Funding Request for 1993

CIAT

Centro Internacional de Agricultura Tropical

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OVERVIEW

I. The 1993 Budget Request: A Companion Document to the CIAT Medium-Term Plan for 1993-1998

In 1991, the CGIAR received CIAT's long-range plan, *CIAT in the 1990s and Beyond: A Strategic Plan.* In the same year, the CGIAR approved CIAT's 1992 program and budget, which called for implementing the Strategic Plan during 1992.

In 1992, CIAT submits its Medium-Term Plan for 1993-1998 to TAC and the CGIAR. The Plan lays out the operational program and associated resource requirements for the 6-year period.

This publication presents the financial resources request for 1993. In so doing, it fully coincides with the program plans and resource requirements for 1993 as presented in the Medium-Term Plan. Hence, this budget request is considered a companion document to the Plan, and its information should be cross-referenced with that in the Plan.

II. CIAT's 1993 Budget Request in Perspective

For 1992, the year during which the Strategic Plan was to be implemented by CIAT, the CGIAR approved a budget of US$32,650,000, with a contingent of 88 Senior Staff positions.

Because the CGIAR system lacked financial resources, CIAT was asked to operate, in 1992, on a working budget of $27,700,000 ($26,500,000 from the CGIAR and $1,200,000 from self-generated income). At the same time, CIAT's host country, Colombia, revalued its currency significantly, increasing CIAT's annual operational costs in Colombia by more than $3,000,000. Faced with the resulting shortfall of almost 26%, CIAT opted to proceed with the following three-part strategy:

Restructure central administrative, financial, and support services operations to reduce costs (this allowed the Center to absorb cost increases by about $1,500,000).

Redefine resource needs for the rapid implementation of the Strategic Plan in terms of the minimum resources and activities required. This resulted in significant reductions in ongoing activities and downward adjustments in the definition of resources needed for new activities.

Reallocate resources according to the outcome of the above processes.

Through this three-part strategy, CIAT was able to arrive at a working budget for 1992, amounting to $29,344,000. This budget includes $27,972,000 for the new base (including 70 Senior Staff positions), and $1,372,000 for the net phasing costs of outgoing and incoming activities.

The budget request for activities in 1993 amounts to $30,047,000, expressed in

1992 dollars, or $32,384,000 in current (1993) dollars.[1] Included are 77 Senior Staff positions. The funds requested constitute the minimum required to proceed expeditiously with the implementation of the Strategic Plan.

In addition, CIAT proposes a budget of $10,988,000 for complementary activities.

[1] Because of a continuing process of revaluation of the Colombian peso, CIAT projects a cost increase in 1992/93 of 7%.

Germplasm development research aims to (1) characterize and broaden the genetic base of selected commodities, and (2) understand the gene-governed mechanisms that determine plant adaptation and productivity in major production areas, including those tropical American ecosystems selected for intensive agroecological research. The goal is to develop the potential of germplasm resources to increase their output and efficiency in using inputs. The germplasm development thrust will require feedback on germplasm performance and needs, particularly in multispecies systems. This feedback will be obtained in collaboration with the Resource Management Research Programs (RMRPs). These programs will provide integrated knowledge of production environments within certain ecosystems, thereby providing a systems focus. The experience gained will act as prototype for research on production environments in other ecosystems not studied by the RMRPs.

Resource management research focuses on (1) important tropical American agroecosystems that are threatened by increasingly intensive land use or natural resource degradation, and (2) those that may have potential for relieving such pressures. The aim is to understand the basic processes operating within agroecosystems in order to make agricultural production more sustainable. The expertise on commodity-focused agroecology built up at CIAT over the last twenty years will be valuable. While investigating technological options in the targeted ecosystems, resource management researchers will require the participation of, and support from experts in germplasm development, as well as access to germplasm stocks held by CIAT, sister centers, and regional and national institutions.

This integrated approach is pursued within a framework of interinstitutional cooperation aimed at enhancing complementarity and increasing cost-effectiveness of research at national, regional, and international levels.

Page 4 shows the operational mandate that governs CIAT's activities for the 1990s.

I. Germplasm Development and Resource Management: An Integrated Approach

The pursuit of sustainable agricultural development requires reconciling the crucial trade-off between agricultural production and conservation of the natural resource base. To accomplish its mission, CIAT focuses on generating adoptable land use management practices that address trade-offs through germplasm development and resource management.

These two spheres of activity complement each other by independently and jointly contributing to three interrelated efforts. They are (a) focusing on socioeconomic incentives, (b) efficiently using external inputs, and (c) developing environmental management techniques.

The ***socioeconomic incentives*** approach deals with agriculture-related policies, land use strategies, and sectoral development plans that affect land use patterns across the

Box 1

Operational Mandate for the 1990s

CIAT will contribute to technology development that will lead to long-term improvement in productivity of agricultural resources; to the development of innovative, more cost-effective agricultural research approaches and methods; to the strengthening of agricultural research institutions in participating countries; and to the development of interinstitutional linkages. To that end, CIAT's activities center around the following three areas:

Germplasm development research

Beans: global responsibility for common beans, including a secondary emphasis on snap beans.

Cassava: global responsibility; in Africa, through and in coordination with IITA.

Rice: regional responsibility for Latin America and the Caribbean in coordination with IRRI.

Tropical forages: global responsibility in relation to acid, infertile soils found between sea level and 1800 m.a.s.l.; in Africa, through and in coordination with ILCA.

Resource management research in tropical America

Agroecosystems-oriented research in:

Cleared forest margins.

Hillsides with moderately acid, low-fertility soils, with particular emphasis on the mid-altitudes.

Savannas with acid soils.

Land use research, emphasizing land use strategies and policy alternatives.

Institutional Development

Support activities at national and regional levels.

Note: CIAT will also explore with sister institutions the potential of the crops in their respective mandates (e.g., maize/CIMMYT, sorghum/ICRISAT, MPFTS/ICRAF, soybeans/IITA) as components in production systems within the agroecosystems listed above.

landscape, and influence farmers' decision making on choice of crops, resource allocation, and management techniques.

The ***efficient use of external inputs*** in the production process seeks increased productivity and maximum efficiency in the use of available resources. Innovations will be based on understanding both gene-governed plant responses to external variables (abiotic/biotic) and ecological processes linking biotic and abiotic system components.

The ***environmental management*** approach will focus on the effects of crop/soil and crop/crop interactions on soil structure/erosion and their effect on soil stability and hydrology. Integrated crop and pest management will be important complementary strategies.

This dynamic interaction between the two spheres of activity will be reflected in organizational areas that are linked not only by the exchange of materials and information but also by joint research activities.

The essential flows are as follows:

The Agroecosystems Programs provide a systems perspective that allows the Germplasm Development Programs to focus their technology efforts.

The Land Use Program provides agroecological and socioeconomic information that is relevant to the Germplasm Development Programs.

The Germplasm Development Programs provide the Agroecosystems Programs with information on the feasibility of technical change for specific commodities in the relevant ecosystems, and tested components.

The Germplasm Development Programs provide the Land Use Program with commodity-specific information that allows the development of alternative land use scenarios and analysis of the effect of policy changes.

II. The Board of Trustees

CIAT is governed by an independent Board of Trustees. The 1992-1993 membership of the Board is as follows:

Lucía Pearson de Vaccaro
(Chairman), Peru
Vijay Shankar Vyas, India
Armando Samper Gnecco,
(Chairman Emeritus), Colombia
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III. Organizational Structure

CIAT is structured along four organizational entities. The first is the **Resource**

Management Research Division which consists of the following programs: Agroecosystems (Hillsides, Forest Margins, and Savannas), Tropical Forages, and Land Use. Also attached to this division is Information Management System. The **Germplasm Research Development Division** consists of the Bean, Cassava, and Rice Programs, as well as the research support units for genetic resources, biotechnology, and virology. **Institutional Development Support** comprises the training, conferences, communications, and information (documentation) support functions. **Finance and Administration** is responsible for central financial and services administration and financial and administrative information systems.

IV. Research Sites

CIAT's headquarters is on a 521-ha experiment station near Cali in Valle del Cauca, Colombia. There are four principal substations within the country where further work is carried out: Santander de Quilichao, a 184-ha station located 60 km south of Cali and characterized by acid, infertile soils; Popayán, a mid-altitude, 72-ha station located 150 km south of Cali (both Santander and Popayán stations are on land made available for CIAT's use by the Fundación para la Educación Superior (FES), a private Colombian educational foundation); Santa Rosa, a 31-ha station made available by the Federación Nacional de Arroceros de Colombia (FEDEARROZ), a national rice growers' federation, and located near Villavicencio in the piedmont of the eastern Andes; and, finally, the 22,000 ha research site at Carimagua, located in the heart of the Colombian Llanos and comanaged by CIAT with the Colombian national program, ICA. Cooperative arrangements are maintained with various national and regional institutions to help carry out regional and international testing activities. In some cases, CIAT staff are outposted for research purposes and to support commodity networks.

RECENT ACHIEVEMENTS AND IMPACT

I. Organization

Within the last year, CIAT has been adjusting to the requirements of the Strategic Plan, the implementation of which was formally initiated in 1992. Before the Plan could be initiated funds were drastically reduced. The minimum set of core-funded activities needed to carry out the Plan, had, therefore, to be comprehensively reassessed. The resulting analysis provided the basis for extensively redeploying resources from existing activities to the new resource management programs and selected organizational adjustments.

II. Research Programs

A. *Germplasm Development*

Bean Program

Recent Achievements

The screening of germplasm accessions has identified a number of materials adapted to low phosphorus soils. Low P tolerance has long been known to exist in the Mesoamerican gene pool, but recently CIAT has discovered good materials in the evolutionarily distant Andean gene pool. An initial cross, including both Andean and Mesoamerican parents, produced the highest yielding F_3 population under P stress. This suggest that there is great potential in the Andean material, and that there is significant promise in undertaking difficult crosses between different gene pools.

Substantial progress is also being made in improving bean genotypes for biological nitrogen fixation (BNF). Through inbred back crossing, low-fixing cultivars have been improved to be good fixers. Efforts are also being made to improve fixation in the best fixers. It is now clear that different traits associated with BNF are heritable and genetically distinct, opening the way to improve BNF plateaus through combining different traits.

For the first time, lines bred for water deficit/drought adaptation have been coded. In two seasons, these SEQ lines have outyielded tolerant checks by as much as 500-1000 kg under water deficit stress. The potential of breeding for tolerance of water deficits is high.

This year, the Bean Program cloned the DNA for the angular leaf spot fungus and developed a recombinant plasmid library. The findings support the hypothesis of coevolution of beans and angular leaf spot, which may be significant in the deployment of resistance genes.

A major breakthrough occurred in early 1991 when foreign genes were successfully introduced into beans through genetic engineering. This offers the promise of improving resistance to bean golden mosaic virus, as well as illustrating the effectiveness of a biotechnological technique for generating transgenic plants.

Overall levels of tolerance of the leafhopper, *Empoasca kraemeri*, in common beans have steadily increased under a breeding strategy where yield under leafhopper attack is the

principal selection criterion. Significant yield increases have been obtained, not only in the tolerant small-seed cream and black types, but also in the difficult large and small-seeded, red and white beans. The tolerant lines also have high yields in the absence of insect attack.

