

CATIE

TROPICAL AGRICULTURAL RESEARCH AND TRAINING CENTER

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STRATEGIES FOR A JOINT EFFORT

to help small farmers of
the Central American Isthmus
to increase food production.



TURRIALBA, COSTA RICA

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SUMMARY

CHARACTERISTICS OF THE RURAL ENVIRONMENT IN CENTRAL AMERICA

An obvious need:

Population will more than double by the year 2000 in the Central American countries. Food and energy requirements will consequently have to be increased accordingly.

The area, the small farmer:

The six countries of the Isthmus comprise a population of 16 million inhabitants. Of this, 94 percent live on holdings from less than 4 to 35 hectares. Net income per capita ranges from 49 to 172 dollars for farmers in those units.

Low income per capita, poor housing, poor soils, and small holdings describe the conditions of the small farmers.

Under those circumstances, he cannot take risks.

Most food crops are grown in small farms which account for over 70 percent of the staple food consumed in the area.

The technology:

Small farmers produce most of the food in the area; however, technology is not available for them. Most techniques being developed are for farmers having sufficient resources.

NATIONAL INSTITUTIONS AND CATIE:
A PERSPECTIVE FOR COOPERATION
TO IMPROVE SMALL FARMERS' LIVING CONDITIONS

The mandate:

Small farmers represent a large part of the population, have a large impact on food production, live in poor houses, and raise crops on poor soils; no technology is available in accordance with their resources.

CATIE, a civil, non-profit association is conducting research and offers training and technical cooperation in agriculture, forestry and animal production through close coordination with national institutions in the countries of the Central American Isthmus and the Caribbean.

The objectives:

To increase productivity and production of the small farmers toward improving their living conditions.

The functions:

Research on production, taking into account the economic and biological environment, using a systems approach, considering all limiting factors, studying systems used by farmers and utilizing methodologies to develop suitable alternatives.

Proven technologies and methodologies are transferred to national staff and farmers. This has been some of the main results of CATIE's research efforts. Ten alternatives for cropping systems have been produced in different areas to increase net income up to 334 percent with small increases in production costs.

Improved animal systems have resulted in increasing milk and beef production to the benefit of farmers' diet and the economy of the area.

Natural resources are properly managed toward conservation and efficient use. Technologies and methodologies that do this are being transferred to improve certain environmental conditions.

Technical cooperation from different programs provides assistance to all countries in many aspects.

The farm is considered as a unit; systems being promoted are based on this concept and on the socioeconomic environment.

Training, main resource for development. Graduate training is given to professionals of the area within CATIE's philosophy and methodologies. Noticeable demand from the countries is being partly satisfied through short-term training events.

In 1978-79, a total of 45 graduate courses were taught. More than 200 professionals attended.

Short-term training involved over 450 professionals during the same period. It is done through seminars, short courses, in-service training and workshops.

Technical Cooperation is aimed toward strengthening national institutions.

This activity is carried out through agreements signed with the institutions to promote already proven technology. This technology is transferred to the farmer. The training of national counterparts is carried out as part of this activity by getting them involved in the development of technologies at the farmers' level. A direct impact on production, diet and living conditions is achieved. The countries are requesting an increasing amount of services in the use of natural resources and conservation. Assistance is given in milk, beef, cocoa and coffee production in many countries of the region.

Integrated efforts:

To accomplish the main goals of the Center and the countries -improving the small farmers' living conditions.

A PROPOSAL TO STRENGTHEN THE ACTIVITIES OF PERENNIAL PLANTS PROGRAM

Introduction

CATIE is a regional institution to promote research and to provide training and technical cooperation in close coordination with the national institutions.

To utilize its resources to better advantage, and to avoid duplication of efforts, CATIE works in cooperation with the International Centers. Their findings are used in CATIE's research work at the farm, and feedback from the farmer is provided to the International Centers.

Because of CATIE's regional scope, ample support is being provided to the national institutions. This fact, added to the quality and continuity of the staff which works in the field, with the farmer, is the main reason explaining the demand for assistance from CATIE.

CATIE has a germplasm bank unique in the region which collects, stores, and provides high quality genetic material to the countries.

Cooperation between the national institutions and CATIE is needed if the countries are to cope with the need for doubling food production, maintaining a rational use of natural resources and preserving a good environment for future generations. This cooperation is already functioning. Further demand to solve problems will require strengthening of CATIE's budget.

To help the countries meet such a challenge, increased budget support is needed to establish a permanent group of able professionals which will provide continuity of efforts.

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Budget requirements:

A three-year budget has been prepared to indicate the projection proposed for this period which will be necessary to meet the personnel requirements to cope properly with present and future demands for CATIE's assistance.

