Log-file S&T/Ag 936-4111
PD-AAZ-755

MODIFICATION OF GRANT

FN 62429

DUNS NO. 99-900-9491

1. Modification Number	2. Effective Date of Modification	3. Grant No.	4. Effective Date of Grant
6	January 1, 1987	DAN-0865-G-IN-3020-00	March 7, 1983

5. Grantee: (Name and Address)

The International Center for Tropical Agriculture (CIAT)
Apartado, Aereo 6713
Cali, Colombia

6. Administered By:

Agency for International Development
Office of Procurement
OP/W/FA: C.A. Williams
Washington, D. C. 20523

7. PIO/T No.: 936-4111-7361181
Appropriation No.: 72-1171021.3
Allotment Symbol: 743-30-099-00-20-71
Budget Plan Code: FDNA-87-13000-KG11
Amt. Oblig. Prior to this Mod. $22,140,000
Amt. Oblig. by this Mod. $4,820,000
Total Obligated Amount $26,960,000

8. Previous PIO/T's:
931-0865-3631114
931-0865-3631114, A1
931-0865-3631114, A2
931-0865-3641124
936-4111.04-5303091
936-4111.04-6302104

9. Description of Modification:

A. The purpose of this modification is to provide $4,820,000 in funds for the partial support of the International Center for Tropical Agriculture Calendar Year (CY) 1987 core operations, research, and program activities. These activities are fully described in Attachment A to this modification. These funds are estimated to be sufficient from January 1, 1987 through approximately December 31, 1987.

B. Amend the cover letter of the Grant to incorporate Attachment C of this modification.

C. All other terms and conditions remain unchanged.

Attachments:
A. Core Program for CY 1987.
B. Estimated Budget for 1987.
C. Amendment to cover letter.

10. AID TECHNICAL OFFICE: S&T/AGR

11. This modification is entered into pursuant to the authority of the Foreign Assistance Act of 1961, as amended. Except as herein provided, all terms and conditions of the Grant referenced in Block #3 remain unchanged and in full force and effect.

12. Grantee is required to sign this document and return 7 copies.

13. GRANTEE: The International Center for Tropical Agriculture (CIAT)

BY: [signature]

John L. Nickel
(Name typed or printed)

TITLE: Director General

DATE: 6 May 1987

THE UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT

BY: [signature]

Jay M. Bergman
(Name typed or printed)

TITLE: Grant Officer

DATE: 4/24/87

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Attachment A

CIAT MANDATE AND PROGRAM FOR 1987

The purpose and approach of CIAT is given in the following statement of objectives:

> To generate and deliver, in collaboration with national and regional institutions, improved technology which will contribute to increased production, productivity and quality of specific food commodities in the tropics--principally countries in Latin America and the Caribbean--thereby enabling producers and consumers, especially those with limited resources, to increase their purchasing power and improve their nutrition.

CIAT's strategy emphasizes enhanced production through increased resource productivity on farms with limited resources and on underutilized land areas. By contributing to the improvement of productivity on small- and medium-scale farms, the Center seeks to provide for increased rural income and employment, moderate and stable food prices, and improved diets, especially of the low-income, urban and rural population. Technology which contributed to expansion of agricultural production of suitable commodities on the less fertile frontier lands makes possible the release of the more fertile lands for maximum crop cultivation, thus achieving more efficient food and animal production using both poor and fertile land resources, to meet consumer demands.

In order to achieve the objectives and apply the strategy described above, and taking into account the results of socioeconomic studies and the mandates of other centers, the CIAT programs have evolved to currently encompass the following responsibilities within the CGIAR system:

1. Global responsibilities for beans (*Phaseolus vulgaris* and related species) and cassava (*Manihot esculenta*);

2. Area-specific responsibilities for Tropical Pastures (specific responsibilities for the acid, infertile soils of the American tropics);

3. Regional responsibilities for Rice (specific responsibilities for the American tropics).

BEAN PROGRAM

The Bean Program's objective is to develop, in collaboration with national programs, improved technology that permits increased bean production and yields. The following primary activities support this objective.

