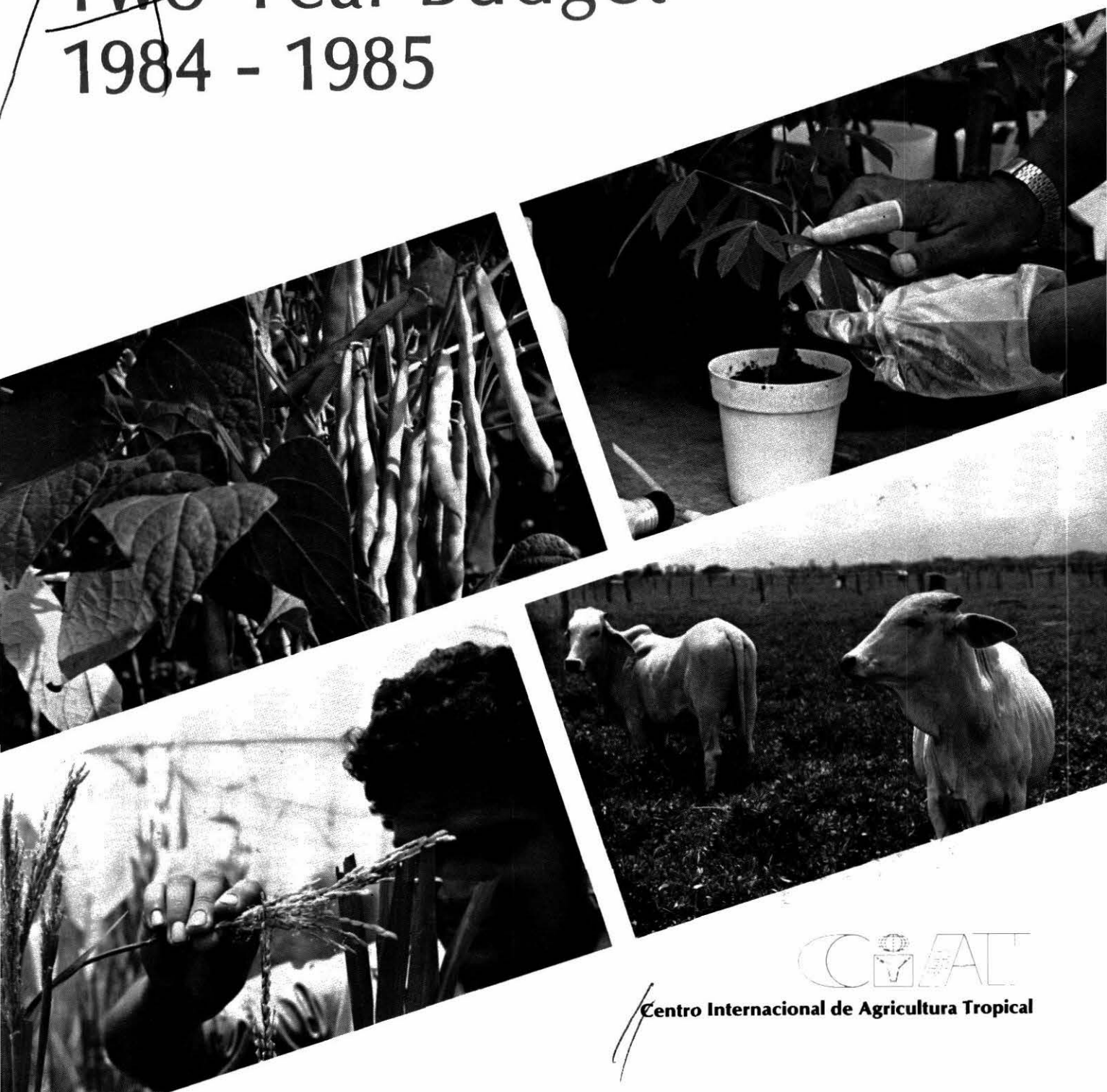
MIDTERM REPORT
Two-Year Budget
1984 - 1985



Centro Internacional de Agricultura Tropical

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15 September 1984

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PROGRAM DEVELOPMENTS

External Review

In the early months of 1984 CIAT underwent its Second External Review. CIAT is pleased that the Program Review Panel, after an exhaustive review, was in a position to fully endorse the basic objectives, strategies, and approaches of the commodity research programs, and to eloquently attest to the solid achievements in research and international cooperation realized since the first External Review. To a large measure, the recommendations made by the Program Review Panel coincide with CIAT's own appraisal of adjustments necessary at this stage of development, and thus CIAT sees in the recommendations a confirmation and endorsement of CIAT's evolving strategies. The Panel also reviewed the CIAT Long-Range Plan of 1981 and an updated version of projections which was made available during the Review. The Panel strongly endorsed the Plan and concurred with the overall strategies and projections of resource requirements to the end of the decade. The Panel was complimentary of the realistic projections which the Center has made in the light of expected reduced growth in resource availability.

The Management Review Panel engaged in a thorough exercise of looking at the management of CIAT, and concluded that the donors of CIAT could rest reassured that their money is being wisely spent. The Panel made a series of suggestions for improvement—in many cases merely for accelerating actions already begun. Again, CIAT welcomes the constructive and useful advice and recommendations it received from the Management Review Team, and gladly accepts these recommendations. At the same time—and as noted by the

Management Review Panel—CIAT is developing an increasing capacity for internal review and improvement.

Recent Technical Developments

Bean Program

In Latin America beans are produced on about 8.3 million hectares. In Eastern Africa, the second most important bean production area, about 2.5 million hectares are devoted to beans. Although production is concentrated over a relatively narrow temperature range, agroclimatological studies undertaken by CIAT have confirmed that climate, soil and cropping systems vary widely from region to region. Superimposed on this variation is a very pronounced and relatively inflexible consumer demand for particular grain types and colors. As a result, improvement must be carried out on a region-specific basis.

