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**INTERIM EVALUATION
OF THE
INTEGRATED PEST MANAGEMENT/ENVIRONMENTAL
PROTECTION PROJECT
(036-4142)**

PREPARED FOR:

S&T/AGR/AP

Washington D.C.

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ACRONYMS

ABS -- A.I.D.'s Annual Budget Submission
A.I.D. -- Agency for International Development
A.I.D./W -- Agency for International Development in Washington
CATIE -- Centro Agronomico Tropical de Investigacion y Ensenanza
CIBC -- Commonwealth Institute of Biological Control
CICP -- Consortium for International Plant Protection
CIP -- Centro Internacional de la Papa
EP -- Environmental Protection
FAO -- Food and Agriculture Organization of the United Nations
FTE -- Full Time Equivalent
ICIPE -- International Center for Insect Physiology and Ecology
IPM -- Integrated Pest Management
IPPC -- International Plant Protection Center
IRRI -- International Rice Research Institute
LDC -- Lesser Developed Countries
MOU -- Memorandum of Understanding
NCSU -- North Carolina State University
NGO -- Non-Governmental Organization
OICD -- Office of International Development and Cooperation/USDA
OSU -- Oregon State University
PIP -- Post Harvest Institute for Perishables
PL-480 -- Public Law No. 480
R&D -- Research and Development
ROCAP -- Regional Office for Caribbean Area Planning/USAID
S&T -- Bureau for Science and Technology/USAID
S&T/AGR -- Office of Agriculture, Bureau for Science and Technology
UCB -- University of California, Berkeley
UMCP -- University of Maryland Contract Personnel
UMI -- University of Miami
USDA -- U.S. Department of Agriculture
USDA/ARS -- U.S. Department of Agriculture/Agricultural Research Service
USDA/APHIS -- U.S. Department of Agriculture/Animal and Plant Health Inspection

EXECUTIVE SUMMARY

Section 1. Introduction and background

1.1. Summary Scope of Work

The purpose of this evaluation is to carry out a comprehensive technical and performance review of the implementation of Contract DAN-4142-C-00-5122-00, the Project Number 936-4142, between the Agency for International Development (AID) and the Consortium for International Crop Protection (CICP).

The evaluation team is to determine: 1) the capability of the contractor to carry out the various elements stated in the contract and 2) the effectiveness of the technical assistance, research, training and networking/communications.

The evaluation team members include:

Dr. Anson R. Bertrand, Team Leader
Dr. Dean L. Haynes, Entomologist
Dr. Michael Hansen, Ecologist
Dr. Ernest P. Imle, Plant Pathologist
Dr. Katherine Reichelderfer, Agricultural Economist

1.2. Methodology

The evaluation team met from October 11-13, 1988 at the Headquarters of CICP in College Park, Maryland to review documents and interview personnel. Persons interviewed included the CICP Director, the Administrative Assistant, the CICP core staff member who resides in College Park, Maryland, and AID Project Manager and Assistant Manager, the Deputy Project Manager and the Networking/Communications Specialist (both located at Oregon State University), and the subcontractors from the University of Miami and the University of Florida. On October 14, the team met at the S&T/AGR office to continue examining documents, to begin to develop the report and to meet with the representatives of the AID Regional Bureaus. Unfortunately, no one from the Regional Bureaus met with the team, even though arrangements for such meetings had been previously made. The team leader spent October 25 at Oregon State University examining documents and interviewing personnel. The review team met on November 1-3, 1988 to get the report of the Team Leader's visit to Oregon State University and to prepare this report.

1.3. Project Description

1.3.1. Relevant History

The present project represents a combining of previous AID projects which provided assistance for crop protection in developing countries. The original project -- No. 931-0930, Pest Management and Related Environmental Management -- was carried out by CICP, then located at the University of California, Berkeley. The International Plant Protection Center (IPPC) at Oregon State University carried out weed control work (Project No. 932-0206). A unit at North Carolina State University carried out the nematode control work (Project No. 936-4149). Kansas State University did the post

Foundation did the vertebrate pest management work (Project No. 936-4173).

The current project, Integrated Pest Management and Environmental Protection (Project No. 936-4142), began October 1, 1985 with CACP as the prime contractor. The project combines features of three prior projects (Projects No. 931-030, 932-0206 and 936-4149). The five year contract terminates September 30, 1990. Funding for the project has been less than originally projected. The expected funding level for the contract was \$8,625,000, but only \$2,031,000 has been authorized for the first 39 months of the expected 60 month contract period.

1.3.2. Purpose and Objectives

The purpose of this project is to help developing countries improve their capabilities to cope with plant pests in an affordable and environmentally safe manner. Specific objectives are to:

- a) Improve the capabilities of developing countries to conduct research and training related to IPM;
- b) Facilitate networks of plant protection scientists and IPM specialists.

1.3.3. Implementation

The form of the project design presupposed that the contractor would take buy-ins and purchase orders from AID missions and host countries. To date, funding through these mechanisms has exceeded that from the central bureau.

1.3.4. Project Financing

At the present rate, the five-year project will be funded at only \$3,124,620 instead of \$8,625,000 as originally intended. This level of funding will provide only 36.2% of the intended funding level for core activities by the Central Bureau of AID. It has not been sufficient to permit the contractor to be innovative and carry out many of the activities envisioned for this project.

The top three subcontractors -- IPPC at Oregon State University, University of Maryland and the University of Miami -- received 46.7%, 22.9% and 10.4%, respectively, of the core funds. The team feels that to accomplish the terms of the contract, there will need to be a reallocation of funds and activities among the prime contractor and the sub-contractors. Recommendations on restructuring can be found in Section 4 of the main report.

Section 2. Summary of previous evaluation

The two previous projects (No. 931-0930 and 931-0206) were reviewed in June and September, 1985, respectively. The current project has not been able to effectively respond to two of the major previous issues: lack of networking and lack of follow-up and analysis of project outputs to measure impact and effectiveness.

Section 3. Evaluation of Project

3.1. Technical Assistance

Based on documents available to this review team and on personal knowledge of team members, there appears to be a serious conflict between the project descriptions and the accepted philosophy of IPM, which emphasizes the ecological basis of pest control, the minimization of the need for pesticides and stresses non-chemical controls and the careful integration of chemicals to prevent interference with natural controls. In addition, core funding of the original proposal has been reduced by cost cutting adjustments. It appears that core staff and activities include little of the original IPM focus.

The project needs to develop a comprehensive outreach program to mission and bureau staff personnel. The AID funding strategy is to require buy-in support and purchase order agreements to sustain IPM activity. This will not be successful unless missions are aware of CICP capability and activity. More core funding for networking activity and travel to locations needing IPM input is essential.

CICP must expand its consulting base and provide better institutional support for consultants which will ensure higher quality performance and that CICP gets credit for its activity.

CICP needs to develop a close link to other AID-funded IPM projects, particularly the Post-harvest Grain Systems/R&D, and Pre/Post-harvest Rodent/Bird Control/R&D. The CICP integrated pest management project looks at environmental safe strategies to control pests during the growing period. The Rodent/Bird Control project deals with protection during harvest and the Post-harvest System deals with protection during storage. As far as a third world subsistence farmer is concerned, this is the same activity over successive time periods. CICP needs to develop methodology which demonstrates crop protection throughout the crop production, utilization time frame in order to have credibility in developing countries.

CICP appears to have no method to evaluate its performance. This was also a clearly stated problem in the 1985 review and no steps have been taken to correct it. Methods of evaluation should be developed and implemented.

The ecological assessment aspect of the project is an area that CICP has excelled in and which could be expanded with confidence of measurable impact.

CICP, or an organization like it, is essential if AID is to carry out its mandate to support IPM as a component of Crop Protection Programs. Pesticide management and IPM do not share the same philosophical bases as does biological control and pest management. The continuous emphasis and predisposition toward the use of pesticides is not an effective way to build IPM programs. CICP may not be the best vehicle to provide pesticide training, pesticide research and pesticide technical assistance for international programs preconceived to use pesticides. However, CICP is the correct vehicle to provide assistance in IPM (the ecological basis for pest control, non-chemical control and the integration of pesticides with natural control factors).

3.2. Training

CICP sponsors training through seminars, workshops, short courses, etc. on all aspects of IPM for strengthening capacities of developing countries to carry out improved pest and pesticide management and for promoting IPM concepts in LDC institutions. Training projects have been funded mostly through a buy-in procedure or by purchase orders. A problem has been that the overhead paid on these activities is passed through to subcontractors and does not provide for administrative costs incurred by CICP Headquarters. The review team feels that it is necessary to restructure overhead distribution to provide for CICP Headquarters activities.

CICP has conducted 34 courses and workshops in training in the 1985-88 period involving some 1,153 participants. Eight of these focused solely on pesticide issues and 26 dealt with broader IPM-related issues. The training activity appears to be good to excellent by western standards but we cannot evaluate the impact of training due to the lack of follow-up.

The review team was pleased to note that CICP has effected a Memorandum of Understanding with the International Center of Insect Physiology and Ecology (ICIPE) for collaboration in training as well as research. More of this type of collaboration should be beneficial to this IPM/EP project. In addition, the review team believes that non-governmental organizations (NGOs) could be used more effectively by CICP in the conduct of training.

3.3. Research

Research activity has been very meager in view of what is called for in the contract. Some short-term research has been supported but there has been little commitment to long-term research. This neglect of the research component of the project brings into question contract compliance. The review team was not given any explanation as to what was reduced when the budget was cut. By default, it appears to have been research. Mission buy-ins have included very little emphasis on IPM or on site-specific research.

The project scope of work should place more emphasis on non-chemical control methodologies. Biological control and host plant resistance are two areas where CICP could expand and provide a strong communication link through networks to national programs.

3.4. Networking/Communications

The contract required a number of network activities to be accomplished; such as setting up IPM research networks which would use information on local cropping systems and knowledge of the local farmers as well as emphasizing the development of systems that maximize natural control factors and minimize the need for outside inputs, such as agrichemicals. Work on the biology and ecology of plants and pests and their natural enemies, on how to calculate critical periods in crop development and develop economic thresholds for such periods was also expected.

Networking and communication in CICP are very weak and underdeveloped. This is reflected in the three other core elements of the project to such an extent that it may not be in compliance with the contract. INFOLETTER has not been an effective

forum for networking. INFOLETTER should come under the direct control of the Director of the project.

3.5. Impact on Target Population

The target population of this project is a diverse group at many levels of technological development. Some are capable of using modern IPM techniques involving pesticides, other totally incapable of wisely using pesticides. Culturally adapted IPM methods must be the prime concern for evaluating CICIP output. However, it is clear to this review team that to reach these target populations, CICIP must work through the intellectual filter of bureau and mission staffs. Therefore, the interim target population of networking activity concerning IPM should be AID staff. We recognize this now because it is the mission staff, through funded buy-ins, that is driving the output of CICIP, not the cognitive learned response of American universities. Proper networking of IPM philosophy and techniques using NGOs and long-term university training would also assist in moving missions and host countries toward use of non-chemical methodology as part of an ecologically sound basis for sustainable food production.

3.6. Organizational Issues

It is assumed by the panel that CICIP, within the terms of its principle contract, should be a responsive organization to the American universities it represents and to USAID missions and host countries that require IPM information. CICIP therefore should provide an effective link for IPM information to flow between its member institutions and third world plant protection programs. The current organization is not functioning in this capacity and internal communication has broken down between the prime contractor and the largest subcontractor. Communication with member institutions is also not functioning well and only a small subset of potential participants are asked to assist. Reorganization and redistribution of activities and resources are essential if CICIP is to satisfactorily comply with terms of the contract. The activity of CICIP to USAID plant protection activity is crucial if AID is to avoid the pesticide treadmill for underdeveloped nations and planning should start immediately with AID for how it will receive this input after termination of this contract in 1990.

SECTION 1.

INTRODUCTION AND BACKGROUND

1.1. Summary Scope of Work

The purpose of this evaluation is to carry out a comprehensive technical and performance review of the implementation of Contract DAN-4142-C-00-5122-00, Project Number 936-4142, between the Agency for International Development (A.I.D.) and the Consortium for International Crop Protection (CICP).

The evaluation team is (1) to determine the capability of the contractor to carry out the various elements stated in the contract and (2) to determine the effectiveness of the contractor in carrying out the required work in the areas of technical assistance, research, training and networking/communications. See annex A for the complete scope of work of the present evaluation.

The evaluation team members include:

Dr. Anson R. Bertrand, Team Leader
Dr. Dean L. Haynes, Entomologist
Dr. Michael Hansen, Ecologist
Dr. Ernest P. Imle, Plant Pathologist
Dr. Katherine Reichelderfer, Agricultural Economist

1.2. Methodology

The members of the evaluation team met at 9:00 a.m. on October 11, 1988 at the Headquarters of the Consortium for International Crop Protection (CICP) in College Park, Maryland. During the period October 11-13 the team held discussions and reviewed documents at the CICP headquarters. Persons interviewed included the CICP Director, the Administrative Assistant, the CICP Core Staff member who resides in College Park Md., the AID Project Manager and Assistant Manager, the Deputy Project Manager, the Networking/Communications Specialist, and the Sub-contractors from the University of Miami and the University of Florida. The Deputy Project Manager and the Networking/Communications Specialist are both located at Oregon State University.

On October 14 the team met at the S&T/AGR office to continue examining documents, begin to develop the report and to meet with representatives of the AID Regional Bureaus. Unfortunately, no one from the Regional Bureaus could meet with the team even though arrangements for such meetings had been made previously.

To gain first hand knowledge of the project activities at Oregon State University, the team leader spent October 25th at Oregon State University examining the documents, interviewing University personnel and persons directly involved in this project.

The review team met on November 1-3, 1988 to get the report of the team leader's visit to Oregon State University and to prepare this report.

The review team had a conference call with the Chairman of the Board of Directors of CACP to discuss Board policies and operating mode and to share observations concerning the IPM/EP project.

1.3. Project Description

1.3.1. Relevant History

The inadequate systems of crop protection in most developing countries dim the prospect for self sufficiency in food and agricultural production. AID/S&T/AGR, prior to 1985, had several projects aimed at providing support in the form of technology, research, training and networking to those developing countries needing assistance. Project No. 931-0930, Pest Management and Related Environmental Management, was carried out by the Consortium for International Crop Protection (CACP) at the University of California, Berkeley. Weed control work was carried out by the International Plant Protection Center (IPPC) at Oregon State University. Post harvest grain systems work (Project No. 936-4144) was carried out at Kansas State University. The Denver Wildlife Foundation carried out the vertebrate pest management work under Project No. 936-4173. A unit at North Carolina State University carried out the crop nematode research and development work under Project No. 936-4149. Storage and processing of fruits and vegetables was carried out at the University of Idaho under Project No. 931-1323. Projects No. 936-4144, 936-4173 and 931-1323 are still being carried out as independent projects by the institutions indicated above. Also S&T/AGR funds a project on tick control at ICIPE and the African Bureau funds a project on host plant resistance at ICIPE.

The current project, Integrated Pest Management and Environmental Protection (Project No. 936-4142), began October 1, 1985 with CACP as the contractor. The planners of this project felt that consolidation of existing pest and pesticide management technologies into an integrated pest management and environmental protection project offered the most cost effective and environmentally sound way to increase food supplies in developing countries. As stated in the contract "employing broad combinations of biological, cultural, mechanical, and chemical technologies, specifically designed for application to a particular pest situation; IPM which considers the pest complex, the crop being protected and the resources available provides the flexibility necessary to achieve the economical and long-lasting solutions to LDC crop protection considered critical to development of agricultural production." Project No. 936-4142 combines the features of three of the prior projects (Projects No. 931-0930, 932-0206 and 936-4149). Since weeds and nematodes are classified as plant pests in a similar fashion as are insects, plant pathogens, birds, rodents, snails, slugs and other organisms that adversely affect crop plants, joining the efforts of the weed and nematode projects into one major project conducted by CACP was deemed advisable by AID to eliminate redundancy and increase the effectiveness within the overall context of IPM. The IPM/EP project does not include livestock IPM, therefore, it is not considered in this report.

Funding for Project No. 936-4142 began October 1, 1985. The contract terminates September 30, 1990. Funding for the project has been less than originally projected. The expected funding level for the five-year life of the contract was \$8,625,000, however, only \$2,031,000 has been authorized for the first 39 months of the expected 60 month contract period. This reduced level of funding has greatly curtailed activities and reduced the potential and actual effectiveness of this project.

1.3.2. Purpose and Objectives

The purpose of this project is to help developing countries improve their capabilities to cope with plant pests in an affordable and environmentally safe manner.

The overall objective is to develop the capabilities of developing countries in the areas of pest and pesticide management including the implementation of integrated pest management systems, to facilitate environmental protection and improvement.

Specific objectives are to:

- a) Improve the capabilities of developing countries to conduct research and training related to IPM.
- b) To facilitate networks of scientists and practitioners.

1.3.3. Implementation

Project No. 936-4142 was designed to capture and utilize the available expertise in U.S. institutions, mostly universities. It requires a prime contractor who has overall responsibility for conduct of the project activities. The activities are carried out by the contractor through use of Core Staff and through sub-contracts for expertise not available in the Core Staff. The project planners anticipated that the project would be funded at a level that would permit activities in research, training, technical support and networking to be carried on with Central Bureau funding. Unfortunately, funding has not been adequate to permit as much of this type of activity as was originally anticipated. The project was designed with the expectation that the contractor would take buy-ins and purchase orders from AID missions and Host Countries. To date, funding through these mechanisms has exceeded that from the Central Bureau.

Implementation of this project requires the Contractor to perform the following tasks:

1.3.3.1. Technical Assistance

Provide short-term (less than 30 days) expertise for project related activities and specific crop protection or pesticide management problems which might arise in an LDC, including but not limited to:

- i) Assist in the development of the crop protection component of new agricultural production, research and extension projects;

- ii) Provide resource support and technical backstopping (on-site) support for crop-protection from pests;
- iii) Assist in the development of regional and national integrated pest management projects;
- iv) Establish linkages with national research institutions and assist with local currency funded projects;
- v) Prepare environmental assessments as needed;
- vi) Provide assistance in design, modification, and evaluation of national pesticide regulatory systems;
- vii) Provide chemical analysis of pesticide residues;
- viii) Assist in developing quality control programs and procedures for LDC laboratories.