1. Genetic improvement of bean germplasm that meets the agronomic requirements of farmers as well as consumer preferences.

2. Development of agronomic practices compatible with improved genotypes.

3. Training to strengthen the research and technology transfer and validation activities of collaborating national programs.

4. International cooperation at all levels for the further development of an active bean research network throughout the action are of the Program.

Genetic improvement to overcome production problems--rather than the use of purchased inputs--is the principal strategy of the Bean Program to increase yields. Genetic improvement activities are based on the large genetic variability encountered in beans and are facilitated by the availability of more than 35,000 bean accessions (including their wild ancestors and related species) in the CIAT germplasm bank. The Bean Program performs several thousand hybridizations per year. The resulting progenies pass through uniform successive nurseries. The best selections are tested in international uniform nurseries from which the national programs select materials for direct use in regional or on-farm testing, or, alternatively, for use in their own breeding programs. At the beginning of this decade, and following several years of systematic training of national programs personnel, the program started an intensive effort to decentralize selection. Today national program scientists are increasingly selecting locally adapted materials mostly of CIAT-generated populations.

The bean breeding activities strive to combine the following desired variability.

(a) Resistance to priority diseases and insects, including bean common mosaic virus (BCMV), rust, anthracnose, angular leaf spot, common bacterial blight, and leafhoppers. In addition, the Bean Program, through its decentralized breeding strategy, attempts to incorporate into improved varieties resistance to important location-specific diseases (such as bean golden mosaic virus in Central America, or the beanfly in Africa). Of major importance in selecting improved varieties is the need to meet local color and seed size requirements. These requirements vary from country to country and from region to region.

(b) Yield potential. Increasing yield potential of a legume crop like beans is a long-term objective. In order to be able to increase yields of beans when disease resistances have been incorporated, the Program has recently started to place great emphasis on genetic improvement for increasing yield potential, first under no-stress conditions, to be followed later under diverse stress conditions.

(c) Improvement of drought resistance. Over large areas in Africa and Latin America beans suffer from drought stress. The germplasm collection and breeding will provide lines better able to withstand drought stress.

(d) Decreased dependence of fertilizer requirements. While all lines are being developed and evaluated under low fertilizer (and plant protection) regimes, a genetically improved bean/*Rhizobium* interaction is sought to increase the nitrogen fixation ability of beans. Also, the Bean Programs strives to enhance the genetic variability for adaptation to low soil phosphorus conditions which is of principal importance in Brazil and large areas in Africa.

While genetic improvement for protein content, cooking time or digestibility is not actively being pursued, the Program does monitor these factors in newly developed materials to ensure that no deterioration occurs.

Since agronomic practices are largely site-specific, the Bean Program conducts little research in this area. There are indications, however, that improved varieties perform differently on the experiment station than on farmers' fields. Given that on-farm research and regional variety trials still are inadequately developed in most countries, the Program has found it necessary to devote considerable resources to validation trials. The Bean Program has therefore developed an active on-farm research and training program with national programs to provide feedback to research and link research and extension. This program is being developed in close collaboration with Other international centers, especially with CIMMYT as beans are mostly grown in association with maize.

CASSAVA PROGRAM

The overall goal of the cassava network is to increase small farmers' income and food supply, and to improve food availability to the overall population. This goal is to be achieved by converting cassava from being mainly a traditional rural staple, to a major, multiuse carbohydrate source.

The Cassava Program has two main components or functions: firstly, that of an international center; and secondly, that of a regional center in Asia and Latin America and the Caribbean. In Asia the regional activities are closely interwoven with the Regional Coordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in Humid Tropics of Asia and the Pacific (CGPRT) which has comparative advantage in the socioeconomic aspects specific to Asian Agriculture. In Africa, IITA has a regional responsibility to serve the important needs of cassava on that continent.

