

CIMMYT 1983

International Maize and Wheat Improvement Center

Annual Report

The International Maize and Wheat Improvement Center (CIMMYT) is an internationally funded, nonprofit scientific research and training organization. Headquartered in Mexico, CIMMYT is engaged in a worldwide research program for maize, wheat, triticale and barley, with emphasis on food production in developing countries. CIMMYT is one of 13 nonprofit international agricultural research and training centers supported by the Consultative Group for International Agricultural Research (CGIAR). The CGIAR is sponsored by the Food and Agriculture Organization (FAO) of the United Nations, the International Bank for Reconstruction and Development (World Bank), and the United Nations Development Programme (UNDP). The CGIAR consists of 50 donor countries, international and regional organizations, and private foundations.

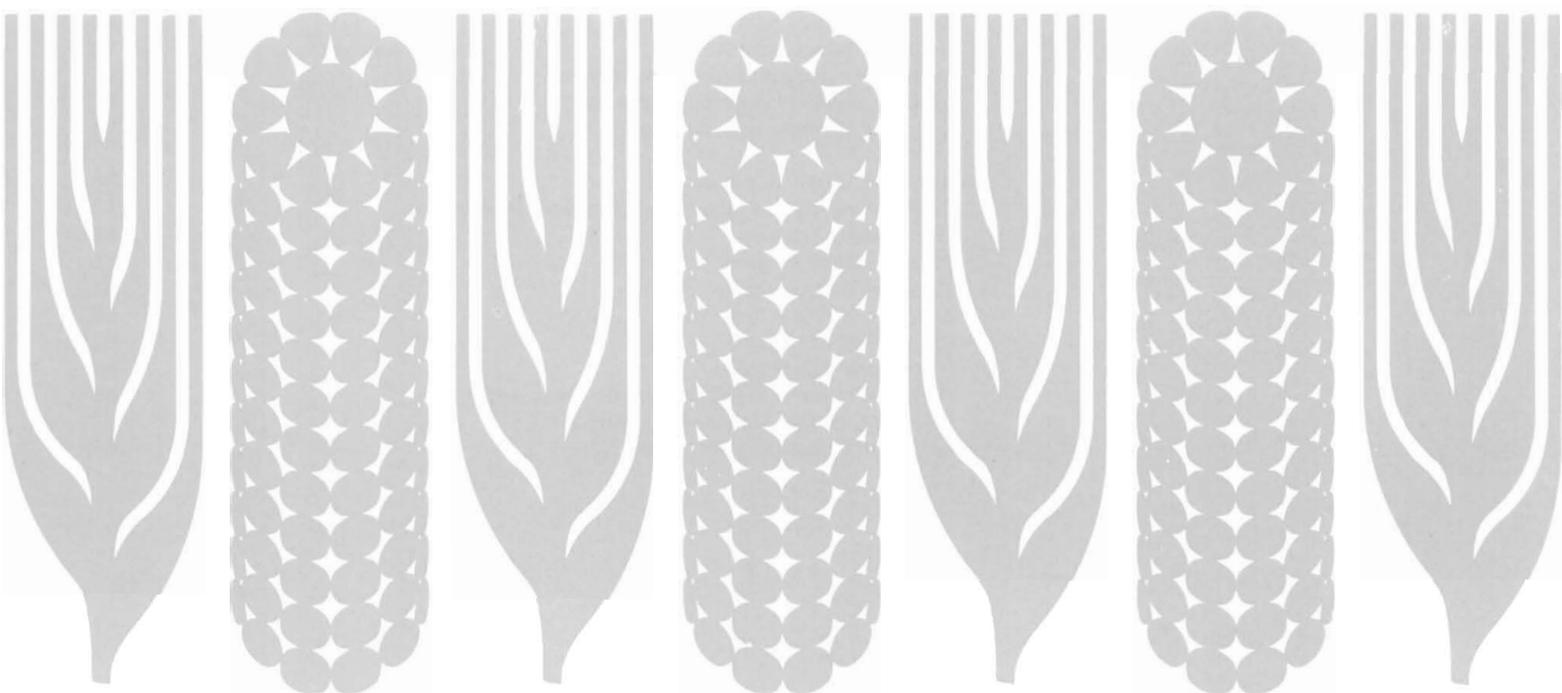
CIMMYT receives support through the CGIAR from a number of sources, including the international aid agencies of Australia, Canada, Denmark, Federal Republic of Germany, France, India, Ireland, Japan, Mexico, the Netherlands, Norway, the Philippines, Saudi Arabia, Spain, Switzerland, United Kingdom and the USA, and from the Australian Centre for International Agricultural Research, European Economic Commission, Ford Foundation, Inter-American Development Bank, International Bank for Reconstruction and Development, International Development Research Centre, OPEC Fund for International Development, Rockefeller Foundation, and the United Nations Development Programme. Responsibility for this publication rests solely with CIMMYT.

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(as of March 1, 1984)

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Water Resources
Mexico

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Consultant
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Director General, National Institute
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Mexico

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Inter-American Development Bank
Ecuador

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Director, Food Research Institute
Stanford University
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Thailand

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University of Tsukuba
Japan

Stachys N. Muturi
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Ministry of Agriculture
Kenya

W. Gerhard Pollmer
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University of Hohenheim
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CIMMYT International Senior Staff

(as of March 1, 1984)

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Robert D. Osler, USA, Deputy Director
General and Treasurer
W. Clive James, Canada, Deputy
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Affairs Officer

General Administration

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Officer
José Ramírez S., Mexico,
Administrative Officer

Maize

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R.L. Paliwal, India, Associate Director
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Unit
Carlos De León, Mexico, Pathology
James Deutsch, USA, Advanced Unit
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Crosses
John Mihm, USA, Entomology
Hiep Ngoc Pham, USA, International
Testing
A.F.E. Palmer, UK, Training
Shivaji Pandey, India, Advanced Unit
David Sperling, USA, Highland Breeding
Surinder K. Vasal, India
Quality Improvement
Alejandro Violic, Chile, Training

Associate Scientists

Abu Michel Foster, UK
Mitsuru Osaki, Japan

Postdoctoral Fellows

Alpha Oumar Diallo, Guinea
Catalino I. Flores, The Philippines
James E. Lothrop, USA
T.M. Tajul Islam, Bangladesh

Andean Region

James B. Barnett, USA
(Based in Colombia)
Gonzalo Granados R., Mexico
(Based in Colombia)
Suketoshi Taba, Japan
(Based in Ecuador)

Asian Region

Kenneth S. Fischer, Australia
(Based in Thailand)
Bobby L. Renfro, USA
(Based in Thailand)

Central America, Mexico and Caribbean Region

Momcilo Babic, Yugoslavia
(Based in Mexico)
Federico Kocher, Switzerland
(Based in Mexico)
Alejandro Ortega C., Mexico
(Based in Mexico)
Willy Villena D., Bolivia
(Based in Mexico)

East African Region

Bantayehu Gelaw, Ethiopia
(Based in Kenya)

Mideast Region

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(Based in Turkey)

West African Region

Magni Bjarnason, Iceland
(Based in Nigeria)

Ghana

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Michael S. Read, USA,
Associate Scientist

Pakistan

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Richard N. Wedderburn, Barbados

Wheat

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Arthur R. Klatt, USA, Associate Director
Norman E. Borlaug, USA, Consultant
Maximino Alcalá S., Mexico,
International Nurseries
Arnoldo Amaya C., Industrial Quality
Girma Bekele, Ethiopia, Pathology
Peter A. Burnett, New Zealand,
Pathology
Pedro Brajcich G., Mexico, Durum
Homer M. Hepworth, USA, Training
Hubert A. Hers, The Netherlands,
Computer Programming
A. Mujeeb Kazi, USA, Wide Crosses
Gerbrand Kingma, The Netherlands,
Training
Edwin Knapp, USA, Training
Walter L. Nelson, USA, Bread Wheat
J. Michael Prescott, USA, Pathology
Sanjaya Rajaram, India, Bread Wheat
Joel Ransom, USA, Agronomy
Ricardo Rodríguez R., Mexico,
Special Germplasm Development
H. Ayla Sencer, Turkey, Germplasm
Bank
Bent Skovmand, Denmark, Triticale
Reynaldo Villareal, The Philippines,
Bread Wheat
Hugo Vivar F., Ecuador, Barley

Associate Scientists

Pierre Malvoisin, France
Elizabeth J. Warham, UK
Masao Yoshida, Japan
Daniel Danial, The Netherlands
(Based in Kenya)

Postdoctoral Fellows

Hans-Joachim Braun,
Fed. Rep. of Germany
Norma Cashion, USA
Walter De Milliano, The Netherlands
Paul Fox, Australia
Johann Neuhaus-Steinmetz,
Fed. Rep. of Germany
Mahmood Osmanzai, Afghanistan
Wolfgang H. Pfeiffer,
Fed. Rep. of Germany
Ravi P. Singh, India
Stephen R. Waddington, UK

Andean Region

H. Jesse Dubin, USA
(Based in Ecuador)
Patrick Wall, Ireland
(Based in Ecuador)

East African Region

Enrique Torres, Colombia
(Based in Kenya)

ICARDA Region

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(Based in Syria)

Latin America Southern Cone Region

Man Mohan Kohli, India
(Based in Chile)
Matthew A. McMahon, Ireland
(Based in Chile)

North, West African and Iberian Peninsula Region

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(Based in Portugal)
George Varughese, India
(Based in Portugal)

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(Based in Thailand)
Eugene E. Saari, USA
(Based in Thailand)
David A. Saunders, Australia
(Based in Thailand)

Bangladesh

Larry Butler, USA
Mengu Mehmet Guler, Turkey

Pakistan

Peter R. Hobbs, UK

Peru

Gregorio Vázquez G., Mexico

Economics

Donald L. Winkelmann, USA, Director
Robert Tripp, USA

Associate Scientist

Alberic C. Hibon, France

Postdoctoral Fellow

Gustavo E. Sain, Argentina

Central American and Caribbean Region

Juan Carlos Martínez, Argentina
(Based in Mexico)

Asian Region

Derek Byerlee, Australia
(Based in Pakistan)
Larry Harrington, USA
(Based in Thailand)

Eastern and Southern African Region

Ponniiah Anandajayasekeram, Sri Lanka
(Based in Kenya)
Michael P. Collinson, UK
(Based in Kenya)
Allan R.C. Low, UK
(Based in Swaziland)

Haiti

Michael Yates, USA

Laboratories

Evangelina Villegas M., Mexico,
Biochemist, in Charge of General
Laboratories
Enrique Ortega M. Mexico,
Associate Scientist

Data Processing Services

Carlos A. González P., Uruguay, Head
Russel Cormier, Canada, Programmer
Neal A. Bredin, Canada,
Associate Scientist

Experiment Stations

John Stewart, UK,
Head and Executive Officer
Roberto Varela, Mexico, Assistant Head
Hannibal Muhtar, Lebanon,
Training Officer

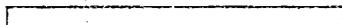
Information Services

Christopher Dowsell, USA
Communications Coordinator
Tiffin D. Harris, USA
Science Writer/Editor
Frederick J. Logan, Canada
Science Writer/Editor

Associate Scientists

Thomas H. Luba, USA,
Associate Science Writer/Editor
M. Victoria Lynch, USA,
Associate Science Writer/Editor

Management Report



Financial Summary

During 1983 three new donors contributed to core programs: the Government of Ireland, which gave funds for training, the European Economic Community, which supported the Andean regional wheat and maize programs, and the Government of Saudi Arabia, which provided unrestricted funds. These three join the Governments of India, Spain, and the Philippines, and the OPEC Fund for International Development, as new donors since 1980.

1983 was a year of uncertainty for CIMMYT as it was for many institutions operating in Mexico. The massive (nearly six-fold) devaluation of the Mexican peso in 1982 had reduced the dollar value of peso expenditures but at the same time had set off fears of an inflationary spiral for 1983. Much to the credit of Mexico's economic managers, however, by year-end most of those fears had not come to pass. Inflation, although reaching 80 percent by government estimates, was by no means as high as originally forecast.

As described in past years, the devaluation of the peso is really a two-edged sword: on the one hand it reduces the dollar value of peso expenses and thus contributes to a surplus of funds compared to budget; on the other hand, it also generates a real financial loss on net assets related to on-going operations in Mexico.

For CIMMYT, as a dollar-denominated institution, the devaluation thus served to reduce financial requirements. Total expenses of the core programs amounted to US\$18,274,000 compared to an original (bottom of the bracket) approved budget of US\$25,333,000. One of the positive aspects of this underexpenditure was that it was largely foreseeable at the beginning of the year, and as such, surplus funds were returned to the CGIAR system.

On the negative side, CIMMYT registered a foreign exchange translation loss on the revaluation of net assets, much as it did in 1982, and again charged that loss to the current year's operation in accordance with generally accepted accounting principles. In 1983, with only an 11 percent devaluation of the peso, a smaller amount compared to 1982 (\$108,000 vs \$650,000), was written off as a loss.

In general, however, the financial condition continues to be satisfactory. Capital balances grew in 1983 by \$820,000, and cash on hand and short-term investments at year-end increased by \$563,000. Accounts receivable showed a marked increase, though, the result of additional donor reimbursible grants. When netted against payments received in advance from donors, however, the status of donor accounts shows a marked improvement over 1982.

Board of Trustees

During 1983 three new trustees joined CIMMYT. Dr. Ramon Claveran, as the new Director General of the National Agricultural Research Institute (INIA) of Mexico, joined as an ex-officio representative of the Government of Mexico. Dr. Claveran is a specialist in pasture and forage management and has had a distinguished career as a scientist and agricultural research leader in Mexico. The second new trustee, also a distinguished scientist as well as an administrator of a large university, is Dr. Doris Howes Calloway, Professor of Nutrition and Provost of the University of California at Berkeley. Dr. Calloway previously served as a member of CIMMYT's Advisory Panel on Nutrition, focusing her attention on issues related to the quality protein maize project. Dr. Ola Heide, Rector of the Agricultural University of Norway, was also elected to the Board in 1983 but later resigned to become a member of the TAC. We take great pleasure in welcoming Drs. Claveran and Calloway to CIMMYT.

During the year the Board of Trustees was involved in a number of special deliberations in addition to their usual program of work. These were concentrated in three areas.

- i) Management discussions on the recommendations made by the Technical Advisory Committee and the CGIAR in its external program review of CIMMYT. These recommendations included the adoption of the "minimum optimum staffing plan," the further strengthening of disciplinary research, and allocation of more resources to selected regional programs. These and other issues are addressed by the Board of Trustees in the 1984 Mid-Term Budget and the 1985-1986 Biennial Budget.

- ii) Discussions of CIMMYT's legal status in Mexico. CIMMYT was established before the creation of the CGIAR and was organized as a Mexican nonprofit corporation. Given the guidelines established by the three co-sponsors of the CGIAR—FAO, UNDP and the World Bank—CIMMYT is now seeking full international status in accordance with its international mandate to improve maize and wheat production, its international training programs, its requirements for the importation of scientific equipment and supplies, and its desire to maintain a truly international cadre of senior staff.
- iii) An across program review of training. This was part of a major institutional review of training. Some preliminary conclusions are described later in this report.

Staff and Program Developments

After thirteen years of service to CIMMYT and to the international network of maize scientists that he helped to create, Dr. Ernest Sprague retired in 1983 as Director of the Maize Program. A search for a new Director began early in the year and covered the major maize-producing countries of the world. The new Director of the program is Dr. Ronald P. Cantrell. Before joining CIMMYT, Dr. Cantrell held a professorship in plant breeding at Purdue University in the United States. During 1981-83 he served as Team Leader for the Purdue University/USAID Farming Systems project in Upper Volta. He now assumes leadership of an international research program that involves collaboration with scientists from virtually every maize-growing country in the developing world. Dr. Cantrell's previous work in plant breeding and in farming systems research in Africa will serve him well in his new multifaceted responsibilities in maize research at CIMMYT.

The appointment of Dr. Cantrell is the third major change in the composition of CIMMYT's directing staff (management policy committee) since 1981. Two years ago Dr. Byrd Curtis, former director of small grains breeding at Cargill Inc., was appointed Director of the Wheat Program. That same year Dr. Clive James, then a natural resources advisor at the Canadian International Development Agency, was named Deputy Director General for Research.

A number of other staff changes took place in 1983. As part of a periodic rotation that is designed to enhance both headquarters and regional capabilities, some senior scientific staff were transferred to new assignments during the year. This rotation provides headquarters staff with the opportunity to work in the institution-building aspects of regional programs and, at the same time, allows regional staff to move back into the research activities at headquarters. In addition, new staff were posted to national assignments in Bangladesh, Haiti, and Peru through extra-core funding arrangements.

One area of significant growth in 1983, as in recent years, was data processing services. Additional hardware was acquired for CIMMYT's VAX 11/780 computer in 1983 and software was developed internally or purchased from vendors. Data processing/statistics will play an increasingly important role in the Center's work in the future.