Impact

Changes in bean production systems between 1975 and 1989 have been assessed in Colombia as a case study to shed light on farmer demand for technology. Use of agrochemicals among small farmers has increased dramatically. Even where small farmers use new varieties, they do not rely on a single variety, but spread their risks by planting a set of varieties. Labor has declined substantially over the period, indicating the importance of seeking technologies that increase labor productivity.

The International Bean Trials Network met in Cali, in October, to address research challenges to improve bean production in different cropping systems. Sustaining productivity in favored monoculture, in favored mixed cropping, and in fragile environments was assessed.

The regional bean research workshop for the Andean Zone (RELEZA) was held at CIAT, in June, organized by ICA. Over 100 researchers participated, and 79 research papers were presented.

A Spanish language multidisciplinary course for bean researchers was held in Cali in February-March 1991. The target group for this course comprised young scientists who have recently joined national bean research programs.

Training in the Andean region moved into a highly specialized mode, focusing on advanced internships to meet specific national program needs.

Future planning for bean research was a major concern in the Africa Regional Program. A participatory planning workshop for the SADCC region of southern Africa was held in Malawi in March 1991. This successful workshop planned the broad strategic directions for the regional network for the next seven years. Namibia joined the SADCC network this year.

In work on the bean stem maggot, the principal insect pest of beans in Africa, of 29 lines previously reported as resistant or tolerant, eight were confirmed as superior and will advance for further testing. Almost all lines demonstrating resistance so far have been introduced to Africa by CIAT. To improve the reliability of bean stem maggot screening, mass-rearing procedures are being developed to permit controlled artificial pressure.

Weed control requires considerable labor in small-scale African production systems where there are often constraints on labor availability. A study was conducted in Uganda to determine the morphological characteristics of beans able to compete with weeds. In trials over three seasons, both bean leaf size and leaf area index were found to be significantly associated with reduced weed biomass. Including these two factors as additional criteria in cultivar selection would help improve ability to suppress weeds.

A very active training program was pursued in Africa, including a research methods

course for Kenya and an on-farm methods course for the southern Africa SADCC region, held in Tanzania. A Pan-Africa course in farmer participatory methods for senior on-farm and bean researchers was held in Tanzania, to expose researchers to the opportunities that participatory methods offer.

Cassava Program

Recent Achievements

The recent arrival of numerous cassava germplasm accessions from IITA and Asian national programs, will further accelerate cooperative endeavors with Africa and Asia. Recent germplasm introductions from Brazil will properly represent one of the richest centers of genetic diversity. A core collection representing the overall genetic diversity has been defined and will be available in 1992 for duplication in another institution. In vitro and field collections of wild *Manihot* relatives have begun. Some species are already included in crossability studies, and biochemical and molecular characterization.

CIAT's cassava in vitro active gene bank is probably the largest and most complete for any crop in the world. This year, consistent recovery of plants from cassava shoot tips, cryopreserved in liquid nitrogen has been achieved. This breakthrough opens the way to a long-term, gene bank storage of cassava.

A promising collaborative effort with Brazilian institutions to develop cassava germplasm for the world's semiarid and subtropical regions has been initiated.

A participatory research model has been developed, in cooperation with Colombian national institutions, which takes into consideration farmers' criteria for selecting and adopting new cassava varieties. This has contributed to the refinement of breeders' selection criteria.

Preliminary experiments on seed treatment and germination have been undertaken as part of a multidisciplinary project to explore the development of true cassava seed as a production alternative.

Research on cassava's tolerance of prolonged mid-season water stress has revealed that certain physiological and morphological characteristics are associated with tolerance of water stress and with yield stability. Most notably, the ability to rapidly form and maintain leaf area is of paramount importance. Genotypic characteristics related to better partitioning of biomass between leaf and stem may lead to higher leaf area index without adverse effect on root yield.

Research on cassava photosynthesis in relation to crop productivity has revealed that cassava's high photosynthetic potential underlies its high productivity under favorable conditions as well as its tolerance of stressful environments.

Electrophoretic analysis of esterase isozymes were developed to identify cassava genotypes. DNA-based techniques for the analysis of *Manihot* genetic diversity have been developed.

Plant regeneration is necessary for a transformation system in cassava. Plant regeneration through somatic embryogenesis on immature leaves and meristem tips has been developed. This is an important first step toward a transformation system in cassava.

Impact

A study on the adoption of cassava production technology components in the Colombian Atlantic coast was undertaken this year. Preliminary results of a subsample of the data shows that cassava drying plants have served as an effective vehicle for cassava technology diffusion.

The Ecuadorean integrated cassava project operates primarily in two coastal provinces, Manabí and Esmeraldas. The goal of the project is to unite and integrate the efforts of local, national, and international agricultural development institutions to identify cassava production, processing, and utilization technologies appropriate for low-resource cassava farmers. Total output from farmer associations in Manabí increased markedly from 50 tons of cassava flour during the initial year of the project (1985-86) to 1,346 tons of flour and 104 tons of starch during 1990-91.

An integrated cassava development project was initiated in the State of Ceará, Brazil, in 1989. One of the principal activities of the project has been the organization of farmers' groups for the construction, operation, and administration of cassava processing facilities. When the project initiated activities in 1989, 12 drying plants already existed. By the end of August 1991, the total number of small-scale processing plants had risen to 59.

The fresh cassava storage technology developed by CIAT/NRI is being tested and adapted to conditions in Paraguay. Starch is used mainly to make a traditional bread known as "chipa." The artisanal and small-scale starch extraction processes employed are very inefficient, with a recovery of only 60% and contamination of water sources, which is a major environmental problem in some localities. Work is under way to improve extraction efficiency and product quality and to introduce simple effluent treatment.

Cassava breeding programs in Asia have benefited significantly from CIAT's selected and upgraded genetic materials. Since 1975, over 270,000 hybrid seeds from CIAT in Colombia have been distributed to nine countries. The establishment of a joint Thai-CIAT cassava breeding program has brought about further progress in breeding for yield, high dry matter, adaptation to semiarid lowland tropics and improved plant type.

A collaborative project between CIAT and IITA is dedicated to broadening the African cassava germplasm base through introducing from the Americas germplasm adapted to specific agroeconomic conditions. The results obtained so far from this large-scale germplasm introduction support the feasibility of such a program and suggest that a preselection of parents based on their agroecological adaptation is a step forward in a germplasm-exchange program.

Rice Program

Recent Achievements

To strategically breed for leaf and neck blast resistance in irrigated and rainfed lowland rice, CIAT shifted research toward a "hot spot" approach. A long-term analysis of the progress being made revealed significant and substantial reductions in susceptibility to both leaf and neck blast.

The upland breeding populations are entering their third round of recombination. Major improvements in plant type, disease

resistance, and grain quality continue to be made. The populations are being partitioned into subsets, according to height, earliness, and input responsiveness and lodging susceptibility. These groups are expected to be differentially suited to the various production scenarios in the region, such as native savanna/severely degraded pasture; relatively well-managed mixed pastures; and high input crops (e.g., soybeans).

Significant progress in improving the efficiency of regenerating double-haploid plants through anther culture continues to be made. A ninefold increase in response was realized within recalcitrant genotypes by modifying the standard medium. Anther culture is now a routine tool for upland breeding and research in rice "hoja blanca" virus and rice blast resistance.

Weed management for sustainability focuses on integrating alternatives to reduce weed pressure with the least adverse effects on the environment. Knowledge of crop losses resulting from weed interference is essential for the economically rational selection of weed management strategies. Competition experiments with weeds, including red rice, were conducted. The critical period when losses to weed competition and the expected yield reduction occur were thus determined. The information obtained facilitates the evaluation of economic benefits of diverse weed management alternatives and the identification of rice growth characteristics related to its competitiveness with weeds.

The program has been breeding rice for blast resistance at a favored upland site for the past seven years. Analysis of the blast population indicates that it is very variable; however, DNA fingerprinting analysis shows that most of the variability is within five distinct lineages. Close scrutiny of the variation suggests that it is nonrandom, and that the potential range of pathogenicity in a site may be predictable. The results suggest both a comprehensive breeding strategy for blast and the fact that durability or resistance may be extended through appropriate management practices.

Impact

Six different Integrated Pest Management (IPM) research activities were conducted on blast and pest management in Guyana and Trinidad. A monitoring tour and workshop on IPM, involving 25 papers, were organized in both countries.

Concerning small-farm machinery, eight field days were organized in Dominican Republic for extensionists, farmers, and agricultural journalists.

Thirty-one sets, with a total of 1,441 of advanced rice lines, were sent to eight Caribbean Rice International Network countries and to Colombia and Mexico.

The socioeconomic section of the Program has concentrated on studying the complex issues of rice technology supply and demand from the angle of the producers and their environment. This task has become crucial in supporting collaborative research plans in Colombia, Ecuador, Venezuela, and Brazil within a multidisciplinary and interinstitutional framework. Major activities have encompassed the study of the adoption and impact of new semidwarf varieties in Latin America; the characterization of farmers and rice farming practices in Brazil, Colombia, Venezuela, and Ecuador; and the study of rice demand and market integration in Colombia.

Tropical Forages Program

Recent Achievements

Currently, the most important grass pest throughout tropical America is the spittlebug. Over the last four years, a major activity has been the development of reproducible and reliable methods to ensure uniform infestation of germplasm under evaluation. Harvesting eggs for mass field infestation of hundreds of accessions is now possible. The mechanics of successful field infestation are still being researched, because, under some circumstances, egg predation is heavy.

Progress has been made in understanding the ecology of leaf-cutting ants. These insects severely affect the establishment of some key grass species, such as *Andropogon gayanus*, and crops such as rice. This knowledge is highly relevant to agronomic practices that may, depending on circumstances, destroy ant nests during land preparation.

Ongoing work at Pucallpa, Peru, and three sites in Costa Rica have confirmed the widespread potential of two key legumes for moderately acid soils. These are *Centrosema macrocarpum* and *Arachis pintoi*. The main issue to be resolved for *Centrosema macrocarpum* is its persistence under grazing. Closely linked to this issue is the potential role of this legume in more intensive production systems, such as dual-purpose systems.

The widespread adaptation of *Arachis pintoi* to the wetter environments of tropical America has now been amply confirmed. Trials at various sites leave no doubt about its long-term persistence under severe grazing pressure and its compatibility with aggressive grasses such as *Brachiaria* spp. and *Cynodon* spp.

Arachis pintoi is a highly promising legume. Unfortunately, the genetic variability of the present collection is extremely limited. An initial collection trip, jointly organized with EMBRAPA's CENARGEN, was undertaken this year in parts of the States of Minas Gerais and Bahia. Other collection trips are currently being organized.

A large variety of woody legumes is being evaluated for their potential in agroforestry in the humid tropics. Although several species are believed to be very well adaptated to extremely acid and infertile soils, a yet unresolved issue is their nutritional quality, since antiquality factors, mainly polyphenols, have been found. Nevertheless, there is also preliminary evidence that in at least some species, there is also genetic variability for this trait.

Significant progress in germplasm screening is being realized in the Cerrados after years of slow advances. There is now little doubt that a wide range of legume and grass species have substantial agronomic potential for the "várzeas," or seasonally flooded lowlands, of the Cerrados. For the larger, and more typical, acid-soil Cerrado environment, legume species such as *Calopogonium* spp. are promising. A large collection of this species has been assembled and is being tested.