1.3.3.2. Training

Conduct a variety of training to strengthen the capacity of developing countries to perform improved pest and pesticide management while institutionalizing the concepts of IPM.

Types of training activities include the following:

- i) Seminars and workshops
- ii) Crop protection short courses
- iii) Pesticide residue and formulation analysis
- iv) Graduate training (long-term)
- v) Pesticide safety

1.3.3.3. Research

The contractor is to identify and implement research activities designed to strength pest and pesticide management capabilities and implementation of IPM programs in developing countries.

1.3.3.4. Networking

The contractor is to foster the establishment of research networks on pest and pesticide management which is carried out in the IPM mode.

Types of activities include the following:

- i) Collaborating with on-going regional activities and existing research networks;
- ii) Conduct regional workshops to identify research needs;
- iii) Collect, publish and disseminate technical information on IPM and environmental protection;

- iv) Periodically publish an international newsletter covering topical aspects of IPM;
- v) Conduct research planning conferences to organize and assist with regional and national research efforts.

1.3.4. Roles of Participants

1.3.4.1. CICP

CICP was selected as the prime contractor because of its long history of effective work in IPM for AID and because it has among its membership 14 U.S. Institutions with considerable capability to contribute IPM component technology, training and research and it can and does acquire other expertise as needed from an even larger set of resources.

1.3.4.2. IPPC

IPPC is the U.S. University based organization with the longest history of extensive involvement and commitment to international weed control activities. Therefore it was designated as the primary source of expertise in weed control for the project. Also, IPPC had capabilities and expertise in training and networking/communications, therefore IPPC was chosen as the sub-contractor to take primary responsibility for these two activities in the project. For the period October 1, 1985 - December 31, 1988, the fund allocation for this activity has been \$946,048.

1.3.4.3. Nematode Project

The Crop Nematode Research and Development Project (Project No. 936-4149) had been S&T/AGR's primary project dealing with nematodes for several years. It was decided that this activity at North Carolina State University (NCSU) should continue after 1987 as a sub-project with CICP to provide the nematode expertise needed in the IPM approach being used in this project. The fund allocation for this sub-project for the period January 1, 1988 to December 31, 1988 was \$85,000.

1.3.4.4. Other sub-contractors

Other sub-contractors which provided inputs to this project are:

- i) A sub-contract was effected with the University of Maryland to provide the project manager, secretary, technical support coordinator, and much of the entomological expertise required. This activity will utilize \$465,000 of core funds for the period October 1, 1985 - December 31, 1988.
- ii) The University of Miami has an excellent laboratory for analytical work on pesticides. A sub-contract with this facility has provided pesticide analysis and training, utilizing \$211,271 of core funds through December 31, 1988.

- iii) The University of California, Berkeley, has provided administrative support and accounting services for CICIP and for this project using \$233,481, as of December 31, 1988.
- iv) A sub-contract between CICIP and the University of Minnesota has provided the services of a Plant Pathologist who has been very effective in support of this project. This sub-contract was shifted to IRRRI during 1987-1988 because the person involved was at IRRRI for one year and will be shifted to the University of Hawaii because the person involved will be taking a permanent position at that University. This activity utilized \$78,200 of core funds.
- v) Individual experts are utilized from time to time to supplement core staff in carrying out activities.

1.3.5. Project Funding

USAID's funding for this project has been much less than originally planned. Only \$2,031,000 has been provided during the first 39 months of the project. If funding continues at the rate it has been during the first 39 months, the five-year project will be funded at only \$3,124,620 instead of \$8,625,000 as originally intended. This level of funding by the Central Bureau of AID will provide only 36.23% of the intended level of funding for core activities. It is apparent that this level of funding has not been sufficient to permit the contractor to be innovative and carry out many of the activities originally envisioned for this project. AID did not provide the Contractor guidance as to which activities to reduce.

This project has been very successful in securing buy-ins for special activities desired by the AID Missions and Host Countries. To date, \$2,211,869 have been acquired by CICIP through buy-ins. This represents 44 separate activities in all three AID regions.

Table I shows the project budget for the period October 1, 1985 - December 31, 1988. This table shows that funds available to the project from buy-ins exceeds that from the Central Bureau. Further analysis of the buy-ins reveals that they have grown each year since the inception of this project. Buy-ins amounted to \$407,506, \$568, 907 and \$1,235,456 in 1986, 1987, and 1988. This has been a rapid rate of growth, but given the reduced budgets throughout AID, it cannot be expected to continue to grow at the same rate. Table I also indicated the individual or organization that carried out the work for each buy-in. Table II shows similar data for the purchase orders.¹ Table III is presented to illustrate how funds derived from buy-ins were used. Table IV shows the level of effort resulting from use of project funds.

The distribution of core funds between CICIP members that have been active in this project is shown in Table I. It is important to note that 47% of the core funds have gone to IPPC to support work in weed management, training

¹Elsewhere in this report buy-ins and purchase orders are considered as buy-ins because purchase orders as reported in Table II are in reality just small buy-ins.

coordination, socio-economics and networking/communications. The use made of these funds is shown in Table V. Table VI shows the technical personnel involved in the project and the percentage of time devoted to project activities.

Table I.

September 30, 1988

PPM PROJECT BUDGET

October 1, 1985 -- December 31, 1988

Core Budget from AID/ST/AGR		
Subcontractors:		
Oregon	\$946,048	
Maryland	465,550	
Miami	211,271	
California	133,481	
Minnesota	45,000	
IRRI (To Aug. 1988)	33,200	
North Carolina	86,000	\$1,920,550
Total Subcontractors		<u>110,450</u>
CICP Headquarters		
Core Budget:		
Oct. 1 1985 - Mar. 4, 1987	950,00	
Mar. 5, 1987 - Jan. 15, 1988	475,000	
Jan. 15, 1988 - Dec. 26, 1988	606,000	
Total Core Funding		\$2,031,000
Buy-ins to Date		
1. Grenada - Bottrell	90,000	
2. AID/ANE - Jensen/Steinhauer	37,000	
3. Burkina - Steinhauer	20,888	
4. Peru - Irwin/Steinhauer (includes \$12,068 Illinois subcontract)	51,588	
5. Mali - Collier	41,746	
6. AID/OFDA (Locust) - Steinhauer	131,383	
7. W. Samoa & Thailand - Collier	34,901	
8. ROCAP - Steinhauer (includes \$162,152 Maryland subcontract)	298,077	
9. Senegal (Locust) - Steinhauer (includes \$42,940 NMSU subcontract)	192,608	
10. Panama - Shenk (Oregon subcontract)	24,000	
11. AID/LAC (Bont Tick) - Steinhauer	29,171	
12. Chad - Steinhauer	25,051	
13. AFR/OFDA - Prog EA - Steinhauer	150,278	
14. LAC-Guat Medfly - Bottrell	257,500	
15. AFR/OFDA - Econ Analysis (IPPC)	295,890	
16. AFR-NEEM Project (Minn/AFGRO)	256,695	
17. Morocco Locust Control	30,000	
18. Dominican Republic EA	35,789	
19. Morocco Tech Asst. - Steinhauer	49,818	
20. Morocco Training - Steinhauer	13,531	
21. El Salvador EA - Bottrell	59,815	
22. Guatemala EA - Bottrell	80,140	
Total Buy-ins		\$2,211,869
Total Core Budget and Buy-ins to Date		\$4,242,869

Table No. II

June 20, 1988

PPM PROJECT

USAID PURCHASE ORDER ACTIVITY/OTHER CONTRACTS
(Technical Backstopping : CICIP Headquarters)

Mission/Consultant	Dates	Amount	Specifically Requested
1. Jamaica - Barfield	7/6-7/16/6	\$ 6,693	Bottrell
2. Haiti - Cusson	7/8 - 7/22/6	6,019	French Speaker
3. Belize - Schaefers	7/13-7/25/6	7,712	Bottrell
4. Sudan - Schaefers	8/8 - 9/14/6	24,948	Schaefers
5. Burkina - Bartholf	8/8 - 10/28/6	28,439	Bartholf
6. Senegal - Philips	8/8 - 9/28/6	30,671	Philips
7. Senegal - Edwards & Huddleston	9/29 - 10/31/6	46,550	CICP Hdqtrs
8. Senegal - Schaefers	10/14-10/26/6	9,600	CICP Hdqtrs
9. Burkina - Paschke	10/28-11/22/6	11,214	Bottrell, Dively, Franklin, Paschke
10. Haiti -- Hellman	11/9-11/14/6	3,781	CICP Hdqtrs
11. Gambia, Senegal & Mauritania - Overholt	11/6-12/1/6	10,825	CICP Hdqtrs
12. Nepal - Klarman	1/20-2/13/7	13,468	CICP Hdqtrs
13. Haiti - Tourigny	2/16-4/1/7	15,827	Cusson
14. Niger - Sanderson	5/16-5/24/7	5,405	Sanderson
15. Sudan, Ethiopia, Somalia	5/28-7/4/7	16,096	Jensen
16. Mali/Sudan - Dynamac	7/87-4/88	200,000	CICP Hdqtrs
17. Sudan/FAO - Mann & Pinto	6/87-11/87	69,500	Bottrell
18. Dom. Repub. - Bottrell	1/4-1/8/8	3,493	Bottrell
19. Egypt - CID/NARP - Steinhauer		11,000	Bottrell
20. Jamaica - Barfield	4/15-4/24/8	12,954	Barfield
21. Tunisia - Hemming	4/1-4/22/8	9,473	CICP Hdqtrs
22. Morocco - Cavin	3/15-3/22/8	4,318	Cavin
TOTAL TO DATE		\$547,986	

Table No. III

Use of Funds from Selected Buy-ins

	AFR/OFDA EA	Senegal TA Locust	AFR Neem Proj.	AFR/OFDA Locust	Chad Bont Tick
Total Funds	\$156,278	192,608	195,678	131,400	29,171
Consultant	84	77	18.6	58	12.2
Fringe Bene.	0	5.8	3.7	0	0
Travel	36.7	70.2	63.7	46	11.1
Other Direct Costs	9.4	5.6	14.3	5	1.0
Indirect Costs	26.0	33.0	15.0	21.9	4.8
Misc.	0	0	14.7	0	0
Salary	0	0	65.8	0	0

Table IV.

Summary of Level of Effort (Person-Months)

Personnel Component	Activity Component				
	Research	Technical Assistance	Training	Networking	TOTAL
For Report Year, Oct. 86 - Sept. 87					
Project Technical Staff	9.3	23.25	19.45	16.03	68.03
Consultants	16.9	52.40	8.60	0.50	78.40
Support Staff	---	---	---	---	47.40*
				TOTAL	193.83
Cumulative from Project Inception, Oct. 85 - Sept. 87					
Project Technical Staff	18.2	43.30	50.15	45.63	157.23
Consultants	16.9	71.85	11.65	0.50	100.90
Support Staff	---	---	---	---	86.40
				TOTAL	344.53

*Support Staff:	CICP Hdqtrs	24.0
	IPPC	20.5
	UMI	2.5
	Neem Project	<u>.4</u>
	Total	47.4

Table V.

**Historical Statement of Account
IPPC/CICP Subcontract Account #30-262-7335
(Buy-ins not included)**

Category	Original Contract 10/85 - 9/86 12 months	Revision to Original 10/85 - 2/87 17 months	Amendment No. 1 3/87 - 12/87 10 months	Amendment No. 3 01/88 - 12/88 12 months	Accumulative Total
Salaries	173,360	69,000	108,428 ¹	119,560	470,348
OPE	54,385	22,588	33,430	37,596	147,999
Services & Supplies					
Services	13,700	2,181	19,282	23,244	66,907
Supplies	4,000				
Communications	4,500				
Travel	34,000	-29,000	5,000	5,000	15,000
Equipment	2,000	-2,000	0	0	0
Indirect Costs	96,541	22,022	60,487	66,744	245,794
TOTAL PER CONTRACT PERIOD	382,486	84,791 467,277²	226,627	252,144	946,048
Total Per Month	31,874	27,487	22,662	21,012	
Total Per FTE	9,107	7,853	8,650	8,082	

¹Weed Scientist position reduced from 1.0 to .5 FTE, Communications Specialist reduced from 1.0 to .7 FTE, Training Coordinator reduced from 1.0 to .9 FTE, and Word Processing Specialist position (1.0 FTE) eliminated.

²Total amount received for initial contract period.

Table VI.

Project Technical Personnel (FTE core funded, as of 9-30-87)

Name	Institution	Position	FTE
A.L. Steinhauer	UMCP	PPM Project Director, UMCP entomologist	0.5
S.F. Miller	IPPC/OSU	PPM Project Deputy Director, IPPC Director, agr. economist	0.5
M.D. Shenk	IPPC/OSU	PPM Training Coordinator, IPPC weed scientist	0.9
J.B. Mann	UMI	Pesticide Residue Chemist	0.75
A.E. Deutsch	IPPC/OSU	PPM and IPPC Communication/Networking Coordinator	0.7
D.G. Bottrell	UMCP	PPM Technical Assistance Coordinator, UMCP entomologist	0.5
A. Chiri	UMCP/ROCAP	Regional Pest Management Specialist	0.5
A.S. Cooper	IPPC/OSU	Weed Scientist/Computer Specialist	0.5
P.S. Teng	UMN/IRRI	PPM Research Coordinator, IRRI plant pathologist	0.29

SECTION 2.

SUMMARY OF PREVIOUS EVALUATIONS

The present project, IPM and Environmental Protection (936-4142), which began in 1985, resulted from the combination of two previous projects, the Pest Management and Related Environmental Protection (Project 931-0930) and the Weed Control Utilization Project (Project 931-0206). Both of the previous projects were reviewed in 1985 just prior to their combination. This section briefly summarizes the results of the two reviews.

The review of the project awarded to the Consortium for International Crop Protection (CICP), Pest Management and Related Environmental Protection, took place in June, 1985. The review focused on six major areas: overall quality of the project, follow-up and evaluation, availability and use of resources, communications, library, and full-time crop protection specialists. The review, while praising CICP's role in the dissemination of IPM and related information to scientists in developing countries, concluded that the project has lots of potential but that the reviewers could not judge the quality of its work due to a lack of information from the field on the effectiveness of CICP-sponsored programs -- either technical assistance trips or seminar/workshops. This criticism was elaborated on in the discussion of follow-up and evaluation, or, rather, the almost complete lack thereof. The review stated that "No systematic follow-up or evaluation of these activities [technical assistance trips or seminar/workshops] appears to have occurred as part of the CICP project"; there only appears to have been only anecdotal evidence. After noting that "It is difficult if not impossible for an outside panel to assess the quality of a project with the size and scope of this one without some documentary evidence of the project's ... effectiveness", the reviewers stated that "it is essential that AID build in, and fund, the capability for evaluation of specific activities such as technical assistance consultations and training workshops".

As for the availability and use of resources, the review found that a small number of individuals were actually involved in CICP activities and that these people were used over and over. The review criticized CICP for being composed of an apparently self-selected group of scientists and recommended that CICP actively recruit new scientists. CICP was also criticized for not making use of the potential resources available from their member universities. The review noted that all 13 member universities have active programs for training students from Third World countries and that most of these universities have international programs with an active presence in Third World countries. In spite of this, CICP apparently did not make use of the Third World students in its activities and did not coordinate or even communicate with the international programs. Furthermore, the review noted that part of the reason for the small number of people actively involved in CICP programs is the difficulty in finding scientists with the appropriate language skills. The review stated that CICP should both actively seek out scientist with the appropriate language skills and should encourage scientists with the appropriate technical skills to take short language courses to enable them to be involved with CICP programs.

As for communications, the review made three points. First, CICP should add a professional editor "to ensure a consistently high quality of contract-related publications". Second, the newsletter "Pest Management News" is considered to be

a valuable, and highly regarded, information source on IPM and should not have been shut down due to lack of personnel. The review concluded that the newsletter should be resumed but that a professional editor should produce and edit it rather than a full-time crop protection specialist, as had previously been the case. Third, public dissemination of CACP work to those in developing countries that need the output was highly desirable but many CACP-sponsored publications were not widely distributed, in part due to a lack of funds. The review "recommended that every effort be made to insure that future AID-sponsored IPM projects are allowed to disseminate project-generated information widely".

As for the library, the review concluded that CACP's library serves a crucial function as a reference library for international pest and pesticide management material and must be saved. More money is needed to hire a professional librarian to maintain, as well as upgrade, it.

The review of the project awarded to IPPC, Weed Control Utilization Project, was conducted in September, 1985. The review, after detailing the background of the project and describing IPPC and its activities, discussed IPPC's response to the seven recommendations made by the team that reviewed the project in 1981. Next, the progress made by the project was discussed. While many students were trained in various countries in short courses or were enrolled in a weed science program at Oregon State University, the review noted that "a formal follow-up program does not exist", meaning that little attempt was made to maintain in contact with these students. Some attempt was made to assess the impact of the project's activities, however. Studies done in Costa Rica and Nicaragua demonstrated a high degree of acceptance of various weed control technologies. Other topics addressed in this part of the review included technical assistance, project publications, social and economic impact of weed control technologies, benefits to developing countries and AID of IPPC activities, linkages with other international organization concerned with weeds, funding, networking, the impact of IPPC work on both government policy and the adoption of certain weed control techniques, and the need for continuing project-funded graduate training programs.

The review made six recommendations. First, that IPPC should consider narrowing its focus to those topics and geographical areas of the world in which it has been most successful. Thus, technical assistance should stress short courses and training in research methodologies, graduate student training should continue and future project should emphasize Latin countries. Second, eliminate work on aquatic weeds and concentrate on terrestrial weed problems. Third, broaden the funding base and stabilize staff structure. Stabilization entails seeking tenured position for IPPC personnel, closer linkages with various OSU programs, increased publication in peer-reviewed journals of project research and seeking both closer ties to and more financial support from the Office of International Agriculture at OSU. Fourth, broaden and expand networking capabilities by expanding the INFOLETTER, serving as a clearinghouse to identify appropriate U.S. scientists for future projects involving technical assistance and maintaining and increasing linkages with various international agencies interested in weed control. Fifth, "expand and improve evaluations of the impact of IPPC programs on economic and social conditions in developing countries", paying particular attention to the issue of the social effect of labor displacement due to the introduction of "improved weed control technologies". Sixth, make the technical material in IPPC's library more widely available, in part through coordination with the USDA/National Agricultural Library and the Agricultural Information Exchange Service/AID.

