

I. PROJECT IDENTIFICATION

1. PROJECT TITLE  
**SMALL FARM CROPPING SYSTEMS**

596-11-140-064

3. RECIPIENT (specify)  
 COUNTRY \_\_\_\_\_  
 REGIONAL ROCAP/CA.  INTERREGIONAL \_\_\_\_\_

4. LIFE OF PROJECT  
 BEGINS FY 1975  
 ENDS FY 1978

5. SUBMISSION  
 ORIGINAL \_\_\_\_\_ DATE \_\_\_\_\_  
 REV. NO. \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTR./PASA NO. \_\_\_\_\_

II. FUNDING (\$000) AND MAN MONTHS (MM) REQUIREMENTS

A. FUNDING BY FISCAL YEAR	B. TOTAL \$	C. PERSONNEL		D. PARTICIPANTS		E. COMMODITIES \$	F. OTHER COSTS \$	G. PASA/CONTR.		H. LOCAL EXCHANGE CURRENCY RATE: \$ US (U.S. OWNED)			
		(1) \$	(2) MM	(1) \$	(2) MM			(1) \$	(2) MM	(1) U.S. GRANT LOAN	(2) COOP COUNTRY	(A) JOINT	(B) COUNTRY
1. PRIOR THRU ACTUAL FY													
2. OMB FY 1975	397	278	220	-	-	20	99	278	220				238
3. BUDGET FY 1976	480	368	336			4	108	368	336				475
4. BUDGET FY 1977	480	368	336			4	108	368	336				475
5. BUDGET FY 1978	480	368	336			4	108	368	336				475
6. BUDGET 13 FY													475
7. ALL SUBD. FY													
8. GRAND TOTAL	1837	1382	1228			32	423	1382	1228				1663

9. OTHER DONOR CONTRIBUTIONS

10. NAME OF DONOR <b>CATIE</b>	11. KIND OF GOODS/SERVICES <b>Technical Assistance, Project Supplies</b>	12. AMOUNT <b>791</b>
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III. ORIGINATING OFFICE CLEARANCE

1. DRAFTER **C. Breitenbach, LA/DR**  
**D.R. Fiester, RRDO/ROCAP**

2. CLEARANCE OFFICER  
**Irving G. Tragon**

TITLE **M. Stickney, RRDO/ROCAP**  
**C.A. Buchanan, ADO/ROCAP**

TITLE **Director, ROCAP**

DATE **1/10/75**

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL  
 Prior to initial disbursements for country-specific activities, ROCAP should receive and determine to be satisfactory in substance, the following: (a) An implementation plan detailing personnel and budget support to be provided by the National Institutions in support of the project and reflected in a formal commitment on the part of those institutions, and (b) a description of existing country mechanisms and plans for their further development, which will reasonably assure delivery of the multicropping information resulting from the project to the small farmers. ROCAP may sign the Pro Ag with CATIE prior to

2. CLEARANCES

BUR/OFF.	SIGNATURE	DATE	BUR/OFF.	SIGNATURE	DATE
LA/DP	L. Harrison (draft)	2/21/75	GC/LA	I. Levy (draft)	2/21/75
LA/MRSD	D. Lion (draft)	2/21/75	LA/DR	M. Dagata	2/21/75
LA/OPNS	C. Uyehara (draft)	2/21/75	LA/DR	B. Sidman	2/21/75

3. APPROVAL AAO OR OFFICE DIRECTOR  
 SIGNATURE **Robert K. Lane**  
 TITLE **Deputy U.S. Coordinator**  
 DATE **4/29/75**

4. APPROVAL AID (See S.O. 1025.1 VTC)  
 SIGNATURE \_\_\_\_\_  
 DATE \_\_\_\_\_  
 ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT

CONDITIONS OF APPROVAL (continued)

satisfaction of the above conditions and disbursements may be initiated as each country satisfies the conditions. Disbursements for non-country-specific start-up costs may commence upon the signing of the Pro Ag.

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NON CAPITAL PROJECT PAPER FOR  
SMALL FARM CROPPING SYSTEM

I. PROJECT SUMMARY

The purpose of this project is to create, through a coordinated Central American food crop research program, a continuing capability to develop improved cropping systems for use on small farms.

The project described here will accomplish the purpose by providing support to the Center for Tropical Agricultural Research (CATIE), located in Turrialba, Costa Rica. CATIE will, in turn, provide coordination and technical assistance to national agricultural research institutions in Central America.

CATIE's assistance activities will focus on:

1. The evaluation, in terms of labor use, risk, nutrition, income generation, energy requirements and similar factors, of cropping systems which are now in use on small farms.
2. The design, field testing, evaluation and development of recommendations for improved cropping systems which increase production and employment per unit area of land at particular levels of technical inputs, soil moisture and length of growing season.

Through technical assistance funded under this project, CATIE's capacity will be strengthened so that the organization can provide research leadership, national and regional coordination, training and operational technical assistance to national research organizations. This assistance will support the national organizations in the conduct of applied research on improvement of cropping systems.