Grazing experiments have continued at all major screening sites. The most exciting results from the Cerrados refer to the long-term persistence of selected grass-legume associations, accompanied by very high weight gains. These associations maintained animals' weight throughout the

extended dry season, whereas animals on pure grass pastures suffered severe weight loss. The feasibility of grass-legume pastures for the Cerrados is thus a reality at the experimental level.

Nutritional studies carried out in grazing experiments at Carimagua have demonstrated that improved grass species are deficient in protein unless associated with legumes. Market forces will probably induce intensification of production systems in the savanna region, hence the introduction of agricultural crops and legume/grass pastures becomes even more important.

Impact

New methodology has been adapted and developed for grazing experimentation. This methodology is now available to RIEPT in the form of two published manuals. A workshop on grazing methodologies was also held for researchers already active in that area.

A number of on-farm initiatives have continued, in cooperation with national institutions. These include (a) the plains and Andean piedmont of Colombia, with ICA and various development banks and other agents; (b) Caqueta Department, in the Colombian Amazon basin, with the local university, ICA, a graziers' association, a number of government institutions, and Nestlé; (c) northern Cauca, Colombia, in association with CVC, a nongovernment institution (FUNDAEC), a graziers' association, and others; (d) in Guapiles, on the Atlantic coast of Costa Rica, with CATIE and the Ministry of Agriculture; (e) in Pucallpa, Peru, with IVITA; and (f) in Silvania, Goiás, Brazil, with EMBRAPA-CPAC. These activities are expected to continue with the support of the new Savannas Program.

On-farm work on the Colombian plains has the longest tradition in the Program. These activities have been successfully transferred almost totally to the national program. The project has provided technical support and seeds for the establishment of approximately 20,000 hectares of sown pastures, with grass-legume associations representing about 50% of the total. Seed multiplication activities have had great impact, leading to the emergence of new seed producers, including established private firms, individual graziers, and new institutions that became actively involved in seed production efforts.

Despite an essentially Latin American responsibility, the Program has gained worldwide recognition for its efforts in developing grass and legume germplasm for acid soils. Because the selected materials and methodologies developed may be widely adaptable, the Program anticipates its germplasm responsibilities to evolve from regional to global. In 1991, the first steps were undertaken to create a regional network among six Southeast Asian countries.

B. Resource Management

The reader is referred to Chapter 3 of the *CIAT Medium-Term Plan 1993-1998*, which shows CIAT's progress in defining the concept of resource management research in operational terms, including the fine-tuning of its strategies and the definition of its activities and expected outputs. Chapter 3 also describes how CIAT has successfully entered a series of interinstitutional arrangements in resource management research, and its considerable progress in

identifying research sites for the agroecosystems in its operational mandate (hillsides, savannas, and forest margins).

By the second half of 1992, CIAT will have successfully recruited research leaders to head the newly created programs and thus formally initiated resource management research.

III. Institutional Development Support

Recent Achievements and Impact

To strengthen national research capacity, IDS, in close collaboration with the NARS, selected trainees strictly on the basis of research team strengthening objectives. Personalized training programs were designed for each trainee, and involved 147 professionals.

National research-development links were strengthened by training extensionists; and by developing seed systems. However, direct training of extensionists is being reduced in favor of developing subregional teams of trainers who will take over this responsibility. Therefore, only four in-country courses for extensionists were held in 1991.

Three subregional training teams were successfully developed for bean production in Central America, for rice production in the northern Andean countries, and for cassava production and utilization in the Southern Cone.

The Information Unit provided CIAT scientists with photocopies of 13,000 documents, 1,100 answers to reference questions, and nearly 1,000 literature searches. External users, on the other hand, purchased photocopies of about 12,000 documents, received answers to over 800 reference questions, and were served by more than 2,000 literature searches.

The productivity of the Graphic Arts Unit increased by 44% (to 20,000 camera-ready pages). Simultaneously, because desk-top publishing was adopted, typesetting was reduced by 35%.

Major books produced were *Tissue Culture in Agriculture, Common Beans: Research for Crop Improvement*, and *A World List of Fungal Diseases of Tropical Pasture Species*. Important working documents published were *Integrated Cassava Projects*, the *Contribution of Improved Pastures to Tropical Animal Production*, and *Pasture Research in Southeast Asia*. Of CIAT's extensive portfolio of publications, nearly 70,000 copies of periodicals were distributed; almost 5,000 publications and 6,000 study guides were sold; and more than 2,000 miscellaneous items were donated.

In 1992, the training, communications, information, and seed activities were integrated under Institutional Development Support. During the transition toward this new arrangement, several seed systems development activities conducted by the Seed Unit, the Central American and Andean Bean projects, the Training and Communications Support Program, and the Tropical Pastures Program were linked into common efforts.

Major progress was made in conceptualizing and implementing alternative small-scale seed supply systems for crops and other plant species of CIAT's interest, which are not served by the established seed industry. To

derive general principles for the successful establishment and management of such systems, real systems are being supported and monitored in six Latin American countries. Seed processing equipment appropriate to the scale of these systems has been developed or adapted, and deployed at nine sites or institutions in Central America, the Caribbean, and the Andean region. The sites provide feedback on the equipment's suitability, and a focal point for further dissemination of the new technology.

IV. Administration & Operations

In 1992, all financial, administrative, and central services (including station operations) areas were analyzed and restructured according to the needs of the Center's new endeavors, with the aim of reducing the size and costs of these operations without undue loss of efficiency. This process reduced support staff positions by 90 (18% of personnel) and reduced cost increases in Colombia, by about $1.5 million.

FINANCIAL AND BUDGETING INFORMATION

I. 1991 Financial Year

The 1991 financial year was marked by profound structural changes in the economy of CIAT's host country, Colombia, which significantly increased the costs of doing business locally with a dollar-denominated budget. Early in the year, with inflation hovering around 30%, the Colombian Government was concerned that inflation would get out of control. Thus, the Government attempted to curb the money supply by drastically increasing the monies that commercial banks needed to deposit with the Central Bank. This led to very high domestic interest rates, which, concomitant with the substantial liberalization of exchange restrictions, had the effect of attracting large amounts of external monetary resources to the Colombian economy.

With so many dollars pouring into the economy and interfering with the inflation control measures, the Government resorted to a second monetary tool: the exchange rate. The Government moved from an officially controlled exchange rate to one determined by market forces. The net effect was a revaluation of the peso by about 13% by the end of 1991.

For 1991, the increase in operating costs due to the revaluation measures was limited to $400,000 (dollars) because (1) the Government measures started only in late June 1991; and (2) CIAT had a 3-month stock of pesos at that time. The full effect of the revaluation on operating costs started to be felt with full force in early 1992.

Tables 1 to 14, on pages 38 to 52, provide details for the financial years 1991 and 1992, and the 1993 funding request.

Core Program

Because of a general underfunding of the approved budgets of the CGIAR, CIAT was asked to operate at a funding level of $28,816,000 ($28,100,000 from the CGIAR and $716,000 from self-generated income). This working budget was 12% below the CGIAR approved core budget of $32,672,000.

Operating Expenditures

Operating expenses were $28,987,000, representing an increase of $1,981,000 over the working target of $27,006,000. This increase was a result of introducing depreciation accounting, which charges depreciation costs against the operations budget (rather than the capital budget). The depreciation charge in 1991 amounted to $1,965,000. It should be noted that, in the reported operating expenses, the previously mentioned revaluation effect in operating costs in 1991 of $400,000 is also included.

Capital Expenditures

New capital expenditures amounted to $659,000. Replacement capital expenditures, representing $984,000, were financed from the Capital Fund that earlier was credited with the annual depreciation charge of $1,965,000.

Earned Income

Self-generated income amounted to $1,790,000, or $1,074,000 more than originally expected. This increase stemmed largely from the high domestic interest rates earned on CIAT's peso investments that became available because of an improved status of the working capital.

Donor Funding

Actual income from donors was $27,856,000. Taking into consideration self-generated income, total available funds for the 1991 core program were $29,646,000.

Complementary Activities

In 1991, complementary activities executed by CIAT amounted to $5,117,000 (see Table 2, Appendix II). List 1 (Appendix I) identifies the various projects involved.

II. 1992 Financial Year

Prospects for the Year

Because of the significant underfunding projected for 1992, the Center had to make an important choice: to delay implementing the Strategic Plan until additional resources became available; or to forcefully and immediately put into operation the Strategic Plan by restructuring and reducing existing activities and introducing the new set of activities. The resource requirements for the core budget, as presented in the next section, correspond to what is considered as the minimum set of resources for implementing the Plan, assuming that a major portion of the proposed complementary activities can also be funded.

Working Budget

Against an approved core budget of $32,650,000 ($30,664,000 for operations and $1,986,000 for capital), a total amount of $27,700,000 was expected to be available. Income from donors was expected to represent $26,500,000 and self-generated income $1,200,000.

The resulting working budget is shown in Table 1 (Appendix II). Using the 1991 working budget as a starting point, List 2 (Appendix I) shows the adjustments that were introduced to arrive at the 1992 working budget of $29,344,000. This working budget reflects a new budget base of $27,972,000, plus $1,372,000 for the net phasing costs of outgoing and incoming activities.

The 1992 proposed working budget exceeds the projected availability of funds by $1,644,000. This shortfall will need to be absorbed by CIAT's existing reserves.

No line item for new capital appears in the 1992 working budget. Capital expenditures for the year will be financed from the Capital Fund created from the annual depreciation charge, which for 1992, will amount to $2,000,000.

Complementary Activities

In 1992, CIAT expects to spend $7,104,000 in the form of complementary activities (see List 3, Appendix I).

III. Funding Request for 1993

Detailed information on the proposed allocation of resources for 1993 is provided in Chapter 8 of the *CIAT Medium-Term Plan 1993-1998*. Total core funding requirements for 1993 amount to $32,384,000 ($32,084,000 for operations and $300,000 for capital). List 4 (Appendix I) shows the changes in the proposed 1993 funding request as compared with the 1992 working budget.

Operating Expenditures

Operating expenditures proposed for 1993 are $29,747,000 before price adjustments. As can be seen in Table 1 (Appendix II), this amount is $403,000 above the level of the 1992 working budget.

Inflation/Exchange Rates

The Colombian inflation rate underlying CIAT's budget request for 1993 is 28%. Offsetting the government-announced annual devaluation rate of 15% from this figure results in a net price increase of 11% in the peso-denominated share of the budget. For dollar-denominated costs, the current estimate of 4% inflation is maintained. The resulting weighted average price increase for 1993 is 7%.

Capital Expenditures

Capital requirements for 1993 are $2,300,000, of which $2,000,000 are of a replacement type and will be financed from the Capital Fund. An additional $300,000 is for new capital required to keep up with advances in new technology and the requirements of new research thrusts. Proposed expenditures are as follows: buildings and site improvements $400,000; operating equipment $500,000; vehicles $420,000; furnishing and office equipment $50,000; research equipment $750,000; and computer equipment $180,000.

Earned Income

Earned income for 1993 is projected to amount to $700,000, comprising self-generated income from farm production, overhead on complementary projects, and financial transactions (mostly interest).

Donor Funding

Against the budget request for $32,384,000 and in light of a projected self-generated income of $700,000, CIAT's request for funding from the CGIAR amounts to $31,684,000.

