

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

Dates of Travel: February 15 – March 16, 2018

Traveler's Name and Affiliation: Laouali Amadou INRAN (National Institute for Agricultural Research)

Purpose of Trip: Finalize and submit two manuscripts for publication on the biological control of the millet head miner

Sites Visited: Center for International Research, Development and Education at Virginia Tech

Description of Activities/Observations:

During this month-long stay, three activities were conducted:

Manuscript 1:

Developing an optimum diet for mass rearing of the rice meal moth *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae) for production of the parasitoid *Habrobracon hebetor* Say (Hymenoptera: Braconidae).

The manuscript was revised with Dr. Muniappan several times from the first to the second week of the stay. The revision focused on methods of calculation, the formula used, as well as the improvement of the sections of the manuscript and its English phrasing. All the citations in the documents were searched and verified to ensure that the cited information aligned with those in the published papers. The improved document was sent to coauthors for observations and comments. The document is ready to be submitted to the Crop Protection Journal and the abstract is attached on the last page of report.

Manuscript 2:

Optimization of *Habracon hebetor* Say (Hymenoptera: Braconidae) releases technic for improving control of the Millet head miner *Heliocheilus albipuntella* in Niger

The work on this manuscript was carried out in the third week. The data was analyzed and commented on by Dr. Muniappan, Dr. Sidhu and myself. The results for the second manuscript were selected from the results generated by data analysis. Published papers related to the title of the second manuscript were downloaded and printed. 75% of the manuscript was written by the end of the stay. The first draft will be ready by next week.

Seminar presentation:

A seminar presentation about the research activities conducted on the biological control of the millet head miner in Niger was demonstrated on March 14th in CIRED's Main Conference Room.

The presentation consisted of the following five parts:

- Diet fortification of the host larvae for parasitoids production
- Millet head miner biological control results in West Africa
- Optimization of *H. hebetor* release techniques for better control of MHM larval populations
- Identification of local eggs parasite and their test millet head miner eggs
- Production of parasite bags by farmers' cooperatives

A dozen of people attended the seminar.

The presentation was followed by questions related to egg parasites, economic impacts, and gender consideration in the project activities.

Other:

- Poster presentation on Biological control with *Habrobracon hebetor* to the interested visitors during the CIRED launch ceremony on March 8th.
- I was interviewed by Sara Hendery, IPM IL Communications Coordinator, about my research and my collaboration with the IPM team for a VT news release.

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

The second draft of my work will be completed soon and will be submitted for comments and observations.

List of Contacts Made:

Name	Title/Organization	Contact Info (address, phone, email)
Muniappan Rangaswamy	IPM Director	rmuni@vt.edu
Sara Hendery	Communicator	saraeh91@vt.edu
Jaspreet Sidhu	Research Associate	jsidhu1@vt.edu
Amer Fayad	Associate Director	afayad@vt.edu

Abstract

The rice meal moth, *Corcyra cephalonica* (Stainton), a factitious host for the production of the parasitoid, *Habrobracon hebetor* (Say), was reared at different rates, on pearl millet (*Pennisetum glaucum* (L.) R. Br.) flour alone and in combinations of flours of sorghum

(*Sorghum bicolor* (L.) Moench), peanut (*Arachis hypogea* L.), and cowpea (*Vigna unguiculata* (L.) Walp.). There was no significant difference among treatments in the duration from first instar larva to moth emergence. The highest number of eggs per female moth and a higher number of larvae was recorded from females fed on cereals combined with legumes. Heavier pupae were recorded from larvae fed on cereals compared to those fed on the mixture of cereals and legumes. A high number of *H. hebetor* 4.9 larvae/*C. cephalonica* larva was obtained on larvae fed on a diet of 75% pearl millet +25% cowpea. However, more *C. cephalonica* larvae were produced in the 50% pearl millet +50% cowpea diet and as a result, this diet produced the most parasitoids. With 7.5 tons this diet placed in 750 rearing containers of 32 cm height x 34 cm diameter, each container inoculated with 25 *C. cephalonica* larvae and kept for a three-month rearing period, will produce 2,680,257 larvae. This is sufficient to fill 102,648 release bags with two mated female *H. hebetor* added to each bag for distribution to about 6,843 villages. The cost of production of employing this process calculated to be to be \$0.0008 per *C. cephalonica* larva produced.

Keywords: *Corcyra cephalonica*, *Habrobracon hebetor*, Mass rearing, Pearl millet, Sorghum, Cowpea.