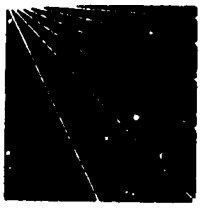

Consortium for International Crop Protection

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CONSORTIUM FOR INTERNATIONAL CROP PROTECTION

PEST MANAGEMENT & RELATED ENVIRONMENTAL PROTECTION PROJECT*

ANNUAL REPORT

TO

AGENCY FOR INTERNATIONAL DEVELOPMENT

OCTOBER 1981 - SEPTEMBER 1982

Ray F. Smith, University of California, Executive Director

Member Institutions:

Cornell University
North Carolina State University
Oregon State University
Purdue University
Texas A&M University
University of California
University of Florida
University of Hawaii
University of Illinois
University of Maryland
University of Miami, Florida
University of Minnesota
University of Puerto Rico
U. S. Department of Agriculture

*Contract No. AID/DSAN-C-0252

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ORIGIN AND OBJECTIVES

The Consortium for International Crop Protection (CICP) is a non-profit organization formed in 1978 by a group of U.S. universities for the principal purpose of assisting developing nations reduce food crop losses caused by pests while also safeguarding the environment. CICP's basic goal is to advance economically efficient and environmentally sound crop protection practices in developing countries. Specific objectives of CICP's programs are to:

* increase understanding of crop protection
* promote development and implementation of integrated pest management programs
* advance the agromedical approach to safe use and management of pesticides
* survey crop protection needs and problems
* develop training programs and educational materials in crop protection and pesticide management
* assess, evaluate and implement crop protection programs
* conduct and supervise research in crop protection and pesticide management

ORIGIN

CICP is a direct outgrowth of an earlier USAID-funded program of technical assistance on pesticides and pest management to developing countries known as the UC/USAID Project in Pest Management and Related Environmental Protection. Administered by the University of California from 1971 to 1980, this project combined the expertise, experience and other resources of nine U.S. universities and the USDA in a common effort to respond to the crop protection needs of less developed countries.

The participating universities in this project established CICP in August 1978 as a separate corporation in order to continue and expand their collaborative efforts to improve and upgrade the crop protection capabilities of developing nations. Since 1980, four additional universities and the United States Department of Agriculture have become members of CICP, thereby adding an even greater dimension of breadth and strength to its crop protection expertise.

CICP is partially funded by USAID and works closely with the Agency in carrying out various programs in the developing countries. A long-term commitment to improving and upgrading the crop protection capabilities of developing nations characterizes CICP's programs and contributes to their relative stability and continuity.

CICP operates under the overall guidance and direction of a fourteen-member Board of Directors, each of whom represents a member institution. This body determines general policy, sets priorities and approves programs. Consortium headquarters are at the University of California, Berkeley.

CICP's programs are managed by an Executive Director and a small staff who implement policies and coordinate activities. The full-time staff includes three pest management specialists, a librarian, an administrative assistant, and other administrative and secretarial office support.

CICP does not award grants; rather, it relies on external funding sources to provide the resources to help developing countries increase the crop protection capabilities of their institutions. CICP also encourages its member institutions to increase their capabilities to

provide technical assistance in collaborative international programs.

CICP member institutions offer a large and diverse technical resource in the areas of crop protection, integrated pest management and agromedicine. This resource includes individuals who are specialists in the following areas: plant pathology, entomology, weed science, nematology, vertebrate pest control, agronomy, plant breeding, plant physiology, agricultural economics, systems analysis, epidemiology, plant virology, pesticide toxicology and chemistry. Specialists in these areas and the CICP staff are the primary technical resource for CICP. CICP has a computerized data bank which contains information on an individual's area of expertise, language ability, and familiarity with a given crop, pest or pest complex, or geographical region. This system assists in the identification of specialists with specific skills and experience and allows CICP to respond quickly to organizations requesting qualified individuals to carry out specific short- or long-term assignments.

RESPONSE TO USAID MISSION REQUESTS FOR TECHNICAL ASSISTANCE

At the request of USAID Missions overseas, CICP provides short-term consultants to assist with pest and pesticide management projects. This work is undertaken with a view to avoid hazards to pesticide applicators and the environment by assuring that appropriate pesticides are safely and judiciously used within an integrated pest management framework.

Niger October 18-23 and October 30-November 4, 1981, and May 8-28, 1982

CICP continued its longstanding provision of technical assistance to USAID/Niger for projects including crop protection. In this capacity, Pest Management Specialist P. C. Matteson paid three visits to the Niamey

Department Development Project. The project is an integrated rural development effort that teaches farm families improved agricultural techniques (including pesticide application) at residential training centers. Dr. Matteson consulted on a change to pesticides that are relatively safe for applicators and the environment and on the testing of promising chemicals and innovative sprayers for cowpea pest control. A joint program was established with GTZ researchers attached to the Crop Protection Service, and ties between the project and the CPS were strengthened. Arrangements were made for the shipment of essential experimental equipment from CICP, and for the collection and analysis of pesticide residue samples from the treated cowpea fields. Roussel UCLAF cooperated in this effort, which yielded residue data on the synthetic pyrethroid cypermethrin that was useful to both the producer and to the Niamey project.

In May, 1982, Dr. Matteson undertook a factfinding assignment for the USAID Mission, reporting on the status of the Niger component of the CILSS Sahel Regional IPM Project and how the Mission could support and, if necessary, manage it.

Mali November 4-14, 1981

CICP Pest Management Specialist P. C. Matteson completed an Environmental Assessment/risk-benefit analysis and guidelines for the use of pesticides in the Semi-Arid Tropics Crops Research Projects, Phase II. This is an AID-funded program implemented by ICRISAT to develop a series of technical packages on millet, sorghum and grain legumes in the 400-1200 mm rainfall zone of West Africa, and to make them available to small farmers and herders.

Pesticides are currently used on a very modest scale for seed treatment, termite control, seed storage and some field pests. Dr. Matteson completed a risk-benefit analysis of these use patterns. In addition, ICRISAT researchers requested the preparation of a list of recommended pesticides for possible future use on project crops. This entailed a survey of pesticide availability in Mali and consultations with national entomology and weed science researchers. The final document also included guidelines for proper pesticide handling as well as for safety precautions and safety apparel for project staff.

Mexico February 8-14, 1982

The U.S. Ambassador to Mexico noted an apparent insect problem on ash trees, Fraxinus spp., in Mexico City. At the Ambassador's request, F. W. Howard, Associate Professor of Entomology at the University of Florida, appraised the problem and made recommendations. Dr. Howard concluded that the ash plant bug is probably a major pest, with infestations aggravated because urban pollution kills its natural enemies. Recommendations were for research on the life history, ecology, and natural enemies of the ash plant bug in Mexico, with a view to controlling it through the establishment of new natural enemies or by other ecologically and economically sound means.

