IPM IL Lab Trip Report

Name of the traveler: R. Muniappan, Director, IPM IL, Virginia Tech

Countries Visited: Kenya and Ethiopia

Duration of travel: February 7th to 22nd, 2015

Sites Visited: *Kenya:* USAID mission, KALRO headquarters and stations, CIMMYT MLND Research Center at Naivasa, Dudutech, KAVES headquarters, icipe, University of Nairobi College of Agriculture and Veterinary Sciences. *Ethiopia:* USAID mission, ATA, Ambo Plant Protection Center, Melkassa Horticultural Research Center, Chickpea Research Center, ILRI, Zygogramma release site at Wollenchiti and EIAR headquarters.

IPM Innovation Lab Director Muni Muniappan joins USAID's John Bowman, Dr. Jack Adundo, and another staff member in front of the predaceous mites production greenhouse at Dudutech in Kenya.

Description

February 7 – I left Blacksburg on the morning of February 7th and reached Nairobi in the afternoon of February 8. That evening, I prepared a PowerPoint presentation about IPM IL to present to the mission the next day. Dr. John Bowman and I met at 10.30 pm.

February 9, 9.30am – John Bowman and I met with Mr. Andrew Read and Mr. Patrick Boro at the USAID mission, where we briefed them on the past activities and future plans of IPM IL in Kenya and solicited their input for issuing RFAs for the new phase.
Some of the salient points that came out of the meeting were:

- The Kenya Agricultural Value Chains Enterprises Project (KAVES) is expanding in horticulture and nutrition areas.
- USDA/FAS is planning to start an extension project in Kenya.
- There are 47 counties in Kenya. Each county has a governor and six ministries. The county agricultural minister is in charge of agricultural extension.
- Kenya Feed the Future Innovation Engine (KFIE) managed by Land O'Lakes, identifies innovative agricultural technologies, mentors selected innovators, and

facilitates wide-scale commercialization of high-impact solutions to farmer-identified needs.

- FHI -360 - The Kenya Nutrition and HIV program supports HIV/AIDS programs to ensure better outcomes for people through nutrition assistance. The program operates in over 500 sites across the country.
- Hort IL has awarded a project to Rutgers University for improving indigenous vegetable production in Kenya, Uganda and Zambia. Amaranth, African eggplant, spider plant, and moringa will be included.

February 10, 8.30 am – John and I traveled to Kenya Agricultural and Livestock Research Organization (KALRO) Headquarters and met with Dr. Lusicke Wasilwa, deputy director general, Dr. Miriam Otipa, plant pathologist and an entomologist from Kabete Research Station. Dr. Wasilwa listed the following crops and their pest problems to be of importance to Kenya.

- Macadamia nut – Nut borer, stink bug, and Phytophthora disease
- Avocado – Phytophthora and anthracnose diseases
- Mango – Fruit flies, seed weevil, mealybug, and mango seed rot
- Banana – Virus diseases
- Groundnut – Aflatoxin
- Cassava – Brown streak virus disease and aflatoxin
- Maize – Larger grain borer and MLND (Maize Lethal Necrosis Disease)
- Tomato – *Tuta absoluta*, fruit borer, bacterial wilt, *Tomato yellow leaf curl virus*, whitefly, and thrips
- Capsicum – Bacterial wilt, white flies, and thrips
- Beans – Pod borer, whiteflies, thrips and virus diseases
- Cabbage – Diamondback moth and aphids

Meeting with Dr. Lusike Wasilwa, the deputy director general of Kenya Agricultural and Livestock Research Organization, in a goose berry field.

10.20 am – We visited Muguga Research Station and met with entomologists Mr. Samuel Njiaha and Mr. John Wademje. They mentioned that they have worked on biological control of Salvinia, cassava green mite, cassava mealybug, citrus wooly whitefly, diamondback moth, water lettuce, and larger grain borer.

We toured a field of corn with *Desmodium* planted in between rows and Napier grass planted around the field for push and pull technic to control stem borers. We were shown another experimental field where insecticidal control of *T. absoluta* was conducted. The treatments were Neem, Karate, Marshall and Thunder, plus a control for comparison. No differences were observed between the treatments.

1.00 pm – We visited the farm of Mr. Moses Njiriri who has been growing mango, avocado, citrus, papaya, apple, tree tomato, peppers, onion and other crops.

1.45 pm – We visited the diagnostics laboratory managed by Dr. Miriam Otipa at the Kabete research station. We observed a field where vegetable seedlings were grown under net.

4.30 pm – In the afternoon, we visited Thika Practical Training Center (PTC) and met with S.J.N. Muriuki, entomologist, John M. Ndungu, social scientist, Anthony Nyangu, PTC, Miriam Otipa and Dr. Lusicke Wasilwa. John Bowman described the aims and goals of the new IPM Innovation lab. Dr. Wasilwa said that PTC is run by public and private partnership, and the facility belonged to KALRO. It has conducted five training courses in 2014. We observed plots of amaranthus, goose berry, kinova, and spider plant.