CIMMYT-ICARDA Discussions— Since ICARDA was created by the CGIAR System in the mid-1970s, that institute and CIMMYT have shared, in a rather poorly defined manner, overlapping mandates for the genetic improvement of durum wheat and barley. Following external program reviews of the two institutes in 1983, a division of responsibilities for the improvement of those two crops was clarified and accepted by the CGIAR. Briefly stated, ICARDA will exercise a global mandate for barley improvement and locate a staff person at CIMMYT headquarters to conduct the required activities specified in a jointly prepared program of work. CIMMYT's lead role in global durum wheat improvement was confirmed and, similarly, the Center will locate a senior plant breeder at ICARDA headquarters to further strengthen durum wheat improvement activities in the Middle East region. It is hoped that this arrangement will enhance the ability of both CIMMYT and ICARDA to serve the needs of developing countries in a productive and coordinated manner.

1983 Review of Training

One of CIMMYT's primary objectives is to help fortify the human resource capacities of developing country national programs to conduct effective research on crop improvement and production. In fulfillment of this objective CIMMYT engages in a wide array of program activities that can be broadly classified as training. Each of these is briefly described.

During 1983, CIMMYT conducted an extensive internal and external review of its training program activities, a process which involved the entire staff and Board of Trustees. CIMMYT's review of this important subject began with the preparation of a background paper on training activities since 1966. It continued with the development of a follow-up survey questionnaire that was sent to 650 former maize, wheat, and economics in-service trainees (representing 80 percent of all former trainees since 1978). By the end of 1983, CIMMYT had

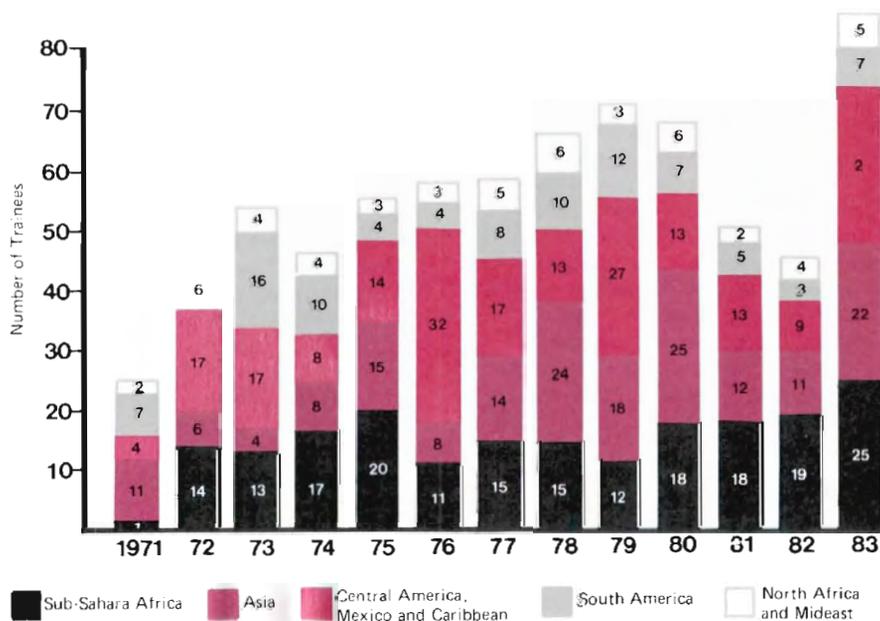


Figure 1. Maize In-Service Trainees, Regional Origins, 1971-83

received a 60 percent response to the questionnaire. In September, an external consultant with considerable experience in international agricultural training, spent two weeks with directing staff and training officers reviewing the Center's current array of training activities and the results of the follow-up questionnaire.

The consultant's report, along with other background information, was thoroughly discussed during CIMMYT's in-house review, which focused in 1983 entirely on training. A synthesis of these discussions was immediately reviewed by the Trustees' Program Committee in their September meeting.

In-Service Training in Mexico— CIMMYT's major training activity is aimed at developing the scientific skills of middle-level research workers. In-service training courses emphasize learning-by-doing to improve the research practitioner skills of agricultural workers. More than 1,400 individuals from 72

countries have completed in-service training courses since 1966. The regional origins and numbers of in-service training graduates annually, 1971-83, are shown in Figures 1 and 2. Almost all in-service trainees stay in Mexico for a full crop research cycle (5-7 months). Typically, trainees are under 30 years of age and have been employed by their governments in agricultural research or extension for at least five years. Approximately 60 percent of all in-service trainees hold a first degree (B.Sc.) in agriculture.

Most in-service trainees are enrolled in the maize and wheat production agronomy courses, which emphasize the importance of on-farm research to develop and/or identify relevant production technologies for recommendation to farmers. They are also exposed to an on-farm research design that involves the integration of economists into the research team. The crop improvement courses rank second in terms of number of trainees. In the Wheat Program, four courses are offered: breeding, pathology, cereal

technology, and experiment station management. In the Maize Program, the mix is slightly different, with three course offerings: crop improvement, protein quality laboratory analysis, and experiment station management.

Visiting Scientists—Travel fellowships are provided to roughly 100 senior-level national researchers each year, so they can visit CIMMYT in Mexico for consultation, for refresher courses, or for more direct participation in the germplasm selection process. Visiting scientists usually stay in Mexico from two weeks to three months and have individually tailored programs.

In-Service Training Outside Mexico—CIMMYT staff are increasingly engaged in training activities outside Mexico. Such activities are generally held as national in-service training courses. CIMMYT's outreach staff are especially involved in these training activities, although headquarters staff, principally the training officers, also participate. In the case of the Economics Program, special project funds have been mobilized to support economics training officer positions in on-farm research for the eastern and southern African region and in Haiti.

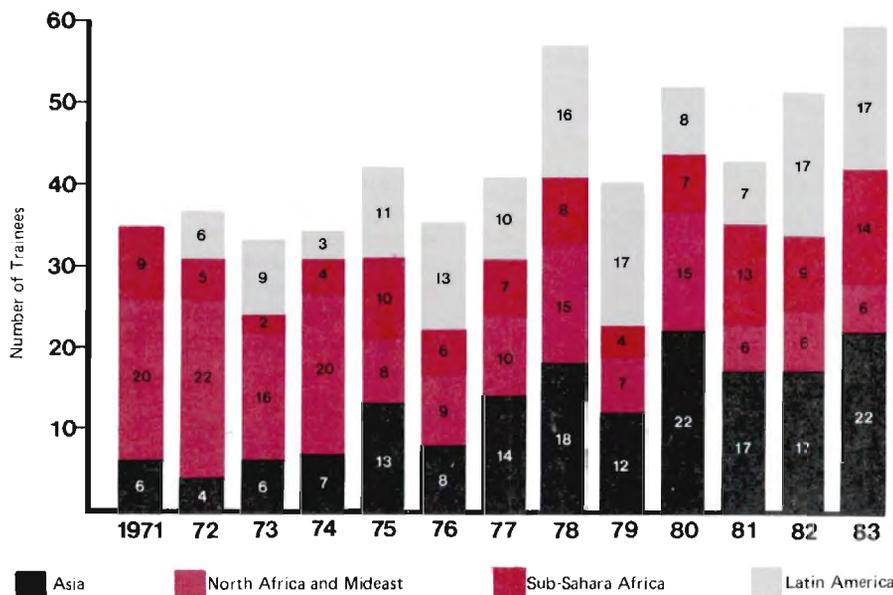


Figure 2. Wheat In-Service Trainees, Regional Origins, 1971-83

CIMMYT's involvement in training programs outside Mexico has taken a variety of forms. One has been three-way sponsorships of specific courses involving the national program, CIMMYT and another agricultural institute with training expertise in a particular subject. An example of this approach is that of the national and regional cereal disease research workshops jointly organized by the Plant Protection Institute (IPO), Wageningen, the Netherlands, and regional pathologists from the Wheat Program. Most of the involvement in training courses outside Mexico, however, has comprised efforts involving individual national programs, and regional crops program and economics program staff, usually joined by some headquarters training staff. Most courses have dealt with on-farm research methodologies and have been conducted on farmers' fields; former in-service trainees often share in the teaching responsibilities for these courses.

Consultation—Approximately 40 percent of CIMMYT's total scientific staff are posted to national and regional assignments outside Mexico. A major portion of their work involves visits to national program colleagues for discussions and review of research projects.

Headquarters staff are also heavily engaged in consulting services. In total, CIMMYT's senior staff spent an average of 40 man-days per person in 1983 visiting national program colleagues in 55 countries. This active program of consultation is an important component in the Center's overall strategy to reach its training objective, to strengthen the human resource capacities of developing country research programs.

Conferences and Workshops—CIMMYT sponsors a number of conferences and workshops at headquarters each year. Such events are generally designed to improve coordination of activities within the international research networks or to conduct state-of-the-art research reviews on selected topics. Outreach staff are also active in helping to organize annual or biennial conferences and workshops with national crop improvement and production researchers in particular regions or countries.

Graduate Student/Predoctoral Research Fellowships—Since its establishment, CIMMYT has provided thesis research support for over 100 M.Sc. and Ph.D students, 70 percent of whom came from collaborating national programs in the developing world. Most of CIMMYT's thesis research support to graduate students and doctoral fellows is at their degree-granting institutions, with CIMMYT's support taking the form of providing germplasm and/or international testing data for thesis research projects. Ordinarily, one or two thesis projects per year are actually carried out in Mexico at CIMMYT.

Postdoctoral Fellowships—CIMMYT's postdoctoral program involves one to two year assignments for recently graduated Ph.Ds. The objectives of these programs are to prepare new professionals for career opportunities in international agricultural research and to bring to the Center new knowledge on selected research topics. Postdoctoral fellows generally work under the supervision of senior international staff members. Roughly 80 individuals (evenly divided between developed and developing countries) have completed this program since 1966. Normally, 12 to 14 postdoctoral fellows are in residence during any given year.

Some Conclusions to Date—Based on its in-house discussions and the former-trainee survey results, it is apparent that CIMMYT has offered high-quality training courses in Mexico along with relatively frequent follow-up visits once the trainee has returned to his home country institution. CIMMYT's alumni generally feel that the Center's in-service training is unique in its contribution to the development of effective research practitioners and is considered to be an important complement to the more theoretical training given by universities.

From the beginning, CIMMYT has directed most of its training efforts on middle-level researchers (with 3 to 5 years of experience in national programs). Over the last decade,

however, the number of countries with which the Center collaborates has more than doubled. The current size and scope of national research and production efforts in wheat and maize in the developing world means that several thousand research workers require some form of in-service training each year. Certainly, CIMMYT can only hope to provide quality training to a fraction of this manpower base at its headquarters in Mexico.

CIMMYT's efforts to strengthen national programs must continue to take into account the differences that exist among national programs. Some developing countries have well-established research institutions; some are just beginning. CIMMYT's training-related assistance must reflect these differences by tailoring its program offerings. While directing most of its training-related support where the greatest needs exist, the more established national programs should not be neglected.

Increase Funding to National Programs for Training—Three-quarters of the respondents to the former-trainee questionnaire (from 64 countries) indicated that their national program institute did not offer in-service training programs that accomplished the same objectives as the CIMMYT training courses. However, enrollment limitations for in-service training, the relatively high cost of this type of intensive training, plus the large and growing training demands of collaborating national institutes, make it essential for national

programs to establish their own in-service training programs. To help in this effort, CIMMYT is seeking to mobilize donor funds to establish national in-service training programs, especially in production agronomy on-farm research methodologies, where there is an urgent need for larger cadres of research workers to achieve greater production impact at the farm level. Increased assistance is also needed to help collaborating institutions secure more donor funds for postgraduate training.

Maximizing the "Multiplier Effect"—Faced with demand for training that cannot be adequately satisfied at headquarters, the selection of candidates for the relatively limited number of slots available for the in-service training courses in Mexico will become even more important in the future. Efforts are being made to ensure that each in-service trainee is an acknowledged potential national research leader. CIMMYT's outreach staff, in consultation with national programs, must play an increasingly important role in identifying the best candidates for intensive training in Mexico. These individuals represent a major resource for increasing the multiplier effect for CIMMYT's training activities in Mexico. Approximately 80 percent of the respondents reported that access to a fuller range of instructional materials that described key research procedures would have been very useful, both while they were at CIMMYT and also after they returned home.

Training Activities in Mexico— CIMMYT intends to continue its tutorial-type form of in-service training in Mexico. In order to increase its activities in the development of training-related materials and its participation in national in-service training courses, the Wheat Program reduced the frequency of its in-service training courses in Mexico from two cycles to one cycle per year. The Economics Program also shifted its emphasis from training in Mexico to in-country training activities elsewhere.

Although CIMMYT has an impressive record with follow-up visits to former trainees, most former trainees who responded to the follow-up questionnaire indicated that they had not returned to the Center as visiting scientists since their in-service training. Many respondents thought that more visiting scientist fellowships should be offered for former trainees who continue to work as research collaborators, 5 to 7 years after their initial training period. Accordingly, CIMMYT will attempt to increase the number of visiting scientist fellowships it offers each year.

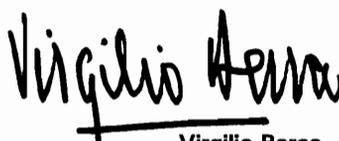
In-Country Training Outside Mexico— CIMMYT plans to increase considerably its involvement in in-country training activities, particularly in the area of crop management research procedures. For CIMMYT to plan and carry out its in-country training efforts effectively, developing country collaborators should have manpower development plans for their research institutes which include increasing responsibility for in-service training. The training officers and outreach staff, along with selected outside consultants, will serve as the principal resource personnel to assist national staff responsible for conducting in-service training within their own institutions. To adequately support these efforts, a range of training course formats and instructional materials will need to be developed.

Workshops and Conferences— With its large number of collaborating institutes, CIMMYT plans to increase its networking activities with national collaborators through sponsoring and co-sponsoring more national, regional and global conferences and workshops. Such meetings can facilitate information exchange on germplasm development and production agronomy research programs among network participants. These forums can also help CIMMYT in its research priority setting and monitoring of progress in its various program initiatives. In recent core-restricted and extra-core

grant proposals to underwrite research and training programs, specific line items are also being included to fund more regional and global workshops and conferences for network collaborators.

Improved Information Services—A more continuous flow of scientific information and training-related materials is also needed, especially to support collaborators from more developed programs. CIMMYT's expanded Communications Program and a newly proposed Scientific Information Unit will be key components in the Center's efforts to provide more effective backstopping to collaborating scientists in national programs. The bibliographic and document delivery services may prove to be especially valuable to collaborators from more developed institutions who, while they do not need basic training courses for their staff, may still have difficulty in acquiring scientific information that requires hard currency expenditures.

Summary—CIMMYT's review of training has broadened into a more comprehensive discussion of the Center's overall efforts to strengthen the human resource capacities of developing country national programs and to convey effectively research results to collaborators. As a result of these discussions, CIMMYT is seeking additional funding to develop improved training and information services facilities at headquarters and to increase its staff resources devoted to these activities. Funds are also being sought to assist national programs in the development of in-service training programs for their own staff, and to help secure additional scholarships for postgraduate training of national collaborators. With donor support, the Center can continue to play a critical catalytic role in the development of effectively trained maize and wheat researchers and production specialists throughout the developing world.


Virgilio Barco
Chairman, Board of Trustees


Robert D. Havener
Director General

Year in Review



CIMMYT has received reports from collaborators in 32 developing countries of more than 116 high-yielding maize varieties and hybrids that are based, at least in part, on CIMMYT-developed materials. At least three million hectares are now planted with these improved maize materials.

Introduction

CIMMYT's primary research thrust is to assist crop scientists from developing countries to produce improved maize, wheat, triticale, and barley varieties that are capable of high and dependable yields on farmers' fields. Priority is given to developing germplasm with improved genetic disease and insect resistance, tolerance to drought and other environment stresses, and in some cases—such as with triticale—with improved grain quality.

Crop production research issues are also of growing concern to the Center. Most of CIMMYT's crop management research activities are carried out by regionally and nationally staff members through collaborative research arrangements with developing country programs. In the course of CIMMYT's work some very cost-effective procedures have been developed to guide research aimed at formulating more profitable and productive farming systems.

Three research service units—experiment stations, laboratories, and data processing—provide support to CIMMYT's scientific programs. The experiment station staff manage the facilities and equipment for CIMMYT's breeding programs at five principal research stations in Mexico. Four of these stations—El Batan, Poza Rica, Tlaltizapan, and Toluca—are owned by CIMMYT. The fifth station, CIANO, located in northwest Mexico at Ciudad Obregon, Sonora, is owned and operated by INIA, Mexico's national research institute and CIMMYT's principal research site for its small grains improvement programs.

CIMMYT's laboratories include facilities for milling and baking evaluations, protein quality evaluations, soil and plant tissue analyses, and cytological and pathology studies. The new data processing facility has undergone a major reorganization including installation of new hardware to provide a modern data processing and computer center to serve CIMMYT's research and administrative requirements.