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CATIE has been performing such inter-disciplinary research for several years and is the Latin American institution with the greatest experience in this field. The methodologies which have been developed during the course of applied research on cropping systems at CATIE are applicable, with minimum modifications, for conducting the same type of analysis although under different ecological situations, throughout Central America.

ROCAP support to CATIE will allow for efficient and economic allocation of technical assistance and encourage research by national institutions in all five countries to be compatible, coordinated and shared among them. It will permit regional economies of scale in developing and applying this research. Additionally this project will facilitate CATIE's sharing of its experience in inter-disciplinary research with the five countries and hasten the development of technical recommendations in this area in each cooperating country.

An expanded senior research team located at CATIE will provide short-term assistance to national programs in technical areas not requiring full time specialists. A CATIE research agronomist located in each of the cooperating countries will provide continuing coordination for each national program, liaison with the CATIE technical advisors and technical support to national counterparts.

This project will be coordinated at the regional level with the ROCAP Soil Fertility Project from which it will receive technical assistance on soil fertility and fertilizer use problems. At the national level, the activity will receive support from the Central American governments' soil fertility research systems. The project will also draw on and collaborate with CIAT and CIMMYT for improved plant material and production methods; INCAP, for human nutritional research; and the AID/TAB research program for information and expertise on weed control, pest management and irrigation.

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Agronomists from each of the CA national research institutions, supported by CATIE specialists, will carry out a minimum of five field trials in each country annually. National research technicians will participate in regional workshops for developing inter-country exchange of methodologies, standardization of design and conduct of field trials, and the interpretation of results. USAIDs will suggest priority commodities in which research under this project can best contribute to USAID loan and grant funded assistance.

Technical recommendations on new or improved cropping systems for specific ecological situations will be fed into Agriculture Information Management Project for further adaptation and dissemination to end-users.

ROCAP support to this project will amount to \$1.7 million which will be obligated over a four year period (FY 1975-1978).

## II. PROJECT SETTING

One of the major constraints to the improvement of production on small farms is the lack of adequate recommendations for cropping systems which are suitable for application under the socio-economic and ecological conditions prevailing in the tropics.

In Central America, almost all agronomic research conducted to date has focused primarily on the development of economically efficient monocropping practices biased towards economies of scale and usually emphasizing employment substitution through mechanization. This, in turn, has led to production recommendations on monocropping which have been adopted most rapidly by medium and large farm enterprises. The existing bias toward research on single crops usually results from the training of technicians in temperate zone countries, where monocropping research has well-developed methodologies, and is operationally easier to conduct.

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The design, conduct and interpretation of experiments on crop mixtures is a complex task often requiring coordinated inter-disciplinary research and the use of modern methodologies, such as systems analysis. Hence the tendency has been to ignore the fact that large numbers of small farm operators have empirically developed cropping systems which increase total productivity per area of land over given production periods. Small farmers have intercropped corn with beans, yucca and beans, and various vegetable combinations for many years.

Extensive research conducted by CATIE at Turrialba, Costa Rica, and other studies conducted by USAID/El Salvador technicians, have demonstrated that these empirically evolved options may be more propitious for small farmers. This is further supported by research conducted in the Orient which indicates that further systematic studies can significantly improve on existing cropping systems. Research done to date, including intercropping and crop rotations, has resulted in increased efficiency in the use of available capital, sunlight, fertilizer, and has expanded employment opportunities.

Research on cropping systems was the theme of an AID-sponsored conference held at CATIE in Costa Rica in early 1974. This meeting was attended by representatives of all CA agricultural research agencies. Lectures, discussions on research methodologies and results based on world-wide experience were presented. Benefits from the use of improved cropping systems were reported in employment generation, increased production per unit area of land, potential nutritional effects, and increased efficiency in the use of production inputs. Interest was expressed by CA government representatives and regional institutions in pursuing further the research results reported by CATIE and El Salvador.

At the same time that this conference was being organized, AID/W began to develop a project on Small Farm Income Improvement for implementation by CATIE. This was done in response to AID's search for new programs which focused

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more sharply on small farmer problems; it received preliminary approval on January 9, 1974 under the Accelerated Development Program in AID/W. Subsequently, ROCAP was requested by LA/DR to assume responsibility for preparing a PROP on this project as an element of its regional agricultural program.

In October 1974, the CA Ministers of Agriculture, through the "Acuerdo de San Jose", designated multiple cropping research a priority effort to be coordinated regionally. The Ministers, at this meeting, created a consultative commission composed of the Directors of Research and Extension of the five Central American countries to develop a cooperative plan for attainment of self-sufficiency in basic food crops by 1980. All aspects of basic food crop production, including cropping systems research, will be coordinated regionally through this consultative commission under the direction of the Ministers of Agriculture.

The USAIDs in Central America are providing important bilateral support to the improvement of agricultural research, the production of food crops, the expansion of the cooperative movement for agricultural production and the improvement of agricultural marketing systems. This project will allow CATIE to provide the cropping systems input to complement these efforts.

El Salvador, in addition to CATIE, is utilizing existing national and USAID capability to conduct cropping systems research. Discussion of their preliminary results at the CATIE conference pinpointed the need for improved interdisciplinary approaches. The El Salvador technicians involved in this research are seeking increased technical assistance.

