

CIMMYT BUDGET / FUND (Annual)

CIMMYT

**Mid-Term
Budget
Request
1986**

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Preface

It is a pleasure to be able to report on CIMMYT's program of work and budget for 1986.

In this document CIMMYT's management and trustees are using a new budget format which we hope portrays a clear, comprehensive, and cogent plan of action for the coming year. A number of points are worth mentioning:

- i) The Maize Program is scheduled for continued manpower increases in 1986 (since 1983, staffing levels have increased 50%);
- ii) With planned 1986 staff additions, most of the recommendations of CIMMYT's 1982 external review panel have now been taken into account, namely the strengthening of selected regional programs (e.g. Maize E. Africa), additional staff in headquarters disciplinary research, and the appointment of a training coordinator;
- iii) Some of these planned changes, however, are possible only under optimistic funding scenarios in 1986. We feel that given CIMMYT's past successes and its present dynamism it is of great importance to incorporate these changes and additions into the center's program of research and training.
- iv) The financial plan adopted to carry out these objectives is structured so as to account for the many unknowns related to inflation and exchange rates.

This **1986 Mid-Term Budget Request** is published with two companion pieces. The **1984 Research Highlights** is a technical publication that highlights major findings and accomplishments in selected research programs. The **1984 Annual Report** is a non-technical description of CIMMYT's activities that also includes the independently audited financial statement, a management review and highlights of major extra core grants. Together these three publications describe CIMMYT's significant accomplishments to date, its current status, and its future plans.

Executive Summary

(US\$'s 000s)	1984 Actual		1985 Current Estimate		1986 TAC Recommended	
	Cost	My	Cost	My	Cost	My
Research	13,828	61.0	14,514	64.0	14,789	66.0
Training	2,721	7.25	2,000	8.5	1,800	9.0
Information	789	3.0	818	3.0	818	3.0
General Administration	1,504	6.0	1,800	6.0	1,800	6.0
Plant Operation	1,475	-0-	1,908	-0-	1,908	-0-
Sub-Total	20,317	77.25	21,040	81.5	21,115	84.0
Contingency	—	—	200	—	220	—
Inflation/Exchange	—	—	—	—	1,860	—
Capital	785 ^{1/}	—	155	—	310	—
Grand Total	21,102	77.25	21,395	81.5	23,505	84.0

^{1/} includes translation effect

1984—Total revenues were \$500,000 lower than the bottom of the bracket budget; this situation required reductions in operating costs, especially in training activities.

1985—The latest estimate from CGIAR/Secretariat (June 1985) indicates funding lower than bottom of bracket. This has necessitated a further cut in funds designated for training.

1986—The TAC recommended level implies a real increase in funds of less than 1% and a net increase in staff of 2.5 my. Additions are made in Maize: 1.0 my Breeding, 1.0 my Asia, 2.0 my Eastern and Southern Africa. Annualizations occur in Maize Germplasm Bank and Training, and Winter Wheat (Turkey) programs. Reductions are scheduled for Maize: 1.0 my Central America and Caribbean; Wheat: 1.0 my Pathology, 1.0 my Andean.

CIMMYT in the 1980s

The Global Wheat Situation

The worldwide production of wheat has increased remarkably since the early 1970s, growing by 177 million tons from 1970 to 1984. Roughly half of that increase occurred in developing countries, and much of the other half was exported to the Third World. Wheat is an important source of calories and, to a lesser extent, protein in the diets of hundreds of millions of people living in developing countries. Wheat consumption in the Third World increased by about 70% over the last decade, reflecting an annual rate of growth that, if it were to continue indefinitely, would result in a doubling of the Third World demand for wheat every 14 years.

To accommodate this growing demand, developing countries have had to increase their importation of wheat. About 50 million tons were imported in 1983-84; nearly one-third of this total went to traditional wheat-producing countries in the Middle East and North Africa, but an increasing share (now about 40%, or 20 million tons) was destined for tropical countries (23°N-23°S latitudes) where wheat is not a traditional crop. This growing preference for wheat in the tropics portends an even greater demand by Third World nations.

Demographic shifts and changes in income levels are the two key factors driving the rapid increase in wheat consumption in the developing world. Evidence from food consumption surveys suggests that wheat consumption is much more important in urban than rural areas, and that it is more important to the growing middle and upper income groups. With urbanization and rising incomes, consumers in most developing countries tend to eat more wheat (and rice) and less coarse grains. Indirect consumption of coarse grains, however, is often higher in middle and upper income and urban groups because of higher consumption of grain-fed livestock products.

Government policies in the developing world often encourage wheat consumption over other grains. Governments often import wheat as an easy, short-run solution to feeding their growing urban populations. Subsidies on wheat products, overvalued exchange rates, and food aid (usually in the form of wheat) all contribute to making wheat and wheat products relatively cheap in developing countries, thereby encouraging their consumption.

The Global Maize Situation

Maize, with a 416 million ton (Mt) global harvest in 1983, ranks second to wheat (with rice third) among the world's cereal crops. Worldwide, about 66% of all maize is used for feeding livestock, while 25% is for human consumption and 9% is used for industrial purposes and as seed. In 1983, developing countries produced 160 Mt of maize, with roughly 80 Mt destined for direct human consumption, 70 Mt used for animal feed, and the remainder for industrial and seed purposes.

Maize for food use is particularly important in sub-Saharan Africa, Mexico, Central America and Caribbean, and in the Andean countries of South America. In these areas, maize is a staple food for the rural poor. In recent years, the demand for maize as a livestock grain has also grown rapidly in the Third World, especially in the newly industrializing middle income countries that are not traditional maize producers. Rising income levels in these countries, particularly in urban areas, have resulted in rapid increases in meat and poultry consumption. A considerable portion of this new demand has been met through maize imports, which have increased six-fold in the developing world since 1971-73.

Future maize demand will be driven by two key factors: population and income growth. In those developing countries that rely on maize as a dietary staple, maize demand for direct food use is expected to grow in line with population, but could grow faster in chronically food-deficit areas. Future demand for maize as a feed grain will depend primarily on national economic growth rates, especially in the newly industrializing countries of Asia and Latin America. With forecasted economic growth, feed use demand could increase by 3-4% per capita during the remainder of the 1980s and at even higher growth rates in the decades beyond. Taking account of population and income growth, the developing world will likely require an additional 130 million tons of maize to satisfy annual demand by the year 2000. With area expansions slowing, greater use of yield-increasing technologies will be critical if developing countries are to take advantage of their own growing demands for maize.

To date, maize has attained the highest yield levels in the temperate areas of the world where modern agricultural production technologies are employed. Although approximately 50% of the world's maize area is planted in the developing countries, only 25% of the world's maize crop is harvested there. Indeed, there is more than a 3 t/ha yield difference between the average maize yield of the developed market economies and that of the developing world. Many factors explain the difference in maize yields between tropical and temperate zones. Maize in most developing countries is grown as a subsistence, rainfed crop in the hot season, generally subject to periodic drought and/or excesses of water at different stages of the growth cycle, without effective weed and pest control, and usually under low fertility conditions. As well, traditional tropical maize varieties are not very grain efficient. They are tall, leafy, and subject to lodging. They have a low grain-to-stover ratio and are less responsive to high density and improved management as compared with the temperate maize plant.

Significant research efforts to develop more grain-efficient maize materials for tropical areas began less than 20 years ago, and until recently, the majority of national breeding programs have been handicapped by the narrow genetic base of the materials available to them. Today, a wide range of superior germplasm is available for most of the lowland and intermediate elevation environments of the developing world. This germplasm base will require further refinement and extensive testing before it can be released to farmers for widespread use. In several parts of the developing world—such as in India (winter maize), Brazil and Guatemala—the adoption of higher yielding technologies is beginning to happen; these stories, however, must be repeated in many other parts of the developing world, especially in Asia and sub-Saharan Africa during the remainder of this century.

The Demand for CIMMYT's Products and Services

The trends in global production, consumption and trade of wheat and maize briefly described above serve to reinforce the need for CIMMYT's five main products and services:

- 1) improved germplasm adapted to the major production environments of the developing countries, especially the less-favored areas,
- 2) development of cost-effective procedures for crop improvement and crop management research,
- 3) training of developing country personnel in research procedures and management,
- 4) research consultation to national maize and wheat programs,
- 5) scientific information about maize, wheat and triticale.

These products and services have evolved over time from the Center's mandate to "...promote and carry out, nationally and internationally, programs to improve in all aspects maize and wheat production." CIMMYT's products are really intermediate goods intended for use by the Center's primary clientele: national crop improvement programs in the developing world. Today, these products are produced and delivered by way of a complex and interrelated mosaic of research activities taking place in Mexico and in numerous locations around the world.

To keep in contact with the more basic types of research under way elsewhere, the Center also enters into collaborative research arrangements with other institutions. Such projects can provide basic research institutions with a mechanism to link their work to CIMMYT's expertise, wealth of germplasm, and delivery systems (networks), while allowing CIMMYT to stay abreast of the developments in related basic research areas.

Wheat Program

General objectives—The gains made in Third World wheat production since the early 1970s constitute a striking achievement, and are largely the result of the close working relationships established between CIMMYT scientists and their national crop program counterparts. However, the growing demand for wheat in the developing countries of the world implies a need for equally striking production achievements in the future. CIMMYT's Wheat Program, therefore, remains dedicated to the overall goal of improving both the level and the dependability of wheat yields in the developing world.

