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TO - AID/W CAPTO A 30

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DIRECTOR, AID/W

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FROM - ROCAP/Guatemala

SUBJECT - Project Evaluation: 596-0064 Small Farm Cropping Systems

REFERENCE -
FOR: NO/PAV

PROJECT EVALUATION SUMMARY

1. Mission or AID/W Office Name ROCAP	2. Project Number 596-0064
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3. Project Title Small Farm Cropping Systems

4. Key project dates (fiscal years)			
a. Contracts signed	b. Final FY 1977	c. Final Input delivered	Project terminates in March 1979

5. Total U.S. funding - life of project \$1,500,000
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6. Evaluation Number 77-3	7. Period covered by this evaluation From: One year To: May, 1977	8. Date of this Evaluation Review: June 6, 1977
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9. Action Decisions Reached at Evaluation Review: Eighteen recommendations are summarized in Part III of the Narrative Report and are discussed in detail in the body of the report. All have been reviewed with the project manager, the cooperating regional institution (CATE) and with the Regional Rural Development Officer.	10. Officer or Unit responsible for follow-up	11. Date action to be completed
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PAGE 1 OF 36

DRAFTED BY RHechtman:aba	OFFICE Program	PHONE NO. 63	DATE 6/8/77	APPROVED BY: ADIR:BS:dam
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A.I.D. AND OTHER CLEARANCES

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FM:C.Murphy

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13. **SUMMARY:** A technical evaluation concluded that "the project is outstanding in its organization, conceptual orientation and staff competence." Reviews in the cooperating Central American countries revealed varying levels of progress to date; however, the evaluations concluded it to be "highly probable that project goals will be accomplished."
14. **EVALUATION METHODOLOGY:** The scheduled evaluation was performed during a two week period by consultant Richard Harwood assisted by Edward Rice (TAB). Supporting their efforts were the Head of CATIE's Crop and Soils Department, who until recently had also been CATIE's Acting Director, Dr. Jorge Soria and the entire project team. Additional important contributions to the evaluation were made by Project Manager C. James Murphrey in San Jose, and Regional Rural Development Officer Donald R. Fiester, in Guatemala. The evaluators were given the following scope of work to which the attached report responds:
1. Review of alternate cropping systems developed by the project including their potential applicability to small farmers;
 2. Assessment of significance of CATIE's role in assisting National Research Agencies including quality and performance of CATIE's technicians, collection and analysis of information, development of new production recommendations, and conduct of field trials (design, installation, management, harvest, data collection and interpretation, and coordination for comparability of results);
 3. Analysis of changes in resource allocations by CATIE and the Central American governments for cropping systems research;
 4. Identification of the degree of use of research method and information among the Central American countries;
 5. Inspection of field trials in each cooperating Central American country to determine adequacy of experiment designs and validity of research findings and recommendations (including crops, soils, plant physiology, pest management, water management, weed control, economics, and marketing).

6. Review of published evaluations of project-conducted field trials and assessment of impact of project training of national technicians in evaluation methods.
 7. The evaluation will determine the degree to which project has achieved targets specified in relevant documentation (PROPs/Logical Frameworks, Project Agreements/PERTS) and likelihood of schedule maintenance for life of project. Specific attention will be given to CATIE's support of this project, its institutional capacity to improve/increase this support, and CATIE's potential for managing additional ROCAP-supported agricultural projects in Central America.
15. DOCUMENTS TO BE REVISED TO REFLECT DECISIONS NOTED ON PAGE 1:

None

This evaluation brought out ideas which helped in the development of a new Project Identification Document (PID), submitted with the FY 1979 ROCAP ABS.

SMALL FARM CROPPING SYSTEMS PROJECT
ROCAP Project Number 596-0064

I. Progress to date vs. Plan (Comparison with PERT activities listed in PERT dated 9/10/76)

PERT Activity

- | | | |
|---|--|--|
| 0 | Basic Pro-Ag memoranda of understanding and baseline data of three countries | Accomplished for Costa Rica, Nicaragua and Honduras. The baseline are of necessity continuous. The original baseline, case studies, market analysis, pest surveys and other activities are continuously adding to the data base for all sites. Cropping systems are being monitored. Data accumulation and analysis is on schedule and it is anticipated that all baseline data needs for final systems design will be met well before the end of the project. |
| 1 | Basic memoranda of understanding Guatemala El Salvador | Accomplished. All five countries now signed and work is being planned for the final two. The Guatemala plans are scheduled for completion the first week of April. |
| 2 | Amendment to CY 77 contract | Accomplished. The CATIE work plan has been published following a February review. |
| 3 | Policies developed and disseminated | In progress. The plans and policies have been completed and are now under discussion with national research |

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Evaluation

committees on a country by country basis.

The general program evaluation has been completed with outstanding thoroughness, impartiality and soundness of judgment.

The program is on schedule in Costa Rica, Nicaragua and Honduras. In Guatemala the project goals can be met according to present scheduling. The San Salvador site will depend on the timely location of a CATIE technician.

II. Overview and Program Prospects

The project is outstanding in its organization, conceptual orientation and staff competence. The orientation, in particular, far surpasses that of any other systems project that has been attempted to date. After a slow start, momentum has increased to where for most sites the work is on schedule. Guatemala should catch up during 1977, but El Salvador may lag behind due to the slowness of reaching agreement there. It appears highly probable that project goals will be accomplished. If this is in fact the case (that these goals are achieved) the project will have exciting potential for major accomplishment far beyond the original goals. The message to CATIE from all of this, to quote from the philosophy of "Peanuts" is, "There is no greater burden than a great potential".