Object of Expense Analysis

Table 8 (Appendix II) presents the 1993 budget proposal broken down by category of expense (object of expense). A noteworthy fact is that, in the progressive reductions in the budget, CIAT has been able to maintain, or even reduce, the percentage of total resources claimed by personnel. This is despite the sharp revaluation of the Colombian peso, which, in dollar terms, increased the cost of locally recruited staff by 20%. To keep personnel costs in the 60%-63% range, a disproportionally large percentage of local staff positions needed to be eliminated in 1992.

The trend of decreased expenditures in training, as shown in Table 8 (Appendix II), reflects the fact that the Center is de-emphasizing production-oriented training, an

activity that is progressively being devolved to regional and in-country levels.

Finally, the rather large and progressive reduction in travel expenditures is the result of a management decision to curtail travel to the minimum necessary. This is an area of concern as international mobility is central to maximizing the comparative advantage of an international research center such as CIAT.

Complementary Activities

CIAT proposes complementary activities for 1993, amounting to $10,988,000 and involving 25 Senior Staff positions. List 5 (Appendix I) summarizes the projected complementary activities and shows the funding status of the respective projects.

Appendix I

LISTS

1. Complementary activities in 1991

2. Changes in the 1992 working budget vis-à-vis the 1991 working budget

3. 1992 Complementary activities

4. Principal changes in the proposed 1993 budget

5. 1993 Proposed complementary activities

List 1. Complementary activities in 1991 ('000 US$)

Activity	Senior Staff	Expenses	Donor
1. *Bean Program*			
Eastern, southern, and Great Lakes Region of Africa	5	1,826	USAID/CIDA/SDC
Andean region	1	135	SDC
Central America	-	282	SDC
Research on *Phaseolus* germplasm	-	63	Italy
Genetic improvement	-	36	Belgium
Bean improvement	-	13	Iran
Microbiology	-	3	GTZ
IPM development system	-	5	IDRC
2. *Cassava Program*			
Development of cassava germplasm	-	198	IFAD
Development of production and processing technologies (NE Brazil)	-	258	Kellogg Foundation
Development of cassava in Ecuador	1	78	FUNDAGRO
Cassava processing in Colombia	-	62	IDRC
Development of cassava processing and utilization	-	154	Colombia
Cassava flour utilization	-	28	France
Cassava development	-	9	Rockefeller Foundation
Soil conservation	-	73	Germany
Physiology research	-	65	Australia
Biological control of cassava mite	-	162	UNDP
3. *Rice Program*			
Caribbean Rice Improvement Network	1	465	CIDA
Rice biotechnology research	-	96	Rockefeller Foundation

(Continued)

List 1. (Continued)

Activity	Senior Staff	Expenses	Donor
4. *Tropical Forages Program*			
Research for improving native grasslands	-	87	Japan
CSIRO forage seeds--Asia	-	110	Australia
Tropical forages network	-	5	IDRC
Seed pasture production	-	2	IDRC
Pastures production systems	-	19	GTZ
5. *Research Support*			
Farmer participatory research	1	273	Kellogg Foundation
6. *Training and Conferences*	-	401	Various
7. *Capital and replacement*	-	209	CIDA/USAID/ IDB/IDRC/ Rockefeller/Others
TOTAL	9	5,117	

List 2. Changes in the 1992 working budget, vis-à-vis the 1991 working budget

Budget requirements	**Amount**[1]
1991 working budget	28,816,000
+ inflation adjustment (9%)	2,593,000
1992 cost of 1991 set of activities	31,409,000
Area	
Germplasm Development Research Division	
1. Bean Program	
a. Deletion of positions for:	
- Cropping Systems Specialist	(150,000)
- African-based positions (3 positions)	(645,000)
- Regional coordination in the Andean region	(254,000)
- Economics	(158,000)
- Microbiology	(156,000)
- Agronomy (International trials)	(267,000)
- Breeding (Black-seeded)	(218,000)
b. Addition of positions for:	
- G/E Interaction	230,000
- Germplasm characterization	230,000
c. Selective reductions in the operations budget	(441,000)
2. Cassava Program	
a. Deletion of positions for:	
- Agronomy (Asia)	(175,000)
- Agronomy (Americas)	(217,000)
b. Addition of position for Genetics	230,000
c. Selective reductions in the operations budget	(167,000)

(Continued)

List 2. (Continued)

Area	Amount[1]
3. Rice Program	
a. Deletion of positions for:	
- Coordination of the Caribbean regional program	(90,000)
- Breeding	(206,000)
- Agronomy	(166,000)
- Economics (1/2 position)	(49,000)
- Entomology (1/2 position)	(47,000)
b. Addition of position for Physiology	230,000
c. Net other adjustments	62,000
4. Tropical Forages Program	
a. Deletion of positions for:	
- Screening (Llanos)	(230,000)
- Nutrient recycling (Humid tropics)	(107,000)
- Livestock systems	(257,000)
- Economics	(130,000)
- Integration of systems	(217,000)
- Pasture reclamation (Cerrados)	(172,000)
- Screening (Forest margins)	(119,000)
- Ecophysiology	(223,000)
- BNF/N recycling	(212,000)
- Entomology (1/2 position)	(78,000)
b. Addition of position for Germplasm Specialist	230,000
c. Deletion from the core program of tropical forages network	(180,000)
d. Selective reductions in the operations budget	(399,000)
5. Biotechnology Research Unit	
Addition of position for Molecular Geneticist	85,000

(Continued)

List 2. (Continued)

Area	Amount[1]
6. Genetic Resources Unit	
Addition to operations budget	62,000
7. Strategic research initiatives in germplasm development	100,000
Resource Management Research Division	
1. Land Use Program	
a. Addition of positions for:	
- Program Leader	300,000
- Agricultural land use	230,000
- GIS/Information management	200,000
b. Support for Sociologist	40,000
2. Savannas Program	
Addition of positions for:	
- Program Leader	360,000
- Crop/pasture systems (Cerrados)	230,000
- Nitrogen cycling	230,000
- Nutrient cycling	230,000
- Ecophysiology	230,000
- Farming systems economics (1/2 position)	120,000
3. Forest Margins Program	
Addition of position for Program Leader	300,000

(Continued)

List 2. (Continued)

Area	Amount[1]
4. Hillsides Program	
Addition of position for Program Leader	300,000
5. Strategic research initiatives in resource management research	100,000
Research Support	
1. Closing of Agroecological Studies Unit (now incorporated in Land Use Program)	(237,000)
2. Elimination of line item for research contracts (now incorporated in "strategic research initiatives")	(169,000)
3. Deletion of position for Information Management System	(86,000)
4. Selective reductions in the operations budget for Research Stations	(278,000)
5. Net other modifications in Research Support	64,000
Institutional Development Support	
1. Deletion of the Seed Supply Unit	(562,000)
2. Transfer of Project Design Specialist from Management and Administration (paid from indirect costs recovery)	0
3. Deletion from the core program of human resources development	(238,000)
4. Net other modifications in Institutional Development Support	(383,000)

(Continued)

List 2. (Continued)

Area	Amount[1]
Management and Administration	
1. Reduction in central services	(160,000)
2. Net other modifications in Management and Administration	(193,000)
3. Transfer of Project Design Specialist to Institutional Development Support (paid from indirect costs recovery)	0
4. Addition to the operations budget of Board of Trustees	16,000
Others	
Addition of depreciation expense to operations	2,000,000
Capital	(1,810,000)
Subtotal	(3,437,000)
New 1992 budget base	27,972,000
Net phasing costs of outgoing and incoming activities	1,372,000
TOTAL 1992 REQUIREMENTS	29,344,000

[1] Numbers in parentheses signify negative amounts.

List 3. 1992 Complementary activities ('000 US$)

Activity	Senior Staff	Budget	Donor
1. *Bean Program*			
Eastern, southern, and Great Lakes Region of Africa	7	2,285	USAID/CIDA/SDC
Andean region	1	425	SDC
Research on *Phaseolus* germplasm	-	200	Italy
Molecular mapping	-	54	Belgium
2. *Cassava Program*			
Genetic improvement	-	224	IFAD
Plant nutrition	-	80	IDRC
Integrated pest and disease management	1	572	UNDP
Biotechnology network	-	162	Netherlands
Integrated projects in the Americas	1	560	Kellogg/ FUNDAGRO/IDRC
Molecular mapping	-	80	Rockefeller Foundation
3. *Rice Program*			
Caribbean Rice Improvement Network	1	200	CIDA
Rice biotechnology research	-	90	Rockefeller Foundation
Anther culture network	-	50	Rockefeller Foundation
4. *Tropical Forages Program*			
Screening: Southeast Asia	1	210	Australia
Stability of savannas resources	1	166	Not yet funded
Germplasm biology	-	91	IDRC
In vitro management of germplasm	-	134	GTZ

(Continued)

List 3. (Continued)

Activity	Senior Staff	Budget	Donor
5. *Genetic Resources*			
Sorghum and soybean germplasm	-	80	Not yet funded
6. *Resource Management Research Division*			
Improved native grassland (Savannas)	1	65	Japan
Integrated crop/soil management (Hillsides)	-	130	Germany
7. *Institutional Development Support*			
Development of regional training capacity	-	600	IDB
8. *Research Support*			
Farmer participatory research	1	279	Kellogg Foundation
9. *Contingencies*	-	67	Not yet funded
10. *Capital*	-	300	CIDA/USAID/SDC/ IDB/Japan/Kellogg/ Others
TOTAL	15	7,104	

List 4. Principal changes in the proposed 1993 budget

Budget requirements	**Amount**[1]
1992 working budget	29,344,000
Net phasing costs of 1992 outgoing and incoming activities	(1,372,000)
	27,972,000
Area	
Germplasm Development Research Division	
1. Bean Program	
- Deletion of position for Central America coordination	(120,000)
2. Genetic Resources Unit	
- Addition to operations budget	31,000
3. Strategic research initiatives	85,000
Resource Management Research Division	
1. Land Use Program	
a. Addition of position for Environmental Impact Economics	200,000
b. Additional support for Sociologist	10,000
c. Support for Resource Economics	50,000
2. Savannas Program	
- Research station support in Llanos	100,000
3. Forest Margins Program	
Addition of positions for:	
- Soils management/organic matter	200,000
- Production systems	200,000
- Anthropology	200,000

(Continued)

List 4. (Continued)

Area	Amount[1]
4. Hillsides Program	
Addition of positions for:	
- Soils management	230,000
- Sociology/Anthropology	200,000
- Production systems	200,000
5. Strategic research initiatives	85,000
Research Support	
1. Addition of position for Impact Assessment	200,000
2. Selective reductions in the operations budget for research stations	(96,000)
Subtotal operations	29,747,000
Additional operating funds	234,000
Price increase (inflation)	2,103,000
Subtotal operating requirements	32,084,000
Capital	300,000
TOTAL 1993 REQUIREMENTS	32,384,000

[1] Numbers in parentheses signify negative amounts.

