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Annual Report

October 1, 1985 - September 30, 1986

INTEGRATED PEST MANAGEMENT and ENVIRONMENTAL PROTECTION PROJECT

AID Contract No. DAN-4142-C-00-5122-00

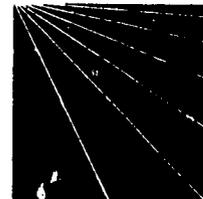
Project No. 936-4142

submitted to:

**U.S. Agency for International Development
Bureau of Science and Technology
Office of Agriculture**

by:

Consortium for International Crop Protection



ANNUAL REPORT

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by the

Consortium for International Crop Protection

February 1987



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CONTENTS

Executive Summary	iii
Acronyms	v
Foreword	vii
I. Project Background and Organization	1
A. Background	1
B. Description of Activities	2
C. Organization	3
II. Activities/Accomplishments	5
A. Training	5
B. Technical assistance	11
C. Research	16
D. Networking	17
III. Distribution of Personnel Effort	24
IV. Appendixes	28
1. General Project Data	28
2. Summary of Travel	31
3. Summary of Level of Effort	34

EXECUTIVE SUMMARY

In 1985, the U.S. Agency for International Development compressed elements of two long-running, centrally-funded projects into a single new, 5-year initiative, Integrated Pest Management and Environmental Protection, and contracted with the Consortium for International Crop Protection (CICP) to conduct the program.

Project activities were organized under four major categories: technical assistance, training, research, and networking/communication. Through sub-contracts, member institutions with demonstrated relevant expertise assumed responsibilities for conducting segments of each category.

During the report period, October 1, 1985 through September 30, 1986, Project personnel participated in nine training courses presented in five less developed countries (LDCs) and the U.S. Training was provided to 164 participants from 22 LDCs. Of the nine courses, four concerned weed management and two focused on pesticide residue. The Project arranged for consultant specialists to provide over three person-months of training in Thailand and Grenada. Additionally, training support was provided to USAID/Burundi.

Through a buy-in, technical assistance was provided to USAID/Grenada to develop strengthened crop protection practices guidelines. The Project provided 19.45 person-months of technical assistance consulting, predominantly for the African grasshopper/locust problem. A Project specialist visited Egypt and prepared a report concerning status and needs of IPM in Egypt. Technical backstopping included Project specialists consulting with

Executive Summary (cont.)

USAID missions and local institutions in seven LDCs. Specialized technical literature collections, a key resource for responding to pest and pesticide management inquiries from LDC scientists and institutions, continued to be upgraded.

Research conducted by sub-contractors involved use of mulches for non-chemical weed management, assessment of risk influence in IPM, and nozzle efficiency for small-scale spraying equipment. Collaborative research included an analysis of rice disease management systems in five Asian countries, and advance planning for long-term research in Grenada.

Networking visits to selected LDC institutions and USAID missions resulted in a Memorandum of Understanding with the International Centre for Insect Physiology and Ecology (Kenya) and a PIO/T for weed/pesticide management training in Panama.

Two newsletter mailing lists were merged, and one issue of the IPPC INFOLETTER published and distributed (by air mail overseas) to more than 8,500 recipients. INFOLETTER's size was increased 25%. Project personnel prepared various papers and publications during the year and participated in numerous conferences, symposia, and workshops.

A program for disseminating donated pest management materials to LDC libraries continued, as did an effort, with Weed Science Society of America funding, to provide weed science mini-libraries to selected LDC research centers. Over 4,000 copies of various publications were disseminated in response to requests from LDC scientists, institutions, and others.

ACRONYMS

- AAAS - American Association for the Advancement of Science
- AID - United States Agency for International Development
- AID/S&T/AGR - Agency for International Development, Bureau of Science and Technology, Office of Agriculture
- AID/W - AID/Washington
- CATIE - Centro Agronomico Tropical de Investigacion y Ensenanza
- CICP - Consortium for International Crop Protection
- EAP - Escuela Agricultura Panamericana
- FAO - Food and Agriculture Organization of the United Nations
- GTZ - German Agency for Technical Cooperation
- ICIPE - International Centre for Insect Physiology and Ecology
- IFAD - International Fund for Agricultural Development
- IICA - Instituto Interamericano de Cooperacion para la Agricultura
- IPM - Integrated pest management
- IPPC - International Plant Protection Center (at Oregon State University)
- IRRI - International Rice Research Institute
- IWSS - International Weed Science Society
- LDC - less developed country
- MARDI - Malaysian Agricultural Research and Development Institute
- MOA - ministry of agriculture
- MOAFS - Ministry of Agriculture and Food Security (Egypt)
- NARP - National Agricultural Research Project
- OIA - Office of International Agriculture
- OSU - Oregon State University

Acronyms (cont.)

PL480 - Public Law 480

PIO/T - Project Implementation Order/Technical Services

PMU - Pest Management Unit

PPM - Pest and Pesticide Management

PROMCAFE - Programa para el Mejoramiento de Cafe

REDSO/EA - AID's Regional Office for Economic Development Services
Organization/East Africa

REDSO/WA - AID's Regional Office for Economic Development Services
Organization/West Africa

ROCAP - AID's Regional Office for Central American Programs

RPMS - Regional Pest Management Specialist

SCPM - Silwood Centre for Pest Management

TA - Technical Assistance

UCB - University of California, Berkeley

UMCP - University of Maryland at College Park

UMI - University of Miami

UMN - University of Minnesota

USAID - U.S. Agency for International Development (missions)

FOREWORD

This report summarizes the activities performed under the Integrated Pest Management and Environmental Protection Project for the period October 1, 1985 through September 30, 1986. The Project, funded centrally by the U.S. Agency for International Development, Bureau of Science and Technology, Office of Agriculture, represents the combined activities formerly conducted by the Consortium for International Crop Protection (CICP) and the International Plant Protection Center (IPPC) at Oregon State University. The transition from two separate projects to a single coordinated effort was accomplished and the Project is positioned to provide AID missions with effective, environmentally sound crop protection assistance, training, research, and networking. Even though this was a transition year, significant accomplishments were performed by project personnel.