The number of personnel will reach a total of 11 by the third year, of which 5 will be financed by CATIE's budget and 6 will require extra funding.

The total contribution requested comes to US\$910,200. The impact of the additional resources on the total income for the first year, represents a two percent.

CHARACTERISTICS OF THE RURAL ENVIRONMENT IN THE CENTRAL AMERICAN ISTHMUS

AN OBVIOUS NEED:

More food and energy for an increasing population

To cope with the food and energy requirements of an increasing population, most countries of the Central American Isthmus will have to more than double their food production and properly program the use and replenishment of their natural resources before the end of the next decade, thereby presenting a dramatic challenge for those involved in rural development.

THE AREA, THE SMALL FARMER: a challenge

The Central American Isthmus is made up of Costa Rica, El Salvador, Nicaragua, Honduras, Guatemala, and Panamá. The population of Central American Countries is about 16 million people and will be more than 35 millions by the year 2000. In 1970 the rural population represented 64 percent of the total inhabitants of which, 76 percent are located in holdings of less than 4 hectares, and 18 percent, in holdings between 4 and 35 hectares; the rest, only six percent, are located in properties over 35 hectares.

The average annual income seems to be correlated to the size of holdings: 49, 172, and 952 dollars per capita, corresponding to less than 4 hectares, between 4 and 35 hectares, and over 35 hectares, respectively.

The low income, added to the small size of the farms, as well as their being located on poor soils, defines and puts the small farmer in a difficult situation which inhibits him from taking risks.

Of the total area devoted to agriculture, farmers with less than 4 hectares, dedicate 60 percent of their land to food crops; those with holdings between 4 and 35, dedicate 41 per cent to food crops; those with properties over 35 hectares, dedicate only 4.2 percent to food crops.

Although not programmed, small and medium-sized farmers of the area are responsible for producing a large percentage of the staple food consumed in the region. About 80 percent of this production comes from these farmers with small holdings, low net income, and poor soils.

THE TECHNOLOGY:

Unsuited to small
farmers' socioeconomic
environment

Although it is a recognized fact that the small farmers are involved in feeding themselves and a large percentage of the rest of the population, no technology has been developed that suits their particular socioeconomic and biological environment. New ideas and new research are needed to produce solutions which are both technically and culturally acceptable to tropical small farmers to increase production and productivity.

THE NATIONAL INSTITUTIONS AND CATIE: A PERSPECTIVE FOR COOPERATION TO IMPROVE SMALL FARMERS' LIVING CONDITIONS

Small farmers are a large part of either the total or the rural population; they have a noticeable impact on the staple food consumed in the area either from an animal or plant source; they live in poor houses, crop in poor soils, and the technology to improve their productivity and consequently their standard of living, is negligible.

THE MANDATE:

towards regional
coverage to benefit
small farmers

CATIE is a civil, non-profit, autonomous association, scientific and educational in nature, established to carry out, promote and stimulate research, and to provide technical cooperation and training in agricultural, animal and forestry production to produce technical alternatives for the regional needs of the small farmers of the American tropics, particularly in the countries of the Central American Isthmus and the Caribbean.

THE OBJECTIVES:

in accordance with
the environment,
resources, and national

CATIE's objective is to increase agricultural, livestock and forestry production and productivity, especially of the small farmers of the Central American Isthmus, with the purpose of contributing to the improvement of their living standards by making proper use of natural resources within the framework of national policies, in close cooperation with the national institutions.

THE FUNCTIONS:
toward a
systems approach

*Research: for
production

Research to produce an impact on small farms' production and productivity has to take into account both the economic and biological environment. Methodologies capable of contemplating them are needed. By focusing research on a Systems Approach, considering all limitant factors, and studying systems being utilized by farmers, CATIE has developed a methodology that is being proven at the farmers' level, to generate technological alternatives, according with the farmers resources, consequently, easy to adopt. As a result of the research efforts, both methodology and technologies suitable to the environment are generated by close cooperation between CATIE staff and personnel from the national institutions.

Technologies and methodologies developed, after proven are transferred to the farmers and the national staff of the area.

A methodology to do research at the farm level, assistance to develop national programs in cropping systems, and the initial steps to establish a research network in the Isthmus, are some of the main results of CATIE's efforts. Ten alternatives for cropping systems including corn, beans, cassava, squash, pumpkin, sorghum and cowpea, in different combinations, have been developed.

They may produce an increase in the farmer's net income ranging from 66 to 334 percent, with an increase of only 15 to 23 percent in production costs.

Improved crop management and proper land utilization practices are contributing to a better and more efficient use of the small farmers' resources and producing additional income as a result of combining several annual crops. Significant reduction in soil preparation operations, better use of inputs, and the acquisition of additional products such as those coming from perennial plants and trees are other achievements of CATIE's research efforts.