The allocation among crops of the Wheat Program's research resources reflects in part the importance of each crop in the developing world. Bread wheat (*Triticum aestivum* L.) is grown on roughly 240 million hectares worldwide (about 90% of the total area devoted to wheat). Approximately 40% of this area is in the developing world (some 100 million hectares), of which 70% is currently planted to spring-habit wheat. More than 45 million hectares in developing countries and 10 million hectares in industrialized countries are planted to spring-habit bread wheat varieties carrying CIMMYT germplasm in their pedigrees. To date, national crop improvement programs have released more than 350 bread wheat varieties that are based to varying degrees on CIMMYT germplasm. In accordance with these realities, bread wheat commands approximately 50% of the Program's direct research resources.

Durum wheat (*T. durum*) is grown on about 11 million hectares in the developing world, with 60 percent of this area located in the Mediterranean Basin countries of North Africa and the Middle East. Approximately 60 percent of all developing country durum wheat is produced in semiarid regions; the remainder is grown either under irrigation or in locations receiving more than 500 mm of precipitation per crop cycle. Cooperating national programs have released 48 high-yielding durum varieties based on CIMMYT germplasm. While durum wheat is clearly of lesser significance than bread wheat on a global basis, it is very important regionally; moreover, because comparatively less research has been done on durums, the potential for germplasm improvement

in the *near term* is probably greater for durum wheat than for bread wheat. Consequently, about 20% of the Wheat Program's resources are devoted to the improvement of durums.

CIMMYT's progress in developing triticale as a commercial crop constitutes a remarkable research achievement. Triticale shows good adaptation to difficult production environments, such as in acid soils with high concentrations of soluble minerals (such as aluminum) or in cool highland production areas where heavy disease pressure exists. In such environments, triticale can outyield wheat by as much as 100%. Triticale test weights and bread-making quality have improved significantly since the Center's research efforts began, reflecting improvements in seed type and endosperm development. This progress in germplasm improvement has contributed to the release of more than 40 triticale varieties in 11 countries during the past two decades (most of these releases have occurred since 1979) and it is estimated that 750,000 hectares are now planted to improved varieties around the world. While most of this area is currently located in developed countries, commercial triticale production is beginning to spread rapidly within the developing world. Even so, triticale remains an experimental effort and, accordingly, some 20% of the Wheat Program's resources are invested in the improvement of this crop.

Reducing the "yield gap". The CIMMYT Wheat Program believes that the greatest potential for increasing the productivity of the resources committed to wheat in the near future lies in the more effective transfer to farmers in developing countries of agronomic technology developed by national and international research programs. There exists a significant "yield gap" between the current genetic yield potential of improved wheat varieties and the average yields actually obtained on farmers' fields. On-farm research, improved distribution of production inputs, and a greater emphasis on advanced training of developing country scientists, all combined with enlightened government policies to encourage domestic production, can greatly reduce this yield gap.

Improving genetic yield potential. The importance that CIMMYT gives to reducing the yield gap in many Third World wheat-producing countries is not meant to imply that there is little or no hope for further improving genetic yield potential, *per se*. Realistic, longer term possibilities exist for the continued improvement of the genetic yield potential of wheat. The successes achieved during the last 20 years, particularly through the development and introduction of high-yielding, disease-resistant semidwarf varieties, indicate that on-going research in this area is warranted. While the kind of jump in yields that accompanied the advent of semidwarf wheats is not anticipated, it is highly probable that a slow, steady gain in yield potential can be realized. Toward this objective, the Wheat Program continues to exploit the highly successful approaches of: (1) making numerous crosses within individual gene pools and (2) probing more deeply the numerous genetic combinations possible from crossing cultivars from different gene pools, such as spring x winter combinations.

Improving yield dependability. Of equal importance to improving genetic yield potential, however, are the Center's efforts to continue improving the dependability of yields across environments. This is being accomplished in several ways: (1) by improving the resistance of CIMMYT germplasm to various diseases and insects, (2) by increasing its tolerance to problem soils, and (3) by improving tolerance to such environmental stresses as drought and excessive heat.

Germplasm improvement strategies—CIMMYT's breeding strategy to develop broadly adapted cultivars by screening germplasm over a diverse range of environments has proven to be of great utility in the developing world. However, some of the production problems faced today in marginal areas require more site-specific testing and selection. To develop appropriate materials for these more demanding production requirements, CIMMYT has moved toward more specific classifications of germplasm for international testing. This is resulting in a growing number of smaller, more problem-oriented and/or geographically targeted nurseries (e.g. drought tolerance, heat tolerance, earlier maturity, and helminthosporium nurseries).

A second fundamental strategy involves an increasing reliance on regional staff to guide and implement the modified germplasm development approach mentioned above. A number of regional nurseries have been organized in Asia, Latin America, and Africa that are proving to be more effective in the identification and development of materials with enhanced resistance to particular diseases and pests or with greater tolerance to certain problem soils and other agroclimatic stresses.

A third strategy has resulted in the establishment of specific cooperative research arrangements with selected national programs strategically located to address particular problems. In these projects, genetic material is shuttled between Mexico and the collaborating national programs with alternate cycles of improvement carried out at each location. Examples of cooperative research include the CIMMYT/Oregon State University/Turkey spring x winter wheat research project, the CIMMYT/Brazilian aluminum-tolerant bread wheat breeding program, and the CIMMYT/China cooperative shuttle-breeding program for fusarium head scab. Wheat production on millions of hectares of land in more marginal environments can potentially be increased as a result of this research.

The Wheat Program has embarked on a cooperative venture with Turkish wheat scientists (implemented under the existing bi-lateral agreement between the government of Turkey and CIMMYT) to develop broadly adapted, high-yielding winter wheat germplasm for the extensive winter and facultative wheat areas of Turkey and the world. This cooperative effort will be international in scope, involving selected agricultural research centers of excellence located in winter wheat environments around the world. Turkey's diverse wheat environments and its strong national wheat research program make it an ideal location from which to conduct such a joint international effort.

Still another approach receiving increasing attention at CIMMYT is the agronomic practicality of incorporating into wheat certain desirable genetic traits from alien species. The focus of CIMMYT's wheat wide cross work is not higher genetic yield potential, *per se*, but rather better resistance to diseases and greater tolerance to environmental extremes. Success here will increase dependability and raise yields as well. It is also hoped that better tolerance to drought and

saline soils can be incorporated by way of germplasm introgression through wide crosses to related species. At present, the Wheat Program is engaged in collaborative research projects in this area with the University of Utah, the Plant Breeding Institute at Cambridge, Colorado State University, CSIRO in Australia and others.

Increasing attention is also being given to the problems associated with wheat production in the warmer, more tropical environments. CIMMYT's research focuses on developing greater resistance to helminthosporium and fusarium diseases, as well as greater tolerance to heat stress, which can seriously affect the tillering and grain-filling ability of wheat. Payoffs in this research area could result in expanded wheat production during the coolest season or in the higher elevations of the warmer tropics, thus helping non-traditional wheat-producing countries meet their growing consumer demand for wheat. Another very important research thrust is the development of a broader range of earlier-maturing germplasm in wheat and triticale. Such materials allow for greater cropping intensification where farmland is in short supply, and are critical to those tropical areas, such as in Bangladesh, where the optimum wheat-growing season is short.

Program organization—The three crop sub-programs (bread wheat, durum wheat and triticale) are assisted in their research by a number of support programs and/or specialities (pathology,

special germplasm development, wide crosses, the wheat germplasm bank, the wheat milling and baking laboratory, and the international testing, agronomy and training programs). Six regional wheat programs are also in operation: South and Southeast Asia, North and West Africa and the Iberian Peninsula, Eastern and Southern Africa, the Andean region of South America, the Southern Cone region of South America, and the Middle East and Western Asia region (which is based at ICARDA). These regional staff link resident research activities with those of cooperating national programs.

Summary—Despite the rather abundant supplies of wheat today, long-run trends suggest a very strong demand and the potential for serious regional shortfalls. Due to population growth and rising incomes, the agricultural scientific community is faced with the challenge of devising technologies that will enable global food production to more than double during the next 20 to 30 years. The CIMMYT Wheat Program's role in this massive undertaking must remain highly focused to ensure long-run effectiveness, and any changes in or expansions of program activities and staff must result from a careful analysis of the demand for CIMMYT's primary products: germplasm, training, research procedures, consultation and information.

Maize Program

Program priorities and germplasm improvement strategies—CIMMYT emphasizes the development of improved maize genotypes for grain production in the developing world. Its maize improvement program includes mechanisms for integrating breeding activities with germplasm exchange into a germplasm development system in which national collaborators play full partnership roles. In organizing its germplasm development work, CIMMYT has attempted to develop broadly adapted materials to serve the important maize-growing environments in the developing world. Toward this end, the CIMMYT staff perceive four levels of generality: a limited number of *mega-environments*, each of these made up of various *macro-environments*, these in turn composed of *specific environments*, and these made up by *farmer-site environments*.

Mega-environments are characterized by maturity requirements through heat unit needs, elevation, grain types, and by certain commonly encountered matrices of diseases. *Macro-environments* within mega-environments are defined by more particular stresses, e.g., by downy mildew, by streak virus, by corn borers, by aluminum toxicity. For *specific environments* the designation rests on, for example, particular forms of moisture stress or cropping patterns.

CIMMYT aims its work at mega- and macro-environments, each national program concentrates on its own specific environments, and farmers accommodate their site requirements to the range of materials available to them. One perception critical to the organization of CIMMYT's work is that most mega-environments include locations on several continents, indeed within individual countries. Hence, this global maize improvement strategy derives large operational and research advantages from the similarities among sites in given mega- and macro-environments.