List 5. 1993 Proposed Complementary activities ('000 US$)

Activity	Senior Staff	Budget	Donor
1. *Bean Program*			
Eastern, southern, and Great Lakes Region of Africa	7	2,285	USAID/CIDA/SDC
Andean region	1	300	SDC
Research on *Phaseolus* germplasm	-	80	Italy
Biotechnology network	-	300	Belgium
Molecular mapping	-	57	Belgium
Bean transformation	-	15	Not yet funded
Snap bean breeding	1	255	Not yet funded
2. *Cassava Program*			
Genetic improvement	-	224	IFAD
Plant nutrition	-	130	Not yet funded
Integrated pest and disease management	1	912	UNDP
Integrated crop/soil management	1	300	Not yet funded
Biotechnology network	-	312	Netherlands
Integrated projects in the Americas	1	560	Kellogg/IDRC/ FUNDAGRO
Molecular mapping	-	80	Rockefeller Foundation
True seed	-	130	Not yet funded
Socioeconomic research and product development in Asia	-	170	Not yet funded
Wild germplasm	-	90	Not yet funded
3. *Rice Program*			
Caribbean Rice Improvement Network	1	360	Not yet funded
Rice biotechnology research	-	90	Rockefeller Foundation

(Continued)

Appendix II

FINANCIAL TABLES

1. Budget request by Programs and Units: Core
2. Budget request by Programs and Units: Complementary
3. Budget request by Programs and Activity: Core
4. Budget request by Programs and Activity: Complementary
5. Budget request by research and research-related activity: Core
6. Budget request by research and research-related activity: Complementary
7. Regional distribution of research and research-related activity requirements: Core
8. Budget request by categories of expenditures: Core and complementary
9. Staffing pattern: Core
10. Staffing pattern: Complementary
11. Budget request for capital expenditures and assets: Core and complementary
12. Budget request: Price assumptions. Core
13. Budget request: Sources and application of funds
14. Budget request: Balance sheet. Core and complementary

Table 1. Budget request by Programs and Units: Amounts for core activities in 1990, 1991, 1992, and 1993 (SYs = Senior Staff years; thousands of current US dollars).

	Actual 1990		Actual 1991		1992 Budget				1993 Budget request		Changes over 1992 estimate	
					Approved		Estimate					
	SYs	Amount	SYs	Amount	SYs*	Amount	SYs	Amount	SYs	Amount	$'000	%
1. Operations												
Germplasm Development												
Beans	21	4,653	21	4,877	17	4,003	15	3,880	14	3,390	(500)	(13)
Cassava	11	2,580	11	2,647	11	2,604	10	2,655	10	2,400	(255)	(10)
Rice	8	1,981	8	1,648	7.75	1,652	6	1,655	6	1,540	(115)	(7)
Tropical Forages	17	3,845	18	4,127	13.5	3,350	9.5	2,615	9.5	2,395	(220)	(8)
Biotechnology	2	421	2	383	3	680	3	500	3	500	–	–
Virology	2	339	2	359	2	359	2	352	2	352	–	–
Genetic resources	1	495	1	584	1	593	1	649	1	680	31	5
Strategic research initiatives	–	26	–	60	–	104	–	100	–	185	85	85
Research management	1	201	1	210	1	228	1	238	1	238	–	–
Total germplasm development	63	14,541	64	14,895	58.25	13,573	47.5	12,654	46.5	11,680	(974)	(8)
Resource Management												
Forest Margins	–	–	–	–	2	480	1	300	4	900	600	200
Hillsides	–	–	–	–	2	480	1	300	4	930	630	210
Savannas	–	–	–	–	5.75	1,428	5.5	1,400	5.5	1,500	100	7
Land Use	–	–	–	–	6	1,411	3	770	4	1,030	260	34
Strategic research initiatives	–	–	–	145	–	104	–	100	–	185	85	85
Research management	1	202	1	203	1	231	1	233	1	233	–	–
Total resource management	1	202	1	348	16.75	4,134	11.5	3,103	16.5	4,778	1,675	54
Research Support												
Research services	–	276	–	319	–	380	–	438	–	438	–	–
Field operations	1	817	1	852	1	904	1	871	1	773	(98)	(11)
Carimagua	–	434	–	404	–	428	–	347	–	347	–	–
Information management / Biometry	–	510	1	618	1	752	–	507	–	510	3	1
Visiting scientists and postdoctorals	–	450	–	518	–	578	–	532	–	532	–	–
Impact assessment	–	–	–	–	–	–	–	–	1	200	200	–
Agroecological studies	1	209	2	256	–	–	–	–	–	–	–	–
Animal herd	–	260	–	–	–	–	–	–	–	–	–	–
Total research support	2	2,956	4	2,967	2	3,042	1	2,695	2	2,800	105	4
Institutional Development Support												
Associate Director	1	185	1	185	1	193	1	228	1	228	–	–
Professional development	–	1,097	–	910	1	1,220	–	560	–	460	(100)	(18)
Conferences	–	180	–	191	–	275	–	240	–	240	–	–
Information and documentation	1	543	1	580	1	574	1	585	1	550	(35)	(6)
Communication/Public affairs	1	743	2	846	2	927	2	1,031	2	1,031	–	–
Seed supply	1	438	2	512	2	537	–	268	–	–	(268)	(100)
Project design **	–	–	–	–	1	–	1	–	1	–	–	–
Total institutional development	4	3,186	6	3,224	8	3,726	5	3,912	5	2,509	–	–
Management and administration												
Board of Trustees	–	229	–	171	–							
Central administration	6	1,903	6	1,801	5							
Central services	–	3,277	–	3,616	–							
Total management and administration	6	5,409	6	5,588	5							
Depreciation expense	–	–	–	1,965	–							
Contingencies	–	–	–	–	–							
Total operations	76	26,294	81	28,987	88							
Price increase	–	–	–	–	–							
Total operations	76	26,294	81	28,987	88							
Additional operating funds	–	404	–	–	–							
Total operating requirements	76	26,698	81	28,987	88							
Self-generated income												
Investments	–	163	–	1,179	–							
Overhead	–	615	–	491	–							
Other (sales, etc.)	–	57	–	120	–							
Total self-generated income	–	835	–	1,790	–							
Total operating funds required	76	25,863	81	27,197	88							
2. Total capital	–	1,870	–	659	–							
3. Total funding requirements	76	27,733	81	27,856	88	31,910	70	28,144	77	31,684	3,540	13

* Positions are shown for the full year although, for budgetary purposes, a fill ratio of 96 % is assumed.

** Paid from indirect cost recovery.

Table 2. Budget request by Programs and Units: Amounts for complementary activities in 1990, 1991, 1992, and 1993 (SYs = Senior Staff years; thousands of current US dollars).

	Actual 1990		Actual 1991		1992 Budget				1993 Budget request		Changes over 1992 estimate	
					Approved		Estimate					
	SYs	Amount	SYs	Amount	SYs	Amount	SYs	Amount	SYs	Amount	$'000	%
1. Operations												
Germplasm Development												
Beans	6	2,595	6	2,285	9	3,455	8	2,964	9	3,292	328	11
Cassava	2	590	1	1,090	4	2,194	2	1,678	3	2,908	1,230	73
Rice	–	204	1	487	1.25	726	1	340	2	970	630	185
Tropical Forages	–	321	–	226	1.75	446	2	601	3	777	176	29
Biotechnology	–	66	–	83	1	638	–	–	1	215	215	–
Virology	–	10	–	–	–	–	–	–	–	–	–	–
Genetic resources	–	–	–	62	–	400	–	80	–	50	(30)	(38)
Total germplasm development	**8**	**3,786**	**8**	**4,233**	**17**	**7,859**	**13**	**5,663**	**18**	**8,212**	**2,549**	**45**
Resource Management												
Forest Margins	–	–	–	–	0.25	58	–	–	2	350	350	–
Hillsides	–	–	–	–	2	468	–	130	3	480	350	269
Savannas	–	–	–	–	–	–	1	65	1	65	–	–
Land Use	–	–	–	–	1	234	–	–	–	–	–	–
Total resource management	**–**	**–**	**–**	**–**	**3.25**	**760**	**1**	**195**	**6**	**895**	**700**	**359**
Institutional Development Support												
Professional development	–	185	–	295	–	624	–	600	–	600	–	–
Conferences	–	30	–	64	–	–	–	–	–	300	300	–
Total institutional development	**–**	**215**	**–**	**359**	**–**	**624**	**–**	**600**	**–**	**900**	**300**	**–**
Research Support												
Seeds	–	49	–	–	–	–	–	–	–	–	–	–
Farmer participatory research	1	183	1	276	1	290	1	279	1	279	–	–
Total research support	**1**	**232**	**1**	**276**	**1**	**290**	**1**	**279**	**1**	**279**	**–**	**–**
Contingencies	–	–	–	–	–	92	–	67	–	103	36	54
Total operations	**9**	**4,233**	**9**	**4,868**	**21.25**	**9,626**	**15**	**6,804**	**25**	**10,389**	**3,585**	**53**
Additional operating funds	–	–	–	–	–	261	–	–	–	299	299	–
Total operations	**–**	**–**	**–**	**–**	**–**	**261**	**–**	**–**	**–**	**299**	**299**	**–**
2. Capital	–	408	–	249	–	312	–	300	–	300	–	–
3. Total funding requirements	**9**	**4,641**	**9**	**5,117**	**21.25**	**10,199**	**15**	**7,104**	**25**	**10,988**	**3,884**	**55**

Table 3. Budget request by Programs and Activity: Amounts for core activities in 1991, 1992, and 1993 (SYs = Senior Staff years; thousands of current US dollars).

