CATIE

CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA

AN UNDERSTANDING OF THE FARMING SYSTEMS OF SMALL FARMERS IN CENTRAL AMERICA

A RESEARCH PROPOSAL

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C O N T E N T S

AN UNDERSTANDING OF THE FARMING SYSTEMS OF SMALL FARMERS IN CENTRAL AMERICA

"The general objective of CATIE is to increase, through the rational use of natural resources, agricultural, livestock and forestry production and productivity, particularly of the small farmers of the Central American Isthmus, thereby contributing to the betterment of their living standards ... (4).

I. INTRODUCTION

In contrast to the conventional approach used by agricultural development researchers in Latin America (19), the Tropical Agricultural Research and Training Center (CATIE) has directed its research efforts to the study of agricultural technologies appropriate to the bio-physical and socio-economic conditions, that is, the environment in which they will be applied (3, 12, 13).

Furthermore, CATIE has defined the small farmers of the Central American Isthmus as the target group of their research efforts. Based on the characteristics and importance of this group for the agricultural economy of the Central American Isthmus (20), CATIE has defined the following as its basic objective: To provide as much knowledge and efforts as it possibly can in order to improve the production level, the net income and the general well-being of the small farmers of the Isthmus (4).

Given the nature of such task, CATIE's work objective is: "To identify and develop production technologies which, through the rational use of natural resources, will increase production levels and productivity of these resources and technologies which are appropriate to the environmental conditions in which the small farmers of the Central American Isthmus function."

The stated work objective is based on the premise that the conditions imposed on technologies, existing or prospective, increase the likelihood of farmer acceptance, thereby making a positive step in the direction of realizing the basic objective stated above (1, 2, 7, 8).

The nature of the research and its accompanying objectives demand, furthermore, that CATIE co-ordinate its activities with the appropriate institutions and development professionals in each country of the Isthmus and interact directly with the farmers themselves in the areas of interest. The advantage of CATIE's approach is evident; the methodology being developed can be simultaneously transferred to the national institutions interested in expanding their efforts, or in initiating technology diffusion or production programs based on the results and experiences of such research. In addition, the existing interaction with the farmers improves the communication and exchange of knowledge and experience between professionals and farmers.

The latter can definitely accelerate the process of identifying improved technologies and can provide the possibility of technology transfer from farmer to farmer.

Furthermore, in accordance with past research experience exclusively dealing with small farmers, CATIE has accepted the farming system concept as the valid frame of reference for research orientation. This research focus, being a novel one for CATIE, demands precise knowledge of the farming systems emplyed by the small farmers. In other words, CATIE unreservedly sustains the philosophy that a farming system must be studied and understood before it can be improved.

Consequently, it is necessary to realize an effective diagnosis of the small farmers' farming systems in the Central American Isthmus. Initially, a static diagnosis can be accomplished by means of a field survey of approximately 400 small farmers in each country. Subsequently,

a dynamic diagnosis can be realized by means of farm records and periodic surveys. Both phases of the diagnosis complement each other and will provide a sound basis for establishing CATIE's research priorities and identifying viable alternatives, based on farmer-relevant criteria.

The present proposal is directed to realizing the static phase of the diagnosis. Section II describes the conceptual framework for the static diagnosis and CATIE's current efforts in this respect.

Sections III, IV, V and VI describe the specific research objectives, the strategy, the calendar of activities, and the budgetary needs in order to realize these objectives, respectively.

It should be emphasized that the present proposal is the first phase of the diagnosis of the farming systems. In this sense, this phase is the necessary condition, but not sufficient, for studying and understanding the small farmers and their environment.

II. BACKGROUND

The most important condition of the research on improved technologies for small farmers which CATIE is attempting to realize is that such technologies be appropriate to the environmental conditions in which the farmers function. This implies that it is essential to have previous knowledge of the environment, resources, and existing technologies in order to have an adequate point of departure and comparison. Such knowledge would not only permit an identification of research priorities, but would also permit an adequate evaluation of research results and provide guidelines for technology diffusion or production programs based on such results.

In general, the small farmers of the Central American Isthmus manage farms either on an individual or collective basis (20). The farm is a production system which provides society with its products and from which the small farmer derives all, or an important part, of his income. The farm system should establish, consequently, the frame of reference within which research is to be designed, developed and evaluated.

Thus, the farming system is also the valid focal point for the analysis of the environment to which the technologies under study should be adapted.

A. The Farm as a System

As a system, the farm functions in an ecological, social and economic environment. The environment determines its characteristic features and its components in the same way as it determines the relative importance and relationship among these components (9, 11, 16).

In order to understand the farming system in its totality, it is essential to pay equal attention to the environmental factors (exogenous factors) and to the various components of the system and their chronological relationships during the year of agricultural production (endogenous factors) (17).

A. 1 Endogenous Factors

The endogenous components of the farming system are: crops (the crop subsystem), livestock (the livestock subsystem), forestry (the forestry subsystem), and the social component represented by the farmer and his family (the social subsystem).

In general the boundaries of these subsystems or components are rather blurred at the level at which the small farmer operates (in comparison to large farmers), thereby demonstrating the complexity and dynamic interactions among the various components of the farming system. Apparently such configuration is the impact of the process of evolutionary changes and of continuous adjustments, approximating a dynamic equilibrium among the total farm system, the resource endowments of the farm, and the ecological, social and economic environment in which it operates.