Senegal, Cape Verde and Guinea-Bissau, Africa March 5-28, 1982

AID's Regional Food Crop Protection (RFCP) Project, West Africa, has centered on infrastructural and training support to national crop protection services in Cape Verde, Mauritania, the Gambia, Senegal, Guinea-

Bissau and the Cameroons, In accordance with recommendations of the 1981 evaluation, the third phase is to be reoriented toward integrated pest management extension for small farmers, and will be complementary to the AID-funded CILSS IPM Research Project that covers most of the same countries. Some applied research will help establish economic thresholds for pesticide use, sampling and surveillance methods.

A. L. Steinhauer, Chairman of the University of Maryland Department of Entomology, and P. C. Matteson, CICP Pest Management Specialist, attended the project's semiannual meeting in Dakar, Senegal. They helped project staff modify their workplans in accordance with new project aims and Dr. Steinhauer led a discussion session on crop loss assessment techniques. It was clear that further research guidance would be needed, and Dr. Steinhauer prepared a set of written guidelines for crop loss assessment and the establishment of tentative action thresholds for pesticide application, as well as arranging for a research specialist from the University of Maryland to come to Senegal to advise project staff in the field.

Dr. Steinhauer then visited RFCP countries Cape Verde and Guinea-Bissau to explore the possibilities for IPM extension. He found a virtually complete lack of IPM technology and extension capability in both countries, and helped plan workshops and other activities to improve the awareness and skills of local personnel.

In August, 1982, Dr. Matteson served as technical resource person in a meeting of the Bureau for Africa Executive Committee for Project Review. She spoke in favor of a one-year extension of Phase II of the RFCP Project, as a transitional period for the reoriented program. The Committee approved these plans.

Cook Islands, Tahiti, Western Samoa, Fiji April 18-May 10, 1982

CICP Pest Management Specialist D. G. Bottrell visited the South Pacific to review pesticide use in projects financed by AID, to assist U.S. Peace Corps volunteers in acquiring information on pesticides and alternative methods of control, and to assist AID's South Pacific Regional Development Office in Suva, Fiji with matters pertaining to pesticide use in AID-financed projects.

Panama July 4-25, 1982

The Agricultural Technology Transfer System Project will assist the Panamanian Ministry of Agriculture to establish a national extension service. This organization is to disseminate appropriate agricultural technology and practical information to small farmers, with the goal of expanding their production and improving their income. E. Vogel, CICP consultant, prepared an environmental assessment of pesticide use within the project, reviewing proposed chemicals. He recommended the development of a pesticide users' manual for small farmers and pest management "train-the-trainer" courses for extension agents in order to insure that the planned technology transfer is safe and effective.

Barbados July 5-20, 1982

C. S. Koehler of the University of California completed Environmental Assessments of pesticide use in two projects for USAID/Barbados: the Caribbean Agricultural Trading Company (CATCO) Project, and the Dominica Banana Company Project. CATCO will distribute farm inputs on a regionwide basis, channeling them to farmers through established wholesalers and retailers.

Dr. Koehler advised on appropriate pesticides and arranged for compliance with Barbados' pesticide regulations, spot-checking of pesticide residues on traded produce, and the production of a crop protection manual for CATCO customers that describes proper pest management practices and pesticide safety measures. For Dominica, he reviewed pesticides appropriate for bananas, the principal cash crop.

Belize July 22-31, 1982

The Caribbean Basin Initiative (CBI) will extend trade concessions and tax credits to U.S. investors in order to enhance the economic status of the Caribbean countries. The CBI is expected to have a major impact on agriculture in Belize: expanded acreages, improved crops, more efficient crop protection practices and better-developed markets.

At AID request, CICP assigned C. S. Barfield of the University of Florida to explore the potential consequences of the CBI on crop production and protection. He reported on alterations in present crop protection practices that will be necessary for CBI funds to be used legally under the environmental guidelines of USAID (Environmental Procedures, 22, CFR Part 216) and USEPA (Chapter 1, Section 162, EPA Guidelines). Dr. Barfield made a strong recommendation that USAID work with the Belizean Ministry of Natural Resources to establish guidelines and training programs for registration and safe use of pesticides in Belize, and that procedures be developed to monitor pesticide use patterns. This will be mandatory to minimize harmful health side-effects of pesticide use and to check that crop managers are using pesticides properly.

Tunisia August 1-14, 1982

Refinements in the Central Tunisia Rural Development/Rural Extension and Outreach Sub-Project meant that some pesticides would be used on demonstration plots on farmers' land. USAID/Tunisia requested CICP assistance with the necessary Environmental Assessment. G. A. Schaefers of Cornell University went to Tunisia to complete the assignment.

The project seeks to improve communication within farming communities, enhancing the quality of life in 11 areas in central Tunisia that are largely suited to cereal culture but with some vegetable and fruit production in irrigated regions. Dr. Schaefers reviewed crop protection plans in a research and training farm, plant production nurseries and demonstration plots. He developed guidelines for the selection and handling of pesticides and advised on proper storage facilities and safety precautions and the necessary training for project staff who handle pesticides.

PROGRAM EVALUATION AND DESIGN

AID/Washington or USAID Missions overseas often call upon CICP to evaluate projects involving crop protection, and to participate in the design of agricultural projects. This ensures that proper provision is made for pest management, and that, as far as possible, an IPM approach is taken toward crop protection. Such an approach safeguards the health of the environment and of pesticide applicators through conformity with AID environmental regulations and pesticide safety policy. It also ensures superior crop protection on the long term through a balanced pest management program that favors cultural and biological controls where they are economical and effective, avoiding unnecessary pesticide use.

Secondary Food Crops Development Project, Indonesia January 28-February 28, 1982

W. W. Allen of the University of California, Berkeley, travelled to Indonesia to assist in the preparation of a project paper for the Secondary Food Crops Development Project and to write an Environmental Assessment of pesticide use in the project. This task required a survey of pest problems, the formulation of pest control methods for corn, soybeans, peanuts, mung beans and cassava, and the planning of measures to stimulate pest management research, improve training of pesticide users, improve pesticide storage and provide for the monitoring of pesticide use.

Bases of Plant Resistance to Insect Attack, Kenya June 17-July 12, 1982

CICP consultant F. G. Maxwell of Texas A&M University headed a four-man team that went to Kenya to write a "Bases of Plant Resistance to Insect Attack" project paper for USAID. This is an ongoing program at ICIPE, centered on food crops in a small farm context. The team visited ICIPE facilities in Nairobi, Mombasa and Mbita Point (on Lake Victoria), Ministry of Agriculture officials, and other agriculture-related projects that are current or possible collaborators.