Improved animal production systems have helped, through better crop management, use of tropical legumes and proper grazing practices, to increase farmer's net income. Breeds and crosses have been evaluate and those proven adaptable to tropical conditions have been selected and are being promoted.

CATIE has worked toward the management and conservation of the natural resources. Crop and tree associations significantly contributing to the farmer's net income have been identified. The Forestry Nursery has been renovated to provide material to be included in the research work. The Collection of New Species has been increased, the Latin American Forest Seeds Bank has been promoted. In addition, the development and utilization of wildlife species in several countries have been of noticeable help to the area.

Annual crops, perennial plants, rugged adaptable animals, animal management, wildlands and wildlife management and the socioeconomic factors affecting these systems are all part of the farm; and as such are considered by CATIE's efforts in order to provide proper answer to the farmer's problems.

***Training: main
resource for
development**

Training is considered a fundamental tool to promote the methodologies developed in order to reach the target population. For this, a considerable number of professionals have to be trained to extrapolate and multiply the Center's efforts. Personnel from national institutions, who are involved in research, extension and education, are being trained through a long-term Graduate Program and short-term training activities.

There is a recognized need to design methodologies to accelerate training to help satisfy countries' needs. To achieve this, CATIE is making an effort to carry out training activities at different levels, using methods that make it possible to train larger numbers of professionals.

Agricultural engineers, agronomists, researchers, extension agents, technicians, university professors and students, and personnel from intermediate-level educational institutions will be the target of CATIE's training efforts.

In only one year (1977-1978), the staff of the Center gave a total of 45 courses within the Graduate Program carried out through a joint effort between the University of Costa Rica and CATIE. This involved over 200 professionals of the region and other countries in Latin American. The staff also participated in short-term training activities within the six countries of the Central American Isthmus, working together with the staff of the national institutions. These short-term training activities involved 450 professionals

through short courses, seminars, workshops, in-service training and international meetings. Through these efforts, CATIE is contributing substantially to strengthening a regional network of researchers and experts in agricultural development, interested and trained to do research oriented toward the needs and resources of the small farmers of the American Tropics.

***Technical
Cooperation:
toward strength-
ening national
institutions .**

Technical cooperation activities are carried out to make sure that technologies developed reach the farmers, and that there is a feedback from the farmer to the researcher.

To properly do this, appropriate and efficient methods of transferring technologies also have to be produced.

Technical cooperation activities, carried out through contracts and agreements with the national institutions of the countries, are the basic channels through which suitable technologies can be tested at the farmer's level, working with the personnel of the national institutions. This concentrated action serves as a model with the multiple purpose of transferring technologies to a large mass of farmers and to train personnel and test methods of transference to accelerate the process.

To accomplish such purposes, CATIE has signed contracts and agreements with the national institutions of the countries for the application of technologies, the planning and development of cropping systems, to exchange germplasm, to assist technically credit programs linked to livestock development activities, to promote milk production as part of land colonization projects, to train personnel, to develop agricultural practices and to manage wildland areas. Technical assistance has been given to Panama in the form of research related to livestock production in order to generate and transfer developed alternatives in this field. Many countries have been helped in planning the management of their natural resources, in managing watersheds, management and conservation of hydraulic resources, in development of national parks and in training programs for the conservation of the environment.

INTEGRATE EFFORTS:

- . Systems approach
- . Interdisciplinary team
- . Training and tech. coop.
- . Working with the farmer
- . At the farm level
- . With national institutions



To accomplish the goals of improving small farmer's living conditions, CATIE is using a multidisciplinary team, working in close cooperation with staff from the national institutions, in the farmers' fields, cognizant of the farmers' problems, and with the farmers' active participation in the process of developing alternatives. Research is conducted away from the experiment station using available inputs. Staff from the countries is trained using methodologies developed and proven suitable. Methods of technology transfer are being developed through promoting proven technologies.

THE STRATEGY:

*The programs:
four interacting disciplines in the same institution working at Turrialba and at the country level, to carry out research, training and technical cooperation

The Center has the privilege of having the four basic areas of production for rural areas: Animal Production, Annual Crops, Perennial Plants and Natural Renewable Resources.

Altogether, the functions assigned to the Center and the Programs designed to implement them, have made it possible for CATIE to produce a noticeable impact within the important area of production, an action recognized by the support provided by the Ministers of Agriculture of Mexico, the countries of the Central American Isthmus and the Dominican Republic.

CATIE's Programs have a regional projection and their actions are carried out through projects jointly implemented with the national institutions. Activities within the projects are aimed at the

generation of technology, methodologies for transference, training at different levels, and to assist the institutions through technical cooperation actions.