As a historical note, Dr. W. Bradfield of the International Rice Research Institute in the Philippines started the first systematic research effort on cropping systems utilizing modern research techniques in 1967. More recently, the International Center for Tropical Agriculture in Colombia has begun research on vegetable intercropping as has the National Research Institute of Colombia. Results from this work are becoming available for adaptation to Central

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American situations. Dr. Bradfield, now retired from IRRI, is a technical consultant to CATIE on its cropping system research and will be called upon as a continuing consultant for future research in this area.

### III. PROJECT DESCRIPTION

This project is designed to create a coordinated regional agricultural research system for the development of improved cropping systems recommendations for use by small farmers. The research will be aimed at evaluating the economic, nutritional and employment effects resulting from the efficient use of production inputs, such as fertilizer, pesticides, improved seed, etc., on new or existing cropping systems.

The term "cropping systems", as used here, refers to those planting combinations and sequences of annual and perennial food crops grown on the same piece of land during defined production periods. Intercropping, crop overlapping, cropping sequences, and multiple cropping are all terms relevant to the concept. The project emphasis will be on those systems in which, during at least part of the growing season, two or more crops are grown together. It will utilize both national and regional institutional capabilities in coordination, training and analysis of the results of field trials to develop recommendations for the application of modern technology to traditional systems.

There is no Central American national institution with the methodology, management or experience needed to conduct the research proposed here, nor do national research organizations systematically exchange experimental results and research experiences among themselves. This type of exchange is essential in reducing duplication of effort and making rapid progress in developing practical recommendations. Cropping system recommendations for different areas of C. A. will be fed into the regional information system. At this point, these technical recommendations will be combined with other information and a technical "package" for use by small farmers.

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Other economies will result from multi-country training of national technicians and the utilization of uniform experimental designs permitting comparable analysis of field trials among countries and allowing researchers in one country to adapt results from another country to local situations with a minimum of additional investigation.

CATIE has been selected by ROCAP to be the implementing agency of this program. This institution is a well-qualified research agency with a core of highly-trained agricultural scientists experienced in cropping system investigations. It has excellent research facilities, the finest library on tropical agriculture in Latin America, an administration sensitive to socio-economic problems and good contacts with national research agencies.

During the past several years, CATIE has conducted the most extensive field trials supported by laboratory analysis yet undertaken on cropping systems in Latin America. One of these compares 54 different multiple cropping systems utilizing five basic commodities in monocropping, intercropping and cropping sequence systems. Results of these trials can lead to simpler, more practical experimental designs adaptable to national research capabilities. CATIE has also developed methods of interpreting field trial results which may be applicable to varying ecological situations.

As a result of the cropping system seminar mentioned earlier and their own field experience in this area, CATIE has received various requests by C. A. national research institutions to provide technical assistance for expanded research and experimentation.

Improved plant material developed by the international research institutes is also available for utilization in this activity. This program will make maximum use of established technological practices in developing improved cropping systems. All research undertaken under this project will conform with the policies of the Regional Research Coordination Commission. The project will not fund research on plant breeding, development of new pest control methods or similar activities.

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CATIE's emphasis will be on assisting national research groups to concentrate in the evaluation of technology and crop mixes most appropriate to increasing employment and productivity per area of land on small farms. The project will provide technical expertise to assist national technicians in the systematic organization, standardization of design, implementation, data collection and interpretation of field trial results and conduct a survey of existing cropping systems utilized by small farmers in selected Central American situations. ROCAP-funded assistance will augment CATIE's technical capability to provide that assistance. There is a substantial number of women technicians currently working in the regional technological centers such as CATIE. Every effort will be made to draw upon them in the design, implementation and training aspects of the project.

Since soil fertility analysis must be an integral part of cropping systems, short-term technical assistance will be provided through the ROCAP-funded Soil Fertility Project to the Small Farm Cropping Systems Project. An arrangement will be made with INCAP to draw on their extensive knowledge of nutritional problems in Central America for suggestions on particular food crop combinations which might contribute to the solution of nutritional deficiencies in rural areas. Information on agricultural market prices and socio-economic information will be provided by the ROCAP Agricultural Information Management Project to CATIE and to national cropping systems research technicians in order to insure that field trials are oriented towards the expansion of employment opportunities and increasing economic returns on small farms. The international research centers, CIAT, CIMMYT and IRRI, as well as AID's Technical Assistance Bureau, will be requested to provide research information and short-term technical assistance for the selection of high yield seed varieties, improved cultural practice recommendations and similar areas.

In conducting cropping systems research, individual field trials will be conducted under different ecological situations in each country. Each of these field trials will include one or more basic food crops (corn, rice, beans, sorghum, yucca and sweet potatoes) in its annual crop cycle. In addition to these basic food commodities, higher valued diversified cash crops will be also included where appropriate in the field trials to increase potential income, employment and total nutritional value of the cropping system.

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These studies will be conducted under dry farming or under irrigation depending upon the availability of supplemental irrigation in each ecological situation.

