

## **Feed the Future: Innovation Lab for Integrated Pest Management Trip Report –**

**Countries visited:** Nepal, Bangladesh and Cambodia

**Dates of travel:** 28 January to 11 February 2018

**Traveler's name and affiliation:** Lawrence E. Datnoff, LSU, Chair, IPM Innovation Lab  
Technical Advisory Committee

**Sites visited:** **Nepal** – IDE Country Office, Bakhundole, Lalitpur, Shining Star Vet Center, Nepalgunj and field visit to Banke District; **Bangladesh** – HRC, BARI, Joydebpur, Gazipur and field visit to Bogra as well as BARI; and **Cambodia** – IDE Country Office plus field and campus visit to RUA-

### **Nepal (30 January to 3 February)**

**Description of Activities:** iDE (Komal Pradhan, Luke Colavito, Lalit Sah, Saroj Shakya) and IPM Innovation Lab (George Norton, Rangaswamy Muniappan, Elvis Heinrichs, Amer Fayad, Ed Rajotte, Cristina Rosa, Megan O'Rourke and Jonathan Jacobs) personal met to discuss progress on IPM package objectives for Nepal. Information was provided on the progress to use biocontrol products developed in India for IPM use in Nepal and the impact of the Community Business Facilitators (CBFs) in moving commercial products for IPM use into developing areas and cooperatives. Update on last year's field trials was presented by Lapit Sah. Many of the objectives were being successfully accomplished with a number of positive outcomes and included the following: – Identifying which lures worked best for Tuta and developing a threshold for Tuta at 35 adults per week, IPM packages improved yields, mustard cake appeared to be a good carbon source for anaerobic soil disinfestation (ASD). Some general questions were asked by the team regarding analysis of data, if ratings for disease and insect damage were uniformly applied across farm locations and if some additional treatments were being applied that were not in the protocols – i. e. Phospan. Field visits at B-gaun, Banke District revealed that the experimental design and implementation of IPM packages were moving forward positively for onion, chili, French bean and tomatoes. The field experiments were very well maintained although some control plots were missing or appeared compromised because farmers did not want to lose production. The visit to the Vet Store revealed the different biocontrols and traps being sold and there was discussion regarding the CBFs. There was also questions about the open storage of the biocontrol products might compromise the efficacy of the materials.

**Suggestions, Recommendations, and/or Follow up Items:** Based on the first days update on the IPM package experiments and field site visit, a number of suggestions were made by the IPM team to Lapit Sah and IDE for next season's field experiments and included the following: add two types of controls – farmers practice and non-treated, for tomato pith necrosis – need more information for implementation of treatments and experimental design to include non-treated control, develop further refinements of trapping fruit flies to define species attacking bittergourd and impact on

fruit quality, provide help with raw data inputting into spread sheets and help with statistical analysis, and continue with on-station testing of ASD on chili peppers and implement this strategy against clubroot in cauliflower.

**Overall impression for Nepal:** IPM Innovation Lab Team did an excellent job of reviewing and refining the experimental design and evaluations for next year's series of IPM package objectives as well as other treatments to be implemented and began to organize data for publications.