- A. L. Steinhauer

Project Director

I. PROJECT BACKGROUND AND ORGANIZATION

A. BACKGROUND

The United States Agency for International Development (AID) 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 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, or 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 proposal (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. The PPM Project also reflects the

intent to help developing countries closely monitor the need for, use, and handling of pesticides.

PPM Project activities aimed at fostering, expanding, and strengthening regional and national pest and pesticide management programs in developing countries fall within four major categories:

- * technical assistance: assist AID missions, AID offices, and AID/S&T/AGR with preparation of Project Identification Documents, Project Papers, Initial Environmental Examinations, and Environmental Assessments; assist with implementing crop protection programs in IDCs; 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.

A specialist has been assigned responsibility for coordinating each function within the project.

B. DESCRIPTION OF ACTIVITIES

The PPM Project utilizes the four components of technical assistance, training, communication/networking, and research to conduct appropriate programs in integrated pest management and environmental protection. Activities primarily focus on the

disciplines of weed management (terrestrial), entomology, plant pathology, and pesticide management.

The PPM Project provides a source of pest and pesticide management expertise for AID. Assistance is provided through:

- * designing and implementing cost-effective, environmentally sensitive pest and pesticide management research;
- * identifying pests; assessing pest-caused crop losses;
- * training in a wide range of pest and pesticide management topics;
- * assuring safe use and disposal of any crop pesticides used; and,
- * conducting pesticide use environmental assessments.

C. ORGANIZATION

AID awarded a 5-year contract for the PPM project to CIGP based on a proposal prepared jointly by the Consortium and the International Plant Protection Center at Oregon State with input from the University of Maryland College Park, the University of Miami Medical School, and the University of Minnesota.

By being contracted through CIGP, the PPM project has access to faculties at the 13 CIGP-member universities, plus the U.S. Department of Agriculture. The resulting pool includes experts with combinations of PPM background, international experience, and language capability covering most aspects of pest and pesticide management.

As primary contractor, CIGP has sub-contracted with five member institutions to conduct various phases of the program. The organizations involved and their areas of responsibility are:

Consortium for International Crop Protection (CICP)

- * Overall project coordination and administration;
- * Liaison with AID and other donor groups;
- * Project development.

International Plant Protection Center, Oregon State University (IPPC)

- * weed management;
- * training coordination;
- * socio-economics;
- * information/networking.

University of Maryland College Park, Department of Entomology (UMCP)

- * entomology;
- * technical assistance coordination.

University of Minnesota, Department of Plant Pathology (U.N)

- * plant pathology;
- * research coordination.

University of Miami, School of Medicine, Department of Epidemiology
and Public Health (U.M)

- * pesticide residue analysis training;
- * agromedical consulting and training.

II. ACTIVITIES / ACCOMPLISHMENTS

A. TRAINING

An active slate of pest and pesticide management training activities was conducted through the PPM Project during the report period. Additionally, PPM Project-supported personnel were involved with training through linkages with both parent and other institutions.

1. COURSES

During the report period, PPM Project personnel participated in nine training courses. From the Somaliian Weed Management Course during December 1985 to the Use of Microcomputers to Improve Plant Protection in Developing Countries course presented during September 1986, the Project directly reached 164 trainees from 22 less developed countries. Seven PPM Project specialists provided over 1,700 person-hours of instruction. Four of the courses were conducted on-site in an LDC, and two were presented all in Spanish.

Table 1 lists the specifics for each training course.

In several cases, primary funding for the courses was provided by sources other than AID.

Table 1. Chronological List of Training Activities
 Conducted Through the PPM Project
 or Involving PPM Project Personnel

date	activity	sub-contractor	personnel
Nov. 15-20, 1985	<u>IICA/ROCAP coffee rust shortcourse</u> El Salvador - pesticide safety technology - sponsorship through PROMECAFE - 26 participants	UMI IPPC	Mann Shenk
Dec. 2-12, 1985	<u>Somalia Weed Management Course</u> - first ever weed management course presented in Somalia - sponsored by FAO - 33 participants	IPPC	Burrill
Jan. 7-Feb. 31, 1986	<u>Weed Control</u> - a 3-hour credit course - presented (all in Spanish) at the Escuela Agricultura Panamericana, Honduras - 33 students	IPPC	Shenk
Jan. 7-31, 1986	<u>Weed Science Course</u> - presented in Jordan - supported by USAID/Jordan - in collaboration with Washington State Univ. - 27 participants.	IPPC	Burrill
Mar. 3-May 23, 1986	<u>Pesticide Residue Analysis</u> - post-course test scores improved 380% over pre-course scores	UMI	Mann
Jul. 14-Aug. 1, 1986	<u>Weed Management Strategies</u> - first at-Corvallis shortcourse - presented by IPPC - participants from seven IDCs.	IPPC	Burrill, Shenk, Cooper, Miller
Aug. 4-Oct. 24, 1986	<u>Pesticide Residue Analysis</u> - post-course test scores improved 368% over pre-course scores	UMI	Mann
Aug. 18-29, 1986	<u>IPM Course</u> - course presented through "buy-in" from USAID/Grenada	UMCP	Bottrell, Shenk

Table 1. (continued)

date	activity	sub-contractor	personnel
Sept. 2-19, 1986	<u>Use of Micro-computers to Improve Plant Protection in Developing Countries</u>	UMN	Teng
	<ul style="list-style-type: none"> - 15 participants - all costs, except Teng's time, were supported by non-PPM Project sources 		

2. GRENADA

Through a "buy-in" arrangement between USAID/Grenada and CICP, USAID/Grenada secured a series of training in pest and pesticide management. During the reporting period, a 2-week in-service course in IPM was organized for research technicians, extension officers, and commodity organization personnel engaged in crop protection. The course was conducted during August 1986. Other training activities during the period included development of a training module in correct pesticide use for extension workers and farmers.