For each generalized environment, CIMMYT develops several broadly suitable materials for use by national program scientists as source materials to select for more specific requirements. Through this CIMMYT-coordinated international maize testing program, individual national programs are contributing and receiving useful materials. In simple terms, each site in a given broadly generalized environment benefits from the best efforts of all other sites in the same environment. As well, each site benefits from the improvement of the broadly adapted materials coming from CIMMYT itself.

At the next level, several macro-environments are also of sufficient size to warrant additional attention by CIMMYT in developing materials for use by national programs. CIMMYT's response to these situations has been to depute staff to relevant sites to ensure that materials suitable to the mega-environment can also accommodate significant macro-stresses. Much of the leadership in this improvement work for mega-environment problems is provided by CIMMYT's regional staff, who combine a knowledge of the characteristics of the material available from CIMMYT's pools and populations with an awareness of potentially useful material from each macro-environment of interest. In particular, regional staff have assumed the leadership for developing germplasm with resistance to diseases not found in Mexico; examples include work on downy mildew (Asia), streak virus (Africa), and late wilt (Middle East).

Hence, both headquarters and regional staff, working in close partnership with national scientists, are involved in the development of a range of advanced materials (populations, varieties, hybrids) that are suitably refined in yield potential, agronomic characters and stability to serve the germplasm requirements of national programs.

More than 800 experimental varieties have been developed since CIMMYT began its current scheme of population improvement through international testing less than a decade ago. Approximately 30 national programs, drawing on the germplasm developed through the international testing

program, have released more than 120 varieties and hybrids during the last eight years. These improved materials are showing—in addition to higher yield potential and superior agronomic characteristics—an improved tolerance to stress situations, such as moisture stress.

Given the circumstances of most maize farmers in the developing world, CIMMYT has emphasized open-pollinated maize varieties as the end-product of its germplasm development work. This emphasis has prevailed for several reasons. The primary factor has been the lack of adequate seed production and distribution systems needed for a hybrid seed strategy to work. A second factor has been the lack of yield advantage for hybrids compared to open-pollinated varieties under the production conditions of resource-poor farmers. With considerable genetic buffering capacity, and the possibility of saving seed from season to season, open-pollinated varieties are especially appropriate for resource-poor farmers, who account for the bulk of developing country maize production.

However, the maize production conditions in the developing world are not uniform and continue to improve. Under more productive conditions, the use of high-yielding and uniform hybrids and improved agronomic practices offers the potential for significant productivity increases. While the development of open-pollinated varieties will remain a central feature of CIMMYT's work for some time to come, CIMMYT has also recently established a hybrid development program in response to growing national program requests for research collaboration and assistance. Information will be generated about the inbreeding depression and heterotic patterns of CIMMYT's broad-based pools and populations. Research and training regarding the development and production of non-conventional hybrids will also be undertaken.

Program organization—The Maize Program's research organization involves scientists posted at headquarters as well as in regions outside Mexico. Scientists engaged in germplasm development and population improvement work for normal and quality protein maize types are assisted by a number of research support units (plant protection, physiology/agronomy, germplasm bank, wide crosses, and international testing). In addition, 15 maize specialists are assigned to one of six regional program posts (Andean countries; Central America, Mexico, and the Caribbean; East Africa; West Africa; Asia; and Middle East and North Africa). Beginning in 1984, CIMMYT's work in sub-Saharan Africa is conducted in collaboration with IITA as a joint CIMMYT/IITA program.

Summary—Given the prospects for a significant return from the additional resources, CIMMYT is convinced that an increase in its maize research funding base can result in important productivity gains, especially in Africa and Asia, in the near-term (3-5 years). Future rates of productivity improvement will depend largely on extending the use of high-yielding varieties and hybrids as well as adopting improved agronomic practices. Given the considerable scope for increasing maize yield levels in many developing countries, added investments in maize research and production programs stand to offer very high rates of return in the coming decade.

Economics Program

Background—The activities of the Economics Program are best described in the context of a set of postulates about farmers and about the demand for international agricultural research. With respect to farmers, it is felt that developing country farmers are purposeful in their behavior, that income and risk are two dominant elements shaping their decisions, and that farmers are reasonably effective in allocating the scarce resources at their disposal.

The postulates regarding agricultural research are that most agricultural research should aim at increasing productivity and that national programs are responsible for developing improved

technologies for farmers. Together these views of farmers and agricultural research form the underlying elements of the demand for the services of the CIMMYT Economics Program. These services come in three types. The first is in developing cost-effective procedures which enhance researcher capacity to provide data and analysis for decision making. The second is in training, with much of the training focused on the use of the on-farm research procedures for technology generation. The third relates to the generation of data and analysis for CIMMYT management and others. Most of the work is at the farm level and involves collaboration with biological scientists.

Procedures—The procedures in use or under development in the Economics Program aim to facilitate research in three dimensions: technology generation, research resource allocation, and policy implementation. The three efforts follow the same strategy: undertaking cooperative work with agronomists and economists in national programs, evolving procedures, synthesizing experience in manuals, and then developing training in the application of the procedures. In each case, the goal is to facilitate national program efforts to do the needed research. Currently, refinement and training in the area of technology generation absorbs the bulk of the Economics Program's energies.

Technology generation. Early experiences with national programs pointed to the importance of an on-farm research approach that (1) focuses on representative farmers, (2) aims at near-term technology generation, (3) features collaboration among biological and social scientists, and (4) recognizes the role of the whole farming system in developing technologies appropriate for individual enterprises.

In time, this research came to be viewed as having three phases:

- 1) identifying farmer circumstances and assessing these for opportunities for biological research,

- 2) ranking the potential research opportunities in terms of their probable payoffs given farmer circumstances, and
- 3) undertaking on-farm experimentation that focuses on high priority opportunities.

The CIMMYT Economics Program has emphasized the development of cost-effective procedures for the first two phases. The procedures recognize the important feedback between on-farm research and experiment station research, as well as that between research and extension. While concentrating on maize- and wheat-based technologies, the resulting procedures are broadly applicable to other commodities.

From the outset, CIMMYT has worked with a limited number of national programs. The intention was that at least a portion of these programs would develop and institutionalize on-farm research activities, and thus serve as models for other national programs and for development assistance agencies.

At the present time, nearly a dozen national programs are well on the way towards integrating on-farm research procedures into the process of technology generation. Interest in on-farm research is expanding rapidly in national programs and in development assistance agencies. For example, Economics Program staff are now working with Swiss Development Cooperation, USAID, and CIDA/Canada in several national programs. Results in national programs (e.g. Ecuador and Panama) are noteworthy. In one instance, a benefit-cost analysis was done to show the very favorable returns from investment in this approach to technology generation.

Allocation of research resources. A second set of procedures will help researchers to provide information about the assignment of research resources to crops and to regions. The aim is to provide information about the underlying economic competitiveness or comparative advantage of different crops in specific regions. In CIMMYT the technique by which the procedures are being developed involves estimating the real costs of resources used in producing commodities, e.g. maize or wheat. With this analysis, it is possible to identify the direct effects on competitiveness of taxes, subsidies, and exchange rate anomalies. Furthermore, the application of the procedures will

provide measures of the sensitivity of the underlying competitiveness of crops to particular changes, especially those induced by agricultural research. With this information in hand, managers will have a more precise sense of opportunities for enhancing the productivity of available national resources through agricultural research.

A major effort now underway involves collaboration with national program colleagues in case studies which examine the real resource cost of producing maize and wheat in selected regions of their countries. These studies will serve as a basis for developing a manual of procedures that national program researchers can use to develop similar analyses.

Assessing policy and its implementation. The third set of procedures will take advantage of farm-level research: to identify the adequacy of systems for delivering inputs, marketing products, disseminating information, and providing credit; to estimate the direct losses in production associated with inadequacies; and to identify avenues through which system support might be improved. The goal is to derive cost-effective methods for undertaking such research and to synthesize these procedures in manuals appropriate for use in national programs. This work is under way on a limited basis, with the allocation of more resources dependent on progress.

Data generation and analyses—Encouraged by CIMMYT Trustees and management, and with reinforcement from the last External Review Panel, the Economics Program is also giving more attention to data and analysis for CIMMYT decision makers. Three lines of work are currently featured:

- 1) reports on the world maize and wheat economies,
- 2) delineation and description of agroclimatic production regions for wheat and maize, and
- 3) resource cost analysis (referred to above) with special reference to tropical wheats.

Training and Conferences

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.

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. In the Wheat Program, four courses are offered: crop production, crop improvement, cereal technology, and experiment station management. In the Maize Program, the mix is slightly different: crop production, crop improvement, protein quality laboratory analysis, and experiment station management. 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. The Economics Program participates in this training. The crop improvement courses rank second in terms of number of trainees.

Visiting scientists—Travel fellowships are provided to senior level national researchers to visit CIMMYT for consultation, refresher courses, or more direct participation in the germplasm selection process.

In-service training outside Mexico—Such activities are generally held as national in-service training courses. CIMMYT's outreach staff are especially involved in these training activities with assistance from headquarters' training officers. The Economics Program has been particularly active in this area.

Graduate student fellowships—CIMMYT helps to manage and direct graduate student training and thesis research for collaborators from national programs who obtain scholarships for graduate studies. A limited number of thesis research opportunities are offered to PhD candidates under CIMMYT supervision, usually in Mexico.

Postdoctoral fellowships—The objectives of this program are to prepare new professionals for career opportunities in international agricultural research and to bring to CIMMYT new knowledge on selected research topics.

Conferences—CIMMYT sponsors conferences that are designed to improve the 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 organizing workshops with national program collaborators on topics of regional importance.

