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Figure 1 consists of six histograms labeled A through F, arranged horizontally. Each histogram shows the frequency of non-zero elements in the rows of a specific matrix. The x-axis for all histograms is 'Number of non-zero elements' ranging from 0 to 1000. The y-axis is 'Frequency' ranging from 0 to 100. Histogram A (Matrix A) shows a high frequency at 0 non-zero elements. Histograms B through F (Matrices B-F) show distributions shifted to the right, with peaks around 400-600 non-zero elements.

CIAT



• **Centro Internacional de Agricultura Tropical**

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OBJECTIVES AND ACTIVITIES OF CIAT

The mission of the Centro Internacional de Agricultura Tropical (CIAT) is to accelerate agricultural and economic development and to increase agricultural production and productivity to improve the diets and welfare of the people of the lowland tropics, with special emphasis on Latin America. CIAT works in concert with governments, educational and research institutions, and private enterprise.

CIAT seeks maximum results in minimum periods of time. Its operations are characterized by multi-disciplinary approaches, concentrated thrusts, cooperative efforts with national and private entities, and numerous efforts to demonstrate and multiply results.

While CIAT attacks the problems of crop and animal production necessary to increase the quality and quantity of food available, it also is concerned with economic development and reduced production costs leading to improved buying power so that urban residents may purchase and thus benefit from the increased production of food.

In its operations, CIAT seeks (a) to be catalytic in the agricultural and economic development of the tropics; (b) to establish and demonstrate a pace-setting level of program excellence; (c) to collaborate and cooperate with national institutions throughout the lowland tropics on research, educational, and extension programs and to facilitate the development of cooperating networks among these institutions; (d) to maintain mutually complementary programs and relationships with other international centers and regional organizations, and (e) to establish and maintain cooperative linkages with agricultural research and training institutions in the developed countries.

CIAT's primary areas of research are beef cattle, cassava and field beans. It also has modest rice and maize programs, strongly linked with IRRI and CIMMYT, respectively. Finally, it has a program of limited scope on swine, primarily concerned with training and collaboration with national programs in the areas of management and nutrition.

General Activities of CIAT

CIAT concentrates on the agricultural problems of the tropical lowland areas below 3,000 feet elevation and with particular emphasis, initially, on the lowland tropics of Latin America. The general activities of CIAT are designed:

1. To develop and demonstrate new technology to increase the productivity of specific crops and animals selected for their importance in the American tropics.
2. To develop information and practices for use in bringing into economical production specific lowland areas not presently developed or fully utilized.
3. To develop and demonstrate effective techniques and strategies for the rapid spread and adoption of improved varieties and agricultural practices.

2.

4. To help national institutions to develop staffs and programs, so that these may handle more effectively present and future research and educational tasks.
5. To provide an information center to process and exchange data and references relevant to the agricultural and economic development of the lowland tropics.
6. To provide a facility to collect, preserve, supply, and exchange plant and animal germplasm.
7. To provide opportunities for the further training and development of professionals and non-professionals in agriculture at CIAT and elsewhere with specific emphasis upon raising the level of expertise of the indigenous human resources within the context of existing institutions.

* * *

Early in the history of CIAT, the Board of Trustees adopted a statement similar to the foregoing as a brief description of the mission, purposes and objectives of CIAT, as well as of the activities it considered appropriate for achieving CIAT's goals.

Since 1968, the Board, management and staff have operated with this general framework, modifying programs and activities annually on the basis of research progress, shifts in needs, and changes in priorities. In recent years, the Consultative Group, donors, and representatives of national programs all have participated significantly.

With the emergence of research results--new varieties, new practices--and development of training programs, CIAT anticipates increasingly greater involvement in special projects and programs whereby national institutions may participate in the transfer and adaptation of the new technology to increase agricultural production and productivity in the countries of the lowland tropics.

* * *

Location of Program Activities

Because of the diverse nature of the lowland tropics, CIAT plans from the beginning recognized the inability of undertaking problems significant to the lowland tropics at a single location. The process of choosing a headquarters site also included consideration of means of doing research in other environments, each of which would be representative of an extensive area of the lowland tropics.

The Board of Trustees subsequently authorized CIAT management to place core research and training activities at such locations in Colombia as would best satisfy the needs. Through cooperative arrangements with the Instituto Colombiano Agropecuario (ICA), the Colombian Institute of Agriculture, CIAT has established research activities in two lowland tropical environments quite different than those of the headquarters site. One of these is at the Carimagua Research Station of ICA in the eastern plains in an area of extremely infertile, extremely acid soils typical in varying degrees of some 700,000,000 hectares in

Latin America. The other, at the Turipana Research Station of ICA, is representative of many coastal plain areas in Latin America.

In addition, CIAT and ICA collaborate on several projects at the Palmira Research Station of ICA immediately adjacent to the CIAT headquarters farm.

At these locations, ICA and CIAT collaborate directly on certain experiments, while in other cases, the ICA station provides logistic support for experiments and projects of CIAT.

More recently, some commodity programs of CIAT, particularly cassava, field beans, rice and maize, have placed some experiments in farmers' fields to test new varieties and practices under a range of environmental conditions. This also provides opportunity to identify problems specific to certain environments.

Characteristics of the three principal sites of CIAT activities in Colombia are as follows :

Palmira (Headquarters) -- 3°30' North, 76° West; average temperature, 24° C; 1,006 meters elevation; annual rainfall 1,124 mm., with two dry, two wet seasons; soils of the Cauca Valley are among the most fertile in the tropics, the major problems being high pH associated with poor drainage, and micronutrient deficiencies.

Carimagua -- 4° 30' North, 71° 31' West; average temperature 27° C; 150 meters elevation; annual rainfall 1,900 mm. , with heavy rains from April to December, and a definite dry period from mid-December to the end of March ; soils are sedimentary oxisols, highly acid (pH 4.2 to 4.3), high in exchangeable aluminum.

Turipana -- 8° North, 76° West; average temperature 27° C. ; 12 meters elevation; annual rainfall 1,233 mm, with definite wet and dry seasons — heaviest rains in the period May to November, a distinct dry period from December into March; soils on the station are potentially productive given adequate drainage and supplemental irrigation in the long dry season. This station serves a diverse coastal plains area of some 132,000 square kilometers. The soils in the gently rolling plains lack fertility and are acid; soils of the alluvial river valleys are fertile, but drainage problems, salt, and micronutrient deficiencies often limit production. Temperatures in the area range from 27° to 35° C, and rainfall from 400 to 1,500 mm.

THE 1976 BUDGET REQUEST AND PROJECTIONS 1977 - 1980

The 1976 budget request, approved by CIAT's Board of Trustees, amounts to \$6,894,000 for core operations and \$ 992,000 for capital. Earned income and other balances are estimated at \$ 350,000 so the net request for funds amounts to \$ 7,536,000. The 1975 program and budget document projected \$ 6,766,000 for core operations and \$ 420,000 for capital. The absolute increase in core operations is somewhat reduced because the Maize program will be included in the CIMMYT budget as from 1976, however, it should be stressed that, if for any reason the CIMMYT/CIAT Maize Program is eliminated from CIMMYT's budget, the \$ 244,000 cost of the program should be added to CIAT's budget. A proposal to have an IRRI / CIAT's Rice Program included in IRRI's budget for 1976 was not accepted by IRRI's Board of Trustees and the \$ 291,000 cost of a separate CIAT Rice Program is therefore, included in this request.

The following table shows the 1975 and 1976 figures :

	<u>1975</u>	<u>1976</u>	<u>% Increase</u>
	(\$ thousands)		
Core Operations	5,453	6,894	26
Capital	825	992	20
	<u>6,278</u>	<u>7,886</u>	
Less earned income, etc. *	268	350	31
	<u>* 6,010</u>	<u>7,536</u>	25

* These figures are now somewhat different in table II on page 53 of this document.

The following table analyses the difference between the revised 1975 and the proposed 1976 core operations' budgets:

	<u>\$ thousands</u>	<u>% Increase over 1975</u>
<u>1975 Core Operations' Budget</u>	5,453	
1) Cost of full year operation with level of activity assumed for end of 1975	164	3.0
2) Inflation	654	12.0
3) Expansion of programs		
a) Additional senior staff	93	1.7
b) Additional scientific & supervisory staff	36	0.6

	<u>\$ thousands</u>	<u>% Increase over 1975</u>
c) Additional other staff	115	2.0
d) Additional consultants and other temporary personnel, supplies, services travel, etc.	275	5.0
4) New activities		
a) Senior staff	57	1.0
b) Support costs	58	1.0
5) Other increases		
a) Reduced contingency	(92)	(1.7)
b) Additional equipment replacement	81	1.4
1976 Core Operations' Budget	<u>6,894</u>	<u>26 %</u>

The increase in 1976 over the 1975 budget are explained below :

- 1) 1975 has started with several unfilled senior staff positions and other vacancies at the lower levels. In addition almost all new positions in 1975 are budgeted for only part of the year - usually 9 months. The effect of having these positions filled for all of 1976 adds approximately \$ 160,000 to the 1976 budget.
- 2) Over the last nine months inflation in Colombia has been running at a high rate (between 25 and 35 % per annum). To a certain extent this has been offset by a devaluation of the Colombian peso as compared with the US dollar of about 18 % . At the same time, inflation for imported supplies, travel, etc. has been running at the unusually high rate prevailing in many other parts of the world. Included in the 1976 proposals is an average 12 % for inflation. This is somewhat higher than that which many experts are predicting but we believe it to be realistic.
- 3 a) The following additional senior staff positions and their respective manpower for the expansion of programs are proposed for 1976 :

<u>Positions</u>	<u>Manyears</u>
Cassava - Agronomy / Cultural Practices	0.75
Beans - Breeding	1.00
- Pathology	0.50
- Agronomy	1.00
* Station Operations	1.00

* This is a regrading of the position for the Farm Superintendent.

- 3b) 3 additional research associates and assistants to give an additional 2.75 man-years are proposed for the various programs. Also 3 extra positions at this level are proposed for the administrative groups. This with the increase included in 4 b) will bring the total of scientific and supervisory staff to 124 which is approximately 2.8 per senior staff member .

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- 3 c) 75 additional clerical staff and other support staff (laborers, drivers, etc.) are proposed for 1976.
- 3 d) Some of the increases in travel, supplies, etc. are caused by inflation and the full year effect of 1975 increases ; the increases here are to support the increases noted in 3 a) - c) .
- 4 a) Two additional senior staff positions for Forage Germplasm work and Soil Microbiology in the Beef Program, to give an additional 1.75 manyears , are proposed as new activities for 1976.
- 4 b) The cost for support staff and other expenses for the senior staff included in 4 a) is approximately \$ 58,000 .
- 5 a) A contingency amounting to 1% of the total budget has been included.
- 5 b) An estimated \$ 152,000 is included for the replacement of equipment.

Projections 1977 - 1980

All programs and support groups were asked to submit, in addition to their requirements for 1976, projections to 1980. Certain adjustments have been made to these requests but on the whole they have been included, as submitted, in the projections shown on tables I and II .

In 1974 a special committee of the Board of Trustees reviewed the organization and programs of CIAT. In November 1974, the new Director General took up his post. He was requested by the Board of Trustees to review CIAT's organization and make recommendations for change. These were presented to the Executive and Program Committees of the Board of Trustees at their meetings in February and May. Following the recommendations by the Program and Executive Committees, the Board of Trustees accepted the Director General's proposals and his recommendations for the organizational structure of CIAT. They requested, however, that further studies and reviews be made of the Beef Program. Since these will not be completed until early 1976, the projections of staffing and budgets in this document should be considered only tentative at this stage.

SUMMARY OF ACHIEVEMENTS

The work of CIAT during the calendar year 1974 is detailed in that Annual Report. The following paragraphs show some of the significant accomplishments in research and training since our last budget report.

Beef -- Marked cattle productivity increases continue to be obtained with improved grass and legume-grass pastures in field research at the Instituto Colombiano Agropecuario's Carimagua research station. Pastures made up of a mixture of grass and the tropical forage legume *Stylosanthes guyanensis* have given weight gains as high as 200 kg/ha/yr. During the dry season, cattle on stylo-based pastures gained weight whereas cattle on native grass alone lost weight.

Complete mineral supplementation markedly improved calving percentages in first calf heifers. The return on mineral investment with these heifers is about two to one.

Early weaning of calves at 2 1/2 months of age resulted in much earlier rebreeding of cows grazing native and molasses grass pastures. On both types of pasture, lactation places a great stress on the cow because pasture nutrition is so low. Early-weaned calves do well on a calf supplement feed, cut grass and later, pasture.