Results from the cropping system field trials will be compared against existing cropping systems under prevailing technology on small farms adjacent to the research study. New cropping systems to be recommended will be expected to meet two or more of the following criteria (1) increase the production index\* over existing technology by more than 100; (2) addition of one or more non-traditional crops to existing cropping systems; (3) increasing the net value of total production by 50 per cent using constant prices; (4) increasing employment per area of land cultivated by 20 percent without reducing income per employment unit (using constant prices); (5) increasing the nutritional efficient use of land using new cropping systems in terms of carbohydrates (total weight of calories) and proteins (total weight of amino acids) by 20 percent; or (6) increase the efficiency in the use of production inputs by 25 percent in new cropping systems compared to the sum of equivalent monocropping systems.

By the end of the second year the studies will be expected to produce a minimum of two area specific recommendations. A minimum of ten area specific recommendations are expected at the end of the project.

The area-specific technical recommendations developed as a result of this research will be provided to the agricultural information system for incorporation into technological packages or other forms suitable for end-users. The Agricultural Information Management Project will further support this project by training key national extension agronomists in new

\* Production index: Is the sum of yields of crops under existing technology divided into the highest total yield of the new cropping system on an equivalent land area. This index is the one now being used by CATIE in its experiments at Turrialba.

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cropping systems methods in order to further assure that dissemination to the target population is accurate and effective.

## V. IMPLEMENTATION PLAN

### FY 1975-76

A. In cooperation with each cooperating country research institution and USAIDs, CATIE will carry out the following:

#### 1. Planning and Programming:

- a. Determine areas and commodities to be utilized in the five field research projects and areas in which the existing cropping systems survey will be conducted.  
Jan./Feb. 1975
- b. Develop detailed work plans, assign national research personnel, national operational support and schedule CATIE technical assistance.  
Jan./Feb. 1975
- c. Determine training requirements and schedule for short courses.  
Mar./April, 1975
- d. Hold short courses in each cooperating country to train personnel in the proper procedures for installing, managing, harvesting and collecting data from complex field trials of cropping systems.  
May/June, 1975

#### 2. Field Research Implementation

- a. Plant, maintain and harvest field trials, collecting required research data on each experiment.  
July 1975/March 1976

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- b. Conduct survey and analyze results of existing small farmer cropping systems.  
September 1975/Feb. 1976
3. Summarizing and exchanging results of field trials and the small farmer survey, hold a combined workshop for all five cropping systems programs to exchange research results and develop 1976-1977 work plans; prepare recommendations on improved or alternative cropping systems for publication and transfer to the Agricultural Information Management Project.  
March 1976.
4. Coordination and Training
- a. Organize the five country Research Coordination Commission.  
April 1975
- b. Research personnel attend training courses and workshops.  
May 1975/March 1976
- B. CATIE will carry out the following activities in support of the program:
- a. Select personnel for their technical assistance staff.
- b. Locate national coordinators in Guatemala, El Salvador, Honduras and Nicaragua.  
March/July 1975
- c. Provide continuing technical backstopping for planning, implementation, research analysis and develop recommendations from field experiments and small farmer survey.  
March 1975/March 1976
- d. Conduct training courses and workshops.  
May 1975/March 1976.
- C. ROCAP will:  
Provide overall program guidance, monitor program implementation, and evaluation of programs.  
March 1975/March 1976

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SECOND YEAR (1976-77)

- A. CATIE will continue to provide similar technical assistance and training services under comparable work schedule as in first year.
- B. National research institutions will, on the basis of the first year program, develop a second generation set of field experiments and continue existing cropping system survey initiated in 1975-1976.
- C. ROCAP will continue to monitor program as during 1975-1976.

Activities during the third and fourth years will be essentially the same as those during the first and second years. At the end of the fourth year, a minimum of ten (10) alternatives or improved small farmers cropping systems will have been developed and the recommendations concerning their management in appropriate ecological zones will have been provided to the Agricultural Information Management Project.

VI. RELATION OF PURPOSE TO GOAL

The sector goal is to create the environment or conditions in which the rural poor have increased opportunities to benefit from development. The contribution to this project toward the attainment of that goal through achievement of the purpose is as follows:

The small farmers of Central America are now using empirically developed cropping systems in order to produce their basic needs of food and fiber. These systems usually use indigenous varieties which are often resistant to the insects and diseases prevailing in the locality, but with low yield capability under normal weather regimes. These varieties may or may not give increased yields when grown under a system using modern technological inputs and, when yield increases are found, these are sometimes not as great as those attributable to improved varieties when both are grown under similar conditions.

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The cropping systems now practiced by small farmers have not been described adequately from a technical standpoint and only recently has an effort been made to study these systems from an inter-disciplinary standpoint. These studies indicate that, in terms of available inputs, those cropping systems optimize food production at minimal risk to family survival.

The postulate stated here is that the cropping systems now used by small farmers are a necessary and adequate weapon in their fight for survival but are not sufficient if they are to fight for prosperity and to increase food supplies in the region. This project can develop alternative cropping systems that are capable of profitably using modern farm production inputs and which, if followed, will increase yields per unit area and on-farm employment. If the increase in yields can be marketed at a profit, then there will be higher net incomes in the rural areas.

