Development and Delivery of Ecologically-Based IPM Packages in Central Asia

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Viruses**:** Naidu Rayapati, Washington State University; Sue Tolin, Virginia Tech

Gender Issues**:** Linda Racioppi and Zahra Jamal, Michigan State University; Maria Elisa Christie, Virginia Tech

Socio-Economic Impact Assessment**:** Mywish Maredia and Richard Bernsten, Michigan State University; George Norton, Virginia Tech

Summary

This collaborative research and capacity building program has included research to improve pest management through enhancing capacities of existing biolaboratories and through a better understanding of landscape ecology, local biodiversity, and habitat management. Out of more than 50 locally collected plants screened, 8 plants have shown potential for their use in agricultural landscapes for enhancing biological control of pests. IPM outreach and educational activities have been initiated through Farmer Field Schools (FFS) and Student Field Schools (SFS) in collaboration with national agricultural research systems (NARS), non-governmental organizations (NGOs) and local universities.

Building on the strong foundation and the regional network established during past four years, the current project is implementing a new five-year collaborative program to develop and deliver ecologically-based IPM packages for key food security crops - wheat, tomato and potato. The IPM packages for these three crops

are targeted to address key pest management problems in Tajikistan, Kyrgyzstan and Uzbekistan.

The project places a strong emphasis on scholarship, publications and dissemination of research results through both electronic and print media. For additional information, please visit http://ipm.msu.edu/central-asia.htm

Wheat IPM Package for Northern part of Tajikistan

Screening of wheat varieties for resistance to cereal leaf beetle (CLB) (Oulema melanopa L. Coleoptera: Chrysomelidae)

In the last decade, cereal leaf beetle became one of the most dangerous pests in wheat crop in Central Asia. Researchers at ICARDA have identified different wheat lines that may be resistant to this pest. The objective of this study was to screen and select best lines that show resistance to cereal leaf beetle. Wheat seeds were received from Biodiversity and Integrated Gene Management Program (BIGMP) of Entomology section from ICARDA. On November 28-29, 2009, a total of 130 wheat entries were planted with susceptible check of the local wheat variety Sadoqat repeated after every nine entries at a research plot site of Research Institute of Farming "Zemledeliya" of the Academy of Agricultural Science of Tajikistan. The lines showing high resistance to CLB were krasnokolosaya, Frunsenskaya 60, and Lutescencs 1207\1.

Sunn pest monitoring: During May-June 2010, a survey was conducted to determine the distribution of Sunn pest in Tajikistan. The survey confirmed this pest has established only in northern region of Tajikistan (Table 1).

Table 1: Sunn pest distribution monitoring in wheat crop fields in the North region of Tajikistan, May 21-23, 2010

Districts/Location and date	GPS data	The sunn pest abundance in the 1 m² wheat field			Number of damage ears of wheat in 1 m²
		Egg	Larvae	Adult	
Panjakent 21.05.2010	N 39.50820 E 067. 49311 Altitude: 924m	16	0	0	0
Istaravshan 22.05.2010	N 39.98263 E 069. 01879 Altitude: 823m	0	0	1	7
Istaravshan 22.05.2010	N 39.99459 E 069. 02714 Altitude: 794m	0	0	0	8
Zafarobod 22.05.2010	N 40.15412 E 069. 25397 Altitude: 402m	0	0	0	3
Spitamen 22.05.2010	N 40.12606 E 069. 25081 Altitude: 451m	0	1	0	4

Spitamen 22.05.2010	N 40.12798 E 069. 26469 Altitude: 465m	0	0	0	4
Spitamen, farmer Ilhom Boimatov 22.05.2010	N 40.13420 E 069. 31091 Altitude: 464m	0	5	3	5
Isfara, Jilgazi village 23.05.2010	N 40.15337 E 070. 71998 Altitude: 822m	0	3	3	4
Isfara 23.05.2010	N 40.16642 E 070. 74240 Altitude: 812m	0	2	5	4
Isfara, Bogiston village 23.05.2010	N 40.17256 E 070. 80219 Altitude: 809m	0	2	3	3
Konibodom, Madaniyat village 23.05.2010	N 40.22377 E 070. 27560 Altitude: 378m	0	0	0	0
Konibodom 23.05.2010	N 40.24834 E 070. 09825 Altitude: 358m	0	3	0	3
Konibodom, Karakjikum village 23.05.2010	N 40.24790 E 070. 08578 Altitude: 358m	0	2	0	2
Bobojon Gafurov 23.05.2010	N 40.21531 E 069. 92989 Altitude: 361m	0	5	0	2

Tomato Crop

In Uzbekistan, tomato is the fourth most important vegetable after pepper, onions and potato. Tomato is mostly grown for the local market and a minor proportion is exported to regional countries. The potential for growing tomato in Uzbekistan is great because it is labor intensive, and thus generates rural employment, improves nutrition of the people, has export potential, and increases the income of growers. However, compared to cotton and wheat, it gets less attention from the government.

