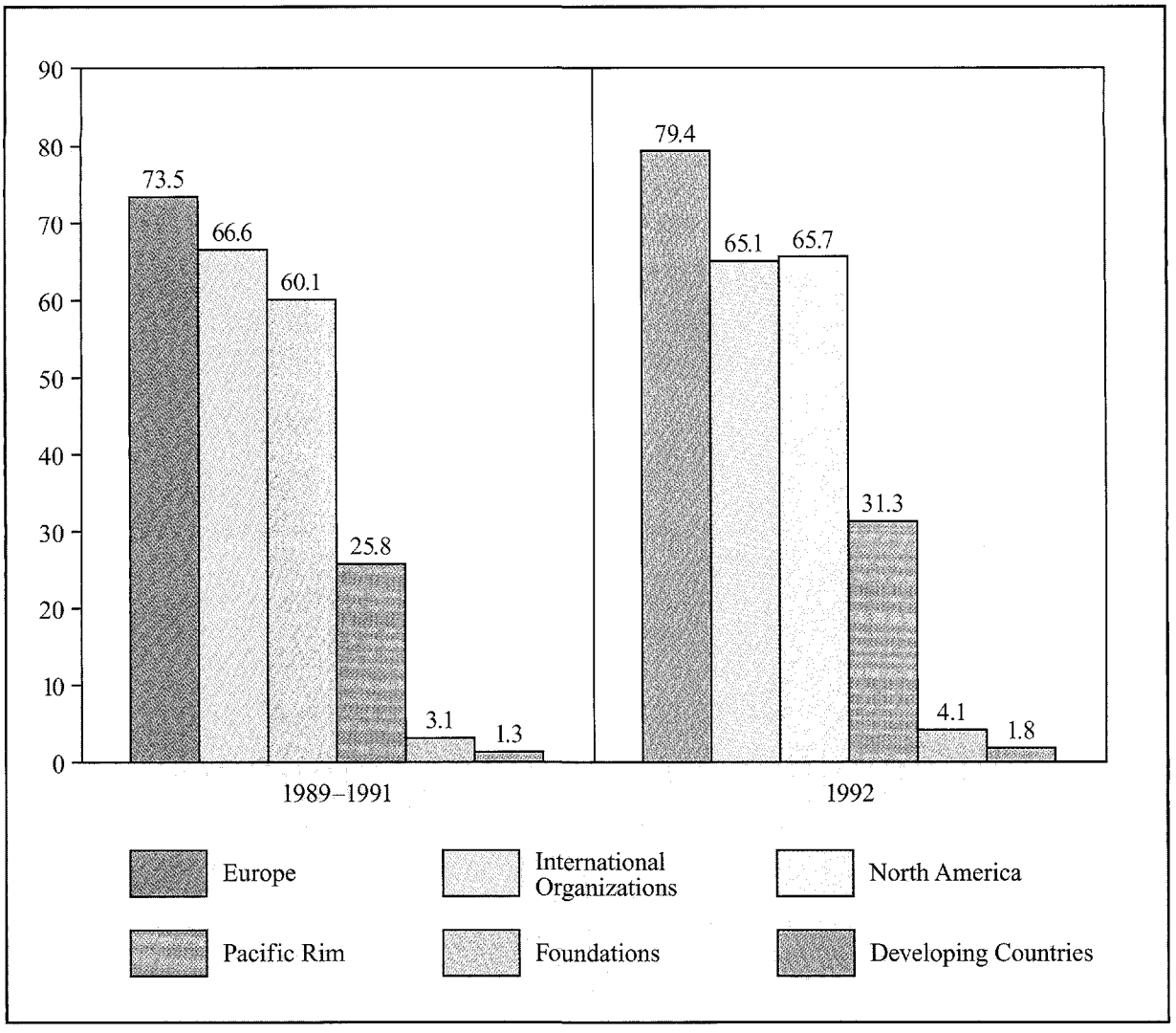
Unrestricted grants represented 82 percent of total core program funding in 1992. For the pre-expansion centers, unrestricted funding was 85 percent of their total core funding compared to 84 percent in 1991.

