IPM IL Trip Report

Name and Title of the Traveler: R. Muniappan, Director IPM Innovation Lab, Virginia Tech, Blacksburg, VA 24061.

Countries visited: Vietnam and Cambodia.

Duration of the Visit: November 28 to December 14, 2014.

Purpose of the Visit: To meet with USAID missions and institutions in Vietnam and Cambodia for preparation of RFAs for sub-awards.

Description:

Nov. 28, 6.00 am: Left Boston and reached Hanoi on November 30th at 10.15 pm.

John, Muni and Binh (USAID/Vietnam) with Plant Protection Department personnel

Dec. 1, Hanoi: At 8.30 am, Dr. John Bowman and I met at the Melia Hotel. We both visited USDA/FAS office at 9.00 am and met with Mark A. Dries, Counselor for Agricultural Affairs and Michael Ward, Agricultural Attaché. They informed us that dragon fruit, rambutan, longan and lychee have been approved for export from Vietnam to the U.S. These fruits are all grown in different regions of Vietnam: Lychee is grown in the north, longan is grown in both the south and north, and rambutan and dragon fruit are grown in the south. There is some interest in exporting mango and star apple to the U.S. Some shipments of dragon fruit from Vietnam were rejected in the U.S. due to excess residue of Difenoconazole, a Syngenta product used to control a fungus disease. Dr. Michael Braverman, Rutgers University is checking on fungicide residue in dragon fruits.

We also learned about how the Fulbright and Borlaug programs are active in Vietnam.

11.00 am: We met with Todd Hammer, Director, Office of Economic Growth & Governance (EG^2), Ms. Binh Le, Development Assistance Specialist, (EG^2), and Ms. Binh Nguyen (Cabi), Assistant, (EG^2), at the USAID mission. They too mentioned the exportation of lychee, longan, dragon fruit, and rambutan after irradiation to U.S. and Vietnamese interest in exporting mango and star apple. Mr. Hammer asked Cabi to help us arrange meetings with various agencies while we were in Vietnam.

It was established that Ms. Binh Le at the mission will be the contact person for IPM IL project in Vietnam.

1.30 pm: We met with Ms. Nguyen Thi Ha, M&E Specialist / Gender Advisor at the mission. She mentioned that an earlier Ox Farm project on rice in Vietnam had a significant IPM component. In the Mekong Vitality Expansion project, there was a concentrated effort on women's financial networking. The Center for Agricultural Program (CAP) has emphasized women's empowerment in agriculture.

4.00 pm: We met with Mr. Khuong Tran, who leads a series of climate change projects. He talked about a project on forest protection in the north central part of Vietnam, which was implemented by Winrock International to address climate change.

Dec. 2, 9.00 am: We visited the Plant Protection Department (PPD) and met with Mr. Bi Xuan Phong, Deputy Director, two of his staff members, and Ms. Ngo Thi Phuong Dung, officer of Planning, Science, Inter-Cooperation Division. PPD has four regional centers and district plant protection centers.

The FAO had an IPM program from 1993 to 2011. In 2011, a national IPM program was started for all crops. There is a World Bank-supported IPM project in southern Vietnam, and New Zealand is supporting an IPM program for dragon fruit.

Brown spot disease on dragon fruit and witches broom disease of longan are serious problems.

Trichoderma is produced by private companies in Vietnam, and *Trichoderma* inoculated compost is produced by the farmers. As of now, it is mostly large-scale farmers who use *Trichoderma*, so the government is introducing this technology to small-scale farmers.

2.00 pm: We met with Vu Thanh Hai, Nguyen Doc Khanh, Pham Hong Thai, Ha Viet Cuong, Ho Thi Thu Graug, and Le Thi Bieh Lien of Vietnam National University of Agriculture. They mentioned that lychee and longan are the important exportable crops in northern Vietnam. The cropping period of lychee is from March to July. Important pests of lychee are fruit borer and the eriophyid mite, while pests for longan include witches broom, eriophyid mite and *Tassaratoma* bug.