Relevant section of report

Recommendations

- 7 Program conceptualization should focus during the next few weeks on arriving at a format for final systems recommendations, taking into consideration the needs for future production programs. This is our most important recommendation. It does not imply a deficiency in the program, but that sufficient progress has been made to permit such an endeavor.
- 10 The systems planned for testing in 1977 should be carefully evaluated in terms of their estimated capability to meet project goals. This is our second most important recommendation.
- 4D The level of field management in the trials should be uniform and above farmer average.
- 4E Rainfall data must be collected at each site.
- 6D The project director should screen all requests for staff assistance outside the project. This particularly pertains to requests for statistical analysis where the request is not concerned with developing a capability but simply to get data processed.

- 8E The Central experiment should be redesigned with input from all staff for the 1978 season.
- 9A The entomology compendium should be completed before the end of the project. An intermediate level entomologist will probably be needed to do that.
- 9D The marketing studies should be more sharply focused.
- 9E Weed management expertise should be more fully incorporated into trial systems.
- 13 Input into national programs should be directed into the on-going research agency responsible for cropping systems research rather than be a service to short-term projects.
- 13 CATIE must rapidly evolve its strategy for regional assistance. Suggestions are made for consideration.
- 17 The "state of the arts" study should be coordinated with TAB. It is suggested that Dr. Boynton attend the April 11 meeting in Washington (at TAB expense).
- 17 The reference collection for insects, horticulture and cropping systems references should be mechanized. Thermotrex seems a likely method.
- 17 A documentation reference service should be provided to cooperating agencies.
- 21 Following the establishment of ties with national research agencies, training needs should be evaluated.
- 21 More graduate students are needed in the project.
- 22 Consultant visits should be carefully planned.
- 27 The next review should be scheduled during the time when crops are in the field.

III. Details of the program by subject matter area

Questions asked in the instructions to the reviewers are answered together with additional comments that we felt relevant. Suggestions for improvement have come from CATIE staff as well as from us. We are here assuming responsibility for them. The review of the small farm cropping systems project was conducted in an open atmosphere with free exchange of ideas on problem areas and on areas showing great potential rather than to problems now existing. We were provided all information requested, and any areas not effectively covered are omissions of the reviewers, not of CATIE.

1. Program Organization

The project was slow in organizing during early 1976 as staff were recruited, primarily because of shortage of administrative personnel at CATIE. The appointment of a new CATIE director and freeing of Dr. Soria has helped immensely. The appointment of Dr. Soria as project head and Dr. Moreno as technical coordinator late in 1976 gave the project its needed organizational structure. This aspect of the program is now very adequate. A remaining need in outreach support will be discussed later. The appointment of Ing. Palencia to Nicaragua, Dr. Hart to Honduras, Dr. Rodriguez to Guatemala, Drs. Holle and Saunders to San Isidro and Dr. Burgos to Guadalupe has decentralized coordination of these sites in a highly functional manner. The work in El Salvador will not progress satisfactorily until a site coordinator is recruited. The demands of this site require great care in selection of a suitable scientist.

Many of the technical responsibilities of the complex program are handled by "Task groups" within the project. The composition of these groups is now informal. It is suggested that more of such groups be formed to cover additional problem areas. These task groups should not be "closed". They should be open to input from any staff member. They should cover:

a. Technical coordination, administration (Moreno, Navarro, others);

b. Linkage with other relevant programs in the region (individual staff assignments by project);

- c. Documentation (Saunders, Holle, Jiménez, Boynton);
- d. Training;
- e. Program goal conceptualization (Burgow, Saunders, others)
- f. Extrapolation of data, cropping system requirements (Holle, others)

Task group assignments should be spread among the staff so as not to overload any one individual. The technical coordinator would oversee all groups.

Dr. Moreno is an effective coordinator. He is getting good support from the team. It is suggested that all consultants to the project support this coordinating position by working through him.

2. Budget

The recent breakdown of budget by country and team member was effective and adequate. It was an essential step. The team members seem satisfied that the amounts budgeted are adequate at the field level. Travel schedules and budgets have been worked out and are reported below. The overall project expenditures are running behind obligations because of delays in staff recruitment. It is suggested that as the project progresses careful financial review be made and consideration given to use of these funds in other categories up to the 15% contract limit for changes among categories. The hiring of short-term intermediate level staff would be such an option and would greatly increase staff efficiency. The short-term nature of the funding would not obligate CATIE to continue such personnel beyond the life of the project.

In summary, the organizational and budgetary aspects of the program are now effective.

3. Quality and performance of scientific staff

We found a high level of individual competence in the staff. They work exceptionally well together and have brought into being a highly creative environment. CATIE's selection and recruit-

ment program has been outstanding. Additional comments are being made elsewhere with copies sent to the individuals concerned.

The problem of salary increments for project staff has not been resolved. Allowance was made in the project budget for such increment but internal CATIE fiscal problems have restricted all staff increments. This should be discussed between CATIE and ROCAP. The staff are certainly deserving of such increments in view of their performance. They should not be kept at beginning salary.

4. Details of the Technical Program

A. Planning process

(1) Conceptualization of methods. The team has developed a strong capability to conceptualize. The research methodologies are quite well in hand but adjustments will be necessary during the next few months. The final project goals must now be conceptualized during the next few weeks. This need will be spelled out below.

(2) Field trial plans. The cropping seasons are fortunately timed the same in all countries, permitting trial outlining and planning in February-March. PERT timing schedules not agreeing with this timing should be changed. Plans were laid out during a February meeting at Turrialba and details of 1977 trials are now nearly complete in preparation for the April start of the planting season. The timing of this year's planning was excellent.

(3) Coordination with national program heads is now taking place. The program heads are planning assignment of additional support capability for April. The Guatemala site planning will be done in Guatemala by a CATIE team comprised of Drs. Bazar, Hart and others the week of March 28 in collaboration with ICTA personnel. The Guatemala site should thus have a full program for 1977 since ICTA already has baseline data and experience at the site.

