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AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Bolivia

Exploratory Research in Farming Systems

Project Number: 511-0464

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Department of State

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SUBJECT:EXPLORATORY RESEARCH IN FARMING SYSTEMS

REF: STATE 234123

1. ON SEPTEMBER 28, 1976, AA/LA APPROVED THE SUBJECT GRANT PROJECT.

2. MISSION IS AUTHORIZED TO SIGN A PROJECT AGREEMENT FOR THE SUBJECT 495,000 DOLS GRANT PROJECT. IN ORDER TO ASSURE OBLIGATION OF THESE FUNDS IN THE TRANSITION QUARTER, THE PROJECT AGREEMENT MUST BE SIGNED BY SEPTEMBER 30, 1976.

3. ADVICE OF ALLOTMENT FOLLOWS BY IMMEDIATE SEPTTEL. ROBINSON.

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EXPLORATORY RESEARCH IN FARMING SYSTEMS

IN NORTH CENTRAL ORIENTE

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PART I. Summary and Recommendations

A. Face Sheet

B. Recommendations

Pursuant to the analysis contained in this Project Paper, the Mission recommends that AID authorize a grant in the amount of \$495,000 to the Government of Bolivia for use by the Bolivian Institute of Agricultural Technology (IBTA). The funds would be utilized to support basic agronomic research which would facilitate the participation of the small farm sub-sector in the agricultural development of Bolivia's north central Oriente.

C. Description of the Project

1. Grantee and Implementing Agency

The Grantee will be the Government of Bolivia (GOB). The Bolivian Institute of Agricultural Technology (IBTA), a semi-autonomous agency of the Ministry of Agriculture and Rural Affairs (MACA) which is responsible for the coordination of all research and extension activities in Bolivia, will serve as the Project coordinator and implementing agency. The Development Corporations of the Departments of Beni and Pando will collaborate with IBTA both substantively and financially in the establishment and activities of the research stations which will receive Project assistance.

2. Amount of Assistance

AID Grant Funds	\$ 495,000	(50%)
GOB Contribution	\$ 260,000	(27%)
Development Corporations	\$ 210,000	(21%)
Small Farmer Contribution	\$ 20,000	(2%)

3. Summary Description of Project

The Project will consist of assistance to the GOB for the research of appropriate crop and livestock technologies for integration into small farm systems in the north central Oriente. In terms of organization, the project will involve a joint effort among IBTA, the Development Corporations of the Departments of Beni and Pando and USAID. AID funds will finance technical assistance, research equipment, training, vehicles, and communications equipment. Research activities will focus on the investigation and identification of crop and livestock technologies suitable for incorporation into small farm production systems in the Project area. Research activities will be carried out on three research stations, and about fifty small farms representative of the various ecological regions in the Project area. Research results will assist the GOB in planning for the development of this sparsely populated area which has significant agricultural potential, and which will be connected to the major markets of Bolivia by reliable road transportation within the next five years, according to current plans.

The Project's target group will be the small farmer of the north central Oriente. Initially, the Project's direct beneficiaries will be limited to the estimated 40 to 50 small farmer participants in the applied research program. Ultimately, research results may be extended to the estimated 35,000 small farmers already in the area, and to a large number of incoming campesino settlers from more densely populated areas in the highlands and valleys.

It is anticipated that the Project will contribute to the long-term development of the north central Oriente not only through the provision of agronomic data which is vital to development planning, but also through the development of a continuing capability for research and extension in appropriate small farm technologies.

D. Summary Findings

The Project Committee has determined that the proposed activities are technically and financially feasible for completion within the Project's disbursement period. Research activities will be carefully planned by DETA and the long-term Advisor on the basis of an assessment of small farm production systems and constraints currently faced by small farmers. Constant contact with small farmers through on-farm experiments is expected to maintain the relevance of research activities to small farm constraints and production possibilities. The implementing agency is believed to have the capacity to direct and coordinate research activities. There appear to be no financial constraints to prevent the GOB and the participating departmental Development Corporations from providing the funding required for Project implementation.

On the basis of the analysis contained in this Project Paper, the USAID Mission to Bolivia concludes that the Project is technically, economically and financially sound, and will contribute to small farmer participation in the development of the north central Oriente.

E. Conditions of Project Approval

The conditions of Project approval are discussed in Section V. F., and will be met prior to the signing of the Project Agreement scheduled for no later than September 30, 1976.

F. Project Paper Committee

Helen Soos,	RTD, Project Manager
Douglas Kline,	TR, Project Coordinator
Richard Archie,	PR
Tom Fallon,	CON

Drafted by: Helen Soos and Douglas Kline

PART II. PROJECT BACKGROUND

A. Background of Project Proposal

1. Priority and Relevance

The Agricultural Sector provides a livelihood for two-thirds of Bolivia's population, yet contributes less than 20% to the country's gross domestic product. Estimated per capita output of food is about 15% below the average for Latin America. Over the last fifteen years food production in Bolivia has been increasing at a rate of about 2 percent annually, while food demand has been growing at about 4 percent per year. The gap in food production relative to demand has resulted in an apparent per capita decline in food production of 12 to 13 percent over the past ten years, although some improvement may have occurred in the past two years with the discontinuation of rigid price controls.

Decreases in food production relative to demand are in part a function of uneven population distribution, as this distribution relates to Bolivia's natural resource base for potential agricultural production. Of an estimated rural population of 3.8 million in 1975, 1.4 million or 37% of the population inhabited the Altiplano, 1.7 million or 47% inhabited the Valleys and Yungas, and the remaining 586,000 (16%) inhabited the lowlands of the Oriente. Thus, approximately 84% of Bolivia's rural population lives on about 40% of the national territory, which is about equally divided between the over-populated, low-yielding Altiplano and the Valley regions.

The sparsely populated lowlands include tropical rain forests in the northwest, vast natural pastures in central areas, sub-tropical forest and savannah in the south central region, with poorer and dryer lands of the Frazilian Shield to the east and of the Chaco in the south. About half of this lowland region, or about 30% of Bolivia's national territory, contains potentially productive arable farm and pasture land.

A recent AID contracted study on the agricultural potential of the Oriente, A Preliminary Study of Areas for Small Farmer Settlement in the Bolivian Lowlands (Manuel Vivado P. y Asociados, August, 1976), indicates that much of the land in the Oriente appears to have significant agricultural potential. Using USDA/SCS Land Capability

Classes, Classes I through IV are considered suitable for field crops, permanent crops, and pasture. Class I refers to the best soils and so on in decreasing order. Class IV is suitable for agriculture, but with some limitations. Class V is of value for pasture, range, woodland or wildlife. In the Oriente, the division of land into five capability classes is as follows:

Class I	59,270	Km ²
Class II	31,950	Km ²
Class III	141,550	Km ²
Class IV	32,420	Km ²
Class V	<u>333,118</u>	Km ²
Total	598,308	Km ²

Thus about 10% of the 600,000 square kilometers in the Oriente has high agricultural potential. A substantial portion of this land is in the Pando Department (See Figure 2). Another 29% of the land falls under Classes II and III, in the Beni and Pando Departments as well as Santa Cruz. Despite the preliminary nature of this information, it is clear that agricultural potential in the Oriente exists. A satellite study financed under the New Lands Development Loan (511-T-050) will further investigate the potential of agricultural lands in the Oriente.

The development experience of the Santa Cruz Department provides an example of the type of agricultural development which could occur in the Beni and Pando Departments. The growth of agricultural production in the rich lands surrounding Santa Cruz has been impressive, with the value of production averaging an annual growth rate of about 30% since 1963. This development is attributable to a combination of factors, including rich lands, access roads and enterprising settlers.

The objective of the present proposal is to investigate the agronomic aspects of the land potential in the heretofore sparsely settled Departments of Beni and Pando, with a specific emphasis on how small farmers can take advantage of the opportunities which will be forthcoming in the area as access roads are constructed. (See Section II. A. 2.) Accordingly, the Project purpose is to research appropriate crop and livestock technologies and develop strategies to introduce improved farming systems applicable to small farmers of the north central Oriente, specifically in the Departments of Beni and Pando.

With the development of appropriate technology to support such production systems and the concomitant expansion of the transportation network in accord with current plans and expectations, Bolivian agriculture could progress toward the goals of increasing domestic food production while providing opportunities for higher incomes and improved standards of living for the rural poor.

The present proposal for exploratory research of the agricultural potential of the Beni and Pando Departments is a direct result of the high priority given to the area in the current GOB five year development plan, and of a specific request by MACA. Bolivian officials foresee that the present road building programs linking La Paz with Rurrenabaque will provide Altiplano and Valleys settlers the opportunity to resettle in the Rio Beni area as well as eastward from Rurrenabaque toward Reyes, San Borja, San Ignacio and eventually northward following the road from Santa Cruz to Trinidad. Because Altiplano settlers will bring with them traditional highland technology unsuited to the exigencies of sub-tropical and tropical agriculture, MACA officials desire to gain empirical data on the agricultural potential of the tropical savannah regions of central Beni and the humid tropics region of Pando well in advance of the spontaneous colonization. ^{1/}

The development experience of Bolivia to date, as well as that of other Latin American countries, leaves little doubt that the improved access will be accompanied- and even preceded by- an influx of settlers and colonists seeking new opportunities for a better and more productive life. Most of these new settlers, who currently live in the overcrowded highlands where agricultural productivity is low, will find difficulty in adapting to a new ecological environment and will have to adjust to agricultural technologies which are yet imperfectly understood. If small farmer technologies are not developed and these technologies are not disseminated via an organized program directed at small farmers, large land holders will benefit from the opening up of the area as was the case in Santa Cruz with the completion of the Santa Cruz/Cochabamba highway.

Specific colonization schemes are in preliminary stages of planning, both by the GOB and by other donors including AID. The research undertaken through this Project will constitute a major input into

^{1/} Previous results in Bolivia have shown that the first five years after the settlers arrival in a new environment are the most critical and constitute the period when the greatest percentage of abandonment and return to the Altiplano or Valley areas occurs if they are not able to incorporate appropriate production technologies.

these colonization schemes. However, historical experience in Bolivia indicates that at least four times as many Bolivians engage in spontaneous colonization as in directed colonization, once access is available. Therefore the outputs of this Project, while they will contribute to the planning of colonization activities, will also assist the many Bolivians who are likely to settle spontaneously.

2. Current Development Activities and Plans

Currently, a limited amount of GOB and USAID assistance is being channeled into the Santa Cruz area of the south central Oriente. In this area, agroclimatic conditions and the proximity and ease of access to the external and highlands market favor a relatively intensive agricultural development based mainly on cereal grains, sugar, cotton and other food crops. Livestock husbandry, again based on intensive management techniques, is also a significant activity in this area.

However, other areas of the lowlands, particularly the north central Oriente which lie principally in the Departments of Beni and Pando are largely undeveloped and support but a limited and widely dispersed population. These areas are characterized by vast grassland savannahs which are utilized for extensive livestock grazing and by tropical forests. The areas appear to have the potential to support more intensive crop and livestock husbandry.

