

IPM CRSP Trip Report

S. E. Asia, Cambodia

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Accompanied by: R. Muniappan and Robert Hedlund

Countries Visited: Thailand, Cambodia

Dates of Travel: April 1 – April 13, 2010

Travelers Names and Affiliations: Michael D. Hammig, Gerald R. Carner and B. Merle Shepard, Clemson University; R. Muniappan, Virginia Tech University; Robert Hedlund, USAID

Purpose of Trip: To visit with personnel in organizations involved in IPM in Cambodia and learn about ongoing IPM activities and to develop collaborative agreements with some of these groups.

Sites Visited:

Thailand:

FAO Regional Office for Asia and the Pacific

Cambodia:

USAID Mission in Phnom Penh,

Agriculture Development International (ADI) Office,

Cambodian Center for Study and Development in Agriculture (CEDAC),

Australian Centre for International Agricultural Research (ACIAR),

Headquarters of Cambodian General Directorate of Agriculture (GDA),

International Development Enterprises (IDE) field activity sites in Prey Veng and Svay Rieng Provinces,

International Volunteers of Yamagata (IVY) vegetable production site in Svay Rieng Province,

Royal University of Agriculture,

Mungbean Growing Area at the edge of Tonle Sap Lake near Siem Reap,

FFS Location in Kampong Cham,

GDA/ Department of Plant Protection, Sanitary and Phytosanitary

Description of Activities/Observations:

This first visit by members of the Clemson IPM CRSP Team to Cambodia focused on making contacts with parties working in the area of IPM and on identifying potential partners. In all, we contacted 24 people from the following entities: FAO/Bangkok, USAID/Phnom Penh, NGOs, the Ministry of Agriculture, Forestry and Fisheries, the Royal University of Agriculture. Six provinces were visited, and in three of these, we visited farmer field sites where training/demonstrations were being carried out. In Prey Veng and Svay Rieng Provinces, the focus was mainly on irrigation systems and cultural techniques. In Kampong Cham Province, we visited a field site where FFS training had been conducted.

Sites visited:

FAO Regional Office for Asia and the Pacific. We met with Ms. Dada C. Morales-Abubakar, Program Development Officer for the Inter-Country Program for IPM in Vegetables in South and Southeast Asia and Dr. Jan Willem Ketelaar, Team Leader, at the FAO headquarters in Bangkok. This FAO vegetable program has been active in Cambodia, since 1993 with sponsorship from Australia, Norway and the Netherlands. This project was completed last year and has been replaced by a smaller project funded by Sweden which emphasizes pesticide risk reduction. We were presented a summary of problems related to IPM in Cambodia and an overview of FAO activities designed to address these problems. In Cambodia, out of a total population of 14 million, 82% live in rural areas and over one half live below the poverty level. According to FAO, pesticides are used by 100% of vegetable farmers. Major challenges include lack of farmer knowledge of vegetable systems, lack of trained extension personnel, and indiscriminate use of chemical pesticides, many of which are highly toxic (Class 1a, Class 1b). All chemicals are imported, mainly from Vietnam and Thailand. In rice, pesticide-induced outbreaks of the brown planthopper have been so large that farmers have collected them and used them as compost. More information about the FAO program can be found at: vegetableipmasia.org. Under this website is a report on mungbean, which includes case studies and a participatory rapid appraisal of mungbean production in three provinces. FAO also is working on policy development regarding pesticide risk reduction and as part of this activity, they are sponsoring a health impact study conducted by Bill Daniel of the University of Washington.

FAO recommended that our activities focus on mungbean and chilies. For mungbean, although yields range around 1000 kg per hectare, production expenses (mainly imported pesticides), are high and profits are low. An FAO study on gender division of labor showed that about half the labor in mungbean production is done by women. Pests include pod sucking insects (*Piezodorus* and *Nezara*), and pod boring insects, (*Etiella* and *Maruca*). Chilies present a problem where varieties desired by the export market are ill suited to Cambodia.

USAID Mission in Phnom Penh. The team met with the following USAID personnel: Flynn Fuller, Mission Director, Ronit Kirshner-Gerard, Private Enterprise and Development Officer, Reed Aeschliman, Director, Office of General Development and Samram Tuy, Assistant Development Officer. We learned that Ambassador Carol Rodley has requested that we obtain country clearance when we make trips to Cambodia as part of our USAID project, and that she be kept abreast of our activities there. We are requested to attend and participate in the launching of the HARVEST/Food Security Program in late November or December when the core group is assembled. We will coordinate our future activities with this group.