The study of the farm, therefore, should not only include a quantitative description of the various components, their contribution to total income and demand on the farm's resources, but also an understanding of the interrelationships existing among them and between these components and the total environment of the farm.

The interrelationships are the direct result of the competitive, complementary or supplementary nature of the interaction among the various components with respect to the resources of the farm during the production year. These resources can be fixed resources such as land, capital investments and management capacity, or flow resources such as labor, working

capital, water and others of this type. There are flows of resources among the various activities within the farm, from the environment to the farm entity and vice versa. These flows vary during the season of the year, and perhaps it would be more productive to concentrate attention on their efficient use during existing peaks and valleys rather than on their use in absolute terms.

The intrinsic interrelationships within the farming system of the small farmer imply that the adoption of a new or improved technology will definitely have an impact on the total farm (6). The researcher should be aware of this fact and should understand the total system to be sure that the impact of the proposed technology would not only mean an improvement in one sector of the farm, but that it should imply a net improvement for the system and, therefore, the farmer. This suggests that, in addition to having technical and cash benefits, the improved technology should be congruent with the farming system; it should possess a level of complexity that falls within the range of the management capacity of the farmer; it should be sufficiently compatible with the total environment and attractive to the farmer, thereby increasing the probability of its acceptance as part of the farming system. ((5, 18)

Naturally, knowledge of the small farmer's farm system would be incomplete without particular attention to the farmer, his management capacity, his goals, his felt needs and his family. This knowledge includes having an idea of his susceptibility to new ideas, eagerness for modernization, willingness and ability to accept instructions and other aspects such as his attitudes toward technical assistance, risk and the use of credit. (5, 9)

A. 2 Exogenous Factors

The farmer is able to control only some of the factors that impinge upon the farm. These controllable factors are generally endogenous to the farm. There are, however, various other factors which are similarly very important in determining the type of farm, its management and in general the dependence of the system, and yet they cannot be controlled by the farmers. The majority of these non-controllable factors are exogenous or environmental factors. The study of these factors and their relationship to the farm entity is, therefore, also important.(7, 11, 16)

The exogenous factors are associated with the general ecological characteristics of the areas, community structures and governmental policies and infrastructure. From the socio-economic perspective, the most important factors include the infrastructure of markets for needed inputs and potential products in the area. It is exogenous factors like these which determine the feasibility and thus the existence of particular types of farms and their sub-systems from all the technically possible types in the community. At the level of the farm system, it can be said that the farmer, with his cultural peculiarities, management ability, goals and available resources, adjusts himself to the entire set of determining factors in order to accomplish his social function of insuring the survival of himself and his family and of producing for the market, in the latter case, provided he is able to and benefits from such function.

B. Current Efforts

Although restrained by current personnel and budget limitations, CATIE has begun to act under the directives of the above discussed perspective which, in turn, reflects the general research methodology of the Institution.(2, 4, 14, 15,) In this regard, the realized efforts include preliminary surveys to identify, principally, the cropping systems and the

controllable agricultural resources in the geographical areas of priority under the Small Farmer Cropping Systems Project of CATIE Subsequently, in the same areas, an effort has been begun to acquire knowledge of a broader scope on the types of existing farms and their management practices (farming system survey). Furthermore, CATIE is executing a survey in four different ecological regions of Costa Rica intended to identify and analyze the predominant agricultural production systems currently used by the small farmers, with emphasis on the livestock component.

The results of the preliminary surveys have been of tremendous value to the research efforts of the Small Farmer Cropping Systems Project. Similarly, it is expected that the results of the second survey, which is currently being analyzed, and the livestock survey will be used for a more general orientation of CATIE's research, integrating, as would be necessary according to the diagnosed conditions, the crop, livestock and forestry components.

Annex 1 presents selected preliminary results of the survey based on the farming systems concept and also, adjunct, there is a summary report of the preliminary surveys.

In general, the result of these surveys have demonstrated that there is a wealth of knowledge which can be derived from studying and understanding various aspects of the small farmers' farming systems. Some of these aspects pertain to knowledge on: available resource levels, the extent of farm activities, technologies employed or types of management, farmer perspectives and problems. Of major importance is the valuable contribution these surveys can make in orientating ongoing agronomic research by pinpointing weaknesses and potential strengths of actual farming practices.

Granted that the geographical focus of the realized diagnosis of

small farmers to this point in time has been very limited, the diagnostic effort is incomplete, and therefore, demands immediate attention.

Thus, there is a definite need to expand the diagnostic effort and to revise the methodology in order to serve more effectively the research interests of CATIE. However, this felt need of CATIE requires adequate assitance specifically directed to such task.

III. RESEARCH OBJECTIVES

Because the small farmers's farming systems in the Central American Isthmus are a relatively unexplored area and consequently the availability of relevant socio-economic data is limited, the research objectives of the static diagnosis must of necessity be rather comprehensive. However, the overriding objective is to examine the endogenous and exogenous factors affecting the farm system. More specifically, the objectives can be stated as follows:

A. To identify the present bundle of productive, or potentially productive, resources at the disposal of the small farm entity.

B. To determine the importance of the various farm subsystems (principal activities) in terms of their demands on farm resources and contribution to the small farm income, cash and in kind.