To date, the principal factor which has hindered the development of north-central lowlands/ ^{has been the lack} of a transportation network. Currently, the main transportation service into this area is by river boat or by air to one of about nine towns or 50 small airstrips which are utilized mainly for shipping slaughtered beef carcasses to urban markets. Current transportation costs dictate that only products with high value-to-weight ratios are feasible for commercial production. But this situation is changing. The GOB and other donors are jointly developing plans and projects to open access routes to several population centers in these areas. Within the La Paz Department, the IDB is financing the construction of a road from Suapi to Puerto Salinas which will eventually help to link La Paz and Trinidad. The Public Works Committee of Beni and Santa Cruz Departments are financing the construction of an all-weather highway connecting Trinidad and Santa Cruz. This road will be cleared by late 1976, but will require approximately four years to construct to all-weather standards. A new road from Trinidad west to San Ignacio, and ultimately on to San Borja and Puerto Salinas is also being constructed with Brazilian equipment. An overland trail

FIGURE 1 : MAP OF ROAD CONSTRUCTION ACTIVITIES

MINISTERIO DE TRANSPORTES Y COMUNICACIONES
SERVICIO NACIONAL DE CAMINOS

BOLIVIA

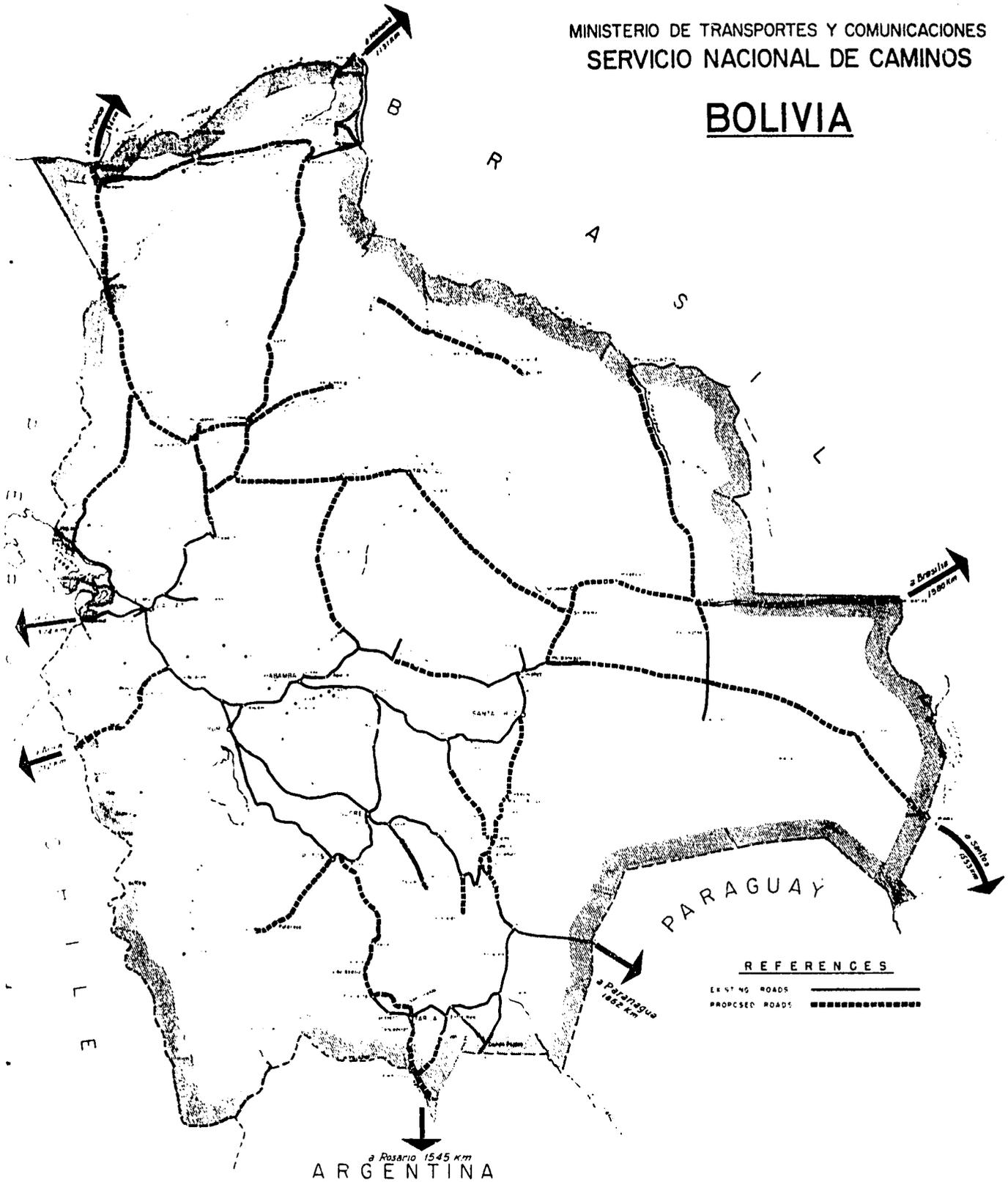


TABLE I : ROAD CONSTRUCTION ACTIVITIES

<u>Section</u>	<u>Current Status</u>	<u>Financing</u>	<u>Completion Time</u>	<u>GOB Entity in Charge</u>
Trinidad-San Borja	Under Construction (Approx. 10% complete)	Treasury & Beni P.W. Committee	Probably this year	S.N.C.
Sapecho-San Borja	Under Construction (Approx. 75% complete)	Treasury	Probably this year	Army Battallion
Cobija-Porvenir	Complete	-	-	-
Porvenir-Pto. Heath	Under Construction	Treasury	In three years	Army Battallion
Porvenir-Riberalta	No Studies yet	-	Six years	-
Mapiri-Apolo	Under Construction	Various	In 1977	O.S.C.A.R. (Church entity)
Rurrenabaque-Reyes	Complete	-	-	-
Reyes-Santa Rosa	Under Construction	Treasury	Probably this year	
Santa Rosa-Riberalta	Planned to start in 1977	-	-	-
Buena Ventura-Ixiamas	Under Construction	Cordepaz and Prefectura of La Paz	Four years	CORDEPAZ
Puerto Siles - Baures	Under Construction	Treasury and Beni P.W. Committee	-	S.N.C.
Trinidad-San Romero	Under Construction	Beni and Santa Cruz P.W. Committee	Four Years	S.N.C.

northward from Puerto Salinas to connect Riberalta and Guayaramerin with the new road terminus will probably constitute the next phase of the use of the Brazilian equipment. Other overland links connecting such places as Apolo, Magdalena, and Concepción with the primary highway system will probably become realities through complementary development activities. The above transportation network will link the Beni with the consumption centers of La Paz, Cochabamba and Santa Cruz over the next five years. (See Table I)

B. Overview of Related Activities

Several on-going activities supported by the GOB and various international agencies will complement the activities proposed in this Project.

The foremost among these is the IICA-Tropicos project through which the GOB is undertaking to strengthen its agricultural research capacity in tropical areas, which comprise 60% of Bolivia's national territory. The OAS sponsored IICA-Tropicos project consists of international collaboration with Brazil, Colombia, Ecuador, Perú and Venezuela for research in tropical agriculture in Latin America. It is anticipated that the proposed Project will assist the GOB with its contribution to the IICA-Tropico project. Bolivia's contribution will also assist other Latin American countries through the utilization of complementary research with respect to the role of pastures and livestock production. The above project is based on technical collaboration rather than financial assistance; the only direct assistance that Bolivia can obtain from it is the form of occasional technical expertise.

The Inter-American Development Bank plans to provide technical assistance to IBTA for the organization and implementation of a national program for agronomic research. This assistance will be concentrated in IBTA's central office in La Paz.

Research and training activities supported by USAID in the Agriculture Sector I Project and the Coca Crop Substitution Project will indirectly complement the proposed Project through the strengthening of national research capability which will ultimately strengthen research in the Oriente. Both of the above Projects are limited in geographic scope. Some of the research results may eventually be complementary to research in the Oriente.

An ERTS-GEOBOL satellite study currently underway through AID's Tropical Lands Development Project (Loan 511-T-050) will complement the proposed Project over the long term. The objective of the study, which is scheduled for CY 1977, is to identify land areas which are appropriate for future colonization in the Oriente of Bolivia.

The World Bank is currently implementing an animal health project in the Beni. This project is expected to assist primarily large beef producers in the Beni, but may eventually reach the small farmer as well.

In 1976, the United Kingdom initiated a technical assistance project (the British Tropical Mission) to assist the GOB in the research and development of improved technologies in sugar cane, cotton, and tropical forages in the Santa Cruz area. To the extent that similar ecological conditions permit, coordination with this project will be maintained to incorporate mutually beneficial knowledge.

PART III PROJECT DESCRIPTION

A. Goal and Purpose

The goal of the Project, which coincides with the GOB's agriculture sector goal, is to increase the per capita income and the standard of living of the rural people. The sub-goal of the Project is to facilitate the participation of the small farm sub-sector in the agricultural development of the north central Oriente.

The purposes of the Project are:

1. To develop and evaluate new small farmer production models compatible with the various ecological systems in north central Oriente of Bolivia.
2. To promote the development of a continuing capability for research and extension in appropriate small farmer technologies for the north central Oriente.

In light of the skewed distribution of Bolivia's population relative to the apparent agricultural potential of the land resources, and the current construction of major highways linking Trinidad to both Santa Cruz and La Paz, and La Paz to the Pando, the Project will assist the GOB in planning for a more rational distribution of Bolivia's human and natural resources. The Project will contribute a vital input toward the understanding of the agricultural potential of the north central Oriente. This input will assist the GOB in planning for the development of that region and facilitating the design of appropriate investment programs for the region. By promoting the development of an appropriate technological base for existing and future small farmer settlers in the area, the Project will contribute to the sector goal of increasing per capita income and enhancing the living standards of rural Bolivians. In addition to contributing to the execution of this Project, the institutional purpose of the Project will facilitate a more rapid development of the necessary research and extension services that will be required for subsequent development projects in the area.

B. Project Outputs

1. A study and analysis of the current production systems used by the small farmers in the North Central Oriente.

2. A research plan designed to gather and analyze information on soils, mean temperatures and rainfall and to organize research, experimental stations and cooperating farmers for the initiation of varietal and cultural practice testing programs.

- 2a. Research plan revisions as required.

3. A report on soil and climatic conditions and a set of hypothesis for the initiation of a varietal and cultural practices testing program. (Hypotheses redeveloped as required).

4. MACA agronomists selected for training: a) to MS level; b) to CIAT; and 3' short term visits.
5. Ecological zones and cooperating farmers selected and on-farm experiments concluded.
6. A summary crop calendar describing inputs used and testing results.
7. Analysis of testing results and a report recommending crop specific technologies for each of the areas involved in testing.
8. Hypotheses on inter and multiple cropping and livestock systems designed, evaluated, and reported.
9. A study on the economics and marketing possibilities and constraints of technically viable production models.
10. A summary report identifying basic problems and/or potential requiring further research in the areas of production, processing and transportation.
11. A summary report drawing on the above reports of the agricultural potential in the North Central Oriente will be written and published for policy input to the Ministry of Agriculture.

C. The Project Focus

1. The Project Area

The Project will focus on the Departments of Beni and Pando, and more specifically on the two ecologically diverse regions therein: the natural grasslands of the central Beni Plains, and the tropical semi-deciduous forest of Pando and northeast Beni.

a. Beni Plains

The entire Department of Beni falls within the Tosi-Holdridge humid sub-tropical forest classification, and comprises about 135,848 square kilometers or approximately 15% of the total land area of Bolivia. These vast natural grasslands, interspersed with gallery forests along stream systems, can be characterized by elevations ranging from 600 to 850 feet, average temperatures of 79°F, average rainfall of about 70 inches, and a total

population of about 116,000 with a combined urban and rural population density of .85 per square kilometer. Large portions of the region are inundated for 3 to 6 months of the year, but there is a pronounced dry season from June through September. At present the two main commercial agricultural activities are beef cattle and rice, both of which have a comparative advantage in this particular type of rainfall regime with its seasonal flooding and heavy but relatively fertile soils.

Agriculturally this region is important to Bolivia as a provider of beef. The Beni is presently supporting approximately a million head of beef cattle or about 44% of the national cattle herd. The Beni Development Corporation estimates that this cattle herd could be tripled in the future by the introduction of improved herd management systems.

The agricultural potential of this region, particularly in terms of activities which could implicate small farmers, is significant in terms of Bolivia's current agricultural production. At the present time, basic foods including vegetables and fruits are imported into the Beni from Cochabamba. Yet this region appears to have the potential not only to be self-sufficient in almost all basic crops, but also to provide the Bolivian market with livestock of various types and staple food and feed grains such as rice, corn, beans and sorghum.

b. Tropical Semi-Deciduous Forest

The northern segment of Beni and the Department of Pando are so similar in biological, infrastructure, human resources, and soil and forest characteristics, that they are treated as one ecological agricultural system. These regions fall within the Amazon Rain Forest ecologic zone and are identified as Humid Tropical Forest and Premontane Humid Tropical Forest in the Tosi-Holdridge Classification. Elevations vary from 400 to 1150 feet, annual temperatures average about 83°F, and average annual precipitation ranges from 90 to 100 inches which is distributed throughout the year.

The overall soil pattern is complex due to an intricate network of surface drainage. This is characterized by alluvial terraces, natural back-water swamp areas and uplands not subject to annual inundation. The terrain varies from undulating to perfectly flat. There remains a considerable amount of information to be gathered concerning this region. Until further studies are performed, the use of non-alluvial soils probably should be restricted to permanent tree or horticultural crops. The delicate balance now in effect which has produced one of the most impressive rain forest regions left in Bolivia requires further study before major settlement activities are encouraged.