Animal health survey teams have encountered the breeding diseases brucellosis, leptospirosis and infectious rhinotracheitis in the Colombian Llanos region. Leptospirosis was previously thought to be insignificant in this region, but new data suggest it may cause a significant reduction in calving percentages.

Cassava -- A yield of 46 tons/ha of cassava was obtained after a 12-month season on relatively poor soils and with limited inputs on a farmer's field near CIAT.

CIAT's cassava germplasm collection of over 2,000 cultivars has now been fully evaluated and 320 of the most promising cultivars are being grown for further selection in regional trials throughout Colombia.

Field tests have identified varieties in the CIAT cassava germplasm bank which have some resistance to three major cassava diseases. Agronomic studies on the control of cassava bacterial blight, perhaps the most damaging disease to the crop, show that blight can be eradicated by land fallowing, crop rotation or adjusting the planting time for the new crop.

A crossbreeding project is now well under way. About 3,000 first-cross hybrid seeds are being tested in a yield trial while another 10,000 first-cross plants are established in a selection field.

In cooperation with the Instituto Colombiano Agropecuario a network of varietal trials in 14 locations in Colombia has been developed. This makes possible the evaluation of new material under a broad range of ecological conditions. Current trials contain the most promising selections from the germplasm collection. The same system will be used to evaluate new classes selected from the hybrids now being tested at CIAT.

The CIAT cassava crossbreeding program has furnished seeds to interested breeders in Brazil and at the International Institute for Tropical Agriculture in Nigeria.

CIAT cassava researchers have determined the optimum levels for 10 essential nutrients in the cassava plant. In addition, they have found that potassium is usually the most limiting major nutrient in the soil for high cassava yields. The form in which additional potassium is applied can be important, depending on the chemical characteristics of the soil involved.

An economic survey of cassava production on 305 farms in five zones of Colombia has answered many questions about cropping systems involving cassava and has shown the major weed, insect and disease problems existing under various ecological conditions. Results from the study should help direct future research on this crop.

Field Beans -- With more than 10,000 collections now in CIAT's bean germplasm bank, the program has concentrated on evaluating new accessions to classify their characteristics. This bank will be the source of germplasm for other national programs as well as for CIAT's breeding program (initiated in mid-1974). Goal of the CIAT program is to develop new high-yielding insect and disease resistant varieties adapted over a range of conditions.

Varieties resistant to the leafhopper, Empoasca, and to several of the most important plant diseases have been identified.

Disease-free seed offers a major possibility for increasing bean yields throughout Latin America. Disease-free seed of a local Guatemalan variety was furnished to an agency of that country for increase and certification. Sown in the fields of small farmers, totalling over 84 hectares, the cleaned seed yielded 1,545 kg/ha, compared with yields of 515 kg/ha, for commercial seed of the same variety. At CIAT, yields of two common varieties have almost doubled when clean seed is planted.

CIAT research has determined the optimum times for planting beans and maize when the two crops are grown together. Optimum yields of the two crops depend on correct timing and on whether the bean variety planted is a bush or climbing type. Other research, however, has shown that adapted varieties of climbing beans planted among artificial supports yield much higher than beans in corn. Much higher plant populations are possible and there is no competition for light from maize.

Bean yields can generally be increased greatly in Latin American countries. Yields of almost 3,000 kg/ha have been obtained with bush beans in replicated plots at CIAT. Much higher yields have been achieved using the labor intensive combination of artificial supports and climbing bean varieties.

Maize -- Maize breeding work at CIAT is showing that it will be possible to develop brachytic short plants which will yield as well as the usual, adapted commercial varieties. Shorter plants are much less likely to lodge, or break over, in wind and rain.

Studies in northern Colombia indicate that herbicide control of weeds coupled with some hand weeding gives a much higher return for maize cultivation than hand weeding alone.

Rice -- National average rice yields in Colombia have risen from 3.0 to 5.4 tons per hectare since 1966. Substantial gains in Peru, Ecuador, Venezuela, Cuba, Mexico and portions of Central America can also be attributed to new varieties developed by the CIAT / ICA program or introduced from IRRI with the collaboration of CIAT.

In May, 1974, CIAT and the Instituto Colombiano Agropecuario jointly released CICA 6, a rice variety with some resistance to the rice blast disease. The resistance is only expected to be useful for a year or two, but in the presence of the blast disease CICA 6 will out-yield the other common dwarf varieties usually grown in irrigated areas.

Intensive breeding work is continuing to find stable resistance to blast disease. Promising seed is now being tested at several locations in Colombia, in Brazil, Guatemala, El Salvador, Venezuela, Ecuador, Costa Rica, Panama and at the International Rice Research Institute, in the Philippines.

CIAT workers are now evaluating rice lines which are some 15 to 20 centimeters higher than the common dwarfs. A higher plant should compete better with weeds; because of the high costs of nitrogen fertilizers, lesser amounts applied can lead to higher weed populations in the crop.

Red rice and volunteer rice seedlings are considered weeds and can greatly reduce yields. Herbicides normally used in rice do not control either plant so CIAT researchers have developed a cultivation scheme that provides excellent control of both red rice and volunteers plus several other weeds.

Swine -- Research in cooperation with the Instituto Colombiano Agropecuario shows it is possible to select a line or lines of pigs that maintain normal performance on a diet containing only about 10 percent protein (compared with pigs on a usual 16 percent diet).

The CIAT Swine Program has given much assistance to national programs in Bolivia, Costa Rica and Peru where swine production units are being built and will be manned by professionals trained at CIAT. Other technical assistance has been given in Ecuador and Guatemala, as well as in Colombia. A cooperative program also exists with the University of Ibadan, Nigeria.

Studies have proven that swine diets based on opaque-2 maize (compared with common maize and cassava meal diets) require much less additional protein materials. Feeding systems based on opaque-2 maize would thus be less dependent on the cost of protein supplements than either of the other two diet ingredients.

Crossbreeding studies using Duroc boars and native Zungo sows, Duroc sows and Zungo boars, and Zungo boars and sows, show that pigs from either of the first two combinations converted feed much better than pure Zungo pigs. During the growing period between weaning and reaching 50 kilograms in weight, Zungo pigs required 18 percent more feed (and an additional 19 days) than the crossbreds .

Training and Conferences -- One of the less visible but most important achievements is the growing number of trained personnel CIAT is returning to countries in the lowland tropics where we can continue to look for cooperation in the development of technology. CIAT's ultimate success in the area of responsibility will depend in large part on its credibility with the governments of countries it is charged to help. As each year passes stronger relations are being built with those charged with agricultural development in those countries. Alumni of the CIAT Training Program form an important element in this collaboration.

During calendar year 1974, 162 persons from 22 countries were enrolled in the five training categories at CIAT.

During the same year, 1,600 persons from outside CIAT participated in some 25 national and international conferences, symposia, workshops and short courses.

Library and Documentation Services -- The Library added some 7,000 volumes and 55 new journal subscriptions to its holdings. Bibliographic exchange agreements now exist with 523 institutions in 71 countries.

The Cassava Information Center, the worldwide collection for scientific information on cassava, has now processed two-thirds of its 4,000 documents. Abstracts of each document are available to anyone interested in a given segment of cassava production or utilization.

An Economics Documentation Center for Latin American Agriculture (CEDEAL) is being developed to provide a centralized collection of research materials in rural social sciences, and especially agricultural economics.

Development of a Bean Documentation Center has begun. It will collect all available information on field beans, and will make abstracts to be distributed upon request by any interested bean researchers.

Librarians from the International Centers met at CIAT to discuss the needs and best methods for improving informational and library services between the respective centers.

BEEF PRODUCTION SYSTEMSResources

	* Staff	Many years		Direct Research Costs		
		1975	1976	\$ thousands	1976	% Incr.
				1975		
Animal Science-N.S.Raun (Director)		.75	1.00	836	1,228	47
Pastures & Forages Utilization-O. Paladines		1.00	1.00			
Agrostology - B. Grof		1.00	1.00			
Forage Germplasm - N. N.		-	1.00			
Seed Production - J. Ferguson		1.00	1.00			
Ruminant Nutrition - N. N.		.50	1.00			
Beef Production - H. Stonaker		1.00	1.00			
+ Hemoparasitology - E. Wells		1.00	1.00			
+ Animal Microbiology - E. Aycardi		.75	1.00			
+ Pathology - G. Morales		.25	1.00			
Helminthology		-				
Soils - J. Spain		1.00	1.00			
Soil Microbiology - N. N.			.75			
Weeds - J. Doll		.50				
Economics - A. Valdés		1.00	1.00			
Total Senior Staff		9.75	12.75			
Scientific and Supervisory Staff		18.30	23.00			

* In addition to the staff shown here, 2 senior staff level and 2 scientific and supervisory staff level people in Animal Health are at CIAT funded through AID and Texas A&M University. This support, which is estimated to cost approximately \$ 265,000, is expected to continue in 1975 and 1976.

+ Shown here are the approximate inputs to Beef of the Animal Health team which in 1975 works on animal health in both Beef and Swine.

Budget Changes

The program Committee of CIAT's Board of Trustees has requested the Director General to undertake a thorough study of the Beef Program. This study is underway and recommendations regarding geographic and ecological scope of the program, the approach to be followed in the solution of major constraints to livestock production in this region, and the organization, staff and budget projections related to the revised program will be presented to the Executive Committee of the Board in February 1976, and reflected in the 1977 Program and Budget Proposals. In the meantime, senior staff and support increases will be restricted to those resulting from previous decisions and those which the Board considers most likely to be included in a modified program. For this reason increases in senior staff include only two senior staff positions, a soil microbiologist and a forage germplasm specialist, in addition to the full-year effect of the ruminant nutritionist budgeted for the latter half of 1975.

A soil microbiologist is urgently needed to continue the work previously begun by the soil microbiologist, who was working part time in beef and part time in beans, and now is allocated full time to the bean program. Soil microbiology is an essential component in trying to find means of increasing productivity of pastures on poor soils while minimizing the use of fertilizers.

A germplasm specialist is necessary, with supporting funds, for collection, organization and evaluation of forage legume and grass germplasm. This item is included in the budget on the recommendation of the International Board of Plant Genetic Resources. A detailed project proposal for activities to cover this important phase of CIAT's forage improvement activities within the beef program, and as a service to national forage improvement programs, was sent to the IBPGR for funding in early 1975. The Board considered and approved this project as being of high priority and is expected to provide the sum of \$ 50,000 to cover activities during 1975, in order to get the project off to the earliest possible start. However, the Board expressed opinion that, since this type of activity is basic to the Center's beef program, it should more appropriately be included in the 1976 core budget.

Pasture weed control input will terminate at the end of 1975, resulting in a decrease of 0.5 M/Y senior scientist input in 1976. The Director-Animal Sciences, previously working 25% on Swine, will devote full time to Beef in 1976.

The net increase in research associates and assistants is to add one additional research assistant in seed production, one additional research assistant in beef husbandry and two research assistants in animal health, provide one research associate and one research assistant for soil microbiology, and one research assistant for forage germplasm. These increases are offset by a reduction of two research assistants in weed control.

Program Commentary

The overall program objective is to contribute to the agricultural and economic development of the lowland tropics through the development of beef cattle based farming systems using grasslands that are not presently suitable for crop production, and using feedstuffs that are not destined for consumption by humans or non-ruminants.

The specific program focus is on the extensive latosol grassland areas (approximately 250,000,000 hectares) in the Llanos of Venezuela and Colombia, Campo Cerrado of Brazil, Beni of Bolivia, as well as similar lands elsewhere. These soils are generally infertile, and many have limited potential for commercial crop production.

CIAT's principal field program is located at the Carimagua station of the Instituto Colombiano Agropecuario in the heart of the Eastern Plains of Colombia frequently referred to in this document as the Llanos Orientales.

Marked increases in cattle productivity have been obtained through the use of improved grass and legume-grass pastures at Carimagua. In the rainy season, weight gains on molasses grass (*Melinis minutiflora*), a pioneer improved grass, have been four to five times greater than on native grass. However, even higher weight gains of 200 kg/ha/yr have been obtained on stylo (*Stylosanthes guyanensis*) - grass based pastures as compared to 20 kilograms on

native grass. Stylo, a tropical forage legume, is much higher in protein than grasses, is drought resistant, and with soil Rhizobia can symbiotically fix atmospheric nitrogen in the soil. During the dry season, cattle on stylo-based pastures gained weight (310 to 370 gm/head/day) whereas cattle on native and improved grasses lost weight (202 to 610 gm/head/day).