C. To identify both ecological and socio-economic constraints which the small farmer faces.

D. To define a preliminary set of small farmer-relevant criteria for evaluating research progess and results.

These research objectives should provide the key component of the information matrix needed by CATIE in its orientation to the farming system approach and total commitment to work toward the betterment of the small farmers' living standards in the Central American Isthmus.

First, there is a need to acquire precise information on resource availabilities and capabilities since these form the basic element in

the decision making process of the small farmer.

Second, there is a need to define a frame of reference to establish research priorities and strategies and to assist in determining the critical factors of production for small farmers (example: land, available labor, cash, rainfall, and probably others).

Third, there is a need to specify a set of small farmers and society-relevant criteria, in order of importance, to evaluate technological alternatives for stable farming systems. These criteria could include income generation, nutritional needs, employment generation, congruence with the farming system, compatibility between resource requirements of promising alternatives and their availabilities at the farm, complexity of management, to mention a few. In summary, CATIE desires to have a sound and profound understanding of the farming systems employed by the small farmers and their requirements and expectations from these systems. In this manner, CATIE's research can give utmost consideration to the aspects of the proposed technologies that would be viable and attractive to the farmers.

IV. STRATEGY

In order to restructure its research focus along the lines of the farming system approach, CATIE has expressed its total commitment to the field of socio-economics. Although the professional staff is well aware that working in direct contact with the small farmer involves continual monitoring of his situation and feedback, it is clear that a static diagnosis is imperative as an initial step to realize the aforementioned objectives. In the same vein of conceptualizing the methodology, it is clear that professional inputs into the various phases of the research project will be needed from the fields of farm management (economics), rural sociology, anthropology, agronomy, animal husbandry and forestry.

Specifically the project being proposed for funding consists of six defined phases:

A. Organizational phase.

B. Review of the existing information and initial interaction with the national institutions.

C. Determination of the sample design and methodology and development of the survey instrument.

D. Reconnaissance of the areas to be sampled and the testing of the instrument.

E. Training of the enumerators and the execution of the survey.

F. Analysis of the data, report of the conclusions and dissemination of the report.

G. Integration and planning.

A. Organizational Phase

Obviously, the initial phase must include an orientation for the project leader. Next, the research objectives will provide the basis for the elaboration of the scope of the analysis. This should result in a draft of hypothetical propositions which will provide the key gridelines for the entire effort. It will require the participation of professionals with some expertise in rural development, farm management and agricultural research, under the general guidance of the project leader. It is estimated that the elaboration of the scope of the analysis can be realized during a three-day workshop in Turrialba.

B. Review of the Existing Information and Initial Interaction with National Institutions.

Based on the results of phase A, the project leader can undertake a review of the state of the arts in the Central American Isthmus, that is, a review of the existing information that would permit a preliminary evaluation of the hypothetical statements. This is desirable since it could result in an elimination of certain hypotheses where the evidence is conclusive and concentration in the areas where the evidence is weak.

The initial interaction with the national institutions is considered in this phase because it is not uncommon that a significant portion of micro-level data is found in the offices of the ministries of agriculture, extension, credit and other institutions in these countries. Therefore, it is logical that a formal presentation of the present

project be made to these institutions* while simultaneously soliciting their perspectives and co-operation. Such co-operation can be in the following forms: the provision of the information which will be part of the review of the state of the arts, the specification of the geographical regions that have priority in their national plans, their assistance in the reconnaissance phase of the project and their participation in the integration and planning phase.

C. Determination of the Sample Design and Methodology, and Development of the Survey Instrument

Having in mind the geographical areas of national priority, the project leader should develop the sample design and methodology to insure representativeness. An appropriate methodology is the area frame sampling procedure where some degree of stratification could be done on the basis of ecological, socio-economic or some other criteria. Sample size should be limited to approximately 400 farmers in each country.

At this time, the development of the survey instrument should also be realized granted that the project leader should have completed a revised version of the hypotheses and a review of the state of the arts.

D. Reconnaissance of the Areas to be Sampled and the Testing of the Survey Instrument

The areas selected for sampling should be reconnoitred by making specific visits to the sites where the survey will be done and by reviewing existing secondary information. This is a requirement to develop, pre-test and debug the survey instrument.

*Over the years CATIE has cultivated a sound relationship with a number of national institutions in each country of the Central American Isthmus.

The reconnaissance team in each country should include the project leader, a selected member of CATIE's staff and at least two members of the national institution.

E. Training of the Enumerators and Execution of the Survey

Once the instrument has been developed and tested, the training of the persons serving as enumerators in each country should begin. This step is often neglected because of the assumption that once a questionaire, usually simple enough to cater to the communication level of the farmers, is constructed, it is expected that it will be well understood by the enumerators. CATIE's experience, in this regard, demonstrates that it is not always a valid assumtion.

In addition to a careful training process, it is recommended that the survey teams in each country be composed of national professionals, and it is preferable that they be from the very region where the survey is being done. This is important to avoid communication problems and helpful to establish a sound relationship with the farmers, often a prerequisite to acquire accurately the necesary data.

To expedite the execution of the survey, it is recommended that three other professionals share the responsibility of this phase.

