IPM CRSP Trip Report

Country Visited: Guatemala

Dates of Travel: 31 March to 3 April 2013

Travelers Names and Affiliations: Beth K. Gugino, Department of Plant Pathology and Environmental Microbiology, The Pennsylvania State University

Purpose of Trip: The primary objective of this short trip was to review the experimental designs and data collection protocols for the upcoming field trials being established in late April/early May by collaborators in Guatemala.

Sites Visited:
- Universidad de Valle de Guatemala, Guatemala City
- Popoyán, greenhouse tomato production facility outside Guatemala City

Description of Activities/Observations:

The first day and a half days of the two day trip was spent reviewing and revising the field experiments proposed for the 2013 rainy season. A total of four trials were proposed with the overall objective being to evaluate the effectiveness *Trichoderma* spp. to improve plant health and manage naturally occurring soilborne diseases. Two trials are being conducted at the research farm in Solola and two trials are being conducted in grower fields with an emphasis on demonstration and education. The first tomato trial was simplified and will evaluate methods of application of a commercially available *Trichoderma*-based product (Excalibur Gold) in macrotunnel, microtunnel and open field production systems. The six application treatments (untreated control, soil amendment only, transplant drench only, transplant drench plus 2nd drench, soil amendment plus transplant drench and soil amendment plus transplant drench and 2nd drench) will be replicated four times and the use of the three production systems will enable a cost-benefit comparison between the systems. Several native strains of *Trichoderma* spp. have been isolated and this mix of strains will also be evaluated using the sample application treatments in the microtunnel system only. The importance of not introducing additional variables into the trials was discussed and trials will be routinely scouted for pests and foliar diseases, if needed select fungicides and insecticides will be applied across all treatments to prevent potential loss of the trial. The physical arrangement of the treatments in a randomized complete block design was also discussed as was the importance of blocking based on potential variability in the field which could potentially confound the results. In-season and harvest data collection (numbers and types of samples) were discussed and a rough timeline of activities developed and will be detailed in the revised field trial plans being prepared.

The objective of the two on-farm tomato field trials are to demonstrate the efficacy of commercially available *Trichoderma* and *Bacillus*-based products for managing soilborne pathogens and promoting plant health both with and without the use of a microtunnel compared to the grower standard without the microtunnel. There will be at least four treatments replicated four times. Depending on the presence of plant-parasitic nematodes at the field site location, a fifth treatment with a nematophagous fungus may be included.
The fourth trial is to evaluate the efficacy of commercially available Trichoderma spp. (Excalibur Gold) on potato plant health and disease management in a greenhouse trial. This trial will be conducted in the same greenhouse as the pepper trial during the June 2012 visit. Due to space constraints, four application treatments will be evaluated (untreated control, pre-plant soil amendment, in-furrow drench at planting and in-furrow drench at planting plus a 2nd drench after emergence). Similar in-season and harvest data will be collected as in the tomato experiments.

Tuesday morning I also spent time reviewing the proposed changes to the experimental plans with Dr. Rolando Cifuentes, the Director Centro de Estudios Agrícolas y Forestales, Institute de Investigaciones. He had provided some initial input into the field trial designs in collaboration with Margarita Palmieri and is in agreement with the proposed changes.

Tuesday afternoon we visited Popoyán, greenhouse tomato production facility outside Guatemala City (www.popoyan.com). They are the primary exporter of tomatoes and peppers from Guatemala to the U.S. and Europe. Popoyán in collaboration with Priva, a Dutch horticulture automation company, as well as several other corporate sponsors dedicated a new training center (Centro de Capacitación Innovación y Producción Popoyán-Priva CCIPPP) adjacent to Popoyán’s commercial greenhouse in early March. This facility has educational meeting rooms as well as a series of small state of the art greenhouses for hands-on grower trainings as well as additional ones to conduct smaller scale research trials. Larger research greenhouses allow promising practices to be ramped up to commercial scale to facilitate a more realistic cost-benefit analysis. We had an opportunity to tour the facility and visit with the field manager Joaquin Melgar Ing. and the general manager/owner Francisco Viteri Ing. Francisco is very interested and supportive of hands-on training not only of growers but of students as well as is interested and welcomes further discussion of about potential student internships. They are currently hosting a Dutch student for several months. Additional information about the center and the grand opening can be found on YouTube by searching Priva Training Centre: CCIPPP Guatemala and TVAgro-CCIPPP.

Suggestions, Recommendations, and/or Follow-up Items:

- Based on our extensive discussion, Margarita Palmeiri will work with Marco Arévalo to revise the field trial designs and protocols and will email them to Beth Gugino.

- Margarita and Macro will follow-up with Jeff Alwang to develop a protocol/method for conducting an economic analysis to compare the use of Trichoderma spp. and general tomato production in the macrotunnel, microtunnel and open field production systems.

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<td>Joaquin Melgar Ing.</td>
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