All the Programs carry out initial surveys to find out what are the predominant systems in the area. This survey is used to determine the main limiting factors in the system used by the farmer. Based on these and data on climatic and socioeconomic conditions, alternatives to the farmers' systems are designed. Validation in the farmer's field is the next step. Once validated, transference to the farmer takes place through technical cooperation agreements with national institutions. The Annual Crops Program concentrates its activities in the following areas:

- a. Development and improvement of cropping systems for small farmers in specific environments.
- b. Development of methodologies to increase the geographic area for which cropping systems alternatives can be recommended.
- c. Analysis of cropping systems behavior and their response to environment and management factors.

The Animal Production Program has four main lines of action:

- a. Development of specialized milk production systems.
- b. Development of beef production systems.
- c. Development of dual purpose production systems.
- d. Development of small animals production systems for small farmers.

The Natural Renewable Resources Program carries out activities in:

- a. Wood Production.
- b. Watershed and wildland management
- c. Agroforestry systems

The Perennial Plants Program emphasizes work on:

- a. Development of cocoa production systems.

b. Development of coffee production systems.

c. Multiple cropping perennial plants systems.

Efforts expanded in all these areas will generate technologies, will train people and will produce methods of transferring and evaluating the findings once they reach the main target-the small farmer.

Specific activities are being carried out in all the countries of the Central American Isthmus, and technical assistance is provided also outside the area.

The benefits of joint activities between national entities and CATIE on production, diet, resource conservation, and efficient use of natural renewable resources and inputs are evident. The methodology used is simple, easy to adopt, and applicable to most environments.

Demand for this kind of effort toward developing adequate technologies is increasing.

CATIE's present basic budget will become unsuitable to respond to the challenges of the 80's. Additional support will be needed to cope with it without stretching CATIE's staff beyond the point of reasonable efficiency.

A PROPOSAL TO STRENGTHEN THE ACTIVITIES OF PERENNIAL PLANTS PROGRAM

INTRODUCTION

CATIE is a regional institution that works to promote research, training and technical cooperation in close coordination with national institutions. It is becoming a leader in the application of new methodologies for agricultural development by using interdisciplinary teams to work toward solving small farmers' problems.

Technical assistance available in different forms and provided by the Center, is in increasing demand.

CATIE also works in cooperation with the International Centers in a effort to better utilize their findings to avoid duplication of efforts or waste of resources.

Because of CATIE's regional scope, ample support is being provided to the national institutions. This fact, added to the quality and continuity of the staff which works in the field, with the farmer, is the main reason explaining the increasing demand for assistance from CATIE.

Examples of this demand are the recently approved projects on watershed and wildland management for Costa Rica and Panamá, whose governments have requested CATIE's assistance. Coffee and cocoa production are also main concerns of the countries, and a recent project financed by the World Bank in Panamá is going to be implemented through CATIE's assistance in that country.

In addition to this, the Center has a germplasm bank, unique in the area, which collects, stores and provides high quality genetic material to supply the needs of the countries.

To respond to the demands of countries that will be responsible for feeding 35 million people by the year 2000, and that will have to create a large number of jobs per country every year to maintain the increasing population, an institution such as CATIE is strongly needed if the continuity of efforts, toward increasing food production and protection of resources, is going to be provided.

To accomplish this, the Center needs increasing budget support in order to establish a permanent team of able professionals in the different areas and programs.

The Programs needing support are described below. The needed personnel and the corresponding budget are also indicated.

BACKGROUND INFORMATION

Perennial Plants constitute an important part of the production systems used in the countries of the Isthmus and are a reliable source of income for small farmers. In many cases perennial plants are the main crop, in others they are part of the production system. The most frequent perennial plants are: coffee, cocoa, sugarcane, peach palm, fruit trees, and some forest species. The latter in agroforestry systems provide shade, animal feed, fence posts, construction materials and at the same time serves as an energy source for the small farmer.

Although very little information about the role of perennials within the farm is available, it is known that in certain areas they achieve vital importance and have very diverse uses. It is common to find on small farms the association of perennial and semi-perennial and annual crops, such as in the case of a forest species with coffee or cocoa, plaintain, or an annual crop. This provides initial shade and protection as well as cash income from the annual crop grown during the establishment of the cocoa or coffee. Later on, the forest species will provide the permanent shade.

Even though these systems are common in the area, there is no information available on agroforestry or other systems, which will make it possible to evaluate the contribution of the perennial species to the production system. Also, relatively little is known of the role perennials play in general, in the farming systems and economy of small farmers.