(4) Meeting of the regional CS committee. This committee should not be concerned with details of field experimentation. The committee should meet perhaps in June or July to review

the conceptualization of the final recommendation package and the outline of work through the next two years. The committee might profit from visiting one of the better sites (not the atypical site of Guayabo). Consideration might be given to have the committee meet in a country other than Costa Rica, for several reasons:

a. It would encourage active input from regional representatives by adding emphasis to the fact that it is not a Turrialba but a regional program.

b. It would indicate CATIE's willingness to "meet the regional members of the team on their own ground".

c. By affording a cooperating country the opportunity to host the meeting it encourages them to "put their best foot forward". This can be used either to show an unusually good program of cooperation to others or to push a slow-moving program. (This alternating of meeting sites is one of the strongest aspects of the IRRI program).

B. Types of trials

The estimate for the 1977 trial composition is 60% pattern studies and 40% satellite experiments. Next year the ratio is planned for about 50/50. It would seem advisable to add a few more patterns in 1977 and test a few less new ones in '78 in view of project timing. The team as a whole should decide on this.

C. Trial Design

Field design for patterns include: about 50 mm² per plot, 2-3 replications per field with patterns tested across about 5 fields, making 10-15 replications per pattern. Analysis can run across fields but probably will not, as several variables will interact. Several years of IRRI experience with hundreds of trials has indicated that this planned approach is the most effective. Regression analysis of the key variables (planting date, labor input, etc.) vs. yield is a far more effective analysis than straight ANOV (analysis of variance) of a fixed design. Dr. Onoro, the project biometrician has seen most of the fields and plans to visit them during the growing season. This is essential for his obtaining

a feeling for variability patterns and the redesign of experiments for 1978 trials. He should assist field workers in deciding on yield sampling methods for 1977.

D. Trial Management

The level of management differed between sites and with the philosophy of site coordinators in 1976 (previous personal observation). These differences therefore do not represent differences in management capability of the coordinators. The Nicaragua site had the highest management, the Honduras site the lowest and Costa Rica is in between. The team has discussed these differences at length. An intermediate level of management has been decided on for most sites. This should be reviewed following definition of the final recommendation format during the next few weeks. A great deal of research philosophy underlays this decision. My experience indicates that at intermediate or above average management levels (as compared to the better farmer management) the interaction between management and systems are not significant. (At extreme management levels they may be). There are many advantages to having the trials cared for at above-average management levels (precision of planting, weed control, etc.), the most important of which is the confidence and enthusiasm that good looking trials instill in the research team and in cooperating farmers.

E. Data Collecting and Handling

All of the data for 1976 are in the hands of the biometrician and await computer facilities for storage. Hand analysis has been done for all data. For 1977 standard data forms are nearly completed, and will be used. All statistical analysis will be done by the biometrician with joint interpretation with the scientists. The data will go from the field farms directly to computer cassettes in a one-step process. The computer file is by farm, with standard coding across all farms and locations. Separate storage formats will be used for entomology and other kinds of data which do not fit the agronomy format. Data handling seems to be as well organized as it can be at this point in the project. The data will be compatible with any other system if an operator has the code sheets. CATIP should decide on its policy for making original data available. The scientists who work with systems modeling usually are starved for data and almost never collect their own.

While data from the project should be available to everyone, many institutions make data summaries available but restrict use of raw, unevaluated data. This is a complex and delicate issue that requires consideration.

The specific kinds of data (parameters being measured) were not checked in detail but include:

1. Evaluation of pest and disease incidence and damage.
2. Yields
3. Other miscellaneous parameters.

During 1977 detailed measurements of a complete range of parameters are not called for, since this year's trials represent an initial screening of both management and systems. Labor figures are not being measured for all systems. These would be useful but incur considerable expense and would call for a redesign of trials. Such effort will have to be made in 1978 but for this year, careful estimates of labor needs from baseline data would seem sufficient. Rainfall data must be measured starting well before planting. If the gauges on order do not arrive in time temporary gauges can be made. It is essential that researchers collect the rainfall data weekly; discussing them with the farmer so that they rapidly acquire the farmer's expertise in understanding how rainfall affects system management and performance.

5. Coordination of SPCS and the Soil Fertility Projects

While these projects are separate administratively, CATIE views them as being functionally a single thrust. Dr. Bazan has been designated to provide CATIE liaison with the Guatemala site in the SPCS program and to head the fertility program. He will coordinate fertility and soil management support to the SPCS program. The Turrialba lab (Ing. Diaz) will coordinate support testing for the region. Dr. Walker has actively assisted in SPCS site selection and soil testing. Field trials are shared in several cases between the projects, meeting the objectives of both projects. This coordination should continue. (Soil Fertility is ROCAP Project 596-0063).

6. Computer

A. The Hewlett Packard computer on order should meet the needs for most data handling and analysis during the life of the project (for project data only). Two limitations of the machine for overall CATIE use and for future analysis are:

1. The data input capacity. One input console only can be used, which utilizes the memory for input, fully occupying the machine during input.

2. The inability to transfer data from cassette to large tape reels for input to larger computers.

B. Several CATIE staff feel that card punch and card reader capability would solve both long-range problems. Direct key to tape machines are cheaper to operate (avoiding cards) and could probably be tied directly to the computer for input or for transfer from reel to cassette or vice versa. This would give complete flexibility.

C. The basic language used by the HP computer is adequate for data handling and compatible with Fortran which would probably be used in higher level analysis in the future. The data are thus accessible.

D. A problem that could become major is the increasing volume of requests for analysis of data. During 1977 these services should be held to an absolute minimum, as the biometrician will be overloaded with project data. He probably cannot handle all of the present backlog and keep up with incoming data during 1977. The project Director should personally screen requests for help. No one should solicit more analysis. Certainly assistance should not be provided outside the National Research Programs receiving direct CATIE assistance.

7. Program Conceptualization

The SPCS project must be considered the leading program in the Americas in terms of its emerging conceptualization of research methodologies for SPCS. The only other major program in the region, that of CIAT, was a complete disaster in this regard, which was the one major reason for its failure.