USAID would like us to identify our in-country representative and collaborators as soon as possible. They mentioned that SANREM had already identified their collaborators. They said that Kimberly Lucas will be joining the USAID Cambodia Mission, moving from Afghanistan, and will serve as the Economic Development Officer for Agriculture. In a discussion of the Cambodian government's National IPM Program, we learned that the extension system in Cambodia is basically dysfunctional. There are 500 officers, but they lack the proper training and have no funding, not even gas money.

Agriculture Development International (ADI). Dr. Tim Purcell, Director, and Mr. Sok Muniroth provided us with an overview of agricultural activities being carried out by the numerous NGOs and other aid organizations in Cambodia.

ACIAR is a prominent player in the agriculture sector, with a number of scientists working on vegetable pests and diseases. Caroline LaMer is working with plant pathogens. Mark Hickey is working on value-chain for vegetables. Bob Martin is the team leader for ACIAR and Craig Meisner is the in-country director. Rowena Eastick is working on peanuts at CARDI.

ASTA (Agricultural Service Technology Associates) is a carryover group from the old FAO IPM Program. They are under contract with local governments.

Srer Khmer is another NGO involved in IPM that is a carryover from the FAO-IPM program

AVRDC is working with CARDI, but is only a "Fly in/Fly out" group.

FAO has a huge food security project (rice, seed, fertilizer) funded by the EU (11 million Euros) Ajay Markandy is the FAO Representative.

AFD (French Development Agency) – TWGAW Project (Strategy for Agriculture and Water) – This is a flagship project for Cambodia – every other project has to be in line with this strategy. Mottos for this project include "Empower the unempowered" and "Include the excluded"

ADI has been conducting value chain research for many years in Cambodia and will be a valuable resource for information on various commodities produced in Cambodia. They have an excellent library.

Cambodian Center for Study and Development in Agriculture (CEDAC). We met with Mr. Keam Makarady, director of this NGO. This project is focused on farmer awareness through education and finding alternatives to chemical pesticides and fertilizers. They also provide

training on the safe use of pesticides to reduce the use of pesticide cocktails. The training includes providing cropping alternatives that don't require pesticides. Their approach is not through farmer field schools, but shortterm training with follow-up visits two times per month. CEDAC has 269 full time staff members that act as extension workers throughout the country. They also have opened 8 shops for selling organically-produced products.

Australian Centre for International Agricultural Research (ACIAR). We met with Dr. Craig Meisner, country director for this group that is very active in Cambodia. He works with CARDI, GDA and RUA. His focus is working with input supply dealers and ACIAR does not use the FFS training method. Because of the weak government extension programs most farm production advice in Cambodia comes from input suppliers. He indicated that farmers were often advised against the use of chemical fertilizers during early government training programs which has led to some of the lowest rice yields in S.E. Asia. Australian private interests are proposing a A\$600 million program for agriculture in Cambodia with a focus on export. Dr. Meisner mentioned that the top entomologist in the GDA is Dr. Preap Wisarto, the managing director of the Department of Plant Protection. He said that The GDA and CARDI can work together if their roles are clearly defined.

General Directorate of Agriculture (GDA). We met with Dr. So Khan Rithykun, Deputy Director General (and currently Acting Director General), Dr. Ngin Chhay, Director, Department of Rice Crop and Mr. Chou Chethyryth. Dr. Ngin Chhay is also director of the National IPM program and Mr. Chou Chethyryth is the key person for implementation of IPM in Cambodia. They will likely be our major contacts for the implementation of this project. The National IPM Program was established in 1993 with various sources of support. Farmer Field Schools have provided training for rice and some vegetable farmers. However, there are 8 million farmers in Cambodia and only 16,000 have been trained through Farmer Field Schools. One of their main constraints is lack of capacity to produce bio-agents. Also, Bt is imported and expensive and usually not of good quality. There is a parasitoid rearing facility, but there is no support for rearing these bio-agents. Potential IPM CRSP activities that were recommended by GDA are support for: 1. Organic production, 2. Bio-agent production and 3. Training on specific IPM approaches.

International Development Enterprises (IDE). We were accompanied on a field trip to Prey Veng and Svay Rieng Provinces to visit IDE field activities by Dr. Philip Charlesworth, Agricultural Program Manager and Mr. Sieng Kan, Project Coordinator. Also, Mr. Nico Janssen of the **Netherlands Development Organization** traveled with us. In Prey Veng Province we visited a site where a drip irrigation project was being undertaken. In this area, vegetables can usually be grown early in the dry season, but the extreme heat and dry conditions of the latter part of the dry season make it very difficult to produce any kind of crop. Using drip irrigation and shade cover, the cooperating farmer had successfully grown and harvested a crop of Chinese kale (Fig. 1). A second crop of kale was ready to be harvested and was moderately damaged by the diamondback moth (Fig. 2). Farmers and extension workers were not aware of the potential for the use of parasitoids for diamondback moth control. The farmer mentioned that some damage on the crop was preferred in the market because it indicated that no pesticides were used. Application of Bt (Biobit) had been made 6-7 times. The use of shade cloth was key to growing

vegetables in the hot, dry season. Tomatoes and eggplant were to be planted after the Chinese kale. A bore well was used as the source of water.