In addition to its crop research programs, CIMMYT is heavily engaged in training-related activities. Most of the Center's formal training courses are aimed at strengthening the scientific skills of relatively recent agricultural graduates who occupy middle-level research positions in their home institutes. However, many other training opportunities are also offered.

To better support and complement the research and training efforts of hundreds of collaborating national programs, CIMMYT has posted roughly 40 percent of its senior staff (through core and extra-core funding) to regional and national program assignments in Africa, Asia, and Latin America.

Reported here are highlights of CIMMYT's 1983 activities in research, training and communications, and consultation. Greater detail about the Center's research program of work is found in the 1983 *CIMMYT Research Highlights* and numerous technical reports and information bulletins that have been published by the Center over the last five years.

Maize Research Program

Research in the Maize Program is directed towards the development and maintenance of broadly based gene pools and populations that offer higher yield potential and greater environmental stability for developing country production conditions. Given the circumstances of the majority of maize farmers in the tropics and subtropics, the development of disease- and insect-resistant varieties is a major research objective. Because of weaknesses in the seed production and distribution systems in most collaborating countries, we also emphasize the development of open-pollinated varieties, but not to the exclusion of research on hybrids.

Germplasm Development—Many sources of genetic diversity have been used to form the 43 tropical, subtropical, and temperate zone gene pools—33 normal and 10 quality protein maize—currently being improved and maintained in the maize improvement program. These gene pools are genetic reservoirs formed through the mixing of different germplasm with similar adaptation, maturity, grain color, and texture. Recently, several new gene pools have been constituted to better serve the germplasm requirements for highland areas and for areas requiring varieties with early maturity characteristics.

A major genetic resource base for the development of CIMMYT's gene pools has been the Center's maize germplasm bank—one of the world's largest—with approximately 10,000 accessions from 46 countries. The bank holds a wealth of potentially useful germplasm for crop improvement researchers and is operated as a service unit for resident breeders as well as national scientific collaborators. In 1983, CIMMYT supplied seed samples from 245 different bank collections to research collaborators in nine countries.

CIMMYT is also currently handling 33 advanced populations—23 normal maize and 10 quality protein maize populations carrying the opaque-2 gene—which are suited to a range of climatic conditions (tropical, subtropical, temperate), maturity periods (early, intermediate, late), grain color (yellow, white), and kernel type (flint, dent). These advanced populations are more refined and uniform than CIMMYT's gene pools and have undergone more intensive improvement for a range of agronomic characters.

International Testing—International testing plays a major role in CIMMYT's maize improvement system. Maize populations are tested at several stages of advancement after the judgment is made that the material offers superior germplasm for some part of the developing world. National collaborators are key partners in the development of these materials. Their on-site local selections provide the basis for developing the experimental varieties entered into the international testing program.

More than 750 experimental varieties have been developed since CIMMYT began the current scheme of population improvement and international testing less than a decade ago. More than 30 national programs, drawing on germplasm developed through the international testing program, have released more than 100 varieties during the last five years. Dozens more new varieties are now in the final stages of national varietal certification and commercial release.

In 1983, CIMMYT shipped 802 individual maize trials to collaborators in 68 countries (see Appendix I). Three types of trials were included in the 1983 international testing program:

- 1) International Progeny Testing Trials (IPTTs)
- 2) International Experimental Variety Trials (EVTs)
- 3) International Elite Experimental Variety Trials (ELVTs).

Sixteen advanced populations were tested in IPTTs during the year, generally at six international sites each. Eight different EVT trials were also distributed. The most frequently requested EVT trials during 1983 were EVT 14A and 14B, which were sent to 85 locations and include the best intermediate-to-early maturity white and yellow grain materials. Two quality protein maize trials, EVT 15A and 15B, were also distributed. In addition, three ELVTs, comprising the best-performing elite experimental varieties, were distributed widely throughout the developing world.



CIMMYT has been successful in its efforts to improve the nutritional quality of maize. Quality protein maize varieties with normal appearance and taste have been developed that are similar or superior in yield to many of the normal varieties now under cultivation in the developing world.

Yield Potential—CIMMYT has made a major research effort to increase the grain yield efficiency of tropical maize. By recurrent selection for shorter plant types, CIMMYT has achieved major reductions (1 to 2 meters) in the average height of many its populations without the use of dwarfing genes. To date, the most outstanding populations are its tropical lowland white and yellow grain materials with intermediate to late maturity. Not only has the incidence of lodging been reduced in these materials, but the plants are more responsive to improved management and have higher yield potential through a more grain-efficient harvest index. In recent EVT's, the best experimental varieties from these populations out-yielded the best local checks (varieties and hybrids) in most of the locations reporting data to CIMMYT for analysis.

Yield Dependability—The experimental varieties developed through the international testing program continue to show many biological improvements for yield dependability. CIMMYT's germplasm improvement methodology—using a multiple-trait selection index in combination with the multilocational international testing system—is producing broadly adapted materials with polygenic resistance to diseases and insects and/or tolerance to a host of environmental stresses. CIMMYT has given considerable emphasis to the development in its germplasm of reliable resistance to the major disease problems found in the developing world. Selection is exercised continuously in both pools and populations for resistance to ear and stalk rots and for leaf blights and rusts. International testing program trial results show that the level of resistance of the CIMMYT germplasm to foliar diseases has improved considerably in recent years.

For those important maize diseases not present in Mexico at consequent levels, CIMMYT has entered into a number of cooperative research projects with other research institutions located in major disease-affected areas (these activities will be described later in this report). Regional staff have assumed the research leadership for developing varieties with resistance to these diseases.

CIMMYT's insect-rearing laboratory produced enough insect larvae in 1983 to artificially infest and screen most maize pools and populations for important insects prevalent in Mexico. Techniques have been perfected to raise millions of larvae to infest thousands of maize progenies. Progress has been slow in improving insect resistance in CIMMYT's pools and populations. Most evident is the resistance developed to fall armyworm and to certain classes of borers.

The materials emanating from the international testing program are showing—in addition to their higher yield potential and superior agronomic characteristics—an improved tolerance to stress situations, such as moisture stress. In addition, special research studies are continuing to evaluate alternative selection criteria which could be used to develop drought-resistant materials more quickly.

Nutritional Quality—CIMMYT has made a major effort to improve the nutritional quality in maize—without sacrificing yield—through the use of the opaque-2 gene in combination with other genetic modifiers. As a result of this research effort, many of the problems originally associated with opaque-2 maize, such as reduced yield, vulnerability to ear rots and stored-grain pests, and the dull chalky appearance, have been

largely overcome. Various normal-looking white and yellow grain experimental varieties have been developed that are equal or superior in yield potential to many normal maize varieties now under cultivation in the developing world.

The yield potential and adaptation of CIMMYT's nutritionally superior maize materials continue to improve. In 1983, 123 experimental variety trials were requested by collaborators from 64 countries. Also in 1983, Guatemala became the first developing country to release a quality protein maize variety for commercial production. Named Nutricia, this variety has superior protein quality (double the normal

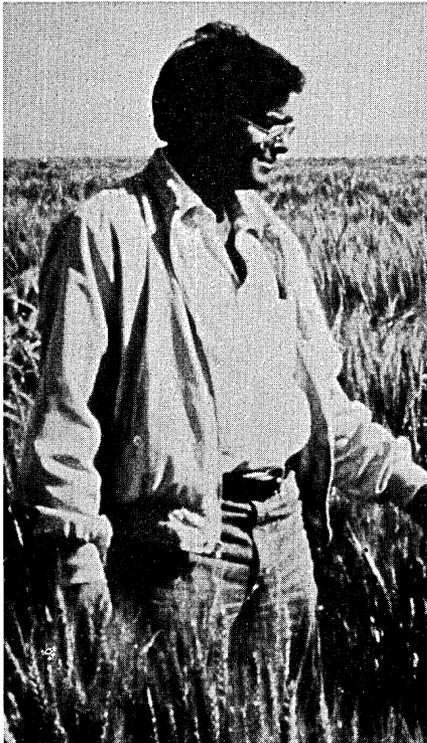
amount of lysine and typtophan) as compared to normal materials, and has demonstrated a farm-level yield potential of above 4 t/ha.

Wide Cross Research—Crosses between maize and several alien genera—sorghum, *Tripsacum* and millet—were pursued in 1983 to determine the feasibility of using potentially useful genes from these genera for maize improvement. The aim is to make maize a more environmentally stable crop with better disease and insect resistance and greater tolerance of moisture stresses, such as drought and waterlogging. The greatest success to date has been with maize x *Tripsacum* crosses, and this hybrid combination is now receiving the major research attention.

More than a dozen *Tripsacum* x maize F1 combinations have been produced. A collection of "Tripsacoid" maize materials developed by scientists at the University of Illinois (USA) is being crossed to a CIMMYT gene pool and various populations in order to evaluate useful genes for increased resistance to several diseases and insects of maize. Collaboration also continued with University of Illinois scientists on a new "Transforming DNA" technique which hopefully can increase the frequency of obtaining hybrids of maize and other crop species.



CIMMYT is engaged in a special research effort to develop high-yielding maize varieties with resistance to maize streak virus, an important disease problem in Sub-Saharan Africa. This collaborative research program is being jointly conducted with the International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria and scientists from West African national maize research programs.



More than 35 million hectares in the developing world and 5 million hectares in industrialized countries are planted with bread wheat varieties carrying CIMMYT-developed germplasm in their parentage. To date, national crop improvement programs have released more than 300 bread wheat varieties that are based, to varying degrees, on CIMMYT germplasm.

Wheat Program Research

The Wheat Program has expanded its scope over the last 18 years to include research on bread wheat, durum wheat, barley, and triticale. Since the Center's inception, over 300 high-yielding bread wheat varieties, 50 durum wheat varieties, 40 triticale varieties, and 6 barley varieties that carry CIMMYT germplasm in their parentage have been released by national programs. This record of contribution to varietal improvement in the developing world is unparalleled in the field of international agricultural research.

International Nursery Program—Each year, more than a million packets of experimental wheat, triticale, and barley seed are assembled into 42 screening and yield nurseries and crossing blocks for distribution and testing at hundreds of locations worldwide. In 1983, collaborating scientists in 91 countries requested 2,072 trials of wheat, triticale, and barley from these different germplasm nursery categories (see Appendix 1). New nursery categories have been created for germplasm with early-maturity characteristics, suitability for dryland conditions, special disease and soil stress situations, and for heat and cold tolerant materials. A new global disease surveillance trap nursery was also distributed for the first time in 1983 to 63 locations around the world. Collaborative research arrangements for more specific germplasm screening of germplasm are also being established with selected national programs strategically located to address particular problems.

International testing constitutes a key research function in CIMMYT's efforts to develop broadly adapted cultivars and to speed their distribution to national program collaborators. This international research network has also facilitated the introduction of significant new genetic variability—vital to progress

in plant breeding—into national crop improvement programs and has served as a unifying thread to bring together the work of thousands of scientists worldwide.

Bread Wheat—The bread wheat program is the largest of CIMMYT's small grains improvement efforts. Since 1980, 41 high-yielding bread wheat varieties based on CIMMYT germplasm developed through this program have been released in 18 countries. A broad genetic base is maintained in the CIMMYT materials for such characters as yield potential, wide adaptation, industrial quality and disease resistance.

Currently, the best yielding bread wheat lines are the progeny of spring x winter crosses, which have added 5 to 10 percent to maximum yield potential and greater yield dependability when compared to our best pure spring-habit semidwarf wheat varieties. The adaptation of these spring x winter lines is also evident from international trials. One cross, Veery, has produced a number of lines that have been the top yielders during the last four years of international testing. Added drought and tolerance and improved disease resistance are also increasingly evident in some spring x winter materials.

In bread wheat research a continuing strong emphasis is placed on developing enhanced and stable disease resistance, particularly to the major rusts—leaf, stem, and stripe—which still constitute the major disease threat to dependable yields in much of the developing world. Of the three rusts, the achievement of more stable leaf rust resistance has been the most elusive. Some of CIMMYT's bread wheat cultivars have, however, demonstrated a "slow rusting" characteristic, e.g., they become infected with leaf rust, but at such a slow rate of infection that little reduction in yield occurs. Materials with this characteristic are being extensively used in the current crossing program.

Other disease problems are also being addressed. In particular, considerable research attention is given to developing materials with higher levels of resistance to the fungal diseases caused by *Septoria* spp. More recently, the development of materials with resistance to *Fusarium* spp. (an important disease problem in central China and other areas with warm, humid climates) and *Helminthosporium* spp. (also a disease problem in warmer production areas) has increased in priority.

A number of high-yielding bread wheat lines with tolerance to the higher levels of free aluminum often found in acid soil areas and with improved resistance to the many diseases found in these environments are being rapidly developed through a cooperative shuttle breeding program with national scientists from Brazil. With adequate disease resistance, these varieties will yield up to twice as

much as the currently available commercial varieties grown in Brazil's wheat production areas which have acid soils that are high in soluble aluminum.

Durum Wheat—Durum wheat is principally used for making pasta products and certain types of unleavened bread. Worldwide, this wheat species is grown on about 30 million hectares, with roughly 11 million hectares in production in the developing world (principally the rainfed production areas in the Mediterranean basin countries of North Africa and the Middle East, Argentina, and Chile). Approximately 50 high-yielding durum varieties that are based on germplasm developed by CIMMYT's durum breeders have been released in 15 countries.

The current yields of the best durum materials are equal to, or higher than, the best bread wheat materials. Yields of up to 11 t/ha

have been recorded at certain international testing locations. In the Yaqui Valley around the CIANO experiment station, commercial yields of the durum variety Yavaros 79 have consistently been higher than those of the best bread wheats.

The durum crossing program now places a heavy emphasis on improving disease resistance. The development of durum lines with high levels of yellow rust resistance has been quite successful. However, higher resistance to stem rust, septoria, and fusarium is needed, since high levels of susceptibility to these diseases are still recorded in many production areas. Good genetic sources of resistance to these diseases exist within CIMMYT's durum wheat crossing blocks and are since high levels of susceptibility to these diseases are still recorded in many production areas. Good genetic sources of resistance to these diseases exist within CIMMYT's durum wheat crossing blocks and are now being fully exploited to pyramid genes for higher and more stable resistance.

More winter x spring crosses are being made each year to capitalize on genes found in winter habit durum wheats for enhanced tolerance to cold and drought stress conditions and to increase the levels of resistance to certain diseases. Efforts to modify the spike architecture in the durum plant to reduce the incidence of head-rotting diseases which affect durums in many areas have been quite successful.

Considerable headway has also been made in developing sawfly-resistant durum types with solid stems for areas in North Africa where sawflies can cause serious damage in normal semidwarf materials. Continuing efforts are also being made to develop earlier maturing, drought tolerant varieties with good yield potential and disease resistance.



Durum wheat is principally used for making pasta and certain types of unleavened bread. The yields of CIMMYT's best durum materials are equal to, or higher than, its best bread wheats. Efforts continue to improve the disease resistance and adaptation of these materials in order to increase their yield dependability under a broader range of commercial growing conditions.



Considerable progress has been made in the development of high-yielding triticale varieties with excellent tolerance to agroclimatic stresses and high levels of resistance to most small grains diseases. In certain environments, CIMMYT's best triticale lines yield considerably more than its best wheats. A problem of shrivelled grain has hampered the commercial acceptance of triticale. The improvement achieved grain quality is an important factor for the accelerating trend in triticale varietal releases by cooperating national programs around the world.

Such materials would be particularly advantageous in areas characterized by drought stress problems and/or with a short growing season.

There is a growing export potential for durum wheats with large grains, high grain test weights, and acceptable pigment and protein content. To help collaborating developing countries that have the potential to export durum wheat, numerous lines with high yield potential and satisfactory quality characteristics have been developed.

Triticale—Triticale is a man-made cereal which resulted from the successful hybridization of wheat and rye. CIMMYT's research interest in triticale is motivated by several major considerations. One is the somewhat greater total dry matter production of triticale vis-a-vis semidwarf wheats, which gives triticale a combined forage and grain advantage over wheat as a livestock feed. Second, a repartitioning of triticale's total biomass production to grain could allow triticale to attain higher levels of maximum genetic yield potential than wheat. Finally, triticale to date has also shown very high levels of resistance to the rusts and several other diseases as well as tolerance to agroclimatic and soil stresses, such as cool highland temperatures and acid soils high in free aluminum where phosphorus availability is limiting.

Approximately 40 high-yielding triticale varieties based on CIMMYT materials have been released (mainly since 1979) in 11 countries. Approximately 750,000 hectares are now in commercial production; while most of this area is located in developed countries, the recent surge in varietal releases in developing countries indicates a rapidly growing interest in triticale, both as a food and forage-feed crop.

Problems of lodging, late maturity and inferior grain quality have been overcome to a considerable extent. Many medium-tall semidwarf triticale types with greatly improved straw

strength have been developed. In addition, a new range of earlier maturing triticales were sent out for international testing in 1983. A few of these lines ripen within five days of CIMMYT's earliest maturing wheat materials.