SECTION 3. EVALUATION OF THE PROJECT

3.1. Technical Assistance

A major activity required by the contract is to provide technical assistance to the missions and host countries.

3.1.1. Program Purpose

Based on documents available to the review team and on personal knowledge of some team members, there appears to be conflict between the project description and the accepted definition of IPM. The activity data sheet for this project, included in the ABS, offers the following purpose: "To provide missions and regional bureaus with a comprehensive multidisciplinary capability in pest and pesticide management." The background statement supporting this purpose appears to give much more emphasis to weeds and the needs associated with pesticide use than with the promotion of ecologically sound pest management. For example, the final and what appears to be the non-historical guidance statement for supporting the project is as follows: "The project will provide a balanced combination of sound research and technical development; foster and accelerate appropriate training for LDC agricultural educators, extension and research technicians, private sector employees and Peace Corps volunteers; on pest and pesticide management." This implied emphasis on pesticide use is not consistent with the spirit of IPM which emphasizes non-chemical control and careful integration of chemicals into control procedures to prevent interference with natural controls. On the other hand, the contract document itself does not project this reliance on pesticides. The contract states: "by employing broad combinations of biological control, mechanical, and chemical technologies, specifically designed for application to a particular pest situation, integrated pest management, in considering the pest complex, the crop being protected, and resources available will provide the flexibility necessary to achieve the economical and long-lasting solutions to LDC crop protection considered critical to the development of agricultural production."

As stated previously, the project description and the project data sheet give very little emphasis to non-chemical pest control and appears to project a bias toward the use of pesticides. The apparent emphasis on pesticides, when viewed against the historical commitment of IPM to pest ecology, has produced an unintelligible purpose for this project that does not serve its accomplishment or goal. It should be made clear, in revised project description documents, that this project does not advocate the use of pesticides when they are not used already and that it advocates reduction in their use where possible. This is compatible with recent AID policy statements and should be promulgated. The lack of a clearly stated purpose for this project prevents CICP, IPPC and project management from promulgating common goals and objectives of the major elements of this project.

3.1.2. Methodology

Core funding for this project has been reduced several times as described elsewhere in this report. It appears that the activities include little of the original plan. Project funding resulting from mission buy-ins for individual technical support activities is the primary method used to initiate and carry out new project activity. The project does not have its own particular approach, but reacts to needs and requests from bureaus and missions. Without core funding sufficient to permit the contractor to contact bureaus, missions and host countries directly, requests often are after-the-fact situations.

The two environmental assessments reviewed were well done and would have been very useful if they had been prepared before action was taken.

The methods used to provide training were reviewed at IPPC and judged to be very good. The methods proposed for use by the sub-contractor at the University of Florida appears to be excellent; however, this work is only partially the result of this project. The review team did not have the benefit of responses from those who received training.

Very little research is under way. IPPC is using computer modeling, on the grasshopper-locust research project. A research network does not exist.

A series of reports that demonstrate that CICP can perform rapidly and effectively to meet the needs of IPM related programs was made available to the team during the review. The reports all dealt with pesticide use and had little to offer in the way of IPM. They were:

- a) Recommendations and Executive Summary of the South Asian Pesticide Management and IPM Workshop. February 23-27, 1987.
- b) African Grasshopper and Locust Pesticide Testing Project. July-September, 1987.
- c) Environmental Assessment for the Targeted Watershed Management Project and Assessment of Need for Pesticide Use in the Agroforestry Outreach Project. October, 1986.

For example in c above, the study is well done and carries the disclaimer at the beginning that "It is unrealistic to expect the average Haitian peasant to use pesticides properly, or in many cases, to use pesticides at all." Near the end of this report it is indicated that this deficiency can be overcome by offering a one day course on application, handling and disposal of pesticides to PVO technicians. This report addresses the need for pesticides and also the perceived inability for the ultimate recipient to use IPM technology which minimizes pesticide usage. This conceptual conflict between solutions from the developed countries and false assumptions about host country farmers' ability is common within these reports. The rationale is as false as the solution, which simply requires more training for pesticide utilization. The problem lies with perceptions in AID and CICP. AID, working through CICP and others is obligated to provide culturally-adapted pest control recommendations. This and the other reports fall short of providing true IPM support to the missions and host countries.

CICP has told the review team that they would like to work more on non-chemical control activities. It is clear that the current system of buy-ins to this project will largely prevent this. One might logically ask, is CICP the most appropriate organization to carry out a project which emphasizes pesticide use. This question is especially relevant, given the reduction in funding and the direction that the buy-ins are driving project activity.

Other reports reviewed were:

- d) Study of Pesticide Waste Sites and Disposal of Absolute Pesticide Stocks in Thailand and Western Samoa. September, 1986.

In this report a strong presentation is made about not being able to use pesticides in a safe manner in Thailand, but the only solution offered was more training, which implies continued use of pesticides.

Similar conclusions were in the following reports:

- e) Environmental Assessment and Analysis of Pesticide Use in Agricultural Research Projects in Jamaica. October 1986.
- f) Training program in IPM and Pesticide Management in Jamaica. July 1986.
- g) Reducing Costs and Increasing Efficiency of Natural Crop Production Programs in Grenada. February 1987.

In report g above, only thrips are controlled by non-chemical means. Chemical recommendations are made for all others.

Another report reviewed was, h, Antifeedant Effect of Neem, *Azadirachta indica*, A. Juss, Kernal Extracts on *Kraussaria A:igulifera* (Krauss) (Orthoptera: Acrididae) a Sahelian Grasshopper. June, 1988, Radcliff, et al.

It appears that the project's accomplishments are almost all pesticide related. It is difficult to find much IPM in the program to date.

As stated earlier, the buy-in process is the principal method for CICP to identify and explore technology transfer to national programs. There needs to be a more organized method which allows CICP to work with the mission personnel to increase their awareness of the potential of non-chemical pest control methods. They must know more about IPM if it is to be effectively used in host countries. The usual mission response to pest problems is to turn to pesticides rather than to IPM techniques. This situation can only be changed if CICP can work with mission personnel before the problems arise so that they will recommend and push for IPM in their work with host country counterparts.

The CICP program to secure and provide consultants does not appear to be well organized. The computer consultant list and statement of expertise is not up to date and there does not appear to be a systematic way to update it. A small group of core staff and a few favorite consultants do most of the

technical assistance. No analysis of this was available. It appears that the project is more self-contained than need be.

Evidence that the project (CICP) acts as a broker for U.S. University expertise is missing from all reports and planning documents. A strong role for U.S. Universities, or at least the CICP members, is assumed to exist. The capability does exist, but is not being effectively used.

3.2. Training

3.2.1. Purpose

The purpose of training under the contract for this project is to help LDCs develop and institutionalize integrated pest management. Training under the project is to foster and strength regional and national programs to support sustainable agricultural production systems.

3.2.2. Methodology

Training is accomplished through seminars, workshops, short courses, etc. The project incorporates technical components from Oregon State University, Miami University, North Carolina State University, University of Minnesota and University of Maryland. CICP occasionally calls on staff resources of other Consortium members and non-members.

Training projects to date have been funded mostly through a buy-in procedure or through purchase orders whereby an AID mission and regional office arranges with CICP to buy training services. Most training requests have emphasized pesticide management rather than IPM. CICP procures the necessary specialists; however, occasionally the CICP core staff also acts directly with LDC agencies and others to explore the need for and to plan, develop and conduct training projects.

CICP has plans to hold one major workshop each year but the low level of core funding makes this practically impossible.

3.2.3. Scope

CICP is capable of delivering training in all aspects of IPM for strengthening capacities of LDCs to carry out pest management programs. This capability includes all aspects of crop protection, biological control, weed science, environmental protection. These are all proper subjects for attention in CICP training activities. The heavy emphasis on pesticide training does not result from lack of CICP capacity to deliver IPM related subject matter.

3.2.4. Accomplishments

Based on examination of training materials at CICP and discussions with persons who have delivered the training, the results could be described as good to very good but when weighed against the needs, the results are, in fact, very small and related principally to pesticide utilization.

Although the IPM/EP project has conducted extensive training activities as described below, the need for additional training is great.

Some examples of training activities carried out are:

- Two major training workshops were held in 1985, one in Egypt and one in the Caribbean, the latter in cooperation with the Commonwealth Institute of Biological Control (CIBC).
- A major workshop in Pesticide Management and Integrated Pest Management, organized by CICP and held in 1987 in Thailand, was attended by two hundred delegates from eighteen countries. There were 68 presentations. Twelve major subject areas and problems related to IPM were identified and a Working Group established for each. The emphasis was mainly on training but it also impacted effects for Technical Assistance, Networking and Research.
- Over the first three years of the contract project a total of 1,153 individuals from 45 LDCs received training in a range of Pest and Pesticide Management skills. Most of the training was conducted by project staff with occasional reliance on consultants.
- Under the University of Maryland Sub-contract CICP conducted IPM training in Grenada involving services from IPPC, University of Florida, University of Maryland and University of Illinois. Also, in Grenada a two-week Pesticide Management course was given for 23 participants from Agricultural Ministry and Extension Services. This training was conducted by the training coordinator at IPPC.
- A Pesticide Management course (4 weeks) was given in Panama.
- An International Workshop on Crop Loss Assessment with 63 participants was convened by CICP's Dr. Teng in the Philippine Republic in 1987 with joint funding from FAO, IRRI and GTZ. A Pest Assessment Workshop with 24 participants was held in Malaysia in 1988 with joint funding from FAO and Malaysia. Two other courses are being planned, one for the Philippine Republic and one in Hawaii.
- Under a sub-contract at University of Miami three 3-month training courses were held in Pesticide and Residue analysis at which 8 specialist-students were trained. No long-term graduate training has yet been accomplished. Correction of this deficiency in the project would strength training and research.
- The IPPC conducted 22 courses and workshops in training in the 1985-88 period involving some 623 participants. Seven of these training activities were in Weed Management and Control. The other fifteen were in IPM and Pesticide Safety.
- Through the NCSU sub-contract 14 participants from 8 countries were trained in a 3-week workshop on nematodes. Another course held in 1987 included 3 special participants, one of them from CIAT. Seventeen participants also received individual short-term instructional training with emphasis on screening plants for nematode resistance. Several seminars and workshops also were held outside the U.S. through the NCSU contract -- all had some training components.

3.2.5. Buy-ins

Much of the training conducted by this project has been effected through buy-ins and purchase orders. Most of which are for specific activities. The project's training efforts therefore have been largely to meet locally perceived needs rather than to develop broad knowledge based on which to build lasting IPM and environmental programs in the LDCs. IPM and environmental protection are too important to be left to local interests. Training in these areas should be driven and spurred by initiatives and inputs at the earliest stages from the specialist resources available through CICIP. This points again to a need for CICIP to have a stronger core staffing to support IPM/EP through this project. Adequate funds for core staffing should be provided if the project is to promote IPM/EP to the extent called for in the contract and as recommended in the Report of the Committee on Health and Environment, Feb. 1988.

In responding to the increasing volume of buy-in requests CICIP has built a program of mostly short-term activities -- a situation not favorable for development and implementation of a long-term strategy to meet training needs in IPM and surely not favorable for IPM based research.

Of twenty-two buy-ins in the 86-88 period, ten had training as the sole or principal component. These were held in ten countries of Latin America, Caribbean and Africa with over 580 participants. Several of these projects are ongoing and will involve additional numbers of trainees.

Seven of the twenty-two purchase order activities also held in Latin America, Caribbean and Africa were primarily for training or had training components. We were not given the exact number of trainees involved.

3.2.6. Other Training Resources

The review team believes that N.G.O. staffs could be used more effectively by CICIP in the conduct of training. News releases, TV spots, radio, etc. appear not to have been used by the project. There has not been much cooperation with the International Agriculture Research Centers (IARCs) although a productive collaboration in Central America has been established with Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE). CICIP has hired a full-time IPM specialist headquartered at AID Regional Office for Caribbean Area Planning (ROCAP) in Costa Rica who coordinates pest management specialists, of which there is one located in each of the ROCAP area countries. Part of his time is devoted to training through involvement in workshops, seminars, short courses, etc. and through his close collaboration with the ongoing research and training programs at CATIE.

The review team was pleased to note that CICIP has effected a Memorandum of Understanding (MOU) with the International Center for Insect Physiology and Ecology (ICIPE) for collaboration in training as well as research. More collaboration of this kind should be beneficial to the IPM/EP project.

A grave weakness of the CICIP training efforts is the lack of follow-up to assess value and effectiveness of training given. One needs to know how much was learned and retained? Did it result in any changes in the trainees' actions and

operations? What are the most effective ways to present information to trainees? Except for the University of Florida Sub-contract, no organized efforts have been made to determine the most effective ways of presenting information. Without this follow-up assessment the value of the training effort cannot be known and it must therefore be questioned until this deficiency is corrected.

No long-term graduate training has been done. This needs attention as a goal of CACP; work is to initiate and foster independent research on IPM. Graduate training would benefit all four of the major thrusts of the contract.

Some alternate means for accomplishing training objectives would include purchase of training services from institutions via competitive bids, or contracting with a single university to provide, organize and coordinate all training services. neither alternative is likely to be less costly than the existing university consortium system (CACP). The effectiveness of alternatives cannot be assessed at this time but IPM training needs may be more effectively met by presenting the training in a sustainable agriculture context.

3.3. Research

2.3.1. Scope and Purpose

Research is one of four thrust areas mandated for CACP in the contract. CACP is to identify, implement and backstop research activities to strengthen pest and pesticide management capabilities in the LDCs. The Report of the Committee on Health and Environment (Feb. 18, 1988) emphasizes IPM/EP and calls upon AID to increase research related there to.

3.3.2. Objectives

The objectives are to develop data and information on the biology, ecology and genetics of crops and pests and to carry out applied research in the field aimed at better crop protection in the LDCs through applications of all aspects of IPM.

3.3.3. Accomplishments

Accomplishments resulting from research have been meager in view of what is called for in the contract. Some short-term research has been supported but there has been little long-term commitment for research. The project is being funded at only 36% of its original planned level and research has been at the end of the line as a claimant of staff effort among the four major thrusts. The very limited project activities in research have been mostly short-term and conducted in connection with technical assistance.

Mission and regional offices have presented no long-term research projects in their buy-in requests to the project. Emphasis on research for IPM/EP has been notably inadequate.

Of 22 projects supported under purchase orders, only two had some small research components: Pesticide testing in Mali/Sudan and the residues work by Dr. Mann, University of Miami, done cooperative with the Food and Agriculture Organization (FAO) in Sudan. Only five of 22 buy-ins have had

some small research components. These were: Pesticide residues/Mali; RC CAP Maryland sub-contract: in cooperation with CATIE; Economic Analysis (IPPC) - crop loss, cost benefits in Africa; Neem project in Africa - Univ. Minn.; Morocco/Steinhauer.

CICP cooperated with the Malaysian IPM Committee and the Agricultural University of the Netherlands in research in predicting vegetable disease outbreaks and in studies on pesticide practices of farmers. In the Philippines, there was cooperation in on-farm experiments and surveys of corn borer and other insects and in some research on yield/loss assessments. There has also been some cooperation with FAO in pest impact assessment.

Work on pesticide residue analysis is important and should be tied more into planned research projects in the LDCs. Some research has been involved but potential is good for longer-term significant projects, including research projects related to graduate training.

The research at North Carolina State University (NCSU) in screening crop lines for nematode resistance and simulation modeling has resulted in wide use of their methods by others, including CIP. This CICP sponsored research and testing has potential for a strong contribution to LDC crop protection.

3.3.4. Some IPPC Activities with a Relationship to Research

IPPC submitted to AID a proposal for developing an expert system, simulation model, to assist in the decision making process in locust control in Africa. A contract was awarded by AID in Oct. 1987.

Testing of small sprayers and nozzles, to increase efficiency and reduce amounts of pesticides used and to meet small farmer needs, has continued.

Thesis research on a threatening, fast-spreading tropical weed has raised warnings of its potential to spread into cooler temperate areas (Rottboellia)

A proposal from IPPC has been submitted to the AID Science Advisor for study, in cooperation with University of Khartoum. The research will concern control of Striga using certain legumes species.

Living mulches for weed control have been studied.

An IRRI Entomologist is spending a sabbatical with IPPC to assist in a study of pesticide effects on natural enemies of insects in rice.

A system for channeling more project effort into research might be to designate those resources that are to support the project's research activities. Efforts to "seed" or supplement the research of others rather than to attempt to independently design and conduct research projects could pay great dividends. Another alternative would be to designate a portion of CICP staff for pest management research.

Either alternative may present some advantages over the present near-absence of attention to research. The addition of a full-time staff position might relieve some of the stresses of trying to meet demands of the 4-thrust areas in the contract. On the other hand, reallocation of project staff effort

to allow some to concentrate on research may decrease the number and diversity of project activities.

Through acting as a broker for selected research activities of others, CICIP probably could achieve more IPM/EP research than at present. It also could raise the CICIP image, helping to attract support and benefit networking.

Very great opportunities exist and can be developed for IPM/EP research in pathology. CICIP could be very effective in raising awareness and in assisting others in developing this area that has enormous potential for pay-off.

3.4. Networking/communications

3.4.1. Program purpose

Networking/communications was among the four core areas in the project. The Project design Summary Logical frame contains little explicit reference to networking except to say that 3 regional crop protection research networks will be established and that 4 research planning conferences will be held. According to the Project contract, the major purpose of the networking component was to "actively foster the establishment and growth of research networks on pest and pesticide management". Such a network should get developing country scientists to interact with each other and to gain the capability "to develop and supplement economically efficient, socially acceptable, and environmentally sound programs in pest and pesticide management" i.e. to develop integrated pest management systems. This is the ultimate focus/goal of the networking and communications work.

The contract dictated a number of actions to be undertaken to help accomplish the setting up of the research networks: regional workshops, an information and communication service and research planning conferences. Regional workshops (at least three of them), which would emphasize close interactions among developing country researchers, were to be held. The information and communication service would undertake two tasks: maintain an up-to-date collection of technical literature of use to Third World researchers as well as publish and distribute quarterly an "international newsletter covering topical aspects of integrated pest management". The project would also sponsor and organize national and regional pest management research planning conferences in order to disseminate information on state-of-the-art research activities.