In addition to Grenada project coordinator D. G. Bottrell, PPM Project training coordinator M. D. Shenk, and the following consultants participated in the training effort in Grenada:

M. D. McGlamery, Univ. of Illinois weed scientist

B. H. Marose, UMCP, weed scientist

J. L. Knapp, Univ. of Florida entomologist

G. P. Dively, UMCP entomologist

In addition, M. L. Higgins, Fellow, American Association for the Advancement of Science (housed in AID's Bureau for Latin America and the Caribbean) served as a trainer in the August IPM course.

3. TRAINING CONSULTATION

The Project arranged for and provided 3.05 person-months of pest and pesticide training consultation in two LDCs by five technical specialists. Table 2 lists the details for each consultation.

Table 2. Chronological List of Technical Specialists Providing Training Consultation through the PPM Project
October 1, 1985 - September 30, 1986

project output	site	dates	PM	consultant
Southeast Asia Pesticide/IPM Workshop planning	Thailand	May-Sept 86	0.7	J. Jensen
Southeast Asia Pesticide/IPM Workshop planning	Thailand	May-Sept 86	0.1	W.H. Reissig
Developed a farmer pesticide training program	Grenada	Jun 86	1.3	M.D. McGlamery
Provided technical assistance and served as technical resource and lecturer in IPM course	Grenada	Aug 86	0.35	B.H. Marose
Provided technical assistance and served as technical resource and lecturer in IPM course	Grenada	Aug-Sept 86	0.60	J.L. Knapp

4. TRAINING SUPPORT

In addition to actual training, a variety of initiatives to support pest and pesticide management training in LDCs were carried out under a series of contracts and memoranda of understanding with AID missions and other agencies. Table 3 provides details for the relevant training support activities involving 10.6 person-months of PPM Project personnel effort.

a. Honduras - IPPC began work on the preparation of a Field & Laboratory Guide Manual for Weed Control for the Escuela Agricultura Panamericana in Honduras. The all-in-Spanish volume will be a primary resource for the main weed science curriculum at EAP. Shenk tested draft sections during the 3-credit hour course in weed control he taught at EAP during Jan-Feb 1986.

b. Burundi - The AID Regional Advisor for Pest Management in East Africa contacted IPPC and requested that multiple copies of various weed management publications be acquired and sent to Burundi to support a course there being sponsored by USAID/Burundi. The Project complied and provided all requested materials.

c. Jordan and Somalia - In support of weed management courses sponsored by USAID/Jordan and FAO/Somalia, PPI Project staff at IPPC acquired and shipped requested texts and extension materials.

5. SPECIAL PROGRAM

Project associate A. S. Cooper (IPPC) developed and conducted a 3-week specialized study program for a visiting weed scientist from Pakistan (Table 3), including a trip to the University of California, Davis for the International Horticultural Congress. The program emphasized pesticide residue considerations.

6. INDUSTRY INITIATIVE

IPPC launched a program to collaborate with the agrochemical and small application equipment industry to conduct pesticide safety training in developing countries. A series of personal contacts, followed by individual letters to most of the major firms, set forth the outlines of training and proposed that a collaborative approach would be more cost-effective and have greater impact.

Table 3. Training Support and Training Activities Conducted by the PPM Project Through Contracts and Memoranda of Understanding During October 1, 1985 - September 30, 1986

sponsor	activity	PM	personnel
FAO	Prepare Weed Management Instructor's Guide	2.0	Burrill
		0.5	Shenk
FAO	Acquire and ship text materials for weed management course in Somalia	0.2	Burrill
EAP/AID	Prepare syllabus for weed control course at EAP, Honduras	2.0	Shenk
		3.0	Fischer*
		0.5	Deutsch
USAID/Jordan	Acquire and ship text materials for weed management course in collaboration with Washington State University	0.2	Burrill
USAID/ Burundi	Acquire and ship text materials to support weed management shortcourse	0.2	Shenk
Univ. of IL/ AID	Provide specialized training at IPPC for Pakistani scientist	2.0	Cooper*

* Supported by non-PPM Project funds

A meeting with all interested entities was set for February 1987, just preceding the Weed Science Society of America annual meeting.

7. OTHER

Project personnel, by virtue of their association with graduate programs at their home institutions, were involved in advising international graduate students, many of whom are AID funded. A.L. Steinhauer, S.F. Miller, L.C. Burrill, D.G. Bottrell, M.D. Shenk, and P.S. Teng all took part.

B. TECHNICAL ASSISTANCE

1. GRENADA

Via the "buy-in" mode, USAID/Grenada contracted with CICP, through the PPM Project, to provide technical assistance as well as training. TA involved developing guidelines for coordinating, consolidating, and strengthening crop protection practices carried out by commodity organizations and farmers. D. G. Bottrell (UMCP entomologist) coordinated the TA activities and utilized the consultants listed previously.

2. TECHNICAL ASSISTANCE CONSULTING

AID and USAID missions utilized the PPM Project to provide consultants for a variety of pest and pesticide management technical assistance. Table 4 presents a chronological list of these consultations.

Thirteen specialists were engaged to provide 19.45 person-months of pest and pesticide management technical assistance. Their work was conducted in 16 countries or regions in East and West Africa, Asia, Latin America, the Carribean, and the Pacific.