Project activities will support the most effective means of providing the African small farmer with better crop protection: breeding for host plant resistance. The project will obtain germplasm previously screened for insect resistance by other organizations, confirm the reported resistance at Mbita Point, characterize its mode of action and study the basic mechanisms, including the effect of various levels of resistance on pest population dynamics over time. In addition, methodology and techniques are being developed for improved identification of resistance and tracking the

inheritance of resistance in subsequent crosses. The program, besides producing useful research results, will provide an excellent and unique postgraduate and postdoctoral training opportunity for African specialists.

Peru Integrated Crop Protection Program June 23-July 11, 1982

CICP fielded a four-person team to survey the nature and magnitude of Peruvian food crop protection problems and develop a strategy for creating and managing a comprehensive integrated crop protection program there. The team was composed of M. E. Irwin, entomologist, University of Illinois; L. K. Bond, agricultural economist and extension specialist, Utah State University; J. W. deGrazio, vertebrate pest management specialist, Denver Wildlife Research Center, Department of the Interior; and M. D. Shenk, weed scientist, Oregon State University.

In order to develop the implementation guidelines, human, equipment and supply resources and facilities needed to carry out a national program were assessed. Shortfalls in resources were identified, and a determination was made of the extent to which these shortfalls can be met by recent and impending contracts between the Government of Peru and various donors, including the World Bank, the Inter-American Development Bank, and AID. The team found that the time is right for Peru to mount a major, nationally coordinated effort in crop protection. This should revitalize a once-strong capability that has been nearly destroyed during a recent sustained period of suppression and decline.

It was recommended that the national crop protection program be implemented cooperatively by the Instituto Nacional de Investigación y Promoción Agropecuaria (INIPA), which is the legal entity responsible for national crop protection, and the Universidad Nacional Agraria,

which possesses the necessary pool of professional talent. Personnel and budget limitations make it advisable to establish a central National Integrated Crop Protection Center at La Molina, with highly trained experts in various crop protection disciplines who could be on call to regional and local projects to help set up experiments and solve specific problems. Pest identification, literature assemblage, statistical, word processing and editing capabilities could also be made available there. The biological control unit within INIPA is singled out for more funding and a significant role in the national center. A crash program in vertebrate pest management is also proposed, since this is an important area which has been neglected up until now.

Pilot integrated crop protection projects are proposed for four specific sites: The Lambayeque Valley, Tarapoto and the Mantaro Valley for annual food crops, and the Alto Huallaga for perennial crops. Their research findings should form the technology base to be transferred to the extension structure.

Perhaps the most urgent and important recommendation is for massive integrated crop protection training at all levels as the only avenue to the establishment of a long-term national program.

REGIONAL PEST MANAGEMENT SPECIALIST ACTIVITIES

The CICP Regional Pest Management Specialist (RPMS), E. E. Trujillo, has functioned as a member of the AID/ROCAP staff, Guatemala City, since 1980. In this capacity, and as an extension specialist in crop protection, the RPMS has travelled to all the countries of the region on request except for Nicaragua. Advisory services were provided to the USAID missions for crop protection programs, pesticide use and safety and other priority

areas dealing with pest management. These services have also been extended to the national departments of Sanidad Vegetal and other regional institutions dealing in IPM and pesticide use as it relates to plant, animal and human health. The RPMS has also maintained close ties with some of the regional institutions, particularly the International Regional Organization of Plant and Animal Health (OIRSA) and the Central American Institute of Research and Industrial Technology (ICAITI).

IPM Needs in the Central America and Panama Region July 4-August 7, 1982

One of the responsibilities of the RPMS is to give encouragement, guidance and assistance toward the development of IPM in the Central America and Panama (CAP) region. In this capacity, Dr. Trujillo and CICP consultant W. C. Mitchell of the University of Hawaii undertook a factfinding mission to Panama, Costa Rica, Guatemala and Honduras. Their objective was to survey organizations and institutions with a view to present and future IPM capabilities. This included availability of trained personnel, financial support for IPM, laboratory, academic, library and computer facilities, major pest problems, ongoing research, and other relevant items. These were detailed for each country in a report published by CICP.

Among their recommendations for bolstering future IPM capability in the CAP region were a greater emphasis on IPM subjects in academic curricula, an inventory of regional crop pests, better integration of the different crop protection disciplines (entomology, plant pathology, weed science, nematology, etc), and the establishment of a regional pest identification laboratory. In general, research support (facilities, equipment, supplies) was found to be inadequate. Lack of vehicles or

spare parts and money to buy gasoline and inability to maintain scientific equipment were common problems. These call for a more judicious use of financial resources and better training for maintenance technicians.

Technical Assistance

Panama December 12, 1981-Jaunary 23, 1982. The Instituto de Investigación Agropecuaria de Panamá (IDIAP) has given high priority to the development of IPM for crops on which pesticides are widely used. This involves the creation and coordination of IPM research teams to deal with grains, fruits, vegetables and agro-industrial crops within specialized experimen- l centers, as well as with the promotion of training and technology ısfer to applied research at the farm level. Dr. Trujillo assisted IAP in the development of a national plan for IPM, including pest verification, biological controls, improved overall farm management practices and dissemination of IPM information to producers.

Honduras January 28-29, 1982. The RPMS assisted USAID/Honduras with IPM and pesticide recommendations for the Small Farmer Coffee Production Project and a malaria control project.

Guatemala Ongoing. The solutions provided to the cardamom industry of Guatemala are a good example of how much help can be provided to CAP countries by a well selected consultant from an American university. Cardamom mosaic virus, a serious pest of the crop, needed to be purified to develop a plant indexing virological technique for the detection of the virus in planting material. This program was carried out with a minimum of support from AID, but with full support of the Guatemalan private

sector and a great amount of scientific inquiry on the part of Dr. Dennis Gonsalves from Cornell University at Geneva, New York. Dr. Gonsalves participated with the RPMS on initial surveys of the cardamom fields of the Pacific and Northern sections of the country in 1980 and 1981. In late 1981, Dr. Gonsalves received a grant from the Cardamom Association to develop the virus identification technique, which involves enzyme-linked immunofluorescent assay (ELISA). Throughout this association, the RPMS has cooperated closely and has been the liaison between Dr. Gonsalves and the Cardamom Association. Dr. Gonsalves was successful in purifying the cardamom mosaic virus and conjugated the enzyme in 1981. In early 1982, under the auspices of the Association, he came to Guatemala to give a week's training in ELISA and virology sampling techniques to selected Guatemalan technicians.