Agriculturally, the region is important to Bolivia as an earner of foreign exchange by exploitation of this vast forest empire for Brazil nuts, rubber, and precious woods. The principal agricultural enterprises are extractive in nature: they include the gathering of Brazil nuts and tapping of wild rubber, extraction of precious woods, and the pursuit of fish and game for food and commerce. There is an incipient agriculture developing along existing penetration roads and navigable streams. For development purposes the whole region is burdened with a series of constraints which mitigate against desirable development goals. These include low investments in the area; communications problems; lack of transportation and marketing infrastructure; and a small population with limited manpower both qualified and unskilled.

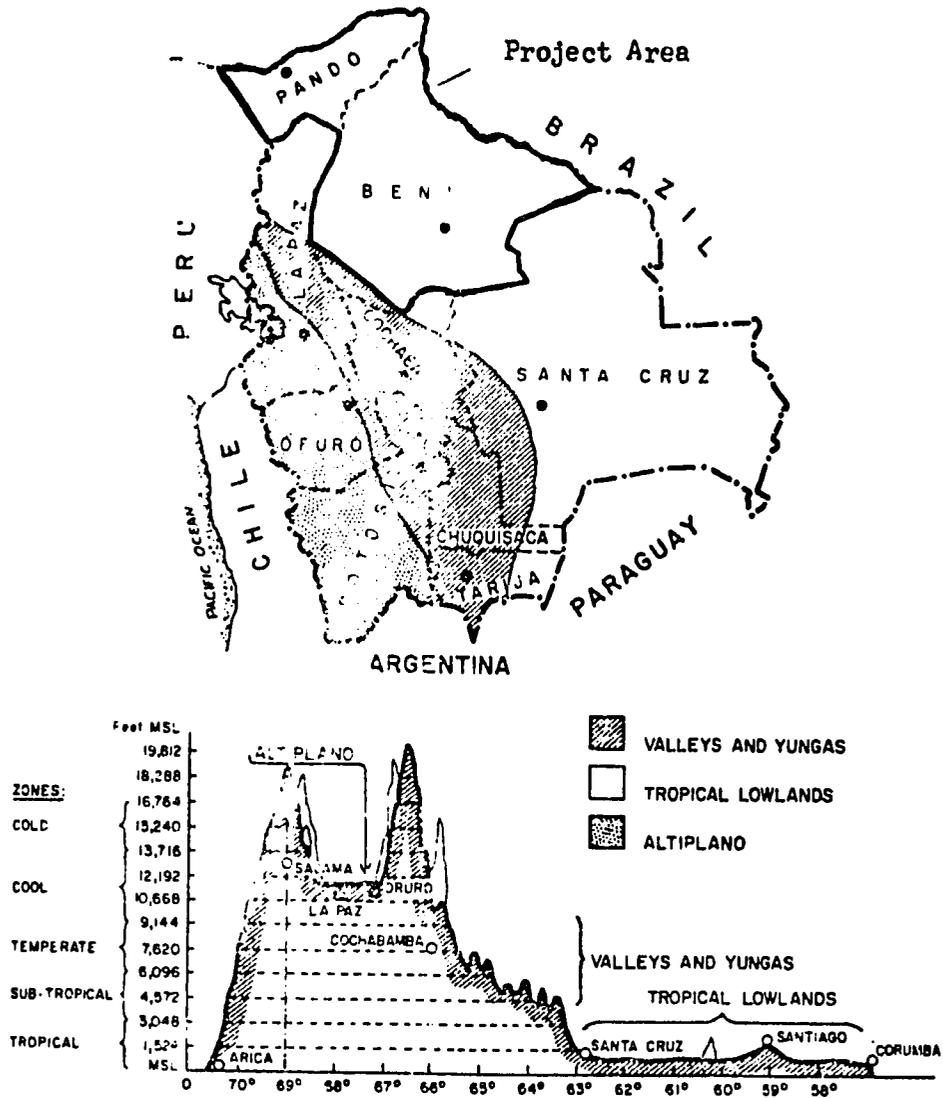
2. The Research Focus

Currently, IBTA maintains only one basic agricultural research station within the Project area. This station, located at Riberalta, was established in the mid-1950's, and has concentrated research on rubber and oil palm. Given the vast area, both geographically and ecologically, it was apparent that this station could not respond to the range of agricultural research required to achieve the desired results. During intensive review discussions between MACA and USAID officials, the GOB pinpointed three principal priority areas in which bilateral collaboration would be most productive. The first of these areas is the Central Beni Plains surrounding Trinidad. The other two areas are in the humid forest regions of Cobija in the Department of Pando and Riberalta in the Department of Beni. IBTA and USAID officials then agreed to concentrate the major portion of Project resources on the development of a joint IBTA/CODEBENI station in the Trinidad area. Some equipment, guidance, and supervisory assistance amounting to about 25% of AID funds will be channelled to the existing station in Riberalta and a new IBTA/CORDENO station in Cobija respectively. This research focus was selected for the following reasons:

- 1) The Trinidad area represents a growing population center with some spontaneous and semi-directed colonization activities already underway, the latter under the auspices of CODEBENI.

- 2) This area will be linked by road to both La Paz and Santa Cruz over the next five or so years, whereas direct road (and market) links to Riberalta and Pando are contemplated over a longer period. Therefore the Trinidad area is likely to be settled first.

Figure 2: Area of Project Focus



3) The existing research capability in the Trinidad area is better than in the Pando given the existence of University research facilities, the presence of a rice development project with Chinese technical assistance funded jointly by the Development Corporations of the Department of Beni and Santa Cruz, and the strong interest and initiative of CODEBENI in establishing a research station.

4) The Trinidad area possesses greater potential in the short-run to be incorporated into the Bolivian national economy owing to easier access and more hospitable ecological conditions.

Despite this proclivity toward the Trinidad area, the MACA through IBTA, as Project moderator, will allocate at least 25% of Project funds to the tropical semi-deciduous area of Pando and northern Beni, since this frontier region appears to have a substantial agricultural potential which is complementary to rather than competitive with other parts of Bolivia, and can easily export products to the Brazilian market.

In addition, it is anticipated that experimentation and regional trials will be conducted on the farm of up to fifty participating farmers in varying ecological zones of the Project area. This collaboration will extend the Project focus beyond the immediate areas of the research station.

3. The Target Group

The Project's target group will be the small farmer of the north central Oriente. Initially, the Project's direct beneficiaries will be limited to the estimated 40 to 50 small farmer participants in the applied research program. Ultimately, a relevant technological informational base should be available to be extended to a portion of the estimated 35,000 small farmers already in the area (19,000 in the Central Oriente and 16,000 in the North Oriente), and to a large number of incoming campesino settlers from more densely populated areas in the highlands and valleys.

D. Project Design

The project will consist of assistance to the GOB for the research of appropriate crop and livestock technologies for integration into small farm systems in the north central Oriente. The project headquarters will be in Trinidad near the major station (San Carlitos) to be developed under this Project. Two sub-stations, Riberalta and Cobiá, will also be utilized to carry out on-station trials. Implementation and supervision of the regional or ecological zone trials, as well as those with cooperating farmers, will be carried out in their respective areas by the technicians of these three stations.

In terms of organization, the Project will involve a joint effort between IBTA, the Development Corporations of the Departments of Beni and Pando, and USAID. Tentative arrangements developed between IBTA and the two development corporations will be formalized upon notice of AID approval of this Project. IBTA will also be responsible for providing liaison on an information/exchange basis between this Project and that of CIAT ^{1/}related activities, University at Beni, and a Swiss technical team at Reyes in the foothills of the Alto Beni region. The IBTA project manager at Trinidad will serve as the counterpart to the long-term Project financed technician, with coordination at the La Paz office/^{being} the responsibility of the Chief of the IBTA Planning Office.

The implementation of research activities will be based on constant contact with production constraints at the level of small farm systems. As field work progresses, the Project will involve the participation of up to 50 small farm collaborators. The experimental work thus carried on by the Project at the farm level will be as much promotional or extension oriented as research oriented.

1. Instituto Boliviano de Tecnología Agropecuaria (IBTA)

Primary responsibility for the implementation of the Project will be in IBTA, the new semi-autonomous agency of the Ministry of Campesino Affairs and Agriculture resulting from a decentralization of MACA's research and extension services. IBTA was created by the Supreme Decree No. 13168 in December, 1975 to serve as the coordinating agency for all agricultural research and extension activities in Bolivia.

IBTA currently has 274 employees, including nine with Ph.D. or Master Degrees. (For further detail on the functions of IBTA, see Section IV.B.)

2. The Beni Development Committee (CODEBENI)

CODEBENI will play a key role in the implementation of the Project, principally in the Trinidad area but also to a lesser extent throughout the entire Department of Beni. On its initiative, but with knowledge of the possibility of this Project, CODEBENI initiated development of an experimental research station at San Carlitos, 25 Km. east of Trinidad, in March 1976. Progress attained at this station during its short period of existence is impressive for an institution of such limited resources: a basic infrastructure of buildings has been erected, and some research activities underway with minimal equipment. Project and IBTA support, collaboration and direction will provide timely assistance. A joint IBTA/CODEBENI effort will also assist IBTA insofar as CODEBENI personnel can provide inputs to the Project activities and have a

^{1/} Center for Investigation for Tropical Agriculture, the joint IBTA/CORDESCO (Santa Cruz) research and extension entity, similar to the federal/state systems of the U.S. This Project may encourage a similar evolution in the Beni and Pando Departments.

vested interest in applying research results towards the development of the Beni. Studies of various types already carried out by CODEBENI attest not only to the intelligence and thoroughness with which CODEBENI is tackling a complex development challenge, but also to the analytical base from which they can proceed. CODEBENI currently employs ten professionals, five of which are involved in its agricultural activities.

Apart from serving as a prime collaborator in exploratory research, CODEBENI will play a key role in the identification and selection of zones representative of the diverse ecological regions in the Beni, and of small farmers in these zones who can participate in experimental research.

3. The Development Corporation of the Northeast (CORDENO)

In the Pando Department, CORDENO will play a role similar to that of CODEBENI in the Beni. CORDENO, with its limited resources has chosen to focus on agricultural research and extension activities, largely in the absence of other interested parties. However, the experimental station site they have chosen is undeveloped, without even the minimum of facilities in place, and no research has yet begun. As noted earlier, the major focus of the Project will relate to the Trinidad area, with some guidance and supervisory assistance to the northeastern Oriente. Thus the role of CORDENO, although important is expected to be less critical than that of CODEBENI.

E. Research Plan

A research plan will be jointly designed by IBTA, the Departmental Corporations of Pando and Beni, and personnel working at the research station including the Long-Term Advisors. The effort will be coordinated by the Long-term Advisor. The final Research Plan will be submitted within six months of the arrival of the Long-Term Advisor, and will be approved by IBTA and USAID. It will be specific with respect to crops and a time frame, and may be altered subsequent to each End-of Harvest Report as the need arises.

A representative Research Plan which will identify crops to be considered for the final Research Plan is described in Table II. In addition, the Plan will be developed on the basis of the following guidelines:

1. The Research Plan will be based on a sound analysis of existing research results (from private, public and foreign entities), research capabilities, crop and forage production and current small farmer systems in the Oriente. Up to six months may be devoted to this analysis while the Plan is being developed.

TABLE II: PRELIMINARY RESEARCH PLAN

I. Field and Tree Crops:

- A. Species that are grown in the area but need research for selection and technology improvement:

<u>Field Crops</u>	<u>Vegetables</u>	<u>Fruits</u> (Secondary Priority)
* Rice	* Pumpkins	grapefruit
* Corn		limes
* Yuca		lemons
* Beans		papaya
Sugar Cane		banana
Plantain		mango
		watermelon
		melon

- B. Species that exist in the area for which little information is available:

* Sweet potatoes	* Onions	Avocados
	Carrots	Oranges
	Lettuce	Tangerines
	Cucumber	Cashew
	Radish	Chirimoya
	* Squash	Coffee
	Tomato	Cocoa
	* Chili	Pineapple

- C. Species not known in area, for which research may be useful:

Potatoes	Nuts (different kinds)
* Sorghum	
Soybean	
Wheat	

II. Forage:

Much research has to be done in pastures. A botanical classification of native pastures is needed as well as evaluation of their nutritional value. New pastures can be introduced only after knowing the value of native pastures which already form a part of the ecological environment. Depending on this study, the introduction of new species and the selection of native species could be researched.