Information Services

This unit works with the research and training programs in a variety of ways:

- 1) providing national collaborators with a continuing flow of information on CIMMYT's activities,
- 2) developing an array of pertinent training related materials,
- 3) providing the CIMMYT staff and national collaborators with relevant scientific information on maize, wheat and triticale from the international research community, and
- 4) developing collaborative mechanisms to translate relevant CIMMYT publications into languages other than English and Spanish.

Research Support Units

Laboratory staff undertake protein and protein quality evaluations (mainly maize), milling and baking evaluations (mainly small grains), and soil analyses. Another important activity is the screening of maize and small grains seedlings for aluminum toxicity. The seed health unit provides pathology support to both the maize and wheat programs and manages large greenhouse and laboratory operations. The experiment stations unit manages four major CIMMYT owned stations located in different ecological areas of Mexico. Data processing provides computing and statistical services to all programs.

1984 Program Highlights

Program Activities

Maize program—In 1984, CIMMYT shipped 507 individual maize trials to collaborators in 65 countries. These trials contained CIMMYT's most advanced germplasm with different grain types and colors, maturity characteristics, and adaptation to various elevations. In addition, the Center's maize germplasm bank unit supplied seed from 1,076 bank accessions to research collaborators in 13 countries.

CIMMYT's Maize Program efforts in sub-Saharan Africa, now more closely coordinated with ILTA, were expanded during the year. Plans were formulated to launch (in late 1985) a research program to develop germplasm for the intermediate-elevation maize production zones found throughout southern and eastern Africa. In addition, a grant from CIDA, Canada, signed in November 1984, will permit CIMMYT to post in 1985 two additional maize scientists (agronomy and training) to its regional program initiative in eastern and southern Africa. Increased emphasis will be given in this region to developing stress-tolerant germplasm.

CIMMYT began making important modifications to its maize germplasm bank facility in August 1984, which will allow the temperature in one of the cold storage rooms to be maintained at -15°C . This modification will provide CIMMYT and the global maize research network with a long-term storage facility that will increase the lifetime (germination viability) of the seed. These modifications greatly improve CIMMYT's ability to maintain and manage this important germplasm bank collection, one of the largest in the world for maize.

New collaborative maize research projects with other institutions also were identified during 1984. In August, a U.S. Universities/CIMMYT Workshop on Maize was held at headquarters with funding provided by USAID. Six collaborative research projects were identified by Workshop participants and a committee has been established to mobilize funds for this collaborative research agenda.

Wheat program—During 1984, more than 500,000 packets of experimental wheat, triticale and barley seed were assembled into 44 different nursery categories for testing at hundreds of locations worldwide. New nursery categories have been created for germplasm with early-maturing characteristics, suitability for dryland conditions, special disease and soil stress problems, and for heat and cold tolerant materials. National collaborators from 97 countries requested 2,052 trials from this array of nursery offerings. During the year, seed from 3,211 collections on the Wheat Program germplasm bank were supplied to collaborators from national programs.

During 1984, CIMMYT and ICARDA put into effect a new division of responsibilities for wheat and barley. Briefly stated, CIMMYT will exercise a global mandate for bread and durum wheats and triticale, and ICARDA will exercise a global mandate for barley. As part of this agreement, CIMMYT has two wheat scientists posted at ICARDA's headquarters in Syria to carry out germplasm development work. Similarly, ICARDA has a barley breeder posted in Mexico at CIMMYT's headquarters to focus germplasm development work on barley production problems found in the Western Hemisphere.

In November 1984, CIMMYT launched a new research project aimed at reducing the losses in small grains caused by the barley yellow dwarf virus (BYDV), a widespread and significant disease throughout small grains areas. The overall goal of the project, funded by the Government of Italy, is to establish a network of cooperators familiar with BYDV around the world and initiate or strengthen the exchange of germplasm and information among developed and developing country research institutions.

Economics program—During 1984, CIMMYT economists continued their work in the development of procedures to enhance researcher capacity to provide data and analysis for decision making in national programs. In addition, new formats and teaching materials were developed for training, and efforts in data generation and analysis for CIMMYT decision makers were increased.

Work that was initiated in 1983 with national program colleagues to develop research procedures to examine the real resource cost of producing maize and wheat in selected regions of their countries continued in 1984. In addition, plans were formulated to launch a new program to develop procedures that draw on on-farm research data to identify the adequacy of systems for delivering inputs, marketing products, disseminating information, and providing credit. Such information can then be used to estimate the direct losses in production associated with inadequacies in the implementation of these production support programs.

During the year, a second regional economist assigned to Asia was posted in Pakistan to serve the countries of south Asia. The emphasis on sub-Saharan Africa continued with three staff members working in eastern and southern Africa.

Seed health—In September, CIMMYT expanded its activities related to seed health by establishing a seed health unit (seed pathology) that serves the various germplasm development programs at CIMMYT. This new seed health unit is responsible for conducting all standard tests for seed-borne pathogens in germplasm destined for international distribution. Added responsibilities include the development of improved methods of detection of seed-borne pathogens, tests for the efficacy of chemical seed treatments, and determination of improved seed treatment procedures. These expanded seed health activities are all conducted in close cooperation with the Mexican Plant Protection and Quarantine Organization.

Training programs—During 1984, seventy-six research workers from 32 developing countries attended in-service maize training courses at CIMMYT. Another 13 visiting maize scientists were invited to Mexico during the year. CIMMYT's Maize Program staff also cooperated in the training of seven MS and one PhD degree students from developing countries. In addition, six postdoctoral fellows were in residence in the Maize Program during the year.

In the Wheat Program, 48 research workers from 21 countries attended in-service training courses during 1984. Travel fellowships for 21 visiting wheat scientists were provided during the year. Wheat Program staff also cooperated in 1984 in the training of seven MS and two PhD students from developing countries. In addition, 10 postdoctoral fellows were in residence during the year.

Participation in in-country training programs is also an important activity of CIMMYT's training officers and regional program staff, especially in the area of on-farm research methodologies. During 1984, CIMMYT staff participated in more than a dozen in-country training programs in Africa, Asia, and Latin America.

Information services—During 1984, CIMMYT's Information Services were reorganized. In addition to its ongoing publications and communications activities, two new initiatives were launched: an instructional materials development effort and a Scientific Information Unit (SIU).

In 1984, CIMMYT published 40 new titles and distributed these according to interest areas to a mailing list of 5,700 names. Six issues of the *Wheat, Barley, and Triticale Abstracts*, co-published with the Commonwealth Agricultural Bureaux (CAB), were sent to CIMMYT's closest collaborators and technical wheat libraries in the developing world. More than 100 other scientific papers were prepared by CIMMYT staff for publication in scientific journals or for presentation at international and national meetings.

Data processing services—In November, CIMMYT hosted a workshop on data base management systems. In attendance were participants from five international agricultural research centers, as well as representatives from developed and developing country institutions. As a result of this workshop, participants agreed to create an informal users' group to exchange experiences and locally developed software packages. An agreement also was reached among several centers to make joint purchases of some software, resulting in a considerable savings over individual purchases.

Financial Summary

Inflation and exchange rates dominated the financial environment in 1984. In Mexico, while inflation remained high it did register a decline from previous years. The drop—from 80% to 60% (in official figures)—was less than hoped for but still represented a significant achievement and marked the second year in a row that the rate of price increases fell. Some important items in the CIMMYT market basket, however, increased by more than 60% during 1984. Among these were local wages and certain field and laboratory items. Throughout the year, however, the peso declined in value against the US dollar and thus offset some of the local price increases. The net effect of peso inflation and devaluation, however, was an approximate 25% price increase in dollar terms in Mexico.

In the USA, inflation continued at moderate rates. Somewhat surprisingly, though, US interest rates remained relatively high. Together these factors resulted in a strong dollar compared to other major currencies. This had a negative effect on CIMMYT's programs, as close to 25% of grant revenues were denominated in the hardest-hit currencies.

CIMMYT's operating budget for 1984 called for \$20,975,000 in program expenditures and \$400,000 in capital items. This was equivalent to the bottom of the budget bracket as recommended by the TAC. At year end, total core expenses

amounted to \$20,317,000 in programs, \$482,000 in capital, and \$303,000 in foreign exchange translation expenses. The sources and use of these funds are shown in the table below:

Table 1. Sources and Uses of Core Funds, 1984

(US\$'s 000s)	1984 Budget	1984 Actual
Sources		
Grants (Unrestricted and Restricted)	20,756	19,828
Administrative Fees (Extra Core)	300	443
Sale of Crops & Other Income	50	24
Interest Income	200	508
Carry forward from 1983	69	69
Total Sources	23,375	20,872
Uses		
Wheat	5,363	5,843
Maize	4,154	4,282
Economics	944	960
Laboratories	531	526
Experiment Stations	1,396	1,453
Training and Conferences	3,551	2,721
Information Services	758	789
General Administration	2,000	1,504
Data Processing	585	764
Plant Operations	1,483	1,475
Contingency	210	1/
Total Program Uses	20,975	20,317
Capital Acquisitions	400	482
Translation Effect	—	303
Total Uses	21,375	21,102
Balance	-0-	(230)

1/ Distributed to programs during year

Total revenues were down from the amount programmed at the bottom of the bracket. This was mainly due to a shortfall in grant income. A major factor here was exchange rates, both in dollars and pesos. Also, one donor, for legal reasons related to its agreement with the Government of Mexico, continued to pay its contribution at the controlled exchange rate, a 10-15% discount below the free or market rate. CIMMYT, with the concurrence of its independent auditors, registered the funds received at the market rate. The net effect was a reduction in the contribution of over \$400,000.