February 11, 10.00 am – We met with Mr. Steve New, COP, KAVES project. This project addresses dairy, horticulture, maize, and staples. He is of the opinion that, instead of growing maize in dry areas, other crops such as sorghum should be advocated. Striga is a problem in maize, and the herbicide coated seeds sold by Syngenta is providing protection against this weed. Purdue storage bags are very effective in controlling pests. Horticultural crops addressed by KAVES are mango, passion fruit, beans, and peas. The program is also interested in greenhouse production. Pesticide residue is a problem in fruits and vegetables exported from Kenya.

Fig. Juliana Kimanthi displays her French beans (*Phaseolus vulgaris*) that she grows for export.

3.30 pm – We traveled to Kabaa Valley accompanied by Mr. Molinge Meshacka, KAVES horticulture agent. We visited Mrs. Juliana Kimanthi, a farmer who is producing French beans (*Phaseolus vulgaris*) for export. She has been using a product called "Plant Mate" produced in the Philippines and sold by a local company. She expressed satisfaction in using this product in crop production. The agent who sold the product, Mr. Brian Mbithi, mentioned that it contains bio-fertilizer and pesticide agents. The farmer has applied 30 kgs of the product over three acres of her farm. The cost of product is 75 Shillings per kg.
There are about 800 farmers in the valley produce about one million kilograms of beans for export.

February 12, 9.00 am to 11.30 am – We traveled to Naivasa town.
11.30 am – We visited CIMMYT station inside KALRO compound and met with Dr. Bhis Das, a plant breeder who works on screening resistant varieties to MLND. The research project was started at Naivasa because it is the epicenter of this disease. MLND is a combination of two viral diseases. Dr. Das showed us greenhouses and open fields where he is conducting screening trails.

1.00 pm – At Dudutech, we were received by Dr. Jack Adundu, technical manager. He delivered a PowerPoint presentation detailing the various activities being conducted by his institution. Dudutech produces bio-agents, VAM, *Trichoderma, Beauveria, Phytoseiulus persimilis, Amblyseilus californicus, Amblyseilus cucumeris, Steinernema feltii, Heterorhabditis, Hypoaspis miles,* and *Paecilomyces sp.* A large volume of these products are exported to Europe and sold to large scale farmers in Kenya, and only a limited quantity is sold to small scale farmers. The organization is collaborating with Russell IPM to supply pheromone traps. We were given a tour of the predaceous mites and parasitic nematodes production facilities. Dudutech is recommending and providing products for "Environmentally Intelligent Farming".

February 13, 8.30 am – We traveled to the University of Nairobi College of Agriculture and Veterinary Sciences and met with Dr. Jane Ambuko, horticulturist, and Dr. William Maina Muiru, plant pathologist. They gave us a tour of their greenhouses where trials are being conducted on varietal testing of tomato for pests and diseases, physiology of beans treated with Rhizobium, use of predaceous mites, wild tomato plants screened for bacterial wilt, screening of cassava for Cassava brown steak virus disease, spider plant (*Cleome gynandra*) collection, pesticide screening and nutrient analysis.

We were also shown a brick cooler and an evaporation charcoal cooler built with the support of Hort IL for storing fresh vegetables.

11.15 am –We visited the International Center for Insect Physiology and Ecology (*icipe*) and met with Dr. Christopher Prideaux, Dr. Sunday Ekesi, Dr. Sevgan Subramanian, and Dr. Rajender Saini. Dr. John Bowman explained the focus of the current IPM Innovation Lab and how it is going to develop and implement sub-awards. Dr. Ekesi mentioned that they work on pests of vegetable, fruit, and staple crops and also on migratory pests, army worms, and locusts. They have a project for management of thrips on beans. They are in the process of importing the predaceous mite, *Phytoseiulus longipes,* for control of *Tetranychus evansi*. They also work on fruit flies, *Tuta absoluta,* leafminer (*Liriomyza huidobrensis*), citrus greening, MLND, and push-and-pull technique to control stem borers of maize and sorghum. Icipe has developed tsetse fly repellent collars for cattle and is also working on acaricide resistance in ticks.

2.20 pm – We met with Sophie Walker, COP of the ACDI-VOCA project on aflatoxin management. This project is developing cheaper grain drying and storing methods for controlling aflatoxin development in post-harvest grains and also *Aspergillus* control methods in the field.

February 14 (Saturday) – I left Nairobi at 11.30 am and reached Addis Ababa at 1.30 pm.
February 15 (Sunday) – I worked on the trip report and met with Dr. Brhane Gebrekidon in the evening to work out details for our Ethiopia contacts and meetings.

February 16 – Dr. Brhane, Mr. Million, Dr. Kassuhan and I traveled to Ambo Plant Protection Center. On the way, we visited the Holetta research station of the EIAR and met with Director Aster Yehannes Chakiso. This station concentrates on Biotechnology, apples, peaches, barley, and livestock. The director indicated station's interest working on management of tsetse fly, other biting flies, and ticks.
At the Ambo Plant Protection Station, we checked on the status of the quarantine facilities and activities. *Zygogramma* culture is progressing well, but the *Listronotus* culture requires

replenishment. EIAR is supporting maintenance of the quarantine facilities and culturing the two natural enemies. This station also has cultures of *Beauveria, Metarhizium, Steinernema,* and *Heterorhabditis*.