	Actual 1991		1992 Budget				1993 Budget request		Changes over 1992 estimate	
			Approved		Estimate					
	SYs	Amount	SYs	Amount	SYs	Amount	SYs	Amount	$'000	%
1. Operations program										
A. Research Activities										
1. Conservation and management of natural resources										
1.1 Ecosystem conservation and management	2.1	554	10.5	2,825	8.3	2,486	12.1	3,372	906	37
1.2 Germplasm collection, conservation, characterization and evaluation	5.0	1,293	6.5	1,739	5.1	1,517	5.2	1,445	(72)	(5)
Total activity 1	7.1	1,847	17.0	4,564	13.4	3,983	17.3	4,817	834	21
2. Germplasm enhancement and breeding										
2.1 Crops										
2.1.1 Beans	6.2	1,607	10.0	2,673	7.9	2,333	7.7	2,140	(193)	(8)
2.1.2 Cassava	4.3	1,108	6.9	1,847	5.4	1,612	5.8	1,618	6	–
2.1.3 Rice	2.8	739	4.9	1,304	3.8	1,138	4.1	1,156	18	2
2.1.4 Tropical forges	3.4	886	5.4	1,456	4.3	1,271	4.5	1,252	(19)	(1)
Total sub-activity 2.1	16.7	4,340	27.2	7,280	21.4	6,354	22.1	6,166	(189)	(3)
Total activity 2	16.7	4,340	27.2	7,280	21.4	6,354	22.1	6,166	(189)	(3)
3. Production systems development and management										
3.1 Crops systems										
3.1.1 Beans	4.1	1,071	3.3	891	2.6	778	2.6	732	(46)	(6)
3.1.2 Cassava	3.8	979	3.1	826	2.4	721	2.1	578	(143)	(20)
3.1.3 Rice	2.8	720	2.3	609	1.8	531	1.7	482	(49)	(9)
3.1.4 Tropical forges	4.3	1,106	3.5	935	2.8	816	2.6	713	(103)	(13)
Total sub-activity 3.1	15.0	3,878	12.2	3,261	9.6	2,846	9.0	2,505	(341)	(12)
3.2 Livestock systems	4.6	1,200	1.2	326	1.0	285	1.0	289	4	1
Total activity 3	19.6	5,078	13.4	3,587	10.6	3,131	10.0	2,794	(337)	(11)
4. Socioeconomic, public policy and public management research										
4.1 Economic and social analysis	3.9	1,016	5.3	1,413	4.2	1,233	5.5	1,541	308	25
4.2 Policy analysis	0.4	92	1.6	435	1.3	378	1.7	482	103	27
4.3 Governance and management of public systems	–	–	0.4	109	0.3	95	0.7	193	98	103
Total activity 4	4.3	1,108	7.3	1,957	5.8	1,707	7.9	2,216	509	30
Total research activities	47.7	12,373	64.9	17,388	51.2	15,175	57.3	15,993	818	5
5. Institution building										
5.1 Training and conferences	12.3	3,232	5.6	1,520	4.5	1,327	3.4	962	(365)	(28)
5.2 Documentation, publication and dissemination of information	7.5	1,938	6.5	2,262	6.7	1,992	6.9	1,927	(65)	(3)
5.4 Networks	3.5	923	2.0	544	1.6	475	1.4	385	(90)	(19)
Total institution building activities	23.3	6,094	16.1	4,346	12.8	3,794	11.7	3,274	(520)	(14)
B. Research Support	4	2,967	2	3,042	1	2,885	2	2,600	105	4
C. Administration/Operations										
1. Management and administration	6	1,972	5	2,103	5	2,161	6	2,161	–	–
2. Central services	–	3,816	–	3,490	–	3,519	–	3,519	–	–
3. Depreciation	–	1,965	–	–	–	2,000	–	2,000	–	–
Total administration/operations	6	7,553	5	5,593	5	7,680	6	7,680	–	–
Subtotal operations program	81	28,987	88	30,369	70	29,344	77	29,747	403	1
D. Inflation	–	–	–	–	–	–	–	2,103	2,103	–
Total operations program	81	28,987	88	30,369	70	29,344	77	31,850	2,506	9
2. Additional operating funds	–	–	–	295	–	–	–	234	234	–
Total operating requirements	–	–	–	295	–	–	–	234	234	–
3. Self-generated income										
1. Investment	–	1,178	–	200	–	700	–	250	(450)	(64)
2. Overhead	–	491	–	400	–	400	–	400	–	–
3. Other (sales, etc)	–	120	–	140	–	100	–	50	(50)	(50)
Total self-generated income	–	1,790	–	740	–	1,200	–	700	(500)	(42)
Total operating funds required	81	27,197	88	29,924	70	28,144	77	31,384	3,240	12
4. Capital program	–	659	–	1,986	–	–	–	300	300	–
Total funding required	81	27,856	88	31,910	70	28,144	77	31,684	3,540	13

Table 4. Budget request by Programs and Activity: Amounts for complementary activities in 1991, 1992, and 1993 (SYs = Senior Staff years; thousands of current US dollars).

	Actual 1991		1992 Budget				1993 Budget request		Changes over 1992 estimate	
			Approved		Estimate					
	SYs	Amount	SYs	Amount	SYs	Amount	SYs	Amount	$'000	%
1. Operations program										
A. Research Activities										
1. Conservation and management of natural resources										
1.1 Ecosystem conservation and management	0.3	188	1.4	639	0.4	152	1.8	676	524	345
1.2 Germplasm collection, conservation, characterization and evaluation	0.5	276	1.9	867	1.0	437	1.4	535	98	22
Total activity 1	**0.8**	**464**	**3.3**	**1,506**	**1.4**	**589**	**3.2**	**1,211**	**622**	**106**
2. Germplasm enhancement and breeding										
2.1 Crops										
2.1.1 Beans	1.0	602	4.8	2,203	4.1	1,747	5.0	1,927	180	10
2.1.2 Cassava	0.5	303	3.1	1,418	2.4	1,006	4.7	1,805	799	79
2.1.3 Rice	0	271	1.1	510	0.5	222	1.7	647	425	191
2.1.3 Tropical forages	–	–	0.5	232	0.7	292	1.0	382	90	31
Total sub-activity 2.1	2.0	1,176	9.0	4,363	7.0	3,267	11.4	4,761	1,404	43
Total activity 2	**2.0**	**1,176**	**9.0**	**4,363**	**7.0**	**3,267**	**11.4**	**4,761**	**1,404**	**43**
3. Production systems development and management										
3.1 Crops systems										
3.1.1 Beans	1.0	545	1.4	626	1.2	497	1.6	610	113	23
3.1.2 Cassava	0.4	239	1.1	523	0.9	371	1.6	615	244	66
3.1.3 Rice	0.5	37	0.4	205	0.2	59	0.7	264	175	197
3.1.3 Tropical forages	–	–	0.3	122	0.4	152	0.5	203	51	34
Total sub-activity 3.1	1.8	822	3.2	1,476	2.7	1,109	4.4	1,692	583	53
3.2 Livestock systems	0.2	87	0.1	52	0.2	66	0.2	87	21	32
Total activity 3	**2.0**	**909**	**3.3**	**1,528**	**2.9**	**1,175**	**4.6**	**1,779**	**604**	**51**
4. Socioeconomic, public policy and public management research										
4.1 Economic and social analysis	0.5	280	1.6	749	1.2	502	2.4	905	403	80
4.2 Policy analysis	–	18	0.5	207	0.3	127	0.6	215	88	69
4.3 Governance and management of public systems	–	–	0.1	29	–	6	0.1	39	33	550
Total activity 4	**0.5**	**298**	**2.2**	**985**	**1.5**	**635**	**3.1**	**1,159**	**524**	**83**
Total research activities	**5.3**	**2,847**	**17.8**	**8,382**	**12.8**	**5,666**	**22.3**	**8,910**	**3,244**	**57**
5. Institution building										
5.1 Training and conferences	1.4	790	1.0	624	1.0	600	1.0	900	300	50
5.2 Documentation, publication and dissemination of information	0.6	326	–	–	–	–	–	–	–	–
5.3 Organization and management counselling	0.5	317	–	–	–	–	–	–	–	–
5.4 Networks	0.5	312	0.7	330	0.6	259	0.8	300	41	16
Total institution building activities	**3.0**	**1,745**	**1.7**	**954**	**1.6**	**859**	**1.8**	**1,200**	**341**	**40**
B. Research Support	1	276	1	280	1	279	1	279	–	–
Total operations program	**9**	**4,868**	**21**	**9,626**	**15**	**6,804**	**25**	**10,389**	**3,585**	**53**
2. Additional operating funds	–	–	–	261	–	–	–	299	299	–
Total operating funds required	**9**	**4,868**	**21**	**9,887**	**15**	**6,804**	**25**	**10,688**	**3,884**	**57**
4. Capital program	–	249	–	312	–	300	–	300	–	–
Total funding required	**9**	**5,117**	**21**	**10,199**	**15**	**7,104**	**25**	**10,988**	**3,884**	**55**

Table 5. Budget request by research and research–related activity: Amounts for core activities in 1991, 1992, and 1993 (thousands of current US dollars; percent share).

Activities	Actual 1991		1992 Budget				1993 Budget request		Change over 1992 estimate	
			Approved		Estimate					
	Amount	%	Amount	%	Amount	%	Amount	%	$'000	%
1. **Conservation and management of natural resources**										
1.1 Ecosystem conservation and management	870	3.0	3,948	13.0	3,815	13.0	5,574	17.5	1,759	46.0
1.2 Germplasm collection, conservation, characterization and evaluation	2,029	7.0	2,429	8.0	2,347	8.0	2,389	7.5	41	2.0
Total activity 1	**2,899**	**10.0**	**6,377**	**21.0**	**6,162**	**21.0**	**7,963**	**25.0**	**1,800**	**29.0**
2. **Germplasm enhancement and breeding**										
2.1 Crops										
2.1.1 Beans	2,522	8.7	3,735	12.3	3,609	12.3	3,535	11.1	(74)	(2.0)
2.1.2 Cassava	1,739	6.0	2,581	8.5	2,494	8.5	2,675	8.4	181	7.0
2.1.3 Rice	1,159	4.0	1,822	6.0	1,761	6.0	1,911	6.0	150	9.0
2.1.4 Tropical Forages	1,391	4.8	2,035	6.7	1,966	6.7	2,070	6.5	104	5.0
Total sub–activity 2.1	**6,812**	**23.5**	**10,173**	**33.5**	**9,830**	**33.5**	**10,192**	**32.0**	**362**	**4.0**
Total activity 2	**6,812**	**23.5**	**10,173**	**33.5**	**9,830**	**33.5**	**10,192**	**32.0**	**362**	**4.0**
3. **Production systems development and management**										
3.1 Cropping systems										
3.1.1 Beans	1,681	5.8	1,245	4.1	1,203	4.1	1,210	3.8	7	1.0
3.1.2 Cassava	1,536	5.3	1,154	3.8	1,115	3.8	956	3.0	(160)	(14.0)
3.1.3 Rice	1,130	3.9	850	2.8	822	2.8	796	2.5	(25)	(3.0)
3.1.4 Tropical Forages	1,739	6.0	1,306	4.3	1,262	4.3	1,178	3.7	(83)	(7.0)
Total sub–activity 3.1	**6,087**	**21.0**	**4,555**	**15.0**	**4,401**	**15.0**	**4,141**	**13.0**	**(261)**	**(6.0)**
3.2 Livestock systems	1,884	6.5	456	1.5	440	1.5	478	1.5	38	9.0
Total activity 3	**7,971**	**27.5**	**5,011**	**16.5**	**4,842**	**16.5**	**4,618**	**14.5**	**(223)**	**(5.0)**
4. **Socioeconomic, public policy and public management research**										
4.1 Economic and social analysis	1,594	5.5	1,974	6.5	1,907	6.5	2,548	8.0	641	34.0
4.2 Policy analysis	145	0.5	607	2.0	587	2.0	796	2.5	209	36.0
4.3 Governance and management of public systems	–	–	152	0.5	147	0.5	319	1.0	172	117.0
Total activity 4	**1,739**	**6.0**	**2,733**	**9.0**	**2,641**	**9.0**	**3,663**	**11.5**	**1,022**	**39.0**
5. **Institution building**										
5.1 Training and conferences	5,073	17.5	2,126	7.0	2,054	7.0	1,593	5.0	(462)	(22.0)
5.2 Documentation, publication and dissemination of information	3,044	10.5	3,189	10.5	3,081	10.5	3,185	10.0	104	3.0
5.4 Networks	1,449	5.0	760	2.5	735	2.5	637	2.0	(98)	(13.0)
Total activity 5	**9,566**	**33.0**	**6,075**	**20.0**	**5,870**	**20.0**	**5,415**	**17.0**	**(455)**	**(8.0)**
Total research and research–related activities	**28,987**	**100.0**	**30,369**	**100.0**	**29,344**	**100.0**	**31,850**	**100.0**	**2,506**	**9.0**

Table 6. Budget request by research and research-related activity: Amounts for complementary activities in 1991, 1992, and 1993 (thousands of current US dollars; percent share).

Actual 1991	1992 Budget				1993 Budget request		Change over 1992 estimate	
	Approved		Estimate					
	Amount	%	Amount	%	Amount	%	$'000	%
					695	6.7	537	340.0
							93	20.0

Table 6. Budget request by research and research-related activity: Amounts for complementary activities in 1991, 1992, and 1993 (thousands of current US dollars; percent share).