Fig. 1. Chinese kale being grown under shade cloth with drip irrigation in Prey Veng Province.



Fig. 2. Chinese kale ready for harvest with moderate damage from diamondback moth.

Also in Prey Veng, Trok Village (Svay Chrum district) we visited another irrigation demonstration site organized jointly by IDE and a Japanese NGO, IVY (see below) (Fig. 3). Longbean (heavy infested with leafminer) (Fig. 4), onions, kale, bitter gourd (infested with a pyralid), eggplant, and wilt) and many plants were infested with leaf hoppers. spinach were being grown. The soil was very poor in this area, and organic fertilizer was an important input for this project. Eggplant was dying from an unknown cause (possibly bacterial wilt.)



Fig. 3. Irrigation project in Trok Village operated by IVY in cooperation with IDE



Fig. 4. Leaves of longbean heavily infested with leafminers

Over lunch, we met with Ms. Ayumi Matsuura, Project Manager for **International Volunteers of Yamagata (IVY)**. She is a volunteer working with farmers to increase production during the dry season and is the manager of the site that we had just visited. Her activities are coordinated with IDE.

We stopped by the IDE headquarters in Svey Rieng and Philip Charlesworth (IDE) presented an overview of their activities (Fig. 5).



Fig. 5. Phillip Charlesworth explaining the organization of the IDE Project.

At the next site we visited, Mr. Ngy Samnang from the **Kbal Koh Vegetable Research and Production Station** was conducting a farmer field school type training program for farm business advisors (FBAs) at Tropriang Ray village (11.07 N., 105.57 E) (Fig. 6). There were 17 FBAs from 17 different districts. These are private entrepreneurs who are establishing farm input supply businesses. As part of their business, they become a key source of advice for their farmer clientele. IDE supports this activity by acting as the wholesale supplier and conducting the production management training. FBA training covers three cropping cycles and lasts one year. The lead trainer, Mr. Ngy Samnang (Fig. 7), is from the Kbal Koh Vegetable Station. He has previous experience with AVRDC. The current training cycle is focused on eggplant and tomato. The next cycle will be rice and vegetables. Soil amendments include lime and compost. They will use grafting to control bacterial wilt and were growing resistant eggplant rootstock (EG 203) which they had obtained from AVRDC. Tomato transplants had already been grafted to the resistant rootstock. They will not be using *Trichoderma* because it is not available. They have reared parasites (*Cotesia*) in the past but are currently not doing so. Through their businesses, the FBAs provide inputs and advice to several thousand farmers. We saw roadside billboards advertizing this program (Fig. 8). In a nearby field, luffa plants were infected with a virus. Samples were taken and sent to Dr. Naidu Rayapadi for identification. *Margaronia indica* larvae were infesting cucumbers in the same area. Thrips and whiteflies were also infesting the cucumber.



Fig. 6 FBAs preparing beds for farmer field school being conducted by IDE.



Fig. 7 Mr. Ngy Samnang, lead trainer for the FBA program showing resistant rootstock seedlings of eggplant



Fig. 8. Roadside billboard advertizing IDE program.

Royal University of Agriculture. We met with Dr. Men Sarom, Vice Rector, and Dr. Chuong Sophal, Dean of the Faculty of Agronomy. RUA is the oldest university in Cambodia. It was established in 1964, but was closed for four years during the Pol Pot era. The RUA became a fully functional University 10 years ago. Currently, there are approximately 2000 students. The university is under the Ministry of Agriculture, but is semi-autonomous. RUA has 8 faculties and Agronomy is the largest. Agronomy has three departments – Soils, Plant Production, and Plant Protection. There are 5 lecturers in Plant Protection covering the 5 disciplines in the curriculum. These lecturers are employees of other government agencies, so there appears to be a real need for capacity building in Plant Protection. The Agronomy faculty has a 2 ha research station on campus for student projects. There is also an off-campus research station.

Debriefing at USAID MISSION. We met with again at the USAID Mission in Phnom Penh for a departure briefing with Ronit Kirshner-Gerard and Samram Tuy. We summarized our activities for the week, and they emphasized that our project should concentrate on vegetables and other staple crops that link directly with food security. We will keep them updated as we proceed to implement our IPM CRSP activities there.