3.30 pm: We visited the Fruit and Vegetable Research Institute (FAVRI) and met with Dr. Nguyen Quoc Hung, Director General and the banana breeder. They emphasized the importance of lychee and banana as exportable crops for Vietnam and mentioned that *Fusarium* wilt Race-4 on Cavendish and Race-1 on silk banana are serious problem.

Muni Muniappan and John Bowman examine an insect collection at the Plant Protection Research Institute

Dec. 3, 9.00 am: We visited the National Plant Protection Institute and met with Dr. Trinh Xuam Hoat, Deputy Director General; Dr. Nguyen Van Liem, Vice Director; Dr. Le Van Nhat, Head of International Cooperation; and Dr. Nhaw, Head of Biological Control program. Dr. Hoat gave a PowerPoint presentation covering various research activities carried out by the institute. Some of the important pests and diseases mentioned in his presentation were rice viruses, witches broom of longan, sugarcane virus, citrus greening, dragon fruit brown spot, fruit flies and anthracnose, *Pratylenchus* nematode on coffee, cassava mealybug, cassava witches broom, lychee fruit borer, anthracnose and powdery mildew, fruit flies and anthracnose on mango.

He mentioned that the upland rice LC93-4 is resistant to brown plant hopper and IR-4625 is resistant to black streak.

PPRI produces SH-BVI – a mixture of several micro-organisms to control nematodes and soil-borne diseases. It also produces *Metarhizium* and *Beauveria* fungi for control of insect pests.

2.00 pm: We met with Joakim Parker, Mission Director. He mentioned that 15 U.S. companies advise the Minister of Agriculture in Vietnam. He was interested in receiving a copy of the press release on USAID awarding IPM Innovation Lab to Virginia Tech. He also suggested that we follow up with the PEER program.

9.00 pm: Traveled to Ho Chi Minh City.

Dec. 4: We visited Nong Lam University and met with Dr. Vo thai Dan, Dean Faculty of Agronomy, Dr. Tim, Head of Horticulture, Mr. Luong Le Cao. Biocontrol and Cacao Entomology, Dr. Le Khac Hoang, Entomologist, Mr. Turut, Entomologist, Mr. Dac, Entomologist and Miss Kiew, Entomologist.

Nong Lam University was started in 1995, and it has five entomologists, four plant pathologists, two weed scientists, and four horticulturists. There are 1,000 undergraduate students, 300 MS students, and 14 PhD students.

Witches broom of longan specimen

The strength of Nong lam University is in agricultural research activities in the south and uplands of Vietnam. According to Nong Lam University scientists, the longan cultivar 'Xung Com Vang' is resistant to witches broom disease. They recommend using 'Tien da bo' a susceptible cultivar to witches broom as rootstock and 'Xung com Vang' as a scion to overcome witches broom disease.

The following pests and diseases of fruits were mentioned as important: Mango – fruit flies, red banded caterpillar, and the stem borer (*Batocera rufomaculata*); Grapefruit – fruit borer (*Citripestis sagittiferalla*); Citrus – citrus greening and root diseases; and Coconut – *Diocalandra frumenti*.

2.00 pm: We visited the U.S. consulate in Ho Chi Minh City and met with Dwight Anthony Wilder, Agricultural Attaché, USDA; Nathaniel Rettenmayer, Economic Officer; Tran Quoc Quan, Agricultural Specialist, USDA; and Vo Thanh Kiet, Senior Agricultural Specialist. USDA; Vo Dinh Hoai Thanh, Environment, Science, Technology & Health Assistant.

They, too, mentioned fruit borer of lychee, witches broom of longan, pesticide residue in dragon fruit, and fruit flies and anthracnose on mango are problems. They recommended that we meet with Dr. Dat who is in charge of quarantine aspects of fruit export in Vietnam.

3.40 pm: We met with Dr. Nguyen Huu Dat, Director, Post Entry quarantine Center, and Chu Hong Chau, Entomologist of Southern Post-entry Quarantine Center of the Plant Protection Department.

These researchers discussed how hot vapor treatment is given to fruits exported to Japan, Korea, and New Zealand, and fruits exported to U.S. are irradiated to prevent fruit flies, *Bactrocera dorsalis* and *B. correcta*, which are of quarantine importance.