3.4.2. Methodology

To achieve the goals of the networking/communication work, the project produces newsletters, holds workshops on IPM-related topics, presents material at technical meetings, and produces reports, books and other written material.

Before discussing the pros and cons as well as the effectiveness of these various products, it should be mentioned that the networking/communications part of the project was the responsibility of IPPC/OSU. For the first year of the project, there was a full-time (1 FTE) communication specialist, while for the second year of the project this dropped to .7 FTE due to financial cuts in the project.

3.4.3. Accomplishments and/or failures

3.4.3.1. Networking

The networking and communication, as will become clear in the following discussion, does not appear to be in compliance with the contract. Indeed, very little real networking is going on at all. A major problem stems from the subcontractor's (IPPC's) lack of understanding of what an effective research network should be. IPPC acts more as a node in an information system -- gathering and distributing it from a central location. Their concept of a network appears as a wheel with spokes with IPPC acting as the central hub to send out information (particularly the newsletter, but also papers, books, reports, etc.) to individuals/institutions in developing countries, who represent the spokes. There is little, or no, intended flow of information among the scientists in the developing countries. An effective network should look like a web, not a wheel. The goal is to stimulate information flow among the scientists themselves so that they can give each other ideas and develop their own IPM systems that are compatible with the local ecological, economical and social conditions. In a true network, the information flow among the developing country scientists will be more important and abundant than the information coming directly from IPPC and the project.

A brief survey of the material reviewed shows a lack of understanding of what an effective network is. A majority of what the project reports as "networking" is simply routine professional communication which does not constitute progress towards development of a network. To demonstrate accomplishments in the information/networking area, IPPC seems content to list how many pieces of information, reports, books or copies of the various newsletters were sent out to scientists; how many lectures, and on what topics, were given by project personnel; or how many visits staff members made to various institutions interested in agricultural work. The review team was given no indication whether or not any of these activities actually led to the stimulation of communication among the developing country scientists themselves. The only documentation provided for assessing the quality or impact of these activities consisted of testimonial letters from participants. Better documentation, of a more systematic nature, is sorely needed. A previous review of IPPC found that there was no real follow-up on the students who took part in regional workshops or who came to OSU for training in a weed science program to see what impact their learning had on their activities in their own countries after they returned home. This lack of follow-up makes it impossible to assess the impact of the workshops or training sessions, but strongly suggests that no real attempt was made to stimulate the formation of a research network. Nothing appears to have changed, in this regard, since the last review.

Furthermore, IPPC is not systematically using other opportunities for networking (i.e. other means of communication), although certain individuals have used some of them. The project has not taken advantage of existing networks -- technical networks, such as PestNet

at CIPE, BugNet at University of Texas, etc.; professional societies and their networks (with the exception of the International Weed Science Society); news networks (newspaper, radio, TV spots, etc.); or non-governmental organizations (NGOs) -- either to actively solicit information or articles for the newsletter or to disseminate information produced by the project. The project should aggressively pursue linkages with existing international networks and professional societies. While the costs of establishing a new, independent network are large, the marginal costs of active association with existing networks are low. Unless the project links with, and participates in, functional networks, it is likely to fail in meeting its networking responsibilities.

In part due to a reduction in funding, no research planning conferences appear to have been held. While there have been talks on various aspects of weed control given at international fora, none could be construed as research planning conferences. Some of the workshops on IPM techniques put on by CACP could conceivably be viewed as research planning conferences, but only by stretching the definition of a research planning conference. Even given this, however, the lack of funds for the project has meant that virtually no research of this kind has been done.

3.4.3.2. Newsletters

Three different newsletters have been produced as part of this project: INFOLETTER, HAUSTORIUM and THE INTERNATIONAL NEMATOLOGY NETWORK NEWSLETTER. INFOLETTER will be the last to be discussed as it was specifically called for in the contract.

- HAUSTORIUM is a small (six-page), biannual newsletter that was initially put out by the International Parasitic Seed Plant Research Group through Old Dominion University and published out of OSU. It appears to be an excellent newsletter and has an excellent reputation. The subject range is narrowly focused on parasitic weeds and deals almost exclusively with research on the biology and control of Striga, the major pest of cereal crops in Africa. It also has an announcements section which lists meetings that deal with parasitic weeds as well as other items of interest to the members. HAUSTORIUM has a small readership, basically limited to scientists working in the field who would use it to keep abreast of the latest work on Striga and to identify and communicate with other colleagues doing work similar to their own. At present, 450 copies are mailed out, mostly to people from developing countries. The technical quality of material in the newsletter is quite high and it seems to work quite well to stimulate research and independent communication among scientists working on Striga. When the International Parasitic Seed Plant Research Group no longer had enough money to publish the newsletter, IPPC supplied the funds and has published three issues. The cost of publication of this newsletter is \$1,100 for two six-page issues per year. This cost represents a good investment because it is easy to conceive the role HAUSTORIUM does play in developing and

strengthening a network of scientists working on problems associated with Striga control.

- The INTERNATIONAL NEMATOLOGY NETWORK NEWSLETTER began publication in December, 1984 and was initially put out by a nematologist from North Carolina State University. The newsletter comes out quarterly and publishes abbreviated results of most short term experiments by researchers from developing countries on nematode work. In addition, it contains an information section which lists dates of upcoming meetings and events of interests to nematologists as well as a list of recent publications on plant-parasitic nematodes. Initially the newsletter focused on the root knot nematode (Meloidogyne spp.), a major nematode problem worldwide and was highly regarded. The newsletter has expanded beyond Meloidogyne to include information on other plant-parasitic nematode problems and to be distributed to a wider audience. When the journal began, 150 individuals received it. Now over 3.5 years later, 600 individuals, 480 of whom are in developing countries, receive it. Concomitant with the broadened approach has been a decline in the quality of the articles (although the two are not necessarily cause and effect). The last few issues have contained articles of questionable quality. In essence, it now serves as a substitute for a technical journal, for researchers who generally cannot publish in referred journals. Positive aspects of this newsletter include its focus on a relatively specific subject (nematodes) of importance, a section devoted to information about meetings and other happenings of interest to nematologists, a section listing recent publications and the fact that it serves as a good vehicle for communication among scientists who work on nematodes in Third World countries and is fairly readily available to them. The technical quality of the material in the recent issues of newsletter is questionable because of the abbreviated presentation and lack of peer review. Perusal of a couple of issues leave the impression that research reported is of low quality, often representing masters work or the duplication of studies done by others. However, it obviously serves a useful communication and potential networking function for nematologists in Third World countries.

There are problems with continuing publication of this nematology newsletter. First, the person who initially published it will retire and there is some doubt as to whether he will continue to put it out. Second, there is opposition to the newsletter by some people working in Nematology at North Carolina State because they view it as a renegade operation. The department does not get any overhead from it. This newsletter can, and probably does fulfill a very useful communication and networking function. If it is to be continued, the technical quality of the material should be improved, probably through a linkage with a professional association of nematologists. In addition, an appropriate scientist(s) would have to be found to serve as editor. The

Nematology department at NC State is no longer interested in publishing it.

- The INFOLETTER serves as the major newsletter and communication source for the project. The contract explicitly stated that "an international published newsletter covering topical aspects of integrated pest management shall be published and distributed every 4 months". INFOLETTER serves that purpose. It has a very wide distribution, being sent free to over 8,000 people in some 172 countries four times each year. It is also very costly and time consuming to produce. One quarter of the communication specialist's time and one-tenth of a secretarial FTE are needed to put it out. Each issue costs about \$11,400 to produce, including \$4,000 for overhead costs and \$2,000 for postage. Because of the cost and reduction in project funding, the newsletter has not come out quarterly as contracted; 2-3 issues are produced each year.

Due to a lack of the appropriate data, the review team could not assess the usefulness of the newsletter or even how widely read it is. The over 8,000 recipients include people who, at one time, have taken a course from, or attended a training session given by, IPPC personnel, people who have expressed interest in getting the newsletter, or people who were on one of the lists given to the IPPC by CIGP or some other organization. No screening has been done of these lists to see how appropriate the potential recipients were. The team was given no evidence of attempts to query the supposed readership to get their feedback about the newsletter, to involve them in the process of writing for it, to ask how it might be improved, or even find out how many people actually read it. Without a readership survey, it's virtually impossible to assess the utility of the newsletter.

~~A number of factors makes the review team question the usefulness of this newsletter.~~

A number of factors makes the review team question the usefulness of this newsletter. First, the person responsible for putting together the newsletter stated that it is very hard to get material to put into the newsletter. Given the amount of IPM and related activities throughout the world, just the opposite should be true. This suggests that the newsletter as a passive vehicle for delivering information to a reader, rather than as a dynamic networking and communication tool that would actively be used by its readership who would regularly submit items for publications in it or use it as a way to communicate with others. Some examples can be cited where readers have used the newsletter for announcements. Second, the technical quality of the information in the newsletter is judged to be low. Substantive issues are either not dealt with or discussed in a very cursory or vague fashion. There is very little actual substance to the newsletter. Given the quality of other work by the project, the technical value of the information in this newsletter is substandard. Third, the topics dealt with in the newsletter are

heavily skewed toward weed control and tend to ignore other pests or give them short shrift. The newsletter has not successfully broadened its base beyond the weed control field, and the question remains whether such an attempt was ever really made. Fourth, the newsletter does not really focus on a true IPM approach to pest control; it tends to emphasize a chemical approach to solving pest problems. Of the six issues reviewed, 5 contain pictures of, and sales information on, machinery/equipment used to apply pesticides. All 6 issues contained articles or information about synthetic organic pesticides or on pest control issues from a pro-pesticide industry viewpoint. IPM is rarely mentioned in any of the articles, nor is the need for minimizing the use of pesticides or taking an ecological approach to pest control. Indeed, the tone of many of the articles and of the short book descriptions/notices is often negative toward those working to decrease pesticide use. Just reading the newsletter, one would never know that it is supposed to deal with IPM; it reads more like a newsletter that has a strong industry bias and which encourages pesticide use.

The INFOLETTER does have positive aspects, though. It is distributed very widely and free of charge. The In-print section, which lists literature on pest and pesticide management, is quite useful and represents a wide range of literature, although there's an over-emphasis on weeds and weed control. Just leafing through this section would help someone keep up with some of the pest control literature that is available. This part of the newsletter is definitely worth keeping, although it should be expanded to include more information on IPM-related topics. It's also obvious that many groups use the In-print section to advertise the publications they put out. If the article section was not so pro-chemical use, many of the readers might be willing to write short articles or pieces on their work.

In sum, the INFOLETTER falls far short of both what it should be and what it could be. The technical quality is low, it is sent indiscriminately to people who may not use it, it fails as a networking tool, and it is very expensive. It does not really fulfill the requirement in the contract for "an international newsletter covering topical aspects of integrated pest management". If there was not such a desperate need for networking/communication newsletter in this field, the review team would be tempted to suggest dropping it and spending the money elsewhere. However, the newsletter definitely needs to be saved. As a first step, a reader survey should be taken to determine who uses it, who should continue to receive it and how it can be modified to suit the readers' needs. To make it serve more of a networking function would require a more proactive editor -- one who should actively solicit articles from various groups and always be thinking of ways to get the newsletter to both serve its readership and encourage the networking of local groups working on pest control issues. Ideally, the newsletter should stimulate activity at the local level. To improve the technical quality of the newsletter, a specialist in

IPM, or one who knows the field well, should be involved in its production. Also, if the newsletter continues to have a broad audience, the project should define the subclasses of a general newsletter audience and assure that news items meet the needs of that audience. This would greatly increase the effectiveness of technical information transfer, above and beyond that which is possible via the untargeted approach now employed. To insure a more balanced focus on different classes of pests and to improve the quality of the newsletter, the review team suggests consideration of the following possible ways to produce the newsletter: 1. produce it at the CACP central office by an IPM specialist assisted by an editor; 2. continue to produce it at IPPC, but add an IPM specialist to the production team; and 3. encourage each major component activity (entomology, pathology, weed science, nematology, etc.) to produce a technical newsletter for a smaller group of scientists and turn the project newsletter into a general information newsletter for a much larger group. The third option requires a bit of explanation. Given the usefulness of the technical newsletters (HAUSTORIUM and the INTERNATIONAL NEMATOLOGY NETWORK NEWSLETTER), it makes sense to send them to a targeted audience who will use them as an information and networking vehicle. This would be an effective way to transfer technical information, but poses a danger in terms of discipline-specific focus in an area lacking adequate interdisciplinary approach. The general newsletter would be an inexpensive flier containing general, nontechnical information sent to a broad and undefined audience, at a total cost not to exceed around 60 cents per recipient per issue. (At present, INFOLETTER costs about \$1.40 per recipient per issue.)

In conclusion, some serious thought needs to be given to the networking/communication area by CACP and its subcontractors. The work done in this area has not fostered the establishment and growth of research networks. The research planning conferences have not taken place and the information and communication service can be improved. Project leader(s) must understand what is meant by networking and should strive to ensure that all the communication and networking activities stimulate the formation of networks which, in turn, are not dependent on the project for their existence and continuance.

3.5. Impact on Target Population

The project's principal functions involve the development and transfer, by various means, of knowledge and information regarding efficient, effective, safe, and environmentally sound agricultural pest control practices. The ultimate recipients of the benefits of the new or newly transferred knowledge and information comprise a diverse target population which includes:

- Resource poor farmers in LDC's;
- Resource sufficient farmers in LDC's;
- Domestic and foreign consumers of food produced in LDC's;

- Rural populations of LDC's; and
- National government agencies and operations.

3.5.1. Nature of Impacts

The receipt of appropriate, well-targeted guidance and site-specific pest management information provides resource-poor farmers in LDC's the means for increasing agricultural productivity without major capital expenditure. IPM information, if transferred and applied, accords reduction in pest losses through techniques employing labor, management, and other factors of production in new ways. The result is greater agricultural income or enhanced food self-sufficiency.

Farmers not highly constrained by credit or capital availability also gain by the incorporation of knowledge regarding IPM and the availability of data and information on local pest species or pest problems. The documented advantages of IPM technology adoption include increased efficiency of production, leading to higher levels of output and producer welfare, and reduced production risk (see Annex D). IPM adoption is predicated upon the availability of technical information describing the pest management decision process and prescribing decision rules. Effective application of IPM decision rules can also rely, in many instances, upon the availability of timely, periodic descriptive information on local weather or pest variables. Thus, the impacts of knowledge and information transfer on the adoption of IPM are potentially great. And the technology's adoption is a necessary condition for realization of the ultimate, agricultural production and farm income enhancement impacts of IPM.

Farmers, farm families, and farm workers are also significantly affected by information that indicates the risks of pesticide exposure and allows them to avoid the acute and chronic human health hazards of pesticide misuse. Widely disseminated and specific recommendations regarding pesticide mixing, application, and disposal can result in a dramatic decrease in pesticide poisonings that otherwise occur due to lack of information on the safety aspects of pesticide use.

Rural populations, in general, are subject to unwitting exposure to pesticides via groundwater and surface water contamination from pesticide residues or disposal, or indirectly through consumption of foods derived from nontarget species, such as fish, which concentrate pesticide wastes. To the extent that changes in farm-level pesticide use and government decisions regarding pesticide use are modified as a result of appropriate transfer of IPM and pesticide safety information, the general health and vigor of rural populations can be maintained or increased.

In a similar vein, the risk of exposure to pesticides through consumption of pesticide-treated commodities can be reduced as a result of improved pest and pesticide management by farmers and government agencies. Risk of exposure through food consumption is not restricted to rural, or even national populations. Pesticide treated foodstuffs with the potential for dangerously high residue levels are consumed principally by urban dwellers and, if the treated commodity is exported, by consumers in importing countries. Thus, the population potentially impacted by research,

information, and training that results in reduced incidence and magnitude of pesticide residuals in LDC-produced food is literally global.

Finally, provision of information and guidance on pest and pesticide management can greatly improve the decision making capabilities of national government agencies with responsibility for agricultural development, trade, and public health. For example:

- Without measures, the knowledge of means for measurement, or access to facilities for measurement of pesticide residues on food and accumulated in the populace, trade and public health agencies have little basis on which to assess the need to formulate, design, target, and implement programs to prevent or reduce export constraints or the effects of chronic pesticide exposure.
- Without high quality information on pest status, alternative means of pest control, and the relative effectiveness, capital requirements, environmental, and economic outcomes of alternatives, the probability rises for error in national government decisions regarding agricultural development and pest control policies and programs. The impact of such policy decision-making errors could include cost inefficiency or outright failure in meeting short and long-term policy goals.

3.5.2. Intermediate Contacts

With the exception of national government agencies, the project involves limited direct contacts with the target populations. The project's resource constraints are such that it would not be feasible for its personnel to directly contact or affect a sufficient number of individuals in the ultimate farm, rural, and consumer target groups to have any significant, widespread impact. Thus, the project's modus operandi is to develop and transfer new and existing knowledge and information to a range of intermediate actors and groups that routinely have more direct contact with target populations. In this manner, knowledge and information is more widely and efficiently disseminated through effective employment of established and accepted institutions. These institutions and intermediate contacts include research, extension, public health, and policy institutions within the LDC's, as well as LDC and developed country-based non-governmental organizations, the international research community, and developed country-based professionals who, in turn, interact with additional LDC contacts. Figure I illustrates the method through which achievement of project objectives ultimately has an impact on target populations. The number and complexity of linkages shown in Figure I have important implications for the project's benefits. Project documentation is inadequate to judge the effectiveness of contact with intermediate groups. The general nature of the benefits of the project is presented in Section 3.6.

3.6. **Cost/Effectiveness in Accomplishing Project Objectives**

The project's objectives and success in meeting objectives are reviewed in previous sections of this report. Objectives have been met with varying degrees of success, their accomplishment having resulted in a wide range of

heterogeneous outputs. Potential project benefits are likewise diverse, accruing to a broad set of individuals and groups, in a variety of ways.