## VI. BUDGET

### A. ROCAP INPUTS

It is anticipated that the cost of this project in the five ROCAP countries will total 1.7 million dollars over a four year period (FY 1975-1978). During FY 1975, \$367,000 is required for this activity. During the second and third years of project activities the project will require a funding level of \$450,000 to cover expenses of the ROCAP funded assistance.

Inputs provided by ROCAP will be made available through a contract with CATIE. Counterpart inputs will be contributed by CATIE, and by the cooperating countries annually to meet total program research requirements.

The major ROCAP inputs to this program and their use are:

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### 1. Personnel Services

A contract-funded project director and an agronomist specializing in crops and soils will be employed on a full-time basis using ROCAP financing. CATIE will also provide coordination of the program in Costa Rica; the other two national program coordinators will be project funded.

The majority of the project staff will be located at Turrialba but will spend most of its time in the five host countries, working on the field experiments and demonstrations, providing in-service training and participating in the short courses and conferences to be held within each country. The purpose of locating most of the staff at the Turrialba headquarters is to make possible a team approach to the field problems, and to take advantage of the library, laboratories, computer services and experimental farm facilities. It is expected that from two-thirds to one-half of the time of the staff members will be spent in the host countries and the activities at Turrialba will be devoted to preparation of plans and reports, summarization of results, use of laboratory facilities for complementation of the field work in the different countries and development of methodologies. The core staff will also lecture in seminars, conferences and short courses pertinent to the project.

Short-term consultants in systems analysis, nematology, biometrics, etc., will be employed as required to meet special needs of the participating countries.

### 2. Participating Training

No long-term degree training will be made available under this program. No participant funding will be required.

### 3. Commodities

The project will supply a vehicle to each of the five national field coordinators during FY 1975. A sixth vehicle will be purchased in FY 1976.

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#### 4. Other Costs

A total of \$315,000 has been budgeted for other costs during the first three years of the project. These funds are to cover costs of travel and per diem (\$100,500), conferences and short courses (\$59,000), office and laboratory supplies (\$16,500), field supplies and agro-chemicals (\$16,000), re-search equipment (\$30,000), computer costs (\$24,000), and vehicle maintenance and operating costs (\$59,000). The balance (\$10,000) is divided among line items of lower unit costs.

The project's primary training focus will be on applied in-service training provided by the specialists to counterpart technicians. Research project personnel will also organize and participate in in-country conferences and training workshops. The cost of trainee support in in-country training is to be provided by each cooperating country. Third country training will be provided through short courses and conferences at CATIE, for Central American research personnel. The sum of \$59,000 has been allocated for this purpose during the first three years of project operations.

Some short-term training, at the Pan American School of Agriculture, will be funded by the ROCAP Agricultural Information Management project starting in FY 1976. These short courses will provide training on cropping systems in addition to those on info transfer and the development of technological packages.

Some specialized research equipment and minimal office and laboratory equipment will be supplied through the project. Normal office equipment required by the staff located at CATIE will be provided by that institution. National coordinators located in the cooperating countries will be provided office space and equipment by the host country. Only computer costs will be charged to the project by IICA at the current prices of such services. Special services of IICA/CIDA for the preparation of bibliographical materials may be charged to the project on an actual cost basis.

	FY-1975		FY-1976		FY -1977		FY --1978	
	MM	\$	MM	\$	MM	\$	MM	\$
<b>5. The ROCAF Budget</b>								
<b>A. Personnel - contract</b>								
1) U.S.								
1 project manager	12	60,000	12	60,000	12	60,000	12	60,000
1 cropping system research planner	12	60,000	12	60,000	12	60,000	12	60,000
2) Specialists US and non-US (agronomists, 2 national program coordinators, plant pathologist, agricultural economist, statistician, water management specialist, entomologist, field advisors, etc.)								
Para-professional	70	122,000	96	201,000	96	201,000	96	201,000
	<u>126</u>	<u>36,000</u>	<u>216</u>	<u>47,000</u>	<u>216</u>	<u>47,000</u>	<u>216</u>	<u>47,000</u>
Total Personnel	220	248,000	336	338,000	336	338,000	336	338,000
<b>B. Commodities</b>								
Vehicles, 4 wheel drive	5	20,000	1	4,000				
<b>C. Other Costs</b>								
1. Travel and Per Diem								
Regional Travel								
a) contract employed specialists 33 trips a/ \$150 per ticket 770 days at \$25.00								
		5,000		5,000		5,000		5,000
		19,150		19,150		19,150		19,150
b) CATIE Specialists								
		1,200		1,200		1,200		1,200
		2,400		2,400		2,400		2,400

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	<u>FY-1975</u>	<u>FY-1976</u>	<u>FY-1977</u>	<u>FY-1978</u>
c) In country travel of country coordinator - 320 days at \$18.00	5,750	5,750	5,750	5,750
2. Conferences and Short Courses	15,000	20,000	24,000	24,000
3. Office and laboratory supplies and information materials	5,500	5,500	5,500	5,500
4. Field supplies and agro-chemicals	4,000	6,000	6,000	6,000
5. Publication costs	2,000	2,000	2,000	2,000
6. Research equipment	10,000	10,000	10,000	10,000
7. Specialized Office Equipment	4,000	2,000	2,000	2,000
8. Computer Costs	8,000	8,000	8,000	8,000
9. Vehicle maintenance and operating costs	17,000	21,000	21,000	21,000
Total other costs	99,000	108,000	108,000	108,000
GRAND TOTAL	397,000	480,000	480,000	480,000

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THE CATIE INPUTSA. During the Grant Period:

ROCAP has discussed with CATIE those inputs which that institution must make as its contribution to this program. CATIE has agreed to provide the following.