The CIAT program, in its global capacity, provides the following major inputs into the overall research and development efforts of the network:

(a) Maintenance of the world cassava germplasm collection; and from this base the provision of elite gene pools with known characteristics to regional and national programs. Coupled with this effort is the development of improved breeding methodology.

(b) Development of the basic principles for establishing improved production and utilization systems, and the research methodology required to adapt such systems to local conditions.

(c) Basic research directed to better understanding the crop and its interaction with environmental stresses.

(d) Analysis of the future potential role of cassava in the economy of the developing world.

(e) Operation of the world's cassava documentation and information center.

(f) Organization of training opportunities and meetings for cassava workers from national and regional programs.

In its function as a regional center for Latin America and the Caribbean, CIAT has set up a group to investigate integration of production, utilization and marketing of cassava. This section works closely with national programs in setting up small scale integrated cassava pilot projects. The overall activities of the group concentrate on: (a) macro-economic analysis of cassava potential in given countries/projects; (b) planning and organization of project structure; (c) establishment of projects and development of local adaptive research; (d) economic analysis of the pilot projects, and (e) policy recommendations on commercialization when solicited by governments.

In order to satisfy the specific requirements of germplasm for Asia, to develop agronomic practices more appropriate to the intensive cropping systems, and also to assist in strengthening Asian national programs, a CIAT regional program is now established in Asia.

The combination of new varieties and improved agronomic practices have been shown to greatly increase cassava productivity and reduce costs. In Latin America benefits can only be reaped from this new technology by closely linking cassava with processing and marketing. The establishment of pilot projects in various countries will accelerate the diffusion process, and large increases in the use of the new storage technology for fresh cassava and the entry of large quantities of dried cassava into the animal feed market. Both these aspects of cassava will bring benefits to both the small scale producer and the consumer. The former will benefit from increased demand for his product, thus allowing him to reap the benefits of improved production technology; and the latter, in the case of fresh cassava from a cheaper, higher quality product. In the case of dried cassava for animal feed savings will be made in foreign exchange, which is so scarce in the regions at present.

In Asia the major benefits will come from the new varieties that will increase production with little or no change in production costs.

At present in Africa production of cassava is declining due to the effects of mealybugs and mites. The use of biological control, developed by cooperative activities of CIAT, IITA and the Commonwealth Institute of Biological Control CIBC in a truly international effort should reverse this trend and alleviate, at least partially, the serious food deficits in that continent.

RICE PROGRAM

Objectives for Rice Program activities in collaboration with national institutions in the Western Hemisphere include:

1. Continuing to develop germplasm-based technology designed to overcome the principal constraints to increased production of irrigated rice and the more favored upland production systems.

2. Developing widely applicable production technology, including the introduction and evaluation of appropriate farm machinery, oriented toward weed control and other related cultural practices to reduce costs and increase stability of supply.

3. Strengthening of national rice research programs in the region through training, conferences and technical collaboration activities and through

these mechanisms to further stimulate the highly effective regional rice research network which is now in place.

Research Strategy for Irrigated Rice

This system will continue to receive major attention. Enhanced tolerance to diseases (e.g., blast, other fungal diseases, "hoja blanca") and soil problems (e.g., iron toxicity and straighthead disease) would increase yields, lower production costs, and increase production stability. The approach will combine breeding directly for disease resistance with breeding for tolerance to soil stresses and emphasize weed control and lower seeding and fertilizer rates. Lowered inputs should result in decreased fungal disease severity. Additionally, breeding will focus on better lodging resistance and, simultaneously, seek modest gain in yield capacity.

Improvement in farm cultural practices is indispensable to narrow the gap between varietal yield potential and farm productivity. Research on cultural practices has lagged behind varietal development. New technology in tractor wheels will be linked to recent advances in low-volume sprayers with the goal of increasing such farm operations as seeding and applications of fertilizers, herbicides, and pesticides. This should reduce costs, increase weed control efficiency, permit reduction in seeding rates, and lessen dependence on the inefficient airplane. Work in integrated pest management shows that costly insecticide applications can be eliminated for most insects.