III. Time Frame:

April to November: On-station trials
December to March: On-station trials and on-farm experiments.

- * Crops which are recommended for immediate research and application to small farms.

2. The Plan should identify crops on which research should be carried out. A listing of nearly all possible crops is included in Table II. The final selection of crops, and the technologies which are researched, must be integratable into small farm systems. A system for collecting cost data will be integrated into the design of the Research Plan to permit subsequent economic analysis.

A preliminary selection of crops to be researched indicates that four major classes of crops should be included:

I. Food and Feed Grains.

Corn	Sorghum
Rice	Wheat

II. Basic Field Crops.

Soybeans	Beans
Yucca	Potatoes (sweet)

III. Vegetables.

Onion	Squash
Chili	Others (to be determined)
Pumpkins	

IV. Tree Crops (lower priority)

Bananas	Mango
Plantain	Citrus
Papaya	

3. A time frame for carrying out research on the relevant crops will be developed. This time frame will be based on crop cycles as carried out on small farms. Interim periods (e.g. the dry season) will be used for the investigation of new varieties and/or crops and/or techniques. The natural growing season from December to March will be utilized to carry out on-farm as well as on-station experiments. The remainder of the year will be devoted to on-station experiments (with simple irrigation via water-pumps) and work with small farmers such as selection of participating farmers, discussion of felt needs, discussion of experiment results, etc.

4. A determination of the need for short-term technical assistance will be made on the basis of the above analysis, and included in the Plan.

F. Project Inputs and Financial Plan

The Project has been designed on the basis of approximately equivalent inputs from U.S. and Bolivian sources over a three year period. The AID component will serve primarily to make available to the GOB those items of technical services, commodities and training which are difficult to finance under conventional GOB budgeting practices. The inputs will finance the following activities, as summarized in Table III.

1. AID Contribution

a. Long-term technical assistance will be provided as a grant to IBTA to locate, screen, recruit, contract and administer the service of a tropical field crop agronomist for approximately three years. This Advisor is expected to be familiar with tropical agricultural research in Latin America. He will be based in Trinidad, but will have responsibilities to initiate, support and supervise research in other parts of the north central Oriente, working principally through the research station in Riberalta and Cobija, where counterpart Bolivians will also be stationed. IPTA will be responsible for the direction of the activities of this Advisor, who will have as his counterparts at least three qualified Bolivian agronomists in Trinidad, and two each in Riberalta and Cobija. At least one extensionist in each research station area will be assigned to the Project. These counterparts will work in close collaboration with the Advisor in the design and promotion of exploratory research in small farm systems, as per the research plan which they will prepare.

b. Short term technical assistance of up to six months will be provided in special technical areas of expertise, such as specialized crops, non-traditional crops, forage, and/or soils. At least one Bolivian counterpart will be assigned to work with each short-term technician.

In the final year of the Project, Short-term consultants will be hired to perform marketing and economic studies. These studies will provide an assessment of the long-term economic viability for small farmer production of crops which are technically feasible to produce in the Oriente from the point of view of both production and marketing. These studies will constitute a vital input into the Summary Report (See Project Outputs, Section III.B.).

c. Research equipment and materials will include simple agricultural research equipment, such as pumps and simple farm machinery, agricultural inputs and laboratory equipment. Agricultural research equipment and inputs will be provided as required to each of the three priority research stations. Only the simplest machinery, for plowing, irrigation, sowing, and harvesting, will be provided in order to maintain technological proximity to the small farmer.

Laboratory equipment will be concentrated in the Trinidad area. Two laboratories will be equipped, one for soils analysis, and one for analyzing the nutrient content of crops. All research stations participating in the Project will utilize these laboratories.

d. A vehicle will be provided by AID funds to IBTA for use by each research station, primarily for extension activities, and for the Long-term Advisor. Lack of transportation constitutes one of the major weaknesses of the present research network.

e. Communications equipment will be provided by AID to each research center at Trinidad, Riberalta and Cobija, so that these relatively isolated posts can maintain close contact with IBTA for research guidance as well as essential logistic/budgetary support.

f. Training. The intensive review revealed that trained manpower constitutes one of the major constraints to the successful continuity of this activity. Therefore the Project will provide six man years of long-term training and six short-term trips to research centers in Latin America. The subject matter priorities will include tropical agronomy, forage, and other areas relevant to the GOB's research priorities in the Oriente. The selection of the candidates will be the joint responsibility of IBTA and local participating institutions, and will be approved by USAID.

2. GOB Contribution

a. The GOB will provide full-time counterpart technicians on at least a three-to-one basis with the tropical field crop advisor long-term and a one-to-one basis for short term technicians. Current staff of participating research stations will be supplemented to include three technicians in Trinidad, and two each in Riberalta and Cobija. In addition, an extension agent will be assigned to each research station to assist with on-farm experiments.

b. Both IBTA and the Departmental Corporations will finance a portion of materials through their normal operation budgets.

c. Land, buildings and renovations will be the contribution of the GOB through IBTA and the Departmental Development Corporations. Buildings will include 2 laboratories, office space, dormitories and dining rooms. Land has already been made available in the Trinidad and Riberalta areas. Therefore only land contributed in the Cobija area will be included as a Bolivian contribution. The CODEBENI has agreed to spend \$46,000 on the construction of a laboratory, administrative facilities and storehouse. The CORDENO will finance a portion of land acquisition costs, and about 20% of infrastructure costs in Cobija. The GOB through IBTA will finance other infrastructure costs.

TABLE III: Project Inputs and Financial Plan
(000 \$US)

	<u>AID Grant</u>	<u>GOB (IBTA) Resources</u>	<u>Departmental Corp. Contributions</u>	<u>Small Farmer Contribution</u>	<u>TOTAL</u>
Long-Term T.A. and Counterparts Three years	190.	50.	30.	-	270.
Short-Term T.A. Twelve Months	56.	-	-	-	56.
Research equipment and materials	120.	40.	40.	-	200.
Land, Buildings and Lab. Construction & Renovation	-	90.	60.	-	150.
Vehicles	36.	-	-	-	36.
Communication Equipment	8.	-	-	-	8.
Training					85.
a) Long-Term (6 years)	65.	-	-	-	
b) Short-Term (6 trips)	20.	-	-	-	
Operating Expenses	-	60.	40.	-	100.
Land Development for Project Research	-	20.	40.	20.	80.
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
T o t a l	495.	260.	210.	20.	985.
% T o t a l	50%	27%	21%	2%	

- 21 -

d. The lack of operating expenses often constitute a weakness in operations of this nature. IBTA and the Departmental Corporations will share these expenses. An input of this magnitude is required to bring the research in the Oriente up to a level of capability to use foreign assistance effectively.

e. Land Development for research activities will constitute a further JCB contribution. This will consist of clearing land and preparing it for cultivation.

3. Cooperating Farmer Contribution

The small farmer contribution to the Project will consist of new land development, use of existing land, labor, and traditional inputs. Non-traditional inputs will be provided on a grant basis from the material stock of the supervising research station.

PART IV: PROJECT SOUNDNESS ANALYSIS

A. Technical Soundness

1. Selection of Appropriate Technology

The GOB's request to initiate the investigation of suitable agronomic technologies adaptable to the resource capabilities of small farmers in the North Central Oriente, is based on long-term considerations regarding the development potential of the Oriente. The contribution of small farmers to the development of the Beni and Pando Departments can be enhanced through the research of appropriate technology. With appropriate technology, the small farmer can contribute relatively more to the development of these regions than his counterpart in the Santa Cruz area. The research of appropriate technologies will benefit not only small farmers already living in the Project area, but also colonists who will settle in the area when access roads are completed.

Appropriate technology for the future colonist is different from what he currently uses. There is little effective technology that can be transferred easily and quickly from a semi-arid high plateau agricultural system to a humid or subtropical environment where high rainfall, 3-5 months of inundation, and attendant crops, livestock, pest and disease problems are major constraints. Also, the technological packages that are being designed with this farmer in mind should be of a low level of sophistication because the highland farmer is not geared to absorbing rapidly sophisticated levels of technology. Given this situation, this Project will attempt to identify appropriate technologies in the Oriente, recognizing the fact that the Beni Plains and Northern Bolivia constitute two different ecosystems whose agricultural potentials, problems and solutions are largely unknown.

The efficiency, productivity and usefulness of research in appropriate technology for the North Central Oriente will be contingent upon:

1. The skills of the grant-funded advisors and Bolivian researchers in correctly identifying limiting factors from the small farmer's viewpoint. Close contacts with small farmers for experimentation purposes is expected to sharpen these skills.
2. The research management capability of the long-term Advisor and his counterparts and their ability to instill discipline, not

only in the manner in which research problems are addressed, but also to improve such administrative requirements as assuring the provision of research equipment, laboratory or field preparation, and seeds, fertilizer, pesticides, and labor on a timely basis.

3. The applicability of research to economic and marketing conditions. Economically relevant technology is exceedingly hard to come by in the Oriente due to the constraint of inadequate infrastructure and a rudimentary collection system for current input/output information. (Such information will be more difficult for the collection economy of Northern Bolivia which is based on the existing realities of the Brazilian frontier. It is a production system based on a high value, low density, non-perishable crops for which there is international demand. Other constraints such as climate appear to favor a tree crop agriculture. Such systems require a longer period of research than will be possible under the time frame of the Project.) Economic data collected during research trials will contribute to the solution of this problem.
4. The ability of the GOB and grant funded technical assistance personnel to design and conduct an analysis of the present agricultural production systems, both crop and livestock, in the Beni Plains and Northern Bolivia. This analysis will form the basis of the Research Plan, and will take into account the necessity to:
 - a) identify production problems;
 - b) determine how to address these problems during the life of this Project;
 - c) identify the limiting factors and determine how they can be resolved economically;
 - d) promote a survey of the state-of-the-art and effective responses to similar problems in Brazil, Peru, Colombia and Venezuela and others where on-going research on similar problems is underway;
 - e) utilize essential components of foreign results which can be transplanted to Bolivia as a point of departure for designing and planning Bolivian research to address identified field problems;
 - f) recognize the requirement for maintaining constant dialogue between researchers and farmers at the field level in order that research endeavors are compatible with the realities of small farm systems.
5. The ability of GOB researchers and extensionists to interpret what research results mean in terms of their applicability to the small farmers production systems, and to integrate such information into small farm systems in such a manner that it will be acceptable,

and prove to be more productive and economic over a wide range of Oriente small farmers. This implies that for the purposes of the Project the Research Plan would be more productive if priority were given to adaptive research rather than basic research.

2. Technical Design of the Project

The Project has been designed to take into account the aforementioned complexities of developing appropriate small farm technologies. The skills of both long and short term technicians will be reviewed carefully by the Mission and the GOB to assure that researchers have had experience with tropical small farm production systems. Additionally, the GOB and USAID will carefully review the qualifications of counterpart personnel.

As discussed in the Project description, careful attention will be made to assure that research will be directed to small farmer production. The fact that 50 small farmers will participate directly in the Project and will contribute to decisions with respect to crops to be investigated will help to assure that relevant technologies will be selected. The presence of extension agents to assist researchers will facilitate farmer/technician interchange. The Project has been designed to allow the technicians sufficient time to familiarize themselves with small farmer production systems, and to consult with farmers prior to the development of a Research Plan. Additionally, the selection of research equipment will take into account the technological realities of small farm systems.

3. Technical Capability for Project Implementation

As discussed in the institutional section of the project, IBTA, the MACA's coordinating agency for agricultural research and extension, has the capacity to serve as the Project's principal executing agency. The Development Corporations in the Beni and Pando have demonstrated an interest in the execution of the project through activities undertaken independently. IBTA will contribute its knowledge with regard to international and national research technology and assure complementarity of research among the three participating stations. The Development Corporations will contribute limited research experience and a knowledge of local conditions which can increase the relevance of research to local areas. Finally, small farmers will bring to the Project knowledge of their own problems, potentials and aspirations, without which the Project would fail.

h. Environmental Analysis

Neither the contamination of water nor air is anticipated as a result of Project activities. Small amounts of fertilizer will be procured with grant funds for purposes of experimentation. This fertilizer will be of the nitrogen-potassium-phosphate type which will be absorbed as part of the plant nutrient cycle. Major emphasis will be placed on organic fertilization through crop rotations. Insecticide use will be minimal, and will be made up of organic phosphates to assure no negative effect. Water runoff from the Project area is expected to be minimal, and will not cause pollution of adjoining rivers, streams, or lakes. Given the absence of commercial enterprises in the Project no contamination of air is anticipated.