The types of conceptualization have been and are:

Phase I mid-1976 to March, 1977

- a. methodologies for field test of systems (continuing)
- b. methodologies for farmer-participant research (continuing)
- c. methodologies for extrapolation of technology across environments (continuing)

It is recommended that the process be expanded by beginning Phase II of conceptualization involving continuation of the past 3 areas but placing them more fully and precisely in the context of the final goal, systems recommendations.

Phase II The assembling of the format for final systems recommendations. A logical timetable would call for final recommendations for the 10 systems in late 1978, national program extension and verification trials in 1979 and production programs in 1980. The design of the recommendation format thus should follow the following steps:

- (1) Identification of the extent of target production zones (as determined by administrative and geographical restrictions). This will indicate the extent of extrapolation necessary.
- (2) A brief description of the eventual production program mechanism, including capabilities for providing inputs and other services.
- (3) The outlining of the production recommendation format for each area taking into account geographical area, program structure and data generation capabilities of the project. This latter aspect adds several new dimensions to possible recommendations that have not formerly been possible through traditional research approaches.
- (4) The adjustment and supplementation of the format through coordination with other regional programs (PIADIC, etc.)

Once the systems recommendation format has been designed, research trials can then be evaluated for the most part by their eventual contribution to filling the blanks of this format. It is strongly recommended that this process be completed during the 1977 season. Final approval would then be the responsibility of the regional committee.

8. Work done during the 1976 season

A. The original baseline studies were completed and summarized for all locations in Costa Rica, Nicaragua and Honduras. Supplementary information about the area is becoming available as technical surveys, marketing studies and farm monitoring are carried out, continuously adding to baseline data for each site. The process is continuous, rather than sporadic as implied by the PERT. The collection and analysis of such data seems satisfactory and will provide all data now seen as necessary for final systems recommendations.

B. The pattern studies and satellite experiments done in 1976 served mostly to broaden the baseline data through better understanding of existing systems.

C. The sites chosen in 1976 represent a broad range of environmental conditions needed to provide data points for eventual extrapolation of data and for development of a capability of systems design. All seem to have the potential for short-range improvement of systems.

D. Types of data collected

The 1976 data are surveyed data and observational type data which are considered "soft". This is appropriate for initial understanding. During 1977 the data will be largely "hard" or experimental data and in 1978 exclusively so.

E. Central experiment

The central experiment was designed to run for 3 to 5 years. This year (1977) should be the third and final year for the experiment as it now stands. There is a continuing need for

a central experiment for purposes of providing research information, demonstration and graduate student or short course training. The experiment should be redesigned based on past findings and plans for systems research in the future, with input from the entire team.

9. Review of work by disciplines

A. Entomology

1. A basic reference collection of insects important on the 41 most important crops of Central America is well underway. This will be useful for future pest identification.

2. A compendium of insect pests on all major crops in Central America is well underway. It should be finished by the end of the project. It provides an expected pest profile for every crop the SFCS team deals with. It is recommended that:

a. An M.S. level assistant be hired to do much of the indexing work on the compendium.

b. A request be made immediately by CATIE to ROCAP to Dr. Rice for literature searches on the most important crops while he still has access to search facilities.

3. Economic thresholds are being determined for four of the main crops in the SFCS program.

4. Pest damage surveys and control recommendations are being accomplished for all sites.

The program is precisely on target and proceeding well.

B. Agronomy

Concentration is on pattern design and test for 1977. It is recommended that this emphasis be increased for 1977. More will be added to this below. Fertility, plant population and management studies should be foremost in 1978.

C. Production economics

Baseline data accumulation is continuing. Case study farms are being monitored. Most attention is being given to management costs of systems alternatives. The eventual goal is the design of systems to fit given socio-economic environments. Data on labor use continue to provide the greatest difficulty. The experimented designs may be modified in 1978 to permit the gathering of more precise labor use estimates.

D. Marketing

Marketing studies are now being carried out by a TAB sponsored scientist. Basic instructions for marketing studies in October of 1976 focused the need for off-farm data. There has been a distinct tendency to not focus sharply on marketing problems and specifically on the market potential in the study sites for crops being considered for recommendation. If such focus is not achieved immediately the current short-term assignment of a marketing specialist will not provide adequate data for systems design. The design requirements must be arrived at through consultation between the marketing specialist and the scientist who are outlining the format for systems recommendations.

There is no justification for the marketing specialist to formulate a "methodology for selection of new crops for cropping systems" when his responsibility is to provide specific data, by crop and site, for the market potential portion of such a recommendation.

E. Weed management

The weed management team from Oregon State is a highly professional component that has been well integrated into the needs of the team. Their focus is:

1. Residual carryover of herbicides used in multiple cropping.
2. Selectivity of herbicides for multiple cropping.
3. Teaching weed control short courses to professional staff in participating countries.

4. Soil preparation - weed control methods and interaction.

Their recommendations are being included in systems experiments to a limited extent in 1977 during the initial cropping pattern test phase. Full use of their technology should be practiced in 1978 trials, during the agronomic test phase when recommendations are being worked out for specific management practices. In the 1977 trials it is sufficient to achieve a relatively high, uniform level of weed management regardless of cost. Much more emphasis should be placed on weed management experiments in 1978 to be integrated into the general crop management outline. The 1977 trial outline seems adequate to develop information needed for this next round of trials. During 1977 the various team members should become practiced in herbicide use in preparation for the 1978 full-scale weed management component. We did not have opportunity to talk with the weed scientist, as they were conducting a short course in Nicaragua. We would suggest that they consider the problem of weed shifts in intensively managed systems toward the more difficult to control weeds and look at ways to prevent this shift.

F. Horticulture

(a) A bibliography of Central American vegetable crops is 70% complete with publication planned for 1978. This work will constitute a baseline study for future work in horticulture in the region.

(b) Contacts are being established with all sources of vegetable crop technology in the region.

(c) Climatic requirements are being estimated for each of the major horticulture crops.

(d) Horticulture crops are being included in systems at each site.