Many new irrigated rice areas are coming into production, principally by small producers. They lack appropriate small machinery to facilitate the transition from transplanting to direct seeding where labor is scarce. Such machines (hand seeders, boom sprayers, harvesters and threshers) are commercially available. The Rice Program will emphasize introduction of appropriate machinery through national programs.

Research strategy for the more favored upland systems.

Selected lines from the irrigated breeding program can contribute to the varietal component for expanding this system in the region. Nevertheless, a breeding program is designed to address the peculiar stresses of upland soils, particularly moisture and mineral nutrition, and their interaction with fungal diseases in several sites reflecting a range of ecologies from moderately- to highly-favored upland. Vigorous dwarf varieties tolerant to problem soils, diseases, and short dry periods should increase and stabilize yields at an average of 3 t/ha, 0.5 ton higher than existing average productivity.

Weed infestations constitute a powerful yield constraint in upland rice and are more difficult to control than in irrigated rice. Since available herbicides are relatively effective, research will focus on appropriate terrestrial delivery systems to improve timing and reduce dosages.

New Production Systems Research Strategy

The vast savanna regions of Colombia, Venezuela, and Brazil and are favored by abundant, well distributed rainfall, but the soils are extremely acid and infertile.

Although little upland rice is produced on these soils there is a clear need for a crop component in the pasture system being developed by the Tropical Pastures Program to facilitate and finance land preparation for pasture establishment. Upland rice could become a pioneer crop thus encouraging the economically sound development of acid, high rainfall savannas.

A minimum-input, upland rice system using cultivars having tolerance to acid soil and diseases appears attainable. Initial research with soil-adapted cultivars consistently gives plot yields of 3.5 to 4.5 t/ha without soil amendments or chemical protection. Thus, a 3 ton commercial yield seems reasonable and economically viable. A high volume crossing program is underway with upland materials from Africa, Brazil, Japan and other sources. Specific breeding objectives are identified and parental sources are available. Although typical, high yielding, irrigated germplasm is not useful for this ecology, many rices are well adapted to infertile, acid soils having over 80 percent aluminum saturation. Breeding will stress tolerance to Mn and Al toxicities and P, Zn, and other deficiencies. The ideal plant type remains unclear but intermediate grain quality, multiple fungal tolerances, hoja blanca, sogata, and sugar cane borer resistance are requirements.

Research on cultural practices will concentrate on weed control, methods of seeding and applying fertilizer, and conversion into pastures after one or two rice crops.

TROPICAL PASTURES PROGRAM

The objective of the Tropical Pastures Program is to develop and transfer, together with national institutions, improved, low-input pasture technology in the acid, infertile soil lowlands of the humid and subhumid tropics, with principal responsibility for tropical America, in order to increase beef and milk production, conserve and improve soil resources of tropical ecosystems, and provide a basis for an economically and ecologically sound utilization of underexploited land resources.

The Program's research team is organized into three functional groups: (a) Germplasm evaluation (including the sections of germplasm, agronomy, plant pathology, entomology, and breeding); (b) Pasture evaluation (including the sections of soil plant nutrition and microbiology, ecophysiology, pasture development, pasture quality and production); and (c) Pasture evaluation in production systems (including the sections on seed production, farming systems, and economics). These three units assure a dynamic flow of germplasm in which characterization of germplasm screening by ecosystems, assembly of appropriate pasture production technology, and economic evaluation of new pasture technology in farm systems, constitute major research areas. While thousands of germplasm entries are worked with during the initial phases of the flow of germplasm though the Program activities, only very few highly promising germplasm materials succeed in being selected for the assembly of pasture technologies and further evaluations.

The Program exploits the natural variability of germplasm to identify grass and legume species adapted to the various ecosystems in the region. Accordingly, germplasm is assembled from a wide range of conditions throughout the acid, infertile soil regions of tropical America as well as Southeast Asia and Africa. Presently, the CIAT germplasm bank contains some 16,000 accessions.