A small amount of land clearing and earth moving is anticipated during the Project. However, this land will be cultivated. Thus erosion because of water or wind will not result from Project activities.

Research will, in part, focus on the effect of new varieties on soil nutrients. After each crop harvest, soils will be examined to determine the types of crop rotation and fertilizer which should be used to prevent soil depletion and therefore assure continued productivity of the soil base.

B. Institutional Analysis

The Ministry of Rural Affairs and Agriculture (MACA), through its research and extension branch, the Bolivian Institute of Agricultural Technology (IBTA), will be the primary institution through which the Project will be implemented. The Development Corporations of the Beni and Pando Departments will collaborate as primary participating institutions through the provision of operating expenses and physical facilities. The respective roles of these institutions are described in Section III. D above.

1. Instituto Boliviano de Tecnología Agropecuaria (IBTA)

IBTA was created by Supreme Decree No. 13168 in December, 1975, to serve as the coordinating agency for agricultural research and extension within the Ministry of Agriculture. The specific functions of IBTA are:

- a) To plan, coordinate and execute agricultural research activities and the transfer of technology to Bolivian farmers;
- b) To initiate in 1976 a plan to integrate into its program all activities relating to agricultural technology;
- c) To program, organize, coordinate and supervise agricultural research extension activities at all levels of organization, both public and private, so as to assure an efficient use of resources;
- d) To promote and execute programs at a professional level including technicians, farmers and livestock raisers, with the goal of establishing improvements in agricultural production;
- e) To develop and disseminate technological information in order to promote the adoption of new technology to increase production, productivity and the optimal use of natural resources.

IBTA's Directorate is composed of representatives of the Ministries of Planning, Finance and Industry, of private entities, and of the Office of Planning within MACA. Additionally, representatives from the following institutions, among others, are included in the Directorate as necessary: the Bolivian Agricultural Bank, the National Institute of Colonization, the National Agrarian Reform Institute, the National Community Development Service and the Central Bank.

IBTA was created as a result of the merger of the Agricultural Research Service and the Agricultural Extension Service of the MACA. At present IBTA employs 274 people, of which about 120 work on extension (including 80 field agents), and 120 on research, with the remaining 34 employees in La Paz providing supervisory, administrative and support functions. IBTA's operating budget for 1976 is slightly over \$1,527,000 excluding sources from external donors. To date, the budget for tropical research in the Beni and Pando has been less than adequate. However, this budget will increase substantially

with the approval of the proposed Project. Additionally, MACA personnel have indicated to the Mission that this increased attention will continue to this priority development area.

IBTA's activities at the present time are concentrated on the revitalization of Bolivia's research and extension network, which declined substantially after the U. S. withdrew support of the SAI program in the mid-1960's. IBTA's major problem centers around trained manpower, since fundamental agronomic research can not be effectively carried out without professionals with post-graduate degrees. A substantial number of professionals are earning post-graduate degrees under GOB and international donor programs, including the Agricultural Sector I loan. Thus, although the development of manpower constitutes by its very nature a long term endeavour, efforts are being made to alleviate this constraint to agricultural development. As discussed in the Project description, the manpower issue will be addressed under this program through the provision of funds for short and long-term training.

IBTA's research network currently includes nine research stations with two more stations being established in Trinidad and Cobija as a result of this Project. An existing station in Riberalta will also be expanded and partially moved to El Maral 40 kms. away. Currently, the research network includes nine persons with Masters and/or Doctorate degrees, while other researchers are trained at the level of Ingeniero Agrónomo. IBTA plans to increase this staff by about 50 over the next one to two year period including two more Ph. D. and four more Masters level agronomists.

The extension network of IBTA is responsible for the introduction of modern inputs, seeds, and techniques of production; the provision of agricultural information; and the development of youth programs. To carry out these activities, the extension network is organized into nine regional and eighty-six provincial offices throughout the country. Of the 120 employees, about 20 are titled Ingeniero Agrónomo, 25 have completed five years of University study but have not yet submitted their theses, and the remainder have certificates from vocational schools or institutions specializing in Agriculture.

A close coordination of the roles of these two branches of IBTA is maintained in all regions of Bolivia. This coordination will be highly beneficial to the Project, insofar as research will be conducted as much on small farms as on experimental stations.

IBTA personnel in the Project area currently include an agronomist and two extensionists in Trinidad; six agronomists and two extensionists in Riberalta; and an agronomist (Director of Research) and two extensionists in Cobija. These personnel will be expanded to at least three agronomists in each area. At the present time, the number of extensionists in each area is sufficient. One full time extension agent will be assigned to each of the three Project areas to assist in coordinating research experiments conducted on the plots of participating small farmers. It is anticipated that additional extension agents will be needed when appropriate small farm technologies are developed.

2. Participating Institutions

a. Corporación de Desarrollo del Beni (CODEBENI)

CODEBENI is staffed with ten professionals who are responsible for the overall development of the Beni. Five of these are responsible for agricultural planning. Recently, CODEBENI completed a five-year Agricultural Development Plan on the basis of a diagnostic analysis of agricultural potentials contracted to a private consulting firm. A similar analysis for livestock potential is nearing completion, and will provide the basis for a livestock operational plan. CODEBENI is also planning a series of in-depth studies of specific agricultural activities which are expected to contribute toward the definition of specific development activities. These include production and demand studies which reveal a deficit in nearly all food crops.

Apart from planning activities, CODEBENI has entered into a mutual assistance agreement with the Development Corporation of the Department of Santa Cruz (CORDESCO) for agricultural research in rice and other crops. These two agencies are also mutually supportive for infrastructure development. In an effort to link Trinidad and Santa Cruz, CODEBENI is pushing a penetration road southward from Villa Banzer to Km. 130 and CORDESCO is pushing its own new land penetration road northward from Santa Cruz.

CODEBENI has also assisted the Association de Agricultores del Beni (ASABE) in the preparation of a feasibility study in support of a loan proposal for a pre-cooperative development program along the new road. This proposal plans to organize 100 farmers into joint agricultural enterprises for farming 1,000 hectares of land divided between corn, rice, and sorghum. The proposal supports a full line of services including mechanization of the above crops plus assistance for yuca, plátanos, bananas and fruits and vegetables on individual family plots.

CODEBENI's budget for 1975 amounted to \$65,000. Nearly \$27,000 of this budget was allocated to agricultural research. The major activity supported by this budget was the establishment of the San Carlitos experimental research station. This 1,000 hectare station is located 25 kilometers east of Trinidad on the Santa Cruz highway. Initiated in March, 1976, the station has already been provided with housing and some equipment, and critical adaptive research is being carried on with fruit and vegetables, rice and corn, and some improved pasture.

Within operating distance of this station, at Km. 5 lies Laguna Suarez. CODEBENI and CORDESCO are collaborating with a Chinese Technical Mission which is working on appropriate rice technology for floating, wet and dryland rice. Two Chinese technicians have worked for two seasons at Laguna Suárez, and have made progress toward variety adaptation and improvement of wet land cultural practices. 76 varieties have been tested and about 5 lines are worthy of expanded planting. Seed production is also underway.

However, some mechanization and water management appears to be essential. In addition, CODEBENI has built and is operating a rice storage facility near Sachojere in the same general area.

CODEBENI is staffed by a qualified, young, and aggressive group of national Oriente technicians, and is one of the most promising development organizations in the region. Despite its small staff, CODEBENI will experience no difficulties in assuming additional responsibilities for this Project, since several of its staff are already involved in planning and implementing agricultural research activities in the absence of IDTA activities in the region. CODEBENI attaches a high priority to the proposed Project, as reflected by its budgetary allocations of over \$50,000 to the Project.

b. Corporación de Desarrollo de Nor Oeste (CORDENO)

CORDENO is the departmental development corporation of the Pando. The budget of CORDENO derives in part from GOB allocation, but primarily from a 1% tax on importations into the country. This budget amounted to about \$50,000 in 1975.

Apart from general development planning activities similar to those of CODEBENI, CORDENO has initiated responsibility for agricultural research in the absence of other interested entities. However, the research station is still in incipient stages of development. As in Trinidad, MACA plans to sign a long-term collaborative agreement with CORDENO, and to concentrate research activities in one station. Given the similarities of the ecological conditions in Cobija and Riberalta, the transferability of research among the stations is expected to be mutually beneficial.

C. Social Soundness

1. The Target Group

The primary beneficiary of the Project will be the small farmer of the north central Oriente. Fifty of these small farmers will benefit directly from participation in the experimental research activities financed under the Project. Eventually, the results of the research project could be disseminated to many of the estimated 35,000 small farm families who reside in the Project's target area. Additionally the target group will include new colonists from the Altiplano and Valleys regions which are the poorest regions in Bolivia (See Figure 3 on page 34.)

The socio-economic characteristics of the target farmer vary according to the ecological region in which he lives. In the central Oriente the estimated 19,000 small farmers, often recent colonists, raise a few subsistence crops (corn, yuca, rice, beans, vegetables and plantains) and derive cash income primarily from the sale of up to five head of cattle per year. Average cultivated land ranges from one to four hectares. Average small farm income in 1975 was estimated at about \$450 per farm family or about \$71 per capita.

In the north Oriente, which has about 16,000 small farmers, the average farmer lives in a gatherer or collection economy, based on rubber and Brazil nuts which are harvested in response to market forces. About two-thirds of the Brazil nuts in the Cobija region were unharvested last year owing to a lack of market demand. Cultivated land averages less than 1.5 hectares, which are devoted to yuca, rice, beans, maize and some vegetable crops strictly for subsistence purposes. This diet is supplemented by tree crops such as bananas, plantains and oranges. Average income in 1975 probably did not exceed about \$400 per farm family or about \$68 per capita.

The health situation of the Beni's population is among the worst in Bolivia. Due to tropical climatic conditions, it is estimated that nearly 90% of the population suffers from parasitic diseases. Additionally, unlike the Santa Cruz area, malaria continues to be a problem with eradication measures difficult to administer owing in large part to the lack of a transportation network and to the dispersed population. Although medical facilities are available, usage of these facilities are low due to the poor transportation network and difficulties involved in servicing a highly dispersed population.

With regard to education, the teacher-pupil ratio compares favorably to the other areas of rural Bolivia. However, attendance rates are considerably lower due to the lack of a transportation network.

The future settlers in the Oriente constitute the final, but largely unknown, portion of a future target group which will benefit from the research results. These settlers will probably come from the Altiplano, where average per capita income in 1975 was estimated at \$57; or from the Valleys, where per capita income averaged about \$70. Cultivation practices will shift from potatoes and maize to rice, yuca and different types of maize as these settlers move into the north west Oriente. Since settlers do not

generally emanate from the poorest segments of the population because the act of settlement requires some capital, average income figures for these areas of origin are probably fairly accurate.

2. Social/Cultural Feasibility

The Project addresses one of the most fundamental questions in rural development: constraints to increased small farm production and income. The primary emphasis of the Project will be on the development of technologies applicable to small farmers. As pointed out in the Project description, 50 small farmers will play, through experimenting directly with varieties, an integral role in the development of these technologies. It is anticipated that these farmers will work closely with GOB and grant funded technicians in decisions regarding technologies to be applied. Furthermore, as pointed out in the Research Plan in Table II, the primary emphasis of the Project will be on the development of crop technologies. Because larger farmers in the area are involved almost exclusively in livestock production, initial results with regard to crop varieties will be applicable almost exclusively to small farmers. Although the Project's major focus is on the technological aspects of increasing small farmer production, socio-cultural aspects of small farmer behavior are likely to constitute important obstacles to the adoption of the research outputs of the Project. A recent study on rural development projects (D.A.I., Strategies for Small Farmer Development) indicates that to maximize the chances for success, the small farmer should: i) be involved on a meaningful level in decision-making processes which affect him and; ii) be prepared to make resource commitments to the adoption of new technologies.

The Project has been designed to try to meet those conditions. Agricultural research activities will be developed on the basis of an understanding of small farmers and their production systems as well as their problems and aspirations. Close contact between researchers and small farmers throughout the implementation of the Project is expected to encourage this difficult process. The Research Plan will be developed within six months after the arrival of grant-funded technician to allow technician time to select the 50 participating small farmers and integrate their ideas into the Research Plan. Clearly farmers will not commit (and therefore risk) labor and resources to the program unless their ideas with regard to what should be planted are taken into account. Furthermore, their continued participation will be contingent upon an ongoing role in the decision making process.