Supplementation often increases productivity and profit in latosol grass-land areas. Complete mineral supplementation has increased calving percentages of cows grazing native grass by 50-75 per cent (from 58-69 to as high as 103 per cent). All native and improved grasses grown in these latosols, as well as Stylo, are deficient in phosphorous. Protein supplementation during the dry season enabled steers grazing molasses grass pastures to gain weight (10 kilograms) while non-supplemented steers lost weight (55 kilograms).

Early weaning of calves at 2 1/2 months enabled cows grazing native and molasses grass pastures (on a marginal plane of nutrition) to rebreed . All early weaned calves are healthy and nearly as heavy as nursing calves.

Health status also limits productivity. Survey teams have encountered the breeding diseases brucellosis, leptospirosis and infectious bovine rhinotracheitis in the Llanos Orientales. Incidence of the hemoparasite diseases anaplasmosis and babesiosis has been variable, with anaplasmosis being generally endemic and babesiosis being spotty. In the North Coast, with higher cattle densities, both hemoparasite diseases appear to be highly endemic. Wild animal populations are being checked to determine potential health hazards to man or cattle.

The economists have concentrated on determining the economics of beef production systems in latosol grassland areas. Model simulation studies indicate good returns to low cost inputs that can be applied in the short term, such as mineral supplementation. These studies also indicate that the establishment of improved pastures, a higher cost input, is economically viable, even though temporary negative cash flows are to be expected . Other activities have included a regional workshop on economic aspects of the livestock sector in Latin America, and a bench-mark study of the livestock sector in collaboration with national institutions in Peru and Ecuador.

A prototype of a family farm unit has been established to provide data and experience on how to make available technology work for small farmers in areas such as the Llanos Orientales. It included a component to produce food for the farm family and feedstuffs for minor species, and a beef cattle component as the principal commercial part of the enterprise.

Work at CIAT, Palmira, as related to the development of highly intensified systems for small farm units in fertile soil areas indicates that live weight gains of (2500 kg/ha/yr) can be produced with fertilized and irrigated elephant grass.

A seminar sponsored by CIAT on potentials for increasing beef production in the american tropics was attended by 261 beef production specialists from Latin America and other parts of the world.

CIAT contemplates limited expansion of its operations at Carimagua. Projects to be initiated or to be expanded in 1975-76 include a) increased attention to seed production of the Stylo legume, b) use of the Stylo legume and non-protein nitrogen supplements to correct protein deficiencies of dry season grasses, c) plant nutrition

studies as related to pastures and food crops, d) soil microbiology studies with tropical forage legumes, e) second herd systems project to determine fertility and growth rate of beef cattle in life cycle production systems using native, improved grass and grass-Stylo legume pastures, f) mineral nutrition of cattle, g) animal health investigations relating to the role of ticks as reservoirs and vectors of disease and h) survey of family farms in the Carimagua area by the economics group, with subsequent pilot testing of technology packages with farmers.

In Turipaná, activities in pasture establishment and weed control will be reduced, animal health investigations will continue, and an investigation on milk-beef production in beef cattle herds, initiated in 1975, will be continued into 1976.

Expanded work programmed at the CIAT Center will be principally as related to the Carimagua program, i.e. seed production, plant nutrition, soils microbiology, early weaning of calves and tick investigations.

Special Projects

Discussions are underway with IDRC regarding the possibility of providing a forage agronomist to accelerate the evaluation of the improved pastures, with particular emphasis on the testing and dissemination of the information and material already developed in Colombia in other locations. Discussions are also underway with Brazilian authorities on the possibility of placing this special project-funded scientist at the Planaltina station of EMBRAPA, located in the Campo Cerrado, near Brasília.

SWINE PRODUCTION SYSTEMS

Resources

	* Staff	Many years		Direct Research Costs		
		1975	1976	\$ thousands	%	Incr.
				1975	1976	
	Animal Science-N.S.Raun (Dir. An. Sc.)	.25		262	233	-11
	Nutrition-J. Maner (Leader)	1.00	1.00			
	-G. Gómez	1.00	1.00			
+	Animal Microbiology-E. Aycardi	.25	-			
+	Pathology - G. Morales	.75	-			
	Total Senior Staff	3.25	2.00			
	Scientific and Supervisory Staff	5.00	4.00			
* In addition to the staff shown here for 1975 an outreach specialist funded by IDRC works in the program						
+ Shown here are the approximate inputs to Swine of the Animal Health team which in 1975 works on animal health in both Swine and Beef.						

Budget Changes

For 1976 the sharing of the Director Animal Sciences and the input of Animal Health will be ceased. The Economist has also been assigned full-time to the Beef Program. These changes are in accordance with the change in emphasis of the program described below.

Program Commentary

The future impact of the swine program will depend to a major degree upon the number of trained research and extension workers available to develop and transfer new technology to the farmer for application for more efficient and increased production. If technology advances are to be converted into production increases, each country or region will need scientists with a background and understanding of production-oriented research. The small number of well trained swine production and research scientists available in Latin America for accomplishing this task requires that major emphasis be given to the training of teams of swine specialists to meet this need. Whereas previously primary emphasis has been given to the development of new technology and secondary emphasis to the transfer of this technology, in 1975 and 1976 the emphasis will be reversed. The number of swine production and research trainees will be significantly increased to more rapidly meet the needs of national teaching, research, extension and development institutions working with swine. It is proposed that this be accomplished by the establishment of a new Swine Production Training Course to train swine specialists. The increased training capability will be provided by substantial support from the Training Program and by internal shifts in senior staff time allocations.

The 100 million head of swine in Latin America play a role in the agricultural economy of both small and large farms and provide animal protein for humans. The outlook for improving swine production and thus total availability of pork is based on the knowledge that swine production efficiency is low (extraction rate less than 50 per cent compared with an efficient rate of 160-170 per cent) and that it can be improved significantly through proper and adequate use of available feeds, genetic improvement of existing breeding stock and prevention and control of diseases and parasites. Significant improvements and increases in swine production are possible through increased efficiency and without an increase in the present swine population and to some extent the present level of feedstuffs being utilized.

Program Achievements - 1974

Major emphasis in the program to date has been to develop swine production systems based on the use of available feed resources, giving emphasis to the utilization of food by-products and farm-grown products that because of quality, price or distance to market contribute little to farm income, and on the employment of health and management practices required for efficient production.

A major need has been the replacement of grains with by-products and other feed-stuffs that are available and the proper supplementation of these energy sources with adequate protein. Efficient feeding systems have been developed to use cassava, reject bananas, molasses, rice meal and opaque - 2 maize. Long term feeding studies with both cassava meal and opaque -2 maize have demonstrated that the levels of hydrocyanic acid normally found in cassava roots when consumed is rapidly detoxified and excreted as urinary thiocyanate and has little if any effect on either growth or reproductive performance.

Adequate protein supplementation has been accomplished by the use of the commercially available by-products of the oil, fish and meat industries. It has also been shown that cowpeas and soybeans can replace these by-products supplements, but that cull black beans and the majority of the forage legumes offer little promise as major sources of supplemental protein for swine.

The swine population of Latin America is based to a large extent on native breeds whose reproductive and growth performance is lower and less efficient than that of improved breeds produced under adequate conditions of nutrition, health and management. The genetic improvement of these animals is being obtained through a crossbreeding program utilizing presently available, improved breeds. Research results have also been obtained to suggest that it would be possible to select lines of pigs from existing populations that could maintain normal performance at lower than normal dietary protein levels.

The swine health program has shown that foot and mouth disease, diarrhea, arthritis and abortions are the diseases most limiting swine production in the region studied. Concentration on these diseases has made it possible to eliminate completely some of these from herds and to reduce economic losses.

Twelve post-graduate interns and research scholars and fellows received training in the swine program during 1974. Many of these have returned to their national institutions to fortify existing programs or to initiate new programs as is being done in Bolivia, Costa Rica and Perú.

Future Development

With the development of effective swine production systems based on by-products and available feed resources, during 1975-1976 a major shift in program emphasis will be made. It is recognized that the transfer and application of new technology development at CIAT and at other institutions will require the training of large teams of swine production and research specialists capable of demonstrating and teaching these new production systems to farmers and of solving local production problems. Major priority will be given to the selection and training of swine production and research teams for countries or regions where the technological and economic feasibility of swine production has been established and where regional and national institutions have given priority and support for development.

The research program will continue to concentrate on the solution of production problems that are shown to limit economic swine production in the regions with production potential that are selected and supported by national institutions. The research program, along with local field studies, will serve as training grounds for swine production and research trainees. In addition the program will continue to seek to develop new and innovative production systems that will improve efficiency and economy of production. A prime example of the latter will be the local testing of the cassava fermentor and the evaluation of the fermentation product as a protein source for swine feeding.

Efficiency in technology transfer will require that regions of present and future swine production potential be identified and that priorities, for providing training and technical assistance for national programs involved in the development of this potential, be established.

CASSAVA PRODUCTION SYSTEMS

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Research Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>		<u>%</u>
			<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Physiology-J. Cock (Leader)	1.00	1.00	442	664	50
Breeding - K. Kawano	1.00	1.00			
Pathology - J. Lozano	1.00	1.00			
Entomology - A. Bellotti	.87	1.00			
Agronomy/Varietal Improvement-J.Toro	1.00	1.00			
Agronomy/Cultural Practices-N.N.		.75			
Soils - R. Howeler	.50	.50			
Economics - G. Scobie *	1.00	1.00			
Total Senior Staff	6.37	7.25			
Scientific and Supervisory Staff	11.50	15.75			

* For part of 1976 Dr. Scobie will be finishing the economic study in Rice mentioned on page 24.

Budget Changes

An additional agronomist to work on development of production packages and to study the multiple cropping situation is proposed for 1976. This will permit the current agronomist to devote full time to the conduct of yield trials with promising lines in many locations as part of the varietal improvement activities. Increases in scientific and supervisory staff are to support the new senior staff member and to bring the level of support back to where it was before the program decided to use the savings from temporarily deleting these positions to provide additional travel and supplies money in 1975. 17 additional support people at the lower levels are requested. This gives a higher level per senior staff position than in other programs but is justified because of the labor intensiveness of cassava trials and because it will enable research to move faster. Substantial increases in printing of publications are planned for 1976.

Program Commentary

The cassava program has continued work aimed at producing the technology for increasing cassava production and utilization with limited inputs. The ideal plant type for CIAT conditions is now nearly defined and work will concentrate on the adaptability of the ideotype. Control methods for bacteria blight have been developed and proved successful under field conditions whilst some resistance to all major diseases has been found. Similarly varieties resistant to most of the major insects have been encountered. Fortunately, in the case of thrips, resistance is found in potentially high yielding types. The hornworm attacks all varieties and can be devastating, however, biological control measures are being developed. Work in pathology and entomology will continue to develop screening methods, screen new hybrids and where resistance cannot be found develop other control measures.

The methodology of breeding has now been determined and more than 30,000 seedlings are being produced each year. These crosses aim to produce high yielding, disease and insect resistant varieties of high quality that can be harvested easily. Up to 500 promising lines will be placed in replicated yield trials in CIAT and observational yield trials on the acid soils of the tropics and poor sandy soils. From these a small number of elite varieties will be tested under farmers' conditions in fourteen locations in Colombia. The best of these lines will enter an international testing program.

A recent workshop has formed the basis of the international testing network. Representatives from Brazil, Peru, Ecuador, Venezuela, Guatemala, Mexico, India, Indonesia, Malaysia, Thailand and the Philippines defined the *modus operandi* of the network for genetic exchange and testing. Discussions have also been held with IITA scientists and officials on means of strengthening cooperation between CIAT and IITA on Cassava research.

The agronomy section is heavily involved in the germplasm testing and cultural practices are not receiving the attention they warrant. Beginning in 1976 more emphasis will be placed on providing information in the cultural needs of the new varieties. In conjunction with the agronomy section the soils group is developing fertilizer practices and methods of alleviating minor element disorders in the vast areas of alluvial soils where much cassava is presently grown. Yields of over 20 t/ha have been obtained in these very infertile soils.

While the entire Cassava Production Systems team will be concerned with the development of new technology which will be viable under real farming conditions, and useful on farms of various sizes, the Economists working together with the Outreach Production Agronomists (see below) will be particularly active in ensuring that new technology being developed is done so with the knowledge of how well it will fit into the larger mix of farming practice, and seeing to it that this technology is validated at the farm level under various ecological and socio-economic conditions.

Weeds have been shown to depress yield severely, however, control methods either using labour or chemicals have been developed. In the future the entomologist will be responsible for developing integrated crop production technology.