3. TECHNICAL BACKSTOPPING

a.) A.L. Steinhauer, D.G. Bottrell, and the PPM Project administrative staff at College Park provided technical backstopping in response to requests from AID offices and missions for technical assistance (Table 4). Steinhauer and Bottrell also identified and arranged for the services of the specialist consultants.

b.) Additionally, Steinhauer and Bottrell provided technical backstopping for AID's Bureau of Science and Technology, Office of Agriculture, and other AID units in Washington, DC, on a continuing

Table 4. Technical Assistance Consulting Conducted through and Coordinated by the Pest and Pesticide Management Project

project output	site	dates	PM	consultant
IPM project evaluation	W. Africa	Mar-Apr 86	2.3	J.D. Paschke
Review medfly Program	Peru	Jun 86	1.0	W.C. Mitchell
Insecticide tests on grasshoppers	Mali	Jun-Aug 86	2.8	G.E. Cavin
Provided technical assistance and facilitated research in pest and pesticide management	Grenada	Jun 86	0.7	G.P. Dively
Pesticide waste and disposal study	Thailand Malaysia	Jun-Jul 86	2.1	G. Zweig
Pesticide waste and disposal study	Thailand Malaysia	Jun-Jul 86	1.7	J. Jensen
* Environmental Assessment	Jamaica	Jul 86	0.7	C.S. Barfield
* Environmental Assessment	Haiti	Jul 86	0.8	M. Cusson
* Environmental Assessment	Belize	Jul 86	0.8	G.A. Schaefers
* Locust/grasshopper control	Sudan Ethiopia Kenya	Aug-Sept 86	1.5	G.A. Schaefers
* Locust/grasshopper control	Senegal	Aug-Sept 86	2.0	F.M. Philips
* Locust/grasshopper control	Burkina Faso	Aug-Sept 86	2.1	D. Bartholf
Provided technical assistance and served as technical resource and lecturer in IPM course	Grenada	Aug 86	.35	B.H. Marose
Provided technical assistance and served as technical resource and lecturer in IPM course	Grenada	Aug-Sept 86	0.6	J.L. Knapp

* Services provided under funding from sources other than AID Contract:
DAN-4142-C-00-5122-00

basis. A major backstopping effort involved providing information on migratory locusts creating problems in Africa.

c.) Bottrell and CICP administrative staff backstopped a Regional Pest Management Specialist located at ROCAP, Costa Rica. The RPMS, an entomologist, serves as technical coordinator for a regional, ROCAP-financed IPM project, with ongoing responsibility for program monitoring.

d.) P. S. Teng (UMN) backstopped and helped plan a pesticide and IPM workshop scheduled for early 1987 in Thailand.

4. ADVISORY

a.) Egypt - During November 1985, D. G. Bottrell was requested by Egypt's Minister of Agriculture and Food Security (MOAFS) to review programs in IPM in crops and recommend procedures for increasing its use through the AID-financed National Agricultural Research Project (NARP). IPM research, training and operational programs at a number of Egyptian universities and MOAFS centers were reviewed. Following the trip to Egypt, a report entitled "Status of and Needs in Integrated Pest Management in Egypt" was developed and submitted to MOAFS and USAID/Egypt. The report, which identified priority needs in IPM, formed the basis for a major new IPM effort to be sponsored by NARP and funded by USAID/Egypt.

b.) Pakistan - M. D. Shenk continued to serve as cooperating scientist for six weed management research projects (under the PL480 program) in Pakistan managed through the U.S. Department of Agriculture. Activity included review of research, analysis of methods, and ongoing general guidance.

c.) Kenya - Following the visit to Egypt in November 1985, Bottrell traveled to Kenya to assist in developing a new interdisciplinary research and education project in IPM at Egerton College. Presently a three-year, post-high school diploma institution in agriculture and forestry, Egerton will soon begin a four-year B.Sc. degree program. IPM training will be emphasized in the new program, and complementary IPM research will be implemented. Bottrell helped to develop the plan of operation for the new efforts in IPM which AID will fund.

d.) Honduras - At the request of USAID/Honduras, Shenk visited the Escuela Agricultura Panamericana at El Zamorano during November 1985 to advise on weed problems and methods of control.

e.) P. S. Teng advised scientists in Malaysia and the Philippines on methods for conducting on-farm assessment of losses due to rodents, rice tungro virus disease, and maize stem borer.

5. OTHER TECHNICAL ASSISTANCE

a.) Teng met with USAID personnel at Thai, Philippine, and Indonesian missions to discuss pest management and the PPM Project.

b.) In September, Shenk was an invited participant in the FAO regional weed management workshop held in Bogota, Colombia, in conjunction with a meeting of the FAO Panel of Experts on Weed Management.

c.) UMI analyzed 10 tomato samples from USAID/Bolivia to assess the impact of pesticide usage. This was a follow-up to samples tested previously to determine baseline levels prior to an AID project's suggestions for pesticide usage.

d.) At the request of AID/W, IPPC staff members Shenk and A. S. Cooper traveled to Washington, DC, to serve on a panel for reviewing/formulating pesticide safety policies for AID.

6. LIBRARY/TECHNICAL LITERATURE

CICP and Project sub-contractors maintain extensive pest and pesticide management related technical literature collections that serve as valuable references in support of USAID mission and AID central administration. Project personnel devoted time to maintaining and upgrading these collections, particularly at CICP headquarters and at IPPC.

a. CICP Headquarters Library - The relocation from California to Maryland required the Consortium to reorganize and reshelve its extensive, over 17,000 holdings library. Through the UMCP subcontract, D.G. Bottrell undertook the lead in re-establishing the CICP collection, along with A.L. Steinhauer and CICP management specialist, E.A. Dawes. Plans are underway to develop and install a computer system with capability of conducting subject-specific searches and retrieving pertinent information for each identified document. Several storage and retrieval systems were examined and computer specialists were contacted for advice. The Sci-Mate Personal Manager program was selected and acquired by UMCP. An indexing and coding system is presently being developed for storing document information on microcomputers. The data base will be stored on a hard disk. However, selected datafiles (e.g., on locust problems in Africa) may be accessed via floppy disks for use in microcomputers at CICP institutions, AID offices, and LDC institutions.

b. IPPC Technical Literature Collection - During the report period, IPPC personnel cataloged in 187 documents using an existing system. More than 800 titles were checked out and returned by users including numerous AID-supported graduate students. Thirty-six subject searches were conducted in support of developing country scientists and institutions.