Offsetting somewhat the drop in grant income was a better than budgeted performance in other areas. Administrative fees from extra-core grants and interest income were both above budget. In the latter case, this was due to new projects coming on stream and the transfer of some training activities from the core program. Interest income was helped by a strong cash flow and by the relatively high rates of interest prevailing during the year. Taking into account all sources, however, 1984's total revenues were some \$500,000 below the (bottom of the bracket) budgeted amount.

Reduced operating costs in some programs helped to offset this shortfall. Principally, the reduction was evident in general administrative (accounting, finance, personnel, etc.) costs. The other major reduction took place in training where actual expenses were below budget. As in previous years, some training activities planned under core programs were funded from extra-core sources. In fact, compared to 1983, extra-core training in 1984 increased at a greater rate than core training.

As in previous years the translation loss was significant. This was due to the write down on net peso assets that occurred as a result of the 25% devaluation of the Mexican peso during the year. In accordance with accepted accounting practice (e.g., Statement No. 52 of the Financial Accounting Standards Board of the United States), this was charged to the current year's expenses. In 1984, unlike previous years, it resulted in a net financial deficit for the institution.

The staffing plan reflecting these financial developments is shown in the following table:

Table 2. Core Staffing, 1984

(man years)	1984 Budget	1984 Actual
Wheat		
Headquarters	16.0	16.0
Regional Program	10.0	9.5
Sub-Total	26.0	25.5
Maize		
Headquarters	12.5	11.5
Regional Programs	11.5	11.75
Sub-Total	24.0	23.25
Economics		
Headquarters	1.5	1.5
Regional Programs	4.0	4.0
Sub-Total	5.5	5.5
Research Support		
Laboratories	2.0	2.0
Experiment Stations	2.0	2.0
Data Processing	2.0	2.75
Sub-Total	6.0	6.75
Training and Conferences	7.5	7.25
Information Services	3.0	3.0
General Administration	6.0	6.0
Plant Operation	-0-	-0-
Total	78.75	77.25

The difference of 1.5 my amounted to 2% of budget, approximately the same percentage as the funding shortfall. Both the Wheat and Maize Programs were slightly under budget. In Wheat, this was due to the transfer of a staff member from a regional to a headquarters post. In Maize, the shortfall was also due to staff transfers. The Maize Program did, however, register an important increase in scientific staff of almost 25% over the 1983 level. This was largely in line with the recommendations of TAC in its 1982 external program review. Appendix 1 shows these core staffing patterns in greater detail.

1985 Prospects

Planning and Strategy

Both financial and program parameters figure prominently in the planning and execution of an operating strategy for 1985. On the financial side, as in past years, three factors will be critical: level of donations, inflation in Mexico, and exchange rates. At this juncture the funding prospects for 1985 are pessimistic, even more so than at the bottom of the bracket. As a result, two steps have been taken to provide short-term relief:

- 1) training funds have been reduced to below their 1982 level in real terms, and
- 2) capital funds have been pared to the minimum, with no provision available for the replenishment of operating funds.

For 1985, at the expected level of funding, CIMMYT has budgeted 81.5 my. This is an increase of 4.25 my over 1984, and generally reflects CIMMYT's decision to further strengthen maize research. It also includes several positions that were mandated by the TAC and the CGIAR. Two represent collaborative arrangements with other centers, and three others—maize germplasm, training coordinator and seed health—are the result of recommendations of the external program review and were specifically recommended for inclusion in CIMMYT's program of work in 1985. Other increases at headquarters in maize physiology/agronomy and training, wheat pathology and economics are the result of annualizations of staff hired in 1984. Table 3 summarizes these changes. (See also Appendix 1).

On the financial side, Table 4 summarizes CIMMYT's sources and uses of core funds. The most significant development is the projected downturn in funds for training. This reflects a general trend in the CGIAR, and hopefully can be made up from extra-core sources.

Table 3. Core Staffing, 1983-85

(man years)	1983 Actual	1984 Actual	1985 Current Estimate
Wheat			
Headquarters	14.75	16.0	15.5
Regional Programs	9.25	9.5	10.5
Sub-Total	24.0	25.5	26.0
Maize			
Headquarters	7.75	11.5	12.5
Regional Programs	11.0	11.75	13.0
Sub-Total	18.75	23.25	25.5
Economics			
Headquarters	2.0	1.5	2.0
Regional Programs	3.0	4.0	4.0
Sub-Total	5.0	5.5	6.0
Training			
Wheat	3.0	3.0	3.0
Maize	3.0	2.25	2.5
Economics	1.0	1.0	1.0
Experiment Stations	1.0	1.0	1.0
Coordinator	-0-	-0-	1.0
Sub-Total	8.0	7.25	8.5
Other Programs			
Research Support	6.0	6.75	6.5
Information Services	2.25	3.0	3.0
General Administration	6.0	6.0	6.0
Sub-Total	14.25	15.75	15.5
Grand Total CIMMYT	70.0	77.25	81.5

Table 4. Sources and Uses of Core Funds, 1983-85

(Nominal US\$'s 000s)	1983 Actual	1984 Actual	1985 Current Estimate
Sources			
Grants	17,475	19,828	20,570
Admin. Fees-ExCore	270	443	475
Interest Income	386	508	300
Other Income	43	24	50
Carry forward	169	69	-0-
Total Sources	18,343	20,872	21,395
Uses			
Wheat	5,275	5,843	5,696
Maize	3,697	4,282	4,500
Economics	903	960	1,055
Laboratories	445	526	609
Experiment Stations	1,146	1,453	1,804
Seed Health	-0-	-0-	150
Training & Conferences	2,478	2,721	2,000
Information Services	662	789	818
General Administration	1,668	1,504	1,800
Data Processing	557	764	700
Plant Operations	1,056	1,475	1,908
Contingency	<u>1/</u>	<u>1/</u>	200
Sub-Total	17,887	20,317	21,240
Capital Acquisitions	279	482	155
Translation Effect	108	303	-0-
Total Uses	18,274	21,102	21,395
Balance	69	(230)	-0-

^{1/} Distributed to programs during the year.

Extra-Core Grants

These are budgeted in 1985 to reach \$5,437,425, including the following major projects:

Extra-Core Grants, 1985

(US \$'s)	Donor	Amount ^{1/}	Man Years
Wheat			
Pakistan	USAID	636,000	1.0
BYDV	Italy ^{2/}	390,000	1.0
E. Africa	CIDA	240,000	1.0
Bangladesh	CIDA	733,600	2.0
Peru	INIPA/IBRD	115,000	1.0
Turkey	UNDP	87,825	-0-
Total Wheat		2,202,425	7.0
Maize			
Pakistan	USAID	409,000	1.0
Ghana	CIDA	1,036,000	2.0
E. Africa	CIDA	425,000	2.0
Central America/Seed	Switzerland	391,000	1.0
Total Maize		2,261,000	6.0
Economics			
Pakistan	USAID	159,000	-0-
Haiti	CIDA	100,000	1.0
E. Africa/FSR	USAID	600,000	2.0
Total Economics		859,000	3.0
Others			
Scientific Information Unit	IDRC	115,000	0-
Total Extra Core		5,437,425^{1/}	16.0

^{1/} Includes administrative fees.

^{2/} Classified as contribution to CGIAR by donor.

In total, these extra-core programs amount to 21% of CIMMYT's operations. Administrative fees charged to these donors represent 19% of general administrative and operating expenses.

The extra-core programs budgeted for 1985 represent a large increase over 1984. This is mainly due to the signing of a new grant (Italy/BYDV), the renewal of an old one (USAID/Pakistan), and increased activity in two on-going projects (CIDA/Bangladesh and CIDA/Ghana). Almost all these grants also include large training and equipment components.

In total, 16 international staff will be supported by extra-core donors. Of these 9.0 my will be in national programs, and 7.0 my in regional programs. All of these projects are expected to continue in 1986 as well.

Summing Up

CIMMYT's planned staffing and funding pattern for 1985 is shown in Table 5.

Table 5. Projected Core and Extra-Core Expenses, 1985

(US \$'s 000)	Core		Extra Core		Total	
	Cost	My	Cost	My	Cost	My
Research						
Wheat	5,696	26.0	1,426	6.0	7,122	32.0
Maize	4,500	25.5	1,952	7.0	6,452	32.5
Economics	1,055	6.0	350	3.0	1,405	9.0
Sub-Total	11,251	57.5	3,728	16.0	14,979	73.5
Research Support						
Laboratories	609	2.0	-0-	-0-	609	2.0
Seed Health	150	0.5	-0-	-0-	150	0.5
Experiment Stations	1,804	4.0	-0-	-0-	1,804	4.0
Data Processing	700	2.0	-0-	-0-	700	2.0
Sub-Total	3,263	6.5	-0-	-0-	3,263	6.5
Total Research	14,514	64.0	3,728	16.0	18,242	80.0
Training and Conf.	2,000	8.5	900 ^{1/}	-0-	2,900	8.5
Information Services	818	3.0	100	-0-	918	3.0
General Administration	1,800	6.0	-0-	-0-	1,800	6.0
Plant Operations	1,908	-0-	-0-	-0-	1,908	-0-
Total Programs	21,040	81.5	4,728 ^{2/}	16.0	25,768	97.5

^{1/} Estimated, including training components of specific program grants.

^{2/} Not including estimated administrative fees.