The project's economic benefits cannot be quantified for direct comparison with project costs. Most of the benefits are nonmeasurable, either because they involve changes in the supply of unpriced goods, or because it is not possible to allocate observed changes in aggregate economic indicators among project-related and unrelated stimuli. Estimation of the value of potentially measurable benefits is constrained by project resources, which are insufficient to accomplish the fairly massive task of collecting and documenting data for thorough economic evaluation. In lieu of benefit/cost analysis, this evaluation employs a rough break-even analysis to judge the probability that project benefits exceed costs, and considers whether alternative means of meeting project objectives might be less costly and/or more effective

The following sections will: (1) identify the nature of potential benefits and describe benefit measurement problems; (2) assess the likelihood that the value of project benefits exceeds project costs; (3) compare alternative means for achieving project objectives; and (4) make recommendations for the approach to and documentation of benefits for use in subsequent evaluations of the project. Annex D provides supplemental summaries of conceptual studies and empirical evidence supporting major conclusions and recommendations.

3.6.1. Identification and Evaluation of Project Benefits

Table VII identifies the relationships among project outputs, potential impacts, and major classes of economic benefits, each of which is reviewed as follows.

3.6.1.1. Increased Agricultural Productivity

The introduction of new or improved pest management technology changes farm production functions in a manner such that higher output and producer welfare are obtained. This is accomplished by increasing the marginal productivity of pest management inputs relative to other inputs. Early adoptors reap the greatest benefits under economic systems that facilitate commodity price response to increased aggregate supply. The aggregate economic benefit derived from increased agricultural productivity is typically estimated by the change in producers' plus consumers' surplus resulting from technology-induced shifts in aggregate supply functions. However, aggregation to the industry level requires that the market equilibrium effects of policy and other changes unrelated to pest management also be taken into account. Thus to obtain a valid aggregate estimate of welfare change, it would be necessary to estimate market supply and demand shifts in product and factor markets in response to the introduction of IPM technology, and to make the resulting adjustments in equilibrium prices and quantities. While it is expected that the agricultural productivity benefits of the project are high, estimation of their magnitude is beyond the scope of the project and its review.

3.6.1.2. Improved Human Capital

The degree to which agricultural productivity rises in response to introduction of IPM and pesticide technology is closely related to the quality of human capital. Proper use of the IPM concept requires substantial management talent, such as the ability to identify and count pests and compare densities with economic thresholds. Project-related transfer to farmers of the abilities to understand, modify, and apply an abstract concept and to make calculations can have broader economic benefits than the increased productivity arising from improved pest management. IPM is a systems-based concept, the understanding of which includes new knowledge about production processes in general. Once such knowledge has been acquired by farmers, it can easily be transferred to all the crop area of a small farm and applied to activities unrelated to pest control, with the per hectare cost of management falling as farm size increases.

The direct and indirect economic benefits of human capital improvements arising from this project would be difficult, if not impossible to evaluate. Their estimation would require that extensive IPM adoption and diffusion research take place and that the behavior of farmer groups targeted by the program and the economic outcome of that behavior be monitored over time. This is clearly beyond the scope of the project, but should be done.

3.6.1.3. Increased Cost-Efficiency of Government Programs

The management of widespread, highly damaging pest populations with pesticides often requires centralized, regional or national coordination because individual farmers' actions are insufficient to achieve effective chemical control. The project has addressed several such pest problems, through its technical assistance and research activities (e.g.: chemical control of Medfly; locust/grasshopper control). Sound fiscal and program decisions regarding wide-area, publicly-funded pest control rely on valid ex-ante assessment of alternative strategies' direct and indirect costs and benefits. Thus, research and technical assistance contributing to accurate benefit estimation can prevent inefficient allocation of scarce public funds. The project's provision of technical assistance in crop loss and environmental impact assessments has potentially high value in this regard. Accurate assessment of regional/national pest status and associated damages provides the necessary basis for comparing direct public pest control program costs with expected benefits and indirect costs.

The value of the benefit of accurate information for government pest control program decision-making is the difference between net social benefits of the information-based alternative versus the strategy that would have been selected under conditions of uncertainty and incomplete information. Cooperation in providing response to technical assistance from the agencies and institutions to which the project provides such information could form the basis for evaluation of these benefits.

In a related vein, the project's encouragement of IPM may enhance the cost-effectiveness of governments' pesticide regulation programs. This additional benefit derives from the fact that IPM programs which substitute for the risk-reducing effects of pesticides offer the possibility of offsetting the welfare costs of pesticide use regulations.

3.6.1.4. Enhanced Trade Economy

Changes (reductions) in pesticide use resulting from a comparison of commodity import restrictions related to pesticide residues on food, and measures of those residues on LDC export commodities can lead to expansion of export markets. The project's provision of information on pesticide-related import restrictions (through technical backstopping for missions) and its training and technical assistance in pesticide residue testing have potentially high benefits for agricultural trade enhancement. The upper bound value of this benefit is equal to the value of tradeable commodities rejected or excluded by importing countries due to the exporter's inability to control pesticide residue levels. The value is increasing as importing countries increase their efforts in sampling for pesticide residues and enforcing import restrictions.¹ The degree to which it approaches its upper bound depends upon the availability of same-cost, equally effective alternatives (e.g.: IPM) to the pesticide use patterns creating residue problems, or the export commodity supply response if a perfect substitute is not available.

The project may also affect the import side of LDC's trade balance. The extension of IPM technology moderates the capital-using bias of traditional agricultural development by decreasing reliance on pesticides. Because moderate proportions of pesticides used in LDC's are imported, IPM adoption can reduce the need for expenditure of scarce foreign currency on imported industrial materials.

3.6.1.5. Reduced Health Risks

The IPM-induced shift in technological bias away from pesticides, and the project's accomplishments in pesticide safety may considerably reduce the risk of acute and chronic pesticide poisoning. As a consequence, both death rates (mortality) and the incidence of nonfatal sickness (morbidity) among LDC rural populations may decline. The value of the benefit of reduced mortality and morbidity can be measured in terms of additional earnings gained from increased longevity or productivity of employment, or through estimation of the value of marginal decreases in the probability of death or sickness resulting from pesticide exposure. There are conceptual and empirical problems with both of these approaches. Even if observed changes in aggregate mortality and morbidity could be directly related to specific

¹The United States, in response to a GAO report (Pesticides: Better Sampling and Enforcement Needed on Imported Food, GAO/RCED-86-219, Sept. 1986), has increased its rate of prohibition and rejection of imported foodstuffs adulterated by pesticide residues.

project outputs (an unlikely possibility), it would be unrealistic to expect that acceptable values could be generated for this otherwise highly significant class of potential benefits.

3.6.1.6. Increased Environmental Quality

Reductions in the environmental load of pesticides, resulting from project-related changes in pesticide use practices, can have benefits associated with reduction in both priced and unpriced off-farm (external) costs of pesticide use. A potentially significant, priced off-farm cost is the reduction in commercial freshwater or marine fish populations resulting from pesticide contamination of fishery waters. Unpriced off-farm costs may include destruction of habitat or reduction in population of noncommercial species, and contamination of ground and surface waters. The latter can evolve into an important priced externality as contamination of drinking water sources reaches dangerous levels.

Because pesticide contamination is a type of nonpoint-source pollution (pollution arising from concentration of residuals originating from a large number of diverse points rather than from a single point source), the benefits of controlling it are difficult to assess. Benefit analysis of controlling water pollution requires quantification of links between sources and receptors. The analyst must know the location and strength of actual or potential sources of contamination and must be able to model the dispersal of the contaminants. The analyst must also know the number of individuals exposed to contaminated water, the extent and timing of exposure, the dose-response relationship, and the nature and extent of health effects on the population at risk. Finally, one needs a way of converting health and environmental quality indicators into monetary values. These analytical requirements preclude quantification of the environmental quality benefits likely to arise from the project's implementation.

A final, broad-based benefit of enhanced environmental quality is its associated increase in the short-run and long-term sustainability of a nation's agricultural sector. Agricultural production relies heavily upon the quality and productivity of the natural resources it employs (land, soil, and water) as well as human resources and manufactured inputs (including pesticides). Excessive use of pesticides can reduce factors productivity through widespread development of pest resistance to pesticides). Thus, efforts resulting in improved pest and pesticide management have long-term but unmeasurable benefits equal to the present, discounted value of future productivity associated with sustained agricultural resource quality.

FIGURE I

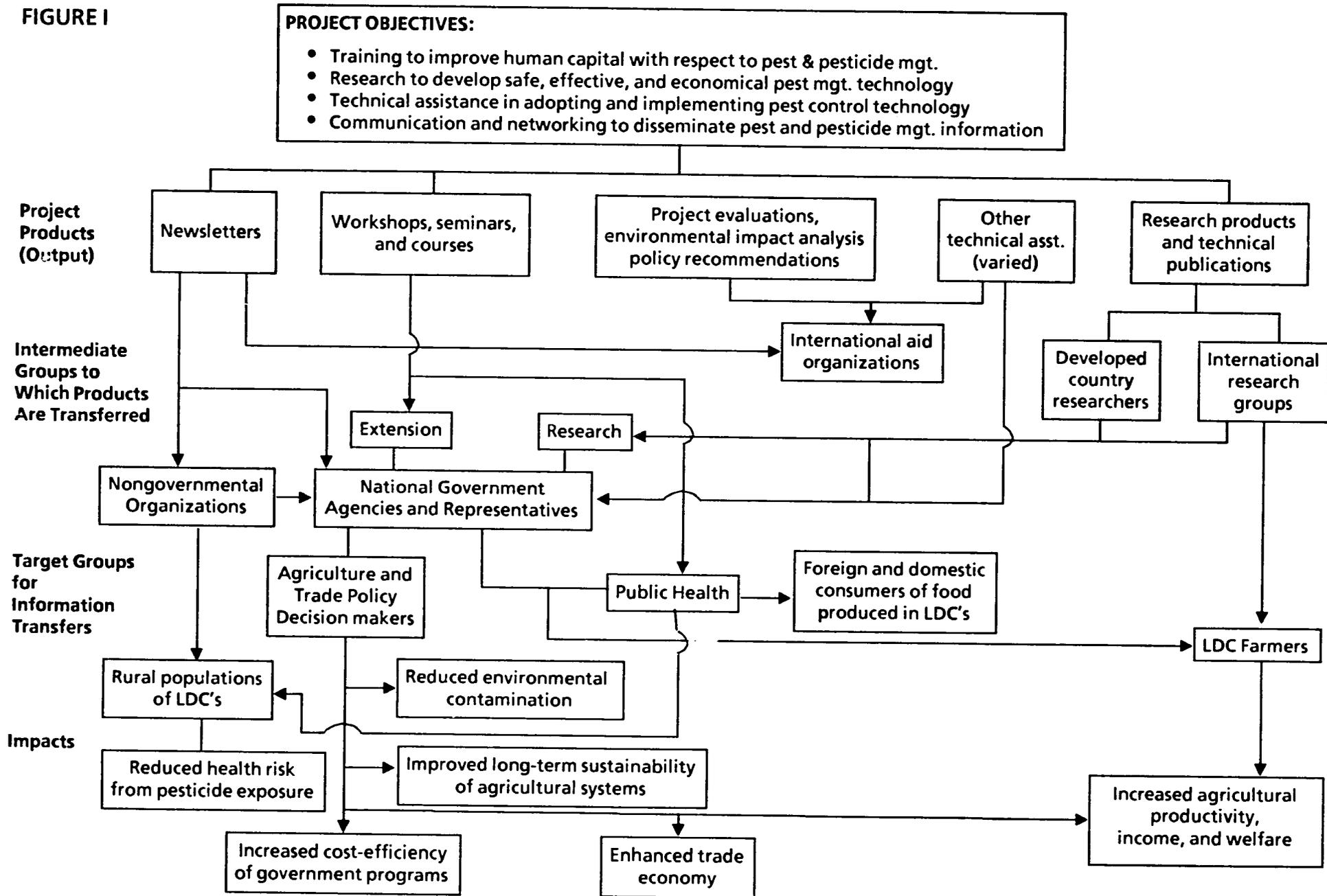


Table VII.

Impacts and Potential Benefits Associated with CACP Project Outputs

Project Outputs	Potential Impacts	Benefits
Training materials Seminars and Courses Workshops Educational newsletter items	Improved human capital in LDC's	Increased labor productivity, income generation, and subsequent transfer of technology
Technical assistance in managing pests of pesticides Pesticide efficacy testing IPM research Technical publications	Increased rate of adoption of efficient and effective means of pest management	Increased agricultural productivity
IPM project evaluations Crop loss assessments Environmental impact assessments Policy recommendations	Improved national government and international pest control and pesticide regulation decision making	Increased cost-efficiency of government programs
Pesticide residue analysis Blood and tissue analysis Pesticide safety training and technical assistance	Reduced acute and chronic health risk from pesticide exposure	Increase labor productivity Increased quality of life Decreased public health costs
Pesticide residue analysis Pesticide application and training and technical assistance Technical assistance in IPM IPM research	Reduced incidence of pesticide residues on export commodities Reduced reliance on pesticide importations	Enhanced trade economy
Pesticide use training and technical assistance IPM training, research and technical assistance	Reduced environmental contamination from pesticides	Maintenance of water quality Improved wildlife habitat Increased fishery productivity Sustained agri-resource quality

3.6.2. Project Benefits Exceed Costs

The absolute magnitude of total project benefits cannot be determined. Total benefits are a function of: (a) the potential value of new information or technology arising from research activities; (b) the effectiveness with which new and newly packaged information is transmitted to intermediate contacts via training and technical assistance activities (primary transmission probabilities); (c) the extent to which the knowledge and information are appropriately disseminated to target populations (secondary transmission probabilities); (d) the change in target population behavior resulting from receipt of new knowledge and information; and (e) the value of benefits arising from information-based changes in target population behavior. As Section F of this report indicates, the values of many of the project's potential benefits are unmeasurable. A lack of data on which to base transmission probabilities, and the inability to observe behavioral changes in some target populations further complicate economic evaluation efforts.

Primary transmission probabilities are determined, in part, by the number of intermediate contacts to whom potentially valuable pest and pesticide management information is transmitted. However, secondary transmission probabilities are a function of the number and type of target population members contacted by the intermediate contacts -- information unavailable from project documentation.

Nevertheless, by making some simple assumptions about transmission probabilities and likelihood of behavior change, we conclude the project's benefits far exceed its costs. The following project output case examples illustrate the logic behind this conclusion.

3.6.2.1. Guatemala Medfly Environmental Impact Analysis

Project output resulting from this activity was an EIA report containing information of value to MOSCAMED program decision makers. Because the report was prepared for use by its direct recipients, U.S. AID, USDA, and the Guatemalan government, the transmission probabilities associated with the information it contains are equal to 100 percent. The EIA report clearly indicates the cost-inefficiency of the current MOSCAMED program, and provides lower cost alternatives for achievement of similar program benefits. If we assume that MOSCAMED program decision makers base their decisions upon the new information provided by the EIA report, considerable cost savings would result. If the least-cost medfly eradication option evaluated through the EIA is selected in lieu of what the EIA finds is the highest cost option, up to \$9.6 million in direct program costs would be saved and indirect costs would be 80 percent lower, without loss of program benefits. The EIA report contains information suggesting that even higher savings, at net (benefits minus costs), present discounted value of approximately \$22 million, could result from a "no program" alternative, though the probability of direct expenditure of U.S. public funds for domestic eradication of isolated medfly outbreaks would increase by some unestimated degree. In either case, the benefits of technical assistance just in medfly program EIA, exceed the total costs

of the project if one assumes that the information provided is acted upon by MOSCAMED program managers.

It is possible that public program cost savings of similar magnitude could result from each of a range of other individual project outputs, including other EIA's, and training in crop loss assessments. The ability to accurately assess crop losses, if transferred to the appropriate representatives of national governments and used to make public pest control decisions, can prevent major expenditure to control minor pest problems, or target scarce public funds to control the most damaging pest problems. Since large scale public pest control programs typically cost over \$20 million, increases in their efficiency and targeting may have benefits valued in the millions of dollars as well.

3.6.2.2. Research on Biological Control

Several of the project's ongoing or planned activities involve search, screening, or practical adaption of biological control alternatives for major pests. Public expenditure on biological control has proved to generate spectacular rates of return. Net benefits of documented biological control research successes range between \$3.2 million for introduction of an effective biocontrol agent on St. Kitts, to an accrued, \$286 million resulting from four Australian biocontrol introductions.²

Assume, for illustrative purposes, that the project's biological control research has a (conservative) 20 percent change of successfully identifying and developing a feasible, large-scale biological control alternative for an LDC pest program. If the net benefits of successful project research fall within the range of values observed for other large-scale biological control programs, then the expected value of the research is between \$640 thousand and \$57 million. Again, in this case, the expected benefits of a small subset of project outputs may exceed total project costs.

3.6.3. Alternative Means of Producing Project Outputs

While there is little doubt that project benefits outweigh costs, the question remains whether project cost-effectiveness could be improved. In the following, alternative means of accomplishing project objectives are examined to determine whether outputs could be produced at lower cost and/or with greater benefits.

The review team could identify no more cost-effective means, in general, for obtaining expertise and services related to pest and pesticide management. AID S&T/AGR, the bureaus, and missions rely on such services to assure

²See: Greathead, D.J., and Waage, J.K. 1983. Opportunities for biological control of agricultural pests in developing countries. World Bank Tech. Pap. No. 11. The World Bank: Wash., D.C.; Simmonds, F.J. 1967. The economics of biological control. Journal of the Royal Soc. Arts: 880-98; and Waterhouse, D.F. 1979. Reduction of some biological constraints on the world's food supply. Pages 6-9 in Proc. 9th Int. Congr. Plant Prot. Washington, D.C. 5-12 August 1979.

promotion, support, and implementation of safe, effective and sustainable systems of agricultural pest control. The university consortium is judged as the most efficient mechanism for procuring high quality services to this end. However, the marginal benefit of university consortium services could be increased through use of alternative funding approaches. Specifically, greater productivity per funding dollar could be expected under the flexibility offered through a cooperative research agreement funding arrangement.

While the university consortium approach is judged to fill a void that could not more efficiently be filled through in-house effort or other contractual arrangements, it is recognized throughout this report that the contractor for this project could achieve efficiency gains through better direction of effort on a variety of objectives. Such gains are possible, for example, through improved targeting of the newsletter and piggybacking on existing networking systems (Section 3.4), allocation of research funds to seed and supplement existing rather than initiate new research plans (Section 3.3), and use of a broader set of individuals to provide technical assistance and training.