The demand for training personnel is high, and the national institutions need further support in their training activities at all levels to maintain their efforts in research and technology transfer towards providing the farmer with alternatives to improve their standard of living.

STRATEGY

The Program's research is founded on diagnostic studies for the identification of perennial plants production systems prevalent in the area, as well as in the identification of factors limiting their production.

Using a multidisciplinary approach, the Program will channel its activities through research projects aimed at studying and collecting information on the traditional cultivation of these plants. Activities will also be dedicated to search for other perennial plant species which could replace or be added to the traditional systems, as well as for species which produce wood, fruits, and animal feed and contribute to the improvement of the farmer's system.

Training is considered a fundamental tool to promote the methodologies developed in order to reach the target population. For this, a considerable number of professionals are being trained through the Program's staff to extrapolate and multiply the Center's efforts. Personnel from national institutions, who are involved in research, extension and education, are being trained through a Graduate Program and short-term training activities. Using different training methods, the target population will be increased in the future.

MAIN LINES OF ACTION

A. DEVELOPMENT OF COCOA PRODUCTION SYSTEMS

Importance and Justification

Cocoa production is a very important component in the agricultural base of the Central American Isthmus. The area devoted to the crop varies according to the country; in Costa Rica there are about 27,000 hectares of cocoa while in Nicaragua, Panama, and Guatemala, as reported in 1973, the range is from 2000- hectares. In Honduras cocoa production is a relatively new enterprise and presently only 800 hectares are under production.

Information available in Costa Rica indicates that most of the production is in the hands of small farmers. A number of factors affect the productivity of small farmers. Among them diseases, low genetic potential and poor management of the crop, are the most important in affecting production. In addition, an uncertain market has also contributed to low yields.

The most important needs are, therefore, a search for resistant, early maturing, and high yielding genetic material; improvement of management practices, ranging from fast and economic establishment methods and plantation renewal to processing of the final product.

Because cocoa is a crop needing shade all the time, it is necessary to research mixed cropping systems with species that, besides providing shade and nutrients to the soil, will result in food, fruits, wood for different uses, and in the general improvement of the small farmers' economy.

Objectives

- To increase production and productivity of cocoa as a mean of improving the living conditions of small farmers.
- To strengthen the research programs for cocoa production in the national institutions of the Central American Isthmus.
- To train personnel of the national institutions as a mean of strengthening the research and extension programs in cocoa production.

Methodology

Research is conducted to answer main production questions in cocoa production. Activities concentrate on the following areas:

- a.- study and diagnosis of the main cocoa production systems within small farms.
- b.- Genetic improvement of the crop.
- c.- Cocoa physiology and cultural practices, regarding propagation, pruning, planting distances, shade and association with other species.
- d.- Pest control.
- e.- Study and diffusion of processing practices.
- f.- Production of certified seed and vegetative material.
- g.- Training through short courses at various levels, including the farmer.
- h.- In-service training of technical personnel of the national institutions.
- i.- Technical assistance to the national programs for research and technology transfer to solve local problems.

B. COFFEE PRODUCTION SYSTEMS

Importance and justification

Coffee represents a large and significant proportion of all exports in El Salvador, Guatemala, Costa Rica, Honduras, Panama and Mexico and utilizes 35 percent of the available hand labor. Consequently, coffee production plays a decisive role in the socioeconomic environment of the above mentioned countries. There exist, however, large differences in yields among the different countries mainly because of differences in the level of technology applied, the management of the systems used for shading, and in the use of some of the inputs.

To improve the value and productivity of this crop it is necessary to improve yields through better management practices and efficient disease control. One of the most important diseases is coffee rust (*Hemileia vastatrix*). In November 1976, *Hemileia* appeared in Nicaragua, menacing, consequently, the whole Central American region, since most of the plantations are based on genetic material susceptible to the rust. The damage that this disease could cause could have very negative effects on the economy of particular countries, as well as on the region. In the last few years, adequate technology for production has been developed that, if used, could help to diminish the effect of coffee rust and of *Hypothenemus hampei*, another important problem, also present in the area.

The countries of the Central American Isthmus and Mexico with the cooperation of the Inter-American Institute of Agricultural Sciences (IICA), "Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA)", and CATIE, created a program (PROMECAFE) with the aim of studying the situation in each of the producing areas in order to develop the necessary technology as well as the new varieties with high yielding and rust resistance characteristics, which are needed to improve production. CATIE plays a pivotal role in this program.

CATIE has one of the best genetic material collections which has been actively maintained for many years.

At the present time, given the importance of this crop in the economy of Central American countries, it is necessary to utilize the genetic material available in the collection, especially in research related to rust and "broca" resistance.