There are four Regional Plant Protection Centers and nine Regional Plant Quarantine Centers in Vietnam.

Dec. 5: We visited SOFRI. Ms. Hilu, a plant pathologist from Dr. Dat's office accompanied us on this trip. At SOFRI, we met Dr. Vo Huu Thoai, Deputy Director General, Southern Horticultural Research Institute; Mr. Mai Van Tri, Director, Southeast Fruit Research Center, and two entomologists. SOFRI was established in 1994 and upgraded in 1997. It has a staff with nine PhDs, 30 M.S., and 61 B.S qualifications.

Dragon fruit brown spot disease caused by the fungus, *Neoscytalidium dimidiatum*, is a serious concern in Vietnam. The fungicides Difenoconazole, Proficonozole, Mancozeb, Carbendazim and Hexaconazole are used for control of this disease.

Specimens of witches broom disease of longan sent to CABI showed negative results for the causative agent phytoplasma.

SOFRI produces protein bait for fruit flies, *Trichoderma* for soil borne diseases, and ant bait.

It was the recommendation of this institute that IPM IL address lychee, longan, dragon fruit, and mango in Vietnam.

Dec. 6. (Saturday): Report writing.

Dec. 7: Traveled to Phnom Penh, Cambodia from Ho Chi Minh City.

6.00 pm: Met with William Bradley, USAID, James Hill, UC-Davis and two members from UC-Davis.

Dec.8, 8.00 am. Dr. Faith Bartz, AAAS Science & Technology Policy Fellow joined us.

9.00 am: We visited the USAID mission and met with William Bradley, Agricultural Officer, USAID; Dennis Lesnick, Director/Chief of Party, HARVEST Program; Edwin Dekorte, Senior Field Agronomist, HARVEST Program; Sambath Sak, Agricultural Economist, USAID; and Sophea ly, Project Management Specialist, USAID.

HARVEST project will be closed by the end of March 2016.

Dennis mentioned that HARVEST works with 4,000 small scale commercial farms totaling about 500 hectares. It has been adopting some of the IPM components like solarization, use of *Trichoderma*, grafting, sticky traps, pheromone traps, and bio-pesticides. It has been involved in obtaining registration of some bio-pesticides in Cambodia. Edwin mentioned that rice blast, stem borer, thrips, rats, golden apple snail and leaf folder are problems in rice. Brown plant hopper is currently not a problem. Rice yield in Cambodia is about 1.5 tonnes/ha which is very low. Rice is grown mostly around Lake Tonle Sap.

11.15 am: We met with Dr. Sandra Stajka, FtF officer, W. Bradley, Sambath Sak, and Sophea Ly.

Sandra asked us to meet with different Cambodian Institutes and agencies and to come with a list of best organizations to collaborate with.

1.00 pm: we met with Mr. Mark Hickey from the NSW Department of Primary Industry who manages the ACIAR project on mangoes in Cambodia. The aim of the ACIAR project is to help small and medium-sized landholders in Cambodia improve the health of their plantations, increase yields and hence increase their income. He mentioned that the primary pests of mango were fruit flies, leaf hoppers, stem borer, and anthracnose.

2.30 pm: We visited General Directorate of Agriculture and met with Mr. So Khan Rithykun, Director General, Ngin Chhay, Director of IPM, and Mr. Kang Kea and Heng Chhunly of Department of Crop Protection.

So Khan Rithykun mentioned that IPM IL has trained many of his staff, and he wants to continue the relationship and train many more staff members. According to Ngin Chhay, GDA has trained over 150,000 farmers in IPM, which constitutes only 1% of the farmers in Cambodia. There is a need for IPM activities and scaling up. IPM is progressing well, but the pesticide companies are having a stronger campaign by providing credits and incentives to their sales people. Herbicide use is becoming popular in Cambodia.

They identified *solanaceous crops* - tomato and eggplant, *crucifers* - Chinese cabbage, cauliflower, and cabbage, *cucurbits* – bitter gourd and cucumber, *yard long beans,* and *celery* are the important vegetables in Cambodia.

Cuelure trap placed in bitter gourd field to monitor fruit flies.