F. Analysis of the Data, Report of the conclusions and Dissemination of the Report

This phase of the project should consist of a careful and exhaustive analysis of the acquired information. Subsequently, the results

will be reported in a concise manner emphasizing the most important conclusions which will define guidelines for future research efforts.

This phase should place utmost attention on communicating, in a clear and effective manner, the results and conclusions to the development and research professionals who will use the information. Of course, these clients include the national institutions.

It should be added that CATIE has the necessary facilities and channels to disseminate the report of the conclusions.

G. Integration and Planning

The final phase is the integral part of the Project. In essence, it will consist of incorporating the information produced by the static diagnosis into CATIE's future actions. One of the principal products of this phase will be a delineation of appropriate measures to be taken, thereby laying the necessary groundwork and orientation of CATIE,s research priorities and of the subsequent dynamic diagnosis.

This phase can be achieved through a series of workshops in Turrialba aimed at assessing and interpreting the results of the project. In addition to CATIE personnel, two staff members of the cooperating institution in each country should be invited to participate in at least one of the workshops.

V. CALENDAR OF ACTIVITIES

In order to provide an idea of the time factor involved in the realization of this Project, a calendar of completed events is demonstrated in Table I. The time required to complete each phase is an average estimate, based on CATIE's past experience of survey efforts in Central America. Therefore, the entire project could be realized within a two-year period upon initiation. In this respect, it is necessary to offer a two-year contract to the project leader.

TABLE 1 Calendar of Activities

Phase	Activity	N° months from beginning of project when each phase should be realized
A	Organizational Phase	2
B	Review of the existing information and interaction with the national institution	6
C	Determination of sample design and methodology and development of the survey	8
D	Reconnaissance of the areas and testing of the survey instrument	10
E	Training of the enumerators and execution of the survey	12
F	Analysis of the survey report of the conclusions dissemination of the report	18
G	Integration and planning	24

VI. BUDGETARY CONSIDERATIONS

A general outline of the budgetary needs has been made. Since CATIE's present hard-core budget is extremely limited, all costs associated with the various aspects of the proposed project would have to come from outside sources. Table II and Annex 2 provide estimated budget figures.

TABLE II BUDGETARY Needs, Two-years

Personnel	141,600
Travel	20,500
Per diem allowance	25,400
Computer Services	4,800
Supplies and communication	3,000
Publications	6,000
Unforeseen costs	10,100
Overhead	31,700
TOTAL	243,100

VIII. FINAL COMMENTS

Once again, it should be stressed that the overriding purpose of the diagnosis of small farms in the Central American Isthmus is to provide guidelines for CATIE's future research, to discover criteria for the evaluation of research progress and results, and to facilitate the subsequent process of technology transfer. This effort is an indispensable component in the long-term plan of CATIE.

To this end, the present project being proposed for funding is the static phase of the diagnostic analysis. It is designed to provide a more accurate picture of the actual farming systems in terms of their bundles of available resources, the dimensions of the various activities, the farm development bottlenecks and a preliminary set of evaluative criteria.

On the other hand, the dynamic phase is also an intrinsic part of the diagnostic analysis. It is well understood that periodic surveys and farm records will be needed to provide a moving bench-mark for CATIE's work. However, the specific design of this subsequent phase will be dependent on the results of the first phase.

In summary, the present proposal to realize the static diagnosis is an imperative for CATIE at this time.

LITERATURE CITED

1. AVILA, M. and M. G. Blase. The schools of thougt on small farm development in the Developing Countries. Paper N°1976-51 Columbia, U.S.A., University of Missouri, Department of Agricultural Economics, 1976. 11+4+9 p.

2. BIGGS, H. H. and TINNERMEIRE, R. L. eds. Small farm agricultural development problems. Fort Collins, Colorado State University, 1974. 168 p.

3. BURGOS, C. F, Bosquejo sobre la metodología seguida por CATIE en la ejecución del Proyecto de Sistemas de Cultivo para Pequeños Agricultores. Turrialba, Costa Rica, CATIE 1977. 29 p.

4. CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA. El nuevo enfoque del CATIE para el desarrollo agrícola y rural de Centro América y Panamá. Turrialba, Costa Rica, 1976. 17 p.

5. COLLINSON, M. P. Farm Management in Peasant Agriculture; a handbook for rural development planning in Africa. New York, Praeger, 1972. 444 p.

6. ENSMINGER, D. Constraints to millions of small farmers in the developing countries risking changes in farming practices and family living patterns. Paper presented to Subplenary Session of the World Food Conference of 1976. A Project of the World Food Institute of Iowa State University. June 27-July 1, 1976. 26 p.

7. FLINN, J. C. The agricultural economics sub-program and research training at the International Institute of Tropical Agriculture. Paper prepared for the review of Ford Foundation Regional Agricultural Economics Program in Central and West Africa, held at IITA, February 13-14, 1976. 16 p.

8. HILDEBRAND, P. E. A multidisciplinary methodology for generating new technology for small, traditional farmers. Paper prepared for Conference on Developing Economics in Agrarian Regions; A Search for Methodology; The Rockefeller Foundation Conference Center, Bellagio, Italy, August 9-4, 1976.

9. LELE, U. Designing Rural Development Programs; lessons from past experience in Africa. Economic Development and Cultural Change 24 (2). 1976.