Many of the decisions for resource allocation are based on an agro-economic survey of cassava production being made in Colombia. When completed the economics group will evaluate new technology, study its impact and help define policies which should be followed by national agencies to assist in stabilizing markets.

One of the methods of preventing marked fluctuations in price is to reduce the perishability of a product; a method of storing cassava in boxes was developed in a joint CIAT/TPI project. Further cooperation with TPI is planned to formulate simple on farm drying systems. These activities are special project funded.

As the program develops, cooperation between national agencies increases the available information on cassava. The documentation service continues to provide resumes of work on cassava. At the same time the program is developing more intensive training programs to provide people to reinforce national agencies. Last year 20 Brazilians were trained in cassava research methodology.

The development to date is better than had been expected and we believe that the first varieties produced by CIAT will be on a number of farms in various countries within five years, thus contributing to overall cassava production.

Special Projects

Discussions are underway with IDRC on major support for outreach activities of the Cassava Program. In addition to special project-funding for a broad range of training activities in cassava, it is expected that two Outreach Production Agronomists will be provided, one for Asia and one for the American tropics. These production agronomists will work with national programs in the organization of coordinated trials to evaluate and disseminate promising new varieties and other technology developed at CIAT under local conditions.

BEAN PRODUCTION SYSTEMS

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Research Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>	<u>%</u>	<u>Incr.</u>
Soil Microbiology-P. Graham(Leader)	1.00	1.00	512	773	51
Physiology - D. Laing	1.00	1.00			
Breeding - G. Hernandez	1.00	1.00			
- N. N. SRT		1.00			
Pathology - G. Galvez	1.00	1.00			
- N. N.		.50			
Entomology-A. van Schponhoven	.87	1.00			
Agronomy - N. N. CAF		1.00			
Soils - R. Howeler	.50	.50			
Economics - P. Andersen	1.00	1.00			
Total Senior Staff	6.37	9.00			
Scientific and Supervisory Staff	20.25	20.75			

Budget Commentary

Three additional senior staff positions are proposed - an additional breeder, a pathologist and an agronomist. These expansions, coupled with special funding support for a germplasm scientist and an outreach production agronomist, reflect the acceptance by CIAT of the coordinative functions for a Latin American bean research network, proposed by TAC in 1974. During 1976 collaborative activities, conferences, training courses, collaborative experimentation proposed by TAC, will be special fund supported and so do not appear in this section of the budget. Scientific and supervisory staff are reduced somewhat from previous levels.

Program Commentary

Dry beans are an important component of the human diet in Latin America, nearly 35 % of the world production occurring in this region. Yield levels are low (550-1200 kg/hect), especially among hillside farmers with low credit or technological inputs. The major objective of the CIAT bean program is to increase this yield both for the " campesino " farmer and for those areas of Colombia, Perú, Chile, Brazil, etc. where some technological inputs are available.

Short term yield increases are expected from practices minimizing yield variation. Thus an initial emphasis has been the development and distribution of disease free seed and the recommendations needed for disease and pest control. Using disease free seed, farmers in one area of Guatemala tripled seed yields. ICTA (in collaboration with CIAT) has more than 500 tons of seed now available for distribution. Varietal materials from other countries are also being cleaned. Pesticide recommendations for various regions are almost complete and will be deemphasised in future studies

The long term improvement in yield will come from varietal improvement and the incorporation of resistance factors into promising materials. The initial step, the evaluation of germplasm material, is progressing rapidly. Varieties resistant to web-blight, common mosaic virus, rust, bacterial blight anthracnose and empoasca, have been identified and breeding for both horizontal resistance and for combination of different disease resistances within a single variety are underway. Agronomically promising varieties have also been identified and studied in replicated yield trials over several locations. Yields averaging 3 tons / hect were obtained in Popayan and Ecuador, while individual plot yields topped 4 tons. Climbing beans particularly showed promise with several varieties topping 5 tons / hect and with a maximum yield under high intensity planting of 5.8 tons/hect. Breeding among high yielding varieties is proceeding.

The program hopes to make promising materials available to national programs as soon as possible, and is cataloguing its germplasm data, and maintaining a data information retrieval system. Rust resistance nurseries and international yield trials, to be initiated in 1975-76, will promote germplasm transfer.

The task of developing and validating technology which can make a major impact at the farm level, with special concern for small of low income farmers, will be the responsibility of each member of the Bean Production Systems team. However, the Agronomist, the Outreach Production Agronomist and the Economist will have special responsibility to work together with national programs to ensure full integration of these efforts and concerns, from the laboratory to the farmers' fields.

In response to the TAC request, the program has initiated some of the activities required by a collaborative bean research network. Specific activities have included :

- a) A workshop to review the bean program and the relevance of its research in relation to Latin American problems was held in October 1974. A technical committee in which the majority of members are Latin American scientists has been elected to advise and review the program. Additional information on research needs and priorities will come from agro-economic surveys currently underway in Colombia but to be extended in 1975-76 to two other countries.
- b) A rust resistance Workshop considered rust symptomatology, and devised standard methods for screening material for rust resistance; 108 varieties are included in the original rust nursery.
- c) A documentation service has been initiated with cards forwarded to 200 scientists in 29 countries. More than 1000 articles have been abstracted to date.
- d) Collaborative experiments are underway in four countries and are to study CIAT developed technology for relevance to particular ecological conditions.
- e) A program document has been prepared and will be distributed to national programs as a guide to the functions and services CIAT can offer. Close contact between CIAT and national programs especially in the training area, will need to be an essential part of the research network activities.

RICE PRODUCTION SYSTEMS

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Research Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>		<u>%</u>
			<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Breeding - P. Jennings (Leader)	1.00	1.00	223	291	30
Agronomy- R. Cheaney	1.00	1.00			
Agricultural Engineering-L. Johnson	1.00	1.00			
Total Senior Staff	3.00	3.00			
Scientific and Supervisory Staff	1.50	2.00			

Budget Changes

The Directors of IRRI and CIAT proposed to their respective Boards of Trustees that the rice production systems program at CIAT should be considered an integral part of the international program of IRRI and the regional responsibilities of CIAT. This proposal was approved by CIAT's Board but IRRI's Board voted to defer action and the additions to IRRI's 1976 budget pending further IRRI survey of prospective developments in rice production in all major regions of Latin America and the Caribbean and the implications of IRRI's participation in terms of personnel and budgets in the next 3 - 5 years. For 1976, until the situation with IRRI is clarified, the personnel and costs of the rice program have been included in CIAT's budget. Projections for 1977 to 1980 do not include rice since it is assumed that by then the program will be included in the IRRI budget. In order to strengthen the ability of the program to provide a technical backstopping for national rice research and development activities, as discussed in future plans and prospects below, the agricultural engineer (presently on sabbatical leave) originally assigned to the small farm systems program and development of ICA's Turipaná station in the 1975 budget, has been assigned full time (when he returns in July 1975) to this program.

Program Commentary

Progress to Date

The CIAT rice breeder and agronomist, cooperating closely with the Colombian ICA rice program, have successfully modified and developed new technology for traditional tropical American conditions. Large quantities of seed of four new dwarf varieties have been released internationally, including IR8 and IR22 from Asia and CICA 4 and CICA 6 developed in Palmira.

Massive training of personnel of national programs from essentially all countries in the hemisphere has given the necessary linkages to farmers. Farmer acceptance of the new technology and resultant increases in production have been spectacular. Data from Colombia indicate : 98 percent adoption of new varieties in the irrigated sector, an increase of 2.4

tons per hectare to 5.4 T/ha, a marked area increase in the irrigated sector with a corresponding decrease in upland area, and an approximate doubling of national production since the program began. Substantial gains have occurred in Peru, Ecuador, Venezuela, Cuba, Mexico and portions of Central America. This technological change has resulted in higher output, changes in pattern of rice trade, and regional shifts in production. A study is currently underway to examine the economic impacts of these changes, with special attention to Colombia where the changes have been among the most dramatic. It is envisaged that by identifying the distribution of the benefits between classes of consumers and producers, and the impact on the rice exporting potential of the region, some general guidelines should emerge for the future direction of rice research to ensure that full advantage of the new materials continues to be achieved.

Special project funds are being sought to place outreach production specialists in Central America and in the southern cone of South America to evaluate, adapt and promote utilization of rice technology developed at IRRI and CIAT in these regions of high potential for utilization of this technology for increased rice production.

Future Plans and Prospects

The countries that have widely adopted the new technology will soon experience difficulty in achieving additional increases in productivity because : a) the area of adoption already is large and b) average yields are extremely high.

Modest gains might be expected through the release of blast resistant varieties and through improvement in weed control. These are paramount program objectives at present.

Massive increases in productivity are possible in the traditional rice areas of the countries which have not adopted the new technology. It is considered that stagnancy in productivity in these countries is not due to inadequate technology. Rather, the solution appears to lie in training, demonstration, and stimulation of local rice workers. To this end a second agronomist has been projected for 1977 in effect to bring semi-tropical Latin America to the level of productivity now experienced in northern South America through Mexico.

Perhaps the most attractive opportunity for increased rice production in the Americas is the exploitation of the enormous idle land and water resources in the humid tropics. Modified Asian technology developed at CIAT is the key to opening these areas to rice culture. This new technology, requires further modification but has been proved on large scale commercial plantings. To polish the new modified Asian system and to prepare for country production programs tied to CIAT and IRRI, the CIAT Agricultural engineer was assigned full time to the rice team in 1975.

MAIZE PRODUCTION SYSTEMS

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Research Costs</u>		
			<u>\$ thousands</u>		<u>%</u>
	<u>1975</u>	<u>1976</u>	<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Breeding - S. Temple	1.00	1.00	90	CIMMYT Budget	
Maize Scientist - N. N.		1.00			
Maize Scientist - N. N.		1.00			
 Total Senior Staff	 1.00	 3.00			
Scientific & Supervisory Staff	4.00	1.00			

Budget Changes

The Directors and Boards of Trustees of CIMMYT and CIAT have agreed that the direct costs of the activities, formerly covered under the CIAT maize program, will become part of the CIMMYT maize budget. The number of senior staff will be expanded from one to three, in order to meet the program objectives described below. Supporting staff will be reduced since most of the research activities will be conducted within national programs.

Program Commentary

The joint CIMMYT-CIAT activities aimed to increasing maize yields in the Andean region and northern Brazil will be conducted in accord with the following principles :

- 1) That maximum emphasis is placed upon strengthening national programs and their staffs ; that research to benefit the Andean region should be conducted as far as possible, on a collaborative basis, within national programs, and that local scientists be asked to share in the planning and execution of regional services.
- 2) That services provided by CIMMYT-CIAT should pool the strong points of the two centers -- particularly CIAT's regional emphasis and CIMMYT's global leadership on maize.
- 3) That CIMMYT and CIAT use these joint Andean services as a demonstration of inter-center relations, in order to establish a pattern of cooperation for wider application to other crops, and other areas.

The activities of this program will be as follows :

- 1) A CIMMYT-CIAT team of two maize scientists will be stationed at the CIAT headquarters, and devote full-time to services which will strengthen national maize programs of the Andean region, including:

- Consulting with national programs regarding their production problems and their research and extension programs for the maize crop.
 - Helping plan and carry out training programs with the staffs of national maize programs, including the promotion of a workshop among maize workers of the region, annually or every two years.
 - Coordinating development of uniform nursery trials and analyzing the data, if necessary.
 - Promoting the participation of Andean scientists in the above activities, including arrangements for mutual consultation among national programs' personnel.
 - Producing a regular information document summarizing maize research in the region, emphasizing the collaboration between the CIMMYT-CIAT team and national programs.
- 2) A CIMMYT-CIAT maize breeder will be stationed in one of the four Andean countries which produce highland flourey maize, to devote full-time to breeding and outreach work on flourey maize.
- 3) Training in maize production research will be divided among CIMMYT, CIAT, and national programs in order to take full advantage of all available resources, including:
- Researchers in maize will receive in-service training at CIMMYT in order to benefit from the multi-disciplined research program for both lowland and highland crops.
 - Both CIMMYT and CIAT will participate in the training of production agronomists, with emphasis on training within national programs.

SMALL FARM SYSTEMS

Resources

* Staff	Many years		Direct Research Costs		
	1975	1976	\$ thousands	%	Incr.
	1975	1976	1975	1976	Incr.
Agronomy - C. Francis (Leader)	1.00	-	175	0	-
Systems Engineering-D. Franklin	.50	-			
Protection Agronomy - J. Doll	.50	-			
Total Senior Staff	2.00	-			
Scientific and Supervisory Staff	7.00	-			

* In addition to the staff shown, a Sociologist funded through FAO, has been working in this program in 1975 and will continue in 1976, as part of the Special Studies Unit.

