

## USAID Horticulture Project in Bangladesh-IPM Component 7 Trip Report

**Country Visited:** Bangladesh

**Dates of Travel:** July 19-29, 2015

**Travelers Names and Affiliations:** Amer Fayad (Virginia Tech) and Naidu Rayapati (Washington State University)

**Purpose of Trip:** Conduct a virus survey of vegetable crop diseases for IPM component 7 CIP/AVRDC Horticulture Project in Jessore and Barisal.

**Sites Visited:** Jessore and Barisal Districts, Bangladesh.

### **Description of Activities/Observations:**

July 19: We traveled from U.S. to Bangladesh.

July 21: We arrived in Dhaka.

July 22: We traveled to Jessore by air, accompanied by Shahadath Hussein (IPM coordinator IPM/CIP) reaching Jessore in the morning. We met the IPM field officer, Md. Shazzadul Islam. We visited IPM demonstration plots and community-based IPM plots in Brac para village, Chowgucha upazilla, Jessore district. We observed sweet potato vine multiplication fields. The major problem reported was the attack of sweet potato weevil. Pheromone traps are used for its management.

In the IPM demonstration plots, we observed virus symptoms on ash gourd and collected a sample from an infected plant. Farmers reported that plants showing virus symptoms produced 8 fruits/plants; whereas healthy looking plants produced 12-15 fruits/plants. We also collected samples from bottle gourd plants showing mosaic symptoms, upward curling and reduced leaf size on young leaves and yellowing on older leaves.

Along the road, we observed severe infestation of jute fields by the jute hairy caterpillar. Severe leaf damage/defoliation was occurring, and caterpillars were also feeding on adjacent fields of gourds and eggplant. We recommended a follow up with the Jute Research Institute and the use of *Bacillus thuringensis*.

In the community-based farmer IPM plots, we observed the use of Cuelure traps for management of fruit flies. The farmer expressed satisfaction using this IPM technology and informed us other farmers who visit his field show interest in the technology and that they will be willing to purchase the lure/traps next year after the project ends.



Severe infestation by hairy caterpillar in Jute

We also observed virus symptoms on pointed gourd (severe leaf reduction and upward shoots). Most fruits in this spot (several plots) showed fungal growth and rotting. It is important to note that this is mostly due to high moisture/rain in recent days and high planting density. Adjacent fields with lower planting density showed less rotting. We collected samples showing virus-like symptoms.



Pointed gourd plants showing yellowing and severe leaf reduction.



Pointed gourd showing severe fruit rotting.

We visited Jhinaikundu, Jessore district and observed virus symptoms on ash gourd, bitter gourd and sponge gourd and collected samples. In several fields, plants showed yellowing/low vigor, mostly due to excess soil moisture/water stagnation.

We visited Hakimpur and collected samples from pumpkin plants showing virus-like symptoms (no fruits produced by these plants). We also collected samples from pointed gourd (severe leaf reduction) and ash gourd (yellow mosaic).

We visited the BARI/RARS station in Jessore and met with the chief scientific officer. We visited the plant pathology lab and assessed the facility for conducting virus training in the future. Currently there are no plant pathologists/entomologists working at the station. One of the plant pathologists we met during an earlier visit in 2013 is pursuing her PhD in Australia. Therefore, conducting virus training course at the research station might be difficult due to inadequate facilities and the absence of plant pathologists. Dr. Shahadath Hussein, IPM coordinator from IPM/CIP, suggested that we can conduct the virus training course at BARI in Gazipur, near Dhaka.

All samples were pressed on FTA cards for further analysis at WSU.





Pumpkin plants showing yellowing mosaic symptoms.

During this visit, one BHEARD student, expected to start his PhD at WSU under the direction of Rayapati, joined us for the field visit and discussed his background and future plans.

July 23: We traveled to Majura village, Jhikorcha upazila. We visited one IPM demonstration plot and observed virus symptoms on brinjal. These symptoms were consistent with CMV infected plants we tested in 2013-14 and reported CMV as the causal agent. We tested these plants by immunostrips, and results showed that they were positive for this virus.



'Little leaf' symptoms in brinjal caused by phytoplasma.