For the expansion centers, only 53 percent of total core grant income received in 1992 was unrestricted. These centers typically relied heavily on project-specific funds before joining the CGIAR.

In 1992, 36 donors contributed to centers' core programs, compared to 39 donors in 1991 (Table 2). The average donor contribution was about $6.9 million. Nine donors (25 percent) contributed 76 percent of the core program grants; 18 donors contributed 96 percent. The breakdown of core funding by donor group is shown in Figure 1.

In 1992, the World Bank grant to the CGIAR was $37.6 million, representing 15 percent of total core program grants. All centers received Bank support. For seven centers, World Bank support represented less than 10 percent of their

Figure 1. CGIAR Core Funding by Donor Group, 1989–1991 and 1992 (in US$ millions)



Note: See Table 2 for individual donors and dollar amounts in each donor category.

total core funding. For six centers, the Bank's grant ranged from 11 to 20 percent of core funding, and for five centers, World Bank support represented more than 20 percent of core funding. The stabilization fund, which had previously helped to buffer system funding due to exchange variations and unexpected cost changes, was not operational in 1992 because of a lack of resources.

Complementary Grants. Grant support for centers' complementary programs—highly restricted activities of a specific mutual interest to one or more donors and a center—represented 22 percent of total funding in 1992. Complementary grants were $71.4 million: $64.9 million for the pre-expansion centers and $6.5 million for the expansion centers. Thirty-two CGIAR donors contributed $66.7 million and a number of non-CGIAR donors provided the remaining $4.7 million. For the pre-expansion centers, complementary program funding for operational purposes increased by 17 percent in 1992 over the 1991 level. Figure 2 illustrates the relative importance of the core and complementary components of each center's total grant funding in 1992.

Restricted grants made to both core and complementary programs represent fully 37 percent of total grant funding to the centers. Half of the centers define 40 percent or more of their total external funding as restricted. Only four centers (including CIFOR) have less than 20 percent of their grants classified as restricted (core and complementary). These ratios provide an insight into the centers' margin of flexibility in managing finances and activities.

Table 2. CGIAR Core Contributions by Donor, 1989–1992 (in millions of units)

		1989		1990		1991		1992[a]	
		Natl. Currency	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*
Europe									
Austria	(US$)		.98		1.00		1.00		1.05
Belgium	(Bfr)	89.23	2.50	100.59	3.16	103.65	3.14	105.26	3.18
	(US$)						0.17		0.12
Denmark	(Dkr)	19.20	2.64	21.65	3.57	23.65	3.39	26.65	4.86
Finland	(Markka)	21.80	5.16	21.40	5.31	21.51	5.91	4.20	1.01
France	(FF)	20.89	3.60	21.00	4.10	21.10	4.10	22.65	4.91
Germany	(DM)	20.84	11.18	18.49	11.21	19.82	11.04	17.05	11.09
	(US$)								2.62
Ireland	(Punt)	0.19	0.28	0.20	0.31	0.20	0.34	0.20	0.34
Italy	(Lire)	5300.00	3.79	2000.49	1.71	2600.00	2.08	2500.00	1.79
	(US$)		5.70		4.39		3.99		4.01
Luxembourg	(US$)						0.25		0.00
Netherlands	(Dfl)	11.81	5.43	12.40	6.89	10.27	5.73	12.06	6.81
	(US$)						0.72		0.83
Norway	(NKr)	27.85	4.09	30.99	4.70	30.00	4.58	37.00	5.63
	(US$)						0.10		0.20
Spain	(US$)		0.50		0.50		0.50		0.62
Sweden	(Skr)	35.12	5.47	37.70	6.20	37.70	6.07	50.63	8.62
Switzerland	(Sfr)	8.67	5.57	8.95	5.91	8.75	6.95	9.90	7.08
	(US$)		3.96		3.47		3.21		3.53
United Kingdom	(Pound)	6.52	10.87	6.60	11.57	6.72	11.49	6.29	10.91
	(US$)						0.08		0.21
Subtotal			**71.72**		**74.01**		**74.82**		**79.39**
North America									
Canada	(Can$)	15.75	13.21	16.05	13.97	16.61	14.53	18.25	15.33
	(US$)		1.16		1.38		1.20		2.23
United States	(US$)		40.00		39.81		41.35		43.03
	(US$)		4.14		5.28		4.28		5.09
Subtotal			**58.51**		**60.44**		**61.36**		**65.66**
Pacific Rim									
Australia	(Aus$)	4.33	3.70	4.80	3.81	3.58	2.79	5.66	4.31
	(US$)						0.38		0.07
Japan	(Yen)	2876.00	19.87	3019.63	23.19	2960.90	22.74	3257.86	25.67
	(US$)						0.96		1.22
Subtotal			**23.57**		**27.00**		**26.87**		**31.27**