This germplasm is screened for tolerance to high soil aluminum and acidity, low phosphorus availability, and tolerance to diseases and insects. Ecotypes which pass this first screening are characterized in terms of tolerance to drought, flooding, burning, grazing, minimum nutrient requirements, nutritive value, and compatibility in grass/legume mixtures. Subsequently, pastures based on highly promising ecotypes are assembled, relevant establishment technology is developed, and cattle liveweight gains are measured. The most promising pasture combinations are subjected to a long-term productivity and economic evaluation, and the respective technological packages are further adapted to the requirements of the predominant farm system in the area. Finally, the improved technology is evaluated in economic terms. This entire research process is carried out in close collaboration with national institutions throughout the area of interest.

To date the main screening sites, which represent major ecosystems, are:

The Carimagua Research Station in the Eastern Plains of Colombia, jointly administered with the Colombian Agricultural Research Institute (ICA), and representing the isohyperthermic savannas, including the "Llanos" of Colombia and Venezuela and the "campos" of northern Brazil (Amapa and Roraima).

The Brazilian Agricultural Center for the Cerrados (CPAC) of EMBRAPA in the central cerrado plateau, near Brasilia. This center represents the isothermic savannas of the continent, including the "Cerrados" of Brazil and well-drained savanna areas of Bolivia and Paraguay.

The Cattle Production Research Station of the Veterinary Institute for Tropical and High-Altitude Research (IVITA), at Pucallpa, Peru, where CIAT participates in a cooperative project to develop low-input pasture technology for the reclamation of already degraded lands in the humid tropics of the continent. CIAT's partners in this project are IVITA and the Peruvian National Institute for Agricultural Research and Promotion (INIPA).

TRAINING

To date, CIAT has provided training to some three thousand professionals. Throughout the years, CIAT has emphasized training in research methodology and production technology as related to the commodities in the Center's mandate. Recent survey data show that 60% of former CIAT training participants are actively working with the commodities on which they received training; an additional 15% continue to be active in agricultural research, albeit not directly related to CIAT's commodities. Nevertheless, the continued growth of national programs and the shift of their personnel to other institutions, including the private sector, continuously renews the demand for training of new personnel.

CIAT training has helped national programs of numerous countries in Latin America, Asia, and Africa to become stronger and to increase their capacity to engage in applied, adaptive, and validative research. CIAT-trained scientists increasingly are playing major roles in the selection and release of new varieties and attendant technologies. Training has also been a key contributing factor in the establishment and development of international and regional research networks on beans, rice, tropical pastures and cassava. These networks facilitate

exchange of germplasm and technical information, and play an important role in the organization and conduct of cooperative research with CIAT and among participative countries. Conferences are the principal tool for the exchange of information and the coordination and development of concerted research strategies in the networks.

In the last two years the training and conference activities at CIAT have streamlined operation to focus more clearly than ever on concerted collaboration with national research programs and private industry to inter-link the various research efforts, and to get newly available technology moving towards the producers' fields. Three sets of action programs have been put into practice:

1) A progressive shifting of emphasis from courses at Palmira headquarters to in-country courses conducted by national institutions with the assistance of CIAT. Such courses are frequently coordinated with the release of new varieties and/or agronomic and plant protection practices.

2) The development of training plans based on expressed medium- and long-term interests of national programs and their scientific manpower needs with regard to CIAT's commodities.

3) The regionalization of courses to increasingly focus on the circumstances of specific regions.

Degree-related training continues to receive high priority but actual increases in this type of training are difficult to realize due to scarcity of funds for academic study.

After many years of predominantly focusing attention in training on Latin America, CIAT's increasing role in Asia (cassava) and Africa (beans) have caused the Center to receive for training an increasing number of professionals from developing countries outside of Latin America and to organize relevant training opportunities in the respective regions.

Through the Seed Unit, CIAT has assumed a lead role in Latin America and the Caribbean in providing training on seed technology and contributing to the development of seed programs in the region through an active conference/workshop program.