Few plants showed symptoms of little leaf (caused by phytoplasmas and transmitted by leafhoppers). We recommended that the farmer rogue infected plants. We also observed high incidence of brinjal fruit and shoot borer. It is important to note that lures for this pest were used in this demonstration plot and that the farmer was clipping infested shoots.

In an adjacent community-based farmer IPM plot (served 20 farmers; total in Jessore: 200 farmers for community-based plots), we observed okra plants showing vein yellowing symptoms. We collected a sample from infected plants.



Brinjal plants with fruit and shoot borer damage.

We visited several pointed gourd fields and observed no virus symptoms; however, high incidence of fungal-like problems was noted with fruit rotting. This is mostly due to high moisture, heavy rains and high plant density. In one pepper field, we observed thrips damage (most often thrips damage is mistaken/ misdiagnosed as virus damage on pepper).





Thrips damage on pepper.

We visited three home gardens (farmers are provided fertilizer, seeds, trellises, training and pheromone traps). In one decimal of land, several crops are grown for home consumption. Little is sold to market.

We visited Sataintala village, Bagharapara upazila. We observed virus symptoms on summer tomato. All tomato was grown under plastic tunnels. We collected samples from plants showing mosaic and leaf curling (mostly BARI 4 hybrid variety). Due to high soil moisture, many plants showed wilting. Farmer reported excellent yield with 300 fruits/plant/month.



Yellowing and leaf curl on tomato plants.

In Sreerampur village, Byapur upazila, we observed virus symptoms on teasel gourd. We collected samples for virus symptomatic teasel gourd, bitter gourd, “Hagra” weed (Malvaceae), bottle gourd (farmer used his own seeds collected from healthy plants/fruits) and sponge gourd (farmer used his own seeds collected from healthy plants/ fruits).

All samples were pressed on FTA cards for further analysis at WSU.

July 24: We traveled to Barisal district. We reached Barisal in the afternoon and were met by IPM Field Officer Md.Olyul Islam. We visited Dhumcham village, Babugonj upazila. There, we observed two adjacent okra fields. One field was planted with Momota hybrid showing vein yellowing symptoms; the other, an Indian hybrid showing tolerance to the virus. A third okra field with Soroj 2 hybrid (package claimed resistance to YMV) showed high incidence of virus-like symptoms. We collected samples from these virus symptomatic plants.

In an adjacent sponge gourd, we observed yellow mosaic symptoms and collected samples. This IPM demonstration plot was used to teach farmers about the use of Culure. The farmer used hybrid seeds (SCI seeds). We also collected samples from “Dortuki” weed (need to be conformed if it is *Sida* sp.), ridge gourd showing mosaic symptoms.

All samples were pressed on FTA cards for further analysis at WSU.





Vein yellowing symptoms on okra.

July 25: We visited Manpasha village, Jahalakathi sader upazila. We observed virus symptoms on cucumber (collected sample).

We then traveled to Baharnpur village, Jahalakathi sader upazila and visited cucumber and sponge gourd fields (IPM demonstration plots with Culure and bird deterrents) and collected samples from symptomatic plants.

We finished the field visit at the Barisal BARI/RARS station. There, we collected a tomato sample from plants showing severe leaf curl.

All samples were pressed on FTA cards for further analysis at WSU.

July 26: We traveled back to Jessore, reaching Jessore city in the afternoon. Upon arrival, we visited DAI office and met with William Levine, COP and Bani Amin, DCOP. We briefed them about our visit and discussed the IPM IL and IPM component of the USAID horticulture project in Bangladesh. We learned from Levine and Amini about the Agriculture Value Chain Project in Bangladesh, and all parties recognized the need to collaborate on future activities. We discussed the issue of seed quality, especially regarding seed-borne viruses. Levine advised that IPM IL reach out to Agriinputs project since they focused and aligned more with agriculture inputs.



July 27: We traveled back to Dhaka, reaching Dhaka City in the morning.

We met with Yousuf Mian (IPM IL Coordinator) and discussed the IPM IL activities. We also met with one BHEARD student expected to start his PhD at WSU under the direction of Rayapati. He discussed his background and future plans with Rayapati.