		1989		1990		1991		1992[a]	
		Natl. Currency	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*	*Natl. Currency*	*Equiv. in US$*
Developing Countries									
Brazil	(US$)		0.05		0.01		0.09		0.00
China	(US$)		0.30		0.30		0.30		0.50
India	(US$)		0.50		0.50		0.50		0.50
Korea	(US$)						0.50		0.50
Mexico	(US$)						0.10		0.04
Nigeria	(US$)		0.02		0.09		0.12		0.03
Philippines	(US$)		0.18		0.20		0.20		0.24
Subtotal			**1.05**		**1.09**		**1.81**		**1.81**
Foundations									
Ford Foundation	(US$)		0.79		0.94		1.18		1.75
IDRC	(Can$)	0.75	0.63	0.91	0.78	0.66	0.54	0.69	0.89
Rockefeller Foundation	(US$)		1.89		1.74		0.90		1.47
Subtotal			**3.31**		**3.47**		**2.63**		**4.10**
International Organizations									
African Development Bank	(US$)		1.14		1.23		1.55		0.23
Arab Fund	(US$)		0.51				0.64		0.62
Asian Development Bank	(US$)		0.03		0.63		0.31		0.79
EEC	(ECU)	8.50	9.45	9.00	12.05	9.00	11.83	9.50	11.56
	(US$)		2.39		3.36		1.62		1.78
IDB	(US$)		11.13		10.50		6.31		5.11
IFAD	(US$)		0.52		0.50		0.36		0.41
OPEC Fund	(US$)		0.30				0.12		0.11
UNDP	(US$)		7.52		6.33		6.64		6.87
UNEP	(US$)		0.03				0.03		0.00
World Bank	(US$)		33.34		34.33		35.11		37.62
Subtotal			**66.36**		**68.93**		**64.53**		**65.08**
Total Contributions			**224.52**		**234.93**		**232.02**		**247.31**
Memo Items:									
Contribution in US$			109.58		118.53		121.42		121.42
(Percentage of total)			49%		50%		52%		49%
Cumulative disbursements by quarter (%)									
Quarter 1			19		16		17		17
Quarter 2			38		34		38		38
Quarter 3			74		56		60		60
Quarter 4			92		92		93		93

a. Based on centers' preliminary audits.