### **Bangladesh (3-6 February)**

**Description of Activities:** The Annual Review and Program Planning Meeting was held at HRC, BARI, Joydebpur, Gazipur. Brief introductions were made by Dr. Abul Kalam Azad, Director General; Dr. ANM Rezaul Karim, Ex. Coordinator, IPM,IL; and Dr. Humnath Bhandari, IRRI representative for Bangladesh to the IPM IL Team (George Norton, Elvis Heinrichs, Amer Fayad, Ed Rajotte, Cristina Rosa, Megan O'Rourke and Jonathan Jacobs). Immediately afterwards, a technical presentation session was made by the scientists conducting research and included the following: BT and Non-Bt eggplant production – Dr. Md. Shahadath Hossain; IPM approach against mango fruitfly - Dr. Md. Shahadath Hossain; Monitoring of tomato leafminer, *Tuta absoluta*- Dr. Md. Shahadath Hossain; Bio-rational based management approach against mango hopper - Dr. Md. Shahadath Hossain; IPM approach against white mold of country bean – Dr. M. S. Ahar; IPM package for summer tomato production – Dr. M. A. Goffar; IPM package for bitter gourd production – Dr. M. A. T. Masud; Socio-economic/impact assessment – Dr. Sadique Rahman; and Colonization of *Ralstonia solanacearum* in *S. sisymbriifolium* and tomato – Dr. Mafruha. Overall, all the scientist had very good success with their research projects and were making good progress and are ready to organize their data for publication as well as to educate farmers on the success of these IPM strategies especially double bagging of mango fruit. Some general questions were asked of each scientist presenting by the IPM IL team regarding analysis of data, if ratings for disease and insect damage were uniformly applied across farm locations, experimental design, controls, etc. Field visit to farmer's fields in Bogra showed that the Bt eggplant with IPM package vs non-Bt isolate with IPM package was in the early stages of growth. There appeared to be no non-treated controls and at one farmer's site some of the eggplants looked like a different variety. Some of the grafts were difficult to distinguish from non-grafted plants. Nevertheless, the IPM packages were in place and progress was being made. Afterwards, the team visited another farm to view rice and eggplant production as well as visiting BARI to see ongoing field research on wheat, tomatoes, eggplant, etc.

**Suggestions, Recommendations, and/or Follow up Items:** Next year's experiments and other activities were discussed and included IPM packages to use such as Trichoderma compost as well as to start drafting manuscripts for publication. It was also suggested that further refinements are needed for impact assessments. A few scientists gave presentations on future field research and refinements were made by

the IPM IL team. The research and refinements were the following: **Studies on new rootstocks against bacterial wilt** : This research will introduce new eggplant root stocks (SMW006, 007 and 008) and the IPM IL Team suggested that they need to grow rootstocks under IPM conditions (netting, Trichoderma compost, using rouging, etc.), that they need to conduct this experiment at the Bogra Station where bacterial wilt is present and in sickbeds at BARI, and that they need to send revised protocol to IPM IL Team. **Integrated White Mold Control**: For this research, they need to flood the field for at least 32 days to reduce the inoculum of white mold. There was a question regarding whether flooding or biocontrols will reduce inoculum to reduce white mold development. As a consequence, a decision was made to use the two biocontrols together and compare them with flooded treatment that included with IPM practices and farmer practices. Dr. Nahar needs to revise the protocols and send to IPM IL Team. **BT vs NonBT eggplant production**: Continue the experiment as is, no changes. **Mango bagging experiment**: No NGOs are currently involved, not an experiment but is for show and tell; so will contact farmers and include in the revised project. New areas for using this IPM approach will be identified so this technology will receive further exposure. The IPM IL Team discussed the work plan for next year and also decided that dissemination of mango bagging and Trichoderma compost will be done by working with NGOs and Farmers. In addition, impact assessments that include area survey on IPM adoption on all crops will be conducted.

**Overall impression for Bangladesh:** IPM Innovation Lab Team did an excellent job of reviewing and refining the experimental design and evaluations for next year's series of IPM package objectives as well as other treatments to be implemented and began to organize data for publications.

### **Cambodia (7-10 February)**

**Description of Activities:** The IPM IL Team (George Norton, , Elvis Heinrichs, Amer Fayad, Ed Rajotte, Cristina Rosa, Megan O'Rourke and Jonathan Jacobs) met with iDE Team (Kim Hian Sang, Ratha and Mike Roberts, Director). Kim Hian provided an update on ongoing field trials at the Siem Reap Location and included the following: 12 trials for cucumber IPM with BCAs + orange oil, BTs, pheromone trap for fruit flies; 12 trials of long bean – rainy and dry season, IPM package similar to cucumbers; there was a question about Trichoderma efficacy; identified new insect pests; no differences were found between BAU (Business As Usual –Farmer's practices) and IPM for beetle and moth incidence and control; identified leafspot caused by Cercospora sp., downy mildew (DM), verticillium wilt, CMV and potyvirus as well as Rhizopus soft rot and Fusarium dry rot; Virus incidence was greater for BAU > CTRL > IPM; for DM no differences were detected between treatments and they questioned the use of Cu for controlling DM as a BAU practice; yield for longbean, BAU and IPM > CTRL; thrips and aphids as well as podborer and worms > in CTRL and lower in BAU=IPM. Challenges and lessons learned from the experiments to date were the following: frequency and intensity of rainfall damaged trials at RUA, number of unknown insect pest and diseases and need support in diagnoses, budget delay, challenge to set up field trials with farmer controls being 100% free from the use of chemicals, field trials highly demanding for