Budget Changes

The activities of this program have been redistributed within the various commodity programs as described in the program commentary below. Because of current and anticipated special project provisions, it will not be necessary to add the Outreach Production Specialist to the Beef and Cassava Program until 1978.

The net changes in senior staff and funding for 1976 and in numbers of senior staff projected for 1977 through 1980 resulting from the distribution of activities previously projected for this program are as follows :

	1976		1977		1978		1979		1980	
	M/Y	\$000	M/Y	\$000	M/Y	\$000	M/Y	\$000	M/Y	\$000
a/ Small Farm Systems	-3.0	-292	-3.5	-287	-4.5	-373	-5.5	-463	-6.0	-514
Bean Prod. Systems	1.5	132	0.5	52	0.5	52	0.5	52	0.5	52
Cassava Prod. Syst.	0.5	41	0.5	41	0.5	41	0.5	41	0.5	41
b/ Special Stud. Unit.		50		100		150		150		150
	-1.0	- 69	-2.5	- 94	-3.5	-130	-4.5	-220	-5.0	-271

a/ In addition, as mentioned, the Biometrician, half time in this program in 1975, will be full time in the Biometrics Unit in 1976.

b/ Included in the Office of the Associate Director General - Research

Program Commentary

Since the earliest stages of CIAT's program development, there has been a recognition of the need to ensure that technology developed at CIAT be useful to and adopted by the small or low-income farmers. It was acknowledged that many crops in tropical developing countries, especially in the subsistence agricultural sector, are not grown in monoculture and that animals often form part of the enterprise mix. Further, it was recognized that there are often great differences between what can be accomplished under the controlled conditions of experiment stations and what is possible under real farming conditions. For these reasons, a continuing attempt has been made to incorporate some mechanism for validating the CIAT technology under real farming conditions and to stimulate inter-program cooperation.

Several structures have been attempted to deal with this complex set of issues and concerns, the most recent of which has been CIAT's Small Farm Systems Program. When it appeared that this experiment was not likely to achieve success in this important field, the Executive Committee of CIAT's Board of Trustees asked the Director General to thoroughly review this program and make specific recommendations regarding the future organizations of these types of activities. In order to accomplish this task, the Director General called a two-day workshop at which a number of distinguished specialists in this field from outside of CIAT, and a selected group of scientists from within CIAT, were asked to carefully consider the objectives, end-products, clients, activities and organizational relationships of CIAT's activities related to the concerns for which the Small Farm Systems Program had been established. A four man task force was named to participate in the Workshop and, following the Workshop, to draft a set of recommendations for the Director General to utilize in making his final recommendations to CIAT's Board of Trustees. With some slight modifications, the recommendations of the Task Force were incorporated into the Director General's recommendations, which were thoroughly discussed and approved by the Program Committee and, subsequently, by the full Board of Trustees. In summary, these recommendations were as follows :

1. That evaluation of new technologies and studies of their adoption should be an integral part of the activities of CIAT's main commodity programs.
2. That this research should be carried out by biologists and economists working within the Commodity teams, and not by staff from a separate systems program unit.
3. That each of the major commodity programs should have assigned to them, on a full time basis, a Production Economist and an Outreach Production Specialist, whose terms of reference would be defined to cover the activities proposed in recommendations 1 and 2 above. The economists' role should be primarily at the micro-economic level and their activities should be primarily concerned with the adoption and evaluation of new technology. The outreach production specialists' role should be to provide the technical input to these activities as well as delivery of CIAT's technologies to national agencies.
4. That an Agricultural Production Systems Coordination Group be established, made up of the Associate Directors General for Research and International Cooperation along with the Economists and Outreach Production Specialists mentioned above, and the center's Biometrician, to maintain an overview of the activities and results of the various commodity programs, with particular

reference to the validation and adoption of technology developed in these units. The group will advise the program leaders of possible modifications in their activities and the nature of the technology generated to ensure that the concerns described below are dealt with as effectively as possible within the commodity programs. The Group will also identify additional activities along these lines which should be conducted by the Special Studies Unit, as well as coordinate inter-program collaboration on research pertaining to mixed-cropping and mixed-farming.

5. That a Special Studies Unit be established under the Associate Director General for Research to conduct studies of an exploratory nature, or of a broad inter-program nature, which cannot be well dealt with within the Commodity Programs. These will include inter-cropping, mixed-farming, and socio economic studies.

These recommendations will result in the discontinuation of the Small Farm Systems Program as a separate unit. In doing so it must be emphasized in the strongest terms that CIAT will continue to strive to :

- 1) Be responsive to welfare issues as well as production goals.
- 2) Be concerned with farming as an integrated system.
- 3) Be concerned with rapid adoption of improved technology in a manner which will reduce, or at least not exacerbate, income inequalities.
- 4) Insure that new technology developed at CIAT is directly useful in, or can be adapted to, various ecological zones within our area of responsibility.
- 5) Insure that new technology will be viable under the conditions of real farms of various sizes.
- 6) Maintain a special concern for small or low income farmers.

We believe these concerns can best be dealt with by vertical integration of the Commodity Programs rather than to continue the attempt at horizontal integration through a separate systems program. This will insure that the job of developing and validating technology for the small farmer and concern for improving the welfare for the poor, users and consumers alike, will be the job, not of a special team, but of every member of staff.

Indeed it has been the concern of the Commodity Programs that their technology be valid and adopted at the farm level and contribute to the solution of the problems of hunger and poverty. As pointed out in the Task Force Report, present Commodity Programs are aiming at developing technology which will be scale neutral, or which will favor small farmers. They also agree, that the problem of crop associations can be dealt with adequately by the commodity programs dealing with one of the crops in the association. Inter-program collaboration on crop associations, involving more than one of the crops in CIAT's mandate, will be enhanced by the establishment of the new ADG (Research) position. It should also be emphasized that what is being recommended is not merely the abolishment of the Small Farm Systems Program, leaving the Commodity Programs as they were, but the establishment within the Commodity Programs of a mechanism to assure vertical integration from the laboratory to the farmer. There is also a recognition that the broader aspects of rural development must be dealt with at the national level.

Based on these recommendations the projected budget includes one full time economist in each of the bean, cassava and beef production systems programs. In addition, outreach production specialists have been placed in the budget projections of each of these three programs. This function will also be accomplished by individual production scientists identified among the projected staff for the swine, maize and rice production systems programs.

To enhance the vertical integration achieved by these additions to the commodity programs and the coordination achieved by the creation of the Agricultural Production Systems Coordination Group, the Biometrics Unit is expected to assist in the task of cross commodity coordination through the maintenance and development of information and methodologies of relevance to the evaluation of CIAT generated technology in various farming and ecological contexts of a special cross-commodity nature such as mixed cropping.

A Special Studies Unit is also being established. This will begin modestly in order to allow the ADG (Research) as much flexibility as possible in determining how best to organize these types of studies. Macro-economic studies required by the management for development of research priorities or outreach strategies, as well as micro-economic studies within the three programs which do not have full time economists assigned to them, will be conducted in this unit. Exploratory, production type studies, as well as special studies identified by the Agricultural Production Systems Coordinating Group will be conducted in this unit. These will be conducted mostly by temporary staff, such as visiting scientists, post-doctoral fellows and pre-doctoral students. However, since these fall largely into two basic categories, socio-economic studies and biological studies, the exact mechanism for organization, planning and continuity of these studies under the leadership of a more permanent senior staff member has not yet been worked out in detail. Consequently, projections in dollar amounts, rather than fixed staff positions, have been included at this time.

The vertical integration of "systems" type activities within Commodity Programs, and the establishment of the Agricultural Production Systems Coordinating Group and Special Studies Unit, represent a new approach in CIAT's continuing concern to develop and disseminate technology with the largest possible impact on the improvement of human welfare. It is our sincere hope and expectation that the restructuring of these activities will result in a greater benefit to the small farmer, and that the development and adoption of new technology will benefit greatly both producers and consumers of basic food commodities. Structuring of activities to achieve these goals is a dynamic process. Consequently, this organizational arrangement will be subject to periodic reviews so that it can be modified from time to time, enabling the total mix of CIAT's activities better to achieve these goals.

TRAINING AND CONFERENCES

Resources

	<u>Staff</u>		<u>Direct Costs</u>		
	<u>Many years</u>		<u>\$ thousands</u>		<u>%</u>
	<u>1975</u>	<u>1976</u>	<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Communication Science-F. Byrnes (Director)	1.00	1.00	585	750	28
Training Coordination-C. Moore	1.00	1.00			
-F. Fernandez	1.00	1.00			
Total Senior Staff	3.00	3.00			
Scientific and Supervisory Staff	7.50	9.50			

Budget Changes

The Editorial Services Unit was previously included with this group. It has now been separated and included in Library and Information Services.

Two additional scientific and supervisory level posts are requested for 1976 to provide an extra 2.0 many years. Of these, one is for a training associate for communication science and one for an additional interpreter.

Experience has indicated there are greater availabilities of special project funds to finance some aspects of training than others. Of 160 trainees at CIAT in 1974, only 62 were financed from CIAT core funds. Further, the value of certain kinds of training, such as post doctoral, has been demonstrated by some of the other centers as well as by CIAT's limited experience in this area. Consequently, the 1976 budget is being increased to provide 2.5 many years of post doctorals, and the stipends for post graduate interns reduced to provide limited funds to finance certain production specialist trainees who can not be funded in the present on-going special projects.

Demands are increasing for various training activities organized around a single commodity and, in some cases, special techniques within a commodity. This has led to an increase in the funds requested in Conferences and Symposia to cover travel and per diem of short course participants and some increases in supplies and services throughout Training and Conferences.

Program Commentary

General

Facilities and available staff time impose definite restrictions on the overall operations in Training and Conferences. The present capacity for housing trainees at CIAT is 80, while

the conference housing maximum is 64. While larger conference groups can be handled by booking rooms in Cali, available air-conditioned facilities limit groups to a maximum of 200.

Scientists in the commodity programs must budget their time between research, training, conference participation, and travel and consultation in other countries. As more trainees complete programs at CIAT, the need increases to provide followup support in the countries. Successful establishment and continuance of in-country training efforts depends on CIAT's abilities to supply temporary instructors and increased amounts of training materials. Growing emphasis on socio-economic issues involving CIAT commodities emphasizes the need for greater inputs from this area into the training programs.

Finally, a pace-setter for training and conference activities in the future is the developing of outreach programs, and every effort is being made to maintain flexibility so as to be able to respond in this area effectively and promptly.

Training for Research and Production

Training activities at CIAT provide learning experiences for professionals, some to conduct production-oriented research in their own organizations, while larger numbers become crop or animal production specialists, helping to translate and communicate new agricultural technology.

Of immediate concern is the preparation of individuals to accelerate research on and the application of new technology in their own countries. These trainees help CIAT to develop effective links for the exchange of knowledge about agricultural problems and their solution, and eventually, to build and strengthen effective networks for research and communication among scientists.

The longer-term goals are to increase the numbers of research workers, educators, and extension specialists with competency to identify and solve production problems and the ability to communicate these solutions to farmers and others. CIAT's continuing training role is to provide counsel and assistance where appropriate, to train cadres of individuals to staff existing and new training operations within countries, to offer opportunities for specialized or refresher training for selected individuals, and to help the various institutions develop more adequate resources of teaching and reference materials.

During 1974, 160 persons from 22 countries were enrolled, including 43 as post-graduate interns in research, 62 as production specialists, 19 as master degree students, 15 working on doctoral dissertations, and 21 special, short-term trainees.

Performance of CIAT trainees after return to their own countries and work organizations and growing awareness of CIAT throughout the world has influenced significantly the growth of the training program, the kinds of persons applying for training, and availability of support for trainees. Of the 160 persons enrolled in 1974, only 62 were supported by CIAT funds directly. Other principal sources of support were the Interamerican Development Bank, 25, and national interests of various countries, 36. More than 1,600 persons from many countries participated in some 25 international and national conferences, symposia, workshops and short courses.

Plans provide for training of the following categories of persons in 1976 :

Post-Doctoral Fellows . CIAT established this category in 1975 with the objective of providing high level, advanced research experience in tropical agriculture for young scientists interested in careers in the tropics. Such a program, as other centers already have demonstrated, becomes the principal source of experienced staff for outreach projects or to undertake major research programs in countries. CIAT expects to identify other sources of funds so as to increase the numbers in this category, but for 1976 is budgeting \$ 74,000 which is expected to cover 3 1/2 man years of such training.