Activities	Actual 1991		1992 Budget				1993 Budget request		Change over 1992 estimate	
			Approved		Estimate					
	Amount	%	Amount	%	Amount	%	Amount	%	$'000	%
1. **Conservation and management of natural resources**	200	4.1	659	6.8	158	2.3	895	6.7	537	340.0
1.1 Ecosystem conservation and management	292	6.0	894	9.3	456	6.7	549	5.3	93	20.0
1.2 Germplasm collection, conservation, characterization and evaluation										
Total activity 1	**492**	**10.1**	**1,553**	**16.1**	**614**	**9.0**	**1,244**	**12.0**	**630**	**103.0**
2. **Germplasm enhancement and breeding**										
2.1 Crops	638	13.1	2,272	23.6	1,822	26.7	1,980	19.1	158	9.0
2.1.1 Beans	321	6.6	1,462	15.2	1,049	15.4	1,854	17.8	805	77.0
2.1.2 Cassava	287	5.9	526	5.5	232	3.4	666	6.4	434	187.0
2.1.3 Rice	–	–	239	2.5	304	4.5	392	3.8	88	29.0
2.1.4 Tropical Forages										
Total sub-activity 2.1	**1,246**	**25.6**	**4,499**	**46.8**	**3,407**	**50.0**	**4,892**	**47.1**	**1,485**	**44.0**
Total activity 2	**1,246**	**25.6**	**4,499**	**46.8**	**3,407**	**50.0**	**4,892**	**47.1**	**1,485**	**44.0**
3. **Production systems development and management**										
3.1 Cropping systems	579	11.9	645	6.7	518	7.6	627	6.0	109	21.0
3.1.1 Beans	253	5.2	539	5.6	386	5.7	632	6.1	246	64.0
3.1.2 Cassava	39	0.8	212	2.2	93	1.4	271	2.6	178	191.0
3.1.3 Rice	–	–	126	1.3	160	2.4	209	2.0	49	31.0
3.1.4 Tropical Forages										
Total subactivity 3.1	**871**	**17.9**	**1,522**	**15.8**	**1,157**	**17.1**	**1,739**	**16.7**	**582**	**50.0**
3.2 Livestock systems	92	1.9	54	0.6	69	1.0	89	0.9	20	29.0
Total activity 3	**964**	**19.8**	**1,576**	**16.4**	**1,226**	**18.1**	**1,828**	**17.6**	**602**	**49.0**
4. **Socioeconomic, public policy and public management research**										
4.1 Economic and social analysis	297	6.1	772	8.0	523	7.7	930	9.0	407	78.0
4.2 Policy analysis	19	0.4	213	2.2	132	1.9	221	2.0	89	67.0
4.3 Governance and management of public systems	–	–	30	0.3	6	0.1	40	0.4	34	567.0
Total activity 4	**316**	**6.5**	**1,015**	**10.5**	**661**	**9.7**	**1,191**	**11.4**	**530**	**80.0**
5. **Institution building**										
5.1 Training and conferences	837	17.2	643	6.7	628	9.2	925	8.9	299	48.0
5.2 Documentation, publication and dissemination of information	346	7.1	–	–	–	–	–	–	–	–
5.3 Organization and management counselling	336	6.9	–	–	–	–	–	–	–	–
5.4 Networks	331	6.8	340	3.5	270	4.0	309	3.0	39	14.0
Total Activity 5	**1,850**	**38.0**	**983**	**10.2**	**898**	**13.2**	**1,234**	**11.9**	**338**	**38.0**
Total research and research-related activities	**4,868**	**100.0**	**9,626**	**100.0**	**6,804**	**100.0**	**10,389**	**100.0**	**3,585**	**53.0**

Table 7. Regional distribution of research and, research–related activity requirements: Allocation of core resources in 1991, 1992, and 1993 (percent share).[1]

Activities	SSA (%)			Asia (%)			LAC (%)		
	91	92	93	91	92	93	91	92	93
1. Conservation and management of natural resources									
1.1 Ecosystem conservation and management	–	–	–	–	–	–	3.0	13.0	17.5
1.2 Germplasm collection, conservation, characterization, and evaluation	2.0	2.0	2.0	1.0	1.5	1.5	4.0	4.5	4.0
2. Germplasm enhancement and breeding	4.5	8.5	8.0	2.5	5.0	5.0	16.5	20.0	19.0
3. Production systems development and management	5.0	4.0	3.0	2.5	2.5	2.5	20.0	10.0	9.0
4. Socioeconomic, public policy, and public management research	1.0	1.0	1.0	0.5	0.5	0.5	4.5	7.5	10.0
5. Institution building									
5.1 Training and conferences	3.0	2.0	1.5	1.0	0.5	0.5	13.5	4.5	3.0
5.2 Documentation, publicationn and dissemination of information	1.5	3.0	3.0	0.5	1.0	1.0	8.5	6.5	6.0
5.4 Networks	1.0	0.5	0.5	0.5	0.5	0.5	3.5	1.5	1.0
Total	17.0	20.5	18.5	8.0	11.0	11.0	70.0	66.0	68.5

[1] LAC = Latin America and Caribbean; SSA = Sub–Saharan Africa.

Table 8. Budget request by categories of expenditures: Amounts for core and complementary activities in 1990, 1991, 1992, and 1993 (thousands of current US dollars).

Expenses by categories	Actual 1990	Actual 1991	1992 Budget Approved	1992 Budget Estimate	1993 Budget request	Changes over 1992 estimate $'000	Changes over 1992 estimate %
Core							
Personnel	17,608	18,597	20,078	18,148	18,148	–	–
Training	1,030	914	1,295	692	692	–	–
Supplies and services	4,696	4,285	5,157	4,991	5,066	75	2
Travel	1,920	1,730	1,879	1,600	1,678	78	5
Other expenses	1,040	1,496	1,659	1,613	1,863	250	15
Depreciation expense	–	1,965	–	2,000	2,000	–	–
Contingency	–	–	301	300	300	–	–
Subtotal	**26,294**	**28,987**	**30,369**	**29,344**	**29,747**	**403**	**1**
Capital	1,870	659	1,986	–	300	300	–
Additional operating funds	404	–	295	–	234	234	–
Price increase	–	–	–	–	2,103	2,103	–
Total core	**28,568**	**29,646**	**32,650**	**29,344**	**32,384**	**3,040**	**10**
Complementary							
Personnel	1,312	1,295	3,053	2,324	3,830	1,506	65
Training	593	599	1,279	850	1,109	259	30
Supplies and services	762	727	1,722	1,120	1,815	695	62
Travel	720	741	1,581	985	1,715	730	74
Other expenses	846	1,506	1,898	1,458	1,817	359	25
Contingency	–	–	92	67	103	36	54
Subtotal	**4,233**	**4,868**	**9,626**	**6,804**	**10,389**	**3,585**	**53**
Capital	408	249	312	300	300	–	–
Additional operating funds	–	–	261	–	299	299	–
Total complementary	**4,641**	**5,117**	**10,199**	**7,104**	**10,988**	**3,884**	**55**
Total							
Personnel	18,920	19,892	23,131	20,472	21,978	1,506	7
Training	1,623	1,513	2,574	1,542	1,801	259	17
Supplies and services	5,458	5,012	6,879	6,111	6,881	770	13
Travel	2,640	2,471	3,460	2,585	3,393	808	31
Other expenses	1,886	3,002	3,557	3,071	3,680	609	20
Depreciation expense	–	1,965	–	2,000	2,000	–	–
Contingency	–	–	393	367	403	36	10
Subtotal	**30,527**	**33,855**	**39,995**	**36,148**	**40,136**	**3,988**	**11**
Capital	2,278	908	2,298	300	600	300	–
Additional operating funds	404	–	556	–	533	533	–
Price increase	–	–	–	–	2,103	2,103	–
Grand total	**33,209**	**34,763**	**42,849**	**36,448**	**43,372**	**6,924**	**19**

Table 9. Staffing pattern: approved positions for 1990, 1991, and 1992, and proposed core positions for 1993.

	Actual 1990	Actual 1991	1992 Budget Approved	1992 Budget Estimate	1993 Budget request	Changes over 1992 estimate No.	Changes over 1992 estimate %
1. International staff positions			*	*	*		
Research							
Beans	21	21	17	15	14	(1)	(7)
Cassava	11	11	11	10	10	–	–
Rice	8	8	7.75	6	6	–	–
Tropical Forages	17	18	13.5	9.5	9.5	–	–
Biotechnology	2	2	3	3	3	–	–
Virology	2	2	2	2	2	–	–
Genetic resources	1	1	1	1	1	–	–
Forest Margins	–	–	2	1	4	3	300
Hillsides	–	–	2	1	4	3	300
Savannas	–	–	5.75	5.5	5.5	–	–
Land Use	–	–	6	3	4	1	33
Total research	**62**	**63**	**71**	**57**	**63**	**6**	**11**
Institutional Development Support	**4**	**6**	**8**	**5**	**5**	–	–
Research Support	**2**	**4**	**2**	**1**	**2**	**1**	**100**
Management and Administration							
Central administration	6	6	5	5	5	–	–
Research management	2	2	2	2	2	–	–
Total management and administration	**8**	**8**	**7**	**7**	**7**	–	–
Total international staff	**76**	**81**	**88**	**70**	**77**	**7**	**10**
2. Supervisory positions	314	317	343	282	297	15	5
3. Support positions	1,244	1,251	1,346	1,009	1,035	26	3
Total positions	**1,634**	**1,649**	**1,777**	**1,361**	**1,409**	**48**	**4**

* Positions are shown for the full year although for budgetary purposes a fill ratio of 96 % is assumed.

Table 10. Staffing pattern: Approved positions for 1990,1991, and 1992, and proposed complementary positions for 1993.

	Actual 1990	Actual 1991	1992 Budget		1993 Budget request	Changes over 1992 estimate	
			Approved	Estimate		No.	%
1. International staff positions							
Research							
Beans	6	6	9	8	9	1	13
Cassava	2	1	4	2	3	1	50
Rice	–	1	1.25	1	2	1	100
Tropical Forages	–	–	1.75	2	3	1	50
Biotechnology	–	–	1	–	1	1	–
Forest Margins	–	–	0.25	–	2	2	–
Hillsides	–	–	2	–	3	3	–
Savannas	–	–	–	1	1	–	–
Land Use	–	–	1	–	–	–	–
Total research	**8**	**8**	**20.25**	**14**	**24**	**10**	**71**
Research Support							
Farmer participatory research	1	1	1	1	1	–	–
Total research support	**1**	**1**	**1**	**1**	**1**	–	–
Total international staff	**9**	**9**	**21**	**15**	**25**	**10**	**67**
2. Supervisory positions	23	23	56	54	65	11	20
3. Support positions	51	51	129	108	130	22	20
Total positions	**83**	**83**	**206.25**	**177**	**220**	**43**	**24**

Table 11. Budget request for capital expenditures and assets: Amounts for core and complementary activities in 1990, 1991, 1992, and 1993 (thousands of current US dollars).