The major drawbacks in CIMMYT's triticale materials are still in grain type and the tendency for the grain to sprout before harvest. Although it has been relatively easy to find triticales with high grain test weights when grown under favorable production conditions, these test weights drop sharply as production environments become less favorable. Considerable progress has been achieved in recent years to overcome this problem; 1983 research data on test weights show a number of high-yielding triticale lines with more acceptable and stable test weights—within 10 percent of commercial bread wheat varieties. Some improvements in preharvest grain sprouting have also been made, although higher levels of resistance are still required.

Barley—CIMMYT began its improvement work on barley as a human food more than a decade ago. Today this improvement program is conducted in direct collaboration with ICARDA, Syria. Substantial progress has been made in the development of barley germplasm with high yield potential, lodging resistance, wide adaptation, hull-less grain types, and improved nutritional quality. The primary problem with CIMMYT's barley materials has been their generally high susceptibility to many diseases, especially leaf rust, stripe rust, scald, helminthosporium, and barley yellow dwarf virus.

A shuttle breeding program between Mexico and the Andean zone (where very heavy natural disease levels exist) has been initiated to speed the development of disease resistance in CIMMYT's barley materials. More effective artificial disease epidemics are also being created in Mexico to generate heavier disease pressure on these materials in order to identify

resistant types. During the 1983-84 season, F₅ lines with excellent agronomic type and with a combination of scald and leaf rust resistance were entered in yield trials.

Several hundred lines have been identified with resistance to the major barley diseases and have been assembled into a special disease-resistance crossing block, which was distributed to collaborators for testing in 49 locations in 28 countries. A Barley yellow dwarf nursery was assembled for the second time in 1983 and distributed to 51 locations in cooperating countries. Markedly accelerated progress on correcting the disease susceptibility of CIMMYT's barley materials is expected over the next several years.

Efforts are also under way to develop a broader maturity range in CIMMYT's barley germplasm. New germplasm sources from European parents are being introduced into the program. More intensive use of winter barley germplasm is being made in spring x winter crosses to develop high-yielding barleys for production areas (such as in Mediterranean countries) requiring late maturing varieties. Conversely, in other barley growing regions with low moisture or short-season environments, earlier-maturing barleys are needed. Superior lines for both maturity extremes are being rapidly developed.

As noted earlier, ICARDA will assume leadership of the CGIAR-supported barley improvement network. Work will continue to be

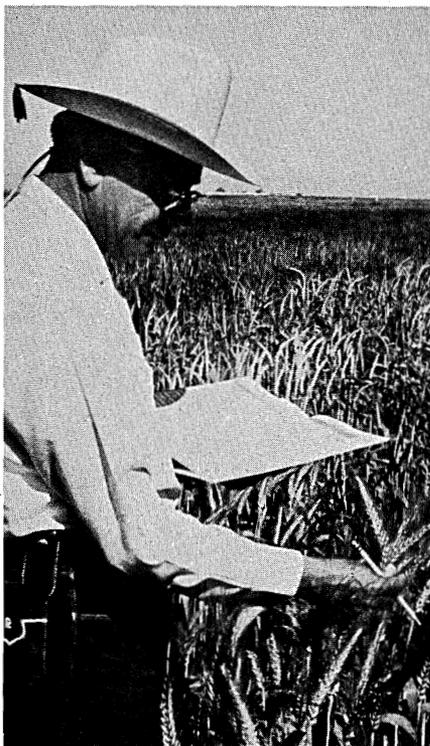
conducted in CIMMYT and Government of Mexico facilities, but under ICARDA direction.

Germplasm Bank—CIMMYT's new small grains germplasm bank facility became fully operational in 1983. In total, CIMMYT now has approximately 20,000 bread wheat, durum wheat, triticale, and barley germplasm accessions in its base collection. During the year, approximately 5,000 new accessions from the CIMMYT breeding programs were added to the germplasm bank collections. Another 1,000 accessions, including land races, special lines, and commercial varieties from other germplasm banks around the world, were introduced into the collection. More than 10,000 seed collections were regenerated during the 1982-83 season, and carefully selected new seed replaced the old. Morphological and agronomic characters were recorded for each of these collections. During the year, seed of 1,968 collections was supplied to collaborators from national programs. Initial steps were also taken to computerize the information being generated on the germplasm bank collections.

Special Germplasm Development—To capitalize on potentially valuable germplasm that cannot be readily utilized in the conventional breeding programs, CIMMYT has a special research unit that attempts to transfer useful genes into lines with good agronomic characteristics. One project involves the development of separate source populations (gene pools) for resistance to *helminthosporium* and *fusarium* in bread wheat, durum wheat and triticale. Another expanded research effort is aimed at developing higher yielding rye types and bread wheats with particularly high grain quality for use as parental stock in the development of new triticales with higher yield potential and better grain quality.



CIMMYT has made considerable progress in the development of high-yielding barley materials for human consumption. In recent years, considerable progress has also been made towards developing the disease resistance of these materials. Beginning in 1984, the International Center for Agricultural Research for Dryland Areas (ICARDA), Aleppo, Syria, will assume full leadership of the CGIAR-supported barley improvement work.



A special germplasm development research project is attempting to produce wheats with larger, more grain-filled heads. Although many problems of grain filling and tillering still have to be overcome, this research may lead to new attainments in the maximum yield potential of future wheat varieties.

Work also continued in 1983 on the yield components of bread and durum wheats. Lines with up to nine grains per spikelet (3 to 5 are the normal number in bread wheat) and twice the number of spikelets per head have been obtained. Grain-filling is the principal problem in these crosses. In addition, larger heads have usually been accompanied by reduced tillering capacity. Some progress has been achieved in improving the trade-off between larger heads and reduced tillering ability, although problems of grain shriveling still exist in these lines.

Four special nurseries containing germplasm developed in this unit were sent for evaluation to collaborators in more than 40 countries during 1983. Two of these nurseries included the best lines developed in the yield component research on bread wheat and durum wheat. The other two nurseries included source materials developed in previous years with high levels of resistance to leaf rust and with tolerance to high levels of free aluminum in the soil.

Wide Cross Research—Another research area receiving greater attention at CIMMYT is the transfer of useful genes from related genera to wheat. Exciting progress is being made in this research program. The goal is to obtain better resistance to certain diseases, such as *H. sativum* and *F. graminis*, and improved tolerance to such stresses as salt, drought, copper deficiencies, and aluminum toxicity. Of the half dozen genera hybridized with wheat, the major species being utilized in the program belong to *Agropyron*, *Elymus*, and *Aegilops*.

Over 80 hybrid combinations have been achieved and have produced advanced backcross progenies with relative ease. The more advanced backcross progenies from five hybrid combinations are now being evaluated in field trials at four locations in Mexico to determine if levels of increased resistance and/or tolerance have been conferred. Some initial results show resistance to *H. sativum* and *F. graminis*, and efforts are under way to transfer this alien resistance to a stable wheat background.

Agronomy Research—Most of CIMMYT's agronomy research is carried out under the auspices of regional and national program projects. Some agronomy (and physiology) research, however, is also carried out in Mexico by the headquarters-based program staff. In particular, headquarters agronomists are becoming increasingly active participants with CIMMYT's breeders in the development of crop improvement methodologies for environmental stress situations such as drought, heat, and cold. Other types of nursery management issues related to fertilizer use, weed control, and irrigation scheduling are also investigated by the agronomy program. Finally, some production-oriented on-farm research trials relevant to wheat and barley production systems in the Yaqui Valley and the high plateau areas of central Mexico were carried out during the year as part of the INIA-CIMMYT cooperative national wheat improvement program.

Economics Program

The Economics Program has made a major contribution to the development of a conceptual framework for assessing the production circumstances of representative farmers in the Third World. Cost-effective research procedures for conducting farm-level surveys have been developed to help understand the most important production problems and resource circumstances faced by the majority of farmers in target research areas. This information is then used to orient subsequent crop research aimed at developing improved technologies. The on-farm research procedures developed by the Economics Program staff, in conjunction with CIMMYT and national program biological scientists, are now being used in many production-oriented research programs in the developing world.

CIMMYT economists were also involved in research studies related to the production and utilization of maize and wheat in the world economy. Data collection and trend analyses about the world maize and wheat economies are also under way. As well, a research project was initiated to develop techniques for estimating the real domestic costs for producing these commodities.

Technology Generation—From the outset, the Economics Program staff has sought to work with selected national programs in developing, demonstrating, and institutionalizing on-farm research procedures. By 1983, nearly a dozen collaborating national research institutes in Africa and Latin America were well on the way towards integrating on-farm research procedures into the process of technology generation.

Research Resource Allocation—

Research systems face the continuing problem of allocating resources among competing crops and regions. What is needed is a means of measuring these parameters in terms of resource allocation, as a basis for more rational decision making. To address such issues, CIMMYT economists have undertaken to adapt an analytical framework of comparative advantage to determine the private and social profitability of producing crops such as maize and wheat, relative to alternative crops. This type of research provides a means of linking research decisions to the environment in which researchers and farmers make decisions. The economics program, in cooperation with national program colleagues, completed two studies in 1983 on the comparative advantage of wheat production in two regions of Mexico and in highland Ecuador; a third study is currently under way in Thailand.



CIMMYT's Economics Program staff have made important contributions to the methodologies used today in on-farm research programs. The adoption of these cost-effective procedures for conducting on-farm surveys has helped researchers in more than a dozen developing countries to understand more fully the important production constraints facing farmers in target research areas.

Data Collection and Analysis—In recent years, the Economics Program has increased its data collection and analysis of the maize and wheat world economies. In 1981-82, CIMMYT initiated two new serial publications: *World Wheat Facts and Trends* and *World Maize Facts and Trends*. These reports assemble, on a regular basis, pertinent data related to maize and wheat production, utilization, and trade, and present this information in a readily comprehensible form for agricultural administrators, researchers, or policy makers.

In 1983, CIMMYT published "World Wheat Facts and Trends, Report Two": "An Analysis of Rapidly Rising Third World Wheat Consumption and Imports." This report reviews the dramatic changes over the last three decades in world wheat trade, and particularly in the developing countries during the 1970s, whose share of world wheat imports rose from one-fourth of the total in 1955 to two-thirds in 1982.



CIMMYT offers a broad range of training opportunities both at headquarters and through its regional and national program networks. In addition to its in-service technical training courses given to more than 120 individuals each year, CIMMYT also offers visiting scientist travel fellowships to bring more senior national researchers to Mexico to review breeding materials and to consult with the CIMMYT staff on research issues of mutual interest.

Training Programs

Training continues to be a major dimension of CIMMYT's total institutional effort. Training activities in Mexico, within the regions, and in national program settings stress the strengthening of field and laboratory research skills needed to conduct effective crop research programs. An increasingly diversified number of training opportunities are offered.

Maize Training—In 1983, sixty-eight scientists from 38 developing countries attended in-service training at CIMMYT (see Appendix II). Four technical training courses were offered: crop improvement, crop production, protein quality laboratory research and experiment station management. Sixty-five percent of the in-service trainees were enrolled in the crop production course. Another 19 visiting scientists were invited to Mexico during the year, spending 1 to 3 months at the center. During 1983, CIMMYT cooperated in the training of eight MSc and four Ph.D students from developing countries. In addition, eight postdoctoral fellows and two associate scientists (on 1 to 2 year assignments) were in residence at CIMMYT in Mexico during the year.

Wheat Training—During 1983, sixty-one in-service wheat scientists from 29 countries participated in CIMMYT's in-service training program (see Appendix II). Five technical training courses were offered: breeding, pathology, crop production, cereal technology, and experiment station management.

Travel fellowships for 23 visiting scientists were provided in 1983. CIMMYT also cooperated in the training of six MSc and four Ph.D students from developing countries during 1983. In addition, seven postdoctoral fellows and two associate scientists were in residence as associate staff within the Wheat Program.

Economics Training—The economics staff continued their participation in 1983 in the maize and wheat crop production in-service training courses held in Mexico. In addition, a number of in-country training courses were undertaken in collaboration with other CIMMYT crops program staff and national program staff. Two postdoctoral fellows also worked within the Economics Program during 1983. Both were assigned to headquarters, with one working full-time with Mexican agricultural research institutions to expand their programs of on-farm research in basic grains.

Regional Programs

During 1983, twenty-six senior staff members were assigned to regional maize, wheat, and economics programs. These staff have important research and training responsibilities, in addition to their liaison activities between CIMMYT headquarters and developing country national programs. The shifting of certain research responsibilities from headquarters to the staff posted in regional programs is an important element in CIMMYT's strategy to expand its research activities on important germplasm development and crop management problems not easily addressed in Mexico.

Regional Program Staff, 1983

Region	Maize	Wheat	Economics
Central America, Mexico and Caribbean	3	—	1
Andean countries	3	2	—
South American Southern Cone	—	2	—
North & West Africa	2	2	—
Middle East	1	1	—
Eastern and Southern Africa	1	1	1
Asia	2	2	2
Total	12	10	4

In maize, a number of disease-related research projects originally organized between CIMMYT headquarters staff

and national collaborators in strategically located countries have been reorganized so that the locus of activities has been shifted to the Center's regional program staff located in the major disease-affected areas. International collaboration is under way on three major diseases of maize: downy mildew, a major problem in Asia, streak virus, a serious disease problem in Africa, and corn stunt virus, mainly a problem in Latin America. Good progress has been made in developing high-yielding varieties with increased resistance to downy mildew and corn stunt virus.

Prior to the establishment of a collaborative research project with IITA and several West African national programs, CIMMYT's work on streak virus resistance lacked a suitable facility to rear the vector needed to ensure adequate selection pressure. Sources of resistance from

IITA's germplasm are now being incorporated into one of CIMMYT's high-yielding tropical lowland populations. In 1983, international progeny testing trials were conducted for the first time. High-yielding experimental varieties with enhanced streak virus resistance have been developed and were included in the 1983 international experimental variety trials.

In the Wheat Program, a number of regional disease screening and surveillance nurseries as well as regional yield trials were prepared and distributed by regional program staff members. One regional disease surveillance nursery was also prepared and distributed by the Andean regional program staff, in cooperation with Ecuador's national wheat research program. Regional screening and yield trials were also prepared by the regional wheat staff assigned to the Southern Cone and Eastern and Southern Africa. In addition, the staff assigned to East Africa assisted the Kenyan national government in the operation of an off-season nursery program as a service to other African and Middle Eastern national research programs.

In the Economics Program, regional economists were actively engaged in collaborative research projects to demonstrate the utility of farm surveys designed to identify critical factors related to farmers' circumstances. During 1983, the regional economist position for the Andean countries was discontinued after six years of effective involvement. During this period, on-farm research programs were initiated in several Andean countries.



CIMMYT's major training activity continues to be its in-service training courses. These courses are aimed at developing the scientific skills of middle-level research workers through a learning-by-doing curriculum. Most trainees are enrolled in the maize and wheat production agronomy courses, which emphasize the importance of on-farm research to develop relevant production technologies for recommendation to farmers.



CIMMYT is increasingly involved in training activities outside Mexico. In Ecuador, on-farm training course participants learn to organize farmers' field days in order to demonstrate their research findings and to get feedback about farmer reactions to various production alternatives under study.

Several staff were deputed during the year to regional assignments in Asia and Eastern and Southern Africa. At the end of 1983, the Asian regional economics program had one staff member posted to Thailand to cover Southeast Asia and one staff member posted to Pakistan to cover South Asia. Two new staff members joined the eastern and southern African regional economics program and were posted to Kenya and Swaziland through special project funds from USAID. These staff are engaged in cooperative research and training programs in on-farm research methodologies.

Information Services

In 1983, CIMMYT published 29 new titles (see Appendix III) which were distributed according to areas of interest to a mailing list containing 4,900 names. Many other papers were submitted to professional journals, or were prepared for presentation at international and national meetings (see Appendix III); some of these papers will appear in proceedings published elsewhere. During 1983, CIMMYT developed plans to considerably increase its information services program. Plans were made (and submitted for extra-core funding consideration) to create a new Scientific Information Unit that will have access to major scientific information databases and will offer bibliographic and document delivery services to national collaborators as well as CIMMYT staff. In addition, the unit will help generate and assist in the analysis of internal databases needed by CIMMYT to manage its research and training programs more effectively.

Conferences and Workshops

During 1983, CIMMYT cosponsored a number of conferences both at headquarters and on a regional or national basis. At headquarters, five major scientific conferences were held during the year. In addition, CIMMYT staff made more than 90 presentations at workshops and conferences organized by other institutions (see Appendix III).

Consultation Assistance

The active consultation schedules of the CIMMYT staff (over 3,000 mandays in 55 developing countries in 1983) are crucial in keeping the Center's research and training programs well-targeted to the needs of national programs in the developing world. In 1983, scores of field trips were carried out by CIMMYT's regional and headquarters staff to review materials from the international nurseries as well as national breeding programs. This heavy travel agenda also serves to provide follow-up support to former CIMMYT trainees as well as to identify new prospective training program candidates. Finally, CIMMYT's senior staff are frequently called upon by national research leaders to advise on the organization of national maize and wheat research programs as well as significant production-related problems in which CIMMYT has expertise.