Post-Graduate Interns . These are young scientists, chiefly from Latin America and the Caribbean, who have completed undergraduate degrees in agronomy, animal science, or veterinary medicine. They receive on-the-job training in production system studies while serving as full-time research interns. Thirty-two man years of these interns are funded in the budget for 1976, at an average of \$ 4,000 each.

Production Specialists . CIAT presently is involved in the eighth and ninth courses designed to prepare agricultural production specialists for developing countries. Each year CIAT offers one course in livestock production, the other in crop production, depending upon demand and available funding. Costs of these courses have been supported, in the past, on a special project basis by the Interamerican Development Bank and other organizations.

The objective of these courses is to produce specialists with the scientific, technical, economic, farming and communication competencies necessary to diagnose production problems of a livestock enterprise, or a crop farm, prepared to work in the field as individuals or, more importantly, to establish and conduct training programs in their own countries.

While special project funding is contemplated for the bulk of the production specialist training in 1976, funds to cover up to 4 man years of such training (\$ 18,000) are included to cover enrollment of individuals who cannot be covered under the special project funding terms.

Research Scholars and Fellows . Allocations for these people will in future be used only for : a) continuation of scholars and fellows already enrolled; b) some scholarships for scholars and fellows to cover the research portion of their M.Sc. or Ph.D studies at CIAT; and c) in certain cases, scholarships for the course work portion of a scholar or fellow who will do his research at CIAT.

Other Trainees . CIAT maintains a flexible policy to provide unique training opportunities for young professionals from many lands. For example, through an agreement with Wageningen University in the Netherlands, fourth year animal science students come to CIAT for up to a year on-the-job experience in the management of animals and pastures under tropical conditions. A similar program has been initiated with Wageningen for students interested in rural sociological problems in the tropics.

Through informal arrangements with various universities, other graduate students may spend extended periods of time with CIAT working under the supervision of CIAT senior staff

and on problems of direct interest to CIAT. CIAT limits its financial involvement to helping, where necessary, with the direct research expense.

Conferences and Symposia

CIAT facilities for conferences and symposia include an organizational staff, meeting rooms, equipment, housing, and feeding. Activities contemplated for 1976 and beyond include policy seminars for national leaders, scientific symposia and technical workshops for research workers, short courses for production specialists, and such other events as may be appropriate for representatives of various entities in the total agricultural development system.

The core budget includes funds to cover the staffing and operations of a small conference management and support staff. The staffing pattern for 1976 includes two professional simultaneous interpreters who between conferences translate manuscripts for conference papers, publications, and other materials.

In 1973, the Board indicated the desirability of putting more stability and predictability into the financial structure for conferences and symposia by providing core funds to support a limited number of scheduled events considered by the commodity program teams as instrumental to achieving the success of the respective commodity programs.

The amount included for core support in 1976 is \$ 161,000 plus the salaries of the staff. This covers the conference needs of CIAT's five commodity programs and, in addition, provides up to \$ 60,000 to finance the equivalent of three commodity or disciplinary short courses of 30 days each.

LIBRARY AND INFORMATION SERVICES

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		<u>% Incr.</u>
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u> <u>1975</u>	<u>1976</u>	
Librarian-F. Monge (Leader)	1.00	1.00	434	513	18
Editors - M. Gutierrez	1.00	1.00			
- C. Bower	.83	1.00			
Photographer - N. Mc Lellan	1.00	-			
Total Senior Staff	3.83	3.00			
Scientific and Supervisory Staff	11.58	13.75			

Budget Changes

The task of setting up CIAT's photographic laboratory and training personnel is now virtually complete and consequently the senior staff position for a photographer, who has been responsible for this, will no longer be needed. An additional research associate is requested to help with the increasing workload for documentation activities. Three other support staff are also requested to handle the new machinery that will be arriving in 1975 and 1976.

Program Commentary

The Library has a collection of about 30,000 books and subscribes to about 1200 journals. Besides the regular function of a specialized library, CIAT's library operates a documentation center for cassava, field beans, agricultural economics and animal health, some of which is supported by special funds from Ford Foundation and IDRC. It also provides a current awareness service of journals' tables of contents.

Information Services includes editors in English and Spanish and a print shop to handle in house most of the editing and printing of an ever increasing workload.

RESEARCH SUPPORT GROUPS

ASSOCIATE DIRECTOR GENERAL - RESEARCH

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>	<u>%</u>	
			<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Associate Director General-K. Rachie	.50	1.00	34	174	512
Scientific and Supervisory Staff	-	2.25			

Program and Budget Changes

The position for Director - Plant Science, which was vacant for all of 1974, has been changed to Associate Director General - Research following approval of reorganization proposals by the Board of Trustees. Dr. Rachie will take up his appointment to this post in the latter half of 1975.

Included here is the new Special Studies Unit referred to in the commentary on the Small Farm Systems Program (pages 29 & 30). Funds have been provided in 1976 for 3 research assistants, travel, and consultants fees.

Included for the first time in 1976 are \$ 50,000 for the support of visiting scientists to be assigned to individual programs.

LABORATORY SERVICES

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>	<u>%</u>	
			<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Scientific and Supervisory Staff	1.00	1.00	45	56	24

Program and Budget Commentary

This unit groups together certain central laboratory services for most programs. Included are a laboratory equipment maintenance engineer, nutritional and soils analysis personnel and a small animal colony. The increased budget reflects the addition of two support staff and other expenses to enable the unit to handle the analytical demands of programs.

BIOMETRICSResources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>		<u>%</u>
			<u>1975</u>	<u>1976</u>	<u>Incr.</u>
Biometrician - D. Franklin	.50	1.00	88	161	83
Scientific and Supervisory Staff	4.00	5.00			

Budget Changes

It is proposed that the biometrician, presently working only half-time in this unit, will be full-time in 1976. This will enable the unit to satisfy the increasing demands for services.

A rented data processing terminal linked to a computer in Bogotá has recently been installed which will increase costs by about \$ 20,000 over those in 1975. This will produce a quantum jump in data processing capability which will require some additional support at the scientific and supervisory and lower levels.

Program Commentary

The Biometrics Unit is a central services unit responsible for providing research design consultation and data analysis services to all of CIAT's research and training activities. The principal functions of the Unit are the following :

1. Research design and analysis of field plot experiments for the crop programs.
2. Research design, data analysis and data base handling for the animal science programs.
3. Information systems and analyses for germplasm collections. (Beans, Cassava, Beef).
4. Consultation on survey design and execution and storage, retrieval and analysis of producer survey data (Cassava, Beans, Beef).
5. Mathematical programming, modelling and computing for economic analyses (all programs except Rice and Maize).
6. Mathematical programming, modelling and computing in the biological sciences (Cassava, Beans, Beef).
7. Training (Research Interns and Production Specialists).
8. Research to improve methods in the above functions.

The analysis of small experiments, particularly the crop field plot experiments, are accomplished through "desk-top computers" available within Unit. Larger experiments, surveys, data banks, and mathematical programming are achieved through the utilization of large scale computers and modern software systems that have been developed for research in agriculture and economics in the United States. Access to large scale computation is achieved through the collaborative program with the Instituto Colombiano Agropecuario, whereby CIAT obtains the capability of processing on the IBM 370-145 computer belonging to the National Administrative Department of Statistics (D.A.N.E.) an agency of the Colombian Government. Demand for the use of large scale computing services has increased markedly in the last year. It has now become inefficient and time consuming to process data in Bogotá by use of couriers and the mails. In considering alternatives to satisfy this demand for computer services, the use of an in-house computer has been ruled out, because the size computer required will be too large. Rather it is contemplated that adequate level of services can be obtained by connecting a data communication terminal located at CIAT to the DANE computer over standard telephone lines.

With the assignment of the Biometrician on a full time basis to the Biometrics unit (from a split assignment in the Small Farm Systems Program), the Biometrics unit assumes the responsibility for maintaining and developing computer based methodology for the evaluation of technology. As a central service unit, Biometrics will collaborate with the commodity production systems programs to perform analyses required for testing their technology in the context of farms as integrated systems. This is accomplished through collaboration in the agro-economic surveys, "on farm" testing of technology (including regional trials) and through the execution of simulation experiments to screen CIAT generated technologies for potential viability under farmer conditions.

STATION OPERATIONS

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>	<u>%</u>	<u>Incr.</u>
			<u>1975</u>	<u>1976</u>	
Farm Superintendent	-	1.00	179	208	16
Scientific and Supervisory Staff	3.00	2.00			

Budget Changes

The Executive Committee of the Board of Trustees approved a proposal to upgrade the position of Farm Superintendent to the senior staff level. Provision for this is made in the 1976 staffing shown. Early in 1975 a labor pool of 30 men was formed to handle some of the peak demands of programs and general maintenance. Previously this work was handled by specially contracted temporary labor.

Program Commentary

CIAT operates a farm at Palmira of approximately 520 hectares. 20 ha. are cultivated without being levelled, 300 h. levelled for irrigation and leached of excess salts, 36 ha. developed and fenced for grazing trials and 100 ha. put to commercial pastures. Buildings and grounds around buildings cover 36 ha. Station Operations operates and maintains 35 Kms. of all weather roads, 43 Kms. of drains, 35.5 Kms. of fence, 22.5 Kms. of irrigation canals and 10 Kms. of concrete and soil-cement lined canals.

Station Operations supports all CIAT's programs, maintains and operates a tractor pool, and manages a labor pool, which has been established in 1975. The areas that are not utilized by the programs are kept clean, producing commercial crops which produce income in excess of \$ 100,000 per annum.

ADMINISTRATION

Resources

<u>Staff</u>	<u>Many years</u>		<u>Direct Costs</u>		<u>% Incr.</u>
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u> <u>1975</u>	<u>1976</u>	
Director General - J.L. Nickel	1.00	1.00	572	749	31
Associate Director General-E. Alvarez	1.00	1.00			
Executive Officer - J.A. Cuellar	.87	1.00			
Controller - A.V. Urquhart	1.00	1.00			
Total Senior Staff	3.87	4.00			
Scientific & Supervisory Staff	12.42	15.25			

Budget Changes

Included for the first time in 1976 are \$ 10,000 for the support before and between assignments of outreach contract staff.

Increases in scientific and supervisory staff are for an analyst for the Controller's office to assist in the installation of a rented accounting machine for which about \$ 12,000 is included in 1976. Two additional administrative posts are included for the Executive Officer, one to assist in space planning and property control and the other to give administrative support for field station operations.

Program Commentary

Grouped under Administration are the Offices of the Director General, the Associate Director General for International Cooperation, the Controller and the Executive Officer. These officers, together with the Associate Director General Research (listed under Research Support Groups) are responsible for overall management of the Center. The Executive Officer's responsibilities are purchasing, travel, food and housing, storerooms and inventory, security, and local staff personnel matters. In addition, the superintendent of Physical Plant and Motor Pool reports to the Executive Officer. The Controller is responsible for budget preparation and budget management, accounting, internal audit, financial reports and certain senior staff personnel matters.

GENERAL OPERATING COSTS

PHYSICAL PLANT

Resources

	<u>Staff</u>		<u>Direct Costs</u>		
	Many years		\$ thousands		% Incr.
	<u>1975</u>	<u>1976</u>	<u>1975</u>	<u>1976</u>	
Scientific and Supervisory Staff	2.00	2.00	366	457	25

Budget Changes

Support staff increased substantially early in 1975 when approximately 25 personnel previously employed through an agency were included as regular employees. For 1976 an additional 12 support staff are requested to enable the unit to satisfy the maintenance cleaning and gardening requirements which have increased because the buildings are no longer new, the airconditioning system is no longer under guarantee and to service new areas. Two additional security people are requested to patrol new buildings.

Program Commentary

The Palmira installations consist of 8 main buildings, including laboratories, plus 76 living units on 45,000 square meters of maintained grounds. The gross area of buildings is 22,000 square meters, of which 70 percent is air-conditioned.

Other than electricity, for which only an emergency generator is maintained, CIAT provides all its own services. Physical Plant includes resources to run and maintain these services, maintain all buildings and grounds and a security force of 33 people. The unit is also responsible for contracting and supervising minor alterations and construction jobs.

MOTOR POOL

Resources

	<u>Staff</u>		<u>Direct Costs</u>		
	<u>1975</u>	<u>1976</u>	<u>\$ thousands</u>		<u>% Incr.</u>
			<u>1975</u>	<u>1976</u>	
Scientific and Supervisory Staff	-	-	144	196	36

Budget Changes

An additional 5 support staff are requested to provide drivers for an additional bus which will arrive by 1976 and get better use out of the vehicle fleet, to service small gasoline motors and motorbikes; and to add an electrician.