This work is excellent in scope and direction. It badly needs basic technological inputs from additional sources (which do not now exist in Central America).

Such inputs are:

(a) Varietal screening. At present most varieties used by farmers are U.S. commercial lines, many of which originated in northern U.S. programs and are strictly temperate climate types. It seems highly unlikely that these varieties would do as well in the humid tropics as tropical lines from the Universities of Hawaii or Florida or from the USDA Puerto Rico station, especially in tomatoes. There is at present no program in Central America to systematically screen tropical materials, and especially those from Japan and China which are far superior to temperate varieties under tropical conditions. Major breeding work will eventually be needed in tropical America. Seed production will be needed, as few of the better U.S. tropical materials are in commercial production.

(b) Background information on insect and disease control is needed. Farmers now spend considerable money on various "witch's brew" combinations of chemicals for vegetables. Effective control recommendations should be made, but little hard information is now available on the best controls.

(c) Handling and packaging information is needed which would be relevant to Central American transport and marketing conditions.

Many others could be mentioned. These major shortcomings do not imply deficiency in the SFCS program. It has neither the mandate nor the resources for major involvement in this developmental kind of research. Unfortunately there is no program in Central America that does.

G. Statistics

Much of the statistics work was summarized above under data handling. Dr. Oñoro is extremely effective in working with each team member, having the ideal personality for such a task. It is visualized that he will shortly become overloaded if he is asked to service a broad range of programs. For instance, PIADIC should not request participation of Dr. Oñoro or other SFCS staff during the lengthy process of formulating methodologies and procedures. They should be called in after a draft of such procedures has been made ready for review.

H. Physiology

Dr. Fargas is spending an estimated 15% of his time on physiology studies, mostly of intercropping, at Turrialba. These studies give insight into systems design requirements. They should continue to be field-oriented and on the major combinations used by the SFCS program. There is a need for many more of these studies (but not at the expense of outreach trials). This is a logical area for far greater input from the graduate school! Physiology studies can be done at Turrialba by staff and students who cannot, because of teaching, spend time away from campus.

I. Pathology, nematodes

Dr. Moreno coordinates the identification and avoidance procedures for diseases and nematodes. This work, while important, does not require major input in a systems program. Interaction of diseases with systems is not at present a researchable area unless major input (beyond the scope of CATIE efforts) is contemplated. Most field crop production is concerned with disease avoidance or control with resistant varieties. With high value crops such as vegetables some control may be practiced. Interactions of disease with cropping systems (at present levels of understanding) simply dictate the avoidance of patterns which permit disease buildup. Those few instances of crops susceptible to the same disease are avoided. There are, actually few such cases. Several of the solanacea share soil-borne diseases as do the legumes. There is some indication that intercrop combinations may reduce incidence of certain diseases but so far these instances are rare. Dr. Moreno should continue to monitor diseases in the test systems and be alert to any possible adverse interactions. His coordination responsibilities alone require nearly full time input, but this monitoring of diseases can be done without a great deal of time spent.

Nematode surveys have so far not indicated that they are a serious problem in the systems under test, at least where they have been grown. Dr. Moreno has made contact with both the North Carolina project and with a testing service in Britain for occasional spot checks. For insurance purposes, selected fields should be spot-checked in each region with actual nematode counts made. If a simple testing service, such as that available in

Britain could be utilized free of charge, the service should be requested. If the service requires participation by the team in a reciprocal kind of field trial program the usefulness of additional basic nematode study trials to the objectives of the program should be carefully considered. North Carolina asks for such participation. Such trials can be useful, but as often as not their usefulness is more to the basic research of the U.S. program than to that of the cooperating country.

10. Adequacy of systems currently under test

First priority for systems recommendations has been placed, by the team, on modification of existing systems. In San Isidro and San Pedro Sula there are about 12 crops included in the systems. The team cannot accurately assess the adequacy of these systems, but suggests first a close look at the stated project goals (PROP 1/10/75, pp 9, 10), which are repeated below, and they make such changes in commodity mix and systems organization as are required to, at a minimum, provide potential gains commensurate with project goals.

General. "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 also be included where appropriate in the field trials to increase potential income, employment and total nutritional value of the cropping systems." This opens the door to a wide range of options. Sesame, for instance, is an excellent small-farm crop because of harvest requirements. It is relay-cropped in corn in Guatemala where it is exported to Japan (an unlimited, high-priced market).

"New cropping systems 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) Adding of one or more non-traditional crops to existing systems.
- (3) Increasing net value of total production by 50%.

- (4) Increase employment by 20% without reducing income per unit.
- (5) Increase protein or calories production by 20% per unit of land.
- (6) Increase efficiency of use of production inputs by 25%*.

These goals seem, to the reviewers, to be reasonable and achievable. It is recommended that specific systems be incorporated to reach selected goals, and the goals of each system be specified. The crops being reported in the San José and Guatemala studies of crop potential as having potential for both increased production and marketing should be closely studied. Soil conservation and animal feed through use of off-season cover crops should also be considered.

The intuitive feeling of several participants in the ROCAP seminar at Turrialba as well as that of the evaluators is that not enough potential is incorporated in the 1977 cropping trials. If the potential is not present in 1977 it is unlikely that it can be added during 1978 in time for inclusion in recommended systems. We do not feel competent to suggest adding specific crops, but recommend that the team carefully evaluate their systems in view of project goals and the above suggestions and satisfy themselves that their systems have sufficient potential to meet project goals.

11. Extrapolation of systems recommendations across zones

Dr. Holle has outlined the requirements for tomatoes. A similar format should be extended for use with entire systems. The process should be a mechanical one (accomplished manually) for the planned production zones. Computer programming and modeling of such a process should follow as a continuation of the project but it is not necessary for the realization of current project goals.

12. Systems modeling

The team is building toward that capability but it is not called for nor needed to achieve current project goals. It should probably be a part of any project continuation. Data may

be fed to PIADIC as they become available but past experience indicates that modeling of complex systems by those not intimately involved in them is not very profitable.