3. Spread and Replicability Effects

Both the spread and replicability effects of the Project depend largely on future extension/promotion efforts which are devoted to disseminating the Project results. Some spread effects may occur in areas where small farmers participate in research experiments. These spread effects will occur initially to participating farmers and their families in terms of increases in income and consumption.

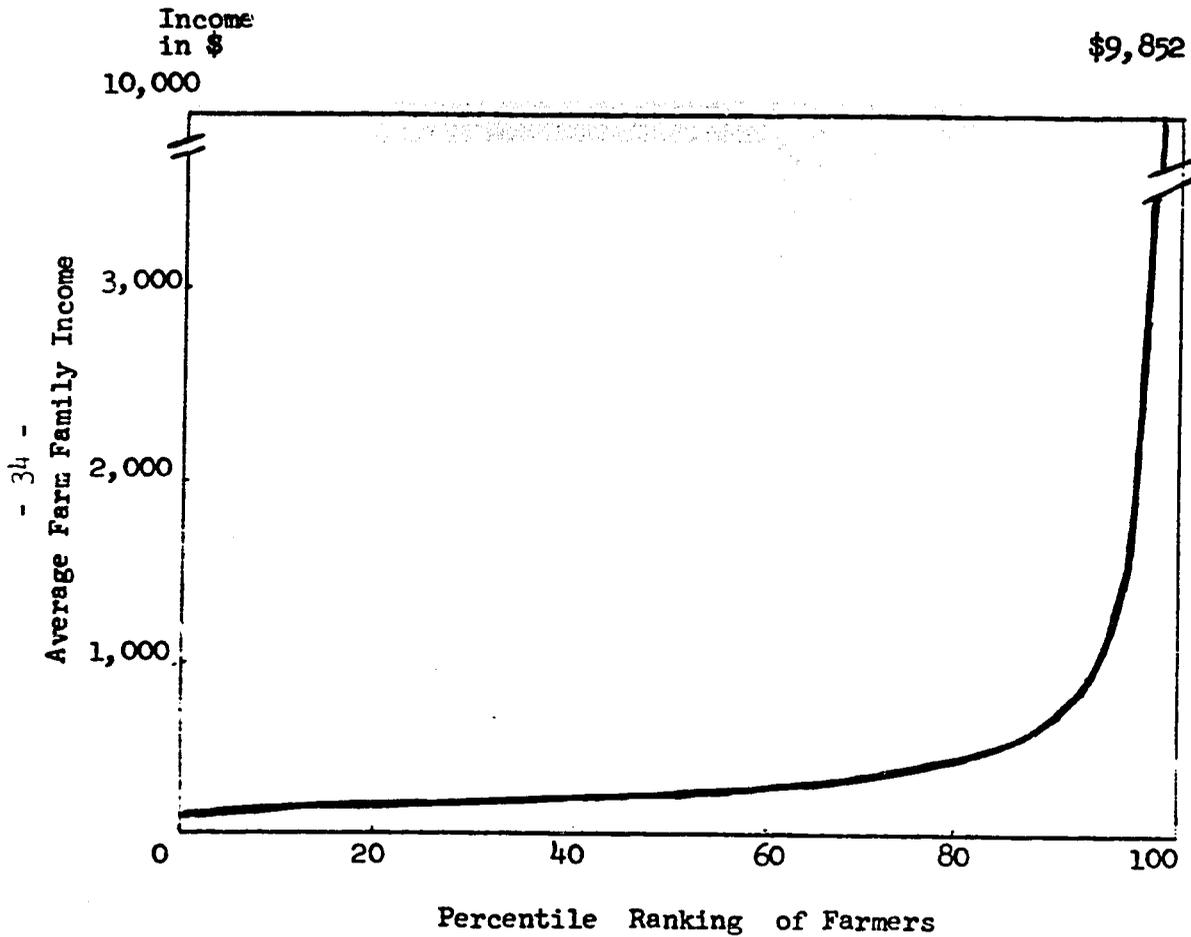
Replicability effects are the major purposes for which applied research experiments on small farms have been designed into the Project. (Given the ecological diversities in the Oriente, adaptive experiments are essential to confirm or disavow the replicability of research results.

FARM IV - FARM FAMILY INCOME OF TARGET GROUPS

Percentile Income:	<u>Target Area</u> (Estimate)	<u>Oriente</u>	<u>Future Settlers</u>	
			<u>Altiplano</u>	<u>Valleys</u>
Up to 40% (under \$260)	12,000	24,000	126,000	100,000
41% to 80% (\$261-\$500)	15,000	31,000	108,000	110,000
81% to 95% (\$501-\$1000)	7,000	29,000	18,000	45,000
96% to 100% (over \$1000)	1,000	14,000	2,000	15,000
 T o t a l	 35,000	 98,000	 254,000	 270,000

Figure 3

Farm Income Distribution in Bolivia - 1975 ^{1/}



Key:

<u>Estimated Average Farm Income</u>		
<u>%</u>	<u>Family</u>	<u>Per Capita</u>
<u>Farmers</u>	<u>Income</u>	<u>Income</u>
1- 10	\$ 217	\$ 34.50
11- 20	225	35.70
21- 30	233	37.00
31- 40	242	38.40
41- 50	283	45.00
51- 60	316	50.00
61- 70	367	58.25
71- 80	450	71.40
81- 90	583	92.50
91- 95	833	132.20
96-100	3333	529.00
96-97	\$ 1090	\$ 173.00
98	1350	214.30
99	3284	521.30
100	9852	1563.80

SUMMARY OF INCOMES

	<u>Farm</u>	<u>Per</u>
	<u>Income</u>	<u>Capita</u>
Average for Bolivia:	\$ 500	\$ 79
Average for Central Oriente	450	71
Average for North Oriente	400	68
Average for Altiplano	325	57
Average for Valleys	500	70

^{1/} Includes only income earned on the farm. Total farm family income is often considered to be 10% to 20% more.

D. Economic Soundness

Assessing the economic soundness of a Project primarily devoted to exploratory research in small farm systems is complicated by 1) the fact that the ultimate beneficiary is the small farmer rather than the research entities which will receive assistance, and 2) the fact that most of the benefits which are likely to accrue from the Project will do so in later years, after research results have been disseminated. Thus a cost-benefit analysis of the Project would not be appropriate until after a reasonable period of time has elapsed. Such a cost-benefit analysis should appropriately include extension costs as well as research costs to calculate production benefits of agricultural research, and should be performed about 8 years after the initiation of research.

A limited cost-benefit analysis could be performed at an earlier stage, when research results are known. This analysis would be based entirely on technological results, including guided on-farm experiments, and would compare the costs of production for unimproved (or traditional) production with improved production practices for relevant crops. This type of appraisal could be performed as soon as research results are available, and will be included in the Evaluation Plan.

The economic soundness analysis which follows therefore rests on an assessment of: 1) the policy soundness of the proposal, and 2) an estimate of comparative costs and benefits of small farmer systems, including future settlements, if the Project were to be foregone.

1. Policy Soundness

The policy soundness of the Project, from an economic viewpoint, rests on the following assertions:

- a. There exists untapped agricultural potential in the north west Oriente;
- b. The distribution of Bolivia's rural population is biased towards over-populated areas suffering from atomistic production and currently low agricultural productivity;
- c. The push/urge for colonization in Bolivia is such that colonists gravitate toward newly accessible areas in spontaneous movements even when directed colonization projects are not organized;

- d. Small farm technology appropriate to agricultural conditions in the Oriente is significantly different from that employed by colonists from the Altiplano and Valleys;
- e. The identification of small farm technology appropriate to or economically viable in the Oriente (and the converse: technology and crops which are not economically viable) would result in better investment practices and production patterns, and consequently in higher agricultural production and returns to small farm incomes, than would be the case without this knowledge.

Therefore, as a GOP policy, plans to open up the Oriente to increased settlement and agricultural production make good sense. This Project will provide an essential input into the GOP's capability of planning for the development of the Oriente.

2. Comparative Costs and Benefits

An estimate of costs and benefits of small farmer production in the Oriente in the absence of this Project would clearly be based on hypotheses, and would therefore be relatively worthless, especially in economic terms. However, it would appear to be obvious that production costs for the small farmer will be lower if he received guidance rather than experimenting over 2-3 years with the adaptation of his prior technological experience and knowledge. It would appear to be equally obvious that benefits will be greater relative to costs, and that they will accrue earlier, thereby enhancing the present value of the benefit-cost ratio. The above process at the micro-economic level would translate itself into considerable savings at the macro-economic level in terms of efficient resource allocation which contributes to the maximization of production. Further economic efficiencies would be obtained from portions of the research which are neutral to farm size, and which would be used by large ranchers in the Beni.

The above analysis is based largely on the assumption that in the long run, large numbers of small farmers will benefit from the research carried out under the Project. However, the economic benefits accruing from a more efficient use of resources would commence during the life of the Project for the 50 or so participating farmers, and could with extension services and/or spread effects reach some of the 35,000 farmers living in the Project area.

Finally, if the results of the Project were primarily negative, indicating that there is little future for small farm activity in the Oriente owing to ecological and agricultural reasons, then the Project could result in considerable savings to the national economy by discouraging settlement. This is likely to occur in some parts of the Oriente, ^{and} part of the contribution of this Project is to identify such areas. The "Preliminary Study of Areas for Small Farmer Settlement" performed during the intensive review, and the forthcoming ERTS-GEOBOL project (See Section II. c) will assist the GOB and Project participants in the identification of these areas.

E. Financial Soundness

Total Project costs amount to \$986,000. The A.I.D. grant will provide \$490,000, the GOB \$200,000, participating small farmers \$20,000, and the Regional Committees \$10,000. The percentage of contributions of the participants are as follows: A.I.D. 50%; GOB 27%; participating small farmers 2% and the Regional Committees 21%. (See Table III, Page 21.)

The A.I.D. grant will provide funds for long and short-term technical assistance, research equipment and materials, vehicles, and communication equipment. The GOB contribution will consist principally of providing counterparts to staff the research stations, land and buildings, operating expenses, and personnel costs. The Development Corporations of Beni and Pando will contribute operating expenses, materials, and technicians to staff the research stations as well as land for the application of Project research. Finally, participating small farmers will donate a portion of their land and labor for the application of Project research.

The GOB has agreed to provide funds to support the Project in accordance with the financial plan. A condition will be included in the Project Agreement requiring that the IBTA budget proposed for CY 1977 include funds sufficient to support the Project as outlined in the financial plan. Additionally, the agreement setting forth a collaborative arrangement between IBTA, the Development Corporations of the Pando and Beni, will outline the resources to be provided by the participating institutions. Finally, a staffing pattern will be provided by the GOB.

The GOB and Development Corporations will have no difficulty in providing contributions to the Project. IBTA's contribution for the first year of the Project amounts to less than 2% of its total operating budget. Using the 1976 budget as a base and projecting a 20% annual increase, the budgetary requirements amount to about 1% during the second and third year of the Project. CODEBENI's budget was about \$65,000 in 1975. Because CODEBENI's contribution will be primarily for buildings which are direct contributions but not operating expenses it is estimated that its contribution during the first year of the Project will amount to about \$7,000 or 12% of the corporations budget. As in the case of IBTA, projected increases in budgetary resources will mean a relative reduction in the percentage of resources devoted to the Project relative to total budgetary allocations.