1. Office space and facilities for the technical specialists and para-professional supporting staff located at Turrialba. The library and reference services located at CATIE will be available for use by project personnel.
2. Project assistance as needed, classrooms and training facilities for holding short courses and conferences in accord with the project program as a part of its contribution.
3. Eight senior research specialists, plus field assistants, field laborers, agricultural equipment for work in this project. It will also provide land, laboratory facilities, etc. for field trials to develop improved experimental methods for cropping systems research. This represents an annual cost of approximately US\$226,000. Consultation trips by CATIE's technicians will be financed by the ROCAP/CATIE contract.
4. The services of two of its staff as national program coordinators and the coordination of the program in Costa Rica.
5. Contract accounting services at cost to the project and agrees to provide necessary financial records and reports as required by ROCAP.

It is estimated that CATIE's annual input will be a minimum of US\$226,000 as a counterpart contribution to the ROCAP input. This figure has been derived in the following manner:

B. After Grant Termination:

A.I.D. and IICA presently provide substantial funds for CATIE's operations. However, that will not be the situation in four years because IICA has begun steadily withdrawing its support, and A.I.D.'s will be non-existent

## AID 1025-1A (7-71) (NARRATIVE DESCRIPTION)

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once the grant terminates. Hence, it is imperative that other sources become available so that CATIE can continue providing the Central backstopping required to service the outreach multiple cropping program.

Toward that end, negotiations have been in progress for over a year with the Consultative Group of International Donors (C.G.) to make CATIE a C.G. international research center responsible for undertaking the leadership in investigations on multiple cropping. The C.G. is to deal with this matter early in the year at its next meeting. Both TAB and the Rockefeller Foundation have continued to be consulted during the development of the ROCAP multiple cropping proposal. They have agreed that once this outreach phase of the work has been approved it will provide a strong justification in the sponsoring of CATIE for core funding under the C.G. network system.

In addition, with the new impetus given the CACM by the San Jose Agreement, the Central American governments have indicated that they intend to designate CATIE as the secretariat in charge of the continued implementation of the multicropping outreach program. It is expected that agreement will be reached on this matter at the C.A. Ministers of Agriculture meeting during the last week of February 1975.

If the multicropping project proves successful, it will set a precedent which should lead to its continued and expanded financing by the individual CACM governments as well as international donors.

Estimated annual technical personnel inputs	\$ 121,000 *
Estimated value of office and laboratory facilities provided	30,000
Estimated costs of administrative and support services	25,000
Travel cost contributions	20,000
Turrialba Field Research costs	30,000
Total CATIE counterpart costs (annual)	\$ 226,000

\* The cost of personnel inputs is estimated to be one-third of the cost of salaries and benefits to CATIE's technical personnel on their present cropping systems project, and cost of auxiliary personnel (1/3 of \$365,000 - \$121,000)

#### COOPERATING COUNTRIES INPUTS

CATIE has discussed project contributions with each country, and has received letters from two Central American countries giving assurance of Ministerial support to this program. CATIE is negotiating with the other countries regarding their support. The Acuerdo of San Jose defines research work on cropping systems for small farms as an area deserving priority attention. This is the framework within which CATIE and the countries will decide on contributions.

What follows is a ROCAP estimate of those inputs which each country will make into the program.

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Personnel: Project director, agronomist (crops and soils) economist, plant protection specialist, marketing specialist, biometrician, enumerators survey existing cropping systems and part time labor required for field trial work. Total man months are estimated at 130/year.

Vehicular Support: Those vehicles which are required to support personnel working with field trials and to support enumerators during the survey.

Material Support: Seed, fertilizer, plant protection materials, tools and other materials required to conduct field trials.

Cooperating countries will assume costs of salaries, travel and per diem in-country, in-country training costs and all other associated costs normally charged to personnel employed by each individual country.

Cooperating countries will also assume all support costs related to vehicles assigned to the project.

(See input segment of logical framework for detailed costs).

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

NARRATIVE SUMMARY

A.1  
The Sector Goal, as defined by the MDCC and stated in the Regional DAP, is to create the environment or conditions in which the rural poor will have increased opportunities to benefit from development.

OBJECTIVELY VERIFIABLE INDICATORS

A.2  
Information which described technically sound and economically viable cropping systems which can be profitably used by small farmers in Central America, is widely available to them in a form suitable for potential end-users.

MEANS OF VERIFICATION

A.3  
A ROCAP/USAID technical review will verify the quantity and the quality of information which has been made available to the agricultural information system by the project. The information presented to potential end-users must:  
(a) provide information to small farmers which will assist them in formulating farm production plans;  
(b) provide information to national planners which will be used by these groups in the allocation of production resources and in creation of programs aimed at improving the conditions of the rural poor.