13. Regional collaboration by the project

SFCS project leaders and technicians have had to take the lead in establishing CATIE presence and to some extent policy in outreach. The instructions for such outreach are summarized in the PROP, dated 1/10/75, page 2.

"CATIE will, in turn, provide coordination and technical assistance to national agricultural research institutions in Central America."

This has been taken to mean a direct input into the on-going national research agency responsible for cropping systems research (ICTA in Guatemala, INTA in Nicaragua and the directorate for research within the Natural Resources Division in Honduras).

The reviewers concur fully with this approach and strongly recommend that CATIE administrative personnel follow through with more formal arrangements for such input. It should be made clear to all concerned agencies that CATIE staff have primary responsibility to these research agencies and to the SFCS project within them. Requests for their consulting assistance to short-term projects within the country other than SFCS should be made formally from the research agency to CATIE. Confusion has arisen on these points, especially with administrative support being provided by a third agency. The main confusion on this point exists in Nicaragua. CATIE should only approve such requests for use of SFCS resources if this assistance will not detract from the SFCS objectives. Assistance outside the program of focus dilutes the program thrust. CATIE can best help national programs by focusing on a limited aspect of the national program and doing a good job in that area.

There is a distinct need for input by CATIE at a high administrative level to establish these policies in cooperating countries. The CATIE Director has indicated that these matters are receiving his first priority.

The reviewers make the following suggestions for consideration in the establishment of CATIE policy for Central

American outreach.

That CATIE, for purposes of scientific assistance and coordination, assume the posture of an indigenous institution rather than that of an outside agency (as do all other assistance agencies). This might involve:

- (1) Administrative affairs be handled within the office of the director of research of the national agency, with the person in charge supported in part or whole by CATIE (eventually). In IRRI's Asian programs this has added few restrictions. If relations and working agreements with the national agency are not sufficiently effective to permit this it is unlikely that creating a separate office is going to help.
- (2) Avoid the use of outside consultants or intermediaries in dealing with these national agencies on administrative or policy matters. Consultant technical help in the field is a different matter.
- (3) Work with a "soft touch" and low profile in non-technical matters. Negotiate as equals, not as patron - client.
- (4) Avoid labeling reports or technical papers from the national site with the CATIE name. Use the name of the national agency. Develop a short acknowledgment statement to CATIE which can go on the bottom of the first page of an informal document or on the first inside page of a bound one. This will clearly set CATIE apart from any other (external) assistance agencies. The same applies to field trial signs. This one policy will work wonders in encouraging local support.
- (5) Set up a communications link between CATIE and the offices of the National Directors of Research of the Ministries of Agriculture.
- (6) Occasionally hold international, project-supported meetings in a cooperating country, hosted jointly with the national agency (coordinating committee, etc.).
- (7) Sponsor travel of cooperating national scientists to visit each others project trials. (This is especially effective

in prodding a logging country program).

These few ideas are not recommendations of the reviewers for CATIE adoption, but are suggestions for consideration as CATIE policy is evolved. It is felt that such a posture would make CATIE far more effective and respected in Central America than would the typical "outside" assistance approach.

14. Comments on specific sites

A. Costa Rica - San Isidro

Little formal national support is available. One local extension man is available, with a vehicle for part-time assignment. A local bank agent also helps. One peace corps volunteer will be assigned to the site.

In Guapiles no help is available, but a research station guest house and facilities are available.

One possible way to correct this lack of support in Costa Rica would be to arrange a trip for two or three key people in the Costa Rican research organization to visit either Nicaragua or Honduras where the project will have good support at a time when field plots look good. Ask host national counterparts to brief the Costa Rican visitors. This along with low profile official pressure (the full-push technique) may help for 1978.

B. Honduras

The regional director is providing good support to the project (and has promised more for 1977). Dr. Hart is well respected by him. A difficulty exists in the competition between the national and regional directors. This is heightened by the structure of the national committee. This committee is ineffective but change in it would be extremely difficult and delicate. We (for once) have no suggestions on this problem. The ineffectiveness of the national committee has little bearing on the completion of the present project in Honduras, but has long-term implications. With good support at the regional level it would seem best to not make a major change, but work at the director's level through the soil fertility project. Membership on the committee might be

rotated periodically according to a fixed schedule at some future date.

The main Honduran thrust is for help to the land reform cooperative farms. The implications of this future CATIE production research programs should be looked into on a continuing basis.

The IICA project on the El Salvador border is requesting CATIE assistance. This consultant service by CATIE technicians should be requested formally as suggested above. It would seem that this project is outside the formally established SFCS project, but is related in that it is supported by the Honduran research organization as well as by IICA. Participation in such a project by any staff for more than two days would thus probably require ROCAF approval.

C. Nicaragua

INIA is anxious for all the help it can get from CATIE. Ing. Falconia has been extremely effective in his work there. Nicaragua poses the greatest problem for diversion of CATIE staff into non-research and non-INIA projects. The proposed IICA project there is production (not research)-oriented and has little or no connection with either INVIENCO or INIA. CATIE's attention should remain focused on research projects and should thus limit its activities to INIA or perhaps INVIENCO projects not focused on multiple cropping.

D. Guatemala

The INIA connection seems ideal.

E. El Salvador

Planned participation in the ongoing (USA-sponsored) project is the only alternative.

F. Panama

The planned participation in Panama seems to come from a technical and climatic standpoint. Inter-embassy-level connections

would seem adequate. Panama should pay costs, with perhaps the cost of CATIE technician consultant visits shared with Panama. Any such arrangements, however, must be carefully considered with respect to limitations of the present ROCAP/CATIE contract. ROCAP currently has no authority to support CATIE in operations in Panama. It would require a request by the Government of Panama to its bilateral AID mission in Panama for a project amendment. Such amendment requires Washington approval. If CATIE were to feel support to Panama appropriate, this may be an opportunity to set a precedent for direct-country support to its programs by requesting Panama to pay all costs, at least for a short-term program over the next two years.