10. LIONBERGER, H. F. and ENSMINGER, D. A. Paradigm of sociological search on the selection and prospects of the small farmer on the international scene; research needs revisited. Columbia, U.S.A., University of Missouri, 1976. 28 p.

11. LOOMIS, R. S. Agricultural systems. Scientific American, 235 (3): 99-105, 1976.

12. MORENO, R. A. Fundamentos del Programa de Sistemas de Cultivo para Pequeños Agricultores del CATIE. Reunión Internacional de Colaboración Técnica CATIE-CIAT-CIMMYT-IICA, Turrialba, Costa Rica, junio 2-3, 1977. Memoria. Turrialba, CATIE, 1977. 11 p.

13. NAVARRO, L. A. y MORENO, R. El enfoque multidisciplinario en la investigación agrícola con pequeños agricultores. Turrialba, Costa Rica, CATIE, 1976. 8 p.

14. _____. Dealing with risk and uncertainty in crop production; a lesson from small farmers. Turrialba, Costa Rica, CATIE, 1977. 29 p.

15. _____. Víctor Manuel Víquez, estudio de caso en Costa Rica Turrialba, Costa Rica, CATIE, 1976. 77+24 p.

16. NORMAN, D. W. The social scientist in farming systems research in Workshop on Farming Systems Research in Mali, November 15-20, 1976. 11 p.

17. _____. The state of the arts in farming systems research in the Savanna areas of West Africa. Outline of a Seminar presented at CATIE, the 30th September, 1977. Turrialba, Costa Rica, CATIE, 1977. 5 p.

18. PATRICK, G. F. , et al eds. Small-farm agriculture: studies in developing nations. West Lafayette, U.S.A., Purdue University Agricultural Experiment Station, 1975.

19. PINTO, J. B. Investigación agrícola y desarrollo; problemas, análisis y perspectivas. Desarrollo Rural en las Américas (Costa Rica) 8(1): 35-50. 1976.

20. SECRETARIA PERMANENTE DEL TRATADO GENERAL DE INTEGRACION ECONOMICA CENTROAMERICANA. Perspectivas para el Desarrollo y la Integración de la Agricultura en Centroamérica. Guatemala, SIECA-FAO, 1974. v. 1, 281 p.

21. SORIA, J. Farming systems under various ecological conditions of Latin America and the improvement of traditional farming with specific reference to the small holders. In expert consultation on Agricultural research in Latin America, Panamá City, June 9-14, 1975. San José, Costa Rica, FAO-IICA 1976. 113-122 pp.

A N N E X 1

AN UNDERSTANDING OF THE FARMING SYSTEMS IN THE AREAS OF OPERATION OF THE SMALL FARMER CROPPING SYSTEMS PROJECT*, CATIE 1977

(A partial Report)

by

Luis A. Navarro**

INTRODUCTION

The low-income farmers*** in the Central American Isthmus obtain all or a very important part of their production and income from their farms. These farms and their management constitute the basic production system, that the farmers form in response to their technical and entrepreneural ability, their resource endowment and environmental conditions, both endogenous and exogenous.

The cropping systems which are of interest to the Small Farmer Cropping Systems Project are only part of the farm system.

The farm, as a system, can be visualized as being integrated by different subsystems: crops, livestock, forestry and the socio-economic component represented by the farmer and his family. These subsystems interact as a matter of common practice and undoubtedly are much more interrelated at the small-farm level that is the case at the large-farm level. Consequently, the logical deduction is that any intended change in any of the subsystems--example: crop subsystem--will have either a positive or negative impact on the rest of the farm.

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*Central American Project being realized by CATIE with the financial assistance of AID/ROCAP.

**Agricultural Economist, CATIE.

***According to SIECA classification, this group includes farmers in microfarms, subfamily farms and the majority of those on family farms of up to 35 hectares in size.

Technically speaking, the aim of research should be a net improvement of the farm production system benefiting the farmer directly and the larger society indirectly. Logically, therefore, research on any of the subsystems constituting part of the system should be realized using the farming system as a framework of immediate reference. Every alternative technology to be identified should fit within such system, and its net effect should be positive for the entire system.

With the objective of sketching the farm, as a frame of reference and thereby more precisely visualizing the importance and possible repercussions of alternative technologies in cropping systems, CATIE executed a field survey to acquire knowledge on the actual farming systems. In order to provide an information base to the Small Farmer Cropping Systems Project, the farm survey was carried out in the project's areas of operation in Costa Rica, Nicaragua and Honduras.

Granted that the survey, which was carried out during June and July of 1977, was eminently static, an effort was made to capture selected dynamic aspects such as the identification of operations and the flow of labor, by activities, during the year of agricultural production.

The principal objective of the survey was to observe the relative importance of the different activities in crops, livestock, forestry and off-farm employment during the year. This would permit a general outline of the management of the total production system and a general assessment of the influence of the environment and resources on such management.

In each area, the sampling of the farmers followed a semi-directed procedure, taking into consideration accessibility and the knowledge of the areas by the national professional staff involved in the effort.

This is a partial report of the results of this farm survey.