1986 Budget Request

Overview

Since the conclusion of its most recent External Program Review CIMMYT has made a concerted effort to meet the recommendations made by the TAC and the donors to the CGIAR. Briefly stated these included:

- strengthening disciplinary research support at headquarters,
- devoting more resources to maize research,
- giving greater attention to maintenance research, particularly in wheat,
- developing a program for the longer term conservation of genetic resources,
- continuing to give high priority to training activities,
- giving more attention to the communication of its work, and
- entering into agreements with ICARDA and IITA on the division of responsibilities.

This review was concluded in March of 1983, and soon thereafter, CIMMYT began taking steps to address these issues. In 1984, it concluded agreements with ICARDA and IITA, made major modifications to its maize germplasm bank, signed agreements with the International Development Research Centre to expand its communications efforts, instituted a program of seed health, and increased resources devoted to maize research by 16%. In 1985, CIMMYT has appointed a germplasm specialist in the maize program and again programmed a substantial increase in funds for maize research. Also in 1985 CIMMYT has appointed an overall coordinator of training and with generous support from the Government of

Japan and the Japanese Shipbuilding Industry Foundation (both extra-core grants), has broken ground on a new \$1.6 million Training, Conference and Information Center.

For 1986, CIMMYT is again presenting a program of work that addresses the concerns and recommendations of the external program review and enables the center to continue to meet the demands placed upon it for research and training. Major additions recommended by TAC for approval by the CGIAR include:

- a maize breeder at headquarters working on problems of stress,
- a maize breeder stationed in Africa working in mid-altitude areas,
- a regional maize specialist assigned to eastern and southern Africa,
- a regional maize specialist assigned to Asia, and
- training fellowships.

CIMMYT feels that the program additions recommended by TAC are of great importance to its overall research and training efforts, and in particular its activities in Africa. The program additions are also in line with the outcome of the external program review. This recommended budget is summarized in Table 6.

Financial Planning

For 1986 CIMMYT has assumed the combined effect of inflation and exchange rates on its budgets to be 9%.

The stabilization fund is intended to remove much of the guesswork about inflation and exchange rates that results from making predictions such as these one to two years in advance. Under this set of operating procedures, adjustments for inflation and exchange rates can be made just prior to, or even during, the operating year. This should help the center forecast its financial needs on a timely basis with greater accuracy.

Table 6. Projected Core Expenses, 1985-86

(US \$'s 000s)	1985		1986	
	Current Estimate		TAC Recommended	
Research				
Wheat	5,696	26.0	5,596	24.5
Maize	4,500	25.5	4,875	29.0
Economics	1,055	6.0	1,055	6.0
Sub-Total	11,251	57.5	11,526	59.5
Research Support				
Labs	609	2.0	609	2.0
Seed Health Experiment Stations	1,804	2.0	1,804	2.0
Data Processing	700	2.0	700	2.0
Sub-Total	3,263	6.5	3,263	6.5
Total Research	14,514	64.0	14,789	66.0
Training and Conferences	2,000	8.5	1,800	9.0
Information	818	3.0	818	3.0
General Administration	1,800	6.0	1,800	6.0
Plant Operations	1,908	-0-	1,908	-0-
Total Programs	21,040	81.5	21,115	84.0
Inflation/Exchange	-0-		1,800	
Capital	155		310	
Grand Total CIMMYT	21,395	81.5	23,505	84.0

In light of this, the 9% figure assumed by CIMMYT is the likely minimum amount required for 1986; any amount greater than that would be considered a drawdown on the stabilization fund. This has two advantages:

- 1) it signals to the CGIAR CIMMYT's minimum requirements and thereby assists in planning at the System level, and
- 2) by moving inflation and exchange rate planning closer to the operating year in question it will likely result for CIMMYT in a more realistic operating budget, and one less subject to inflation and exchange rate swings.

Core Programs (see also Budget Table 1)

Wheat—The TAC study on priorities recommends a moderate decline in core funds devoted to wheat research and this is reflected in their recommendations for 1986. A slight decline is forecast both in terms of financial and human resources. A number of potentially important developments as a consequence of this are worth mentioning. Two program activities put forth by CIMMYT for inclusion in the 1986 budget were not recommended by the TAC. These included:

Wheat pathology. This position is currently filled and as a consequence will result in a staff reduction in this important area of disciplinary support. All wheat pathology research at CIMMYT (covering bread wheat, durum wheat, barley and triticale) will now be handled by two core scientists. This reduction is in apparent contradiction to the previously stated recommendation of the external program review to bolster disciplinary support and maintenance research.

Bread wheat breeder. This was scheduled as a new position to bring to two the number of core scientists in CIMMYT's largest small grains breeding program. The expectation was that this additional person would be involved in maintenance research, in addressing the germplasm needs of the larger and more advanced national programs, and conducting more extensive analyses of data pertaining to CIMMYT's on-going research in bread wheat. Again, this is at odds with the recommendations of the external program review.

The Wheat Program core manpower plan for 1986 is shown below.

WHEAT PROGRAM (man-years)	1985		1986
	1984 Actual	Current Estimate	TAC Recommended
Headquarters			
Improvement			
Bread Wheat	1.0	1.0	1.0
Durum Wheat	1.0	1.0	1.0
Barley	0.75	-0-	-0-
Triticale	1.0	1.0	1.0
Tropical Wheat	2.0	2.0	2.0
Sub-Total	5.75	5.0	5.0
Research and Management Support			
Office of Director	2.0	2.0	2.0
Germplasm Development	1.0	1.0	1.0
Germplasm Bank	1.0	1.0	1.0
International Nurseries	1.0	1.0	1.0
Agronomy	1.0	1.0	1.0
Pathology	2.25	3.0	2.0
Disease Surveillance	1.0	0.5	0.5
Wide Crosses	1.0	1.0	1.0
Sub-Total Headquarters	16.0	15.5	14.5
Regional Programs			
Andean	2.0	2.0	1.0
So. Cone	2.0	2.0	2.0
E. Africa	1.0	1.0	1.0
N. Africa	1.5	1.0	1.0
S. & SE Asia	1.75	2.0	2.0
ICARDA	1.25	2.0	2.0
Winter Wheat	-0-	0.5	1.0
Sub-Total	9.5	10.5	10.0
Total Wheat	25.5	26.0	24.5

Maize Program—All of CIMMYT's projected core staff increases for 1986 come in the Maize Program. At headquarters one additional breeder is programmed. CIMMYT's past efforts in maize research have made important contributions in the development and validation of selection criteria for improving the yield efficiency of maize varieties on the lowland tropics. With its growing agenda on the problems of stress environments, CIMMYT seeks an additional breeder to work with the maize physiologist in the development of germplasm with enhanced resistance/tolerance to drought, temperature extremes, salinity and excesses or deficiencies of mineral elements in the soils.

Several major additions are scheduled for the regional programs. Since the early 1970s, CIMMYT has felt that the demand for its services from individual countries could not be handled exclusively on a bilateral basis. With the growing number of countries that collaborate in the international testing program, CIMMYT sought new approaches to monitor international trials, assist an increasing number of collaborating national institutions, and provide relevant feedback into CIMMYT's central programs. The assembly and provision of nurseries more closely attuned to national and regional requirements also demanded an enhanced ability to help determine these requirements. Finally, CIMMYT's strong interest in stimulating more effective production-oriented national research required a more sustained CIMMYT involvement at the regional level.

CIMMYT's institutional response to this growing international network of maize researchers has been the establishment of six regional programs in Asia (1), sub-Saharan Africa (2), the Middle East (1), and Latin America (2). The primary functions of these regional staff are:

- 1) to promote closer interactions with national programs, especially in cooperative efforts involving germplasm testing and development,
- 2) to identify technical constraints that may affect the use of improved germplasm in increasing food production and to assist national programs wherever possible in developing production solutions through on-farm research that are consistent with national resources and production potential,

- 3) to assist in definition of training requirements, selection of candidates for training, and to give continued encouragement and technical support to national staff in maintaining crop improvement and production activities, and
- 4) to engage in collaborative research projects of international significance in which the region has a unique capability to carry out the germplasm development work.

In general, CIMMYT has achieved minimum staffing levels for most of its regional maize programs with two notable exceptions: eastern and southern Africa, and Asia.

Eastern and Southern Africa Regional Maize Program. More than 9 million hectares of maize are planted in this region. Average yield levels are less than 1.3 t/ha and net imports are now greater than 1 million tons per year. Substantial scope exists to increase yield levels in the near term throughout this region, but especially in the vast mid-elevation environments. CIMMYT, in conjunction with IITA and national scientists, plans to establish a mid-elevation research station in Zimbabwe to develop varieties and hybrids to serve the region and similar zones in other areas of Africa. To provide leadership for CIMMYT's expanded activities in this region, two additional regional maize specialists—one breeder and one pathologist—are needed.

Asian Regional Maize Program. The countries of Asia grow maize on approximately 35 million hectares (20 M ha in China) and account for roughly 45% of all the maize lands in the developing world. CIMMYT's research project to develop downy mildew resistant materials, which is centered in Bangkok, its growing cooperation with maize scientists in the People's Republic of China and in Vietnam, and the sheer size and importance of this region require that CIMMYT increase its regional team, at a minimum, from two to three senior scientists.