15. A summary of resource allocation by countries is as follows:

Resource allocation by countries

Costa Rica - San Isidro

1 extension agent part time
storage facilities

Guatemala

use of guest house at experiment station
station facilities (land, etc.) if needed

Nicaragua

Secretarial assistance (1/2 time)
Field assistant (1) (CATIE shares salary)
Office space
Pick up truck (1)
Motorcycle (1)
Office equipment

Honduras

Field assistant 1/2 time (2', in April)
Secretarial assistant 1/2 time
Administrative secretary 1/2 time

Pick up
Jeep
Office
Office equipment

We did not discuss the project with Costa Rican officials but we have been given to understand that there is little likelihood of additional support in the near future.

The needs in Nicaragua and Honduras are for additional field staff. We were told that two additional staff will be assigned in April in Honduras and that "more staff will be available for the 1977 season" in Nicaragua. This subject of additional country support is a key item for the future agenda of top-level CATIE administrative staff who deal with outreach programs. The CATIE field staff have pushed about as hard as they can while still maintaining good relations.

El Salvador

CATIE has indicated that it will rent office space within IICA's building as its main location. However, a "working office" will be provided by CENFA at Santa Tecla, in order to be close to the national team. We question need to rent an office in IICA. We suggest a CENFA working office with frequent contact with IICA. At any rate it would not seem appropriate to pay rent to IICA and there is question of ROCAP approval for such payment.

Guatemala

To be discussed on the week of the 28th of March.

Comment: The extent of CATIE assistance to the projects should be made known. It is suggested that copies of trip reports to the countries be made available to the concerned national officials.

10. A summary of travel plans by the staff for 1977 follows. This schedule is flexible. It seems adequate to meet project needs. It indicates a sincere effort to support regional research.

Tentative Trip Plans for 1977
(number of trips)

	Costa Rica	Nicaragua	Honduras	El Salvador	Guatemala
Jiménez	6	2	2	2	2
Holle	17	4	4	9	2
Burgos*					
Navarro	26	8	8	6	5
Andrade	4	2	2	2	2
Oñoro	10	6	6	5	
Saunders	15	8	8	4	2
Moreno	15	15	6	4	1
King	12	3	3	2	1
Enríquez	4	4	1	1	1
Mendes	30	2	0	0	0
San					
Soria					
Locatelli	30	4	4	0	0
Shenk	30	4	4	0	0
Johnston	30	5	5	2	2
Fargas	2	1	1	3	0

*Not yet known

In addition each scientist has one trip to attend a major conference in his field.

17. Project Literature Documentation

The collection of primary information sources from other cropping systems programs is essential. Dr. Boynton has done excellent work in making linkages with other programs. ICRISAT and IITA should be added. Much of the information collected is in pre-publication mimeograph form. It is essential information to such a project but not of general interest for inclusion in a central library. The Crops and Soils Department library seems essential to the project. The room needs shelving and an air conditioner.

A current bibliography is being put together by Dr. Boynton in a "state of the art" paper for Central America. This is a needed work which will cover research and research methodologies. It is essential that it be coordinated with a similar work planned by TAB. It is suggested that Dr. Boynton be invited from Cornell by TAB to attend an April 11 meeting on the subject in Washington. Dr. Rice is following up on this.

It is suggested that all references be recorded in a formal reference system, either using the new computer or by the purchase of a thermatex system. Thermatex would seem more appropriate, as it requires little extra skill to operate and would be readily available to students and staff without expensive operating cost. It could be used for the insect reference file, the horticulture file and cropping systems bibliography. A reference service should be provided to cooperating programs. This "reference service" is seen as providing detailed information in the form of mimeographed papers and working documents which are not in published form. Most of the useful documents in cropping systems work fall into this category. They are being collected as part of CATIE's research information needs. The IICA library does not and cannot collect such materials. An indexing service would serve the needs of both CATIE and its outreach programs, but IICA may be called on to assist in the distribution, especially of published materials.

Thermatex might also prove an interesting tool for extrapolation of systems across environments. One of the many talented and creative project members with lots of spare time (especially on holidays and in the evenings) might give thought to this prospect.

18. The CATIE main library is an excellent source of information on tropical crop technology. Because of budget limitations, however, staffing and periodical subscriptions have been reduced, and few new primary references are being purchased. The maintenance of this most excellent library at CATIE is essential to this and future programs planned for CATIE.

19. Project publications have been reviewed. All publications were made available to the team as summarized below. Comments on these publications are as follows:

A. The project should be selective in what it sends out or the distribution will lose effectiveness. Too much information in too great a detail is counterproductive. Some of the documents are working documents that have only limited use outside the team. Summary documents (as the one by Dr. Navarro on baseline data) are more effective for distribution.

B. All papers should be dated and labeled as to the purpose for their writing.

C. Either delete the CATIE name from reports from outreach sites (as discussed above) or give adequate credit to the host research institutions.

CATIE Published Material Presented to the Review Team
on the Subject of Cropping or Farming Systems

<u>Type</u>	<u>Number of Documents</u>	<u>Approximate Number of Pages</u>
Bibliography (pre-project)	2	170
Conference proceedings (1974) (pre-project)	1	400
Systems course 1975 (pre-project)	1	300
General project organization and function	5	200
General description of agriculture in tropical areas	5	122

<u>TYPE</u>	<u>Number of Documents</u>	<u>Approximate Number of Pages</u>
Project study site baseline data (all types)	10	400
Summary of baseline studies	1	23
Component technology of systems (crops, intercropping, fertilizer, pests)	10	170
Central Experiment	3	11
Annual reports, 1976, 77	2	125
Plans for 1978	1	47

20. Seminars

A seminar scheduled has been published, listing 13 seminars in April-June. This is excellent.