Training

The RPMS, assisted by CICP experts from member universities in the U.S., conducted four workshops in plant disease diagnosis for members of the National Departments of Sanidad Vegetal of the CAP region. Two of these were held during the period covered by this report. A plant mycology workshop was conducted in Zamorano, Honduras, November 30-December 8, 1981 with co-instructors J. Amador from Texas A&M and M. Contreras from the Pan American Agricultural School, Honduras. A virology workshop was held in Weslaco, Texas, April 18-May 1, 1982, with teaching assistance from R. Toler, B. Villalon, and J. Amador, all from Texas A&M University.

The workshops in plant disease diagnosis have contributed an important body of knowledge to the region, especially since most countries nominated the same participants to attend all four workshops in plant disease diagnosis, fulfilling an objective of this training. The work-

shops are considered to have met a need in crop protection that can usually only be handled after several years training at a US institution of higher education. It is hoped that this nucleus will serve future RPMS programs, particularly an inventory of economic pests for the region.

Dr. Trujillo has not only participated actively in the instruction programs of all these workshops, but he has been instrumental in planning and coordinating the subject matter covered and functioned as educational training officer, controller, scientific translator and liaison person. The same activities were undertaken for the CICP/AID/ICTA short course in IPM held in Antigua, Guatemala, in November of 1981. The RPMS also lectured and provided backstopping for a Honduran national IPM short course sponsored by USAID, CICP and the Government of Honduras March 22-April 2, 1982. From February 28 to March 6, 1982, Dr. Trujillo participated in the III FAO Consultation Meeting on the Appropriate Use of Pesticides in the Americas, Mexico City.

RESEARCH ACTIVITIES IN SUPPORT OF THE PHILIPPINES NATIONAL CROP PROTECTION CENTER

The National Crop Protection Center (NCPC) on the Los Baños campus of the University of the Philippines received a loan from USAID for training, equipment and technical services to upgrade and expand the Center and its activities. With part of these funds, the Philippine Government entered into a contract with CICP for the provision of expert consultants in areas where skilled national personnel were not available. Six experts were attached to NCPC, four for three months and two for eighteen months.

Integrated Pest Management

T. R. Everett, independent consultant, was posted to NCPC from

October 1, 1981, to March 31, 1983, as Pest Management Specialist and CICP Team Leader. He was responsible for initiating a research, training and extension/liaison program that would provide an example of integrated pest management technology. At the request of NCPC, this effort was focused on control of the Asian corn borer, Ostrinia furnacalis (Guenée). The program provided information for initiating (at selected Regional Crop Protection Centers) a verification trial of technology generated by the NCPC and funded by the Philippine Council for Agricultural and Resources Research. These trials will provide on-farm testing of a pest management system based on insecticide applications restricted to infested plants and on detasseling to reduce corn borer population. This technology has potential for reducing pesticide usage by as much as 23,664,000 pesos while increasing yields by 1½-2 tons/ha on the 200,000 ha of maize under the Masagana program.

Expertise in modeling and pheromone trapping studies for application in pest forecasting was provided for an 18-month period by J. A. Jackman of the Texas A&M University Agricultural Extension Service. From March 1, 1982, to September 30, 1983, Dr. Jackman pursued a variety of activities related to the modeling of pest/crop interactions, primarily those of the Asian corn borer in maize. To develop this model, he initiated work on rearing of the borers to develop data on the relationship between temperature and borer development and gathered and analyzed information on crop losses to Ostrinia spp. under varied circumstances. Using this information, he also developed a static model to determine economic thresholds given values for expected yield, price of the crop and control costs. Another major activity was the testing of various types of pheromone traps for use in Asian corn borer pest monitoring programs. Cooperative work was initia-

ted with the Philippine-German Crop Protection Project. The German Project is implementing a surveillance and early warning system, and yields data useful for testing the corn borer model.

Much of Dr. Jackman's effort was devoted to training activities in his speciality areas. While he was in the Philippines, he gave numerous seminars on modeling and on his program, and attended and participated in pest management meetings. His major training endeavor was a modeling course for 14 students (NCPC staff and University staff and students) presented as a "special problem" course at the University of the Philippines. Topics covered included ecology, mathematics, computer programming, modeling techniques, implementation and advanced topics in simulation. Students worked on their own individual projects with this instructional support. Graduates of the course were able to implement key aspects of applied modeling for crop protection to:

1 - Construct relationships between crops and pests;

2 - Compute growth rates, death rates and other basic life functions;

3 - Relate weather parameters to pest populations;

4 - Diagram pest and crop systems;

5 - Develop conceptual and functional models of pest/crop interactions;

6 - Use simulation to forecast pest populations; and

7 - Plan delivery systems with pest information and decision aids for users in the field.

Pest Management Extension

IPM systems are of value only insofar as they are usable and adopted by farmers. R. Lawless, University of Florida sociologist, and

C. W. Boothroyd, Cornell plant pathologist/extension specialist, were engaged by CICP for three-month consultancies to advise on improving NCPC extension activities and farmer acceptance of recommendations.

Dr. Boothroyd, three NCPC training and research specialists and an instructor from the Department of Entomology, University of the Philippines, formed an NCPC Committee on Extension and Training. They studied the NCPC Extension and Training Program and made recommendations for its improvement. The Committee interviewed key administrators and staff, surveyed available personnel and facilities, inventoried training materials and publications, reviewed academic programs in crop protection, attended farmer training sessions and administered questionnaires to farmers and extension agents. Recommendations made in the Committee's final report included increasing personnel with extension responsibilities, creating an Extension and Training Materials and Publication Center and a Training Materials Preparation Center, maintenance of a pest diagnostic laboratory in cooperation with the University, and strengthening of extension-crop protection education in the agricultural colleges of the Philippines.

Sociologist R. Lawless reviewed the status of sociocultural research in crop protection in the Philippines through a survey of institutions, interviews with key individuals, investigations of facilities and inspection of data and references available in Los Baños. He found a vast foundation for agricultural research but little institutional support for sociocultural research, and concluded that the sociocultural content that is needed in extension and training programs has not yet been realized.

A series of guidelines and recommendations for enhancing socio-cultural inputs to crop protection was developed. Emphasis was placed on perception and decision-making models rather than questionnaire-survey work. In addition, Dr. Lawless laid the groundwork for future activities by preparing a guide to available literature and by strengthening ties to potential cooperators: the University social science faculty, the Programme for the Perception and Management of Pests and Pesticides, the FAO, and numerous agro-sociology programs abroad.