C. RESEARCH

When research, an important component of the PPM Project, is conducted at a sub-contractor's base institution, it usually involves graduate students from LDCs, most of whom are funded through USAID missions. Only those research projects which have been funded through the PPM Project are reported here. Most of the research is funded by multiple donors.

1. RESEARCH CONDUCTED BY SUB-CONTRACTORS

a. Small-scale application equipment - Lever-operated knapsack sprayers are heavily used by small farmers in LDCs to apply pesticides. In addition to correct use and maintenance of sprayers, selecting and using the proper nozzle is a key factor inasmuch as the spray nozzle affects efficacy of pesticide use. Research was initiated at IPPC to identify nozzle standards applicable to small farmer use in LDCs.

b. Herbicides - When it is determined that chemical weed management is an appropriate technique for small farms in LDCs, then it is critical to know what compounds are available and what their capabilities and limitations are. A screening trial of new herbicides

conducted at IPPC provides project personnel the opportunity of evaluating new products for suitability under LDC conditions.

c. Risk - a major tenet of IPM rests on the economics of controlling pests. IPM, just as all agricultural production operations, involves some element and degree of risk. Socio-economic research conducted at IPPC investigated the influence of risk on pest management system selection. Research was also carried out by IPPC staff on the use of computers for economic evaluation of alternative pest management strategies.

2. COLLABORATIVE RESEARCH

Planning was initiated by UMCP staff in Grenada to develop long-term research trials and demonstrations aimed at encouraging non-chemical pest management practices and reducing pesticide use in cocoa.

D. NETWORKING

1. DIRECT INTERNATIONAL NETWORKING

a.) CICP Executive Director A. L. Steinhauer visited the following organizations to explain the objectives of the PPM Project and to explore continuing and new opportunities for cooperation:

- * Rome, Italy - FAO and International Fund for Agricultural Development
- * Abidjan, Ivory Coast - REDSO/WA
- * Nairobi, Kenya - REDSO-EA; ICIPE (International Centre for Insect Physiology and Ecology), and Desert Locust Control Organization for East Africa
- * Frankfurt, West Germany - GTZ

* Brazil - University of Sao Paulo ESALQ and Federal Rural
University of Rio de Janiero

* Costa Rica - CATIE and ROCAP

* Honduras - USAID

Contacts made during the trips helped define several potential areas of joint cooperation. The visit to ICIPE resulted in development of a Memorandum of Understanding between that organization and the PPM Project for cooperative work in biological control of insect pests of food crops in Africa.

b.) D. G. Bottrell and P. S. Teng participated in, and presented invitational plenary papers at, the 2nd International Conference on Plant Protection in the Tropics during March 1986, in Malaysia. The conference, organized by the Malaysian Plant Protection Society, attracted approximately 500 participants from 36 countries.

c.) S. F. Miller and M. D. Shenk traveled to Guatemala, Costa Rica, Bolivia, and Panama during April 1986 to meet with USAID and host country officials for the purpose of explaining the new PPM Project and the capabilities it offers. A request from USAID/Panama, and a PIO/T to conduct weed/pesticide management training courses in Panama was one immediate result. Administrative procedures delayed carrying out the activity until early 1987.

d.) At FAO's invitation, P. S. Teng attended the year-end Plant Protection Service meeting in Rome during December 1985.

2. OTHER INTERNATIONAL NETWORKING

a.) I. O. Akobundu, staff weed scientist at the International Institute of Tropical Agriculture (Ibadan, Nigeria), spent a year's sabbatic leave with IPPC utilizing the IPPC technical literature

collection. He interacted with staff while preparing a manuscript on weed control in the tropics, and also advised graduate students in OSU's Crop Science Department.

b.) Steinhauer, as CIGP Executive Director, and Miller, CIGP Deputy Executive Director, attended the CIGP Board meeting at College Park, MD, in July.

c.) Personnel associated with the PPM Project and sub-contracts--Steinhauer, Miller, Sherk, Mann, Deutsch, Bottrell, Teng, and Dawes, along with representatives from AID/W--Collier, Altman, and Waite--plus Davies (UMI) and O'Laughlin (UMN), attended a 2-day project implementation workshop held at College Park, MD, during December 1985. Professional facilitators from UMCP were engaged to organize, conduct, and report on the activity.

d.) During March 1986, Sherk and A. S. Cooper visited several consulting firms headquartered in Washington, DC. The PPM Project and IPPC's role were explained and descriptive material given to the firms' representatives.

3. INFOLETTER

One issue of the IPPC INFOLETTER was published and distributed during the report period. It featured background and specifics of the new Pest and Pesticide Management project contracted to CIGP by AID. The information acquainted recipients with AID's activities conducted through the Project. INFOLETTER serves as the fundamental networking vehicle for the program.

INFOLETTER's physical size--and therefore information space--was increased by 25%. Several other design improvements were inaugurated. Production costs were reduced through electronic transmission of text

from editor to typesetter, and through elimination of two-color printing.

The mailing list generated by CIGP when headquartered at Berkeley, California, for the newsletter "Pest Management News" was merged with the existing IPPC mailing list for INFOLETTER. Since systems used to maintain the two lists were incompatible, all reviewing and merging to create a master list was performed manually. There was an estimated 41% duplication between the two lists. The merged master list includes over 8,500 recipients in more than 130 countries.

A commercial mailing service was utilized for the first time to distribute INFOLETTER during the reporting period. The results were highly favorable with many recipients receiving their copy within two weeks instead of up to six months as had been the case previously. Due to bulk shipping and consolidation, there was no increase in mailing cost.