Some of the pests and diseases identified were: *Solanaceous crops*: eggplant fruit and shoot borer, mosaic on eggplant, tomato fruit borer, tomato yellow leaf curl virus, and bacterial wilt; *Crucifers*: diamondback moth, flea beetle, webworm and *Spodoptera*; *Beans*: pod borer and aphids; and *Cucurbits*: virus diseases, aphids and *Diaphania indica*.

AVRDC recommended rootstocks to be used for grafting to overcome bacterial wilt disease of solanaceous crops.

Dr. Ken Shofia has been producing *Trichoderma*, but currently production does not meet demand. Cuelure and Methyl Euginol lures are used for fruit fly monitoring.

Cambodia exports aromatic rice to Europe and U.S. and non-aromatic rice to Malaysia and Hong Kong. Intensive cultivation is practised for early wet season and dry season rice. Rain fed rice cultivation is less intensive.

Major pest and diseases of rice in Cambodia are rice blast, bacterial leaf blight, brown spot, brown plant hopper, case worm, and leaf hopper.

Gramin-intek software used for cell-phone diagnostic communications is being experimentally tested in five provinces.

GDA is interested in continued participation in the IL activities in Cambodia.

Dec. 9: Visited Royal University of Agriculture (RUA) and met with Rector Ngor Bun Then, Vice Rector Men Saron, Director of Graduate School Dr. Thavrak Hun and Mr. Meas Piseth, Director of International Cooperation.

There are 5000 undergraduate and 150 graduate students attending RUA. There is only one faculty member each in Entomology, Plant Pathology and Weed Science. Undergraduate students participate in field research activities. About 20 Masters students are working with the HARVEST project. Five or six students are supported by ACIAR's mango chain project.

2.00 pm: Visited Prekleap National College of Agriculture and met with Mr. Thou Vathena, Rector, and Mr. Nou Keosothea, Head of the Department of Agricultural Science. Currently this college offers two-and-four-year agricultural programs. Next year it is planning on starting an MS program. One of the part-time staff members of this college is participating the IFPRI project "Promoting Insect-based Ecosystem Services in Small Holder Landscapes," which operates in Cambodia, China, and Vietnam.

4.00 pm: We met with Mr. Sam Vitou of CEDAC, an NGO. CEDAC works with 160,000 families associated with 1,400 famers associations in 22 provinces. It operates cooperative rice mills, links farmers to financial institutions, and provides crop insurance and organic rice certification. It promotes SRI principle of rice production, composting and use of botanical pesticides. It has a staff of 270 in 22 provinces.

Dec. 10, 9.00 am: We visited the Asian Development Bank office in Phnom Penh and met with Hem Chantou, Senior Officer, Agricultural and natural Resource Management and Mr. Metcalf who leads a Climate Change project. ADB implements a Climate-Resilient Rice Commercialization Sector Development Program. It supports the Promotion of Rice Production and Export, which calls for improved seeds, more efficient irrigation, better farming practices, greater drying, storage, and milling capacities, and better marketing, thereby transforming Cambodia's rice subsector from subsistence farming to commercially-oriented value-chains. It will run until 2019, improving crop productivity, access to credit for producers and rice millers/exporters, access to regional and international rice markets, and enhance national and household food security. It will also support legal and regulatory reforms to promote local seed production and distribution, strengthen agricultural land management, improve capacity of farmers' organizations, promote contract farming, and encourage domestic trading and export of milled rice. Paddy drying and storage facilities constructed under the program, to be operated by public-private partnerships, will ensure better quality paddy for processing and higher added value in Cambodia. This project is implemented in Battambang, Kampong Thom, and Prey Veng provinces.

11.00 am: We met with Mr. Brian Woody, Contracting Officer at the mission, and explained the collaborative process involved in the previous phase of the IPM IL in Cambodia. Even though he did not have any concern about collaborating with Cambodian government agencies, he suggested that we contact Mr. Ion Robertson for clarification.