	Actual 1990	Actual 1991	1992 Budget Approved	1992 Budget Estimate	1993 Budget request	Changes over 1992 estimate $'000	Changes over 1992 estimate %
New core capital expenditures							
Research equipment	232	245	489	–	200	200	–
Operating equipment	82	87	52	–	40	40	–
Furnishing and office equipment	52	52	10	–	30	30	–
Vehicles	–	–	21	–	–	–	–
Buildings and leasehold improvements	234	275	208	–	–	–	–
Computer equipment	90	–	47	–	30	30	–
Total new core capital	**690**	**659**	**827**	–	**300**	**300**	–
Complementary capital expenditures							
Research equipment	286	156	447	180	180	–	–
Operating equipment	74	30	343	50	50	–	–
Furnishing and office equipment	50	–	21	20	20	–	–
Vehicles	24	31	406	20	20	–	–
Buildings and leasehold improvements	–	–	114	–	–	–	–
Other	–	43	140	30	30	–	–
Total complementary capital	**434**	**260**	**1,471**	**300**	**300**	–	–
Total capital	**1,124**	**919**	**2,298**	**300**	**600**	**300**	**100**
Capital stock							
Fixed assets (beginning of year)	29,182	20,257	20,757	20,413	20,713	300	1
Acquisitions	2,125	919	827	300	600	300	100
Disposal	1,578	1,202	1,471	2,000	2,000	–	–
Depreciation for the year	(12,628)	(1,965)	(1,610)	(2,000)	(2,000)	–	–
Fixed assets (at year end)	**20,257**	**20,413**	**21,445**	**20,713**	**21,313**	**600**	**3**

Table 12. Budget request: Price assumptions. Amounts for core activities (in percentages).

Expenses by categories	1991/1992 Net change	1992/1993 Currency	Budget amount ($'000)	% of total	Inflation rate in currency	Change in exchange rate	Net price adjustment
Personnel costs							
	4.00	US$	7,095	26.3	4.0	–	4.0
	16.56	Col$	11,018	40.8	24.0	13.5	9.3
Training							
	4.00	US$	532	2.0	4.0	–	4.0
	4.00	Col$	160	0.6	22.0	13.5	7.5
Supplies and services							
	3.00	US$	1,938	7.2	4.0	–	4.0
	6.55	Col$	2,908	10.8	23.0	13.5	8.4
Operational travel							
	1.00	US$	980	3.6	4.0	–	4.0
	2.15	Col$	653	2.4	24.0	13.5	9.3
Other							
	2.50	US$	593	2.2	4.0	–	4.0
	0.65	Col$	1,100	4.1	23.0	13.5	8.4
Total	**9.01**		**26,977**	**100.0**	–	–	**7.0**

Table 13. Budget request: Sources and application of funds (thousands of current US dollars).

	Donor	Actual 1990	Actual 1991	1992 Budget Approved	1992 Budget Estimate	1993 Budget Request	Change over 1992 estimate $'000	Change over 1992 estimate %
Sources of funds								
1. Grants								
a. Core								
	Australia	–	–	–	152	–	–	–
	Belgium	192	180	–	197	–	–	–
	Brazil	–	–	–	40	–	–	–
	Canada	2,409	2,345	1,260	1,548	–	–	–
	China	10	10	–	20	–	–	–
	EEC	2,408	2,363	–	2,650	–	–	–
	Finland	251	278	–	274	–	–	–
	Ford Foundation	67	100	–	100	–	–	–
	France	267	256	–	243	–	–	–
	Germany	711	728	–	778	–	–	–
	IDB	4,523	2,698	600	1,600	–	–	–
	IDRC	133	74	–	–	–	–	–
	Italy	371	360	–	204	–	–	–
	Japan	2,818	2,791	–	2,761	–	–	–
	Mexico	–	30	–	30	–	–	–
	Netherlands	513	401	–	286	–	–	–
	Norway	640	640	–	684	–	–	–
	Rockefeller	159	–	–	–	–	–	–
	Spain	60	85	–	90	–	–	–
	Sweden	325	339	–	368	–	–	–
	Switzerland	2,557	2,657	2,074	2,074	–	–	–
	UNDP	262	57	–	–	–	–	–
	United Kingdom	922	904	–	963	–	–	–
	USAID	4,920	5,144	5,140	5,140	440	–	–
	World Bank	3,215	4,819	–	5,500	–	–	–
	Stabilization fund	–	597	–	–	–	–	–
	Other	–	–	22,836	798	31,244	–	–
Subtotal core		**27,733**	**27,856**	**31,910**	**26,500**	**31,664**	**5,184**	**20**
b. Complementary								
	Australia	56	186	–	180	60	–	–
	Belgium	63	36	–	300	357	–	–
	CIDA	1,528	1,804	1,500	1,500	610	–	–
	Colombia	121	154	–	54	–	–	–
	EEC	23	11	–	33	–	–	–
	FAO	13	–	–	10	–	–	–
	Ford Foundation	34	–	–	–	–	–	–
	France	19	28	–	54	–	–	–
	FUNDAGRO	102	78	95	95	90	–	–
	Germany	68	80	90	86	130	–	–
	GTZ	19	22	–	60	125	–	–
	IDB	17	109	600	600	600	–	–
	IDRC	94	92	–	300	76	–	–
	IFAD	3	198	260	250	224	–	–
	Iran	20	13	113	–	–	–	–
	Italy	148	65	–	140	80	–	–
	Japan	259	87	150	150	65	–	–
	Kellogg Foundation	449	–	380	380	279	–	–
	Netherlands	27	576	–	200	312	–	–
	Rockefeller	148	132	100	266	270	–	–
	Switzerland	930	819	1,250	1,250	350	–	–
	UNDP	–	162	–	140	912	–	–
	USAID	424	419	200	200	2,035	–	–
	Other	76	46	5,461	856	4,413	–	–
Subtotal complementary		**4,641**	**5,117**	**10,199**	**7,104**	**10,988**	**3,884**	**55**
Total grants		**32,374**	**32,973**	**42,109**	**33,604**	**42,672**	**9,068**	**27**

(Continued)

Table 13. Budget request: Sources and application of funds (thousands of current US dollars).

	Donor	Actual 1990	Actual 1991	1992 Budget Approved	1992 Budget Estimate	1993 Budget Request	Change over 1992 estimate $'000	Change over 1992 estimate %
(Continued.)								
2. Self-generated income								
Investment		163	1,179	200	700	250	(450)	(64)
Overhead		615	491	400	400	400	–	–
Other		57	120	140	100	50	(50)	(50)
Total self-generated income		**835**	**1,790**	**740**	**1,200**	**700**	**(500)**	**(42)**
Total sources		**33,209**	**34,763**	**42,849**	**34,804**	**43,372**	**8,568**	**25**
Application of funds								
1. Operations program								
Core		26,294	28,987	30,369	29,344	31,850	2,506	9
Complementary		4,233	4,868	9,626	6,804	10,389	3,585	53
2 Capital program								
Core		1,870	659	1,986	–	300	300	–
Complementary		408	249	312	300	300	–	–
3. Additional operating funds and reserves								
Core		404	–	295	(1,644)	234	1,878	(114)
Complementary		–	–	261	–	299	299	–
Total applications		**33,209**	**34,763**	**42,849**	**34,804**	**43,372**	**8,568**	**25**
Memo items								
Operating fund at year end		2,429	2,429	2,985	1,085	1,618	533	49
Reserves at year end		2,010	2,621	2,515	2,421	2,500	79	3

Table 14. Budget request: Balance sheet. Amounts for core and complementary activities in 1990, 1991, 1992, and 1993 (thousands of current US dollars).

	Actual		Estimate	Projection
	1990	1991	1992	for 1993
Assets				
Cash and cash equivalents	6,687	7,573	7,854	8,217
Accounts receivable				
Donors	8,405	4,945	5,124	4,910
Employees	230	356	427	409
Other	1,781	1,482	1,566	1,500
Inventories	1,061	1,007	1,000	930
Other current assets	433	855	445	404
Total current assets	**18,597**	**16,218**	**16,416**	**16,370**
Fixed assets				
Property, plant, and equipment	32,885	34,288	36,588	39,188
Less: accumulated depreciation	(12,628)	(13,875)	(15,875)	(17,875)
Total fixed assets	**20,257**	**20,413**	**20,713**	**21,313**
Total assets	**38,854**	**36,631**	**37,129**	**37,683**
Liabilities and fund balances				
Liabilities				
Bank indebtedness	5,400	1,059	1,560	1,234
Accounts payable				
Donors	2,133	2,785	2,384	2,465
Others	5,100	4,462	5,564	4,752
In-trust accounts	285	–	–	–
Accruals and provisions	1,240	1,881	2,106	2,316
Staff reserves	1,610	2,196	2,421	2,500
Total liabilities	**15,768**	**12,383**	**14,035**	**13,267**
Fund balances				
Capital invested in fixed assets				
Core	15,193	14,901	14,913	14,919
Complementary	5,064	5,512	5,800	6,394
Capital fund	400	1,406	1,296	1,485
Operating fund	2,429	2,429	1,085	1,618
Total fund balances	**23,086**	**24,248**	**23,094**	**24,416**
Total liabilities and fund balances	**38,854**	**36,631**	**37,129**	**37,683**

ACRONYMS AND ABBREVIATIONS

BNF	biological nitrogen fixation
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza, Costa Rica
CENARGEN	Centro Nacional de Recursos Genéticos, Brazil
CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo, Mexico
CPAC	Centro de Pesquisa Agropecuária dos Cerrados, EMBRAPA, Brazil
CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia
CVC	Corporación Autónoma Regional del Valle del Cauca, Colombia
DNA	deoxyribonucleic acid (fundamental genetic material)
EEC	European Economic Community, Belgium
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária, Brazil
FAO	Food and Agriculture Organization of the United Nations, Italy
FEDEARROZ	Federación Nacional de Arroceros de Colombia
FES	Fundación para la Educación Superior, Colombia
FUNDAEC	Fundación para la Aplicación y Enseñanza de la Ciencia, Colombia
FUNDAGRO	Fundación para el Desarrollo Agropecuario, Ecuador
G/E	Germplasm by Environment (Specialist at CIAT)
GIS	geographic information systems

GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit [German Agency for Technical Cooperation], Germany
ICA	Instituto Colombiano Agropecuario, Colombia
ICM	integrated crop management
ICRAF	International Center for Research in Agroforestry, Nairobi, Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India
IDB	Inter-American Development Bank, Washington D.C., USA
IDRC	International Development Research Centre, Canada
IDS	Institutional Development Support, CIAT
IFAD	International Fund for Agricultural Development, Italy
IITA	International Institute of Tropical Agriculture, Ibadan, Nigeria
ILCA	International Livestock Center for Africa, Addis Ababa, Ethiopia
INGER	International Network for Genetic Enhancement of Rice, IRRI
IPM	integrated pest management
IRRI	International Rice Research Institute, Los Baños, Philippines
IVITA	Institute Veterinario de Investigaciones Tropicales y de Altura, Peru
m.a.s.l.	meters above sea level
MPFTS	multipurpose forage trees and shrubs
NARS	national agricultural research systems
NRI	National Resources Institute, England
RIEPT	Red Internacional de Evaluación de Pastos Tropicales
RMRP	Resource Management Research Programs, CIAT

SADCC	Southern African Development Coordination Committee
SDC	Swiss Development Cooperation, Switzerland
TAC	Technical Advisory Committee, CGIAR
UNDP	United Nations Development Programme, New York, USA
USAID	United States Agency for International Development, USA