Objectives

- To improve the living conditions of the small coffee farmer of the area through betterment of production and productivity.
- To produce genetic material according to the needs of the farmer.
- To strengthen research in the countries and to train national personnel, as a mean of increasing the capacity of the national institutions.

Methodology

Research emphasizes genetic studies through germoplasm evaluation and variety-genotype comparisons. Studies in cultural practices and physiology of the crop, especially with respect to planting distances, propagation methods, shade and nutrient utilization, and pest control are the primary research topics.

Training courses at different levels and technical assistance to the national institutions are some of the tools utilized in strengthening the National Institutions' capacity.

C. MULTIPLE CROPPING PERENNIAL PLANTS SYSTEMS

Importance and Justification

Systems of mixed perennial plants help to protect soil from erosion and provide shade for other crops and animal grazing in the area. They also con-

tribute to energy supplied through fuelwood, charcoal, and some of the trees included in the systems can be used for wild and domestic animal feed. They can also be used as a source of food for man; others will produce fine woods for different uses.

Very little is known about these systems even though they have been traditionally used in cocoa and coffee production systems. Cocoa and coffee plantations are established agricultural systems and most times combine one or more shade producing species. Species of *Erithrina* and *Inga* are commonly used as permanent shade for cocoa and coffee; however, very little information is available on the use of perennial crops in conjunction with cocoa and coffee or their specific economic contribution.

A preliminary study of the prevalent systems indicates that there are several combinations presently used and that there exist several possibilities for different combinations with perennial plants, annual crops and forest species. These systems, besides providing such income, will protect the soil and watersheds, resulting in a more rational use of the natural resources.

Objectives

- To study and improve the perennial plants cropping systems used by the small farmers so as to guarantee them a continuous production and to contribute to soil and watershed protection.
- To train the staff of National Institutions in research methodology on perennial plant cropping systems in order to ensure transference of technology.

Methodology

Since information on the role of perennials in small farms is relatively scarce, it is necessary to inventory the existing data, carry out surveys in representative areas, and to analyze the importance of the different crops in the production and productivity of the systems.

Analysis will also permit selection of the systems or the system most commonly used and to research the limiting factors with an aim towards improving the system.

ACTIVITIES OF THE PROGRAM NEEDING SUPPORT

The strengthening of the Program necessary to carry out and fully implement its objectives and to achieve the goals within the main lines of action mentioned above, will concentrate on the following activities:

- a) research, jointly carried out with the countries, on the main lines of the Program.
- b) support for research and extension personnel of the national institutions to carry out their own programs,
- c) support for research, training and technical cooperation activities presently carried out by CATIE's staff.

Support for these activities is needed to ensure that the national institutions will be able to implement their own programs in the future; to train their staff, following CATIE's philosophy, to identify and evaluate problems, to assign priorities in decision making, and to make sure resources and efforts will be directly channelled toward the development plans of each individual country. To do this, CATIE needs to increase the number of basic staff to provide the additional support needed to carry out cooperative activities among researchers and extension specialists, and to backstop projects related to CATIE's research objectives which are all to be based on a common goal -improving the living conditions of small farmers. Once the needed support is obtained, CATIE's position and credibility, gained by projecting its efforts toward the countries, by working with the staff of the national institutions, and with the farmers, will permit the Center to project further its influence and actions at the regional and national levels. The regional action of the Center will avoid overlapping of efforts among countries with the consequent saving of human and monetary resources, and will be independent of political fluctuations.

Justification

The goals already achieved by the Program individually and by all CATIE's activities using a multidisciplinary approach regarding farming systems, should be considered as sufficient to justify the request for funding to support basic staff requirements.

Most of the research results obtained from the main lines of the Program will be applicable within the next five or ten years. It then becomes obvious that there is a need for adequate human and physical resources to guarantee stability of CATIE's projections, the validity of its research and the adjustment of the methodologies developed, as well as to provide permanent assistance to the national staff of the countries.

There is an obvious need to learn more about Perennial Plants systems, their

role in the farm and ways to increase efficiency in the use of management practices and inputs. This has to be done if we are to cope with the challenge of doubling food production before the end of this decade, if we are going to protect our environment from destruction, and if we are going to strengthen the economy of the countries with the use of high value agricultural products such as coffee, cocoa, and fruits.

Activities carried out through the Program enables CATIE to produce suitable alternatives for the region through extrapolating research results from one site to other similar areas, avoiding then the duplication and waste of efforts and other limited resources, by providing proper coordination among researcher and extension agents of the different national institutions.

The projection given to the Center through its innovative approach to development, applied during the last few years, has created an increasing demand on the services of the present personnel. The support provided by the Governments of the area constitutes an honor for the Center, but also an additional challenge and responsibility for the institution.