Appendix I

Distribution of international maize trials, 1981-83

Region and country	1981 trials	1982 trials	1983 trials	Region and country	1981 trials	1982 trials	1983 trials
Central America, Mexico and Caribbean				Guinea	2	—	10
Bahamas	1	2	—	Guinea-Bissau	4	5	4
Barbados	2	9	—	Ivory Coast	9	6	5
Belize	3	6	3	Kenya	7	6	39
Costa Rica	8	9	31	Liberia	—	5	—
Cuba	—	3	2	Malawi	12	10	1
Dominican Republic	12	6	10	Mali	4	7	23
El Salvador	4	7	10	Mauritania	2	—	—
Grenada	1	—	—	Mozambique	8	18	—
Guatemala	10	16	17	Niger	1	—	—
Haiti	—	—	4	Nigeria	10	12	4
Honduras	12	20	20	Rep. South Africa	11	10	—
Jamaica	3	8	2	Reunion	8	—	—
Mexico	41	63	68	Senegal	6	10	8
Nicaragua	9	18	6	Sierra Leone	21	—	33
Panama	28	14	26	Somalia	4	5	9
St. Kitts	1	—	—	Sudan	6	5	—
Trinidad	3	—	2	Swaziland	7	6	6
				Tanzania	5	5	11
South America	101	88	114	Togo	4	14	12
Argentina	4	5	18	Transkei	2	2	—
Bolivia	10	15	13	Uganda	5	7	5
Brazil	38	38	39	Upper Volta	11	5	12
Chile	—	2	1	Zaire	4	6	12
Colombia	2	1	8	Zambia	4	—	6
Ecuador	7	2	—	Zimbabwe	6	9	15
Paraguay	5	4	—				
Peru	10	12	16	South and East Asia	81	130	186
Surinam	—	—	3	Afghanistan	—	4	1
Uruguay	2	1	1	Bangladesh	4	8	8
Venezuela	14	8	15	Burma	6	1	9
				China	3	—	—
Mediterranean/Mideast	41	30	24	India	12	20	28
Algeria	—	1	—	Indonesia	2	7	6
Egypt	7	5	2	Korea, South	2	1	1
Iraq	4	—	—	Malaysia	3	7	7
Libya	2	2	—	Nepal	5	8	7
Morocco	3	5	—	Pakistan	12	23	17
Qatar	—	—	2	Philippines	—	13	43
Saudi Arabia	6	3	13	Sri Lanka	6	—	6
Turkey	9	8	—	Thailand	12	14	45
Yemen A.R.	10	6	7	Vietnam	8	22	8
Sub-Saharan Africa	204	189	252	Other	14	14	25
Angola	2	11	3	France	—	2	—
Benin	5	4	6	Germany, Fed. Rep.	—	3	—
Botswana	2	—	—	Greece	2	2	2
Burundi	—	—	12	New Guinea	—	—	12
Cameroon	8	10	6	Tahiti	1	1	—
Cape Verde	—	3	4	USA	6	6	11
Central African Republic	2	—	—	Yugoslavia	5	—	—
Congo	2	4	—				
Comoros	2	—	—	TOTAL TRIALS	578	632	802
Ethiopia	10	—	—	TOTAL COUNTRIES	84	73	68
Gabon	—	—	2				
Gambia	—	—	2				
Ghana	8	4	2				

Appendix I (cont'd)

Distribution of international bread wheat, durum, triticale, and barley nurseries, 1983

	Bread wheat	Durum	Triti- cale	Barley		Bread wheat	Durum	Triti- cale	Barley
Latin America	280	101	93	69	Asia	170	30	44	83
Argentina	44	19	11	2	Afghanistan	3	2	1	1
Bolivia	15	6	4	1	Bangladesh	15	1	1	6
Brazil	61	3	20	5	Bhutan	2	—	1	2
Chile	25	10	8	8	Burma	5	—	1	3
Colombia	7	—	2	2	China	54	5	9	23
Costa Rica	3	2	1	1	India	6	3	1	4
Dominican Republic	1	—	4	—	Indonesia	3	2	1	2
Ecuador	12	1	3	4	Japan	1	—	—	—
Guatemala	10	2	4	1	Korea, South	4	1	4	7
Guyana	3	—	1	—	Nepal	7	3	3	3
Mexico	54	47	27	24	Pakistan	38	1	11	15
Paraguay	17	1	3	2	Philippines	7	2	2	3
Peru	23	10	5	19	Sri Lanka	4	1	1	2
Uruguay	5	—	—	—	Taiwan	3	—	2	3
					Thailand	18	9	6	9
Africa	164	66	60	80	Oceania	17	10	14	2
Algeria	11	9	2	4	Australia	10	3	6	—
Burundi	3	—	—	—	New Zealand	7	7	8	2
Cameroon	5	1	2	2	Europe	133	95	88	78
Congo	3	—	—	—	Austria	—	6	—	2
Egypt	14	9	4	8	Belgium	1	—	3	—
Ethiopia	8	10	4	6	Bulgaria	—	8	2	—
Ghana	—	—	1	—	Czechoslovakia	5	—	—	—
Kenya	13	5	5	12	France	11	5	9	8
Libya	3	4	—	4	German D. Rep.	4	—	2	4
Malawi	7	—	3	3	Germany, F. Rep.	1	6	3	6
Morocco	6	6	4	8	Greece	9	8	6	6
Mozambique	4	—	—	—	Hungary	4	3	3	—
Niger	1	1	1	1	Ireland	5	—	—	—
Nigeria	4	1	2	2	Italy	7	19	6	8
Rwanda	6	—	2	4	Netherlands	—	2	2	—
Senegal	2	—	—	—	Norway	4	—	3	3
South Africa	21	10	10	12	Poland	9	1	9	4
Sudan	8	—	1	—	Portugal	9	5	4	3
Tanzania	12	1	4	2	Rumania	4	2	2	10
Tunisia	6	8	3	6	Spain	38	23	18	12
Uganda	3	—	1	—	Sweden	4	—	4	—
Upper Volta	1	—	1	—	Switzerland	—	—	3	—
Zaire	2	—	1	—	United Kingdom	3	—	1	5
Zambia	15	—	6	—	USSR	7	—	3	—
Zimbabwe	6	1	3	6	Yugoslavia	8	7	5	7
Mideast	88	56	26	39	North America	81	18	17	12
Cyprus	3	5	2	3	Canada	14	10	6	4
Iran	2	1	—	3	USA	67	8	11	8
Iraq	1	2	1	3	TOTAL TRIALS	933	376	342	363
Israel	18	7	2	8	TOTAL COUNTRIES	86	62	78	65
Jordan	4	6	2	3					
Lebanon	1	1	—	—					
Qatar	2	1	1	2					
Saudi Arabia	3	1	3	—					
Syria	23	14	6	7					
Turkey	23	16	9	8					
Yemen, South	8	2	—	2					

Appendix II

Origin of maize in-service trainees, 1971-83

Region and country	1971-83	1983	Region and country	1971-83	1983
Central America, Mexico and Caribbean	209	26	South and East Asia (Cont'd)		
Belize	6	0	Nepal	24	2
Costa Rica	12	1	Pakistan	43	5
Cuba	2	2	Philippines	26	6
Dominica	1	0	Thailand	39	4
Dominican Republic	17	3	Vietnam	4	2
El Salvador	25	3	North Africa and Mideast	46	5
Grenada	1	0	Algeria	1	0
Guatemala	20	3	Egypt	21	2
Guyana	1	0	Syria	2	1
Haiti	18	3	Tunisia	3	0
Honduras	28	3	Turkey	16	2
Jamaica	1	1	Yemen A.R.	3	0
Mexico	38	2	Sub-Saharan Africa	187	25
Nicaragua	24	4	Benin	1	1
Panama	15	1	Botswana	2	0
South America	95	7	Cameroon	4	2
Argentina	11	0	Cape Verde	1	0
Bolivia	12	2	Congo	1	1
Brazil	3	0	Ethiopia	6	0
Colombia	14	1	Ghana	29	2
Chile	2	0	Guinea-Bissau	1	1
Ecuador	20	1	Ivory Coast	4	0
Paraguay	1	1	Kenya	9	4
Peru	24	2	Mali	1	1
Venezuela	8	0	Malawi	6	1
Asia	183	22	Mozambique	3	0
Afghanistan	6	0	Nigeria	15	1
Bangladesh	13	2	Rwanda	1	0
Burma	1	0	Senegal	2	1
India	10	0	Swaziland	1	0
Indonesia	5	1	Tanzania	55	3
Japan	7	0	Transkei	1	0
Korea	2	0	Uganda	3	2
Malaysia	3	0	Zaire	32	2
			Zambia	9	3
			Other	3	0
			TOTAL TRAINING FELLOWS	723	85
			TOTAL COUNTRIES	68	38

Appendix II (cont'd)
Origin of wheat in-service trainees, 1966-83

	1966- 1983	1983		1966- 1983	1983
Latin America	201	17			
Argentina	15	1	Sub-Saharan Africa	96	14
Bolivia	23	3	Burundi	1	1
Brazil	19	0	Cameroon	5	1
Chile	13	0	Chad	1	0
Colombia	7	1	Ethiopia	18	3
Dominican Republic	3	1	Kenya	13	3
Ecuador	21	2	Lesotho	2	0
Guatemala	11	2	Madagascar	2	0
Guyana	2	0	Malagasy	1	0
Honduras	1	0	Malawi	3	0
Mexico	47	2	Mali	3	0
Panama	1	0	Mozambique	1	0
Paraguay	8	1	Nigeria	17	1
Peru	29	4	Rwanda	2	0
Uruguay	1	0	Senegal	2	0
			Somalia	1	0
North Africa			Tanzania	11	3
and Mideast	214	6	Transkei	1	0
Algeria	54	0	Uganda	1	0
Cyprus	2	0	Zaire	2	0
Egypt	15	1	Zambia	7	0
Iran	9	1	Zimbabwe	2	2
Iraq	5	0			
Jordan	7	0	Asia	191	22
Lebanon	4	0	Afghanistan	13	0
Libya	4	0	Bangladesh	45	3
Morocco	20	0	Burma	2	0
Saudi Arabia	2	0	India	18	0
Sudan	3	0	Korea	15	3
Syria	8	1	Nepal	19	0
Tunisia	28	1	Pakistan	61	8
Turkey	50	2	Philippines	9	4
Yemen	3	0	Sri-Lanka	2	1
			Thailand	7	3
			Other Countries	25	2
			France	1	0
			Hungary	2	0
			Norway	1	1
			Poland	3	0
			Portugal	4	1
			Rumania	2	0
			Spain	4	0
			USA	4	0
			USSR	4	0
			TOTAL TRAINING		
			FELLOWS	727	61
			TOTAL COUNTRIES	70	29

Appendix III

Publications Released by CIMMYT in 1983

	Language	Pages	Press Run
Administration			
Informe del CIMMYT 1982	Spanish	136	3,000
Annual Report 1982	English	68	1,500
This is CIMMYT	English	48	3,500
	Spanish	48	3,500
Maize			
CIMMYT's Maize Germplasm Management, Improvement, and Utilization	English	28	2,500
	Spanish	28	2,000
Breeding and Selection for Drought Resistance in Tropical Maize	English	24	2,000
Efficient Mass-Rearing and Infestation Techniques to Screen for Host Plant Resistance to Maize Stem Borers, <i>Diatraea</i> Sp.	English	24	2,000
Efficient Mass-Rearing and Infestation Techniques to Screen for Host Plant Resistance to Fall Armyworm, <i>Spodoptera frugiperda</i>	English	20	2,000
Maize International Testing Report, Final 1981	English	218	750
	Spanish		
Maize International Testing Report, Preliminary 1982	English	244	750
	Spanish		
Maize International Testing Report, Final 1982	English	284	750
	Spanish		
Wheat			
Report on Wheat Improvement, 1980	English	176	2,500
Common Diseases of Small Grain	English	152	7,000
Results of the 13th Intl. Triticale Screening Nursery (ITSN) 1981-82	English	34	500
	Spanish		
Results of the 13th Intl. Durum Screening Nursery (IDSN) 1981-82	English	42	500
	Spanish		
Results of the 18th Intl. Spring Wheat Yield Nursery (ISWYN) 1981-82	English	86	500
	Spanish		
Results of the 13th Intl. Durum Yield Nursery (IDYN) 1981-82	English	50	500
	Spanish		
Results of the 13th Intl. Triticale Yield Nursery (ITYN) 1981-82	English	68	500
	Spanish		
Results of the 15th Intl. Bread Wheat Screening Nursery (IBWSN) 1981-82	English	44	500
	Spanish		
Results of the 11th Elite Durum Yield Trial (EDYT) 1981-82	English	38	500
	Spanish		
Results of the 12th Intl. Septoria Observation Nursery (ISEPTON) 1981-82	English	40	500
	Spanish		
Results of the 3rd Elite Selection Wheat Yield Trial (ESWYT) 1981-82	English	38	500
	Spanish		
Results of the 4th Intl. Barley Yield Trial (IBYT) 1981-82	English	46	500
	Spanish		

Appendix III (cont'd)

Publications Released by CIMMYT in 1983

	Language	Pages	Press Run
Economics			
World Wheat Facts & Trends-Report 2	English	42	7,500
Planification de Technologies Appropies Pour les Agriculteurs, Concepts et Procédés	French	84	1,500
Working Paper Series:			
Creating an On-Farm Research Program in Ecuador	English	30	500
Institutional Innovations in National Agricultural Research: On-Farm Research within IDIAP, Panamá	English	46	700
Maize Production Practices and Problems in Egypt: Results of Three Farmer Surveys	English	70	700
The Economic Returns to Institutional Innovations in National Agricultural Research: On-Farm Research in IDIAP, Panama	English	60	700

Scientific Journal Articles (and monographs/book chapters)

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Independently Audited Financial Statement



México, D. F., March 2, 1984

To the Board of Trustees of
Centro Internacional de Mejoramiento
de Maíz y Trigo, A. C.

In our opinion, the accompanying statements of condition and the related statements of activity and of changes in financial position on a cash basis, expressed in United States dollars, present fairly the financial position of Centro Internacional de Mejoramiento de Maíz y Trigo, A. C. (CIMMYT) at December, 31, 1983 and 1982, and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles for not-for-profit organizations consistently applied. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Our examinations were made primarily for the purpose of forming our opinion on the financial statements taken as a whole. We also examined the additional information presented on Exhibits 1 to 4, expressed in United States dollars, by similar auditing procedures. In our opinion, this additional information is stated fairly in all material respects in relation to the financial statements taken as a whole. Although not necessary for a fair presentation of financial position, results of operations and changes in financial position, this information is presented as additional data.

PRICE WATERHOUSE

A handwritten signature in black ink, appearing to read "C. P. Oscar Córdova".

C. P. Oscar Córdova

**Centro Internacional de Mejoramiento de Maíz y Trigo, A.C.
Statement of Condition**

Currency: U.S. Dlls. (000's)

Assets	As of December 31	
	1983	1982
Current Assets		
Cash on Hand and in Banks	732	645
Short-Term Investments (Note 2)	3,084	2,608
	3,816	3,253
Accounts Receivable (Note 6)		
Donors	2,118	1,307
Others	331	453
	2,449	1,760
Inventories	106	78
Total Current Assets	6,371	5,091
Fixed Assets (Note 2)		
Vehicles	2,879	2,701
Furniture, Fixtures and Equipment	3,465	2,956
Buildings	5,993	5,989
Land	464	464
Other Fixed Assets	369	372
Total Fixed Assets	13,170	12,482
Other Assets		
Guarantee Deposits	1	1
Total Other Assets	1	1
Total Assets	19,542	17,574

The attached notes numbered 1 to 6 form an integral part of these Financial Statements.

**Liabilities, Capital Grants,
Unexpended Funds
and Reserves**

	As of December 31	
	1983	1982
Current Liabilities		
Payments in Advance—Donors (Note 6)	1,421	214
Vouchers Payable	3,133	3,292
Seniority Premiums (Note 2)	77	87
Accrued Taxes	145	—
Accrued Miscellaneous Expenses	7	—
Accounts Payable—Donors	—	42
Total Current Liabilities	4,783	3,635
Capital Grants, Unexpended Funds and Reserves		
Capital		
Fully Expended on Fixed Assets (Note 2)	13,170	12,482
Operating Funds (Note 4)	1,540	1,540
	14,710	14,022
Unexpended Funds		
Core-Unrestricted	808	800
Core-Restricted	19	19
Extra-Core and Cooperative Projects	(48)	(48)
Auxiliary Services	248	16
Translation Effect (Note 3)	(1,070)	(962)
	(43)	(175)
Trustees Reserve	92	92
Total Capital Grants, Unexpended Funds and Reserves	14,759	13,939
Total Liabilities and Capital	19,542	17,574

The attached notes numbered 1 to 6 form an integral part of these Financial Statements.