IMPORTANT ASSUMPTIONS

- A.4
1. Change agents will utilize the information in working with small farmers.
  2. The proper production inputs in adequate quantities, and priced at a level which allows profitable use at recommended rates will be made available to small farmers.
  3. An efficient infrastructure for provision of production inputs and marketing of farm outputs will be available.

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

NARRATIVE SUMMARY

B.1

The purpose of the project is to create through a coordinated Central American food crop research program, a continuing capability to develop alternate cropping systems most appropriate for increasing income, employment, and productivity on small farmer lands. This is to be accomplished thru strengthening the capability of CATIE to coordinate this research in the five Central American countries.

OBJECTIVELY VERIFIABLE INDICATORS

B.2

1. A minimum of ten new or improved cropping systems suitable for small farms will have been developed by this project and the information will have been made available to the agricultural information system for release to potential end-users.
2. CATIE will be regularly assisting Central American countries in applied crop production research relevant to small farms by:
  - a. Providing senior level core technical services to cooperating countries as needed;
  - b. Collecting, analyzing and collating relevant information and developing new production recommendations for processing and dissemination through the Agro-Information Management System.
  - c. Coordination of field trials in cooperating countries to insure comparability of results and uniformity of method to include the active participation of CATIE staff in the design, installation, management, harvesting, data collection and data interpretation phases of these trials.

MEANS OF VERIFICATION

B.3

1. The cropping systems recommended must meet two or more of the following criteria:
  - a. increase the production index\* over existing technology by more than 100;
  - b. addition of one or more non-traditional crops to existing cropping systems;
  - c. increasing the net value of total production by 50 per cent using constant prices;
  - d. increasing employment per area of land cultivated by 20 per cent without reducing income per employment unit (using constant prices);
  - e. increasing the nutritional efficient use of land using new cropping systems in terms of carbohydrates (total weight of calories) and proteins (total weight of amino acids) by 20 per cent; or
  - f. increase the efficiency in the use of production inputs by 25 per cent in new cropping systems compared to the sum of equivalent monocropping systems.

\*Production index: Is the sum of yields of crops under existing technology divided into the highest total yield of the new cropping system on an equivalent land area. This index is the one now being used by CATIE in its experiments at Turrialba.

IMPORTANT ASSUMPTIONS

B.4

The regional research coordinating committee will be appointed by the Ministers of Agriculture of the Central American countries and the committee will be effective in carrying out its function.

Project Title & Number: Small Scale Cropping Systems DND-01-040-064

MINUTE SUMMARY

ORGANIZATIONAL RESPONSIBLE INDICATORS

1. CMRE and national research institutions will have assured leadership in this area and have the financial resources to continue the research.

MEANS OF VERIFICATION

2. A professional review of the activities of the CMRE staff in assisting with the coordination of crop production research in Central American countries and of the degree of exchange of research methodology and data between these countries.
3. A review of the records of personnel assignments of CMRE staff.
4. An analysis will be made of the change in government and CMRE allocations for cropping systems research.

IMPORTANT ASSUMPTIONS

NARRATIVE SUMMARY

- 2.2
1. The development of methodologies to convert small scale (small individual) farmers of open field crops and the introduction of agriculture and the farmer's making improved technological recommendations to crop specific situations. The research disciplines that are included are nutrition, agronomy (crop and soil) economics, plant pathology, pest management, crop management, crop quality, marketing and others.

Major Outputs in Action Steps

- 1) Field Site  
Research  
Definition of crop and land use receiver to develop methodology  
Technical Support  
Transportation of crop seeds in crates and other crop seed  
Market Support  
Field Market Facilities  
Institutions Support  
Local Facilities  
Administration of project
- 2) Field Cropping System  
Research  
---  
Technical Support  
---  
Market Support  
---
- 3) Field Project Research  
Definition of project supported crop and land receiver to complete studies  
Technical Support  
---  
Market Support  
---

OBJECTIVE STATEMENT

- 2.1
- Completion and delivery of recommendations in terms of a research methodology that includes contributions from all of the disciplines cited.

MEANS OF VERIFICATION

- 2.3
- A review of experimental designs by qualified personnel.

IMPORTANT ASSUMPTIONS

- 2.8

Project Title & Number: Small Scale Driping Systems (SAS-11-114106)

GENERAL SUMMARY

2. Field experiments in each country, each testing one or more new drip irrigation systems against established systems with varying levels of modern technological inputs.

OBJECTIVES, VERIFIABLE INDICATORS

The trials in Central America will be completed in the first year; there will be at least twenty-five trials in Central America in the fourth year of the project.

MEANS OF VERIFICATION

1. A review of the experimental designs;
2. A physical check of trials on site;
3. A review of experiments against the following criteria:
  - a. the trials will have been conducted in the major ecological zones of each country;
  - b. each trial will have included one or more of the basic food crops (corn, rice, beans, sorghum, yuca and sweet potatoes) in the annual crop cycle;
  - c. higher value diversified cash crops will have been included in each trial;
  - d. irrigation will have been used where available.