Visit to Mungbean Growing Area. At the edge of Tonle Sap Lake near Siem Reap, we visited a 2000 hectare mungbean-growing area with Srun Khema, Project Coordinator for the National IPM Program and Mr. Sin Saphanareth, IPM trainer. On the way to the mungbean area, we passed through a village where all the houses were built on tall stilts (Fig. 9). During the rainy season the lake level rises and floods the village and all transportation is by boat. This was the closest village to the mungbean area. Each farmer grows about 10 hectares of mungbean. This crop is grown in the area where Lake Tonle Sap recedes during the dry season. During the wet season, this area is under about 20-30 feet of water. The crop was being treated with insecticide 6 to 7 times per season. These were calendar sprays using a fabricated boom with multiple nozzles (Fig. 10&11). Foliar fertilizer also was included in the sprays. Harvesting was being carried out by hand which no doubt exposed the harvesters to pesticide residues. Surveys of the crop revealed the presence of stink bugs (Fig. 12), pod borers and damage to the outside of the pods, probably by grasshoppers. Sesame also was grown in the area. A leaf-feeding caterpillar was present on this crop.



Fig. 9. Village on stilts near mungbean growing area.



Fig. 10. Boom type sprayer used in mungbean fields.



Fig. 11 Boom type sprayer in mungbean field showing extensive width of coverage.



Fig. 12. Stinkbug nymph on mungbean pod.

FFS Location in Kampong Cham. We traveled from Siem Reap to Kampong Cham Province with Ms. Srun Khema to an area where peppers were being grown across the Mekong River from Kampong Cham city. There we were joined by Mr. Sin Sophanareth, the IPM trainer. Farmers (13) were testing a variety that was brought from Thailand to be grown specifically for the Thai organic market. An inspector came from Thailand to make sure that organic practices were being followed. Farmers in the area used botanical insecticides and Bt. The variety was not well adapted to the area. The main problem was lack of heat tolerance (Fig. 13), but there were also serious disease and insect problems. Plants of the local variety in a neighboring field appeared much healthier (Fig. 14). We saw damage from virus, bacterial wilt, stink bugs (Fig. 15), aphids and thrips on both the introduced chili variety and on the local chili variety that was being grown nearby. Tissue samples were taken for virus identification (Fig. 16). In addition, weeds were a serious problem. These farmers had participated in the Farmer Field School for organic chili that had just been completed. It was unfortunate that the chili variety that they used in their demonstration plots was not suited for the area. However, it was apparent that they had benefitted from their FFS training. They were able to identify pests and natural enemies that we saw in the fields, and they had developed on their own, a system for rearing seedlings in pots for transfer to the field. This system worked better than rearing them in seedbeds. They also made their own liquid fertilizer, a practice that they learned in the Farmer Field School.

We surveyed eggplants in an adjacent area. These were infested with leafhoppers that were causing “hopperburn”, the leaf-feeding coccinellid, *Epilachna* sp., and bacterial wilt. Farmers would like to use *Trichoderma*, but this was not available. They had experimented with it before and had good results but had since lost the culture. Farmers were able to identify beneficial insects such as ladybeetles and the predaceous staphilinid, *Paederus*.



Fig. 13. Effect of intense dry season heat on introduced chili variety grown in Kampong Cham.



Fig. 14. Field of local variety of chili next to FFS location.



Fig. 15. Stink bug, *Nezara viridula*, on chili.



Fig. 16. Merle Shepard demonstrating how tissue samples are taken for virus diagnosis.

GDA/ Department of Plant Protection, Sanitary and Phytosanitary. Back in Phnom Penh, we met with Dr. Preap Visarto, entomologist and Managing Director. He had recently moved from CARDI to this position. He mentioned that CARDI concentrated more on basic research and that the GDA Plant Protection Department did more applied research and training. He indicated that we should communicate with him regarding research activities, and with Ngin Chhay about training.

After our visit with the various entities, we realize that our partners should include key personnel from GDA and their FAO/IPM program. In addition, we should partner with IDE and their farmer s business advisory (FBA) network. The need for IPM Farmer participatory research was obvious. Some of IPM tactics developed under the IPM CRSP that could be put into place in Cambodia include: Production and use of *Trichoderma* and VAM, rearing and release of parasitoids, use of resistant varieties, grafting, development of botanical insecticides and use of other microbial agents such as microbial insecticides.

The presence of the papaya mealybug (*Paracoccus marginatus*) on hibiscus and plumeria plants was detected by the IPM CRSP team for the first time in Cambodia. Collections were made in both Phnom Penh and Siem Reap. Specimens were preserved in alcohol and specific identification was made later by Dr. Gillian Watson, an expert on mealybug taxonomy. Heavy infestations of the pink hibiscus mealybug (*Maconellicoccus hirsutus*) was found infesting soursop in Prey Veng province. This pest has been reported before in Cambodia.

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