TABLE 1. General Information

Date of the Survey	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Beginning	3/8/1977	25/7/1977	18/7/1977	30/5/1977
Completion	5/8/1977	27/7/1977	20/7/1977	1/6/1977
Numbers of farmers interviewed	41	41	38	46

TABLE 2 General Resources of the Surveyed Farms: (Average Figures)

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Land				
Land being managed (ha.)	4.3	4.4	23.3	13.5
Labor				
Average man/year of the family that helps on the farm	.8	1.0	1.0	.9
Hired man/years	1.1	.4	1.5	1.9
Animals				
Number of cattle	5.3	2.4	16.2	7.8
Number of swine	1.0	1.2	1.2	1.0
Number of horses	.4	.3	1.5	.8
Number of poultry	13.3	10.0	31.7	19.9
Other animals	.02	.2	.2	.2

RESULTS

TABLE 1 contains general information of the survey. The size of the sample was approximately uniform for all cases, principally, because of budget considerations. Even though the sample sizes do not represent any specific percentage of their respective populations, they can be classified as relatively large samples and thus worthy of statistical analysis.

In TABLE 2 outline of the resources available to the farmers who were interviewed is presented. Capital, as resource could not be accurately quantified by the information presented on the type and number of animals identified in each case, but it is a rough indicator. The index for hired labor could also be used as an indicator of this resource.

A general summary of TABLE 2 demonstrates that the level of resource endowment is high in both areas of Costa Rica compared with those in Nicaragua and Honduras.

TABLE 3. Average Distribution and Percentage of Farm Land Devoted to Each Component.

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual Crops, Ha (%)	2.2 (50.0)	2.4 (48.5)	6.8 (30.9)	2.6 (18.9)
Permanent Crops, Ha (%)	.5 (10.2)	.6 (12.8)	.9 (4.1)	2.0 (15.1)
Land without use or in forest Ha (%)	.1 (1.3)	.4 (7.8)	7.0 (32.0)	2.0 (14.9)
Pasture Land, Ha (%)	1.7 (37.8)	1.5 (29.6)	7.2 (33.0)	6.9 (50.6)
Land under constructions, Ha (%)	.04(.8)	.06(1.2)	.009(.4)	.07(.5)
Area Surveyed, Ha	183.9	295.5	834.1	623.6

An outline of the composition of the farm in each area is described in TABLE 3.

Annual crops and livestock constitute the most important farm subsystem in all the areas surveyed. Annual crops apears to be very important, within the farm surveyed, in Honduras and Nicaragua, in comparison to the areas in Costa Rica. San Isidro is the area that shows livestock as possessing a major share of the total area surveyed (50.6%), but undoubtedly it is a more extensive type of livestock grazing than the highest stocking rate represented by land area devoted to pastures, in Honduras. The indirect implication is that there is a greater interaction between the livestock and crop systems.

TABLE 4. Average Composition of Farm Income, in Central American Dollars, and the Percent Contribution of Each Component to Total Farm Income.

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual Crops, $ (%)	639(55.0)	538(45.4)	2831(79.1)	681(21.6)
Permanent Crops, $ (%)	164(14.0)	371(31.4)	104(2.9)	2006(63.6)
Livestock, $ (%)	200(17.3)	92(7.8)	463(12.9)	254(8.0)
Off-farm employment, $ (%)	114(9.8)	169(14.2)	68(1.9)	40(1.3)
Forestry activity, $ (%)	37(3.2)	13(1.01)	112(3.2)	181(5.7)
Total income $ %	1040(90.1)	1014(85.7)	3512(98.1)	3116(98.7)
Total income $	1154	1183	3579	3156

With regard to the composition of farm income, with the exception of San Isidro, annual crops provide more than 50 percent of that income in all the areas surveyed. In San Isidro, permanent crops provide 63.6% of the farm income in spite of the fact that they only occupy 15.1% of the farm land. There permanent crops are almost exclusively comprised of coffee demonstrating the area's comparative advantage for coffee production. As a matter of fact, the historical background of this area shows that agriculture has evolved from annual crops to coffee cultivation and livestock grazing as a lower intensity in use of land practice.

Another uniform characteristic exhibited in TABLE 4 is that most farm income is generated within the farm, and very little is derived from outside sources.

TABLE 5. Average Composition of Farmer Expenditure, in Central American Dollars, and the Percentage Attributed to Each Component.

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	(San Isidro)
Expenditures on:				
Annual crops, $ (%)	52(5.7)	98(10.5)	601(22.7)	158(6.6)
Permanent crops, $ (%)	6(.7)	16(1.7)	38(1.7)	258(10.0)
Forest production $ (%)	-- --	-- --	-- --	5(.2)
Pasture maintenance, $ (%)	10(1.2)	11(1.2)	136(5.1)	48(2.0)
Livestock management, $ (%)	38(4.2)	23(2.5)	83(3.1)	65(2.7)
Hired Labor, $ (%)	109(12.0)	37(4.0)	680(25.7)	266(11.2)
Basic Family expenses, $ (%)	660(72.6)	738(79.0)	1040(39.3)	1418(59.5)
Miscellaneous, $ (%)	33(3.6)	10(1.2)	68(2.5)	164(6.9)
TOTALS $	886	933	2645	2382

The data in TABLE 5 shows the proportion of expenditures on production activities and family consumption. Evidently the consumption category demands more than 50 percent of total expenditures in each case, excepting Guápiles in Costa Rica.

Interestingly enough, Guápiles has high expenditures because of the cost of hired labor and annual crops. These data reveal the effect of heavy rainfall characteristics and the consequent competition between a vigorous natural vegetation and the crops in the area.