Muni and Brhane tour an Ethiopian tomato field infested with *Tuta absoluta.*

Later we met with Dr. Mulageta Negari, dean of the College of Agriculture and Veterinary Sciences at Ambo University. This university has entomologists, plant pathologists, weed scientists and others working on horticultural crops, wheat, and maize. He also mentioned that there was a new invasive pest in Ethiopia – white mango scale, *Aulacaspis tubercularis*.

February 17, 11.00 am – Dr. Brhane and I met with Tracy Powell at the USAID mission and introduced her to IPM IL activities in the past and future plans. She mentioned that AGP 2 is in the process of being drafted, and no final determination has been made on the crops to be included. The mission would be open to our recommendations of crops to be included in the IPM IL sub-award RFAs pertaining to Ethiopia.

February 18, 10.30 am – Dr. Brhane and Mr. Million and I visited Eebre ziet Agricultural Research Center of EIAR where chickpea research is carried out. We met with the director Dr. Million Eshete, Dr. Mekasha, entomologist, and Mr. Dagnachew Bekele, plant breeder. Ethiopia grows two types of chickpea: Kabuli and Desi. Chick pea is grown on 209,000 hectares in Ethiopia, 70% of which is Desi, while the other 30% is Kabuli. Major plant protection constraints are ascochytes disease, root rot, Fusarium wilt, pod borer (*Helicoverpa armigera*), cutworm (*Agrotis segitum*), and stunt virus disease. In storage, *Calosobruchus chinensis* and rats are major problems. This center is very much interested in collaborating with IPM IL.

2.00 pm – We visited Melkassa Research Center of EIAR where research on vegetable crops is carried on. Dr. Gashawbeza Ayalew, entomologist, recommended that IPM IL work on tomato, onion, pepper, and cabbage in Ethiopia.

3.30 pm – We visited Wollenchiti and observed Zygogramma being multiplied in field cages. Most of the parthenium plants in the fields were dry.

February 19, 9.00 am – Dr. Brhane and I visited ILRI and met with Dr. Kindu Mekonnen with Africa Rising, Dr, Kalpana Sharma, a plant pathologist with CIP, Dr. Bayeh Mulatu with FAO, and Dr. Ngussie Tadesse with ICARDA. Dr. Said Ahmed Kemal of ICARDA and Dr. Peter Thorne of Africa Rising participated via skype.

Dr. Kindu Mekonnen gave an overview of the Africa Rising project. I gave a presentation on past and future activities of IPM IL. Dr. Kalpana Sharma presented her project on potato and sweet potato pests and diseases. Dr. Bayeh Mulatu talked about FAO plant protection activities in Ethiopia, and Dr. Negussie Tadesse discussed fungal disease of faba bean. Drs. Thorne and Kemal interacted via skype during presentations and discussions.

The crops addressed are: Africa Rising - wheat, faba bean, potato, barley and enset; CIP - potato and sweet potato; ICARDA - wheat and faba bean; and FAO - vegetables and cereals.

Faba bean and enset are crops of interest only in Ethiopia and not in Kenya and Tanzania. Faba bean is grown in the highlands of the northern part, and enset is grown in the lowlands of the southern part of Ethiopia.

An unidentified fungal disease of faba bean is considered a serious problem. Removing the residue after harvesting the crop and burning and treating the seeds with *Trichoderma* could help in reducing the incidence of the disease but it has not yet been adopted. In the third phase of IPM IL, the bacterial wilt disease of banana that affects enset was addressed, however, it was dropped from the program when IITA and other institutions with a larger support from donor agencies began addressing this problem.

I do not think IPM IL East Africa horticulture RFA should address one country problems in a regional project. However, IPM IL could address it with an associate award or a buy-in in association with Africa Rising, ICARDA, EIAR, and others.

5.00 pm –We met with Dr. Solomon Haile-Mariam of African Union who coordinates tsetse fly and Trypanosomiasis control in Africa. Several attempts have been made to control tsetse fly in various parts of Africa without much success except in Zanzibar, where it was eradicated by using sterile male technic. All 38 countries are interested in controlling this devastating pest of livestock. There is room for adopting IPM for this pest, which has not been tried.

February 20, 10.30 am – Brhane and I met with Dr. Berga Lemaga, Research Program at Agricultural Transformation Agency. The program was established in December 2010 but has only been in active operation for the past two years. Lemaga gave an overview of the operations of the agency. His suggestion for crops to be addressed by IPM IL were maize (stem borer and post-harvest), chickpea (pod borer and post-harvest), tomato, onion, potato, and pepper.

2.00 pm – We met with Dr. Eshetu Derso, the deputy director of crops for EIAR. His recommendation was that IPM IL address ginger (bacterial wilt), tomato, pepper, and post-harvest problems of maize and chickpea.

10.30 pm – I left Addis Ababa for Washington, DC.

February 21, 8.30 am – I reached Washington, DC. But my flight to Roanoke was cancelled due to heavy snow.

February 22 – I rented a car in Washington, DC, and reached Blacksburg at 6.30 pm.