1.45 pm: We met with Mr. Claudius Bredehoeft of DIZ, Germany. He mentioned that it costs about $800 to $10,000 to register bio-pesticides in Cambodia. For bio-pesticide registration, companies provide documents on the products, GDA conducts laboratory and field trials. *Bacillus subtilis* and *Beauveria bassiana* have already been registered in Cambodia. Currently *Trichoderma* is imported from Hungary, India, Thailand and Vietnam. The company Bayon Heritage is interested in producing *Trichoderma* in Cambodia.

John, Faith and Muni in a cucumber field with Trichoderma treatment and control in Battambang

Dec. 11; 9.00 am: Dr. Faith Bartz and I visited Cambodian Agricultural Research and Development Institute (CARDI) and met with Dr. Ty Channa, Deputy Director, Dr. Khay Sathya, Head of Plant Protection and Mr. Hun Yadana, Rice Breeder. CARDI was established in 1990, and it has five breeders, one entomologist and one plant pathologist. They listed cucumber, yard long bean, bitter gourd, tomato, eggplant, pepper, pumpkin, sweet potato and kang kun to be important vegetable crops in Cambodia. This institute has released 39 varieties of rice. Brown plant hopper is a problem in some years, but rice blast is a new problem that needs to be addressed.

11.00 am: We conducted a conference call with Mr. Ion Robertson to get clarification on collaborating with national institutions. In essence, he told us that we could collaborate with government institutions as long as we do not pay salary of collaborating government employees over and above their regular salary.

1.00 pm: We met with Dr. Charles Philips, a private agricultural businessman. His company has 18 agronomists and three retail stores in Cambodia. He sells most of the agricultural inputs like fertilizers, pesticides and other supplies for farm production in his stores. According to Mr. Philips, brown plant hopper is not a problem on rice but leaf folder is. He is interested in promoting bio-pesticides in Cambodia, and he operates an IPM call center called CAVAC, which provides diagnostic information based on artificial intelligence.

3.30 pm: We met with Rebecca Black, Mission Director, Sean Callahan, Deputy Mission Director, Sandra Stajka, William Bradley, Sophia Ly, and Sampath Sak. John Bowman gave a presentation on BFS and debriefed the mission about our trip. The mission director wanted to to be informed of the success stories and was especially interested in videos of such stories.

8.00 pm: Traveled to Siem Reap.

Dec. 12, 10.00 am: We traveled to Tou Samrang rice seed production farm and met with Mr. Ing Ina. It is a seed production facility under General Directorate of Agriculture. It was established in 1962 and remained under Japanese control until 1970, Chinese control from 1970 to 1979,

Russian control from 1979 to 1984, and has been operated by the Cambodian Government since 1984.

It has 220 hectares of land for rice seed production. Currently 10 varieties of rice are multiplied. Short duration varieties are more popular with farmers than the long duration ones. Until now this facility produced seeds for contracted companies. Next year, it will begin selling directly to farmers.

11.00 am: We traveled to Choanient village to observe a rice demonstration plot of HARVEST project. Mr. Edwin Dekorte and Mr. Phousana explained various agronomical and plant protection measures taken up for rice production. They stressed the importance of good seed, good land preparation, 100 Kg of seeds per hectare, split application of fertilizer and two applications of fungicides. Blast, leaf folder and stem borer damage were noted in the field.

12.00 noon: We visited a cucumber garden of Mr. Tong Seng, which has been adopting technologies recommended by HARVEST project. Harvest has nine horticultural gardens that grow cucumber, corn, eggplant, chilies and bitter gourd.

12.30 pm: Visited Green Store managed by Mr. Philip Charlesworth at Battambang. This store sells various agricultural inputs such as seeds, seedling trays, fertilizers, pesticides, etc.

2.30 pm: We visited a cucumber field at Chabuvor Saing village to observe a field trial being conducted with *Trichoderma* treatment. Cuelure traps were set up and cloth sleeves were used to cover the fruits to prevent fruit fly attack.

4.00 pm: We visited an input dealer shop where fertilizers, pesticides, seeds and other agricultural supplies were sold to farmers. There are about 450 input stores in the four provinces where HARVEST is operating. HARVEST provides training to input dealers and helps in linking with wholesalers.

EXM and Asia Irrigation are two companies that sell *Trichoderma* in Cambodia.

Dec. 13: Returned to Blacksburg, Virginia.