The original 1975 budget provided for a doubling of the price of gasoline. It is estimated that this will not now happen until 1976. The 1975 budget was revised downward accordingly and \$ 25,000 of the increase in 1976 is to make provision for this one factor.

Program Commentary

CIAT operates a fleet of about 140 vehicles. This includes buses, trucks, vans, pickups, jeeps, station wagons, passenger cars and motorcycles. These vehicles are from various manufacturers.

The workshop performs every type of service on vehicles from supply of gasoline, to preventive maintenance, body repairs and major mechanical repairs. In addition, the Motor Pool provides drivers and vehicles when needed and monitors a rented bus service for the transport of employees from Cali and Palmira.

GENERAL EXPENSES

Included in this category are office supplies, electricity, boiler fuel, telephone cost, teléx and cable costs, postage, insurance, etc. The budget for these is \$ 343,000 for 1976 as compared with \$ 283,000 in 1975 - a 21 % increase.

CAPITAL REQUIREMENTS

A special committee, appointed by the Director General, studied probable space requirements for projected staffing levels in 1980 and needs for accommodating increases between now and then. Equipment and other specialized needs of programs have also been reviewed. The following table sets out estimated requirements for capital funds for the years 1976 to 1980.

	<u>Square metres</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Warehouse	2000	\$ 165,000				
Office building	800		\$ 186,000			
Station Operations building	3000	100,000	167,000		\$ 305,000	
Extension of library & information services building	600		117,000			
Controlled temperature & light rooms (3)	60	22,000				
Greenhouse	720		47,000			
Greenhouse / screenhouse service facilities	400		40,000			
Telephone switchboard		92,000		35,000		
Microwave telephone channels		88,000				
Connection to emergency generator		25,000				
Apartment building	290		65,000			
Building modifications		25,000	30,000	35,000		
Modifications to amphitheatre		25,000				
Soil improvement program		25,000	25,000			
Asphalt treatment for service roads		35,000				
Equipment etc.		390,000	476,000	321,000	322,000	\$ 141,000
		\$ 992,000	\$1,153,000	\$ 391,000	\$ 627,000	\$ 141,000

It is estimated that CIAT will have a core senior staff of 68 by 1980 (including Rice and Maize) and that there will be another 20 persons at the senior staff level as visiting scientists, post-doctoral fellows, and special project personnel. These figures compare with a present senior staff of 46 and about 15 visiting scientists, etc. Existing facilities were constructed for a total senior staff of only 36 so capacity is already being stretched in many areas.

We have concluded that today's needs are, and those of the future will be, for more service areas and more offices. Laboratory space will be sufficient through 1980 provided much of that area currently being used for offices can be used as laboratory space, with those needing offices being moved elsewhere. Similarly, a certain amount of additional service area or station operations space can be obtained by moving out the warehouse which occupies part of the present station operations building. However, this will only give about 600 square metres additional space while it is estimated that a total of 2000 square metres are needed now and further 1500 metres later. It is therefore proposed that a similar building to the present station operation building be constructed to give an additional 3,000 square metres. This would be built in two stages to provide space when required.

Nearly all the original farm buildings at El Porvenir, previously used as offices, etc., while the center was being built, are now being used as warehouse space. Most of these buildings are now dilapidated and also not suitable, because of distance and convenience, for use as warehouse space. We propose building a separate warehouse building suitable for storing all CIAT's stocks of supplies and spare parts. This should lead to better stock control, and a reduction in stocks and losses.

The library now has a total of about 31,000 books and it is estimated that it should continue to grow at about 5,000 books per annum (including certain books purchased with program funds and bound volumes of journals). Existing space gives capacity for 38,000 books and will therefore be nearly full by the end of 1976, so additional space will be needed. Two large conference rooms were converted to offices to provide space for the training and social sciences staffs and the travel office. Conference rooms are adequate for current demand but, with likely increases in training courses and conferences, additional space would be desirable. Relocating the personnel using the converted conference rooms would provide this. It is therefore proposed that the existing library and information services building be extended eastwards to provide additional library space on the second floor and training offices on the first floor.

An additional office building is proposed which would accommodate staff presently using laboratory space as offices, the social sciences staff and biometrics. This building could be located at the back of the present administration building so as to be fairly central. Biometrics space in the administration building would be used to house the travel office, the mail room and provide some space for the expansion of the purchasing and controller's sections.

Construction of a second greenhouse financed in the 1974 capital budget will start shortly. It is proposed that additional service facilities for the greenhouses and screen-houses be built in 1977. An additional greenhouse mainly to serve the increasing needs of the bean and cassava programs is requested for 1977.

The beef program is under review. It is thought possible that the beef program will be decentralized with a nucleus staff of about nine at headquarters and the rest of the staff located in groups of two to five in various tropical locations. It is hoped that these people would work in collaboration with and on the stations of national institutions.

Capital requirements would depend on facilities available and support given but should not exceed about \$ 200,000 per location. For purposes of these projections we have included \$200,000 in each of the years 1977 to 1979 but it should be stressed that these are mere estimates and that more meaningful figures will have to await the outcome of the review of the beef program and decisions to be taken next year for the 1977 budget.

Improvements in certain services will be needed to cover the proposed new construction. We understand that our central air-conditioning plant is adequate to handle the new buildings which will be airconditioned i.e. the office building and the extension of the library and information services building. However, the telephone system and the emergency generation plant are both already inadequate. We propose improvements in 1976 which will bring service to a satisfactory level and provide for most of the additions described above.

CIAT has a switchboard for 180 internal lines and has 20 local lines to Palmira. Neither of these is adequate. We propose replacing the present switchboard with one of 400 lines. This will enable us to connect up our housing units, which now have no service, and provide lines for the new buildings. Nearly all calls from and to CIAT are with Cali but since there are only 65 lines from Palmira to Cali, it is extremely difficult to get through. We propose adding a microwave system with 12 channels which will enable us to connect straight into the Cali exchange with a consequent improvement in service, a reduction in telephone charges, improved data transmission for the Biometrics unit, and savings on clerical time trying to get an open line.

A recent study of our emergency power generation and distribution system concluded that the generator is of sufficient capacity but that major changes are needed in the connections to the system. These involve providing additional connections and rewiring many of the existing connections to provide service where needed and give adequate protection to the electrical system. The estimated cost of this work is \$25,000.

The improvement and additions described above are what we estimate will be required by 1980. However a certain amount of additional space will be needed shortly, with requirements building up to 1980. Phasing of these additions is therefore important. We propose that the warehouse be started as soon as possible, i.e. around the middle of 1976, for completion by the end of 1976. This would release needed space in the station operations. Towards the end of 1976 one half of the new station operations building should be started with completion by mid 1977. This would give the additional work space which will be needed by then. The other half should be built in 1979 to cover new requirements. By making temporary offices in existing buildings, we hope to be able to postpone construction of the new office building until 1977. The extension to the library and information services building should be started in mid 1977 with completion early in 1978. An increase of another 100 lines in the switchboard will probably be needed in 1978.

So far no mention has been made of plans for spending money granted in the 1975 capital budget for a house for the food and housing manager and the eating and

changing facilities for workers. We propose going ahead with these this year. The house will release one of the four apartments presently occupied by the food and housing manager. Apartments should then be sufficient for the next two years. We propose that two more apartment units be built in 1977.

Before and as new buildings came on stream and to make temporary arrangements, modifications will have to be made in existing buildings to accommodate staff and as they are moved from one area to another. Provision is made for these changes in 1976, 1977 and 1978.

CIAT's original master plan included an auditorium which has never been built. We believe that, although an auditorium would be a useful addition to the conference facilities, the probable use would not be sufficient to warrant the expense. Instead, we suggest that modifications be made to the amphitheatre building to enable it to be used for the few workshops and conferences that are held with more than 200 people, the maximum number which can fit into our largest conference room.

Experimental work at CIAT has been hampered by soils not being homogenous because drainage is poor, rainfall low and evapotranspiration high, leading to accumulation of salts. An improvement program involving improved drainage, levelling and chemical applications is proposed. This could be done over a two year period using existing earth moving machinery at a cost of approximately \$25,000 per annum.

All services roads in the experimental area of the farm are dirt roads. In the dry seasons, vehicular traffic raises dust which affects experiments. We propose treating 8 Km. of the principal arteries with a semi-asphalt cover at a cost of approximately \$35,000.

Equipment and sundry other needs of each program are detailed in the following table, which is largely self explanatory. These needs have been carefully reviewed :

		*	*	*	*
	1976	1977	1978	1979	1980
<u>BEEF</u>	72,100	219,000	200,000	200,000	20,000

Agrostology

2 garden tractors	2,500
Plot mower	1,250
Scale	600

Seed Production

Suction harvester	3,000	
Crop dryer	5,500	6,000
Windrower	7,500	
Seed cleaner	2,500	
Planter & fertilizer unit	3,000	
Mower	2,500	
Sundry items	3,000	5,000

Pastures & Forages Utilization

Post hole auger	1,250
Water pumps	1,250
Mower	1,000

Husbandry

Tractor	3,000	
Metabolism crates for steers		6,000

Soils Agronomy

Laboratory & greenhouse equipment	3,750
Experimental seeders and tillers	
for pasture establishment	6,000
Crop planter & fertilizer applicator	4,000

* Except in a few cases, where specific needs for 1977 can be anticipated, projections for 1977 to 1980 are global amounts for each program.

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Soil Microbiology</u>					
Furniture	1,500				
Laboratory & greenhouse equipment	4,000				
<u>Animal Health</u>					
Centrifuge		2,000			
Incubator for tick work	2,500				
Sundry items	2,500				
<u>Vehicles</u>					
Pickups (2)	10,000				
<u>CASSAVA</u>	<u>41,500</u>	<u>23,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
<u>Physiology</u>					
Leaf chambers	2,500				
<u>Breeding</u> - Sundry items	1,000				
<u>Pathology & Entomology</u>					
Growth chamber	8,500				
Balance		3,000			
Inoculation room	500				
Sundry items	1,500				
<u>Soils</u> - Sundry items	2,000				
<u>Agronomy</u>					
Back pack sprayers	500				
<u>Furniture</u>	10,000				
<u>Vehicles</u> - 3 pickups	15,000				
<u>BEANS</u>	<u>83,800</u>	<u>32,500</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
Humidity control units (2) for					
germplasm bank	30,000				
Portable irrigation unit	2,500				
Electronic seed counter	3,000				
Cold room		7,500			
Screenhouses (2)	5,000				

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>BEANS</u> Cont.					
Portable leaf area meter	5,000				
Seed germination unit	5,000				
Mettler balance	3,000				
Dissecting microscope		1,250			
Laminar flow hood	1,800				
Linear solarimeters (10)	5,000				
Daily integrators (10)	2,500				
Furniture	6,000	4,000			
Vehicles - 3 pickups	15,000				
<u>RICE</u>					
Field equipment	<u>5,000</u>		<u>1,000</u>	<u>2,000</u>	<u>1,000</u>
<u>TRAINING AND CONFERENCES</u>					
Furniture	4,000				
Typewriters (2) & Calculators	1,000				
<u>LIBRARY & INFORMATION SERVICES</u>					
	<u>59,500</u>	<u>75,000</u>	<u>40,000</u>	<u>40,000</u>	<u>40,000</u>
<u>Library</u>					
Typewriters (2)		1,000			
Cardfiles	2,000				
Microfilm cabinets	2,000				
Microfilm making equipment		18,000			
Miscellaneous equipment, etc.	2,000				
Books (1,500)	30,000	40,000			
<u>Information Services</u>					
Photomechanics camera		12,000			
Collator	6,000				
Bi-color head for offset press	4,000				
Slide projectors & tape recorder system	2,000				
Miscellaneous	4,000				
Microbus for visitor services	7,500				

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>BIOMETRICS</u>	<u>2,000</u>				
Calculator	1,000				
Desks & filing cabinets	1,000				
<u>STATION OPERATIONS</u>	<u>43,000</u>	<u>82,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
Grain silos (4)	7,500	9,000			
Grain cleaner	2,500				
Lining of canals	10,000	10,000			
Irrigation equipment	5,000	5,000			
Tractor	13,000	18,000			
Vehicle - 1 Sedan	5,000				
Combine Harvester		40,000			
<u>ADMINISTRATION</u>	<u>56,100</u>	<u>34,500</u>	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
<u>Executive Officer</u>					
Medical equipment	1,500				
Fire extinguishers, security & first aid equipment	4,000				
Typewriters (2) -calculators (3)	2,500				
Furniture	2,500				
Renovation of Bogota Office	2,500				
Radio-telephone equipment (2)	1,000				
Merchandise handling equipment	1,000				
Vehicle for mail service-pickup	5,500				
<u>Controller</u>					
Calculators (5)	3,000				
Card storage units	1,000				
Furniture	2,600				
Date and time stamps (2)	1,300				
<u>Food & Housing</u>					
Double sink	600				
Stainless steel table	600				
Utility trucks	2,000				
Professional food blenders (2)	1,500				
Sundry equipment	1,000				