The production risks encountered by the bean farmer stem mainly from the disease and drought susceptibility of the crop. Such environmental constraints, however, can be reduced by genetic improvements of the bean plant. This is the area of major emphasis by the Bean Program.

Genetic tolerances to pests and diseases have been encountered in the CIAT bean germplasm bank, which now contains more than 32,000 accessions of *Phaseolus vulgaris*. These sources of tolerance are used extensively in the Program's plant improvement projects which make more than 1,500 hybrid combinations each year.

Recent Results in Insect and Disease Resistance Breeding. The Program's past experience in breeding for resistance to Bean Golden Mosaic Virus (BGMV) showed that, with available sources of resistance, it was possible to gain only modest successive increases in the level of resistance to this regionally very important virus. In recent nurseries, however, new, highly resistant lines have been identified which only show traces of the virus symptoms and give rise to hopes that commercial varieties can be developed with resistance levels significantly above the ones in already released BGMV-tolerant varieties.

Similarly, in bacterial blight new sources of resistance have been identified with resistance levels far superior to those of previously known materials. These resistances were selected from segregating material from crosses made at the University of California between the wild tepary bean (*P. acutifolius*) and the common bean.

Costa Rica bean researchers who are members of the Central American bean network have developed lines which are characterized by excellent levels of resistance to web blight. Before this development, only moderate levels of web blight resistance had been found. These new levels of resistance when available in commercial grain types, may make it possible to open up new areas for bean production in the warmer, humid climates.

The resistance sources to storage insects found in wild beans have now been incorporated into cultivated varieties. Through crosses with large seeded varieties, the small seed size of the wild, resistant donor has been increased to commercially acceptable levels. The process of selecting lines with good levels of resistance from such crosses is continuing.

In anthracnose, the Program continues to find additional race variability specific to production areas. Fortunately, no evidence is available that would point to the formation of new races. This gives hope that lines which have shown to be resistant to anthracnose in all production areas where they have been tested thus far, will maintain their resistance.

Angular leaf spot is a little studied disease. Nevertheless, lines have been identified that are resistant to the pathogen as it occurs in Colombia, Brazil and Africa.

Release of Improved Materials. The release of improved CIAT bean materials is continuing at a rapid pace. In the 1981-83 period, 20 CIAT lines were released by collaborating national institutions in eight countries. During the same time period, three countries (Costa Rica, Guatemala, Honduras) named and released eight local selections from CIAT-provided segregating populations. These releases containing CIAT-improved materials have followed the release (1977-1983) of eleven superior accessions from the CIAT germplasm bank by national programs in twelve different countries.

These new materials are being adopted by the bean farmers and are now beginning to have a measurable impact on production. For example, a recent survey in Costa Rica showed that over 60 percent of the bean farmers are already using the newly released materials. In Guatemala, close to 50 percent of the small bean farmers have adopted new, BCMV resistant varieties developed by CIAT in coordination with the Guatemalan national program; these varieties are also being used in areas of Guatemala where bean production was abandoned due to the virus. In large measure, as a result of the introduction of these new materials, Guatemala has now reached self-sufficiency in bean production.

Another example of increased bean production comes from Argentina. In 1979, that country introduced for testing new CIAT germplasm which is now planted on 30,000 hectares of commercial plantings, which amounts to 80% of the black bean area. Only insufficient seed supply from increased production acreage prevented complete coverage with improved varieties. The yearly value of the increased production and reduced cost of production in 1984 is estimated at US$8.4 million.

Cassava Program

CIAT was pleased by the conclusion reached by the External Program Review team that the Cassava Program has made important and far-reaching progress in the research for improved cassava production—a field which was largely unexplored before the CGIAR system made the decision to include this food staple in its research program. Recent advances registed by the Cassava Program include the following.

Cassava has long been known as a drought tolerant crop. Recent research has shown that this is due to a special mechanism by which stomata sense when humidity is low and potential water loss is large. Under these conditions the stomata rapidly close, thus reducing water loss and allowing the crop to survive. This mechanism not only allows the crop to survive when rainfall is uncertain but it also results in a highly efficient use of limited supplies of water.

In previous years mycorrhiza associations with cassava have been shown to be essential in order to obtain good yields of cassava under low soil phosphorus conditions. Cassava in the field is invariably infected with native strains of mycorrhiza. Very effective strains of mycorrhiza have now been selected in greenhouse trials. When field-grown cassava is inoculated with these efficient strains yields can be increased by up to 90%, with average yield increases of 30% on low phosphorus soils.

In a long growth-cycle, basic staple such as cassava, continued applications of pesticides to control insect and mite problems are not possible. Rather, the control strategy must be based upon integrative pest management. In the case of mites the breeding program has managed to develop moderately resistant lines with high yield potential. This resistance can be combined with biological control agents such as the newly discovered Phytoseiidae mite predators to give highly effective control of this serious pest. The Phytoseiidae predatory mites have recently been introduced by IITA to Africa from CIAT, and field trials show them to be an effective control measure for this devastating pest in that continent.

Much of the world's cassava is grown by small farmers using mixed cropping. After seven years of intensive research on intercropping of cassava, the data obtained have now been compiled in a publication that describes the basic principles involved in obtaining high yields of cassava and the intercrop in mixed cropping situations.

A major constraint on cassava yields is the declining fertility that occurs when cassava is continuously cropped. In traditional systems farmers maintain fertility by fallow systems. However, with the demographic explosion, land scarcity has resulted in shorter fallow periods and a consequent decrease in soil fertility in many cassava growing areas. Long-term research has shown how fertility can be maintained over time by judicious use of fertilizer and also by crop rotations.

In the Americas farmers frequently change their varieties and also experience problems with degeneration of yields in their traditional varieties. CIAT's scientists have shown that this degeneration is partially due to a complex of virus diseases of cassava. Many of these viruses have now been described and methods of eliminating them from

traditional varieties have been developed. By producing virus-free planting stocks yields in farmer's fields can be greatly increased.