Pesticide Toxicology

A three-month consultancy in pesticide toxicology was completed by W. S. Bigley, independent consultant, between October 23, 1981, and January 26, 1982. Dr. Bigley worked with the toxicology and residue laboratories affiliated with the National Crop Protection Center at the University of the Philippines, Los Baños. He found the NCPC toxicology and residue laboratory staff to be well-trained, dedicated and capable of independent research. They work effectively and congenially as a team. This productive atmosphere is responsible for the maintenance of a highly efficient research effort and impressive work output.

Dr. Bigley evaluated and assisted pesticide research programs, helped set up equipment and advised on its use, and studied the magnitude of Philippine problems with improper use of pesticides and with pest resistance to pesticides. The latter prompted recommendations for the establishment of permanent insecticide monitoring and screening laboratories in all major crop regions, for techniques that can help cope with and minimize the development of resistance in pests, for residue monitoring at farm and higher levels, and for ways to integrate pesticides more effectively into IPM programs.

Instrumentation

Instrumentation Specialist T. E. Acree of the New York Agricultural Experiment Station, Geneva, was attached by CICP to the Pesticide Toxicology Laboratory at NCPC from December 2, 1982 to February 27, 1983. During his consultancy, he was able to assist in gaining approval for the purchase of a gas chromatograph/mass spectrometer/data system (GC/MS/DS). He also developed appropriate specifications for the system within the terms of the bids and designed an acceptable environment for its operation and installation. Installation was not possible before the end of the consultancy, but he was able to assist with installation and trouble-shooting for other equipment at the Center.

The most important pre-installation requirement for the GC/MS/DS, as well as for some of the new computational hardware presently on order at NCPC, is the availability of stable and reliable electrical power. During January and February, Dr. Acree measured and recorded voltages at the NCPC laboratory and several other locations on the University campus. He located an excellent source of power very near NCPC and designed an affordable modification to the electrical network supplying the laboratory.

A design for the layout of the new Pesticide Toxicology Laboratory was developed in cooperation with the NCPC staff. The plan promotes the safety of the personnel and the useful life of the analytical equipment. Dr. Acree had frequent discussions with the staff about the materials and methods needed to maintain constant temperature, and non-condensing and dust-free environments. He was also able to assist in the negotiations with the vendors of GC/MS/DS instruments so that many of the accessories needed to maintain the equipment were included in the bids. Individual staff members were taught how to operate and repair various types of

analytical equipment that had been placed on order.

TRAINING ACTIVITIES

A most important area of activity for CICP is training. Lack of properly-trained personnel and ignorance of appropriate crop protection methods and pesticide management measures are at the root of many pest and pesticide problems in the developing world. The provision of effective training is one of the most valuable forms of technical assistance. CICP fields a variety of programs which are described here and in the sections on "Regional Pest Management Specialist Activities" and the "Pesticide Residue Analytical Training Program."

International Course on Integrated Pest Control, Antigua, Guatemala

October 26 - November 19, 1981

This four-week short course was held for plant protection specialists from the countries of Central America and Panama. It was devoted to a review of the basic principles of integrated pest management and the fundamentals of the major plant protection disciplines. It also featured consideration of the current control programs for pests and diseases of specific crops important in the region as well as the presentation of reports by participants from Guatemala, Honduras, El Salvador, Costa Rica and Panama on the general crop protection situation in their respective countries.

The course was sponsored by CICP, AID/ROCAP and the Instituto de Ciencia y Tecnología Agrícola (ICTA), with the collaboration of the Instituto Interamericano de Cooperación para la Agricultura (IICA) and the Centro Internacional de la Papa (CIP). CICP supported several of the students and participation by seven lecturers: D. J. Calvert, CICP Pest Management Specialist; D. Gonzalez, University of California, Riverside;

M. Irwin, University of Illinois; T. A. Granovsky, Texas A&M University; F. Cisneros, Universidad Nacional Agraria, Peru; J. Quezada, University of California, Berkeley; and W. R. Coffman, Cornell University.

The course was very well-received and led to the formation by the participants of a regional IPM Association, the "Asociación Centroamericana y de Panamá de Control Integrado de Plagas," as well as national IPM groups. The Guatemalan group, "Asociación Guatemalteca de Manejo Integrado de Plagas," went on to host a regional integrated pest management congress in February, 1983.

Concepts, Techniques and Application of Integrated Pest Management in Rice in West Africa, Fendall, Liberia January 10-28, 1982

This two-week short course was sponsored by the West Africa Rice Development Association (WARDA), CICP and AID, in collaboration with various national and international organizations involved in work on rice in Africa. It was offered in English and French (by simultaneous translation) at the WARDA Training Centre to 29 trainees from 13 of 15 WARDA member countries.

The course met the following four objectives:

1 - To introduce the presently available concepts and promising techniques, and application of integrated pest management in rice to extension and research officers and project supervisors working on projects related to rice pest control in the WARDA region.

2 - To review pest problems affecting rice in West Africa and the present approaches to their control.

3 - To establish mechanisms for effective dialogue and coordination among rice protection specialists in the WARDA region.

4 - To determine the subsequent need for IPM training for personnel of the WARDA Regional Programme on the Integrated Management of Pests of Rice in West Africa.

In addition to lecture presentations, the course included a field trip to the Central Agricultural Research Institute, Suakoko, and a panel discussion on post-harvest rice pest control. Students divided themselves into three agroecosystem teams for irrigated, swamp,and upland rice, preparing and presenting status reports and recommendations concerning training needs, research requirements, etc.

CICP sponsored four course lecturers: Pest Management Specialists D. G. Bottrell and P. C. Matteson, P. Kenmore of FAO, the Philippines, and C. M. Smith, Louisiana State University. The Consortium also bore a major portion of the course's other costs, including per diem and travel costs of regional lecturers, travel costs and other requirements of the trainees, and publication of the proceedings. Dr. Bottrell revisited WARDA June 26-28, 1982, in order to wrap up short course business and plan appropriate follow-up activities.

Curso Nacional de Control Integrado de Plagas en Granos Básicos y Hortalizas, Comayagua, Honduras March 22-April 2, 1982

CICP sponsored M. Irwin, entomologist from the University of Illinois, as a lecturer for this Honduran national IPM short course. E. Trujillo, CICP Regional Pest Management Specialist, also lectured as well as provided backstopping. The other sponsors were USAID and the government of Honduras.

Train the Trainer Course in Pesticide Safety, San Lorenzo, Paraguay May 25-28, 1982

A four-day training course was held at Extension Service Headquarters in San Lorenzo for 23 participants: eight from the Extension Service, five from CREDI-COOP (an AID-sponsored program that does extension work), three from the National Seed Certification Service, six from the Peace Corps and one representative from a regional agricultural school. It was also the occasion for testing pesticide safety training materials developed for CICP by T. Granovsky and H. Howell, Jr., of Texas A&M University.