3.6.4. Recommendations Regarding Documentation for Future Project Evaluation

It should be clear from this report that inadequate information is available to either quantify project benefits or to arrive at definitive conclusions regarding degree of project cost-effectiveness. The nature of the project's economic benefits and the necessary reliance on intermediate contacts for realization of many of its benefits make economic evaluation difficult even under conditions of full information. However, future project evaluation efforts could be improved through provision of more complete documentation of project outputs' end use. Specifically, better data on which to estimate information transmission probabilities and the beneficial outcome of information transfer could be collected and provided through project reporting. The following suggestions are offered for consideration.

3.6.4.1. Identify Type as Well as Number of Recipients of Project-Provided Training and Information

Who are the recipients of training and information, and with whom and to what degree do they influence target populations? This information could be collected by:

- Surveying newsletter recipients to find out how they use newsletter information, to whom and how widely they disseminate that information; and
- Asking students and trainees to provide basic information (perhaps through a multiple choice instrument) on the nature of their jobs, which types and how many members of the target population they deal with, and how they expect to utilize the training they are receiving. This could be combined with student course evaluation questionnaires we assume are used to provide feedback for project trainers.

Collection and reporting of such data would allow some better measure of the extent to which project-related impacts are magnified and distributed via intermediate contacts.

3.6.4.2. Conduct Follow-Up to Determine Whether and How Project Outputs are Employed by Direct Recipients of Technical Assistance and Research Output

How has the project's output modified policy or program decisions or otherwise influenced the behavior of various actors affecting pest and pesticide management? Systematic follow-up with primary recipients of project output could be conducted to answer this question. Its answer provides a linkage which is essential to eventual demonstration that potential project benefits have, in fact, been realized.

3.7. Organizational and Managerial Issues

Because the IPM/EP project constitutes such a large part of CICIP's overall activities its organizational structure and operating mode are important issues relative to the execution of the IPM/EP contract.

As a consortium CICIP must be responsible to the needs and desires of the member universities. Under the IPM/EP contract it must meet the needs of AID and the host countries on all matters relating to IPM, not just pesticide related issues. As an institution CICIP must project a philosophical stand on reducing the use of pesticides and emphasizing non-chemical controls. If AID's requirements continue to be largely pesticide related, an alternative to CICIP might be less expensive. However, if AID continues to include pesticide advocacy within IPM and CICIP attempts to meet this need, a larger staff than presently exists is probably needed. It is not clear what role CICIP is expected to perform since what is stated in the contract and what is requested by buy-ins seems to differ substantially.

Much of the problem results from the substantial funding cuts for this project. The funds to accomplish the IPM activity have been drastically reduced while funding through buy-ins for pesticide related activities has exceeded expectations.

It appears that some changes in organization and operational procedures are essential if the original terms of the contract are to be adequately covered.

The organizational graph (Fig. II) appears adequate to cover contract requirements. At present, there are 8.15 project personnel. These are divided between four locations in Oregon, Maryland, Florida and Minnesota. The majority of the core staff are in Oregon and Maryland, 3.9 and 3 respectively. At the present time there are no clear lines of responsibility between the two locations, even though the organizational chart shows a distribution of effort.

In theory, the project's management and administration responsibilities are spread among participating institutions. On paper, there would appear to be sufficient resources devoted to the project directorship (0.5 FTE in CICIP headquarters and 0.5 FTE at IPPC) and to the coordination of component project task. In practice, however, it appears that the project suffers from lack of administrative guidance both from within the project and within USAID project management. Because managerial and administrative efficiency have a large bearing on the cost-

effectiveness of all project outputs, alternatives to the current management system warrant some consideration and are suggested below.

Communication between CICIP headquarters and IPPC are practically nonexistent. This limits productivity and creates personnel conflict. This needs to be addressed immediately.

The Maryland headquarters of CICIP and IPPC should each have clearly defined responsibility for meeting project goals and objectives and each should carry out these responsibilities while communicating regularly with each other.

Both IPPC and CICIP have responsibilities beyond this contract. In the future, this needs to have a sharp focus so contract activity will not be confused with total activity.

For purposes of executing the IPM/EP project there appears to be two alternatives for meeting the administrative requirement. Project responsibilities and associated resources could be reallocated so that the full 1.0 FTE responsible for project directorship is centralized at a single location and is able to devote sufficient time and effort to assuring project objectives are met in a cost-effective fashion. Alternatively, project operations could be modified so that the half-time, separate individuals responsible for project directorship are in frequent and complete communications with each other, effectively allocate administrative tasks between themselves, avoid redundancy of effort, and assure full accomplishment of managerial coordination. Either of these alternatives would increase overall project efficiency and effectiveness at no net cost. The panel believes that the first alternative will probably be the most effective in the long run. The panel also believes that large, discreet activities should be separated between sub-contractors. For example, IPPC could take full responsibility for training activity and the University of Miami could be responsible for pesticide monitoring and research. The University of Maryland could take responsibility for networking, research and technical assistance for IPM, biological control, environmental assessment and pest aspects of sustainable agriculture. Such a distribution of responsibility would reduce the need for day to day communications and define and focus responsibility. In the long run, this could increase communication on a professional level. To be able to respond to its members and AID's needs CICIP should have three levels of professional staff; permanent core staff, part-time core staff, and consultants. In addition CICIP must have some support staff.

3.7.1. Recommendations Concerning Organization

The panel believes that CICIP would be a more effective organization for meeting both present and future needs if the following was put in place. Each position should have a position description which clearly states the duties related to the IPM/EP project and for CICIP as an organization. These suggestions are made with full recognition of budget constraints, but the panel feels the responsibility to outline a goal to aim for as soon as possible.

The Director should be a full time position with total responsibility for the CICIP Network activity.

The Director needs a full time staff that includes:

1. An administrative assistant
2. Information coordinator/librarian*
3. Outreach coordinator*

IPPC should take full responsibility for training coordination in all aspect of IPM.

These individuals are viewed as core staff and all would have full time positions with CICP.

Permanent part-time core staff should be individuals who have been assigned CICP responsibility for a percent of their time. There should be the following permanent part time staff:

Entomologist/Biological control
Plant pathologist/Epidemiologist
Nematologist/Soil microbiologist
Weed scientist/Plant ecologist
Economist/Resource Management
Pesticide Chemist
Anthropologist/Sociologist
Crop scientist/Crop ecologist

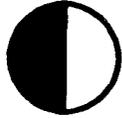
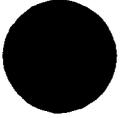
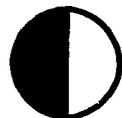
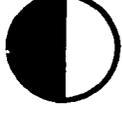
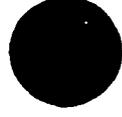
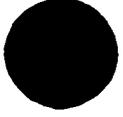
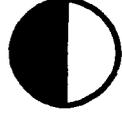
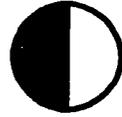
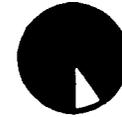
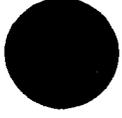
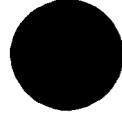
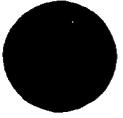
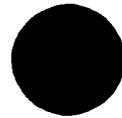
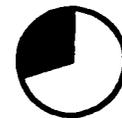
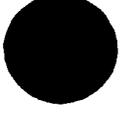
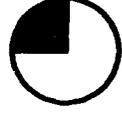
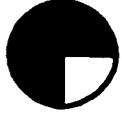
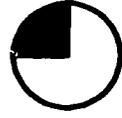
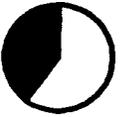
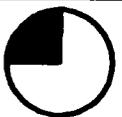
These positions should add up to no more than 1.6 FTE of professional assistance, all of which have job security outside of CICP. They would also provide for professional society representation and linkage.

Other professional help would be high quality consultants from the universities. The core staff and part time core staff would constitute the Technical Advisory Committee of CICP and be assigned specific activities as suggested by the Director and Governing Board.

*In the short run, these activities might be carried out by one person.

Figure II

CICP PPM PROJECT PERSONNEL

SUBCONTRACTOR	OCT '86 - FEB '87 (TOTAL FTE = 10.15)			MAR '87 - DEC '88 (TOTAL FTE = 8.15)		
UMCP	 Proj Dir/Ent .5	 TA Spec/Ent .5	 Secretary 1.0	 Proj Dir/Ent .5	 TA Spec/Ent .5	 Secretary 1.0
IPPC/OSU	 Dep Proj Dir/ Agric Econ .5	 Weed Scientist 1.0	 Training Specilist 1.0	 Dep Proj Dir/ Agric Econ .5	 Weed Scientist .5	 Training Specilist .9
	 Comm Spec 1.0	 Admin Asst 1.0	 Word Proc 1.0	 Comm Spec .7	 Admin Asst 1.0	 Word Proc* .3
UMI	 Chemist 1.0	 Staff Assoc .25		 Chemist .75	 Staff Assoc .25	
UCB	 Mgmt Spec 1.0			 Mgmt Spec 1.0		
UMN	 Res Spec/Plant Pathologist, 0.4			 Res Spec/Plant Pathologist, 0.25		

*Position to terminate 6/87

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3.8 Financial Issues

Section 1.3.5. presents an overview of project funding and use of funds by this project. As indicated in section 1.3.5. this project has been funded at only 36.23% of the level projected when the project was approved in 1984. At the time the contract was signed it was projected that \$3,870,000 would be available. Therefore, a monthly expenditure rate of \$64,500 was authorized. After four months (February 1986) the authorized monthly expenditure rate was reduced to \$52,900. On March 6, 1987 the authorized monthly expenditure rate was further reduced to \$45,217. This is a 30% reduction in core funding below the amount projected at contract signing. The drastically reduced level of funding by AID/S&T of only \$2,031,000 for the first 39 months compared to the planned level of \$5,606,250 has had a devastating effect on the smooth and effective operation of the project and has made it virtually impossible for the project to attain its original objectives. As far as the review team can determine, no specific guidance was given by AID/S&T/AGR as to which elements of the original plan should be reduced or eliminated as funding was reduced.

The IPM/EP project has been used by the regional bureaus and missions to a greater extent than nearly any other project in S&T/AGR. To date, buy-ins from bureaus and missions have aggregated to 42,211,869, an amount greater than the funding by S&T/AGR. The funds acquired through buy-ins have permitted the IPM/EP project structure to be maintained in a responsive posture and have permitted the contractor to respond directly to the immediate needs of developing countries. On the other hand, the buy-ins have largely driven the project activities and funding by S&T/AGR has not been sufficient to permit much of the core project activity originally envisioned. After paying costs necessary to hold the project staff together there was only \$110,450 available for direct project expenditures during the first 39 months.

The result is that as of October 1, 1988, CICIP has a short fall of \$67,000 in its core activities account. Although project personnel has been reduced several times, current (October 1988) monthly obligations to sub-contractors and CICIP headquarters personnel amount to \$44,200. This leaves only \$1,000 to operate ten project infrastructures each month. Since AID is unable to provide additional funds to cover this short fall, further reductions in project personnel appear to be the only choice left for CICIP management. The result will be further diminution in CICIP's ability to carry out core project activities and to service buy-ins from the bureaus and missions.

In order to secure buy-ins CICIP has negotiated overhead rates at an average of only 13.6% instead of the authorized overhead of 20%. In addition, CICIP headquarters has not taken overhead on sub-contractual obligations which have amounted to \$1,920,550 under core funding nor on \$636,564 in sub-contracts resulting from buy-ins. The result is that the overhead funds generated on the small amount of core funding retained at CICIP headquarters and the overhead on the buy-ins managed by CICIP headquarters, although substantial,¹ have not been sufficient to meet CICIP headquarters expenses.

¹ Estimated to be about \$172,000, assuming that 13.6% was taken on all activities executed by Bottrell, Steinhour and Collier.

The review panel was not able to determine the exact amount of overhead actually collected by CACP nor all of the uses made of overhead funds. Some overhead funds were used to provide staff travel which resulted in increased buy-ins, a use that appears prudent and essential, given the reduced rate of core funding.

Prudent management, in the future, would seem to dictate that CACP needs to restructure its overhead policies and procedures to collect the authorized amount and to provide for the infrastructure needs of the project. Further, it appears essential that a complete record be kept of overhead collected and the uses made of these funds by each unit involved in the IPM/EP project.

Given the current emphasis on sustainability that pervades all AID agriculture efforts, and the growing recognition that pests must be controlled in an environmentally safe manner in developing countries if they ever are to meet food demands, it appears that the IPM/EP project should be given a very high priority for funding. If this is done, this project would likely be funded at a rate that will permit it to more nearly accomplish the originally intended objectives.

SECTION 4.

CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

4.1.1. Organization and Management

- a. Project staff was cordial and quite willing to supply information to the review team. Material provided by CICIP headquarters was not well organized and did not permit objective evaluation of impact of the project. Material provided by IPPC was better organized, but it also did not permit evaluation of impact.
- b. The contractor of the IPM/EP project (CICIP) has a complex structure with the project manager in Maryland, the deputy project manager, training coordinator and information/networking specialist in Oregon and five participating institutions as sub-contractors. Project management is exceedingly difficult.
- c. CICIP is a valuable resource for AID. If it is allowed to expire, another similar structure would have to be created to meet AID's needs in IPM/EP. The resulting loss of momentum would not be in the best interest of AID program development.
- d. The concept of a consortium of U.S. Universities and the USDA to provide the best expertise available to meet AID's needs is IPM/EP project, but because of the cumbersome management structure, personality conflicts, and inadequate finances, it has fallen short of its potential.
- e. Communication between the various persons having responsibility for carrying out this project has been inadequate. The project manager does not effectively communicate with nor use his deputy project manager, training coordinator or information/networking specialist.
- f. The CICIP Board of Directors is concerned about (1) the breakdown in communications within CICIP and (2) the lack of effective use of core staff by the project manager and (3) the future of CICIP, given the reduction in core funding by AID that has occurred.
- g. If CICIP remains as the primary contractor to support AID's IPM/EP activities, it will need to be organized to more nearly meet the needs of AID as it responds to the six recommendations in the Report of the Committee on Health and Environment (February 1988).
- h. There appears to be a need to strengthen the core staff of CICIP for executing this project. Difficult choices must be made among the

kinds of staff expertise to be added and/or mandated in the uses of limited funds.

- i. The contract mode under which CICP works on this project appears not be the most appropriate mechanism for securing the type of assistance needed by AID. Perhaps a cooperative agreement or some other mechanism would be more effective and would permit CICP to better respond to AID's short term views, funding delays and changing needs.
- j. Bureaus and missions are not allowed to discuss buy-in costs with CICP. This is a clear handicap to planning for effective use of buy-in funds and CICP resources. Considering CICP to be classed as a sole source supplier for certain types of activities acquired through buy-in would permit more realistic planning and probably result in less cost and a more effective program.
- k. Greater effort by the contractor to contact and dialogue with persons in the regional bureaus who have responsibility for IPM/EP programs would help promote IPM/EP understanding and the involvement of the project in regional plans and activities.

4.1.2. Project Execution

- a. The contractor has been diligent in efforts to faithfully execute the requirements of the contract, but has been severely hampered by drastic funding reductions. To partially offset this deficiency, the contractor has vigorously sought and secured buy-ins.
- b. Most of the activity on this project has been training and technical assistance. Communication has been largely through the newsletter and by word of mouth. Very little true networking has been accomplished. Effective research networks have not been established.
- c. The commitment of AID to help developing countries meet their food needs requires activities aimed at pest management and environmental protection. At the same time the U.S. continues to be a major supplier of pesticides to developing countries. This IPM/EP project is extremely important because it permits AID to deliver assistance to developing countries that is balanced in the approach and effective in controlling crop pests in an environmentally sound manner. However, there appears to be a philosophical difference between the various units in CICP regarding the role of pesticides in IPM/EP. These differences hamper cooperation and harmony in all types of project activities, especially training and technical assistance.
- d. Although this IPM/EP project addresses insects, weeds and nematodes, it does not address many other crop pests that must be controlled in developing countries. In order to provide assistance to developing countries that addresses whole systems rather than just parts of them, it appears that a more comprehensive program for pest management is needed.

- e. This project has become highly reactive to mission short term needs. Given the extensive technical resources available to CICP, it appears that it could be more proactive, taking more initiative in guiding bureaus and missions in IPM/EP matters. This reactive mode makes it nearly impossible to carry out the project's true goals -- stimulating and implementing IPM. Work in developing countries -- which requires a more long term perspective.

4.1.3. Financial Matters

- a. Core reductions have seriously hampered the contractor's ability to successfully execute the contract requirements. This fund limitation has restricted innovation and forced reliance on buy-ins, many of which tend to detract from promotion of sound IPM/EP principles and create problems that brings into question the viability of this IPM/EP project with the current level of core funding.
- b. This project has been highly successful in securing buy-ins. Funds available through buy-ins have exceeded those provided by core funding. These funds have been essential to maintenance of the Contractor's ability to carry on the program that has been carried out to date.
- c. CICP headquarters is running a severe budget deficit, which appears to be largely a result of an inadequate overhead distribution policy and lax management.
- d. CICP headquarters and IPPC did not provide the review team with a detailed indication of the uses made of overhead funds. It appears that a considerable amount of project related travel was supported by overhead funds.

4.1.4. Project Impact

Although materials available to the review team were insufficient to definitively judge project impact, the following observations can be made.

- a. Training that has been delivered appears to have been of high quality. The restricted budget has prevented the contractor from carrying out several greatly needed training/networking activities originally envisioned.
- b. Based on letters and comments shown to the panel, the newsletter appears to be something that people generally appreciate getting. It conveys information concerning publications, equipment and news items. It is not effective as a technical communication nor does it promote IPM. It is very costly.
- c. Research networking efforts have not been carried out, therefore there has been no impact.

- d. Publications observed appear to be of high quality but this impact could not be evaluated. Those presented for review all dealt with pesticides.
- e. The impact of technical assistance could not be determined. The Contractor did not have data to indicate the impact, as was the case at the time of the 1985 review. Because the Regional Bureau representatives did not see fit to meet with the review team, as requested, and because cable responses from the missions were not received, the review team is unable to judge the impact of technical assistance delivered by this project. It should be noted, however, that the repeat business that this project has had from some missions in the form of buy-ins indicates a degree of satisfaction relative to technical assistance that has been delivered to date.
- f. Very little socioeconomic work has been done and its potential impact has not been realized.