Figure 2. CGIAR Core and Complementary Funding by Center, 1992 (in US$ millions)

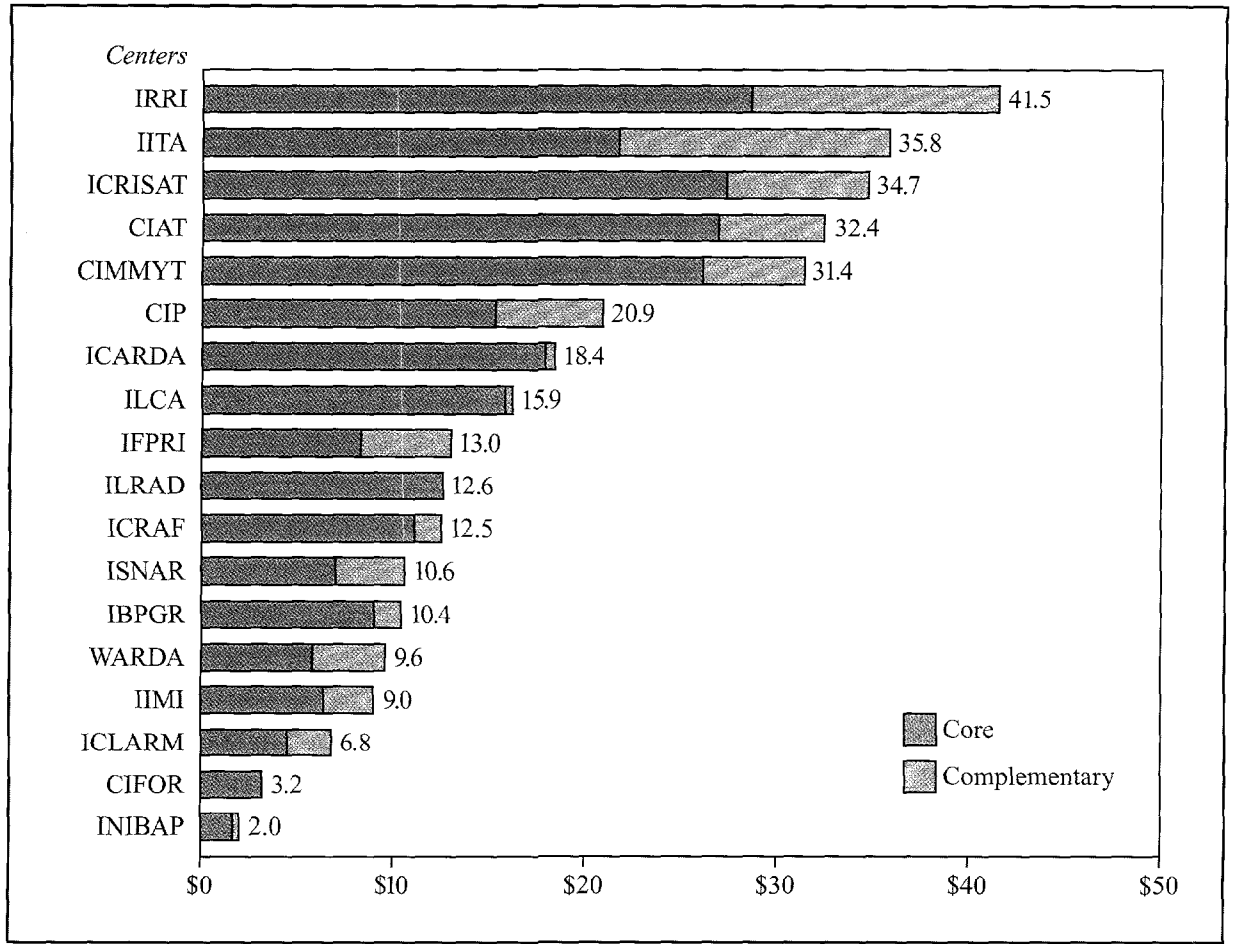


Figure 3. CGIAR Core Expenditures by Program, 1990–1991 and 1992 (in US$ millions)