TABLE 6. Importance of the Various Components According to Use of Credit and/or Technical Assistance

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual Crops, weight*	.54	1.46	.68	.46
Permanent Crops, weight	.02	0.00	.10	.30
Livestock, weight	.10	.05	.29	.33
Forestry, weight	0.00	0.00	0.00	0.00

*The weight is simply the sum of the proportion of interviewed farmers who use credit and the proportion of those who receive technical assistance for each activity. It is only used for purposes of comparison.

The proportion of farmers who use credit and/or technical assistance for every activity, provides an index of considerable importance in that it points out the combined interest in that activity of either the farmer desiring and seeking assistance and/or of the institutions and national infrastructure in rendering it. Based on these indexes, annual crops appears again as the most important activity of the farmer, with livestock in second place.

TABLE 7. Importance of the Various Farm components of Farm Income, from the Farmers' Point of View.

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual crops, weight*	3.98	4.44	4.50	3.61
Permantent crops, weight	.93	2.42	1.13	4.22
Livestock, weight	1.15	.80	2.82	2.02
Forestry, weight	0.0	0.0	0.0	0.0
Off-farm employment	.63	1.90	.58	.39

*The weight was computed using the following formula:

$\sum_{i}^{5} X_i\ (6-i)$ where X_i = proportion of farmers who place the activity in the 1^{th} place of importance.

i = 1,2,....5, where magnitude is inversely related to the degree of importance.

With respect to the importance which the farmers attribute to each farm component in terms of its contribution to total farm income, shown in TABLE 7, these results are in complete agreement with those in TABLE 4. The annual crop component is the most important, excepting San Isidro where it is replaced by permanent crops.

In general, the second most important actitivy is either livestock or permanent crops with the exception of San Isidro.

TABLE 8. Labor Allocation in the Various Farm Activities during the year.

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual Crops, %	76.0	64.1	81.3	39.4
Permanent Crops, %	9.2	11.0	3.7	45.7
Forest and Land Clearing, %	.0	.1	.8	.1
Livestock, %	4.9	1.9	12.2	10.0
Off-farm activity, %	9.8	22.9	2.0	4.0
Work days/year	2239.4	1803	3583	2316

The use of labor, by activity, supports the information already seen in previous tables in that the same tendencies are exhibited. A larger share is employed in annual crops except in San Isidro.

Another interesting fact stems from the observation that in Matagalpa, farmers dedicate relatively more time to off-farm activities. This can be explained in part by the prolonged "dry season" in the region.

Previously it was seen that the farmers employ a major part of their resources in annual crops while these contribute significantly to their income, in addition to demanding a larger share of labor and also using credit and technical assistance proportionately. Together, this information clearly indicates that annual crops are very important in the areas surveyed, excepting perhaps San Isidro. It was logical to expect such a situation given that these areas had been selected by their respective governments as the geographical foci of CATIE's research work in annual crops.

There remains, however, to study the farmers' attitudes toward each of these activities. Surprisingly, the attitudinal indexes used for this analysis demonstrate that the farmers are markedly less positive in their attitudes toward annual crops than toward the other activities (See TABLE 9.). Livestock and permanent crops appear to be much more attractive to them.

TABLE 9. Farmers' Attitudes Toward Each Distinct Farm Component

	Honduras (Yojoa)	Nicaragua (Matagalpa)	Costa Rica (Guápiles)	Costa Rica (San Isidro)
Annual Crops, index*	-.49	-1.59	-1.58	-.63
Permanent Crops, index	.46	1.44	.05	1.00
Livestock, Index	.43	.93	2.00	.50
Forestry and others, index	0.00	0.00	0.00	0.00

*The questionnaire included 10 questions denoting a positive attitude (example: activity you like best) and 10 questions a negative attitude toward an activity (example: activity you believe is less profitable).

To obtain the index the following was used:

$$I_j = \sum_{i=1}^{10} \left(\frac{X_{ij} - Y_{ij}}{Z} \right)$$

Where I_j is the index for the J^{th} activity or component, J=1,2,.....

X_{ij} is the number of farmers who indicate the J^{th} activity when asked the i^{th} positive attitude question.

Y_{ij} is the number of farmers who indicate the j^{th} activity when asked the i^{th} negative attitude question. And

Z is the number of farmers interviewed.

This table seems to support the idea that the lower- income farmers insist on and continue to cultivate annual crops almost exclusively because of obligation, first because of subsistence and security needs, then because of the lack of more and better resources which impede their dedication to more attractive activities, and in many cases because they think it is a responsibility to produce food for the larger community.

The last statement has been manifested in informal conversations with many farmers who apparently are extremely aware that they produce most, if not all, of the goods that the other members of the community consume and that their production is of crucial importance to that sector.

Tables 10, 11, 12 and 13 which follow attempt to present a profile of labor use, by farm activity and by month of the year. In each case, the underlined month refers to the time of the year when the agricultural work year begins in each area surveyed. Undoubtedly, the labor distribution among the different activities of the farm, during the year, is one of the best indicator of the strict relationship existing among farm activities. Annual crops demand most of the used hand labor in almost every month. However, when the monthly percentage of labor used in annual crops decreases, it increases in perennial crops or livestock activities demonstrating the seasonality of the different activities and their complementarity in the use of labor during the year. In the same manner, one can observe the seasonality in the off-farm work.