Fresh cassava consumption is much greater in rural than in urban areas. Low levels of consumption in urban areas are due to the poor quality and high price of fresh cassava in urban markets. The poor quality and high price are directly related to the rapid post-harvest deterioration of cassava roots. If cassava roots are dipped in a low-toxicity fungicide immediately after harvest and then packed in polyethylene bags, the roots can be stored for periods of two to three weeks with no change in eating quality. Recent analysis has shown that the fungicide, which is very low in toxicity, does not enter into the fleshy center parts of the root which are eaten. Ninety-nine percent of the fungal residues are found in the skin which is discarded before cooking. Initial trials have shown that farmers will readily accept this simple new technology.

In cassava development programs a vicious circle is often encountered in which farmers will not increase their production because of the uncertainty of markets. At the same time potential buyers of cassava products are not prepared to use cassava unless they have a guaranteed supply. CIAT, in cooperation with DRI (Rural Integrated Development Program of Colombia), has devised a methodology for the development of small-scale integrated production, processing, and marketing projects. In the last three years the first one of these projects on the North Coast of Colombia has developed from a pilot project to a semi-commercial undertaking; at present, there are seven commercial drying patios established by small farmer groups, and another seven are approved for construction. Plans call for a considerable increase in the number of drying patios in the coming years. Similar drying patios have now been established in northeast Brazil, Mexico and Panama.

In 1983 CIAT placed a full-time breeder in Asia to assist national programs with the transfer of germplasm from the Americas, and with the evaluation of this material in the field. Materials are now being crossed at CIAT specifically for Asian conditions. In Thailand, Rayong 3, a CIAT cross, has now been released as a specially high starch variety. Until recently none of the new materials from the Americas significantly outyielded the Thai variety Rayong 1 grown on more than one million hectares. However, the new crosses specifically made for Asian conditions are showing up to 60% greater yield potential under field conditions than Rayong 1.

Rice Program

CIAT has recently completed an analysis of the impact in Latin America and the Caribbean of the new rice varieties developed and distributed by the Center in close collaboration with national programs in the region and with IRRI.

The analysis shows that by the early 1980's the high-yielding varieties (HYV) were grown on 2,286,000 hectares, up from 800,000 hectares in 1974. This represents 26% of total rice area, or 70% when excluding Brazil. An unexpected spinoff from breeding and selecting material for the irrigated rice system has been the adoption of selected improved materials in upland rice production, especially in the most favored upland systems. Close to 30% (i.e., 660,000 ha) of the area in upland rice production is planted to HYV's.

The estimated quantity of additional rice production in Latin America made possible by the high-yielding varieties is in the order of 2.7 million tons of paddy rice per year. The value of this additional production is more than 800 million dollars per year. The internal rate of return to research in high-yielding varieties is estimated to have been 90% through 1981.

A decentralization of rice research has been effected from CIAT headquarters where disease, insect and soil stresses are minimal, to three areas more representative of rice environments.

(a) Villavicencio area, Colombia, where three ecologies are researched including upland rice on acid savannas, upland and irrigated rice on alluvial soils, and irrigated rice on iron toxic soils. These ecologies are characterized by severe combina-

tions of soil, disease, insect and soil moisture stresses.

(b) Panama, where the breeding program works on upland and irrigated rice in environments characteristic of Central America and the Caribbean. An annual workshop of Central American researchers was instituted to select breeding materials for local evaluation by national programs.

(c) Peru, where breeding populations are evaluated and selected in two sites under severe disease pressures.

Agronomic research on acid, infertile savanna oxisols achieved upland rice yields approaching 4 t/ha. These results demonstrate the potential productivity of an underutilized soil resource occupying vast areas in Latin America.

Research on the hoja blanca virus disease resulted in identification of resistant donors, clarification of resistance inheritance, and a seedling resistance test. Three-way crosses having different resistant parents produced about 10,000 F_1 seed for resistance screening.

Projects involving new rice breeding techniques included:

(a) Recurrent selection, using genetic male sterility, to facilitate recombination of disease resistance genes from diverse donor parents;

(b) Mutation through irradiation, which lowered white belly ratings in the Chilean variety Oro, and resulted in dwarf versions of several tall varieties which are now used as parents in the breeding program;

(c) Anther culture of pollen from F_1 plants, which resulted in spontaneously doubled, homozygous lines regenerated from callus tissue. These lines represented an array of parental recombinations. This technique makes possible the evaluation of fixed lines without the costly and tedious procedure of selection from F_2 to F_5 in the field.

Tropical Pastures Program

Half of tropical America is constituted by acid, infertile soils; 300 million hectares of savannas and 600 million hectares of tropical forests. The area has been studied and characterized by the Tropical Pastures Program into five major ecosystems. Also prevailing livestock production systems in the savanna region have been studied and characterized. The studies have clearly indicated that improved utilization of available resources and cattle can only be achieved through introduction of new, adapted germplasm and very small quantities of inputs, mainly phosphorus, which explains the research emphasis placed upon these two factors.

The inventory of forage germplasm accessions has now reached a total of 11,300 different entries, of which 10,000 are legumes. An increasing proportion of the collection is being obtained in cooperation with national institutions of the region and overseas.

The germplasm collection is being tested in a decentralized manner. A total of 78 regional trials, located in 17 countries of tropical America, has been established by national research institutions; all these institutions are integrated in the International Tropical Pastures Evaluation Network (RIEPT). The number of active trials in the RIEPT is expanding at a rate of about 20 new trials per year and covers all major ecosystems.

As a consequence of these network activities, highly productive and adapted new species and cultivars have been identified and have been released in several countries by the respective national institutions: *Andropogon gayanus* in the case of Colombia, Venezuela, Brazil, Peru and Panama; *Stylosanthes guianensis* and *Stylosanthes macrocephala* in Brazil; and *Stylosanthes capitata* in Colombia. All of these were, until now, undomesticated species.