4. PUBLICATIONS PREPARED

- a.) M. D. Shenk prepared a chapter entitled, "Weed Control in Maize," for a new book, Weed Control in Tropical Crops, Vol. II, published by the Weed Science Society of the Philippines.
- b.) A summary report was prepared for the Jordan weed training course. Copies were provided to all involved entities.
- c.) A summary report was published for the IPPC Weed Management Strategies shortcourse. Pre-course brochures for both the 1986 and 1987 course were developed and published.
- d.) D.G. Bottrell's paper "Applications and Problems of Integrated Pest Management in the Tropics," and P.S. Teng's paper, "Crop Loss Assessment in the Tropics," are being published as part of

the proceedings of the 2nd International Conference on Plant Protection in the Tropics.

e.) Articles by IPPC staff were published in the GIFAP Bulletin and the inaugural issue of Farm Chemicals International.

f.) IPPC specialists reviewed, expanded, and upgraded weed management training manuals for FAO and for the Escuela Agricultura Panamericana, Honduras.

g.) A manuscript for "Weed Control for Extension Agents" was refined and sent for review by technical experts.

h.) Teng arranged for articles related to segments of the PPM Project to be published in newsletters of the International Society of Plant Pathology and the American Phytopathological Society.

5. DISSEMINATION OF PUBLICATIONS

a.) Both the sub-contractors and contractor responded to numerous requests for publications from USAID missions, LDC scientists, and international institutions and organizations. IPPC distributed 2,827 copies of 14 publication titles; the Center also disseminated 1,039 copies of 44 titles in the IPPC Papers reprint series.

UMI, plus other sub-contractors and CICP, distributed 128 copies of An Agromedical Approach to Pesticide Management and an untabulated number of the Spanish version, Enfoque agromedico sobre manejo de plaguicidas.

Copies of the Granovsky et al Trainer's Manual - Training Program for Pesticide Users were given to participant trainees and distributed in response to requests.

b.) Mini-libraries of weed/pesticide management texts and reprints were assembled and provided for each participant in shortcourses sponsored by USAID/Burundi, USAID/Grenada, FAO/Somalia, and USAID/Jordan.

6. COMPUTER-AIDED INSTRUCTION

A program was started to create computer graphics-enhanced instruction modules for pesticide safety and application topics. These are intended to assist in the review of basic concepts in pest/pesticide management. Specific module titles include:

- A. Pesticide Handling and Safety
- B. Pesticide Application Techniques
- C. Pesticide Application Equipment Calibration
- D. Pesticide Rate Calculations
- E. Pesticide Formulations

Of these, #A is available on diskette as a computer-operated module, a 35mm slide set, and as overhead projector transparencies. All formats are accompanied by a printed manual. Portions of the other modules have been completed. The effort was conducted by A.S. Cooper at IPPC.

7. IWSS

IPPC continued to serve as the secretariat for the International Weed Science Society (IWSS). Supported activities included membership transactions and other administrative duties.

IWSS collaborated with the Weed Science Society of America and IPPC to purchase/provide materials for basic weed/pesticide management mini-libraries. In addition to the sets provided to participants in shortcourses just cited, with cooperation of USAID missions nine other sets were shipped to developing countries.

8. OTHER NETWORKING

a.) An electronic networking system was tested to link the PPM Project with FAO and key crop protection institutions worldwide. Also, the Project implemented direct electronic internal and external communications via Western Union's "EasyLink" service, thus greatly facilitating communication among the contractor and sub-contractors.

b.) Arrangements were made for IPPC to resume production of Haustorium, the newsletter of the International Parasitic Seed Plant Research Group.

c.) A descriptive brochure for the PPM Project was designed and written. It was in the final stages of editing and production at the end of the report period with distribution anticipated by November 1986. Also, a logotype for the Project was conceived, developed, and produced. Self-stick labels of the logo were printed and distributed to the contractor and sub-contractors.

d.) A program of collecting and redistributing unused/unwanted technical journals to developing countries was continued at IPPC. A shipment of 161 items was prepared for Malawi, and another collection of over 200 titles was sent to USAID/Liberia for the Central Agricultural Research Institute.

e.) PPM Project weed scientist L.C. Burrill attended the February 1986 meeting of the Weed Science Society of America (Houston, TX), served on the International Programs committee, and was honored by being named a lifetime Fellow of the Society.

f.) Several initial steps were taken to establish a network for rice pest management. Specific activities are to be proposed during a February 1987 Pesticide/IPM workshop in Thailand.

III. DISTRIBUTION OF PERSONNEL EFFORT

Table 5 presents a summary of time devoted to Project activity during the year with an estimated distribution of effort for each specialist, organized under the four major activity themes.

Table 5. Distribution of Effort (person-months) for Project Specialists for the Period October 1, 1985 - September 30, 1986

project output	site	date	PM	individual
<u>TRAINING</u>				
Weed Science	Corvallis	Oct/Dec 85	1.5	Burrill
Weed Management	Somalia	Dec 85	1.0	Burrill
Weed Science	Honduras	Jan/Feb 86	1.0	Shenk
Weed Science	Jordan	Jan 86	1.0	Burrill
IPM	Grenada	Aug 86	1.0	Shenk
Weed Control	Corvallis	Jul/Aug 86	1.0	Burrill
		*	1.0	Shenk
		*	1.0	Deutsch
		*	1.0	Miller
Microcomputer Course	St. Paul	Sept 86	1.2	Teng
Pesticide Safety	El Salvador	Nov 85	0.5	Shenk
Pesticide Residue Course	Miami	Mar/May 86	3.0	Mann
USAID/Grenada Project Training	Grenada	June/Aug 86	.40	Bottrell
2nd International Conference on Plant Protection in the Tropics	Malaysia	Mar 86	0.15	Bottrell
Visiting Trainee/ Pakistan	Corvallis	*	2.0	Cooper**
Pesticide Residue Course	Miami	Aug/Oct 86	2.0	Mann
Preparation/Planning ^{1/}	Miami	Nov 85/ Feb 86	3.25	Mann