The Maize Program core staffing plan for 1986 is shown below:

MAIZE PROGRAM (man-years)	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Headquarters			
Improvement			
Breeding	4.75	5.0	6.0
Plant Protection	2.0	2.0	2.0
Physiology	0.75	1.0	1.0
Sub-Total	7.5	8.0	9.0
Research and Management Support			
Office of Director	2.0	2.0	2.0
International Testing	1.0	1.0	1.0
Germplasm Bank	-0-	0.5	1.0
Wide Crosses	1.0	1.0	1.0
Sub-Total Headquarters	11.5	12.5	14.0
Regional Programs			
Andean	2.75	3.0	3.0
CA/Mexico/Caribbean	3.0	3.0	2.0
E. Africa	1.0	1.0	3.0
W. Africa	2.0	3.0	3.0
Asian	2.0	2.0	3.0
Middle East	1.0	1.0	1.0
Sub-Total	11.75	13.0	15.0
Total Maize	23.25	25.5	29.0

Economics Program—No major additions or deletions are scheduled for 1986. Two-thirds of CIMMYT's core economics staff are posted to outreach programs, as are three economists supported by extra-core grants. This reflects the importance the program places on working with national program collaborators, especially in the development and testing of cost-effective research procedures.

Staffing plans are shown below.

ECONOMICS PROGRAM (man-years)	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Headquarters	1.5	2.0	2.0
Regional Programs			
E. Africa	1.0	1.0	1.0
Central America /Caribbean	1.0	1.0	1.0
Asia	2.0	2.0	2.0
Sub-Total	4.0	4.0	4.0
Total Economics	5.5	6.0	6.0

Training and conferences—The current downturn in core funds being made available for training comes at a time when CIMMYT is seeking to increase its training activities. This has resulted in the evolution of a strategy in which CIMMYT uses core funds to maintain its capacity to train (i.e. its training staff and their logistical support), while turning more and more to new sources of fellowships funds and imaginative financing mechanisms. The table below, which shows core staff, reflects this strategy.

TRAINING AND CONFERENCES (man-years)	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Coordinator	-0-	1.0	1.0
Wheat	3.0	3.0	3.0
Maize	2.25	2.5	3.0
Economics	1.0	1.0	1.0
Experiment Stations	1.0	1.0	1.0
Total Training	7.25	8.5	9.0

Other programs—No major changes are planned, though two programs deserve further mention. Information Services will continue to try to expand its support to the research and training programs and to national programs through the provision of bibliographic and data search services and through the development of training materials. Much of the support for this will come from extra-core sources. Seed Health will enter its first full year of operations in 1985. The core staff member assigned to the program splits his time with the disease surveillance activities in the Wheat Program. The table below summarizes core staffing for 1986.

OTHER PROGRAMS (man-years)	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Information Services	3.0	3.0	3.0
Research Support			
Laboratories	2.0	2.0	2.0
Seed Health	-0-	0.5	0.5
Experiment Stations	2.0	2.0	2.0
Data Processing	2.75	2.0	2.0
Sub-Total	6.75	6.5	6.5
General Administration & Plant Operations			
Office of Director General	4.0	4.0	4.0
Administration	1.0	1.0	1.0
Finance	1.0	1.0	1.0
Sub-Total	6.0	6.0	6.0
Total Other Programs	15.75	15.5	15.5

In the budget tables that follow, the funds required to carry out these core programs and the required core staff changes are described.

Budget Tables

Notes to the Budget Tables

The accompanying budget tables are a required part of the budget submission to the CGIAR. The information contained therein and the format are prescribed by the CGIAR/Secretariat.

Table 1. Summary of International Staff Man-Years and Operating Costs by Activity 1983-1986.

This table shows international staff man-years and the total cost of the center's operations broken down by major core programs. Line items 1-6 describe program operations in constant dollars from the base year onward. Thus the 1986 request is shown in constant 1985 dollars with the total given in Line 6. Inflation and exchange rates are included, as appropriate and compounded from 1986 onward, in Line 7. The total amount for core in current dollars is given in Line 8; it is the sum of Lines 6 and 7. Line 9 shows actual and estimated extra core grants. The purpose of this line is to demonstrate the degree of balance between core and extra core. Line 10 is a completely different breakdown, i.e., by object of expenditure, rather than by program.

Table 2. Summary of Sources and Uses of Funds 1983-1986.

As the title suggest, this table describes sources and uses of funds for the institute. It shows total funds (not just cash) on hand at the start of the year, broken down by source, and describes their application to various programs (core, extra core), capital, and unexpended fund balances during the year. It is similar to an income statement (or statement of financial activity). Total sources and total uses of funds should always be equal; gains or losses that are normally shown on a "bottom line" of an income statement are treated as additions to or subtractions from unexpected funds of this statement. This table is shown in current dollars.

Table 3. Net Requirement from CGIAR 1983-1986.

This table shows total funds required each year, broken down to programs and capital. Any funds on hand (such as the balance in unexpended funds) or estimated income to be earned during the year (such as from short-term investments) are subtracted from the total required to give the net amount across centers gives the total net requirement, or asking, for those institutions funded by the CGIAR. This table is shown in current dollars.

Table 4. Summary Balance Sheet 1983-1986.

Beginning with the base year 1985 and then for all subsequent years, these are notional figures of assets and liabilities. Figures for past years are from the centers' independently audited financial statement. The preparation of the tables serves mainly as a check and planning figure for balances in the Capital Grants, Unexpended Funds, and Reserves (Net Worth) section of the balance sheet. Figures for current assets and liabilities are 'best-guesses' only. This table is shown in current dollars.

Table 5. Capital Expenditures and Reserves 1983-1986.

In an established center such as CIMMYT, capital expenditures are usually a small portion of total budget. Major items are capital acquisitions (new rather than replacement items) and additions to operating funds. In 1983 and 1984 the translation effect was charged here. This table is shown in current dollars.

Table 1. Summary of Core International Staff Years and Operating Costs by Activity 1983-1986 (US Dollars, Thousands)^{1/}

	1983 Actual		1984 Actual		1985 Current Estimate		1986 TAC Recommended Cost	
	Cost	My	Cost	My	Cost	My	Cost	My
Research								
Wheat Program								
Bread Wheat	305	1.0	325	1.0	323	1.0	323	1.0
Durum Wheat	205	1.0	142	1.0	161	1.0	161	1.0
Barley	104	1.0	170	0.75	70	-0-	70	-0-
Triticale	178	1.0	194	1.0	296	1.0	296	1.0
Tropical Wheat	159	1.0	319	2.0	411	2.0	411	2.0
Regional Programs	1,516	9.25	1,507	9.5	1,744	10.5	1,594	10.0
Research and Mgmt. Support	2,808	9.75	3,186	10.25	2,691	10.5	2,741	9.5
Sub-Total Wheat	5,275	24.0	5,843	25.5	5,696	26.0	5,596	24.5
Maize Program								
Improvement	1,160	4.75	1,110	7.50	1,300	8.0	1,450	9.0
Regional Programs	1,765	11.0	1,857	11.75	2,015	13.0	2,240	15.0
Research and Mgmt. Support	772	3.0	1,315	4.0	1,185	4.5	1,185	5.0
Sub-Total Maize	3,697	18.75	4,282	23.25	4,500	25.5	4,875	29.0
Economics Program								
Headquarters	507	2.0	379	1.5	370	2.0	370	2.0
Regional Programs	396	3.0	581	4.0	685	4.0	685	4.0
Sub-Total Economics	903	5.0	960	5.5	1,055	6.0	1,055	6.0
Research Support								
Laboratory Services	445	2.0	526	2.0	609	2.0	609	2.0
Seed Health	-0-	-0-	-0-	-0-	150	0.5	150	0.5
Experiment Stations	1,146	1.5	1,453	2.0	1,804	2.0	1,804	2.0
Data Processing	557	2.5	764	2.75	700	2.0	700	2.0
Sub-Total Research Support	2,148	6.0	2,743	6.75	3,263	6.5	3,263	6.5
Training and Conferences	2,478	8.0	2,721	7.25	2,000	8.5	1,800	9.0
Information Services	662	2.25	789	3.0	818	3.0	818	3.0
General Administration	1,668	6.0	1,504	6.0	1,800	6.0	1,800	-0-
Plant Operations	1,050	-0-	1,475	-0-	1,908	-0-	1,908	-0-
Sub-Total Programs ^{1/}	17,887	70.0	20,317	77.25	21,040	81.5	21,115	84.0
Other								
Contingency ^{2/}	-0-	-0-	-0-	-0-	200	-0-	220	-0-
Nominal Increment ^{3/}	-0-	-0-	-0-	-0-	-0-	-0-	1,860	-0-
Total Core	17,887	70.0	20,317	77.25	21,240	81.5	23,195	84.0
Total Extra Core ^{4/}	2,195	10.25	3,434	13.0	4,728	16.0	4,700	16.0
By Object of Expenditure								
Salaries and Allowances	8,628	-0-	9,504	-0-	10,010	-0-	10,265	-0-
Supplies and Services	6,557	-0-	7,635	-0-	8,318	-0-	8,300	-0-
Fellowships	1,499	-0-	1,775	-0-	1,050	-0-	905	-0-
Travel	1,563	-0-	1,403	-0-	1,862	-0-	1,865	-0-
Total ^{5/}	17,887	70.0	20,317	77.25	21,240	81.5	21,335	84.0

^{1/} 1983-1984 in nominal dollars throughout; 1985-1986 in 1985 dollars Lines 1-6; line 7 in nominal dollars.

^{2/} Equals 1% of program total.

^{3/} The combined effect of inflation and exchange rates from 1985 onward: 9% p.a.

^{4/} Estimates for 1985 onward. Amounts are exclusive of administrative fees.

^{5/} In 1985 dollars from 1985 onward. Total equals core programs plus contingency.