[A major systems seminar is planned for 1977. This is appropriate, but project goals and the systems recommendation format should be completed beforehand. Until that is done the project, to an outsider, will appear vague and too academic. (This was and is still a weakness in the IRRI program). Those of us who know the program realize that this "firming up" was coming but at present the reaction of outsiders is one of lack of understanding and of confusion.]

21. Training

[Following the firming of ideas and establishment of permanent long-term linkages in the countries the training needs should be assessed (during 1977). A committee within the project should outline policy.]

Graduate Training

[There is an insufficient number of graduate students in

the project. Such involvement could add greatly to research capability and is desired by all project staff. It is suggested that active recruitment be undertaken to get students in, as well as influence exerted by CATIE administration to encourage the graduate school to become involved. The work of students assigned to non-project professors could also be supported if it could be coordinated by project staff.

Concerning project members teaching in the graduate school, no official allowance has been made, to my knowledge. It is suggested that until the project is well in hand (say in 1978) this teaching be held to guest lectures or short sections of courses. All project staff are required to travel. Teaching a regular course takes more time than staff now have. It may be desirable, in future projects, to allow for teaching, especially in the off-season.

22. Project Consultants

This aspect was not fully reviewed. We have not read the consultant reports.

Dr. Boynton has been relieved of all administrative connection with the project to devote all of his consultant time on documentation. It is suggested that he finish the state of the art work and establish remaining connections with data sources and available reference services as his full-time contribution during the periods of his consultancy.

23. Dr. Bradfield continues to provide help in the socio-economic area. Project personnel have indicated the value of this participation but we did not have time to look into his work.

Other people who are world-known experts in tropical cropping and farming systems are:

Dr. Hans Ruthenberg
Universität Hohenheim
Hochschule 700 Stuttgart (Hohenheim)
Schwerzstrasse 33, West Germany

(An economist with good all-around agronomy background, author of the major book on African farming systems. A creative

thinker and a real intellect. He would be most useful in the future as farming systems characteristics are studied).

Dr. Hugh Bunting (ODM)

Soils, farming systems. An ecologist who could possibly help in an overview of how systems fit into all aspects of their environment.

Dr. Don Plucknett - University of Hawaii

Systems sampling across environments, new crops for systems.

Dr. Hubert Zandstra, IRRI. (Spanish-speaking)

Especially on extrapolation across environments. He is probably the world's leading expert on this. He is also probably the only person who could help with program organization. (There are just few other effective programs whose staff have more experience in this than the CATIE staff).

Dr. David Norman, Department of Economics
Kansas State University
Manhattan, Kansas

Dr. Norman has many years of experience in the economic of systems studies in Africa. He served as consultant to the IRRI program and is of the "IRRI school of thought" on cropping systems. He could help on fitting economics into the system studies. Dave is the only soft-spoken member of this list. The rest are strong personalities and "characters". They are, without exception, tops in their fields.

They can only be attracted by short-term assignments if they feel they would be in a stimulating and dynamic environment. Their services are not for sale. They are all well established and busy, but could be attracted by the prospect of an intellectually profitable interaction.

Whenever consultants are used it is essential that they be given a specific assignment (in the case of regulars) with their

output specified. (That output should not be a graduate-school type seminar). With short-term visits, CATIE should plan just what it wants from a person and indicate it to him well in advance of his arrival in Central America.

24. Relationship to other Projects

There are many projects which have a bearing on the CATIE project. It is desirable to have at least a knowledge of those projects and working relationship where appropriate. It is essential, however, that the project not become tied down with all sorts of linkages. Contact can be informal and serve the main purposes of avoiding duplication and funneling in information. Individual staff assignments might be made for purposes of keeping an eye on such projects. A list of the ones we were exposed to that may have relevance:

A. PIADIC

The area frame (has more relevance to the next funding phase of the project than to the present one)

Standardization of data reporting (Dr. Boone)

(CATIE can respond when coordination is attempted by PIADIC)

PIADIC Tech Packs

(CATIE can respond to the first tech pack draft by PIADIC)

PIADIC data bank (the bottomless barrel)

All CATIE data can be fed in if needed once the computer is set up.

B. Hawaii Programs (MIFTAL, Soils, Leuceana, etc.)

CATIE should be users, not participants in these programs.

C. North Carolina

Nematode project - in future if services needed. The project requires too much participation at present.

D. Oregon State (weed program)

(present involvement should continue)

E. CRIES project on production potential

(use output from the project)

F. Consortium for water management in Semi-Arid Tropics

(their work may be too specific and detailed for present use)

G. TAB (reference service - internal)

a) Farming Systems Program - CATIE should make immediate use of this through Dr. Rice. CATIE project director should follow this closely - for possible participation and funding.

b) State of the art study. CATIE is already accomplishing this for Central and South America.

H. SIECA - progress indicator study. Seems to have direct socio-economic importance.

I. Country AID projects - should be carefully monitored. Several have a bearing. Contact should be made by in-country staff as well as the CATIE outreach administrator.

25. Project effect on CATIE

The project has led CATIE into its regional involvement. It is forcing institutional changes within CATIE to support both a regional effort and an effort that is production research oriented. Direct input of CATIE results to production programs will also be a new experience. Administrative and support capabilities of CATIE are presently being stretched.

26. The problem of core support

The SFCS project originally required CATIE core support for full-time technical staff both in Turrialba and in outreach. Such support is extremely difficult to solicit from any other donor, who will naturally resist backstopping the project of a second donor. It would seem useful in future projects to separate all technical support costs out as direct costs of the project, with overhead for administrative support negotiated on a project-by-project basis. CATIE, following the patterns of an International Center with regard to funding (as was explicitly stated in the Interim Project Review - April 9, 1976, p. 10) cannot be considered a national institution expected to provide "matching funds".

27. Timing of the next review

The timing suggested in the PERT (June or July of 1978) should be followed. At that time of year the field program could be evaluated whereas in March the fields are dry and bare.