Table 5. Distribution of Effort (continued)

project output	site	date	PM	individual
Preparing Training Material/Honduras	Corvallis	*	2.0	Shenk
		*	3.0	Fischer**
		*	0.5	Deutsch
Preparing Training Material/FAO	Corvallis	*	2.0	Burrill
		*	0.5	Deutsch
Pesticide Safety Course	El Salvador	Dec 85	0.25	Mann
Crop loss workshop	Philippines	Mar 86	0.3	Teng
Pesticide workshop	Thailand	Mar 86	0.1	Teng
<u>TECHNICAL ASSISTANCE</u>				
USAID/Grenada Project	Grenada	Feb/Mar 86	0.15	Bottrell
	Grenada	June 86	0.10	
	Grenada	Aug 86	0.15	
	Maryland (backstopping)	*	1.00	
Pest and Pesticide Assessment	Egypt	Nov 85	0.50	Bottrell**
Project Development	Kenya	Nov 85	0.25	Bottrell
Technical backstopping for Project consultants	Maryland	*	1.50	Steinhauer
			0.75	Bottrell
Technical backstopping for AID/W	Maryland	*	2.00	Steinhauer
			0.50	Bottrell
Technical backstopping for developing country weed scientists			0.5	Burrill
			0.5	Shenk
Library Maintenance	Maryland	*	0.65	Bottrell
Library Maintenance		*	0.5	Miller
Project Design	Africa	*	0.5	Teng
Quality Control	Miami	Oct/Nov 85	0.5	Mann
Analysis of Bolivian Tomato Samples	Miami	May/Aug 86	2.0	Mann
Pakistan PL480	Corvallis/ Pakistan		2.0	Shenk
Honduras EPA	Honduras		1.0	Shenk

Table 5. Distribution of Effort (continued)

project output	site	date	PM	individual
Safety Policy	Washington		0.5 1.0	Shenk Cooper**
Grenada Course Development			0.5	Shenk
PFM Project Discussion	Costa Rica/ Guatemala Bolivia/Panama	Mar/Apr 86	1.0 0.5	Shenk Miller
Industry Initiative	Corvallis		0.5 1.0	Miller Deutsch
<u>RESEARCH</u>				
Disease Management	Asia	June/Sept 86	2.0	Teng
Nozzle Evaluation	Corvallis	*	1.5	Burrill
Mulch Evaluation	Corvallis	*	3.0	Fischer**
Econ. Analysis	Corvallis	*	0.5	Miller
Screening Trial	Corvallis	*	1.0	Burrill
Microcomputer Appl.	Corvallis	*	0.5	Miller
Coordinated research performed under USAID/Grenada Project	Grenada	Feb-Aug 86	0.40	Bottrell
<u>NETWORKING</u>				
Newsletter	Corvallis	*	3.0	Deutsch
Computer Modules	Corvallis	*	9.0	Cooper**
Publications	Corvallis	*	3.0 1.0 0.5 1.0	Deutsch Shenk Miller Burrill
Rice Pest Management	Asia	*	0.5	Teng**
Inter. Conferences	Asia	*	0.1 0.1	Teng Teng**
Reports/Planning	College Park/ Miami	Dec 85	0.5	Mann

Table 5. Distribution of Effort (continued)

project output	site	date	PM	individual
T.A. Information	Miami	*	0.5	Mann
Responding to requests	College Park	*	1.50 0.75	Steinhauer Bottrell
CICP/IPPC Admin.	Corvallis/ College Park	*	1.0	Miller
IITA Visiting Scholar	Corvallis	*	1.0	Burrill
Visits to international organizations	Various	*	1.0	Steinhauer**
Discussed collaborative work with representative of IRRI, MARDI, FAO, and SCPM	Malaysia	Mar 86	0.25	Bottrell**
IWSS Activities	Corvallis	*	0.5	Burrill
		*	0.5	Miller
		*	1.0	Deutsch
Reports	Corvallis	*	0.5	Miller
		*	2.0	Deutsch
Consultants' database	St. Paul	*	0.2	Teng
Electronic networking	St. Paul	*	0.2	Teng

NOTES

* = all during the project year

** = support or travel funding contributed

1/ = includes relocation of laboratory

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IV. APPENDIXES

APPENDIX 1. GENERAL PROJECT DATAA. INSTITUTION ADDRESSES AND INFORMATIONConsortium for International Crop Protection (CICP)

4321 Hartwick Rd., Ste #404, College Park, MD 20740 / USA.

Telephone: (301) 454-5147

Cable address: CONSORTICP

Easylink: #62929197

Telex: 5106013963

Executive Director: A. L. Steinhauer (U. of Maryland)

Deputy Executive Director: S. F. Miller (Oregon State U.)

Chairman, CICP Board of Directors: H. D. Thurston (Cornell U.)

Management Specialist: E. A. Dawes (U. of California)

International Plant Protection Center (IPPC)

Oregon State University, Corvallis, OR 97331 / USA:

Telephone: (503) 754-3541

Easylink: #62929202

Telex: 510 596 0686 OSU CID COVS

Director: S. F. Miller

Department of Entomology

University of Maryland, College Park, MD 20742 / USA

Telephone: (301) 454-3843

Easylink: #62929200

Project leader: D. G. Bottrell

University of Miami

Department of Epidemiology & Public Health

School of Medicine, South Campus, Bldg. B

12500 SW 152nd St., Miami, FL 33177 / USA

Telephone: (305) 284-7320, 7328 Easylink: #62929204

Project Director: J. E. Davies (services contributed)

Training leader: J. B. Mann

Department of Plant Pathology

University of Minnesota

1991 Buford Circle, St. Paul, MN 55108 /USA

Telephone: (612) 625-4213 Telex: 9103505389

Easylink: #62929192

Project Director: P. S. Teng

Agency for International Development (AID)