Table 2. Summary of Sources and Uses of Funds 1983-1986
(US Nominal Dollars, Thousands)

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Sources of Funds				
Core Operations				
Unrestricted Grants	13,112	14,939	15,940	18,180
Restricted Grants	4,363	4,889	4,630	4,500
Earned Income Applied in Year	699	975	825	825
Unexpended Balances-Core	169	69	-0-	-0-
Sub-Total	18,343	20,872	21,395	23,505
Capital and Reserves				
Grants	-0-	-0-	-0-	-0-
Unexpended Balances	-0-	-0-	-0-	-0-
Balance in Operating Funds	1,540	1,540	1,540	1,540
Sub-Total	1,540	1,540	1,540	1,540
Extra Core Operations				
Extra-Core Grants	2,195	2,434	4,728	4,700
Unexpended Balances	(48)	(48)	(48)	(48)
Sub-Total	2,147	3,386	4,680	4,652
Total Sources of Funds	22,030	25,798	27,615	29,697
Uses of Funds				
Core Operations				
	17,887	20,317	21,240	23,195
Capital and Reserves				
	387	785	155	310
Extra-Core Projects				
	2,195	3,434	4,728	4,700
Unexpected Funds				
Core	69	(230)	-0-	-0-
Extra Core	(48)	(48)	(48)	(48)
Operating Funds	1,540	1,540	1,540	1,540
Sub-Total	1,561	1,262	1,492	1,492
Total Uses of Funds	22,030	25,798	27,615	29,697

**Table 3. Net Requirements from CGIAR 1983-1986
(US Nominal Dollars, Thousands)**

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Total Core Operating Funds Required	17,887	20,317	21,240	23,195
Less: Unexpended Funds Balance	169	69	-0-	-0-
Less: Earned Income (excepting administrative fees on Core Restricted Grants)	699	975	825	825
Net Core Operating Funds Required from CGIAR	17,019	19,273	20,415	22,370
Total Capital Funds Required	1,927	2,325	1,695	1,850
Less: Balance of Operating Funds Previous Year	1,540	1,540	1,540	1,540
Net Capital Funds Required from CGIAR	387	785	155	310
Net Funds Required from CGIAR	17,406	20,058	20,570	22,680
Net Funds Received from CGIAR	17,475	19,828	20,570	N/A
Balance Carried Forward	69	(230)	-0-	N/A

Table 4. Summary Balance Sheet 1983-1986
(US Nominal Dollars, Thousands)

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Current Assets				
Cash	732	791	800	800
Short Term Investments	3,084	2,867	3,000	3,000
Receivables (Donors)	2,118	1,437	1,200	1,200
Receivables (Others)	331	429	500	500
Inventories	106	213	532	532
Prepaid Expenses	-0-	-0-	-0-	-0-
Other Current Assets	-0-	-0-	-0-	-0-
Total Current Assets	6,371	5,737	6,032	6,032
Fixed Assets				
Vehicles	2,879	2,906	2,950	3,000
Furnishing and Equipment	3,465	4,169	4,200	4,300
Buildings	5,993	6,356	6,400	6,400
Land	464	464	464	464
Other Fixed	369	369	369	369
Total Fixed Assets	13,170	14,264	14,383	14,533
Other Assets				
	1	10	-0-	-0-
Total Assets	19,542	20,011	20,415	20,565
Liabilities				
Accounts Payable	3,133	2,705	2,000	2,000
Other Liabilities	229	386	400	400
Payments in Advance - Donors	1,421	1,549	1,400	1,400
Total Liabilities	4,783	4,640	3,800	3,800
Fund Balances				
Capital				
Fully Expended in Fixed Assets	13,170	14,264	14,383	14,533
Operating Funds	1,540	1,540	1,540	1,540
Unexpected Funds (Including Translation Effect)	(43)	(525)	600	600
Trustee Reserve	92	92	92	92
Total Fund Balances	14,759	15,371	16,615	16,765
Total Equity	19,542	20,011	20,415	20,565

Table 5. Capital Expenditures 1983-1986
(US Nominal Dollars, Thousands)

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended
Capital				
Acquisitions and Improvements	269	432	105	160
Operating Funds	-0-	-0-	-0-	100
Seniority Premiums	10	50	50	50
Translation Effect ^{1/}	108	303	-0-	-0-
Total Capital	387	785	155	310

^{1/} Translation effect charged to current year's operation in accordance with Statement 52 of the Financial Accounting Standards Board of the United States.

Appendix I
International Staff Man-Year Core Programs 1983-1986

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended	Mini-Opt ^{1/} Model
Wheat Program					
Headquarters					
Bread Wheat	1.0	1.0	1.0	1.0	2.0
Durum Wheat	1.0	1.0	1.0	1.0	1.0
Barley	1.0	0.75	-0-	-0-	1.0
Triticale	1.0	1.0	1.0	1.0	1.0
Tropical Wheat	1.0	2.0	2.0	2.0	2.0
Research and Mgmt. Support					
Office of Director	2.0	2.0	2.0	2.0	2.0
Germplasm Development	1.0	1.0	1.0	1.0	1.0
Germplasm Bank	1.0	1.0	1.0	1.0	1.0
International Nurseries	1.0	1.0	1.0	1.0	1.0
Agronomy	1.25	1.0	1.0	1.0	2.0
Pathology	1.5	2.25	3.0	2.0	3.0
Disease Surveillance	1.0	1.0	0.5	0.5	1.0
Wide Crosses	1.0	1.0	1.0	1.0	1.0
Sub-Total Headquarters	14.75	16.0	15.5	14.5	19.0
Regional Program					
Andean	2.0	2.0	2.0	1.0	2.0
So. Cone	2.0	2.0	2.0	2.0	2.0
East Africa	2.0	1.0	1.0	1.0	1.0
North Africa	2.0	1.5	1.0	1.0	2.0
South & Southeast Asia	1.25	1.75	2.0	2.0	2.0
ICARDA	1.0	1.25	2.0	2.0	1.0
Winter Wheat	-0-	-0-	0.5	1.0	-0-
Sub-Total Regional Programs	9.25	9.5	10.5	10.0	10.0
Training	3.0	3.0	3.0	3.0	3.0
Total Wheat	27.0	28.5	29.0	27.5	32.0

Appendix I (Cont'd)

	1983 Actual	1984 Actual	1985 Current Estimate	1986 TAC Recommended	Mini-Opt ^{1/} Model
Maize Program					
Headquarters					
Breeding	2.75	4.0	5.0	6.0	7.0
Plant Protection	1.0	2.0	2.0	2.0	2.0
Physiology/Agronomy	-0-	0.75	1.0	1.0	1.0
Collaborative Research	1.0	0.75	-0-	-0-	-0-
Research and Mgmt. Support					
Office of Director	2.0	2.0	2.0	2.0	2.0
International Nurseries	1.0	1.0	1.0	1.0	1.0
Wide Crosses	-0-	1.0	1.0	1.0	1.0
Germplasm	-0-	-0-	0.5	1.0	-0-
Sub-Total Headquarters	7.75	11.5	12.5	14.0	14.0
Regional Program					
Andean	3.0	2.75	3.0	3.0	3.0
CA/Mexico/Caribbean	3.0	3.0	3.0	2.0	3.0
East Africa	1.0	1.0	1.0	3.0	2.0
W. Africa	2.0	2.0	3.0	3.0	2.0
Asian	1.0	2.0	2.0	3.0	2.0
Middle East	1.0	1.0	1.0	1.0	1.0
Sub-Total Regional Programs	11.0	11.75	13.0	15.0	13.0
Training	3.0	2.25	2.5	3.0	3.0
Total Maize	21.75	25.5	28.0	32.0	30.0
Economics Program					
Headquarters	2.0	1.5	2.0	2.0	2.0
Regional Program					
CA/Mexico/Caribbean	1.0	1.0	1.0	1.0	1.0
East Africa	1.0	1.0	1.0	1.0	1.0
Asia	1.0	2.0	2.0	2.0	2.0
Latin America	-0-	-0-	-0-	-0-	-0-
Sub-Total Regional Programs	3.0	4.0	4.0	4.0	4.0
Training	1.0	1.0	1.0	1.0	1.0
Total Economics	6.0	6.5	7.0	7.0	7.0

Appendix I (Cont'd)

	1983 Actual	1984 Actual	1985 Current Estimate	1985 TAC Recommended	Mini-Opt ^{1/} Model
Research Support					
Headquarters					
Laboratory Services	2.0	2.0	2.0	2.0	3.0
Experiment Stations	1.5	2.0	2.0	2.0	2.0
Data Processing	2.5	2.75	2.0	2.0	1.0
Seed Health	-0-	-0-	0.5	0.5	-0-
Sub-Total Headquarters	6.0	6.75	6.5	6.5	6.0
Training					
Experiment Stations	1.0	1.0	1.0	1.0	1.0
Coordinator	-0-	-0-	1.0	1.0	1.0
Total Research Support	7.0	7.75	8.5	8.5	8.0
Information Services					
Headquarters	2.25	3.0	3.0	3.0	4.0
General Administration					
Headquarters					
Office of D.G.	4.0	4.0	4.0	4.0	4.0
Financial Management	1.0	1.0	1.0	1.0	1.0
Administrative Services	1.0	1.0	1.0	1.0	1.0
Total Gen. Administration	6.0	6.0	6.0	6.0	6.0
Sub-Total Headquarters	38.75	44.75	45.5	46.0	51.0
Sub-Total Regional Programs	23.25	25.25	27.5	29.0	27.0
Sub-Total Training	8.0	7.25	8.5	9.0	9.0
Grand Total	70.0	77.25	81.5	84.0	87.0

^{1/} The "mini-opt model" was developed by CIMMYT management during its Second Quinquennial Review to describe the minimum size and deployment of staff that would provide for a sustained high rate of impact from its core activities. The model was substantially endorsed by the QQR panel and by TAC.

Notes