monitoring, still not enough evidence if BCAs can replace chemicals, quality and quantity of BCAs for Cambodia are questionable and need further testing under field conditions. The next day the Team visited the Long Bean IPM Field Trial at RUA. The Treatments – IPM package (Trichoderma, transplanted, plastic mulch, BTs, Beauveria and yellow sticky traps), BAU (Directed seeded, fungicides (chlorothalonil, mancozeb and Cu), and insecticide (Abamectrin) and the Control (transplanted and plastic mulch). Afterwards, the Team saw RUA undergraduate student presentations that included Bioefficacy evaluation of *Trichoderma viride*, *T. harizanum* and *T. koningii* for controlling damping off disease on tomato; The efficacy of plant extracts and *Trichoderma harizanum* against *Alternaria solani*; Comparison of the effectiveness of IPM and Farmer's practices in controlling insect pest on yard long bean – Chuleng (insects) and Chenda (plant diseases); Effect of *Bacillus thuringiensis* var. *kurstaki* and *Bacillus thuringiensis* var. *aizawai* on diamondback under nethouse conditions; and Effect of *Ocimum* sp. as a root repellent on Chinese kale on pest infestation in the dry season. Nine undergraduate students are involved in these research projects (4 female, 5 male). After the presentations, the IPM IL Team met with Karen Legrand of the HORT IL. She discussed some of the leafy vegetable work and that pests and diseases are the main production challenges they are encountering. The two groups discussed the use of IPM such as sticky traps, traded further information on what each Lab is doing and agreed they might be able to meet in the future to further discuss how the two ILs might collaborate. George Norton, Short Heinrichs and Amer Fayad met with Rica Flor to discuss Rice IPM. They reviewed IPM results of Trichoderma and host resistance for suppressing rice diseases, Beauveria for insect pest reduction as well as rat management.

**Suggestions, Recommendations, and/or Follow up Items:** A number of suggestions were provided to each RUA student after their research proposal presentation and included that they need to pay more attention to their material and methods, quantifying inoculum of plant pathogens and biocontrol agents, testing the timing and concentration of biocontrols and extracts. Program planning for next season was discussed and it was decided that Longbean IPM research was done but will need one more year for cucumber, plan for tomatoes using farmer's varieties; use radio drama in the future to reach more farmers, conduct a field day with the Longbean trial, have the RUA students experiment look at seedlings with and without Trichoderma and its effect on plant development and nutrient content so women's group will be convinced to use and do a demonstration trial at a Field Day, need more focus on capacity building as it relates to business to increase the availability of IPM items such as biocontrol agents.

**Overall impression for Cambodia:** IPM Innovation Lab Team did an excellent job of reviewing and refining the experimental design and evaluations for next year's series of IPM package objectives as well as other treatments to be implemented and began to organize data for publications. The request by USAID for ILs (HORT and IPM) to interact is not very feasible when no mechanism to formally meet was provided to plan joint activities especially on limited budgets. Nevertheless, the ILs agreed to try and meet in May 2018 to further discuss areas of potential mutual collaboration. One other issue, Kim Hian is devoting more time to the Harvest project as oppose to IPM IL since

the majority of her salary has been shifted to the Harvest project due at least in part to the late of arrival USAID funding this year. She needs her time to be shifted back to the IPM IL just as soon as this year's IPM IL funds arrive.