After the course, arrangements were made for three more field tests in which the course materials were used in turn by the students to work with farmers. Two weeks' activity by Granovsky, Howell, and instructor/evaluator J. I. Grieshop, Extension Specialist, University of California, Davis, accomplished all the objectives set: creating the opportunity to test materials, content and approaches for training trainers in relation to pesticide safety; providing information about the safe use of pesticides to a group of field professionals; and developing the beginnings of an evaluation of the course and its impact.

International Group Training Course on Components Essential for Ecologically Sound Pest and Vector Management Systems, Nairobi, Kenya July 18-August 6, 1982

This training course was sponsored and organized by ICIPE and UNEP. At the request of the Coordinator, CICP provided two U.S. lecturers to participate; H. T. Reynolds from the University of California, Riverside, who spoke on "Development of Integrated Pest Management for American

Cotton Pests," and J. L. Stimac of the University of Florida who made a presentation on "The Use of Computers in Pest Forecasting."

The course was designed to acquaint young scientists actively engaged in insect pest and vector management,and/or who are starting their careers in this field, with recent advances in the fields of pest and vector management and environmental ecology. Emphasis was placed on the impact of chemical control tactics used against insect pests and disease vectors. African case studies were used to provide specific examples of pest management programs that are consistent with the philosophy described in initial lectures.

Train-the-Trainer Program: The Agromedical Approach to Pesticide Safety, Trinidad and St. Lucia, West Indies September 15-22, 1982

Agromedicine is the integrated, interdisciplinary application of the skills and knowledge of agriculture, applied chemistry and medicine for protection from vector-borne diseases and the safe global production of enough food to meet the health and nutritional needs of man. With relation to pesticide management, four of the most serious current agromedical problems are pest resistance to pesticides, human and animal poisoning, persistence of certain pesticides that results in chronic occupational and incidental exposure, and disposal of pesticide containers and old, outdated stocks of pesticides. These problems are most severe in the developing countries and it is important that policymakers, researchers, field technicians and farmers understand them and know how to handle them properly.

Two three-day train-the-trainer programs were conducted in conjunction with the government of Trinidad and Tobago, PAHO, CARDI and

CICP. They were taught by a team composed of J. Davies and R. Levine of the University of Miami School of Medicine and V. Freed, Oregon State University, with support from J. Grieshop, instructor/evaluator, University of California, Davis.

The purposes of the training were:

1 - To test, in realistic situations, the agromedical training materials and programs;

2 - To train agricultural and health professionals from the Caribbean area in the agromedical approach, so that they will be better informed and better skilled to perform as agromedical practitioners; and

3 - To facilitate the development of country or regional agromedical associations.

The two sites and courses provided realistic settings for tests of the materials and programs. A number of "lessons" were learned from these tests and changes and improvements in the materials, the training design and training methodology will be implemented as a result. Such modifications should lead to improvement of an already good program and increase the likelihood that it will be effectively used in other countries. At both locations, there was movement toward the creation of country agromedical associations.

PESTICIDE RESIDUE ANALYTICAL TRAINING PROGRAM

CICP founded a program to provide assistance to developing countries to create a pesticide residue analysis capability and also to develop a coordinated program that would assist in the development and maintenance of uniform standards of operation among pesticide

residue laboratories in participating countries. Early in 1974, a subcontract was negotiated between the University of California and the University of Miami, Florida, for the purpose of providing the services of a specialist in analytical pesticide chemistry, who would develop and direct this program and who would also conduct followup training. The current director is J. B. Mann.

The quality control program tests recipient laboratories' ability to correctly analyze pesticide residue samples sent out from the University of Miami. Their performance allows Mr. Mann to measure the capabilities of each participating laboratory, evaluate the methodology used in residue analysis, and determine any specific training that would be required to upgrade and standardize their work. This program continued throughout the period covered in this annual report.

Mr. Mann developed a training manual, "Manual for Training in Pesticide Analysis," that describes standardized procedures and methodology for analyzing samples. It is used in training programs at the University of Miami which complement the quality control program. These are formal six-week courses providing practical knowledge in sample extraction and cleanup, use of analytical equipment and identification/quantification, in addition to the presentation of basic information on the chemistry and fate of pesticides in the environment. Three of these courses were given starting September 14, 1981,and May 3 and September 20, 1982. The majority of the trainees were chemists assigned to analytical laboratories, and the course is adapted as much as possible to meet their individual needs.

Besides running the quality control and training programs, the

staff of the analytical laboratory at the University of Miami assists in the analysis of samples when asked to do so by AID. In April, 1982, USAID/Guatemala requested the analysis of two cereal products specially formulated to feed children, with cottonseed meal as a protein source. Mission personnel were apprehensive about excessive pesticide residues in the cereals because Guatemalan cotton fields are heavily sprayed with DDT and a number of other insecticides. However, only trace amounts of pesticides were found in the samples in question.

CONFERENCES

CICP personnel and selected members of U.S. member institutions attend major workshops and conferences related to crop protection and pesticide management in the developing world. They lend their expertise to policymaking and planning sessions, present scientific papers, and help provide monitoring and advice for international projects while adding to their own knowledge and staying up-to-date on developments in their areas of specialization.

ICRISAT/IDRC Second International Striga Workshop, Ouagadougou, Upper Volta, October 5-8, 1981

This workshop centered on the Striga problem encountered by small farmers in Africa. P. C. Matteson, Pest Management Specialist, represented CICP. Scientific staff from agricultural institutions throughout the Sahel were present, as were specialists from ICRISAT and SAFGRAD regional crop improvement programs, the USDA Striga laboratory in North Carolina, and U.K. Weed Research Organization.

Presented papers reviewed knowledge to date on the assessment

of crop losses to this parasitic weed, biosystematics, development, host ranges and control methods for Striga spp. important in agriculture. The Sahelian species S. hermonthica, which attacks millet and sorghum, and S. gesneroides, attacking cowpea, were the focus of the discussion. No easily and universally effective Striga control measures for subsistence agriculture can be suggested as yet. Where farm economics permit, crop rotation, trap cropping and fertilization can ameliorate the problem. Destruction of the plants before seed production will help if the farmer persists for several years.

After the workshop, Dr. Matteson was asked by two weed scientists to accompany them in a field study of possible pollinators of S. hermonthica in Upper Volta. S. hermonthica is an outcrossing species, and little is known of its pollination biology. Observations implicated Bombyliidae (Diptera) and Lepidoptera as the major pollinators.