All accessions released have been selected for disease and insect resistance and are characterized by low nutrient requirements, in addition to high potential animal productivity. Thus liming is not required, and phosphorous requirements vary between only 10 and 20 kg P per ha, as opposed to 40 or more kg required by most other species; similar conditions hold for potassium and magnesium. Also, alternative sources of fertilizers continue to be investigated, such as local deposits of P, K and S which have proved more resistant to leaching than commercial fertilizers.

The nutritional quality, and therefore the potential for increased animal yield of some of the new

species, have been characterized. The association of two of the species already released, *A. gayanus* x *S. capitata*, was shown to be capable of yielding weight gains of 190 kg/animal/year and 320 kg/ha/year as compared with 75 and 15 kg, respectively, for the native savanna.

In a multi-year on-farm test in which this same association was incorporated into 5.5% of the area of a cooperating ranch, over a period of five years, the improved pastures were able to increase the carrying capacity of the ranch by 85%, with simultaneous increases of 14% in the calving rate, 49% in weaning weights, and 29% in average cow weight. The pastures received only 20 kg P, 20 kg K, 10 kg Mg and 10 kg S at planting time. Marginal rates of return for this option vary between 19% (assuming a pasture persistence of only five years) to 35% (assuming a pasture persistence of 12 years).

Seed Unit

The aim of the Seed Unit is to contribute to the development of seed programs and industries primarily in Latin America and the Caribbean region. Training of public and private sector personnel has been of highest priority in the unit. Since it started five years ago, the unit has provided specialized training at CIAT to more than 400 seed professionals. The unit also provides direct assistance to the organization and conduct of in-country seed technology courses.

Through technical collaboration with former trainees, national programs, seed associations, key universities, and leaders in seed activities, the unit is building a network to help various segments of the seed sector assist one another. As a result of Seed Unit sponsored activities, several national program leaders are looking more critically at policies and strategies to meet the needs of the seed sector.

At CIAT headquarters, the Seed Unit continues its cooperation with other programs in the production and distribution of basic seed to accelerate the evaluation and use of the most promising lines and varieties. For example, in 1983, the Seed Unit assisted in the multiplication of 26 different lines and varieties, amounting to 58 tons of seed.

Training

Training continues to constitute a cornerstone in the collaboration with national programs, building up the capacity of national and regional programs to assume an ever-increasing responsibility in the generation and adaptation of new production technology, and in disseminating the use of improved methodologies for research and of improved materials and practices for production. A look at 1983 training results reveals the pervasiveness and importance of training in the Center's activities.

Two hundred and fifty professionals received training at CIAT during the year. A majority of these professionals participated in commodity-based, multidisciplinary training courses in beans, cassava, tropical pastures, genetic resources management, and seed technology. Upon termination of these short courses of 1-2 months, most of the participants entered individualized, specialized training. The total person-months of CIAT training offered in 1983 amounted to 709.

In recent years, CIAT has made a special effort to expand its thesis program for graduate students whereby M.Sc. and Ph.D. students conduct the thesis part of their degree program at CIAT. In 1983, 18 M.Sc. students and 14 Ph.D. students engaged in thesis research at CIAT.

The Center also co-organized and conducted subregional courses on beans and on seed quality for the benefit of participants from Central American countries. In addition, CIAT continues its major effort to materially assist national programs in the organization and conduct of in-country research/-production courses on the commodities in CIAT's mandate. In 1983, in-country courses were assisted in Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Honduras and Mexico.

GENERAL DEVELOPMENTS

At the start of 1984 a large part of the Rice Program's activities were transferred to the newly acquired station at Santa Rosa near Villavicencio, Colombia, which is now well developed to support upland rice research.

Work is progressing on the conversion of the amphitheater for use as an auditorium. This conversion is funded by the Kellogg Foundation and its completion is expected before year end.

At the end of 1983 a new Beechcraft King Air model F-90 aircraft was purchased to replace the Mitsubishi which had been in service since 1978. The new aircraft was put into service in February 1984. It primarily serves the research operations in Carimagua (tropical pastures and cassava) and Villavicencio (rice).

In early April 1984 a new IBM System 36 computer was installed to handle separately from the main IBM 4331 computer the needs of finance and administration including management information systems. The 4331 will be used exclusively for research and international cooperation activities.

Negotiations with the Colombian Government and the co-sponsors of the CGIAR regarding obtaining a status for CIAT commensurate with its international mandate are proceeding and it is hoped that a successful conclusion will be arrived at in the not too distant future.

BUDGET AND FINANCES

1983 Finances

CIAT's financial statements for the year ended 31 December 1983 have been distributed to interested donors. They show that operating expenses were US$865,000 less than budget. Capital expenditures were US$484,000 more than the original budget, but in October 1983 the Board approved a transfer of up to US$500,000 from the operating budget to the capital budget. Therefore, overall expenditures were US$381,000 less than the originally approved budget. However, because of lower funding, expenditures exceeded income by US$15,000.

1984-85 Budget and Finances

In 1983 CIAT prepared a Program and Budget proposal covering the biennium 1984-85 following guidelines given by the CG Secretariat.

Budget 1984

As usual, the proposal for 1984 included a forward list of supplemental items and a fallback list of reductions, which were discussed by TAC. A bracket of funding and budget were recommended by TAC and endorsed by the Consultative Group. The bracket ranges from a high figure of US$22,781,000, which represents a 2% increase over the original no-growth guideline, down to a low figure of US$21,255,000, which represents a reduction of about a similar 2% below 1983 levels of operation. These figures do not include transferred special core projects.

CIAT has prepared revised budget estimates for 1984 taking into account current operating costs and with some adjustments to programs following the vertical cuts made in 1982 and 1983. The revised figures are shown in Tables I and II included with

this document in the columns marked "1984 Estimate".

Budget 1985

The 1985 portion of CIAT's 1984-85 Budget Request presented in September 1983 has been modified following revised guidelines given by the CG Secretariat and subsequent considerations and recommendations by TAC.