4.2. Recommendations

This section includes a summary of the major recommendations. Some less important suggested changes may be found throughout the report.

4.2.1. General

- a. The review team discovered many difficulties and deficiencies, most of which appear to be the result of AID reducing the level of funding so drastically below the planned level. In spite of the difficulties and deficiencies, the team believes that there is great merit in AID continuing to draw needed resources relative to IPM/EP through CICIP. CICIP has access to the most competent expertise in the U.S. in IPM. Therefore the team recommends that AID continue to work with CICIP management to try to overcome the difficulties and also continue this project to the end of the contract period.
- b. To effectively carry out the recommendation above, AID and CICIP will, among other things, need to jointly identify which items in the contract scope of work are to be pursued and which are to be delayed due to inadequate funding. Also, the buy-in procedure for CICIP should be simplified so that procurement of buy-ins will not be so difficult and time consuming.

4.2.2. Organization and Management

- a. To better serve the needs of the IPM/EP project it is recommended that CICIP consider making the following changes in staffing and duty assignments.
 - i. Make the Director at CICIP headquarters full-time and have him/her take full responsibility for networking, research, and technical assistance activities for the IPM/EP project.

- ii. Have the person who prepares the INFOLETTER be located at CICIP headquarters for day to day contact with the Project Director and for closer contact with AID and others who are promoting IPM/EP.
- iii. Establish a new position at CICIP headquarters for an information coordinator/librarian. During the remainder of the contract this person could also put out the INFOLETTER.
- iv. Establish a new position at CICIP headquarters for an PM/EP specialist to coordinate outreach activities.
- v. Place responsibility for coordinating all training activities at IPPC at Oregon State University.
- vi. Establish a permanent part-time staff of specialists located at CICIP member institutions who would devote a part of their time to CICIP activities. The following appear to be needed and are listed in priority order.

Plant pathologist/Epidemiologist
 Entomologist/biological control
 Weed scientist/Plant ecologist
 Pesticide Chemist
 Economist/resource management
 Crop Scientist/Crop Ecologist
 Nematologist/biological control
 Anthropologist/Sociologist

The above should add up to no more than 1.6 FTE.

Other professional help could be secured by contract with outstanding individuals, preferably in the CICIP member institutions.

It is recognized by the team that financial constraints may not permit implementation of all the above recommendations during the contract period, but they should be implemented as soon as feasible. If the recommendations cannot be implemented during the contract period, major steps should be taken promptly to improve communications and to make better use of the project staff at IPPC.

- b. To ensure that CICIP remains viable and able to respond to AID's needs the Board of Directors should consider the following recommendations.
 - i. Augment the Board by adding a few individuals drawn from the scientific community at large to ensure representation from pertinent technical areas. The Board should be more involved and ensure that its policies are carried out effectively.
 - ii. Establish a technical committee composed of the full-time and part-time staff described in (a) above.

- ii. Establish additional continuing linkages with key U.S. based professional societies that have interest and capability to contribute to IPM/EP concerns.

4.2.3. Project Execution

- a. CICIP management should spend more time at AID/W "carrying the IPM/EP message", and developing opportunities for CICIP to be involved in more of AID's programs.
- b. To better serve the needs of AID and also the Universities it represents, CICIP should resolve the philosophical differences that exist within the organization regarding the role of pesticides in IPM. CICIP is probably not the most efficient organization to provide pesticide information, if that is all that it is to do for AID.
- c. To increase its sphere of influence and activity and at the same time possibly secure additional resources to better serve the IPM/EP project and IPM in general, it is recommended that CICIP consider the following:
 - i. Renew efforts to get PL-480 support for research by working with OICD/USDA. There are obvious areas of overlapping interest such as bio-control.
 - ii. Make contact with the Collaborative Research Support Program Directors (CRSPs), especially the Sorghum/Millet, Bean/Cowpea, and Peanut CRSPs. There are areas of overlapping interests and opportunities for collaboration between CICIP and these projects.
 - iii. Make efforts to develop collaboration on areas of mutual interest with such organizations as USDA/ARS, FAO, The World Bank, and the International Agricultural Research Centers (IARCs).
- d. More emphasis should be given to networking activities. The international crop protection community should be made aware of the IPM/EP project and of CICIP's work. CICIP should establish links with existing IPM networks, both technical and NGO. When specialists associated with this project and CICIP travel to the field, they should make sure that persons they contact know about the IPM/EP project and about CICIP.
- e. CICIP should target expenditures for research funds toward efforts to supplement research efforts planned or already underway in developing countries rather than starting new research efforts.
- f. CICIP management should carefully examine the INFOLETTER to determine if it is meeting the intended objectives. It is recommended that the cost of the INFOLETTER be reduced by at least 50%, that the mailing list be carefully examined, that the readers be contacted to determine their needs, and that it focus less

on chemical weed control and more on IPM and general items of interest.

- g. CICIP should explore opportunities to provide technical information for inclusion and distribution in newsletters of other organizations and institutes such as the "PestNet" newsletter sponsored by ICIPE.
- h. CICIP should encourage the AID missions to use multi-media channels (TV, radio, and publications) in developing countries to disseminate IPM information. CICIP should also encourage missions to plan for technology transfer in mission sponsored projects related to pest control.
- i. CICIP should update and make better use of the computerized list of experts for securing talent required to meet project demands and activities. Each year the output and effectiveness of individuals used should be evaluated and recorded.
- j. CICIP should plan and implement socioeconomic research to: (1) define the broad economic nature and magnitude of pest and pesticide problems; and (2) provide a catalyst for interest and involvement in IPM and EP activities. Economic evidence often can stimulate interest of politicians and officials who are unfamiliar with pest and pesticide matters.
- k. The Nematode Newsletter should be critically examined to determine its merit. The utility of this publication in LDCs should be assessed by North Carolina State University.
- l. Several areas within the field of non-chemical pest control need increased emphasis through research. Some of them are biological control of insects, weeds, plant pathogens and nematodes. Other areas are cultural controls and development of host plant resistance.
- m. As long as developing countries continue to use pesticides, the IPM/EP project should continue to provide guidance on the safe, judicious and environmentally sound use of pesticides. As a rule, however, pesticide usage should be discouraged where the chemical is not absolutely essential.
- n. One activity that CICIP has done well is conduct environmental assessments. Since CICIP has this high competence, training in environmental assessment should be emphasized as an activity in the IPM/EP project in order to increase the capability of developing countries to conduct their own environmental impact assessments.
- o. Both CICIP and S&T/AGR should develop and implement a vigorous program to advertise the IPM/EP project to regional bureau and mission personnel. The program should stress the advantages of using the resources of CICIP. The program should recommend that CICIP be used not just for quick-fix, short-term needs but also for development of longer term strategies and plans.

- p. As the contractor for the IPM/EP program, CICIP should develop close links with the S&T/AGR funded projects in Post Harvest Grain Systems R&D, Pre/Post-harvest Rodent/Bird Control R&D and Storage/Processing of Fruits and Vegetables (PIP). Pest control for the developing country farmer must cover the entire period from planting to consumption or sale. CICIP should strive, in the IPM/EP project, to develop and demonstrate methodology which controls pests over the entire span of time that is of concern to the developing country farmer.

4.2.4. Financial Matters

- a. AID should make maximum effort to provide increased funding for the IPM/EP project to permit CICIP to carry out the core activities that it cannot execute with the present level of funding.
- b. CICIP should carefully examine its overhead collection and distribution policy to ensure equity and to permit the CICIP headquarters to function as originally envisioned when the IPM/EP project contract was executed.
- c. CICIP must continue to work with AID and with the sub-contractors to find a way to continue operation and to remove the fund deficit that CICIP headquarters has.

4.2.5. Project Impact

- a. CICIP should fully document the number and type of recipients of all project outputs and the end uses to which outputs are employed. To the extent possible, also document the outcomes arising from use of project outputs by primary and subsequent recipients. Failure to document project benefits will seriously jeopardize future extension of the IPM/EP project.

Note: This same recommendation was made by the previous review panel, but still has not been acted on.

ANNEX A

SCOPE OF WORK

SCOPE OF WORK

I. PURPOSE AND RATIONALE FOR TEAM EVALUATION

The purpose of this review is to carry out a comprehensive technical and performance review of the implementation of Contract DAN-4142-C-00-5122-00. Project Number 936-4142, between the Agency for International Development (A.I.D.) and the Consortium for International Crop Protection (CICP).

The evaluation will determine the capability and effectiveness of the contractor to carry out the various elements stated within the initial scopes-of-work in the RFP and the subsequent contract, namely: activities in the areas of research, technical assistance, training and networking.

Specifically, these activities are as follows:

TECHNICAL ASSISTANCE -- provide short-term (i.e. less than 30 days) expertise for A.I.D. project-related activities and specific crop protection or pesticide management problems which might arise within a LDC, including but not limited to:

1. Assist in the development of the crop protection component of new agricultural production, research, and extension project;
2. Provide resource support and technical backstopping (on-site support) for crop-protection pest problems:
 - a. Prepare documentation on the biological and economic aspects of the problem in support of project planning;
 - b. Provide general surveys and assessments of the problem, including socio-economic concerns, and recommended solutions;
 - c. Provide assistance to both USAID and host-country agricultural administrators in identifying national and local opportunities for advancement of rural welfare through the improvement or implementation of integrated pest management procedures.
 - d. Provide guidance in the safe, legal, and cost-effective use of pesticides; and
 - e. Respond to problems caused by emergency pest outbreaks.
3. Assist in the development of regional and national integrated pest management programs;
4. Establish linkages with national research institutions and assist in developing adequate mechanisms and funding guidelines for the implementation of local currency funded research projects;

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5. Prepare environmental assessments, in accordance with A.I.D. Regulation No. 16, for project assistance activities involving pesticides;
6. Provide specialized assistance in the design, modification, and evaluation of national pesticide regulatory systems;
7. Provide chemical analysis of pesticide residues in food, soil, air, water, sediment, fish, and wildlife, and human substrates; and
8. Collaborate with the Association of Official Analytical Chemicals in developing quality control programs and procedures for LDC laboratories.

TRAINING -- conduct a variety of training to strengthen the capacity of developing countries to perform improved pest and pesticide management while institutionalizing the concepts of integrated pest management:

1. Seminars/Workshops: develop and sponsor topical presentations (1-2 weeks) on such subjects as pesticide applications and regulation, agro-medicine, plant pathology, weed science, entomology, etc., throughout the regions of the developing world (Africa, Latin America/Caribbean, Near East/Asia) during the life of the project. Such presentations shall be closely collaborated with the various International Agricultural Research Centers and other national and international organizations in order to ensure the greatest dissemination of the most current research information and to reduce costs.
2. Crop Protection Short Courses: conduct, in collaboration with appropriate regional institutions, intensive programs on topics which are key elements of integrated pest management systems but require highly specialized techniques or sophisticated skills (e.g., crop loss assessments and pest surveys, biological control, and terrestrial weed science);
3. Pesticide Residue and Formulation Analysis: at least annually, in collaboration with a U.S. institution, conduct a pesticide residue analysis training course. While pesticide formulation analysis training is not to be sponsored under this project, assistance shall be provided to LDC institutions on coordinating such training with appropriate Federal/State Laboratories and in placing qualified chemists.
4. Graduate Training: long-term graduate research training will be arranged with cooperating U.S. (or other developed countries) universities to provide national programs and universities in LDCs with the trained personnel necessary to make the critical decisions in the development and planning of crop protection programs.
5. Pesticide Safety Training: conduct short-term training in pesticide safety oriented to individuals who will in turn serve as instructors to the small farmer community in LDCs.

RESEARCH -- identify and implement research activities designed to strengthen pest and pesticide management capabilities in LDCs:

1. General Research: in response to the increasing demand for data on crop and pest biology, ecology, and genetics, laboratory and field-based studies, as well as

applied research activities conducted under actual farming conditions, as exemplified below, shall be performed throughout the life of the project:

- a. Survey and documentation of pest species;
 - b. Identification of actual and potential natural control agents;
 - c. Evaluation of pest-resistant crop varieties;
 - d. Determination of yield losses due to specific pests in selected cropping systems;
 - e. Evaluation and comparison of the effectiveness of different biological and chemical pesticides under local conditions; their compatibility with other elements of an overall integrated pest management approach, and their relative cost effectiveness;
 - f. Economic, social, and environmental evaluation of alternative pest management strategies;
 - g. Ecological interactions of biological and physical entities in selected cropping systems; and
 - h. Development, evaluation, validation, and demonstration of promising pest management technologies and combinations of technologies.
2. **Local Currency Research:** actively solicit research opportunities to be supported by local currency projects; interacting with competent LDC scientists in all crop protection disciplines and national institutions with the ability and interest in serving in administrative and technical management capacities. The potential for local currency projects is especially pronounced in Latin America, the Near East, and East Africa. The project will strive to develop at least four (4) new local currency research activities; one each in the Near East, East Africa, Central America, and the Andean Zone.
 3. **Collaborative Research:** develop close working linkages with national and regional integrated pest management and farming systems efforts currently underway, or implemented during the life of the project, in Latin America, the Caribbean, Africa, and the Near East. Meaningful coordination should also be established with ongoing Agency-sponsored pest management research projects at U.S. institutions.

NETWORKING -- actively foster the establishment and growth of research networks on pest and pesticide management. Collaborating with ongoing regional activities and existing research networks, the Contractor, through a series of regional workshops, shall identify common theme research strategies (emphasizing close interaction among LDC investigators/researchers) to serve as the framework from which to institute new research networks. In coordinating such networking activities, the project will serve the role of an active catalyst rather than a primary funding source. Therefore, the nucleus of individual networks will generally be located outside of the project. Only in such circumstances where there is no logical existing facility for developing local network activities will the project actually undertake networking responsibilities.

In an effort to further stimulate the formulation of active research networks and to facilitate greater exchange of information, the project shall implement:

1. Information and Communication Services: to collect, publish, and disseminate technical information on integrated pest management and crop/environmental protection. The Contractor shall assemble and maintain a current collection of technical literature which shall serve as a reference resource for responding to requests for information from LDC institutions. Additionally, an international newsletter covering topical aspects of integrated pest management shall be published and distributed every four (4) months.
2. Research Planning Conferences: to organize and sponsor national and regional pest management research planning conferences. The Contractor, in coordination with scientists from regional, national, and international institutions, shall periodically conduct such conferences in an effort to maximize the dissemination of information on state-of-the-art research activities.

A managerial review was done in September 1987, but to date no external evaluation has been undertaken. Therefore, this evaluation will, in effect also serve as a mid-term 30 month evaluation as stipulated in the contract agreement. This evaluation is now overdue by several months. The evaluation is also quite timely in that its output should materially assist in the development of needed background information for a forthcoming sectorial review of overall centrally funded activities in agricultural pest management.

Funding:

Since the inception of the project, two reductions in funding levels have been imposed upon the project. The original contract funded core activities at \$64,500 per month. After four months (Feb. 1, 1986) the funding level was reduced to \$52,900 per month. On March 6, 1987 the monthly rate was reduced again to \$45,760. Overall, this amounts to a total reduction of 30% from the originally planned for amount. Most of this reduction has been in cuts made to levels of manpower effort of core staff members. Now, even without additional funding cuts this year the project must further retrench since simple inflationary effects, especially salary increases, could otherwise lead to a deficit. It is apparent that further cuts must be made and these will presumably in part have to come from additional personnel reductions. It is quite possible that some if not all of these cuts will already have been made by CICP before the team review but it is unlikely that a modified scope-of-work will have been negotiated between A.I.D. and the contractor. An extremely important contribution from this external review will be comment as to recommended future project output priorities based on the current level of funding.

II. PROJECT HISTORY AND BACKGROUND

The United States Agency for International Development (A.I.D.) has sponsored pest management-related projects in cooperating developing countries since the mid-sixties. Most recently AID contracted with the Consortium for International Crop Protection (CICP) to conduct a 5-year, multi-disciplinary program in crop pest and pesticide management, the Integrated Pest Management and Related Environmental Protection Project, Project No. 936-4142, AID Contract No. DAN-

4142-C-00-5122-00. The Project is also known as the Pest and Pesticide Management Project (PPM Project).

The PPM Project compressed into one activity elements of several earlier AID crop pest-related programs, specifically: the Weed Control Systems Utilization for Representative Farms in Developing Countries Project (contract AID/ta-C-1303) conducted 1966-1985 by the International Plant Protection Center at Oregon State University; and the Pest Management and Related Environmental Protection Project from 1971 to 1980 started at the University of California, Berkeley under AID Contract csd-3296 and ta-C-1195 and more recently conducted by the Consortium for International Crop Protection (AID Contract DSAN-C-0252) from 1980-1986.

Specific PPM Project objectives, as stated in the project paper (July 1985) are: "to expand the capabilities of less developed countries in the areas of pest and pesticide management." The PPM Project was designed to assist developing country farmers to consider, and possibly use more agronomically, environmentally, and economically sound crop protection methodology. The PPM Project also reflects the intent to help developing countries closely monitor the need, use, and handling of pesticides.

PPM activities aimed at fostering, expanding and strengthening regional and national pest and pesticide management programs funded by A.I.D. in developing countries fall within four major categories.

- technical assistance: assist AID missions, AID regional bureaus, and S&T/AGR in preparation of Project Identification Documents, Project Papers, Initial Environmental Examinations, and Environmental Assessments; assist with implementing crop protection programs in LDC's; provide technical consultancies as needed; and, act as a source of information for specific pest and pesticide problems.
- training: facilitate various pest and pesticide management training courses and activities.
- communication/networking: provide information services and facilitate publication and dissemination of technical pest and pesticide management information.
- research: provide and facilitate a range of pest and pesticide management research assistance.