OAU/International Scientific Council for Trypanosomiasis Research and Control Biannual Meeting, Arusha, Tanzania, October 19-24, 1981

About 200 scientists from Africa and Europe attended this OAU meeting. D. A. Carlson of the USDA Insects Affecting Man and Animals Research Laboratory, Gainesville, Florida, was sponsored by CICP and presented the results of his recent research with two invited papers and coauthorship of a third: "Chemical Taxonomy in Glossina species," "Sex Pheromones in Glossina pallidipes," and "Autosterilization of Glossina morsitans Using Sex Pheromone and Chemosterilants."

Dr. Carlson's first presentation described the use of gas-liquid chromatography of paraffins isolated from tsetse flies to identify different sexes and species, even by analysis of single flies.

Considerable interest was evoked by the talk, and samples of known tsetse species were promised for analysis by scientists from seven African countries.

The second paper concerned isolation, identification and synthesis of the major component of the sex stimulant pheromone of Glossina pallidipes. Such pheromones are contemplated for use with decoys in field traps for autosterilization of male flies. This trapping was the subject of the third paper, and preliminary plans were made at the conference for testing of such a system on an island in Lake Kariba, Zimbabwe.

On his way to the conference, Dr. Carlson visited the Tropical Products Institute, London, to discuss tsetse fly attractants isolated from cattle emanations and recent progress using laboratory and initial field bioassays, Also discussed were TPI-patented microencapsulated insect attractant pheromones for overseas use in a cooperative effort with Imperial Chemical Industries, Ltd.

Second Session of the FAO Committee of Experts on Pest Control, Eschborn, Federal Republic of Germany, October 19-22, 1981

The FAO Committee of Experts on Pest Control is a distinguished group of plant protection specialists from both developing and developed countries that has policymaking, coordinating and oversight responsibilities for international pest control programs. R. F. Smith, CICP Executive Director, attended as a consultant to FAO.

A major focus of the meeting was the FAO/UNDP Action Programme for Improved Plant Protection. In the aftermath of the desert locust outbreaks in 1977/78 and the various efforts undertaken to reduce losses caused by pests, there was a strongly felt need to develop a more viable

world system of plant protection with first emphasis on the African continent. Toward this goal, the Programme is collecting basic information on the state of plant protection in various countries, identifying the shortcomings, and determining the requirements for improvement. The Committee of Experts reviewed progress to date and strategies for improvement of crop protection, including where and what actions should be undertaken, the best approaches, prioritizing of projects, responsibilities of the various parties concerned, funds required, and mechanisms for strengthening and coordinating the work of the Action Programme.

General international crop protection policy was also discussed. Among the subjects were a review of major issues and actions, international collaboration, economic aspects of pest control in developing countries, and pesticides in agriculture.

Eleventh Session of the FAO/UNEP Panel of Experts on Integrated Pest Control, Kuala Lumpur, Malaysia, March 5-10, 1982

Dr. R. F. Smith, CICP Executive Director, is chairman of the FAO/UNEP Panel of Experts on Integrated Pest Control. This panel is the technical advisory body for all projects in the FAO/UNEP Cooperative Global Programme for the Development and Application of Integrated Pest Control in Agriculture. It also counsels the Director-General of FAO and the Executive Secretary of UNEP on matters related to pest control, and produces numerous documents containing guidelines for IPC research and application.

At the Eleventh Session, review of the Global Programme highlighted evaluation of and developments in the Southeast Asia intercountry program for rice IPC, with a detailed review of pest management tactics for rice. Progress and planning of several FAO IPC guidelines publications,

including those for pesticide use and economics, was an important agenda item. The Panel also reviewed the status of its ad hoc task forces and discussed the current and future needs for IPC training activities in Southeast Asia.

XVII Congreso Nacional de Entomología, Saltillo, Coahuila, Mexico, March 28-31, 1982

Nearly 200 entomologists attended the conference, including many students from the local university and the Instituto Tecnológico y de Estudios Superiores in Monterrey. D. J. Calvert, CICP Pest Management Specialist, participated at the invitation of the President of the Sociedad Mexicana de Entomología.

The keynote addresses focused on the epidemiology of malaria, integrated pest control tactics and the structure and regulation of culicid mosquito populations in the north of Venezuela. An all-day roundtable discussion on pesticides addressed pesticide dynamics in the environment, rational agricultural uses, aerial and controlled-droplet applications, and pesticide use on cotton in Guatemala. There was much discussion of the eradication of the Mediterranean fruit fly in Mexico. A large model of the factory that produces sterile male fruit flies for the program had been set up in the hotel lobby. This facility, which was constructed by the U.S., Mexican and Guatemalan governments (the MOSCAMED Commission) produces several hundred million flies each week. Over 3,800,00 hectares have been freed of the fruit fly since the project began in 1979.

IOBC/GERDAT Colloquium on Crop Loss Assessment and Economic Threshold Evaluation in Cotton, Rice and Maize, Paris, France, April 14-16, 1982

Participants in this meeting included French cotton and rice entomologists from Africa, two rice researchers from the People's Republic of China, two entomologists from the California cotton IPM project, a corn entomologist from the University of Minnesota, and a representative of the FAO Southeast Asia Rice IPC project. P. C. Matteson, CICP Pest Management Specialist, attended as an observer.

The first two days were devoted to papers covering recent work on crop loss assessment and damage threshold determination, sampling methods and pest forecasting. Lively discussion was elicited over the advisability of calendar insecticide treatments for cotton in Africa. During the last afternoon, the participants drew up a document containing conclusions and recommendations, with separate sections for cotton and subsistence crops.

International Study Workshop on Crop Borers and Emerging Strategies for Their Control, ICIPE Mbita Point Field Station, Kenya, June 14-18, 1982

D. G. Bottrell, CICP Pest Management Specialist, was invited by the organizing committee to participate in the workshop and present a paper entitled "Social Problems in Pest Management in the Tropics."

The Workshop, which was sponsored by ICIPE and IFAD, had four major objectives:

1 - To review ICIPE's projects, "Crop Borers Research" and "Bases of Plant Resistance to Insect Attack," which are to develop integrated pest management systems for crop borers under subsistence farming conditions;

2 - To assess the success of collaborative research between the ICIPE and other international agricultural centers and national programs;

3 - To review the status of research on cereal stem-boring insects and legume pod-boring insects in the tropics; and

4 - To review the status and prospects of IPM for these insects.

The Workshop participants found that the overall IPM approach being advocated at the Mbita Point Field Station is sound. They recommended that the "Crop Borers" and "Plant Resistance" programs be merged, that pest management research should move from its present entomology emphasis to a more interdisciplinary approach, that activities should be more oriented toward subsistence farming conditions, and that cooperation with other international centers and national programs should be strengthened.