Amounts recommended by TAC are US$24,218,000 for operations and US$603,000 for capital and working capital for a total of US$24,821,000.

The proposed budget represents a 1.6% increase in real terms over the lower (botton of the bracket) budget for 1984. The following table shows the variations in the budget between 1984 and 1985 with comments on the changes following the table.

1985 List of Program changes.

	M-Y	US$000
1. 1984 Operations	60.0	22,073
2. Program Reductions		
a) Postdoctoral fellowships (3)		114
b) General operating expenses		201
c) Training materials		93
		408
3. Program Additions		
a) Creation of full-time positions for Coordinators in:		
- Bean Program	1.0	105
- Cassava Program	1.0	105
- Rice Program	1.0	105
b) Pasture Agronomy - Humid Tropics	1.0	154
c) Head, Germplasm Resources Unit	1.0	105
d) Land Systems Specialist	1.0	185
	6.0	759
4. 1985 Operations Budget	66.0	22,424
5. Price Provision		1,794
6. Working Capital Adjustment		176
7. Capital Expenditures		427
8. Total 1985 Budget Request		24,821

CIAT proposes to implement an important portion of the recommendations of the External Review as part of the 1985 List of Program Changes. Both the External Program Review Panel and the External Management Review Panel recommended that the Coordinator positions in the Bean, Cassava, and Rice Programs be changed from part-time to full-time positions (the Coordinator position in the Tropical Pastures Program is already budgeted as a full-time position). While up to the present, in addition to their Program coordination role, the Coordinators of the commodity research programs have had responsibility for an entire research section within the Program (albeit with the assistance of a Posdoctoral Fellow assigned to them), an upgrading of their positions from part-time to full-time will allow the Coordinators to dedicate their complete attention to the management of their respective programs. In its Long-Range Plan, CIAT had projected such a conversion of the Cassava and Bean Program coordinators for 1985. Now, with the increased complexity of the Rice Program, and in full accord with the recommendation by the External Review, the Rice Program Coordinator position is also proposed to be converted from part-time to full-time.

In the table the cost of creating three full-time coordinator positions is shown in the "Additions" part. These additions are counterbalanced by reductions in resources allocated to Postdoctoral Fellows (i.e., since the Program Coordinators will no longer need to assume responsibility for a research section within their programs, the Postdoctoral Fellow positions budgeted to assist the Coordinator in this function will no longer be necessary). In addition, to pay for the coordinator positions, important cuts in general operating expenses are proposed. CIAT's experience in 1983 and 1984 showed that earlier instituted vertical program cuts, plus the implementation of rigorous measures to reduce energy consumption, communication expenses, gasoline, and the like, are making it possible to significantly reduce the cost for general operating expenses.

The change list includes the reduction of a training materials special core project, funded by the Kellogg Foundation, which terminated in May 1984.

The other additions (Items 3b)-3d) which have been endorsed by TAC are as follows:

Pasture Agronomy for the Humid Tropics (Item 3b). This position is essential in dealing with the problem of pasture degradation and ecological damage in the humid tropics—problems regarded as critical by the countries in Central America, the Caribbean, and the Amazon and Orinoco basins. The initiation of work in the humid tropics has been planned for several years. It was recommended by TAC for 1982 but precluded because of underfunding. The humid tropics ecosystem includes most of the acid soil regions in Central America, the Caribbean, the Amazon basin, and Orinoco basin. It has been estimated that in this ecosystem there are already 6-7 million hectares of pastures, of which more than one million hectares are in a stage of severe degradation, and with the remainder at different stages of degradation. This occurs because most pasture species presently being used are only adapted to the higher soil fertility levels which result from the burning of the forest biomass. Consequently, as fertility declines due to leaching, nutrient fixation in the soil, and nutrient extraction by the pastures, the pasture species gradually disappear, are invaded by weeds, and leave the soil exposed to degradation and erosion. This process, in turn, leads to further deforestation. It has been estimated that 300,000 hectares of forest are cleared annually mostly to compensate for the degradation of pastures planted to non-adapted species. As a countermeasure, alternative new species adapted to the acid, high aluminum and low fertility characteristics of soils are urgently needed. Well-managed adapted pastures have proved to be highly efficient in recycling nutrients in this environment. A high percentage of the accessions in the large forage germplasm collection of CIAT is potentially adapted to these soil conditions. Furthermore, it is likely that many of the materials in the collection are adapted to diseases and pests present in the environment. Preliminary results from several regional trials in this ecosystem confirm that this is the case.

The Forage Agronomist is needed for the systematic screening of the accessions in the existing collection for adaptation to the edaphic and biotic conditions in this ecosystem. These activities are to be complemented by regional trials that include the most promising materials. (A Pasture Reclamation Specialist in charge of developing economically viable methods of incorporating adapted lègumes into existing grass pastures and evaluating the recycling of nutrients in alternative pasture management systems will be added as soon as resources are available for such a position.) The work of the Agronomist is to be supported by the other sections of the Tropical Pastures Program and by specialists in other disciplines from the host national program.

Head, Germplasm Resources Unit (Item 3c). The position of Germplasm Specialist and Head of the Germplasm Resources Unit (GRU) was kept vacant for several years to adjust to underfunding and was finally lost from the 1983 budget as part of the Fallback List. As a result, the Unit has had to substantially reduce research work on the germplasm collections and concentrate instead on providing a germplasm service function to both CIAT scientists and collaborators. The GRU has been supervised by the Physiologist in the Unit which has meant that work in this area (meristem and tissue culture research) and the whole area of biotechnology applications has had to be curtailed to some extent. The size and importance of the germplasm collections in beans, tropical pastures and in cassava demands the attention of a germplasm specialist not only in maintaining and expanding a strong service function (collection, evaluation, documentation, conservation, and distribution of the germplasm) but also in a wide range of research areas which have had to be put aside. These include developing stronger research collaboration with other institutions interested in research which would benefit the CIAT program. A Germplasm Specialist is thus projected in the Forward List to reinstate the position previously cut.