It is the intention of the Program, as well as that of CATIE in general, not to stretch its existent manpower beyond the point of reasonable efficiency. To further extend activities and to better support present operations, the Program and the whole Center must have solid support for a highly qualified staff.

HUMAN RESOURCES NEEDED

To continue the efforts initiated, there is a need for the Senior Staff presented in Table 1. This staff will consist of high level professionals in the various disciplines of Perennial Plants.

The staff will be located at Turrialba headquarters and will cooperate more closely with the national institutions; a considerable number will be located in each country.

The total number of required personnel has been strategically distributed over the years to respond strictly to activities having priority and to complement the actual staff of CATIE and that of the national institutions. To determine the needs, both CATIE's personnel and national staff were considered.

Requirements for the first year call for an Economist to help in the development and analysis of surveys to be carried out in the countries to make a diagnosis later for the purpose of designing alternatives. He will work closely with the anthropologist, as well as with the rest of the team and personnel of other Programs. This joint effort will provide ideas for continuing with more specific surveys and for beginning research, extension and training programs to complement the existent ones. A Horticulturist will also be needed to carry out research on different components of the systems prevailing in different areas. He will be responsible for validating the available or generated technology and to make the necessary adjustments to ensure their adoption by the small farmer.

A Training Coordinator will also be required. Most Program activities, even those directly related to research, imply some training actions. Added to this, the Program carries out teaching at the Graduate level as well as through short courses, seminars, workshops, and in-service training at headquarters and in the countries. These specialists will complement the personnel of the Program and will help in the long-term projection of the activities in their respective fields.

The second year will require the services of a Climatologist to collect and organize available climatological data from each of the regions to give indications of suitable areas where to establish experiments and to validate alternatives with the idea of extrapolation. A Pest Management Specialist is also requested for this year. Research has demonstrated that one of the main constraints to obtaining profits from perennial plants are post-harvest losses due to pests.

Plans for the third year contemplate the addition of a Soils Specialist to help in the extrapolation of research results to save resources and avoid duplication of research. His work complements available information and will help in zoning the areas regarding soil similarities, which will help in the extrapolation process.

These positions, representing the required permanent staff for the Program, will be necessary to conduct research, training and technical assistance according to the projected and increasing needs of the countries.

Junior staff, as well as general support personnel for research and training to increase the efficiency of the Senior Program Staff, is included in the proposal. Funds are also requested to cover operational costs, since that part of the present costs are being covered by special projects.

REQUIRED BUDGET

A three-year budget has been prepared to indicate the projection proposed for this period which will be necessary to meet the personnel requirements to cope properly with present and future demands for CATIE's assistance.

In Tables 1-7, the total and additional budgets needed by the Program are shown. Personnel, materials and equipment are also included. The Tables also show an analysis of the present and proposed budgets for three years.

Table 1 indicates the total Program Senior Staff and additional staff funding required. There are 6 required for the first year (2 additional) and 11 for the third year, representing 6 new positions. All personnel costs include benefits and allowances, as well as social security costs.

Table 2 shows personnel costs and support personnel costs, as well as other support costs.

The total contribution requested for the first year amounts to US\$179,600; and for the three-year period, it comes to US\$910,200 (Table 3).

The proposed situation (Table 4), regarding the percentage of the total Program resources, represents a change from 26 to 45 percent for the first year.

Regarding the impact of the additional resources on the total income for the first year (Table 7), it only represents two percent.

TABLE N° 1. CATIE, PERENNIAL PLANTS PROGRAM. REQUIRED BASIC PROFESSIONAL STAFF AND COSTS FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

POSITION	Academic Level	First Year	Second Year	Third Year	Total
1. Head of Program	PhD.	36.0	40.0	44.0	120.0
2. Agronomist	Ing.Agr.	13.6	15.0	17.0	45.6
3. Research Assistant	Ing.Agr.	15.0	16.5	18.0	49.5
4. Anthropologist	M.S.	15.0	18.0	21.0	54.0
5. Agricultural Economist	PhD/M.S.	34.0	40.0	42.0	116.0
6. Horticulturalist	PhD/M.S.	34.0	40.0	42.0	116.0
7. Training Coordinator	M.S.	36.0	39.0	41.0	116.0
8. Agro-Climatologist	PhD.		45.0	40.0	85.0
9. Cropping System Specialist	PhD.		45.0	40.0	85.0
10. Specialist in Crop protection	PhD.			45.0	45.0
11. Soils specialist	PhD.			45.0	45.0
ADDITIONAL FUNDING REQUIRED		(70.0)	(169.0)	(253.0)	(492.0)
TOTAL BASIC PROFESSIONAL STAFF COSTS		183.6	298.5	395.0	877.1
TOTAL SENIOR STAFF POSITIONS		6	8	11	