Informal Discussions on International Training Activities in Plant Protection and Future Needs, Rome, June 16-18, 1982

These discussions were held in accordance with the recommendations of the Second Session of the Committee of Experts on Pest Control (Eschborn, Germany, October 1981). The Committee had urged a review of the current state of training in plant protection, the setting up of a plan for the assessment of future needs, and the devising of a strategy for action. The meeting was comprised of a small group of experts who are actively involved in training in plant protection in the developing countries. Among them were representatives from CICP, ICIPE, COPR, UNDP, the German Foundation for International Development, the International Agricultural Centre in Wageningen, The Netherlands, the French Cultural

and Technical Cooperation Agency, and FAO. R. F. Smith, Executive Director, represented CICP.

The group reviewed ongoing training activities and held extensive discussions on establishing an inventory of institutions and programs which provide education and training in plant protection and related disciplines. The establishment of model curriculi for various training levels and training needs for the coming five years also received attention. Financing, international coordination and collaborative actions were reviewed as important requirements for progress.

Perception and Management of Pests and Pesticides (PMPP), Nairobi, Kenya, June 21-25, 1982

CICP Executive Director R. F. Smith was invited to attend this international meeting and Pest Management Specialist D. G. Bottrell attended in his stead. The Consortium also sponsored the participation of B. Napompeth of the National Biological Control Research Center, Kasetsart University, Bangkok, Thailand, and K. L. Heong, Crop Protection Branch, Malaysian Agricultural Research and Development Institute, Serdang, Selangor, Malaysia.

The PMPP work group consists of biological, social, and behavioral scientists who are pursuing a program of research on the perception of pests, pesticides and management alternatives (with the support of UNESCO and UNEP). The program focuses on the perceptions and behavior of farmers and pest managers and on the international flow of pesticides. The long-term goal is to provide policymakers with the scientific basis for strategy to mitigate the undesirable effects of pesticide use.

Four factfinding and study projects have been undertaken under

the auspices of the PMPP. These concern national profiles of pesticide and pest management practices, site-specific studies of the perceptions and actions of pest managers and pesticide users, case history studies of alternative pest management systems, and studies of problems related to the international flow of pesticide technology and associated hazards. Progress to date in these areas was reviewed by the participants. A substantial program of presented papers formed the balance of the proceedings.

International Union of Biological Sciences XXI General Assembly, Ottawa, Canada, August 22-27, 1982

R. F. Smith, CICP Executive Director, attended this meeting as Delegate for the Entomology Section, Zoology Division. There were a number of special lectures, and the featured item of the scientific program of the General Assembly was a day-long symposium on "Biology of Northern Oceans."

Dr. Smith was active in the ad hoc Committee on the Scientific Program, which is furthering projects on zoological nomenclature, a network for listing and studying medicinal plants, expanded vegetation maps for Europe, and biological monitoring of the state of the environment. A major new IUBS scientific program was approved: "Decade of the Tropics." Its objective is increasing knowledge and understanding of the biology of the tropics, with five suggested principal themes: energy and mineral storage and cycling within ecosystems, species richness and the capacity for simplification of species-rich systems, biological factors in soil fertility, the biology of tropical agroecosystems, and an understanding of traditional human societies as intrinsic components of tropical ecosystems.

PUBLICATIONS

CICP publications include a periodical newsletter and international conference list, as well as proceedings of IPM short courses and pesticide management seminar/workshops and special studies performed by the Consortium. Nearly all of them are free upon request. The following publications were issued between October 1981 and September 1982:

1. Proceedings, Curso Internacional de Control Integrado de Plagas, Antigua, Guatemala, October 26 - November 19, 1981. Vols. I (196 pp), II (323 pp) and III (347 pp). Instituto de Ciencia y Tecnología Agrícola , Guatemala, C.A. (in Spanish).
2. Final Report, 1980. University of California/Agency for International Development Pest Management and Related Environmental Protection Project. 68 pp.
3. Information brochure, "CICP."
4. Pest Management News (newsletter). In English, 4 (3) October 1981, 4 (4) August 1982. In Spanish, 4 (3) December 1981.
5. International Conference Meeting List. October 1981 and January, April and July 1982.

One instance of CICP's ongoing cooperation with FAO is CICP's oversight and support of the writing of the FAO manual "Economic Guidelines for Crop Pest Control." This will be an important addition to the FAO Guidelines series, since economics is a basic, but often ignored or mishandled aspect of IPC. K. Reichelderfer of the USDA Economic Research Service is chairperson of the ad hoc Task Force on Economics and IPC, which was appointed by the FAO/UNEP Panel of Experts on IPC in September 1981.

Fellow members G. Carlson, IPM economist, North Carolina State University, and G. Norton, ecologist, Imperial College, U.K., are collaborating with her on the text. The Task Force has been reporting to CICP Executive Director R. F. Smith, who is also Chairman of the Panel, and CICP has funded small amounts of travel which has allowed the Task Force to meet when other scheduled travel brings them to the same general area. The manuscript is scheduled for completion September 1, 1983.

ACRONYM LIST

CARDI	Caribbean Agricultural Research and Development Institute
CICP	Consortium for International Crop Protection
CILSS	Comité Interétats de Lutte Contre la Sécheresse au Sahel/ Interstate Committee for Drought Control in the Sahel
COPR	Centre for Overseas Pest Research (U.K.)
FAO	(United Nations) Food and Agricultural Organization
GERDAT	Groupement de'Etudes et de Recherches pour le Développement de l'Agronomie Tropicale/Study and Research Group for the Development of Tropical Agriculture (France)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit/German Agency for Technical Cooperation
ICIPE	International Center for Insect Physiology and Ecology (Kenya)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (India)
ICTA	Instituto de Ciencia y Tecnología Agrícola/Science and Agricultural Technology Institute
IDIAP	Instituto de Investigación Agropecuaria de Panamá/ Agricultural Research Institute of Panama
IDRC	International Development Research Center (Canada)
IFAD	(United Nations) International Fund for Agricultural Development
INIPA	Instituto Nacional de Investigación y Promoción Agropecuaria/ National Agricultural Research and Development Institute (Peru)
IOBC	International Organization for Biological Control
IPM	Integrated Pest Management
OAU	Organization of African Unity
PAHO	Pan American Health Organization
ROCAP	(AID) Regional Office for Central American Programs

SAFGRAD	(Aid) Semi-Arid Food Grains Research and Development Project (Africa)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WARDA	West Africa Rice Development Association
WHO	(United Nations) World Health Organization