Land Systems Specialist (Item 3d). This position to be located in the Agroecological Studies Unit, was projected in the CIAT Long-Range Plan for 1983 and approved by the Board of Trustees as part of the 1982-83 Program and Budget Proposal.

The Agroecological Studies Unit is a vital service to CIAT commodity programs, aiding them in setting research technology evaluation and transfer. It is

the main tool to do target area analysis and classification in the case of rainfed crops.

The position of Land Systems Specialist is required to continue the task of collecting and interpreting the land system data (soils, topography, vegetation, etc.) critical for target area and constraints analysis. The Land Systems Specialist is to aid in the interpretation of regional and international germplasm evaluation. Since testing networks are finite and each trial represents one individual point in a large environmental range, it is of paramount importance that the results of each trial be evaluated with respect to their applicability to specific sub-ranges of the target area. The Land System Specialist is needed to provide the complementary expertise in these edaphoclimatic analyses.

1985 Fallback List

Because of the relatively high degree of uncertainty surrounding forward funding projections, all Centers were requested to list the programs or activities that would be reduced or omitted should funding be insufficient to cover the budget.

The following list of reductions has been endorsed by TAC.

1985 Fallback list.

	Operations				Capital		Total
	M-Y	84$000	Price Prov.	85$000	Working capital	Expend.	
A. 1985 Budget Request	66.0	22,424	1,794	24,218	176	427	24,821
B. Program Items Proposed for Reduction or Deletion Priority							
1. Land System Specialist	1.0	185	15	200	16	22	238
2. Head, Germplasm Unit	1.0	105	8	113	9		122
3. Pasture Agronomy - Humid Tropics	1.0	154	12	166	14	98	278
4. Reduction in Visiting Scientists and Post-Doctorals		209	17	226	18		244
5. Reduction in Training		100	8	108	9		117
6. Elimination of One Sub-program	1.0	200	16	216	18	5	239
	4.0	953	76	1029	84	125	1238
C. 1985 Fallback Proposal	62.0	21,471	1,718	23,189	92	302	23,583

The first three items on the list are additions endorsed by TAC. These would be the first casualties in the event of underfunding.

CIAT considers that, after the implementation of a substantial part of the vertical program cuts mentioned in the Fallback List for 1983 (which resulted in a reduction from 62 to 54 sernior staff positions), all flexibility for the accommodation of further cuts without seriously affecting the viability of the research programs has been eliminated.

Assuming that any underfunding of the CGIAR approved budget will be of a temporary nature, CIAT proposes to largely absorb such funding shortages through temporary cut-backs in funds allocated to visiting scientists, postdoctoral fellows, and training. Recently, increases in the categories of visiting scientists, postdoctoral fellows, and training have been incorporated in the budget. Because of this, and the fact that CIAT has found it relatively easier to find extra core funds for training than for research, reductions in these items are proposed if a fallback position becomes necessary.

If it should become necessary to reduce the budget by more than 2%, CIAT cannot see any other

alternative than to propose additional vertical cuts in its research programs. CIAT proposes to eliminate one sub-program in one of its four commodity research programs. The specific sub-program to be eliminated, should reductions to this level be necessary, would be decided at that time.

Forward List

As part of the 1985 budget process centers were asked to provide details of budget additions which are high priority so that TAC and donors could consider them when viewing the overall picture for the system. These additions were presented to TAC in a forward list. In CIAT's case three items in the list are recommended by TAC, and this budget proposal has been modified accordingly.

For the information of donors, the remaining items in CIAT's 1985 Forward List are given below. The list was modified by CIAT's Board of Trustees following consideration of the External Review recommendations and is therefore responsive to most of the adjustments suggested. Detailed justifications for each item were presented to TAC but are not repeated here. Donors who might wish more details either because they wish to recommend inclusion in the 1985 core budget or because they are interested in funding a particular item as a special project, are invited to contact CIAT management for more information.

Forward List Table 1985.

Priority	Total requirements (85$000)
1. Rice Economics	253
2. Cassava Liaison Asia/Agronomy	297
3. Capital Development - Genetic Resources	250
4. Glasshouse	110
5. Quarantine Glasshouse	80
6. Training Materials	105
7. Pasture Reclamation - Humid Tropics	271
	1,366

Projections

Tables I and II include budget projections for 1986, 1987 and 1988. In the 1984-85 budget document projections included all positions which had been projected in CIAT's Long Range Plan. Recently modified projections, based on the changed financial situation of the system, have been prepared for the remainder of the 1980's. These new projections are therefore included in this report. The following table shows positions currently budgeted, additions in programs projected to change and a summary for the whole of CIAT.

Currently budgeted positions, additions and summary.

	1986	1987	1988
Beans			
Budgeted or projected in previous year	16	17	17
Added positions:			
- Reg. Liaison Scientist (S. Trop. Amer.)	1		
- Breeder (Africa)			1
Total positions	17	17	18
Cassava			
Budgeted or projected in previous year	9	9	11
Added positions:			
- Processing Specialist		1	
- Agronomist		1	
- Reg. Liaison Scientist (Africa)			1
Total positions	9	11	12
Rice			
Budgeted or projected in previous year	6	7	7
Added positions:			
- Economist	1		
Total positions	7	7	7
Tropical Pastures			
Budgeted or projected in previous year	17	20	19
Added positions:			
- Humid Tropics - Pasture Reclamation	1		
- Reg. Coop. (C. America & Caribbean)	1		
- Cerrados - Pathology	1		
- Pasture Agronomy (C. America)			1
Reduced positions:			
- Agronomy (Carimagua)		(1)	
- Entomology			(1)
Total positions	20	19	19
Research Services			
Budgeted or projected in previous year		1	1
Added position:			
- Head, Lab. Serv./Coord. Res. Serv.	1		
Total positions	1	1	1
SUMMARY			
Budgeted or projected in previous year	66	72	73
Added positions:	6	2	3
Reduced positions:		(1)	(1)
Total positions	72	73	75