S&T/AGR/AP, Washington, DC 20523 / USA

Telephone: (703) 235-8886

Project liaison: C. W. Collier

B. PROJECT PERSONNEL

1. Directly Associated Staff

<u>name</u>	<u>institution</u>	<u>position</u>	<u>FTE</u>
A. L. Steinhauer	UMCP	Project Executive Director, CICP Executive Director, entomologist	0.5
S. F. Miller	IPPC	Project Deputy Executive Director, IPPC Director, agr. economist	0.5

M. D. Shenk	IPPC	Training coordinator, weed scientist	1.0
D. G. Bottrell	UMCP	Technical Assistance Coordinator, Entomologist	0.5
L. C. Burrill	IPPC	Weed Scientist	1.0
A. E. Deutsch	IPPC	PPM Information/Networking Coordinator	1.0
J. B. Mann	UMI	Pesticide Residue Chemist	1.0
P. S. Teng	UMN	Research coordinator, Plant Pathologist	0.38
E. A. Dawes	UCB	Management Specialist	1.0
S. G. Larson	IPPC	Office Manager/Accounting	1.0
R. M. Carr	IPPC	Word Processing/Information Assistant	1.0
J. Lombardo	UMCP	Secretary	1.0

2. Associated Staff

<u>name</u>	<u>institution</u>	<u>position</u>	<u>FTE</u>
J. E. Davies	UMI	Leader Agromedical/Pesticide Residue sub-contract, UMI medical doctor	*
A. S. Cooper	IPPC	Weed Scientist/Computer Specialist	*
A. Fischer	IPPC	Graduate assistant/Weed Scientist	*

* - supported by non-project funds

Appendix 2. SUMMARY OF TRAVEL

date	traveler	itinerary	activities
* Nov. 85	Shenk	El Salvador,	IICA/ROCAP coffee rust course
*		Honduras	Visit EAP
*	Mann	El Salvador	IICA/ROCAP coffee rust course
*	Burrill	Somalia,	AID weed management course
*		Kenya	Meet with REDSO
*	Bottrell	Egypt	Assess pest and pesticide problems; prepare recommendations in IPM research training and technical assistance
*		Kenya	Develop IPM project proposal for Egerton College
* Jan. 86	Shenk	Honduras	Teach course at EAP
*	Burrill	Jordan	Conduct AID weed science course
Feb./Mar. 86	Bottrell	Grenada	Develop plan of work for USAID/Grenada "buy-in"
* Mar. 86	Steinhauer	Italy	Visit FAO and IFAD
		Ivory Coast	Visit REDSO/WA
		Kenya	Visit ICIPE and Desert Locust Control Org. for E. Africa
		Fed. Dem. Rep. of Germany	Visit GIZ
*	Bottrell	Malaysia	Participate in 2nd Int'l. Conf. on Tropical Plant Protection; discuss collaboration
*	Teng	Malaysia	Participate in 2nd Int'l. Conf. on Tropical Plant Protection

SUMMARY OF TRAVEL (continued)

<u>date</u>	<u>traveler</u>	<u>itinerary</u>	<u>activities</u>
*	Teng	Thailand	Review proposed short course
	Paschke	W. Africa	IPM project evaluation
* Apr. 86	Miller, Shenk	Guatemala, Costa Rica, Panama, and Bolivia	Explain objectives and capabilities of CICP-IPPC pest and pesticide management project
*	Shenk,	Washington, DC	AID review of pesticide safety training materials
*	Cooper		
May-Sept. 86	Reissig, Jensen	Thailand	Plan SE Asia Pesticide Workshop
June 86	Bottrell	Grenada	Implement Grenada project
	Shenk	Grenada	Arrange for IPM course
	Mitchell	Peru	Review medfly program
	Cavin	Mali	Insecticide tests on grasshoppers
	Dively	Grenada	Technical assistance and research assistance in pest and pesticide management
	McGlamery	Grenada	Develop a farmer pesticide training program
June-Jul. 86	Zweig	Thailand Malaysia W. Samoa	Pesticide waste and disposal study
	Jensen	Thailand Malaysia	
Jul. 86	Teng	Philippines	Visit IRRI, USAID/Manila
*		Malaysia	Meet with MARDI
		Indonesia	Meet with USAID/Indonesia
*	Barfield	Jamaica	Environmental assessment
*	Cusson	Haiti	
*	Schaefers	Belize	

SUMMARY OF TRAVEL (continued)

<u>date</u>	<u>traveler</u>	<u>itinerary</u>	<u>activities</u>
Aug. 86	Bottrell	Grenada	Facilitate "buy-in" work
*	Steinhauer Cooper	Brazil Davis, CA	Visit ag universities Attend the International Horticultural Congress
	Shenk	Grenada	Conduct IPM course
	Marose, Knapp		Provide technical assis- tance/resource, lecture in IPM course
* Aug.-Sept. 86	Schaefers	Sudan, Ethiopia, Kenya	Locust/grasshopper control
*	Philips	Senegal	
*	Bartholf	Burkina Faso	
* Sep. 86	Shenk	Colombia	Attend FAO regional workshop on weed management and participate as an observer in the FAO Panel of Experts on Weed Management
*	Teng	Italy	Visit FAO
*	Steinhauer	Costa Rica, Honduras	Visit AID-ROCAP and meet with USAID missions

* Travel funds provided from sources other than Contract No.
DAN-4142-C-00-5122-00

Appendix 3. SUMMARY OF LEVEL OF EFFORT

PERSON-MONTHS OF EFFORT FOR THE INTEGRATED PEST MANAGEMENT AND ENVIRONMENTAL PROTECTION PROJECT DURING OCTOBER 1, 1985 - SEPTEMBER 30, 1986

personnel component	activity component				TOTAL
	research	technical assistance	training	networking	
project technical staff	5.9	18.35	25.65	20.6	70.5
consultants	--	19.45	3.05	--	22.5
support staff	--	--	--	--	42.0
			Subtotal		135.0
effort contributed (through IPPC)	3.0	1.7	5.0	9.0	18.7
			Total		153.7