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Offices of the Director General & Associates</u>					
Vehicles for visiting scientists & postdoctorals - 4 pickups each year	20,000	22,000			
Sundry equipment	2,000	2,500	3,000	3,500	4,000
<u>GENERAL OPERATIONS</u>	<u>22,000</u>	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
Cleaning equipment	3,000	2,000			
Maintenance equipment	5,000				
Gardening equipment	2,000	3,000			
Motor Pool equipment	2,000	3,000			
Vehicles - 2 pickups for motor pool	10,000				
	<u>390,000</u>	<u>476,000</u>	<u>321,000</u>	<u>322,000</u>	<u>141,000</u>
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CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL
SUMMARY OF MAN YEARS AND COSTS BY PROGRAM AND ACTIVITY
 (U.S.\$ thousands)

TABLE I

PROGRAMS	Actual		Actual		Approved Budget		Revised Budget		Proposed Budget		PROJECTIONS							
	1972		1974		1975		1975		1976		1977		1978		1979		1980	
	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST	M/Y	COST
PROGRAMS																		
Brazil	10.0	661	8.8	734	11.0	864	9.7	836	12.8	1,228	94.5	1,685	17.0	1,783	18.8	2,001	19.0	2,051
Guinea	2.7	202	3.5	230	3.5	279	3.3	267	2.0	233	2.5	255	3.0	312	3.0	316	3.0	321
Cayana	5.4	330	6.0	399	6.3	455	6.4	442	7.2	664	10.2	966	12.0	1,127	13.0	1,247	13.0	1,280
Field Beans	4.2	262	4.9	374	6.7	486	6.4	512	9.0	773	12.3	1,127	13.0	1,191	13.0	1,214	13.0	1,227
Rice	2.4	135	2.0	133	2.1	153	3.0	223	3.0	291								
Maize	1.0	121	.8	83	1.1	100	1.0	90										
Small Farm Systems	.3	36	2.2	185	3.3	286	2.0	175										
Production Economics																		
Total	28.0	1,747	28.2	2,128	33.7	2,633	31.8	2,540	34.0	3,189	41.5	4,036	45.0	4,413	47.8	4,778	48.0	4,895
Training and Conferences																		
Instruction, Coordination, etc.	4.0	258	5.0	409	6.0	483	3.0	255	3.0	317	3.5	370	4.0	393	4.0	395	4.0	396
Postgraduate Interns		54		66		100		90		126		126		128		128		128
Research Scholars & Fellows		77		86		100		90		53		53		53		53		53
Post Doctoral Fellows								20		74		74		80		80		80
Production Specialist								65		18		22		22		22		22
Conferences & Symposia																		
Support		129		43		110		90		161		162		164		166		167
Total	4.0	518	5.0	604	6.0	843	3.0	585	3.0	751	3.5	809	4.0	840	4.0	844	4.0	846
Library & Information Services																		
Research Support Groups	1.0	139	1.0	192	1.0	191	3.8	434	3.0	513	3.0	559	3.0	561	3.0	565	3.0	567
Assoc. Director (Gen. Insp.)							.5	34	1.0	174	1.0	224	1.0	274	1.0	274	1.0	274
Laboratory Services	1.0	48		28		32		45		56	1.0	55		55		55		55
Statistics	.5	40	.5	68	.5	96	.5	86	1.0	161	1.0	175	1.0	176	1.0	177	1.0	178
Engineering	.4	28	1.0	67	.5	56												
Station Operations	.2	104		179		184		179	1.0	208	1.0	233	1.0	248	1.0	256	1.0	268
Total	2.1	230	1.5	342	1.0	370	1.0	346	3.0	599	2.0	687	3.0	753	3.0	762	3.0	775
Administration																		
Office of the Director	1.8	123	2.0	180	2.0	169	1.0	101	1.0	112	1.0	113	1.0	113	1.0	113	1.0	113
General							1.0	74	1.0	92	1.0	102	1.0	102	1.0	102	1.0	102
Assoc. Director, General Outreach																		
Executive Officer	1.0	155	.9	214	1.0	289	.9	248	1.0	329	1.0	342	1.0	347	1.0	352	1.0	357
Controller	.3	41	1.0	120	1.0	135	1.0	149	1.0	215	1.0	220	1.0	220	1.0	220	1.0	220
Board of Trustees		18		43		30		23		29		28		26		26		26
Total	3.1	359	3.9	559	4.0	613	3.9	595	4.0	778	4.0	805	4.0	810	4.0	815	4.0	820
General Operating Expenses																		
Physical Plant	.2	171		310		312		366		457		463		472		481		490
Motor Pool	.2	120		140		157		144		196		187		196		206		212
General Expenses		346		228		279		283		343		353		374		399		426
Total	.4	637		678		748		793		996		1,003		1,042		1,086		1,128
Contingency						55		160		68		79		84		88		90
GRAND TOTAL	36.6	3,630	39.6	4,303	45.7	5,453	43.5	5,453	47.0	6,894	55.0	7,978	59.0	8,503	61.8	8,908	62.0	9,121
Expense Categories																		
Personnel	2,442		3,112		3,912		3,846		4,861		5,778		6,058		6,341		6,416	
Supplies	386		565		562		529		660		690		737		763		773	
Services	318		385		446		429		551		571		618		637		646	
Travel	284		317		356		368		531		583		583		673		683	
Equipment			72		71		71		152		215		291		370		448	
Other			32		5		50		71		60		62		64		65	
Contingency					55		160		68		79		84		88		90	
Total	3,630		4,303		5,453		5,453		6,894		7,978		8,503		8,908		9,121	
Provision for future price changes (10%)											798		785		2,958		4,120	
TOTAL CORE BUDGET	3,630		4,303		5,453		5,453		6,894		8,776		9,288		11,866		13,353	
% Increase (incl. inflation)									26%		16%		7%		5%		2%	

* M/Y equals man years of senior staff.
 * Included in detailed figures.
 ** Includes in Automation Ser. for all countries through Approved Budget 1975.

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CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL

TABLE II

SUMMARY OF SOURCES AND APPLICATION OF FUNDS

(US\$ THOUSANDS)

SOURCES OF FUNDS	Actual	Actual	Approved	Proposed	Proposed	PROJECTIONS			
	1973	1974	Budget	Rev. Budget	Budget	1977	1978	1979	1980
Core Operations									
Unrestricted									
Ford Foundation	750	750		625					
Rockefeller Foundation	682	750		600					
U.S.A.I.D.	880	950		1230					
Government of the Netherlands	125	125		175					
Government of Switzerland	65								
Government of the Fed. Rep. of Germany	56								
International Development Assoc. (IDA)	210								
Interamerican Development Bank		900		1545					
U.N. Environment Programme				70					
Others	4								
Unidentified sources			5185		6544	8376	9888	11496	12953
Balance from previous year	(12)	(37)	2	32					
Income applied in year	168	67	316	136	380	400	400	400	400
SUB-TOTAL	2928	3505	5503	4413	6894	8776	10288	11896	13353
Restricted									
W.K. Kellogg Foundation (Training & Conferences)	290	280		290					
CIDA (Swine and Cassava)	500	750		800					
SUB-TOTAL	790	1030	-	1090					
TOTAL CORE OPERATING FUNDS	3718	4535	5503	5503	6894	8776	10288	11896	13353
Capital									
Rockefeller Foundation	1779	446							
Government of Switzerland		70		115					
United Kingdom		59		25					
International Development Assoc. (IDA)		600		110					
Interamerican Development Bank		100		100					
Government of the Fed. Rep. of Germany		89		290					
Unidentified sources			825	81	992	1353	191	727	341
Balance from previous year	891	175		628					
Balance of working funds		100	100	100	600	600	800	900	1000
Income applied in year		76		104					
TOTAL CAPITAL FUNDS	2670	1715	925	1553	1592	1953	1291	1627	1341
Special Projects									
W.K. Kellogg Foundation	77								
Interamerican Development Bank	161	171		319					
IDRC - Canada	30	194	81	94					
U.S.A.I.D.				265					
United Kingdom		71		87					
Rockefeller Foundation	84	113	91	96					
Ford Foundation		69	43	25					
Others	52	14		40					
Unidentified sources			535	251	1567	1850	2050	2300	2550
Balance from previous year	10	104		301	83	150	250	300	350
Income applied in year		167							
TOTAL SPECIAL PROJECT FUNDS	414	903	750	1478	1650	2000	2300	2600	2900
TOTAL FUNDS	6802	7153	7178	8534	10136	12729	13879	16123	17594
APPLICATION OF FUNDS									
Core Operations	3630	4503	5453	5453	6894	8776	10288	11896	13353
Support of special projects			50	50					
Prior years' adjustments	24								
Capital	2496	987	325	953	992	1153	191	727	141
Special Projects	310	602	750	1395	1500	1750	2000	2250	2500
Unexpended Balances									
a) Unrestricted Core	(37)	32							
b) Capital	175	628							
c) Working Funds	100	100	600	600	600	600	900	1000	1200
d) Special Projects	104	201		83	150	250	300	350	400
e) Total	342	1061	600	683	750	1050	1200	1350	1600
TOTAL APPLICATIONS	6802	7153	7178	8534	10136	12729	13879	16123	17594
Memor:									
1. Total Core Operating Funds Required			5503	6894	8776	10288	11896	13353	
Less Unexpended Balance from previous year			(32)						
Less Earned Income Applied from current year			(136)	(350)	(400)	(400)	(400)	(400)	
Net Core Operating Funds required from C.G. Donors			5335	6544	8376	9888	11496	12953	
Total Capital Funds Required			1553	1592	1953	1291	1627	1341	
Less Unexpended Balance from previous year			(628)						
Less Balance of Working Funds			(100)	(600)	(600)	(800)	(900)	(1000)	
Less Earned Income Applied from current year			(104)						
Net Capital Funds Required from C.G. Donors			721	992	1353	191	727	341	
Total Funds Required from C.G. Donors			6056	7536	9729	10379	12223	13294	
2. Total Earned Income in current year			240	350	400	400	400	400	
Applied to Core Operations			(136)	(350)	(400)	(400)	(400)	(400)	
Applied to Capital			(104)						
Balance Carried Forward			-	-	-	-	-	-	

CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL

TABLE III

SUMMARY FINANCIAL DATA - 1971 - 1976

(US\$ THOUSANDS)

	1971	1972	1973	1974	BUDGET	
					1975	1976
CURRENT ASSETS						
Cash	450	272	139	623	300	200
Receivable from Donors	471	499	497	531	500	500
Receivable from Employees	29	73	69	85	90	100
Receivable from Others	334	287	289	718	600	500
Inventories	7	54	100	199	200	200
Prepaid Expenses	-	17	5	8	10	10
Total Current Assets	1291	1202	1099	2164	1700	1510
FIXED ASSETS						
Revolving Fund Balances	51	64	42	94		
Equipment	618	758	802	1346		
Vehicles	257	314	305	568		
Furnishings and Office Equipment	236	369	378	901		
Buildings	1276	2359	3950	4429		
Other Fixed Assets	-	-	883	9		
Total Fixed Assets	2438	3864	6360	7347	8300	9800
TOTAL ASSETS	3729	5066	7459	9511	10000	11310
LIABILITIES						
Bank Overdraft	-	7	137	317	-	-
Accounts Payable	423	181	351	286	282	300
Payable to Donors	25	25	25	-	-	-
Other Liabilities	-	100	127	385	600	160
Total Liabilities	448	313	640	988	882	460
GRANTS RECEIVED IN ADVANCE			117	115	135	150
FUND BALANCES						
Capital Grants:						
Invested in Fixed Assets	2438	3864	6360	7347	8300	9800
Unexpended Funds (Deficit)						
Core —						
Unrestricted	77	(12)	(37)	32	-	-
Working Fund Grant			100	100	600	600
Capital Grants	703	891	175	628	-	-
Special Projects —						
Donors	63	35	144	301	83	300
Other		(25)	(40)			
	843	889	342	1061	683	900
Total Fund Balances	3281	4753	6702	8408	8983	10700
TOTAL LIABILITIES AND FUND BALANCES	3729	5066	7459	9511	10000	11310

June 13, 1975