Future Plans

The table below shows the projections of training activities in terms of number of participants and person-months for each type of training for the period 1986-1987. The growth in person-months is a result of the relative increase in longer-term training internships (average 6 months), post-M.Sc. training (average 10 months) and thesis training (average 14 months). Short courses at headquarters will gradually decrease as short-term training is shifted to CIAT-assisted in-country courses. Funding for in-country short courses is expected to come mainly from interested country institutions. Regional courses will increase substantially, particularly in Africa.

Number of Participants and Person-months of Training Planned for 1986-1987.

Type of Training	1987 Person/month
INDIVIDUAL TRAINING	
Thesis Research (M.S. and Ph.D.)	448
Specialized Internships	1040
SUBTOTAL	1488
GROUP TRAINING	
Multidisciplinary Courses	22
Specialized Courses	180
Regional Courses	72
SUBTOTAL	274
TOTAL	1762
IN-COUNTRY COURSES	340

Attachment B

CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL - CIAT
PROPOSED BUDGET 1987
SUMMARY OF MAN-YEARS AND COSTS BY PROGRAM AND ACTIVITY

	M-Y		86$000	
OPERATIONS PROGRAM				
RESEARCH PROGRAMS				
Beans	16.0		2,988	
Cassava	10.0		2,108	
Rice	7.0		1,190	
Tropical Pastures	18.0		3,428	
Sub-Total		51.0		9,714
RESEARCH SUPPORT				
Visiting Scientists & Post.Doc.			691	
Genetic Resources	1.0		361	
Biotechnology Research	3.0		491	
Research Services			268	
Station Operations	1.0		782	
Carimagua Station			533	
Data Services	1.0		480	
Agroecological Studies	2.0		297	
Seed Unit	2.0		469	
Sub-Total		10.0		4,372
TOTAL RESEARCH		61.0		14,086
INTERNATIONAL COOPERATION				
Training & Conferences	1.0		1,396	
Communication & Info. Support	3.0		1,423	
TOTAL INTERN. COOP.		4.0		2,819
ADMINISTRATION				
Board of Trustees			142	
Director General	2.0		504	
Directors	3.0		524	
Administrative Support	1.0		1,343	
TOTAL ADMINISTRATION		6.0		2,513
GENERAL OPERATING EXPENSES				
Physical Plant			1,100	
Motor Pool			845	
General Expenses			532	
TOTAL GENERAL EXPENSES				2,477
OTHER				
Contingency			216	
Provision for Price Changes			884	
TOTAL OTHERS				1,100
TOTAL OPERATIONS		71.0		22,995

	86$000	
CATEGORIES OF EXPENSES		
Personnel Costs	14,873	
Honoraria, Stipends & Allow.	1,367	
Supplies & Services	3,552	
Travel	1,445	
Equipment	714	
Other	(56)	
Contingency	216	
Sub-Total		22,111
Provision for Price Changes		884
TOTAL CORE		87$22,995
CAPITAL		
-Capital Development	87$1,078	
-Working Capital	87$ 175	87$1,253
TOTAL CORE BUDGET		87$24,248
Minus Offsetting Items		87$ 300
Funds Requested from Donors		87$23,948

Proposed CIAT CY 1987 Operations Budget

A.	Total Support Budget	$22,995,000
	A.I.D. Contribution	4,820,000
	Other Sources:	18,175,000

B. The A.I.D. contribution shall not be used for Capital Development.

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Attachment C

The Center agrees that it will not utilize U.S. funds to support research activities which are designed to increase the growth or production of any agricultural commodity for export to any country other than the U.S. if such exports reasonably can be expected to cause substantial injury to U.S. exporters of similar commodities to those countries.

The center will provide an annual statement indicating the projects or activities to which United States funds have been attributed, together with a brief description of the activities adequate to show that United States funds have not been used for the purpose noted above. The center further agrees to refund to A.I.D. upon request an amount equal to any United States funds used for this purpose.