Centro Internacional de Mejoramiento de Maíz y Trigo, A.C. Comparative Statement of Activity

Currency: U.S. Dlls. (000's)

	Year ended December 31	
	1983	1982
Revenue (Note 5)		
Grants	19,940	20,825
Administrative Fees	848	869
Sale of Crops	17	27
Interest on Investments in Marketable Securities	386	349
Auxiliary Services	636	586
Other Income	26	—
Total Revenue	21,853	22,656
Expenses (Note 5)		
Research Programs	13,578	13,026
Conferences and Training	3,117	2,277
Information Services	662	534
General Administration	1,669	1,912
Plant Operations	1,056	2,253
Capital Acquisitions	269	364
Auxiliary Services	404	545
Indirect Costs	848	869
Seniority Premiums	10	50
Total Expenses	21,613	21,830
Excess of Revenue over Expenses before Translation Effect		
	240	826
Translation Effect for the Year (Note 3)	(108)	(650)
Net Excess (deficit) of Revenue over Expenses	132	176
Unexpended Funds, Opening Balance	(175)	(351)
Closing Balance Unexpended Funds as per Statement of Condition	(43)	(175)

The attached notes numbered 1 to 6 form an integral part of these Financial Statements.

Centro Internacional de Mejoramiento de Maíz y Trigo, A.C.
Statement of Changes in
Financial Position on a Cash Basis

Currency: U.S. Dlls. (000's)

	Year ended December 31	
	1983	1982
Sources of Cash (Note 2)		
Revenue	21,853	22,656
Capitalization of Fixed Assets Purchased in the Year		
Core-Unrestricted Grants	647	866
Core-Restricted Grants	21	
Extra-Core Grants	20	97
Translation Effect of the year—Net	(108)	(650)
	22,433	22,969
Accounts receivable-others	122	75
Payments in advance-Donors	1,207	
Accrued taxes	145	
Accrued miscellaneous expenses	7	
Inventories		153
Vouchers payable		629
Seniority premiums		23
	23,914	23,849
Applications of Cash (Note 2)		
Expenses	21,613	21,830
Purchases of fixed assets		
Core Unrestricted Grants	647	866
Core Restricted Grants	21	
Extra Core Grants	20	97
Accounts Receivable-Donors	811	617
Inventories	28	
Vouchers payable	159	
Seniority premiums	10	
Accounts Payable-Donors	42	
Payments in advance-Donors		616
Accrued taxes		186
Accrued miscellaneous expenses		16
	23,351	24,228
Increase (Decrease) in cash and in temporary investments	563	(379)
Cash and temporary investments on hand at beginning of year	3,253	3,632
Cash and temporary investments on hand at end of year	3,816	3,253

The attached notes numbered 1 to 6 form an integral part of these Financial Statements.

Notes to the Financial Statements

December 31, 1983 and 1982

US Dollars

Note 1 — Statement of Purpose.

The Centro Internacional de Mejoramiento de Maiz y Trigo, A. C. (CIMMYT) is a private, autonomous, not-for-profit, scientific and educational institution chartered under Mexican law to engage in the improvement of maize and wheat production everywhere in the world, with emphasis on developing countries.

Note 2 — Summary of significant accounting policies.

CIMMYT follows accounting policies recommended by the Secretariat of the Consultative Group on International Agricultural Research (CGIAR), an international association sponsored by the World Bank, the Food and Agriculture Organization of the United Nations, and the United Nations Development Programme. These policies are in accordance with generally accepted accounting practices for not-for-profit organizations and are summarized below:

a. CIMMYT uses the accrual method of accounting for transactions and its books of account are kept in U.S. dollars. Transactions in other currencies (mainly Mexican pesos) are recorded at the rates of exchange prevailing on the dates they are entered into and settled. Assets and liabilities denominated in such currencies are translated into U.S. dollars applying Statement No. 52 of the Financial Accounting Standards Board of The United States. (FAS 52). In accordance with that statement CIMMYT has adopted the U.S. dollar as its "functional currency" in consideration that the Mexican economy has been hyper-inflationary, i.e. with a cumulative inflation rate for the three last years greater than 100 percent as measured by the National Consumer Price Index published by Banco de México.

In compliance with the provisions of Statement B-11 of the Mexican Institute of Public Accountants, the statement of changes in financial position for 1983 has been prepared on a cash basis. The statement of changes in financial position for 1982, originally prepared on a working capital basis, has been restated on a basis consistent with the 1983 statement.

b. Purchase orders issued prior to December 15 are treated as operating expenses of the year in question and are shown on the statement of condition under vouchers payable. This is in accordance with guidelines issued by the Secretariat of the Consultative Group on International Agricultural Research (CGIAR).

c. During periods of cash surplus CIMMYT makes short-term investments in marketable securities. Those denominated in dollars are transacted in the U.S. money market. Interest is credited to income when the security matures or is sold. The security is recorded at cost, which approximates market, and any gain or loss from its sale is recorded at that time. Investments in pesos are held in a short-term interest-bearing account in a Mexican bank or in government securities. Interest is credited to income as accrued.

d. Inventories—Amounts are stated at cost (first-in, first-out method), which is not in excess of market.

e. Fixed Assets—Amounts are stated at acquisition cost. Up to 1971 all purchases of property and equipment were recorded as expenses. In 1972 the Consultative Group requested that the International Agricultural Research Centers change to the "write off, then capitalize" method of recording purchases of property and equipment. Accordingly, all property and equipment purchased under capital grants as from January 1, 1972, was recorded as an asset and credited to capital grants. Prior to 1980 replacements of capital

items were recorded as expenditures of the related programs, and did not enter in any way to form part of CIMMYT's capital grants, shown on the statement of condition. In 1980, this policy was revised to conform with the accounting policies of the Consultative Group on International Agricultural Research. Under this set of guidelines, the incremental value of a capital replacement item, i.e., the amount by which the historical cost of the replacement item is greater (less) than the historical cost of the item being replaced, is credited (debited) to capital grants fully expended on fixed assets. In this way, the statement of condition reflects the historical cost of the fixed assets actually in use.

CIMMYT's buildings at certain locations in Mexico are constructed on land owned by the Mexican government, and will be donated to the government when CIMMYT ceases operations in Mexico.

f. Depreciation—In accordance with the "write off, then capitalize" method, no depreciation is provided since the assets have already been written off at the time of purchase.

g. Seniority premiums, to which employees are entitled upon termination of employment after fifteen years of services, are recognized as expenses as such premiums accrue. The estimate of the accrued benefit determined on the basis of an actuarial study as of the year end amounted to U.S. \$ 150,000 in 1983 (U.S. \$ 50,000 in 1982) and CIMMYT has recorded a liability of U.S. \$ 77,000 in 1983 (U.S. \$ 87,000 in 1982). The charge to income for the year amounted to U.S. \$ 10,000 in 1983 (U.S. \$ 50,000 in 1982) including amortization of past service cost over 10 years.

Other compensation based on length of service, to which employees may be entitled in the event of dismissal or death, in accordance with the Mexican Federal Labor Law, is charged to income in the year in which it becomes payable.

h. Income Recognition: Core unrestricted grants are given annually and are charged to accounts receivable when the amount of the donation becomes known. The receivable is cancelled when the funds are received. Any uncollected portion of the pledge applicable to the current year remains charged to accounts receivable and forms part of the institution's income in that year. If the pledge is later judged to be uncollectible it is written off against income of the year in which it is cancelled.

Core restricted and extra core pledges, which are often for more than one year, are treated somewhat differently. In these cases the amount recognized as a receivable is equal to the expenses incurred under the grant. The uncollected portion of the pledge is not recognized as a receivable and consequently does not contribute to income. Only when expenses are incurred under the grant is an account receivable created and income recorded. This treatment matches revenues and expenses in accordance with the level of activities carried out under the grant.

This accounting policy permits CIMMYT to distinguish between income and amounts pledged in core restricted and extra core grants. This is necessary since these grants often cover more than one year's activities or contain carry-forward provisions in cases of under expenditure. Recognizing the total pledge in a given year as income could result in an over statement of income. Core unrestricted grants do not require this treatment since they are given annually and the amount pledged represents income that year.

Note 3 - Mexican Peso Transactions.

At December 31, 1983 CIMMYT had Mexican peso assets and liabilities amounting to Ps 328,609,000 (Ps 30,823,000 in 1982) and Ps 58,898,000 (Ps 15,968,000 in 1982), which were included in the statement of condition at their US dollar equivalents resulting from applying the year-end rate of Ps 160.47 per dollar.

During 1982 the value of the Mexican peso compared to the dollar fell from Ps 26.06 in January to Ps 148.50 at year end. This devaluation gave rise to a translation loss aggregating U.S. \$ 650,000 for the year. In 1983 the value of the Mexican peso compared to the dollar fell from Ps 147.90 to Ps 160.47 to the dollar. This devaluation gave rise to a translation loss aggregating U.S. \$ 108,000. In accordance with FAS 52, where the firm is judged to be operating in a hyper-inflationary environment and the dollar is therefore the functional currency, the translation effect in each year is charged to current income.

On December 20, 1982 the exchange controls existing at the time in Mexico were relaxed and a free exchange market was allowed to operate along with a controlled market. In general terms, all income from the export of goods, all funds needed by in-bond jobbing companies to cover locally-incurred costs and expenses, and all loans received from foreign banks and other foreign financial entities must be exchanged through the controlled market. Foreign currency will be made available through that market for repayments of principal and payments of interest relative to such loans, payments to foreign suppliers

for goods imported prior to December 20, 1982, and payments of certain goods imported after that date specifically designated by the Commerce Department. The sale of foreign currency in the controlled market is subject to its availability. All exchange transactions not specifically assigned to the controlled market will be handled in the free market, without any restrictions. This situation continued the same during 1983.

At March 2, 1984 date of issuance of the Financial Statements, the exchange rates with the U.S. dollar were as follows:

	Buy	Sell
	Pesos/U.S.dollar	
Controlled	Ps 151.94	Ps 152.04
Free	Ps 168.66	Ps 170.16

Note 4 — Operating funds.

The CGIAR permits CIMMYT (and all other international agricultural research centers funded through it) to maintain, as part of the center's capital accounts, operating funds equal to thirty days of its core operating budget. In 1982 and 1983 there was no increase in operating funds given the small change in the dollar value of core operations.

Note 5 — Revenue and expenses:

A. Revenue. CIMMYT's revenues are grouped into six categories:

i) Grants. These are funds received from donors and are used to support two types of programs at CIMMYT: core and extra core. Core programs must fall within the mandate of the center and be approved by the Board of Trustees. These must also be approved by the members of the CGIAR, who then provide funding.

The CGIAR membership includes governments, government aid agencies, international and regional development banks, and private philanthropic foundations (see Exhibit 2). Core programs are divided into two groups: unrestricted and restricted. Unrestricted grants come with only one requirement: that the funds be used to support core activities. Restricted grants also support core activities but they must be used for an activity mutually agreed upon by CIMMYT and the donor.

Extra core programs must also fall within CIMMYT's mandate and also must be approved by the Board of Trustees. They fall outside of any direct funding through the CGIAR and may be considered related but distinct sets of activities from the core program. In general they are of four types: 1) direct assistance (i.e. posting of staff) to national programs; and 2) training at CIMMYT for persons from a specific country, and 3) collaborative research arrangements with other institutions; and 4) special exploratory research activities. Coordination of this type of funding is done between CIMMYT and the donor.

ii) Administrative Fees. These fees are charged on restricted and extra core grants. They permit CIMMYT to offset the cost of administering these grants, which by design only fund specific research activities. In 1982 and 1983 this fee was generally 15%, though for some on-campus activities it was 25%.

iii) Sale of Crops. CIMMYT operates four experiment stations throughout Mexico. Grain and other produce not required for continuance of the research programs is sold from time to time depending on their availability and quality, and revenues received are registered as income of the period.

iv) Interest on Investments in Marketable Securities. Surplus cash is invested in short-term interest bearing securities, and any interest earned is recorded as income. Similarly interest expense arising from short-term borrowings to cover cash deficit positions is charged to this account.

v) Auxiliary Services. These comprise revenues from the following areas within CIMMYT: Cafeteria, Laundry, Guest House, Dormitories and Staff Residences. As a whole, they are intended to be self-supporting.

vi) Other income. This is a grouping of miscellaneous revenues received from the sale of surplus items such as used tires and other small pieces of equipment no longer needed by CIMMYT.

B. Expenses. The breakdown of CIMMYT's expenses as shown in its statement of activity is largely self-explanatory. Included under Research Programs, the largest single expenditure, are the expenses of the Maize, Wheat, Economics, Experiment Stations, Laboratories and Data Processing units. In 1983 and 1982 their expenses were as follows:

(000's)	1983	1982
Maize	4,439	4,450
Wheat	5,927	5,945
Economics	1,196	558
Experiment Stations	1,145	1,742
Laboratories	293	102
Data Processing	576	142
Others	2	87
Total	13,578	13,026

Note 6 — Accounts receivable — and (Payments in Advance)

Donors: In 1983 and 1982 these were comprised as follows:

Accounts Receivable - Donors (000's)	1983	1982
Canadian International Development Agency	—	358
European Economic Community	49	—
International Agricultural Development Service	—	28
International Crops Research Institute for the Semi-Arid Tropics	20	105
International Institute of Tropical Agriculture	—	27
Norwegian Agency for International Development	—	30
OPEC Fund for International Development	155	294
Philippines, Government of	58	—
Spain, Government of	100	100
United Nations Development Programme	—	132
United States Agency for International Development(1)	1,736	207
Other Donors	—	26
Sub Total: Accounts Receivable - Donors	2,118	1,307
Payments in Advance - Donors		
Canadian International Development Agency	(64)	—
Instituto Nacional de Investigación y Promoción Agropecuaria/World Bank	(22)	—
Switzerland, Government of	(1,090)	(123)
The Ford Foundation	(31)	(75)
The Rockefeller Foundation/UNDP	—	(16)
United Nations Development Programme	(127)	—
Other Donors	(87)	—
Sub Total: Payments in Advance - Donors	(1,421)	(214)
Net Status of Donors Payments	697	1,093

(1). On January 27, 1984 a payment amounting to US\$ 1,499,000 corresponding to 1983's accounts was received from the United States Agency for International Development.

Others: In 1983 and 1982 these were comprised as follows:

(000's)	1983	1982
Loans to Senior Staff	226	164
Personal Charges to Employees	(39)	(23)
Official Expenses Advances	29	98
Employee Credit Union	—	3
Government of Mexico	—	31
Miscellaneous Debtors	115	180
Total	331	453

A program of loans to senior staff, mainly to provide partial financing for house purchases, was initiated in 1982.