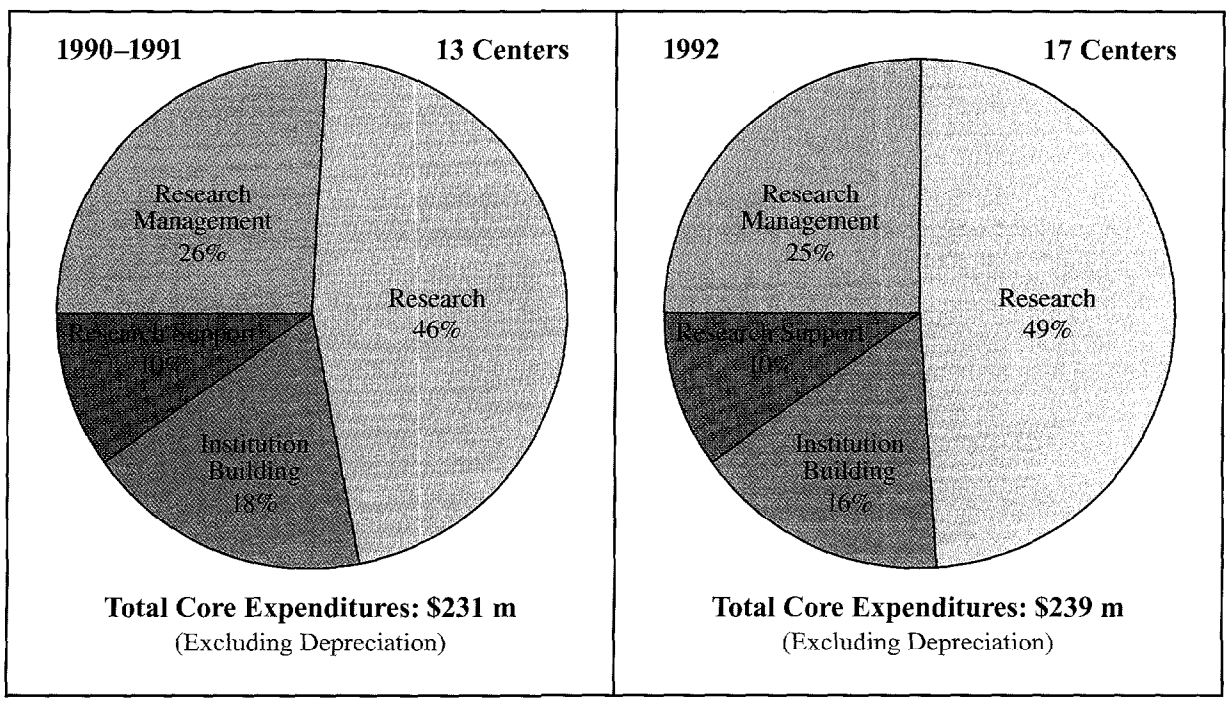


Table 3. CGIAR Core Operating Expenditures by Center, 1990–1992
(in US$ millions)

	1990	*1991*	*1992*
Pre-expansion Centers			
CIAT	26.3	29.0	27.1
CIMMYT	24.7	27.7	28.4
CIP	17.0	19.5	16.1
IBPGR	7.2	7.4	8.2
ICARDA	21.8	22.0	20.1
ICRISAT	30.0	30.6	26.2
IFPRI	9.2	9.0	9.6
IITA	20.6	23.4	22.7
ILCA	20.7	20.9	19.0
ILRAD	12.4	13.9	13.7
IRRI	27.8	30.4	28.8
ISNAR	8.2	8.6	7.1
WARDA	6.2	6.1	6.3
Subtotal Pre-expansion	**232.0**	**248.4**	**233.3**
Percent Change	4%	7%	-6%
Expansion Centers			
CIFOR			0.0
ICLARM			4.2
ICRAF			11.8
IIMI			7.0
INIBAP			2.5
Subtotal Expansion			**25.5**
Total CGIAR	**232.0**	**248.4**	**258.8**
Memo:			
1. Core Capital Expenditures	17.6		
2. Complementary Expenditures (Previously Reported)	54.6	48.7	67.2
3. Adjustment for Capital Programs (1990, 1991)	1.6	7.5	
Total Complementary	**56.2**	**56.2**	**67.2**

Expenditures

In 1992, core program expenses amounted to $258.8 million for the system, including $19.4 million for depreciation charges. The total operating surplus was $9 million. As reflected in Table 3, 1992 expenses (for the 13 pre-expansion centers) on core programs were $15.1 million (6 percent) below the 1991 level.