July 28: We visited the USAID mission in Dhaka and met with Rowshan Ara Akhter (Program Budget Specialist and Gender Focal Point, Economic Growth Office), Mohamad Shibly (Project Management Specialist, Economic Growth Office) and Percy Wilson (Agriculture Officer, Economic Growth Office). We briefed them about the purpose of our visit to Bangladesh and the progress made in the virus survey and the IPM component 7 of USAID horticulture project.

We also discussed the importance to capacity building in IPM, and specifically in plant virology. The USAID mission, through BHEARD program, supported the candidacy of two plant pathologists (one from Khulna Agriculture University and another from BARI, Gazipur) to start their PhD at WSU. They will be working under the direction of Rayapati at WSU.

We also visited CIP office and met the Shawkat Begum, COP, and Asgar Mir, DCOP, and Shahadath Hossain, IPM coordinator. We discussed the progress of the IPM component 7 and updated them on the virus survey. We also discussed the need to include more IPM components in the IPM demonstration plots and the community-based farmer IPM plots.

We learned from CIP that in the winter season, the components included yellow sticky traps and grafting. We also learned that grafting, even though very successful as a technology, was unpopular because of the additional costs, and farmers were not willing to spend more money. This has been a major limitation to wise adoption on this technology in bacterial wilt affected areas. We also discussed the need to include *Trichoderma* in the coming season, in plastic trays for seedling production and in the field for transplanting.

We discussed the prospects of a “no-cost extension.” Begum requested we submit a revised work plan and budget for activities planned until December 31, 2015.

July 29-30: Travel back to the U.S.

**Training Activities Conducted:**

site	Type	Trainees	Number(Male)
IPM demonstration plots/ Community based farmer plots	Virus symptom identification	Farmers	24 M
IPM demonstration plots/ Community based farmer plots	Virus symptom identification	IPM field officers	2 M
IPM demonstration plots/ Community based farmer plots	Sampling/ Spotting of FTA cards	IPM field officers	2 M
IPM demonstration plots/ Community based farmer plots	Immunostrip detection	IPM field officers	2 M

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

It is important to identify viruses in different types of vegetables grown in farmer fields. This will help to relate symptoms for specific viruses in a given crop and plan for developing appropriate management strategies.

Based on our field visits and discussions with CIP and BARI scientists, it is apparent that virus diseases are emerging constraints to vegetable crops, such as cucurbits, peppers, okra and tomato. In Bangladesh, most plant virus diagnostics/identification is based on symptoms only. There are no trained virologists at the BARI stations across the country who can carry on project activities related to IPM strategies for management of virus diseases. There is a need for training young scientists from BARI and national universities in virology. There is also a need for improving the supply chain of quality seed and biopesticides and biofertilizers.

If conditions are suitable, we propose visiting Bangladesh in December of 2015 and conducting an additional virus survey in Jessore and Faridpure districts, as well as a training workshop in virus diagnostics at BARI Gazipur.

#### Summary Recommendations:

- Continue virus survey for dry season vegetable crops with a focus on tomato and cucurbits.
- Follow up on molecular characterization of virus samples collected to identify specific viruses.
- Survey weeds and other plants to identify potential alternate hosts for viruses.
- CIP IPM staff should advise farmers on virus disease management. IPM components include the following:
  - resistant varieties
  - healthy seedlings (growing seedlings in plastic trays with coco pith, *Trichoderma* under net covers, rouging infected plants in the first 30-40 days after transplanting)
  - using appropriate crop density
  - controlling virus vectors
  - removing infected crop residues
  - removing alternate weed hosts
  - crop rotation
- Continue the collaboration with BARI on *Trichoderma*.
- Train BARI early career scientists, especially those in the regional stations in virus diagnostics/identification.
- Conduct field demonstration plots for healthy seedling production by raising seedlings in plastic trays with coco pith, *Trichoderma*, and growing them under nets.
- Work with private companies such as Ispahani and NGOs such as GKSS, and value chain project DAI to improve the availability of IPM components (pheromone traps, plastic trays, coco pith or other alternative, *Trichoderma*, biopesticides and biofertilizers) through Agrovets and local service providers.
- Advocate for commercial nurseries that can sell healthy seedlings at more affordable prices to farmers.
- Print fact sheets and pest identification catalogues on IPM technologies and important diseases and insects.



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