Detailed Statement of Activity

For the Period January 1 to December 31, 1983

Exhibit 1

Currency: U.S. Dlls. (000's)

	Core Unrestricted	Core Restricted	Extra Core Cooperative	Auxiliary Services	Total
Revenue (Note 5)					
Grants	13,112	4,363	2,465	—	19,940
Administrative Fees	848	—	—	—	848
Sale of Crops	17	—	—	—	17
Interest on Investments in Marketable Securities	386	—	—	—	386
Auxiliary Services	—	—	—	636	636
Other Income	26	—	—	—	26
Total revenue	14,389	4,363	2,465	636	21,853
Expenses (Note 5)					
Research Programs	9,180	2,875	1,523	—	13,578
Conferences and Training	1,535	910	672	—	3,117
Information Services	662	—	—	—	662
General Administration	1,669	—	—	—	1,669
Plant Operations	1,056	—	—	—	1,056
Capital Acquisitions	269	—	—	—	269
Auxiliary Services	—	—	—	404	404
Indirect Costs	—	578	270	—	848
Seniority Premiums	10	—	—	—	10
Total expenses	14,381	4,363	2,465	404	21,613
Excess of revenue over expenses before translation effect	8	—	—	232	240
Translation effect for the year	(108)	—	—	—	(108)
Net excess of revenue over expenses	(100)	—	—	232	132

Detail of Sources of Income from Grants

For the Year Ended December 31, 1983

Exhibit 2

Currency: U.S. Dlls. (000's)

Core Unrestricted Grants

Australia, Government of	504	
Canadian International Development Agency	1,311	
Denmark, Government of	247	
Germany, The Federal Republic of	721	
Inter-American Development Bank	2,988	
India, Government of	53	
Philippines, Government of	100	
Spain, Government of	200	
Saudi Arabia, Government of	300	
Norwegian Agency for International Development	26	
The Ford Foundation	100	
The United Kingdom, Government of	562	
United States Agency for International Development	6,000	13,112

Core Restricted

European Economic Community	547	
France, Government of	155	
Germany, The Federal Republic of	29	
International Development Research Centre	79	
Ireland, Government of	36	
Japan, Government of	911	
Norwegian Agency for International Development	77	
OPEC Fund for International Development	325	
Switzerland, Government of	623	
The Ford Foundation	39	
The Netherlands, Government of	115	
The Rockefeller Foundation	100	
United Nations Development Programme	1,327	4,363

Extra Core and Cooperative Projects

Canadian International Development Agency	757	
International Agricultural Development Service	11	
International Crops Research Institute for the Semi-Arid Tropics/IDRC	143	
Instituto Nacional de Investigaciones Agrícolas-INIA México	2	
Instituto Nacional de Investigación y Promoción Agropecuaria/ World Bank	54	
Japan, Government of	2	
Switzerland, Government of	37	
The Ford Foundation	119	
The Rockefeller Foundation	16	
United Nations Development Programme	92	
United States Agency for International Development	1,049	
Miscellaneous Training Grants	183	2,465

Total income from grants 19,940

Core-Restricted Pledges and Expenses

For the Period January 1 to December 31, 1983

Exhibit 3

Currency: U.S. Dlls. (000's)

	Grant Period (1) (mo/day/yr)	Expenses		
		Prior Years	This Year	Total
Government of France				
Collaborative Research—Maize	1/1/83—12/31/83	N/A	76	76
Bread Wheat	1/1/83—12/31/83	N/A	43	43
Triticale	1/1/83—12/31/83	N/A	36	36
Total			155	155 (2)
Government of Japan				
Wheat and Maize Plant Protection	1/1/83—12/31/83	N/A	528	528
Wheat Southern Cone	1/1/83—12/31/83	N/A	383	383
Total			911	911
OPEC Fund for International Development				
Maize West Africa	1/1/83—12/31/84	N/A	325	325
Total			325	325
Government of Switzerland				
Central America and Caribbean—Maize Phase II	1/1/79—12/31/81	1,282	93	1,375
Central America and Caribbean—Maize Phase III	1/1/82—12/31/84	345	382	727
Central America and Caribbean—Economics	1/1/82—12/31/84	144	148	292
Total		1,771	623	2,394
Government of the Netherlands				
Wheat and Maize Diseases Surveillance	1/1/83—12/31/83	N/A	75	75
Computer Programmer (*)	1/6/83—05/31/84	N/A	40	40
Total			115	115
United Nations Development Programme				
Nutritional Quality Maize — Phase IV	4/1/79—03/31/84	4,871	1,054	5,925
Tropical Wheat (*)	7/1/82—06/30/87	124	273	397
Total		4,995	1,327	6,322

(1) For information purposes only

(2) Equivalent to French Francs 1,190,000

N/A = not applicable

(—) indicates zero or insignificant amount

(*) Indicates project transferred from Extra-Core

Exhibit 3 (Cont'd)

Currency: U.S. Dlls. (000's)

	Grant Period (1) (mo/day/yr)	Prior Years	Expenses	
			This Year	Total
European Economic Community				
Andean Regional Wheat and Maize	03/12/83–03/12/86	N/A	547	547
Total			547	547
Ireland				
Training Wheat	1/1/83–12/31/83	N/A	36	36
Total			36	36
Rockefeller Foundation				
Training Wheat and Maize	1/1/83–12/31/83	N/A	100	100
Total			100	100
Norwegian Agency for International Development				
Training Wheat and Maize	(*) 1/1/83–12/31/83	N/A	77	77
Total			77	77
Ford Foundation				
East Africa	(*) 9/24/81–03/31/84	63	39	102
Total		63	39	102
Government of Federal Republic of Germany				
Wheat Improvement Program	(*) 7/1/83–06/30/85	N/A	29	29
Total			29	29
International Development Research Centre				
Data Processing	(*) 11/15/82–11/30/84	10	79	89
Total		10	79	89
Total Core-Restricted		6,839	4,363	11,202

(1) For information purposes only

N/A = Not applicable

(–) Indicates zero or insignificant amount

(*) Indicates project transferred from Extra-Core

Extra-Core Pledges and Expenses

For the Period January 1 to December 31, 1983

Exhibit 4

Currency: U.S. Dlls. (000's)

	Grant Period (1)	Grant Pledged (1)	Expenses		
			Prior Years	This Year	Total
The Ford Foundation					
Economics and Training Algeria	9/1/79–08/31/85	680	455	119	574
Total Ford Foundation			455	119	574
United States Agency for International Development					
Pakistan/Agricultural Research Council					
Wheat and Maize	4/1/76–12/31/83	2,872	1,841	567	2,408
Tanzania Maize	10/1/82–9/30/83	249	46	203	249
Miscellaneous Training	(2)	N/A	344	27	371
Africa Farming Systems Research	6/1/82–06/30/84	1,213	49	252	301
Total USAID			2,280	1,049	3,329
United Nations Development Programme					
Barley Yellow Dwarf Virus	7/1/83–12/31/83	79	–	79	79
Wheat Training	11/1/79–12/31/83	140	78	13	91
Total UNDP			78	92	170
Canadian International Development Agency					
Triticale Research and Training	4/1/78–12/31/80	286 (3)	240	6	246
Haiti-Economics	1/1/83–12/31/84	200 (6)	–	93	93
Ghana-Maize Phase I	1/1/79–12/31/83	753	588	165	753
Ghana Maize Phase II	10/1/83–9/30/88	3,803 (5)	–	37	37
Bangladesh-Wheat	4/1/82–04/30/87	3,744 (4)	400	335	735
Miscellaneous Training	(2)	N/A	–	68	68
Associate Scientist Statistics	4/19/82–03/31/84	80	15	53	68
Total CIDA			1,243	757	2,000

(1) For information purposes only

(2) Grant period not applicable donor pays tuition for each trainee sponsored.

(3) Equivalent to Canadian Dollars 338,944

(4) Equivalent to Canadian Dollars 4,680,000

(5) Equivalent to Canadian Dollars 4,754,300

(6) Equivalent to Canadian Dollars 250,000

N/A Not applicable

(–) indicates zero or insignificant amount

Exhibit 4 (Cont'd)

Currency U.S. Dlls. (000's)

	Grant Period (1)	Grant Pledged (1)	Expenses		
			Prior Years	This Year	Total
The Rockefeller Foundation/United Nations Development Programme/Australia (ADAB)					
Diseases Manual	1/1/82–09/30/83	63	47	16	63
Government of Switzerland					
Central America and Caribbean Seed Production	7/1/83–06/30/86	1,050	—	37	37
Instituto Nacional de Investigación y Promoción Agropecuaria Peru/World Bank					
Wheat	8/1/83–07/31/85	152	—	54	54
Miscellaneous Training Grants	(2)	N/A	15	183	198
Cooperative Projects					
Government of Japan: Visiting Scientists	(2)	N/A	—	2	2
INTA/MEXICO: Potato	(2)	N/A	—	2	2
IADS/NEPAL: Training	(2)	N/A	—	11	11
ICRISAT-IDRC/Sorghum	1/1/81–12/31/84	817	258	143	401
Total Cooperative Projects			258	158	416
Total			4,376	2,465	6,841

(1) For information purposes only

(2) Grant period not applicable donor pays tuition for each trainee sponsored

N/A Not applicable

(—) Indicates zero or insignificant amount

Extra-Core Grants

Extra-core programs are generally of four types:

- 1) Direct assistance (posting of staff or provision of research equipment) to national programs,
- 2) Specialized or advanced-degree training,
- 3) Collaborative research arrangements of a more basic or longer-term nature, and
- 4) Special exploratory research activities.

The CIMMYT Board of Trustees has established certain guidelines with respect to extra-core grants:

- 1) The objective must be within the mandate of CIMMYT,
- 2) The action should not be a mere technical assistance contribution to a country or region but have some potential to strengthen CIMMYT's overall research competence,
- 3) It should, in appropriate cases, have a training component, either for CIMMYT staff in an experience concept or in enhancing national capacity in the area of concern,

- 4) It should not pose an administrative burden on CIMMYT which is not fully identified and reimbursed by overhead or other means in the funding of the project, and
- 5) It should not imply a continuing obligation for CIMMYT, e.g., all potential staff repatriation, rehabilitation or ancillary costs on termination must be funded by the donor.

During 1983, five on-going projects were transferred from extra-core to core-restricted status on the recommendation of the Technical Advisory Committee of the CGIAR. In addition, one new project, Germany/Training, originally slated for extra-core was changed to core-restricted. Those that were shifted included:

UNDP/Tropical Wheat
NORAD/Training
NETHERLANDS/Data
Processing
FORD FOUNDATION/Training
GERMANY/Training
IDRC/Data Processing

In 1983, extra-core grants amounted to \$3,578,457 or 15 percent of core expenditures. The percentage decline from previous years is due to the previously mentioned shifts in classification. Reports on 10 major grants are included in the following pages.

Maize

Project: Central America and Caribbean Maize Seed Production

Donor: Swiss Development Corporation

Pledge: US\$ 1,050,000

Duration: July 1983 - June 1986

Financial Summary

Expenses (US \$)		
Previous Years	\$	N/A
1983	\$	37,000
Total to date	\$	37,000

Balance Available \$ 1,013,000

Objectives

The primary objective of the project, involving cooperation between CIMMYT and the 13 governments of the Central American and Caribbean region, is to improve the maize seed production activities in order to make more effective and efficient use of the germplasm and technology now being generated through a companion project for maize improvement, also funded by the Swiss Development Corporation as part of CIMMYT's core program.

Staffing

One CIMMYT staff member is assigned full time to the project. He is based in Mexico and travels extensively throughout the region.

Project Description

The seed production specialist is involved in five major areas.

- 1) Liaison with national seed production agencies,
- 2) Development of mechanisms for forecasting seed demand and for the generation of superior varieties as they flow from the maize improvement program,
- 3) Work with breeders to develop expertise in the final step of variety development and description: a) selection of individual plants from an experimental variety that will be used for initial seed increase of released varieties, and b) varietal description for producer utilization and certification (stressing those traits that give uniqueness),
- 4) Training to individuals in the procedures of: a) breeder seed maintenance and production of basic seed, and b) production of foundation and certified seed, and
- 5) Assistance in the procurement of equipment and sponsorship of workshops in the region.

Activities in 1983

The project began in mid-1983. The staff member assigned to the project visited responsible scientists and administrators involved in the national seed production programs of Costa Rica, Dominican Republic, Guatemala, Haiti, Honduras and Panama. (El Salvador and Nicaragua are also included in the project, but were not visited in 1983.) These discussions led to the identification of seed quality (maintenance of purity in varieties) and breeder seed production as major problems hindering the development of more effective seed industries. A considerable amount of processing equipment to produce breeder and foundation seed is included in the project and some was delivered to the countries included in the project.

Maize

Project: Ghana Maize Program
Donor: Canadian International Development Agency (CIDA)
Pledge: US\$753,581
Duration: January 1979-December 1983

Financial Summary

Expenses (US \$)
Previous Years \$588,000
1983 \$165,581
Total to date \$753,581

Balance Available \$ - 0 -

Objectives

The overall objective of the project is to increase maize production in Ghana by developing superior maize production technology and to strengthen staff already involved in the current maize research program conducted by the Crops Research Institute. Project staff also conduct research on cowpeas, in coordination with the International Institute of Tropical Agriculture (IITA).

Staffing

The project calls for the assignment of one project director, located in Mexico, and one joint coordinator posted in Ghana. The director of the Maize Program currently serves as project director at no cost to the project.

Project Description

Two types of activities are carried out under the grant:

- 1) Breeding which seeks to allow the development of high-yielding varieties adapted to the various ecological zones and crops uses in Ghana. This is to be accomplished through:
 - a) increased grain yield and yield stability,
 - b) improved resistance to lodging,
 - c) the development of specific maize varieties for the first and second plantings, and
 - d) improved disease and insect resistance.
- 2) On-farm research and demonstrations that are complementary to the breeding program in order to develop:
 - a) suitable maize agronomic practices for the various ecological zones of Ghana,
 - b) cropping systems that will include maize,
 - c) appropriate technology to aid the small scale farmer, and
 - d) extension information.

Substantial training is also provided under the grant at the graduate level (through Canadian and other foreign universities) and through technical training offered at CIMMYT's headquarters in Mexico. Funds are also available for equipment purchases and maintenance necessary for the research and extension programs.

As part of a national production program, the grant has a wide range of beneficiaries, including farmers, consumers and the Crops Research Institute itself. The program also has a tie-in with CIMMYT's core research on maize and maintains close ties with the West Africa regional maize program.

Activities in 1983

Varietal testing continued at six Crops Research Institute stations throughout the country. Varieties were grouped into three maturity classes: late maturity (120 day), intermediate (105 day) and early (95 day). Entries within these trials were approximately 60 percent of CIMMYT origin, having been identified directly from earlier EVT's. At the same time, some upgrading of previous released varieties was undertaken, principally by crossing them with streak-resistant materials from similar genetic backgrounds.

At the Third National Maize Workshop held by the project a decision was taken to release four varieties to the Ghana Seed Company for multiplication and sale. These covered the range of maturity classes and were derived primarily from CIMMYT germplasm.

On-farm research continued at a high level. A total of 172 maize trials and 45 cowpea trials were conducted. The main types of trials conducted were variety (4 types), zero tillage, timing and placement of starter fertilizer application, micronutrient and nutrient trial, insecticide trial, means of substituting for chemical fertilizer using legume rotations, maize cowpea intercrop trials, cowpea variety trial, factors of cowpea production, and cowpea spacing trial. In addition to these replicated trials a total of 250 non-replicated verification demonstrations generated useful data on yields, costs of production, and cropping patterns from all parts of Ghana for the two crops studied.

On-station agronomy research concentrated on planting date studies in maize and cowpea, maize cassava intercropping patterns, long-term rotation trials with maize and cowpea and crop protection studies.

Training of staff was an important part of 1983 activities. Project staff conducted two-day seminars with all staff involved in the on-farm trial programme at regional headquarters throughout the country. A total of 385 people attended these sessions, which dealt with practical problems of conducting trials and demonstrations, and with technical subjects such as sprayer calibration and layout of trials in the field. In addition to training of this nature, a total of 9 project staff are currently engaged in graduate training.

During 1983, the Government of Canada (CIDA) agreed to provide funding for a further 5-year period commencing in January of 1984. CIMMYT has agreed to staff the Grains Development Project for the first three years and to subcontract the cowpea research component to IITA.

Maize

Project:	Pakistan Maize Program
Donor:	United States Agency for International Development (USAID)
Pledge:	US\$ 704,000 RPS 6,268,288 US\$ 1,226,000 (est. total)
Duration:	April 1976-December 1983

Financial Summary

Expenses (US \$)	
Previous Years	\$ 797,000
1983	\$ 305,000
Total to date	\$ 1,102,000
Balance Available	\$ 124,000

Objectives

This is an on-going activity that was initiated in 1976 as part of a major effort by USAID/Pakistan to provide assistance to the Pakistan Agricultural Research Council (PARC) to strengthen their adaptive research capability at the National Agricultural Research Center (NARC) and their cooperative programs at provincial centers.

Staffing

The project calls for one agronomist specializing in maize production and short-term consultants, as required, for up to three man-months in training, and special breeding and storage problems.

Project Description

The maize specialist assists the staff at NARC and at provincial research centers, as well as appropriate extension personnel as desired by the PARC, in their on-going maize programs. Major research emphasis in the project is given to:

- 1) Development of short-season varieties for rainfed areas of maize production through the introduction of new strains and breeding,
- 2) Increasing the protein quality content of commercial varieties,
- 3) Identifying the cause of leaf blight and stalk rot and broadening maize research to include more pathology research, and
- 4) Expanding breeders seed production programs; working closely with research and extension staff to test experimental varieties under farm conditions; and helping to arrange field days and on-farm testing to demonstrate new technology.

Training for the staff of PARC and NARC, both in Pakistan and at CIMMYT's headquarters in Mexico, is also included in the project.

Pakistani research and extension programs, and farmers, are the intended beneficiaries of this project. CIMMYT's core research program in maize also benefits from the work on leaf blight and stalk rot and on efforts to produce short-season varieties for rainfed areas.

Activities in 1983

During 1983 crop improvement research continued on the development of two earlier-maturing populations: NARC Pool 10, an early yellow material, and Pool 20, an intermediate-to-early white material. An effort is being made to reduce the number of pools being handled. The consensus is that three general types of maize materials are needed: white grain/early maturity, white grain/late maturity and yellow grain/late maturity. Work on quality protein maize continued via the evaluation of populations and varieties from the core program based in Mexico. Collaboration in agronomy research continued with NARC and provincial research center staff. Most of this research, however, continues to be conducted on experiment stations. The annual maize training course was held in early March. Twenty-two trainees from all over the country attended the course. In addition to inputs by the maize training staff, the maize Asian regional coordinator and economics headquarters staff also participated in the course. The annual travelling seminar attracted 25 participants. Five Pakistani scientists also attended the in-service training course held at CIMMYT's headquarters in Mexico.

Maize

Project:	Tanzania Maize Program
Donor:	United States Agency for International Development (USAID)
Pledge:	US\$ 248,975
Duration:	October 1982-September 1983

Financial Summary

Expenses (US \$)	
Previous Years	\$ 46,000
1983	\$202,975
Total to date	\$248,975

Balance Available \$ -0-

Objectives

The Maize Program has had staff posted in Tanzania, under a variety of funding arrangements, since 1973. The objectives of the current project are to provide continuity to the nation's on-going maize research and experiment station development activities.