In terms of relative distribution of expenses, Research Management (basic administrative costs excluding depreciation) represented 25 percent of total operational core expenses (centers generally record depreciation as a line item; thus, this expense is not reflected across different programs). Figure 3 shows that expenditure for Institution Building was 16 percent, Research Support 10 percent, and Research programs 49 percent of total core program expenses. Analyzed by object of expenditure, 1992 spending was broadly in line with previous years. Personnel costs remain the highest expenditure, representing 56 percent of the total in 1992. Supplies and services account for 29 percent, and travel for 6 percent. Depreciation charges constitute almost all of the remaining 9 percent.

In previous annual reports, a summary of spending by research and research-related activ-

Table 4. CGIAR Consolidated Balance Sheet, 1990–1992 (in US$ millions)

	1990	*1991*	*1992*
	13 centers		*18 centers*
Current Assets	176.7	182.4	228.9
Net Fixed Assets	210.7	210.0	215.6
Total Assets	**387.4**	**392.4**	**444.5**
Current Liabilities	121.9	124.6	155.1
Long-term Liabilities	2.5	2.0	2.8
Capital in Fixed Assets	210.7	210.0	214.7
Operating Fund	35.9	35.2	40.9
Capital Fund	4.7	11.4	25.6
Other Funds	11.7	9.2	5.5
Total Liabilities/Fund Balances	**387.4**	**392.4**	**444.6**

ity was provided, including details of spending on different commodities. In their 1992 financial statements, centers have translated their activities and corresponding expenses from traditional categories into new classifications of activity introduced by TAC in its report on CGIAR priorities and strategies. This includes, under the broad heading of research activities, conservation and management of natural resources, germplasm enhancement and breeding, production system development and management, and socioeconomic and public policy research. Research support, institution building, and administration and operations are the three other broad categories. Centers have been using these new categories to develop their medium-term plans for 1994–1998. The ex-post reclassification of activities into these new categories produces a somewhat artificial representation of past performance, which is not particularly relevant for the purpose of reporting on the use of resources. The definition of geographical regions has also changed with the same effect.

Total expenditures on complementary programs in 1992 were $67.2 million. For the pre-expansion centers, the total was $61.7 million, which represents a significant increase over the 1991 level. The remaining $5.5 million was for the five new centers. Most of the spending was related to research and institution-building activities.

More detail on the financial position of centers within the CGIAR system is revealed by a consolidated year-end balance sheet (Table 4). The basic soundness of the "system balance sheet" overall reflects centers' conservative financial management practices and policies, which even in a difficult funding environment have resulted in a healthy institutional position.

In general, the need for short-term borrowing was minimal, and centers met their financial obligations on time. An indicator of liquidity is working capital (the difference between current assets and current liabilities) and as of December 31, 1992, the total working capital of the CGIAR system was $74 million for all 18 centers. This is a 28 percent increase from the 1991 level.

Current CGIAR policy encourages centers to maintain an operating fund balance equivalent to 90 days of operations, in order to accommodate periodic cash flow problems and to avoid having to borrow funds. Eleven centers had fewer than the average number of days of operations in 1992, and six centers had more. The aggregate operating fund level at year-end represented 46 days of operations, and although the system total for working capital and operating fund balances appears broadly acceptable, there is a range of levels among centers.

Donors' outstanding payments to centers in 1992 (approximately $51 million at the end of 1992) were offset by prepayments from donors for 1993 of nearly $63 million. At the system level, this implies that any cash flow impact on operations related to donor funding was due to the timing of disbursements throughout the year rather than the year-end status overall.