TABLE 10. Percentage of Work Days, by Month, Employed in Each Farm Activity, Yojoa (Honduras)

	Crops		Forestry and Land Cleaning	Livestock	Off-farm	Average month
	Annual	Permanent				
May	84.8	7.3	.0	1.7	6.2	201
June	90.2	3.2	.0	.5	6.0	170
July	71.6	.0	.0	13.9	14.4	154
August	76.6	4.8	.0	11.4	7.2	166
September	74.0	10.6	.0	7.7	7.7	162
October	76.4	16.3	.0	.7	6.6	179
November	75.4	18.7	.0	.6	5.3	202
December	69.8	21.2	.0	.1	8.9	202
January	67.2	12.5	.0	5.9	14.4	236
February	74.7	1.6	.0	7.2	16.4	169
March	65.7	8.6	.0	6.9	18.8	233
April	80.7	2.7	.0	6.9	9.7	165
Total for the year	76.0	9.2	.0	4.9	9.8	2239

TABLE 11. Percentage of work days, by month, employed in each farm farm activity, Matagalpa (Nicaragua)

	Crops		Forestry and Land Cleaning	Livestock	Off-farm	Average Month
	Annual	Permanent				
April	80.8	3.9	.0	2.5	12.8	159
May	84.9	.9	.0	13.2	13.2	115
June	88.6	4.5	.0	.4	6.5	122
July	77.1	5.2	.0	3.8	13.9	159
August	76.1	4.9	.0	3.5	15.4	144
September	84.8	6.9	.0	.4	7.8	118
October	85.4	7.6	.0	.4	6.6	130
November	58.7	19.9	.0	.4	21.0	174
December	39.9	40.6	.0	.4	19.2	181
January	5.7	13.4	.9	4.4	75.5	142
February	7.1	15.5	.0	3.1	74.3	210
March	52.4	6.4	.0	4.2	37.0	149
Total for the year	64.1	11.0	.1	1.9	22.9	1803

TABLE 12. Percentage of work days, by month, employed in each farm activity, Guápiles (Costa Rica)

	Crops		Forestry and Land Cleaning	Livestock	Off-farm	Average Month
	Annual	Permanent				
December	92.7	.8	.0	6.4	.0	246
January	91.2	1.0	1.3	5.0	1.4	220
February	74.4	2.3	.0	21.9	1.4	232
March	70.3	4.2	.0	22.4	3.1	259
April	79.6	3.2	.0	14.6	2.6	203
May	79.3	4.2	.0	14.5	1.9	190
June	89.1	2.2	.7	7.2	.8	303
July	74.0	7.7	.0	15.0	3.4	427
August	85.5	5.6	.0	7.0	1.8	280
September	84.5	3.0	.0	10.1	2.4	331
October	72.0	5.5	3.6	15.5	3.4	461
November	78.0	4.7	3.2	11.8	2.2	431
Total for the Year	81.3	3.7	.8	12.2	2.0	3583

TABLE 13. Percentage of work days, by month, employed in Each Farm Activity, San isidro (Costa Rica)

	Crops		Forestry and			Average
	Annual	Permanent	Land Cleaning	Livestock	Off-farm	Month
March	55.6	32.1	.5	7.5	4.3	173
April	66.2	16.4	.2	10.0	7.1	140
May	59.8	30.9	.6	5.6	3.1	135
June	19.9	42.1	.0	34.4	3.6	195
July	31.3	31.9	.7	26.5	9.5	180
August	58.8	27.1	.0	10.1	4.0	139
September	44.7	46.5	.0	5.6	3.1	145
October	31.2	61.9	.0	3.7	3.2	168
November	13.7	73.8	.0	9.0	3.5	196
December	18.7	70.2	.0	8.2	2.8	230
January	49.2	41.9	.0	4.9	3.9	150
February	49.8	40.8	.0	6.9	2.5	141
Total for the year	39.4	45.7	.1	10.6	4.0	2316

ANNEX 2

BUDGETARY NEEDS: TWO YEARS

Personnel				
Senior	Project leader	24 man/months	90,000	
Junior	survey team leaders	12 man/months	12,000	
	field survey men	30 man/months	18,000	
	data coders	12 man/months	7,000	
Support Secretary		24 man/months	14,400	
	SUB TOTAL			141,600
Travel				
Intra-country	phases B and D	60 car/days	2,500	
	phase E	240 car/days	8,000	
International	phase B	2 men to 6 countries	2,500	
	phase D	3 men to 6 countries	4,000	
	phase E	1 man to 6 countries	1,500	
	phase G	12 men to CATIE	2,000	
	SUB TOTAL			20,500
Per Diem Allowance				
Leader and CATIE Personnel		120 days	4,900	
Junior Personnel		450 days	18,000	
National Personnel at CATIE		60 days	2,500	
	SUB TOTAL			25,400
Computer Services		90 machine/hour	4,800	
Supplies and Communication			3,000	
Publications			6,000	
	SUB TOTAL			13,800
Total Estimated Costs				201,300
Unforeseen Costs	5% of Total Estimated			10,100
Total Costs				211,400
Overhead	15% of the Total			31,700
	GRAND TOTAL			243,100