IMPORTANT ASSUMPTIONS

Inputs Required to Achieve Objectives

(A) Manpower

Personnel

Scientific assistance to assist with preparation of field questionnaires and distribution of same and to assist with field trials in each cooperating country.

Technical Support

none

Material Support

none

Institutional Support

through institutions and individuals providing facilities.

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Project Title & Number: Small Farm Cropping Systems 596-11-140-064

NARRATIVE SUMMARY

3. A comparative socio-economic evaluation of these trials with respect to potential small farm income, employment, nutrition and risk

OBJECTIVELY VERIFIABLE INDICATORS

Annual evaluation of these trials.  
Publication of evaluation results.

MEANS OF VERIFICATION

Review of that project records and publications and comparison of results with base-line data to be accumulated during the first year of the project.

IMPORTANT ASSUMPTIONS

Inputs required to Achieve Outputs

A) From CATIE

Personnel

Dedication of staff for purposes of assisting with training of cooperating country technicians and with evaluation of data.

Vehicular Support

none

Material Support

none

Institutional Support

Adequate training facilities  
Secretarial assistance

B) From Cooperating Countries

Personnel

Technicians to be trained in evaluation methodology

Vehicular Support

Transportation of project and national personnel

Materials

Office space, secretarial assistance, computation facilities, publication of results

C) From Project Resources

Dedication of project supported staff to assist with training of host country personnel, providing core technical services and with evaluation of results of trials  
Computer facilities

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

NARRATIVE SUMMARY

OBJECTIVELY VERIFIABLE INDICATORS

MEANS OF VERIFICATION

IMPORTANT ASSUMPTIONS

B) From Cooperating Countries

Personnel

Field survey personnel to adequately describe existing systems; local technicians to manage field trials.

Vehicular Support

none

Material Support

none

Institutional Support

Library facilities and adequate training facilities

C) From Project Resources

- 1) Technical advisory assistance in training technicians in design and management of field trials
- 2) Vehicular support of project coordinator
- 3) Travel and per diem (in Central America) of core staff at CATIE.

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

<u>Outputs</u>	<u>Magnitude of Outputs</u>	<u>Means of Measurement</u>	<u>Critical Assumptions</u>
4. A survey of existing intercropping systems in Central America with sufficient quantitative evaluation to permit comparison with output #2	Completion of the survey and publication of results. Comparison of existing and new systems and findings published annually.	A review of project records and of publication.	
<u>Inputs Required to Achieve Outputs</u>			
A. From CATIE			
<u>Personnel</u> Assistance with the designs of questionnaires Training of enumerators Analysis of survey results			
<u>Vehicular Support</u> none			
<u>Materials Support</u> none			
<u>Institutional Support</u> library facilities			
B. From Cooperating Countries			
<u>Personnel</u> Enumerators to survey existing cropping systems and to describe these in quantitative terms			
<u>Vehicular Support</u> Those required to support enumerators			
<u>Material Support</u> Enumerator support costs office equipment.			
<u>Institutional Support</u> Administration of program Secretarial and support personnel costs			
C. From Project Resources			
Assistance with design of questionnaires Personnel required to review information currently available Assistance in the compilation and interpretation of the results of the survey Computer facilities.			

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

Critical Assumptions

<u>Outputs</u>	<u>Magnitude of Outputs</u>	<u>Means of Measurement</u>	
5. A bibliographic review of intercropping systems utilized in other countries with ecological and socio-economic conditions comparable to those in Central America.	The existence of the bibliography	Review of project publications	

Inputs Required to Achieve Outputs

A. From CATIE

Personnel

Those required to screen available information for relevancy and to catalogue these publications

Vehicular Support

none

Material Support

none

Institutional Support

Library and publishing facilities.

B. From Cooperating Countries

Personnel

Those required to screen existing publications for relevant material

Vehicular Support

none

Material Support

relevant reference materials are to be sent in to CATIE

Institutional Support

none

C. From Project Resources

Assistance with shelf research at CATIE.

Assistance to cooperating countries in identifying and screening existing publications for relevant material.

Costs of publishing bibliography.

Project Title & Number: Small Farm Cropping Systems 596-11-140-064

	<u>1975</u>		<u>1976</u>		<u>1977</u>	
	<u>M/M</u>	<u>(\$000)</u>	<u>M/M</u>	<u>(\$000)</u>	<u>M/M</u>	<u>(\$000)</u>
<b><u>INPUTS</u></b>						
<b>A. ROCAP</b>						
Personnel						
Commodities	220	248	336	338	336	338
Other Costs		20		4		-
		<u>39</u>		<u>108</u>		<u>112</u>
Total		367		450		450
<b>B. CATIE</b>						
Personnel		121		121		121
Institutional Facilities		60		60		60
Services		45		45		45
		<u>226</u>		<u>226</u>		<u>226</u>
<b>C. Cooperating Countries</b>						
<b><u>Estimated for one country</u></b>						
Personnel	130	60	130	60	130	60
Commodities		5		5		5
Institutional support		10		10		10
Other costs, vehicles, supplies, training, etc.		20		20		20
		<u>95</u>		<u>95</u>		<u>95</u>
Total	130	95	130	95	130	95