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TABLE 1

SUMMARY OF MAN-YEARS AND COSTS BY PROGRAM AND ACTIVITY

	ACTUAL				1984 BUDGET				1985 BUDGET				PROJECTIONS					
	1982		1983		Original a/		Estimate b/		Original c/		Proposed d/		1986		1987		1988	
	M-Y	82$000	M-Y	83$000	M-Y	83$000	M-Y	84$000	M-Y	84$000	M-Y	84$000	M-Y	84$000	M-Y	84$000	M-Y	84$000
RESEARCH PROGRAMS																		
Beans	9.5	1916	12.0	2458	15.0	2636	15.0	2833	15.0	2984	16.0	2938	16.5	3024	17.0	3078	17.5	3213
Cassava	10.0	2020	8.9	1897	8.0	1844	8.0	1796	8.0	1895	9.0	1901	9.0	1901	10.0	2171	11.5	2411
Rice	4.0	753	4.5	868	4.5	967	5.0	1071	5.0	1078	6.0	1176	6.5	1290	7.0	1358	7.0	1358
Tropical Pastures	19.9	3296	15.9	2959	16.0	3065	16.0	3202	16.0	3069	17.0	3359	18.5	3617	19.0	3561	18.5	3435
SUB-TOTAL	43.4	7985	41.3	8182	43.5	8512	44.0	8902	44.0	9026	48.0	9374	50.5	9832	53.0	10168	54.5	10417
RESEARCH SUPPORT																		
Visiting Scientists & Post Doc.		298		253		299		309		309		195		195		195		195
Germplasm Resources	1.0	313	1.0	356	1.0	354	1.0	397	1.0	366	2.0	502	2.0	502	2.0	502	2.0	502
Research Services		268		269		340		324		352		324	0.5	381	1.0	437	1.0	437
Station Operations	1.0	739	1.0	828	1.0	948	1.0	930	1.0	981	1.0	930	1.0	930	1.0	930	1.0	930
Carimagua Station		485		488		551		506		570		506		506		506		506
Data Services	1.0	539	2.0	675	2.0	888	2.0	683	2.0	920	3.0	868	3.0	868	3.0	868	3.0	868
Seeds			2.0	667	2.0	407	2.0	677	2.0	705	2.0	633	2.0	633	2.0	633	2.0	633
SUB-TOTAL	3.0	2642	6.0	3536	6.0	3787	6.0	3826	6.0	4203	8.0	3958	8.5	4015	9.0	4071	9.0	4071
TOTAL RESEARCH	46.4	10627	47.3	11718	49.5	12299	50.5	12728	50.0	13229	56.0	13332	59.0	13847	62.0	14239	63.5	14488
INTERNATIONAL COOPERATION																		
Training & Conferences	*1.0*	*676*	*1.0*	*1035*	*1.0*	*1817*	*1.0*	*1582*	*1.0*	*1539*	*1.0*	*1615*	*1.0*	*1615*	*1.0*	*1615*	*1.0*	*1615*
Communication & Information Support	3.8	1441	3.0	1392	3.0	1436	3.0	1450	3.0	1486	3.0	1365	3.0	1389	3.0	1389	3.0	1367
TOTAL INTL. COOP.	4.8	2117	4.0	2427	4.0	3253	4.0	3032	4.0	3025	4.0	2980	4.0	3004	4.0	3004	4.0	2982
ADMINISTRATION																		
Board of Trustees		84		107		95		101		98		101		101		101		101
Director General	1.0	354	2.0	464	2.0	502	2.0	508	2.0	520	2.0	508	2.0	508	2.0	508	2.0	508
Directors	4.0	533	3.0	430	3.0	506	3.0	509	3.0	524	3.0	509	3.0	509	3.0	509	3.0	509
Administrative Support	1.0	1188	1.0	1580	1.0	1314	1.0	1521	1.0	1360	1.0	1521	1.0	1523	1.0	1521	1.0	1521
TOTAL ADMINISTRATION	6.0	2159	6.0	2581	6.0	2417	6.0	2639	6.0	2502	6.0	2639	6.0	2641	6.0	2639	6.0	2639
GENERAL OPERATING EXPENSES																		
Physical Plant		*1363*		*1537*		*1517*		*1440*		*1570*		*1440*		*1440*		*1440*		*1440*
Motor Pool		979		609		999		942		1034		942		942		942		942
General Expenses		642		1899		1125		1076		1164		875		875		875		875
TOTAL GENERAL OPER. EXP.		2984		4045		3641		3458		3768		3257		3257		3257		3257
OTHER																		
Contingency						209		216		216		216		216		216		216
Provision for price changes						1854				1690		1794		3680		5756		8016
TOTAL CORE	57.2	82$17887	57.3	83$20771	59.5	84$23673	60.0	84$22073	60.0	85$24430	66.0	85$24218	69.0	86$26645	72.0	87$29111	73.5	88$31598
CATEGORIES OF EXPENSES																		
Personnel Costs		*12631*		*13090*		*13931*		*13986*		*14458*		*14238*		*14605*		*14872*		*15027*
Honoraria, Stipends & Allow.		553		647		1229		1400		1217		1355		1375		1385		1393
Supplies & Services		2788		3358		3446		3439		3543		3511		3598		3663		3701
Travel		956		1441		1476		1292		1497		1336		1365		1386		1398
Equipment		746		1375		855		830		875		820		841		858		867
Other		213		860		673		882		697		922		939		949		954
Contingency						209		244		216		242		242		242		242
SUB-TOTAL		17887		20771		21819		22073		22503		22424		22965		23355		23582
Provision for Price Changes						1854				1927		1794		3680		5756		8016
TOTAL CORE		82$17887		83$20771		84$23673		84$22073		85$24430		85$24218		86$26645		87$29111		88$31598

a/ Figures are the 1984 "Top of the Bracket" budget.
b/ *The estimates for 1984 include inflation of 3.5% between 1983 and 1984.*
c/ Figures for 1985 Original are the 1985 Budget as included in CIAT's 1984-85 Program and Budget document with 3.5% inflation between 1983 and 1984 incorporated. Inflation of 8% between 1984 and 1985 is shown as a total at the bottom of the column.
d/ 1985 "Proposed" assumes inflation of 3.5% between 1983 and 1984 and 8% (shown globally) for inflation between 1984 and 1985.