TABLE 2. CATIE, PERENNIAL PLANTS PROGRAM. SUPPORTING COST OF BASIC PROFESSIONAL STAFF, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Description	First Year	Second Year	Third Year	Total
PERSONNEL	75.5	105.5	142.7	323.7
TRAVEL AND PERDIEM COSTS	5.0	6.0	7.5	18.5
EQUIPMENT AND COMMODITIES	16.0	29.0	13.5	58.5
COMMUNICATION COSTS	5.8	7.5	9.7	23.0
MAINTENANCE & OPERATION COSTS	7.5	7.5	8.5	23.5
SPECIFIC INPUTS	9.0	9.8	11.5	30.3
ADMINISTRATIVE AND LOGISTIC SUPPORT	2.0	4.0	6.0	12.0
GENERAL COSTS	8.0	9.0	10.0	27.0
TOTAL STAFF SUPPORT COSTS	128.8	178.3	209.4	516.5

CUADRO N° 3. CATIE, PERENNIAL PLANTS PROGRAM. SUMMARY OF PROJECTED BASIC COSTS,
BY CATEGORY AND SOURCE, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

Description	First Year	Second Year	Third Year	Total
BREAKDOWN BY CATEGORY				
1. Senior staff costs	183.6	298.5	395.0	877.1
2. Staff support costs	128.8	178.3	209.4	516.5
TOTAL	312.4	476.8	604.4	1.393.6
BREAKDOWN BY SOURCE				
1. CATIE available resources	132.8	159.4	191.2	483.4
2. Additional resources required	179.6	317.4	413.2	910.2
TOTAL	312.4	476.8	604.4	1.393.6

TABLE No 4. CATIE, PERENNIAL PLANTS PROGRAM. TOTAL PROGRAM RESOURCES; PRESENT AND PROPOSED SITUATIONS, FOR THE NEXT THREE YEARS.

(THOUSANDS OF 1980 US DOLLARS)

DESCRIPTION	First Year	Second Year	Third Year	Total
	US\$000	US\$000	US\$000	US\$000
PRESENT SITUATION				
1. Basic activities-CATIE resources	132.8	159.4	191.2	483.4
2. Contracts and specific agreements	384.0	350.0	380.0	1,114.0
TOTAL	516.8	509.4	571.2	1,597.4
PROPOSED SITUATION				
1. Basic activities-CATIE+additional	312.4	476.8	604.4	1,393.6
2. Contracts and specifics agreements	384.0	350.0	380.0	1,114.0
TOTAL	696.4	826.8	984.4	2,507.6

TABLE Nº 5. CATIE, PERENNIAL PLANTS PROGRAM. RELATIONSHIP BETWEEN BASIC RESOURCES AND FUNDING FROM SPECIAL PROJECTS; PRESENT AND PROPOSED.

(THOUSANDS OF 1980 US DOLLARS)

Description	PRESENT		PROPOSED	
	US\$000	£	US\$000	£
1. Gross basic income	2.897.6	29	3.041.2	30
2. Contracts and agreements	7.170.7	71	7.170.7	70
TOTAL	10.068.3	100	10.211.9	100

TABLE N° 6. CATIE, PERENNIAL PLANTS PROGRAM. REQUESTED ADDITIONAL FUNDING EXPRESSED AS A PERCENTAGE OF TOTAL BASIC BUDGET FOR 1980.

(THOUSANDS OF 1980 US DOLLARS)

	US\$000	%
1. CATIE available gross basic income	2.897.6	94
2. Additional Program resources required	<u>179.6</u>	<u>6</u>
TOTAL	3.077.2	100

TABLE N° 7. CATIE, PERENNIAL PLANTS PROGRAM. REQUESTED ADDITIONAL FUNDING EXPRESSED AS A PERCENTAGE OF CATIE'S TOTAL BUDGET FOR 1980.

(THOUSANDS OF 1980 US DOLLARS)

	US\$000	%
1. CATIE total 1980 available income	10.068.3	98
2. Additional Program resources required	<u>179.6</u>	<u>2</u>
TOTAL	10.247.9	100

TABLE Nº 8 . CATIE, GLOBAL BUDGET SUMMARY 1980.

(THOUSANDS OF 1980 US DOLLARS)

Description	US\$000
1. Direction	101.7
2. Technical Coordination	155.3
3. Programs	
3.1 Annual Crops	2.704.8
3.2 Perennial Plants	516.8
3.3 Animal Production	2.129.3
3.4 Natural Renewable Resources	2.147.4
4. Technical support units	916.8
5. Administration and services	593.4
6. Farm operations	371.8
7. General costs	431.0
TOTAL	10.068.3