TABLE V : AID RESOURCES BY FUNDING PERIOD

	(In '000 \$US)				
	<u>T O</u>	<u>FY 1977</u>	<u>FY 1978</u>	<u>FY 1979</u>	<u>Total</u>
A. Technical Assistance	186		-	60	246
1. Long-Term - One tropical field crop advisor for 3 years	(130)			(60)	(190)
2. Short-Term - for special crops and problems 12 months	(56)				(56)
B. Commodities	164				164
1. Research Equipment and Materials	(120)				(120)
2. Vehicles (4)	(36)				(36)
3. Communication Equipment	(8)				(8)
C. Training	85				85
1. Long-Term - Two in U.S. for Masters Degree Four to CIAT for 9-months course	(65)				(65)
2. Short-Term - Six Bolivians for 2-3 months course in Puerto Rico, Costa Rica, etc.	(20)				(20)
T o t a l	435		-	60	495

TABLE VI: GOB Resources by Funding Period
(In 000 US\$)

	<u>FY 77</u>	<u>FY 78</u>	<u>FY 79</u>	<u>Total</u>
<u>GOB (IBTA) Resources</u>				
Counterparts	16	17	17	50
Research Equipment & Materials	16	12	12	40
Land, Bldg. & Lab. Construction	30	30	30	90
Operating Expenses	20	20	20	60
Land Development for Project Research	<u>6</u>	<u>7</u>	<u>7</u>	<u>20</u>
	88	86	86	260
<u>Departmental Committee Contributions</u>				
Counterparts	10	10	10	30
Research Equipment and Materials	15	15	10	40
Land Buildings and Lab. Construction and Renovation	20	20	20	60
Operating Expenses	10	15	15	40
Land Development for Project Research	<u>13</u>	<u>13</u>	<u>14</u>	<u>40</u>
	68	73	69	210
<u>Small Farmers</u>				
Land/Labor for Project Research	<u>6</u>	<u>7</u>	<u>7</u>	<u>20</u>
T o t a l	162	166	162	490

PART V: Implementation Planning

A. Schedule of Major Events

The PPT network, included as Annex C, sets forth the major events which will take place during the project implementation period. A description of the proposed implementation plan is as follows:

1. The Project Paper will be reviewed and approved by the DAEC on September 15, 1976, and grant funds will be authorized on or about September 28, 1976.
2. By September 30, 1976 the Project Agreement will be approved.
3. Requests for Proposals for long-term technical assistance will be issued by October 30, 1976 and the long-term technician will be stationed in Trinidad by February, 1977.
4. Procurement documentation for agricultural research equipment will be issued between October, 1976 and March, 1977. Equipment essential for variety trials on research stations under irrigated conditions will be procured locally through PIO/C's/purchase orders.
5. By July, 1977, IBTA and the Development Corporations of the Beni and Pando, with the assistance of the long-term technician, will have completed a Research Plan in accordance with Section III.E. above. This plan will include a schedule for short-term technical assistance requirements.
6. By October 30, 1977, IBTA and the Development Corporations, with the assistance of a research technician, will have selected up to 25 small farmers for participation in the first year of the experimental program. As these farmers begin to participate, modifications may be made in the Research Plan.
7. Initial results from the planting of experimental varieties will be completed by November, 1977, i.e., irrigated crops grown during the dry season.
8. Research equipment should arrive no later than November, 1977, in time for use during the natural growing season.
9. An annual series of experiments will be carried out at the research stations (including dry season experiments) and

on small farms. Reports on the results of this series will be completed by June, 1978 and June, 1979 respectively.

10. Marketing and economic studies for potentially economically and technically feasible crops identified through research efforts will be completed by November, 1979.
11. All project experimentation will be completed by December, 1979, although participating research stations will continue a program of on-farm and station experiments.

B. Procurement Procedures

Equipment, materials, and technical assistance procured with grant funds will have as their source and origin the U.S., Geographic Code 941 countries and Bolivia. All procurement will take place in accordance with standard AID procedures as defined in Handbook No. 11. Procurement documents will be prepared by USAID in consultation with IBTA and the Development Corporations of the Beni and Pando. (See Section V.G below).

C. USAID Monitoring Requirements

Monitoring will be performed by a Mission Project Committee whose members will have the following monitoring responsibilities:

1. The primary monitoring task will reside with a Project Manager in the Rural Development Division (RDD). This individual's responsibilities will include the following:
 - (i) Coordinating the procurement of technical assistance, equipment and materials;
 - (ii) Maintaining contact with IBTA and the regional Corporations to supervise the implementation of the Project;
 - (iii) Submitting Monthly and Special reports as necessary; and
 - (iv) Maintaining liaison with other USAID Divisions involved in the project.
2. The Development Resources Office (DR) will assist the Project Manager with the procurement of equipment, materials and technical assistance.
3. The Program Office (PR) will assist with the preparation of Grant Documentation including the Project Agreement and PIOs.

D. Reports

A regular reporting system will be established to assist IBTA and USAID in monitoring and guiding the Project. Reports will be organized to reflect activities outlined in the Research Plan and in the Logical Framework. The following reports will be submitted in Spanish and in English, as requested for audit purposes.

1. Long-term Advisor will submit Quarterly Reports to USAID and to IBTA.
2. The Advisors and IBTA will submit annual End of Harvest Experimentation Reports to USAID by July 1.
3. The Long-term Advisor will submit a Final Report to IBTA, and USAID approximately two months prior to departure. This report will serve as a basis for discussions with the GOB to determine how research results may be integrated into development plans for the Oriente.
4. Short-term consultants will submit Reports to IBTA and USAID within two weeks after the completion of each consultancy.

E. Evaluation

Joint IBTA/USAID evaluations will be scheduled periodically to evaluate critical aspects of the Project. The first of these evaluations will be conducted 8 months after the arrival of the long-term Advisor. Thereafter, evaluations will take place within 60 days of the submission of Annual End of Harvest Reports until the project is completed. The last annual evaluation would serve as a final evaluation of the Project. Deviation from this norm would require full justification from IBTA and prior USAID approval.

The Mission would propose issues to be examined at these evaluation sessions on the basis of the Research Plan in Section III.E and the Logical Framework attached as Annex A.

The Mission recommends that the first evaluation focus on the initial implementation phase of the project and involve actions and recommendations to alleviate problems which may contribute to Project delays. In this initial evaluation, particular attention will be devoted to measuring progress against the input indicators as they appear in the Logical Framework. This evaluation will determine whether adequate resources are being made available

by the GOB and regional Development Corporations in support of the Project.

The second and third evaluations will present the first opportunity for a broad evaluation of appropriate crop and livestock technologies applicable to small farmers in the northwest Oriente. During these sessions research results will be evaluated. Particular attention will be devoted to the success of on-farm experiments and the economic viability of appropriate technologies.

F. Conditions of Project Approval

In addition to the standard conditions associated with AID grants, the Project Agreement will include the following:

1. The GOB's agreement to establish a written collaborative arrangement between IBTA, ^{and} the Development Corporations of the Departments of the Pando and Beni.
This agreement would define the respective responsibilities of these institutions as relates to Project implementation, in accordance with Section III.D of this Project Paper,
2. The GOB's agreement to provide adequate staffing to the research institutions, in accordance with Section III.F.2 of this Paper.
3. The GOB's agreement that the IBTA budget proposed for CY 1977 will include counterpart funds as reflected in the Financial Plan of the Project and that the GOB will continue to provide on-going budgetary support to the research activities initiated under this Project;
4. The GOB's agreement that IBTA and the Development Corporations of Beni and Pando will utilize all equipment procured with Project funds only for the purposes of the Project;
5. Agreement that the GOB will utilize the outputs of the Project in the planning of future development activities, including those for which other donor assistance is available, in the northwest Oriente; and,
6. That the GOB will periodically review its research and extension policies in the Oriente to assure relevance and effective application to small farmers residing in the Oriente.

G. Justification of Waivers for Procurement

The Mission proposes that limited local cost financing and U.S. Code 941 procurement be authorized for the proposed Project. Limited local procurement of materials (such as agricultural inputs) and research equipment (such as water pumps) are essential for operations during the first year of the Project and are proposed for inclusion under the waiver. These sources of non-U.S. financing are essential for the timely utilization of funds in accordance with the purposes of the Project. The GOB has requested that U.S. Code 941 procurement for technical assistance be permitted in addition to U.S. procurement. The reasons cited by the GOB include timely availability, experience in tropical agriculture, language and cost considerations. The Mission concurs with the GOB that third country technicians should not be excluded from consideration. The GOB has also requested that U.S. Code 941 procurement be permitted for long term training.

For the above reasons, it is the opinion of the Mission that the tying of grant funds to U.S. procurement would needlessly impede the attainment of the timely purposes of the Project. Therefore, the Mission requests that a waiver be granted for local procurement for up to 15% of Project funds for equipment and materials; and for U.S. Code 941 procurement for up to 60% of Project funds for technical assistance and long term training. These requests represent upper limits: the actual amounts of non-U.S. procurement may be considerably lower.

H. Negotiating Status

No special problems in the negotiation of the Project Agreement are foreseen. All substantive aspects of the Project design have been discussed with the Ministry of Rural Affairs and Agriculture.

I. Issues: None



**MINISTERIO DE ASUNTOS CAMPESINOS
Y AGROPECUARIOS**

Reply Due: <u>9-10</u>
Action taken: _____

DGA-402/76
La Paz, Agosto 26 de 1976



DR

BOLIVIA	
UV	
DE	
CO	
AO	
ADM	
PR	
MEO	
IN	
LON	
NA	
HDD	Señor
HAD	John R. Oleson
RDD	Director USAID/B
EID	La Paz
CDU	
SP	
AAG	Estimado señor Director:
MB	
& P	

Ref: Solicitud de Asistencia Técnica de AID para Desarrollar el Programa de "Investigación Preliminar en Sistemas de Cultivo del Oriente Central".

De acuerdo al diagnóstico de la situación actual del sector agropecuario de Bolivia, se ve que existe un bajo nivel de productividad como consecuencia del excesivo minifundio, siendo este uno de los obstáculos más importantes para el desarrollo económico de Bolivia. Sin embargo, las tierras del Oriente tienen un potencial enorme para absorber a los agricultores y ofrecen posibilidades para expandir la producción. Por otro lado, si analizamos la marcha hacia el Oriente que se viene realizando en el país con los programas camineros de vinculación de La Paz - Rurrenabaque, Reyes, San Borja y San Ignacio, debemos admitir que una colonización espontánea ha de producirse en todas esas regiones, integrando al Altiplano y Valles con las tierras bajas.

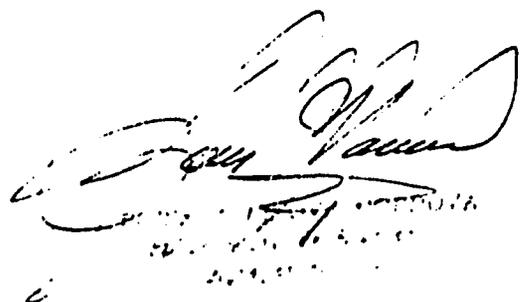
Ante estas consideraciones, el Ministerio de Asuntos Campesinos y Agropecuarios ha iniciado la implantación de un conjunto de tecnologías básicas para desarrollar una agricultura de pequeños agricultores, investigando las técnicas apropiadas de cultivo y explotación ganadera, adelantándose a nuevos asentamientos de campesinos que se producirán en los próximos años.

Siendo el objetivo del Gobierno incrementar el ingreso per cápita y elevar el nivel de vida de la población rural, la investigación de técnicas apropiadas de cultivo y explotación ganadera para pequeños agricultores en los departamentos del Beni y Pando, donde se trata de reforzar el actual programa de investigación preliminar dirigido a este objetivo, requerirá de asistencia técnica y financiera.

2.

Se estima que el costo de un Proyecto Inicial de tres años será de aproximadamente \$us. 1.000.000. A objeto de cubrir parte de este costo nos permitimos solicitar a AID una donación de \$us. 500.000. Estos fondos se utilizarían para cubrir parte de los gastos de asistencia técnica, equipo de investigación y entrenamiento de personal.