Staffing

The project calls for two CIMMYT staff to be posted to Tanzania: one a breeder/ agronomist and the other an agricultural engineer.

Project Description

The principal tasks of the breeder/agronomist are to serve as joint coordinator of the national maize research program and to advise and assist his Tanzanian counterpart in assuming that role upon his departure. The breeder/agronomist also works with AID-funded economists to conduct an evaluation of existing research results for maize with emphasis on the southern highlands. The purpose of this analysis is to develop farm-level management recommendations for maize production. These recommendations will cover:

- 1) Planting densities,
- 2) Fertilization,
- 3) Weed management, and
- 4) Varietal selection.

The agricultural engineer is mainly engaged in supervising and training the Tanzanian staff of TARO-Ilonga in implementing a master land use plan. This includes the development of irrigation systems, fencing, land preparation, repair and servicing of appropriate equipment and training of staff. This is mainly a bridging contract designed to sustain the maize research program in Tanzania until a larger program (also USAID-funded) in farming systems research can get under way. As such, this can be considered an institutional project mainly benefitting the national maize research program.

Activities in 1983

Project activities continued until October, 1983, when the project terminated. Activities during 1983 were related to maize production and improvement research and to the research station land development program. During 1983, three new maize varieties were released by the Tanzanian national maize program. One variety is a late-maturity material with streak virus resistance for lowland and coastal areas. The others are early-maturity and late-maturity materials for intermediate elevations with tolerance to moisture stress. As part of the phase out of this project, a production recommendations manual for the southern highlands of Tanzania was prepared by project staff.

A micro computer was also purchased to analyze research data more effectively; training in software utilization was also provided.

In the research station land development program, plans were finalized for development of the site. Computer software programs were used to calculate the land levelling and drainage requirements. Spare parts lists and maintenance control systems were developed for most machinery and equipment. CIMMYT's experiment station staff from Mexico also assisted project staff in an in-service training program for the land development staff, including machinery operation and maintenance.

Wheat

Project:	Bangladesh Wheat Program
Donor:	Canadian International Development Agency (CIDA)
Pledge:	C\$ 4,456,000 US\$3,610,000 (est. total)
Duration:	April 1982-March 1987

Financial Summary

Expenses (US \$)	
Previous Years	\$ 400,000
1983	\$ 335,000
Total to date	\$ 735,000
Balance Available	\$ 2,875,000

Objectives

The overall objective of the project is to increase wheat production in Bangladesh by developing superior wheat varieties and improved production technology and to help strengthen and support the research and production staff currently assigned to the wheat research program of the Bangladesh Agricultural Research Institute (BARI). Equipment to support the research and experimental activities of the BARI wheat program is also being provided.

Staffing

The project calls for eight man-years of long-term technical advisors and 30 man-months of short-term consultants. One CIMMYT staff member residing in Bangladesh is designated the joint coordinator for the program. A second person was assigned to the project in 1983.

Project Description

The project includes three primary components:

- 1) Technical assistance. CIMMYT staff assigned to the project devote their time to wheat breeding and cropping systems research. Breeding work is oriented toward increased grain yields and yield stability, development of varieties for various ecological zones, and improved disease and insect resistance. Cropping systems research includes fertilizer trials, soil testing, improved water and soils management, and integrated pest management.
- 2) Training. Included in the project are 430 man-months of training: 192 man-months for Ph.D candidates, 108 man-months for MSc candidates, 120 man-months for in-service trainees at CIMMYT, and 10 man-months for visiting scientists, also at CIMMYT.
- 3) Equipment. Some US\$ 500,000 are set aside in the project for the purchase of field and laboratory equipment appropriate for use by the BARI wheat program.

The project is designed to help provide training and other educational opportunities and equipment to the BARI wheat staff and to help continue the flow of appropriate wheat varieties and technology to farmers in Bangladesh. The project also has a direct relationship with core program wheat research efforts aimed at developing early-maturing varieties with tolerance to heat stress and improved resistance to several important foliar diseases.

Activities in 1983

Four new varieties (three of which are of direct CIMMYT origin) were released in 1983, dramatically improving opportunities for genetic diversification. Two of these appear to fit the definition of "flexible" varieties, i.e., ones capable of producing acceptable yields under late-planted conditions but are very

high-yielding if planted at a more favorable date. The development of flexible varieties is a major objective of the breeding program, and in 1983, over 60 lines were selected under this "flexible" criterion for regional varieties.

In the area of pathology research, a survey of nurseries has indicated that the *Helminthosporium* species involved in the prevalent leaf blotch disease of wheat in Bangladesh is *H. sativum*. Several lines from the CIMMYT nurseries with acceptable levels of resistance to the disease will be crossed in Mexico with lines adapted to Bangladesh in the first steps of a shuttle breeding effort to accumulate resistance in adapted varieties.

A second CIMMYT staff member joined the project in 1983 with responsibilities in agronomy. He has begun a series of trials with emphasis on land preparation for moisture conservation and fertilizer management for a wheat - aus rice rotation. Basic questions concerning the performance of new varieties over a range of seeding dates at several sites are also being addressed.

Two PhD candidates and one MSc candidate were sponsored for further study during the year. Unfortunately, this is somewhat less than planned, partially due to difficulties in obtaining government study leave clearances for the candidates. Three other BARI scientific officers were sent to CIMMYT, Mexico, for in-service technical training in rainfed agronomy and cereal technology. Three senior research managers also visited Mexico during March to observe field operations and experiments.

Project research and field equipment were delivered during 1983 with few difficulties. The newly purchased equipment was used to great advantage in the research program.

Wheat

Project:	Pakistan Wheat Program.
Donor:	United States Agency for International Development (USAID)
Pledge:	US\$ 716,000 RPS. 5,644,887 US\$ 1,280,000 (est. total)
Duration:	April 1976-December 1983

Financial Summary

Expenses (US \$)	
Previous Years	\$ 803,000
1983	\$ 246,000
Total to date	\$1,049,000
Balance Available	\$ 231,000

Objectives

This is an on-going activity that was initiated in 1976 as part of a major effort by USAID/Pakistan to provide assistance to the Pakistan Agricultural Research Council (PARC) to strengthen the National Agricultural Research Center (NARC) and cooperative programs at provincial centers.

Staffing

The project calls for one agronomist specializing in wheat production and short-term consultants, as required, for up to three man-months in training and special breeding and storage problems.

Project Description

The wheat specialist is involved in four major areas of research and development:

- 1) Assistance to on-going research programs at NARC and provincial research centers with the aim of strengthening their wheat improvement research programs,
- 2) Collaboration with NARC in initiating a soil tillage/moisture conservation research program to develop improved technology for rainfed crop production,
- 3) Cooperation in the promotion of a comprehensive weed control program at NARC, and
- 4) Assistance in staff development through training programs, both in-country and at CIMMYT headquarters in Mexico.

Like many other extra-core grants, this project is designed with an institution building component (PARC, NARC) and with a direct farmer linkage through the development of improved varieties. The research work done under the project also has feedback to CIMMYT's core programs, especially with research related to rainfed production technology.

Activities in 1983

The 1982-83 wheat crop set a new record for production in Pakistan. Official figures estimated wheat production at 12.32 million tons. This is a 6 percent increase over the previous year and a 47 percent increase since 1977. Favorable weather, ready supplies of quality seed, fertilizer and irrigation water, and price incentives all played vital roles in achieving this record production.

Agricultural research continues to make a contribution to wheat production. Pakistan has developed a well-trained wheat breeding capability over the last fifteen years. During the year, five new bread wheat varieties and one barley variety were released. All the bread wheats carry CIMMYT germplasm in their pedigrees.

Seventy-one international nurseries were sent to Pakistan in 1982-83 consisting of 30 bread wheat, 5 durum, 11 triticale, 15 barley and 10 germplasm development nurseries. These were distributed among the different provincial and national research stations within Pakistan. In agronomy, an on-farm research program was initiated in the northern Punjab as a pilot effort to move more agronomy research from the experiment station to the fields of representative farmers. During the year, data were collected on production systems and farmer circumstances in the study area. Several researchable areas were identified and a series of experiments were designed and conducted.

Eight Pakistani scientists attended the in-service training course in Mexico, and three senior scientists visited the CIMMYT programs in Mexico and the regional disease nursery grown in Kenya. The annual travelling seminar included 35 people. Wheat varieties on experiment stations, farmers fields, extension demonstrations and seed farms were evaluated for yield, disease and agronomic factors.

Economics

Project:	Haiti Economics Program
Donor:	Canadian International Development Agency (CIDA)
Pledge:	C \$245,000 US\$ 199,675 (est.)
Duration:	January 1983 - December 1984

Financial Summary

Expenses (US\$)	
Previous Years	N/A
1983	\$ 93,000
Total to date	\$ 93,000

Balance Available	\$ 106,675
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Objectives

The primary objective of the project is to facilitate the development and diffusion of technologies appropriate to the biological and socio-economic circumstances of representative Haitian farmers growing maize.

Staffing

One CIMMYT economics staff member is assigned to the project for the two-year duration. Additional staff input is provided at no cost to the project by the maize agronomist and economist working in the Central American and Caribbean regional program. (This latter program is classified as core restricted and is funded by the Swiss Development Corporation).

Project Description

The components of the project include:

- 1) Informal surveys of farmer's circumstances,
- 2) On-farm trials and demonstrations of production technologies,
- 3) Training of local counterparts.

The project is an important adjunct to the CIMMYT core economics program. It can be considered a test or demonstration of the kinds of services that the core economics program can offer to national agricultural research and production programs. As designed, the project benefits the Haitian national program and local maize producers. On a much larger scale, the potential beneficiaries are other national programs by means of the development of an effective mechanism for bringing together biological and social science research.

Activities in 1983

Prior research in Haiti had identified five production constraints believed to affect local maize yields. These constraints were subjected to experimentation in representative farmers' fields, and the results from these led to the gradual elimination of some experimental alternatives and the selection of two highly promising technological components: application of nitrogen fertilizer and use of improved varieties.

During 1983, these components were subjected to more rigorous agronomic and economic analysis. The positive impact of both nitrogen fertilization and an improved variety on local maize yields was confirmed under farmer-managed verification trials. This will permit field-tested recommendations to be made in 1984 to local farmers.

Economics

Project:	On-Farm Research in Eastern and Southern Africa
Donor:	United States Agency for International Development (USAID)
Pledge:	US\$ 1,213,000
Duration:	July 1982-March 1985

Financial Summary

Expenses (US\$)	
Previous Years	\$ 49,000
1983	\$252,000
Total to date	\$301,000
Balance Available	\$912,000

Objectives

The project seeks to provide the expertise in on-farm research required by a number of national agricultural research and extension institutions and USAID agricultural project management teams in eastern and southern Africa. The project will concentrate on four major objectives:

- 1) On-farm research,
- 2) Training,
- 3) Network development, and
- 4) Institutionalizing the on-farm research concept.

Staffing

Two CIMMYT economists are assigned to the project. One is responsible for collaborating with USAID-sponsored teams in Lesotho, Botswana, Swaziland and Malawi. The second concentrates on training in the region as well as collaborating with USAID programs.

Project Description

Major activities include:

- 1) Regional seminars and publications. The aim here is to facilitate discussion and exchange among the various programs so that the accumulating experience can be shared.
- 2) Training. The project proposes to implement a series of four in-country training programs using a format recently introduced by the CIMMYT economics group. Training is carried out through a series of "calls" in which research trainees convene at an on-farm research area at various stages in a crop cycle. This is a learning-by-doing process involving farm-level surveys and ending with on-farm research trials and technology demonstrations.
- 3) Direct cooperation with national programs. At the request of national programs and their USAID collaborators, the CIMMYT staff participate in adaptive on-farm research surveys to assess farmer circumstances, evaluate possible new technological components to enhance farmer productivity, and design and implement appropriate on-farm trials.
- 4) Development of research results relevant to policy formulation. This serves not only as the final step in the on-farm research process but also helps to integrate on-farm research into national research and extension programs. It is an important part of the institutionalization of on-farm research.

Benefits from this project will be in the form of added productivity of the agricultural sector in the countries involved. This increased productivity itself will be the result of more effective agricultural research. In providing this expertise in on-farm research the CIMMYT economics program will also benefit from the knowledge acquired and will seek to transfer these lessons to other areas of the world.

Activities in 1983

Activities during the year have been designed to support USAID bilateral agricultural research programs, with a farming systems orientation, and the national programs with which they are associated.

Four international workshops were held in 1983. Subject matter varied at each session; one covered survey techniques and a second complementary one covered the planning, management and evaluation of on-farm experiments. A third workshop for senior research administrators covered the organization, management and implementation of on-farm research programs. A fourth technical workshop was organized around agricultural problems identified by researchers working in several countries in the region. In-country training took place in Zambia, Malawi, Tanzania and Kenya.

Both staff stationed in the region presented papers during year. A quarterly newsletter was issued within the region to a mailing list of 500 addresses. The number of contributors to it has increased, an important initial evidence of the institutionalization of on-farm research within national research systems.

Training

Project:	Algerian Graduate Training Fellowships
Donor:	Ford Foundation
Pledge:	US\$ 670,350
Duration:	September 1979- August 1985

Financial Summary

Expenses (US \$)	
Previous Years	\$455,000
1983	\$119,000
Total to date	\$574,000

Balance Available \$ 96,350

Objectives

The project seeks to facilitate institution building within the Algerian Institute de Development des Grandes Cultures (IDGC) through the provision of graduate training in a number of disciplines.

Staffing

No CIMMYT staff are currently assigned to the project. Administrative support is provided by CIMMYT's personnel and finance departments, and the regional wheat team for North and West Africa stationed in Portugal.

Project Description

The project provides graduate training at universities in France and the USA. Disciplines include agricultural economics, soils, seed production, agronomy and plant breeding.

CIMMYT's involvement with the Algerian national research program dates to the early 1970s when CIMMYT had up to four people posted in Algeria. The current grant is in fact a continuation, in part, of the original program. Activities carried out in this training phase will help to strengthen the linkages between the national program and CIMMYT's North and West Africa regional wheat program.

Activities in 1983

Name	Degree	University	Expected or Actual Completion
Ali Zeghida	M.Sc. Agronomy	Oregon State Univ.	Mar. 1982
Nadjib Benacef	M.Sc. Cereal Breeding	Oregon State Univ.	Apr. 1982
Louchi Brinis	M.Sc. Seed Technology	Mississippi St. U.	Aug. 1982
Abdelkader Benbelkacem	M.Sc. Plant Breeding	Univ. of Minnesota	Sep. 1982
Aomar Ait-Amer	M.Sc. Crop Science	Oregon State Univ.	Jan. 1983
Mohamed Zerkoune	M.Sc. Agronomy	Univ. of Nebraska	Aug. 1983
Adda Besseghieur	M.Sc. Agronomy	Univ. of Saskatchewan	Sep. 1983
Kamel Feliachi	3rd.Cycle Trg.Economics	Univ. of Dijon,France	Nov. 1983
Mohamed Maatoughi	M.Sc. Soils	Oregon State Univ.	Dec. 1983
Hamena Bouzerzour	M.Sc. Agronomy	Univ. of Nebraska	Dec. 1983
Abderrazak Belaid	Ph.D. Agric. Economics	Oregon State Univ.	Mar. 1985
Lakhdar Boukerrou	Ph.D. Plant Breeding	Univ. of Minnesota	Dec. 1985

Data Processing

Project: Associate Expert Data-Processing

Donor: Canadian International Development Agency (CIDA)

Pledge: C\$ 100,000
US\$ 80,000 (est.)

Duration: April 1982-March 1984

Financial Summary

Expenses (US \$'s)

Previous Years	\$ 15,000
1983	\$ 53,000
Total to date	\$ 68,000

Balance Available \$ 12,000

Objective

The project seeks to provide the critical programming and analytical support needed during the conversion from CIMMYT's former computer to its new VAX 11/780 computer.

Staffing

One CIMMYT staff member, a computer programmer and analyst, is assigned to the project.

Project Description

The staff member participates in the conversion of certain current software programs to the VAX 11/780 computer.

Activities in 1983

The software development reported in the 1982 Annual Report continued in 1983. Primarily this focused on the maize international testing program. The software has been designed on a modular basis to obtain maximum flexibility in meeting future needs and allow new reports to be added to the system. The three major components of the system are data entry/maintenance, data storage and retrieval, and reporting. Upon completion of this program, three major software items will have been added to CIMMYT's inventory under the auspices of this grant: a) farm survey analysis program, b) small grains summary system (both completed in 1982), and c) maize international testing.

Other activities under the grant in 1983 have included internal consulting and training. In the area of consulting, the primary emphasis has been on the development of a micro-computer policy for CIMMYT's outreach programs and experiment stations. This has covered both hardware and software issues. In the area of training, a users manual for the VAX 11/780 is being developed as more terminals are installed and additional software becomes available.