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TABLE 11

SUMMARY OF SOURCES AND APPLICATION OF FUNDS

(C US$ Thousands)

	ACTUAL		1984 BUDGET		1985 BUDGET b/		PROJECTIONS		
	1982	1983	ORIGINAL	ESTIMATE a/	ORIGINAL	PROPOSED	1986	1987	1988
SOURCES OF FUNDS									
Core Operations									
Australia	362	404		482					
Belgium	21	121		123					
Canada	1171	1300		1281					
European Economic Community	1353	1351		1374					
Ford Foundation	75	100		100					
France		46		41					
Germany (Federal Republic)	1027	1041		826					
Interamerican Development Bank	3500	4043		4043					
International Fund for Agricultural Development	1000	1150		1000					
Italy		293							
Japan	1200	1303		1363					
Netherlands	310	285		250					
Norway	187	295		268					
OPEC Fund for International Development	600	300		300					
Rockefeller Foundation	150	100							
Spain	50	50		50					
Sweden		79		98					
Switzerland	407	453		448					
United Kingdom	517	458		468					
United States of America	4900	5400		5600					
World Bank	1270	410		540					
Unidentified sources			21815	1035	22416	21577	23841	26130	28426
Balance (deficit) from previous period	-100	165							
Income applied in year	52	69	217	600	400	600	600	600	600
TOTAL CORE OPERATING FUNDS	18052	19216	22032	20290	22816	22177	24441	26730	29026
Capital									
Other	470	605							
Unidentified sources			716	763	468	602	842	765	833
Balance from previous period	265								
Income applied in year	804	794							
Balance of working funds	1326	1500	1638	1577	1814	1800	1975	2170	2370
TOTAL CAPITAL FUNDS	2865	2899	2354	2340	2282	2402	2817	2935	3203
Special Core Projects									
Ford Foundation		35		66					
International Development Research Centre (IDRC)		57		140					
Kellogg Foundation		569		266					
Switzerland		952		1352					
UN Development Programme (UNDP)		110		340					
Uncontirmed sources			2057		1614	1858	2204	2381	2572
Balance from previous period		372		519		183			
TOTAL SPECIAL CORE PROJECTS		2095	2057	2683	1614	2041	2204	2381	2572
Special Projects									
Belgium	27	29		30					
Ford Foundation		25		30					
FAO		42							
German Agency for Technical Cooperation (GTZ)	106	91		80					
German Foundation for International Development		41							
Interamerican Development Bank	10								
IBPGR	78	19		45					
International Development Research Centre	154			210					
International Fertilizer Development Center	96	85		147					
International Maize and Wheat Improvement Center	113	17		81					
International Rice Research Institute	99	70		239					
Japan	120								
Kellogg Foundation	148								
Mississippi State University		105		44					
Rockefeller Foundation	23								
Switzerland	741	434		402					
UN Development Programme	131								
United States Agency for International Development	36	44							
World Bank		204		166					
Others	14	20		65					
Unidentified			943		1169	1169	1550	2050	2550
Balance from previous period	1115	326	500	384	500	500	500	550	600
TOTAL SPECIAL PROJECTS	3011	1552	1443	1923	1669	1669	2050	2600	3150
TOTAL FUNDS	23928	25762	27886	27236	28381	28289	31512	34646	37951
APPLICATION OF FUNDS									
Core Operations	17887	20771	23673	22073	24430	24218	26645	29111	31598
External Review			150	200					
Capital	1365	1358	806	1057	307	427	647	565	623
Special Projects	2313	1168	943	1523	1169	1169	1500	2000	2500
Unexpended Balances									
Unrestricted Core (deficit)	165	-15							
Working Funds	1500	1577	1814	1800	1975	1975	2170	2370	2580
Special Core Projects	372	519		183					
Special Projects	326	384	500	400	500	500	550	600	650
	2363	2465	2314	2383	2475	2475	2720	2970	3230
TOTAL APPLICATIONS	23928	25762	27886	27236	28381	28289	31512	34646	37951
Memo :									
1. Total Core Operating Funds Required	17887	20771	23823	22273	24430	24218	26645	29111	31598
Less Unexpended balance previous period	100	-165		-253		-183			
Less Earned Income Applied	- 52	- 69	-217	-600	-205	-600	-600	-600	-600
Net Core Operating Funds Required	17935	20537	23606	21420	24225	23435	26045	28511	30998
2. Total Capital Funds Required	2395	2330	2620	2857	2282	2402	2817	2935	3203
Less Unexpended balance previous period	-265			-251					
Less Balance Working Funds	-1326	-1500	-1638	-1577	-1814	-1800	-1975	-2170	-2370
Less Earned Income Applied	-804	-794							
Net Capital Funds Required	-	36	982	1029	468	602	842	765	833
3. Total Funds Required from Donors	17935	20573	24588	22449	24693	24037	26887	29276	31831
4. Total Earned Income	856	863	217	600	205	600	600	600	600
Applied to Core Operations	- 52	- 69	-217	-600	-205	-600	-600	-600	-600
Applied to Capital	-804	-794							
Balance	-	-	-	-	-	-	-	-	-

a/ The core operating budget estimate for 1984 includes inflation of 3.5% between 1983 and 1984.
b/ The original and revised 1985 core operating budgets include inflation of 3.5% between 1983 and 1984 and 8% between 1984 and 1985.
c/ Capital expenditures in 1982 and 1983 include the extra value of replacement assets.

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