Agradeciéndole anticipadamente por su cooperación, saludo a usted muy atentamente,



A handwritten signature in black ink, appearing to read "Juan Vazquez". Below the signature, there is a faint, illegible stamp or text.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ANNEX B
Page 1 of 2 Pages

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project: _____
From FY 1977 to FY 1980
Total U.S. Funding \$495,000
Date Prepared: _____

Project Title & Number: Exploratory Research in Farming Systems

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To increase per capita income and standard of living of the rural poor.</p>	<p>Measures of Goal Achievement:</p> <p>a. Gross Sector Product Increases from 2,320 in 1975 to 2,611 in 1979 (\$b millions at constant 1970 Bolivian pesos).</p> <p>b. The share of production of the small farm sector that is marketed increases from 47% to 60% by 1979.</p>	<p>- <u>Boletín Estadístico</u> of the Bolivian Central Bank.</p> <p>- Data and special studies of MACA Offices of Planning, Economics and Statistics.</p>	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> 1. There will be no major downturn in the economic conditions and favorable cost-price relations for agricultural products will prevail. 2. Favorable government pricing policies.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ANNEX B
Page 2 of 5 Pages

Life of Project:
From FY 1977 to FY 1980
Total U.S. Funding \$495,000
Date Prepared:

Project Title & Number: Exploratory Research in Farming Systems

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose:</p> <p>1. To develop and evaluate new small farmer production models compatible with the various ecological systems in Northeast Central Bolivia.</p> <p>2. To promote the development of a continuing capability for research and extension in appropriate small farmer technologies for the north central oriente.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>1. A minimum of 6-8 small farmer production models describing new or improved product mixes with their respective crop varieties, types of livestock and related cultural practices.</p> <p>2. MACA staff qualified to direct and implement research experiments and extension programs in the areas covered by the project increased by 6 agronomists and 3 extensionists.</p>	<p>1. Quarterly Project Reports, and MACA's End of Harvest Experimentation reports.</p> <p>2. MACA's End of Harvest Experimentation reports and the Final Report of the consultants.</p>	<p>Assumptions for achieving purpose:</p> <p>That agriculture potential exists in the project area.</p> <p>That adequate domestic or international markets exist for new or increased production.</p> <p>That GOB salary levels are high enough to attract and retain qualified research and extension personnel.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Exploratory Research in Farming Systems

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																																											
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2a. Research plan revisions as required.	(X) (X)																																																																													
3. A report on soil and climatic conditions and a set of hypothesis for the initiation of a varietal and cultural practices testing program.	X	Project managers and consultants reports.																																																																												
3a. Hypothesis redeveloped as required	(X) (X)																																																																													
4. MACA agronomists selected for training:		Project managers report.																																																																												
a. to MS level	2 - 1 -																																																																													
b. to CIAT	2 2 3 -																																																																													
c. short term visits	3 3 - -																																																																													
5. Ecological zones and cooperating farmers selected and on-farm experiments concluded.	Minimum No. of sites involved	End of Harvest Experimentation Reports.																																																																												
	10 15 10																																																																													
	Minimum varieties tested:																																																																													
	a. crops																																																																													
	b. forage																																																																													
	10 15 15																																																																													
	5 5 5																																																																													

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1977 to FY 1980
Total U.S. Funding \$495,000
Date Prepared: _____

Project Title & Number: Exploratory Research in Farming Systems

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS					MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quantity)						Assumptions for providing inputs:
	IQ	FY 77	FY 78	FY 79	Total		
1. AID Inputs							
Technical Assistance:						AID Records and Project Manager Reports.	- That AID, the GOB and local communities will provide timely contributions to the project.
Long-Term	130	-	-	60	190		
Short-Term	56	-	-	-	56		
Training	85	-	-	-	85		
Commodities:							
a. Research, equipment & materials	120	-	-	-	120		
b. Vehicles	36	-	-	-	36		
c. Communication equipment	8	-	-	-	8		
2. GOB (IBTA) Resources						MACA and Committee records and Quarterly Reports	
Counterparts	16	17	17	17	50		
Research, equipment and materials	16	12	12	12	40		
Land building and construction Lab.	30	30	30	30	90		
Operating Expenses	20	20	20	20	60		
Land Development for Project Research	6	7	7	7	20		
	88	86	86	86	260		
3. Departmental Committee Contributions						Research records and Quarterly Reports.	
Counterparts	10	10	10	10	30		
Research Equipment and Materials	15	15	15	15	40		
Land Buildings and Lab. Construction and Renovation	20	20	20	20	60		
Operating Expenses	10	15	15	15	40		
Land Development for Project Res.	13	13	14	14	40		
	68	73	69	69	210		
4. Small Farmers							
Land/Labor for Project Research	6	7	7	7	20		

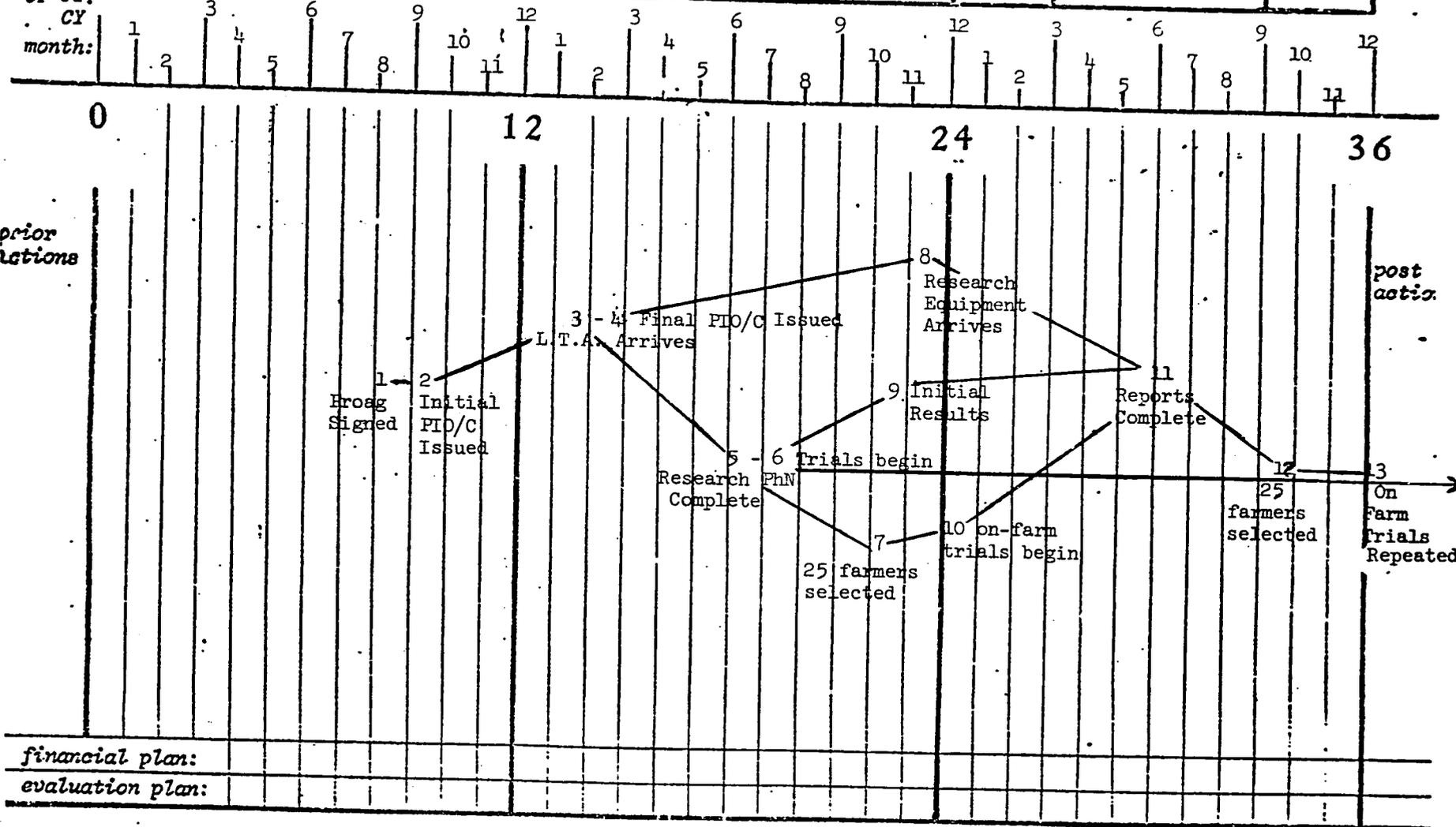
Critical Performance Indicators

1. September 30, 1976 - Project Agreement Signed
2. October 30, 1976 - Requests for Proposals for long-term technical assistance issued. PIO/Cs for initial research equipment and vehicles issued.
3. February 28, 1977 - Long-Term technician stationed in Trinidad.
4. March 30, 1977 - Final PIO/C for research equipment issued
5. July 31, 1977 - Research Plan Complete .
6. August 31, 1977 - On-station trials have begun .
7. October 31, 1977 - 25 farmers selected for participation in research project.
8. November 15, 1977 - Research equipment has arrived.
9. November 30, 1977 - Initial results from on-station trials of experimental varieties complete.
10. December 31, 1977 - On-farm trials begin.
11. June 30, 1978 - Reports from annual series of experiments complete.
12. October 31, 1978 - 25 additional farmers selected for on-farm trials.
13. December 31, 1978 - On-farm trials begin .
14. June 30, 1979 - Reports from annual series of experiments complete.
15. November 30, 1979 - Marketing and Economic Studies complete.
16. December 31, 1979 - Final Report Submitted.

PROJECT PERFORMANCE TRACKING (PPT) SYSTEM

country: Bolivia	project no: 511-0464	project title: Exploratory Research	date: 8/28	/ x / original / / revision#	PPT appr
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or FY:
CY
month:



CRITICAL PERFORMANCE INDICATOR (CPI) NETWORK

PROJECT PERFORMANCE TRACKING (PPT) SYSTEM

country:		project no:		project title:				date:		/ x / original		PPT appr
Bolivia		511-0464		Exploratory Research				8/28		/ / revision#		
or FY:	1	3	6	9	12							
.. CY	2	4	7	10	11							
month:	5	8										
	0				12				24		36	
<i>prior actions</i>											<i>post actions</i>	
			14	15	16							
			Reports Complete	Marketing Studies Complete	Final Reports Submitted							
<i>financial plan:</i>												
<i>evaluation plan:</i>												

CRITICAL PERFORMANCE INDICATOR (CPI) NETWORK

Scope of Work for Tropical Field Crop Agronomist.

A tropical field crop agronomist will serve as a long-term advisor to assist IBTA in the implementation of the Project. This advisor will reside in Trinidad. His responsibilities will include the following:

1. To assist IBTA in an assessment of the small farm agricultural conditions in the north west Oriente in the different ecological zones which characterize that region, including the identification of production problems, limiting factors, and possible ways to address these problems from the small farmer's point of view.
2. To assist IBTA in a compilation of and an analysis for publication of relevant research results from other Bolivian research entities such as the University in Trinidad, CIAT in Santa Cruz, other IBTA stations, private research endeavors by entrepreneurs in the Beni, and appropriate foreign research entities.
3. To assist IBTA in the elaboration of a detailed Research Plan including crop research priorities and time-tables for carrying out on-station and on-farm experiments.
4. To assist IBTA in the planning and execution of research trials on experimental stations and on small farm plots.
5. To supervise the gathering of empirical data and economic data on research experiments, particularly on-farm experiments in order to confirm the validity of research results for small farmer use.
6. To assist IBTA in the assessment of need for and identification and/or screening of short-term technician advisors, and to assist these advisors with contacts and information during their consultancies.
7. To inform IBTA and/or USAID as appropriate of particular problems of a technical or administrative nature which may impede the fulfillment of the Advisor's responsibilities.
8. To submit quarterly Reports; End-of-Harvest Experimentation Reports; and a Final Report to IBTA and USAID.
9. To assist IBTA in the preparation of special reports as outlined in Section III.B., Project Outputs.

Preliminary Equipment List

ANNEX E

RESEARCH STATION

	Trinidad	Riberalta	Cobija
<u>Agricultural equipment</u>			
1 40 HP tractor	9,000	9,000	9,000
1 3 bottom pilow	1,500	1,500	1,500
1 disk	1,500	1,500	1,500
1 flail choppe	3,000	--	--
1 rotary mover	1,300	1,300	1,300
1 power sprayer, tractor pulled type	2,200	--	--
1 trailer	2,000	2,000	2,000
1 tool bar with cultivator and planter unit	2,000	2,000	2,000
1 drill planter	1,500	1,500	1,500
5 band sprayers	1,500	1,500	1,500
5 sets boticultural hand tools	500	500	500
2 walking tractors and implements	3,000	3,000	3,000
1 reed cleaner	500		
1 tractor driven hammer mill			
1 electric generator	4,200	4,200	4,200
1 water pump	500	500	500
1 complete set for a small shop	2,000	1,000 +	1,000 +
1 chain raw	600	600	600
1 laboratory for soil (chemical and physical); and plants and food nutrient analysis	12,000	--	--
<u>Office equipment</u>			
1 typewriter machine	500	500	500
2 calculators	400	400	400
1 refrigerator	700	700	700
1 dehumidifier	300	300	300
1 air conditioner	500	--	--
materials, including seeds and fertilizers	<u>1,000</u>	<u>1,000</u> +	<u>1,000</u> +
Total per station	53,000	33,500	33,500
GRAND TOTAL	120,000		
	=====		

+ Only the most important parts.