During the last several years, there has been a rapid escalation of interest in both Integrated Pest Management (IPM) and pesticide management, both inside and outside A.I.D. Pest problems in Indonesia caused presidential decrees to be made regarding IPM and the banning of 57 pesticide active ingredients. In Central America, the Mediterranean Fruit Fly eradication program proposed by USDA led to LAC/DR's funding of a 500k Environmental Assessment (EA). The CICIP project had full responsibility for this EA which, at the least, covers an extremely controversial program. CICIP also is playing a lead role in pesticide testing/assessment for locust/grasshopper control in Africa and North Africa. Also, through memoranda of understanding with the Commonwealth Institute for Biological Control (CIBC) and the International Centre for Insect Physiology and Ecology (ICIPE), CICIP is gearing for collaborative research activity in biological control. Recently, S&T/AGR and the AID's Bureau for Program and Policy Coordination (PPC) have embarked on the

development of a revised AID policy on pesticides and the drafting of a new set of pest management guidelines.

FAO's new Code of Conduct impinges heavily on A.I.D. concerns in pest management as well as EPA's new initiative in collaboratively assisting (with AID, FAO and other donors) LDC's to strengthen their regulatory infrastructure. At Congressman Obey's request, a special committee was formed to review AID's activities in hazardous chemicals, including pesticides. This committee (Committee on Environment & Health) in its final report, strongly emphasized the need for more attention to IPM by AID.

In Asia, CIGP is active in helping to promote better IPM networking, albeit with almost no discretionary funds to utilize in its effort. In summary, interest in pest management and pesticides is very high and it is essential that the CIGP project use its very limited resources in a manner conducive to servicing regional bureaus and A.I.D./W policy and technical needs.

AID is now evaluating the merits of a possible future "umbrella" pest management activity, broader in scope than the existing CIGP mandate and capable of accommodating all aspects of plant protection as it pertains to entomology, plant pathology, nematology and weed science. To accomplish this ST/AGR intends to perform a sector review in the area of pest management. This proposed evaluation will materially assist in the conduct of the sector review and is expected to provide essential background information for such a review.

III. STATEMENT OF WORK

The evaluation team shall:

1. Review the background information supplied by the S&T/AGR Project Manager. This will include, but not be restricted to the following:

The Project Paper, including the log-frame, the contract and all contract amendments, subcontracts, memoranda, budget/PIO/Ts from mission and regional bureau buy-ins, annual work plans, annual reports, trip reports, reports relating to technical assistance, including environmental assessments, proceedings and agenda of seminar/workshops, training manuals, and terminal reports of predecessor project evaluations; correspondence between CIGP and AID/W related to funding levels and authorized levels of expenditures, auditor reports, relevant correspondence from SER.

In addition, all available AID/W documentation related to the forthcoming sector review of pest management activities will be made available to the team. This will include documents related to the recently completed report on toxic chemicals (including pesticides) as issued by the Committee on Environment and Health; the latest draft versions of AID Pest Management Guidelines and AID's policy on pesticides; AID Regulation 16; AID's response to Congressional Inquiries on Pest Management Activities in Africa.

2. Visit the Project Headquarters at College Park, Md. and the Oregon State University (OSU) subcontract facility and staff at Corvallis, Oregon.

3. Review and comment on current CICP staffing pattern and adequacy/relevancy of technical staff output to overall program objectives.
4. Review the disciplinary balance within the core staff in providing assistance for the conduct of the project.
5. Review adequacy of computerize consultant roster in terms of effectively accessing qualified scientists in the area of crop protection.
6. Review the training activities conducted by the project since its inception and determine whether available training modules are adequate.
7. Review adequacy of CICP networking activity with AID missions, LDCs,, IARC's, U.S. institutions and international organizations.
8. Review the adequacy of the project management infrastructure.
9. The team shall make recommendations as to future program direction and provide suggestions/recommendations as to whether changes in relative emphasis between research, training, technical assistance and networking should be made. In doing so, the team will carefully consider the new focus statements AID has recently issued related to its agricultural activities.
10. Assess the project's outputs, in terms of quality and quantity.
11. Describe the adequacy of linkages between the CICP project and other central and bilateral AID projects having pest management components.
12. Review and recommend changes, if appropriate, with regard to the ongoing communications network between CICP, S&T/AGR, the missions, regional bureaus and CICP member institutions.
13. Develop and/or recommend actions as to appropriate mid-term changes in program directions, considering the increased awareness within AID of the importance of pest management and the potential for increased AID emphasis on pest management within its agricultural development projects.
14. Provide comment on the INFOLETTER currently produced by OSU/International Plant Protection Center (IPPC) with regard to the following:
 - Does the INFOLETTER meet AID needs in promoting the safe use of pesticides?
 - Should the newsletter disseminate information related to AID and other donor funded pest management activities in other projects, such as the Collaborative Research Support Programs (CRSPs) and IARC's?
 - Are LDC's the prime target and are sufficient numbers of organizations and countries in developing countries being reached?
 - Should the editor encourage more contributions from CICP professional staff?

15. The team will provide specific comment on the activities and conduct of the subcontract activities with the University of Miami (residue analysis laboratory) and North Carolina State University (nematology project).
16. The team will comment on whether the S&T/AGR Office is adequately servicing the project.
17. The team will attempt to calculate some financial indications of the project's cost effectiveness. In addition, the team will attempt to conduct a risk/benefit analysis as per Handbook 3, asking the question "What would be the Agency risk if AID did not have such a project?"
18. Finally, the team will seek answers to the following questions:
 - has CICP actively explored the various possible means of developing research projects?
 - do the Memoranda of Understanding developed between ICIPE and CIBC represent a significant first step in obtaining outside funding for biocontrol research?
 - are the current major efforts going into locust/grasshopper and Medfly projects detracting from CICPs ability to respond to other pest management needs?
 - are there any special problems related to the processing of and/or acceptance by SER/CM of purchase orders and PIO/T buy-ins?
 - is the overhead allowed by the AID contracts office adequate for CICP's sustained operation?
 - is core staff interacting with missions and regional bureaus adequately?

IV. COMPOSITION OF TEAM AND QUALIFICATIONS

1. **Team Leader:** The team leader should be a recognized expert in agricultural research administration with a thorough knowledge of AID procedures and their activities/goals related to LDC agricultural development.
2. **Pest Management Scientist Plant Pathologist:** This individual should be from the U.S. university community or USDA with a Ph.D. or equivalent degree in plant pathology. Knowledge of AID or World Bank agricultural development project procedures is desirable as well as direct experience in LDC pest management activities. Familiarity with the working principles of IPM is essential.
3. **Pest Management Scientist Entomologist:** This individual should be familiar with the general principles of IPM and economic entomology, including biological control and should be currently engaged in active research related to pest management. This individual should be fully familiar with various USDA activities in pest management, including those having an international significance such as Mediterranean fruit fly, African Bee, and the screwworm fly.

4. Agricultural Economist: This person should have a thorough understanding of the role of integrated pest management within farming systems, especially as found in the LDC's and in addition should have experience in the conduct of economic analysis at the program level, i.e., the determination of cost effectiveness of program interventions in the LDC's.
5. Environmentalist: This person should have experience in relating the impact of various agricultural practices related to pest management as they relate to the sustainability of these practices and their potential interaction with the natural resource base.

V. BRIEFING/DEBRIEFING OF TEAM

The team will be briefed by S&T/AGR representatives at the beginning of the visit to project headquarters in College Park, Maryland. At this briefing any needed clarifications of the individual requirements within the scope of work will be provided. The evaluation will then commence at project headquarters and will last approximately two and one half days at which time the evaluation team will move into closed sessions at ST/AGR headquarters for an additional 1 1/2 days. The ST/AGR project manager will be available to the team for interaction during this entire time period. One team member will, shortly thereafter visit the Oregon State University facility to view the operation of that subcontract and associated facilities.

At a convenient time in early November the team will reconvene at ST/AGR headquarters for another three days to consolidate the separate sub-reports prepared by the various team members. The team leader and the two crop protection specialists will be expected to attend the entire three day period.

VI. SPECIAL RESPONSIBILITIES OF TEAM MEMBERS

The individual team members will be expected to share in the task of developing the written input for the final assessment. The exact amount and nature of this input will be negotiated between the team leader and the individual team members. Also, the individual team member will be expected to review and comment on any draft materials forwarded to them by the team leader.

VII. TECHNICAL DIRECTIONS

Three (3) copies of a draft report shall be submitted to S&T/AGR/AP by the team leader for review 30 days before the final report due date. ST/AGR/AP will provide comments back to the Team Leader within ten days.

VIII. TEAM COMPOSITION

Tentatively the team composition will be:

1. Dr. Anson Bertrand, Private Consultant, Team Leader
2. Dr. Dean Haynes, Professor of Entomology, Michigan State University

3. Dr. Ernest Imle, Plant Pathologist, USDA (retired)
4. Ms. Barbara Bramble, National Wildlife Federation (or equivalent)
5. Mr. Carroll W. Collier, S&T/AGR (Advisory Capacity Only)
6. Dr. Benjamin Waite, S&T/AGR (Advisory Capacity)
7. Dr. Kitty Reichelderfer, USDA Agricultural Economist

Other Participants:

Dr. A. Steinhauer, CIGP Executive Director
Dr. D. Bottrell, CIGP Entomologist (at College Park, MD)
Ms. E. Dawes, CIGP Office Manager (at College Park, MD)
Mr. B. Mann, CIGP Residue Chemist/Trainer (at College Park, MD)
Mr. M. Shenk, CIGP Weed Scientist (at Corvallis, Oregon)
Dr. S. Miller, CIGP Pest Management Economist (at Corvallis, Oregon and CIGP)
Mr. A. Cooper, CIGP Training Specialist (at Corvallis, Oregon)
Mr. A. Deutsch, CIGP Networking Specialist (at Corvallis, Oregon and CIGP)

IX. METHOD OF ACCESSING TEAM

The team will be accessed through the USDA Agricultural Production RSSA (BST-4109-AG-1085-00).

ANNEX B

INDIVIDUALS INVOLVED

REVIEW TEAM COMPOSITION:

Dr. Anson Bertrand, Agronomist, Private Consultant, Team Leader
Dr. Dean L. Haynes, Professor of Entomology, Michigan State University
Dr. Michael Hansen, Ecologist, The Institute for Consumer Policy Research
Dr. Ernest Imle, Plant Pathologist, Retired from USDA
Dr. Katherine Reichelderfer, Agricultural Economist, ERS/USDA

Other Participants:

Dr. A. Steinhauer, Entomologist, CACP Executive Director
Dr. D. Bottrell, Entomologist, University of Maryland, CACP staff
Ms. E. Dawes, CACP Office Manager
Dr. B. Mann, CACP Residue Chemist/Trainer, University of Miami
Dr. M. Shenk, CACP Weed Scientist and Training Coordinator, Oregon
Dr. S. Miller, CACP Economist, Deputy Project Director, Oregon
Dr. A. Cooper, CACP Training Specialist, Oregon
Mr. A. Deutsch, CACP Communications/Networking Specialist, Oregon
Dr. Benjamin Waite, Plant Pathologist, S&T/AGR/AID, Washington
Mr. Carroll Collier, Project Manager, S&T/AGR/AID, Washington

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ANNEX C

ITINERARY

ITINERARY:

- October 11-13, 1988 Reviewed project activities at CACP Headquarters, College Park, Maryland.
- October 14, 1988 Attempted to meet with AID Regional Bureau Representatives and began report writing.
- October 25, 1988 Team leader reviewed project activities at sub-contractor (IPPC) at Corvallis, Oregon
- November 1-4, 1988 Team met in Washington to prepare draft report.

Note: The specific agenda for the reviews at CACP and IPPC are attached.

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Consortium for International Crop Protection

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AGENDA

EXTERNAL REVIEW

of the

Integrated Pest Management and Related Environmental Protection Project

Consortium for International Crop Protection

4321 Hartwick Road, Suite 404

College Park, Maryland 20740

October 11-13, 1988

Tuesday - October 11

- 9:00 A.M. : Briefing for Panel - C. Collier
- 10:00 A.M. : Break
- 10:15 A.M. : Project Overview - A. Steinhauer
- * History
 - * Objectives
 - * Project Implementation & Strategy
 - * Constraints to Achievement of Objectives
 - * Role of Buy-ins
 - * Sustainability of Project Capabilities
- 12:15 P.M. : Lunch
- 1:30 P.M. : Review of Core Activities - Sub-Contractor's Roles
 Oregon State University (IPPC) - S. Miller
- * Introduction
 - History
 - Present-IPM/EP
 - * Accomplishments 1985-1987
 - Training
 - Technical Assistance
 - Research
 - Information/Networking
- 3:00 P.M. : Break
- 3:15 P.M. : Oregon State University (IPPC) - S. Miller
- * Present Activities 1987-1988
 - * Future Activities 1988-1990
- 5:00 P.M. : Adjourn

AGENDA

October 11-13, 1988

Wednesday - October 12

- 9:00 A.M. : University of Miami - B. Mann
- * Pesticide Chemistry
 - * Residue Chemistry
 - * Training
- 10:15 A.M. : Break
- 10:30 A.M. : University of Minnesota/IRRI - A. Steinhauer
- * Research
 - * Plant Pathology/Networking
 - * Consultant List
- North Carolina State University - A. Steinhauer
- * Nematode Project
- 12:00 Noon : Lunch
- 1:15 P.M. : University of Maryland - D. Bottrell
- * Library
 - * Technical Assistance and Entomology
 - * Other
- 2:45 P.M. : Break
- 3:00 P.M. : Workshops and Training - A. Steinhauer
- * Goals
 - * Development of New Materials and Demo - C. Barfield
- 5:00 P.M. : Adjourn

AGENDA

October 1.-13, 1988

Thursday, October 13

9:00 A.M. : Buy-ins - A. Steinhauer

- * Activities
- * Problems

9:45 A.M. : Cooperation with other Organizations - D. Bottrell
- A. Steinhauer

- * MOU's

10:30 A.M. : Break

10:45 A.M. : Future Plans - A. Steinhauer

12:00 Noon : Adjourn

NOTE: If further interaction needed, re-convene at 1:30 P.M.



PROVISIONAL AGENDA

for TUESDAY, OCTOBER 25, 1988 visit to

Oregon State University (International Plant Protection Center)

**by Dr. A. Bertrand, Review Team Chairman, AID External Review of
Integrated Pest Management and Environmental Protection project**

* (all events at Conference Room, Gilmore Annex/IPPC, unless stated otherwise)

- | | |
|---------------|---|
| 7:00 - 7:50 | Working breakfast - Croft, Miller
* (Lyon's Restaurant) |
| 8:00 - 8:15 | Beneficial insect program - Croft
* (Entomology Dept., Cordley Hall) |
| 8:20 - 9:15 | OSU Weed Management group - Appleby, Burnill, William |
| 9:15 - 9:45 | Introduction to other project staff - Miller, et al |
| 9:45 - 10:30 | Working coffee break/walkabout
- Equipment - Shenk, Cooper
- Pesticide safety module - Cooper
- Technical literature collection - Deutsch
- Living mulch research/bibliography - Cooper |
| 10:35 - 11:30 | Grasshopper/locust program - Coop, Miller, Theiling
* (Entomology Dept., Cordley Hall)
- model
- beneficial insect database |
| 11:35 - 12:00 | Meet individually with project staff - Shenk, Cooper |
| 12:00 - 1:10 | Lunch
* (Memorial Union)
- Office of International Research and Devel. - Miner |

ANNEX D

**ECONOMIC RETURNS TO PROVISION OF PEST MANAGEMENT INFORMATION AND
ADOPTION OF PEST MANAGEMENT TECHNOLOGY:
A BRIEF CONCEPTUAL OVERVIEW**

Economic Returns to Provision of Pest Management Information and Adoption of Pest Management Technology: A Brief Conceptual Overview

Agricultural pests (plant and animal diseases, insects, and weeds) have significant impact on the function of social and economic systems, especially in less developed, agrarian-based economies (Reichelderfer and Bottrell). In countries where farming employs a majority of the population and contributes a sizable proportion of gross domestic product, even modest losses from pests can seriously impair the general welfare of the countries' populations. The value of effective pest management is therefore very high.

Pest management technology that increases agricultural productivity directly, or through substitution of owned for purchased factors of production, has the potential for increasing both producers' and consumers' surpluses. Furthermore, IPM programs that substitute for the risk-reducing effects of pesticides offer the possibility of offsetting the welfare costs of governments' pesticide regulations, and do so in an equitable manner since their availability is most beneficial to those farmers who would otherwise be most directly affected by regulations (Antle).

Proper planning, development, and research can assure that emerging pest management technological advance is appropriate for adoption by a target user group. However, transfer of pest management technology to farmers and governments in less developed countries is complicated by a range of factors, among which information gaps and lack of knowledge are paramount (Matteson, Altieri, and Gagne; Norton and Mumford; Rosenfield, Youdeowei, and Service). LDC farmers will adopt new innovations when they believe they are more profitable (by whatever measure) than current practices, but it is well established that the diffusion of an innovation throughout a region with differing soils, pest problems, and management levels can be a slow process (Byerlee and Polanco; Feder, Just, and Zilberman). Because LDC farmers and farm advisors lack knowledge about which species are truly pests, and what options are available to control them, the pest management option and diffusion process can be greatly accelerated through the provision of information generated from applied research, resulting from training, and extended through technical assistance.

Deficiencies in education and training have constrained implementation of specific IPM programs in developed as well as developing regions of the world (Reichelderfer, Carlson, and Norton). IPM is a knowledge-based management system requiring the practitioner to possess relatively sophisticated identification and calculation skills (Carlson and Mueller). Thus, adoption is contingent upon efforts to educate farmers. Increasingly, though, a lack of well-trained pest advisors and government decision makers constrains the rate at which this education and subsequent acceptance can take place. Unless an adequate supply of trained personnel is available to aid farmers in using complex approaches for pest and pesticide management, widespread implementation of effective pest control practices is not likely to occur. Carlson and Mueller provide empirical evidence of the importance of farmer education to adoption of pest management recommendations by small farmers in India.

Also, to the extent that uncertainty and imperfect information lead to excessive pesticide use, training, education, and extension of new information can be effective in reducing the demand for pesticide materials. Carlson showed the value of weather forecast information in optimizing pesticide use for plant disease control. Hanneman and Farnsworth found that information was the critical factor affecting California farmers' decisions to adopt IPM. Pingali and Carlson report that training which reduced subjective probabilities regarding pest damage led to a substitution of labor and management for pesticide use in orchards. It is apparent, therefore, that improvements in human capital can foster the transition to safer and less chemical-intensive means of pest management.

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