The common tomato varieties grown in Uzbekistan are Shannon, Uysupovskiy, Avitsena and Bull heart.

Pests of tomato in Uzbekistan

Diseases: Common diseases observed are Early Blight (*Alternaria solani*), *Fusarium oxysporum* Late Blight (*Phytophthora infestans*) and Downey mildew (*Pseudoperenospora cubenis*). Early Blight caused by *A. solani* was the most widespread pathogen on tomato crop in Uzbekistan. Leaf Mold caused by *Cladosporium fulvum* appeared only in greenhouses.

Insect and Mite Pests: The common pests were whiteflies, leaf miners, tomato fruit worm (*Helicoverpa armigera*) and russet mites *Aculops lycopersici*. Whiteflies, tomato fruit worm and russet mites in the open fields, and leaf miners, whiteflies and aphids in green houses were serious pests.

Development of artificial diets for rearing of predator mite *Amblyseius mckenziei*

In Uzbekistan, sale of biological control agents account only for about 1% compared to pesticide sales. Predatory mites *Phytoseiulus persimilis*, *Metaseiulus occidentalis*, *Amblyseius californicus*, and other natural enemies have become expensive for use on most crops because of the high cost of production. In most cases, these natural enemies are raised on host mites, which must first be reared, often on a host plant. This process is very labor and space intensive. Replacement of the prey or host with an artificial diet, and development of associated mass production technology with decreased labor inputs, could cut down the cost.

In the laboratory of Uzbek Research Institute for Plant Protection, we have been conducting research on production of predatory mite *Amblyseius* sp. in different artificial diets. There were 3 kinds of artificial diets prepared that were marked as AD 1, AD2 and AD 3, where AD 1 had 300g bran, 20 g yolk, 10 g sucrose, 0,01 g of vitamin mixture and 0, 03g streptomycin sulphate in one liter container. Medium AD 2 is nearly the same, but instead of yolk, yeast autolysate 10g was added. AD 3 had 300 g mixture bran with flour, 100g of sugar, 50 g of margarine and 50 ml of milk.

Amblyseiuse mckenziei developed normally from egg to adult on the three artificial diets. However, the longevity of the adult females varied. AD3 showed the best results comparing to others where female longevity of *A.mckenziei* was 65 days, much longer then on AD1 (50 days), AD 2 (55 days) and on natural diet (37 days). Eggs showed no abnormalities; larvae fed on diets had normal development; and adults were comparable in size to individuals reared on a natural diet.

Potato Crop Management: Photos taken at Farmers Field Days – Kyrgyzstan 2010

This cost-effective method of rearing of *A. mchenziei* has the potential for dramatically reducing the use of conventional insecticides without increased crop loss.

Potato Crop

Pests of potato in Kyrgyzstan

Important fungal diseases are *Macrosporiu*m leaf spot, *Alternaria* leaf spot, Black scurf, and Late Blight on potato leaves. These fungus diseases cause serious damage under damp weather conditions, resulting in up to 60% rotten tubers. Late Blight occurred 10 - 35%, and the incidence of bacterial diseases, such as Bacterial ring rot and a Black leg, was 5%. About 20% of the farmers use fungicides and a few apply Trichodermin or Baikal M-1.

Common potato varieties grown are Picasso, Neva, Mondial, the Drag, Sante, the Symbol, Latona, Chelpek, etc. Potato varieties: Picasso, the Symbol, Nur, Latona, Neva, Dzhelli, and Beluga showed resistance to late blight.

Colorado potato beetle is the most serious insect pest.

Student field school on wheat crop

IPM in Tajikistan

The project objective on IPM outreach and education focused on both academic and nonacademic stakeholders through student field schools (SFS) and farmers field schools (FFS), in collaboration with NGOs, government institutes and local universities in Tajikistan. To enhance university education, an inventory of IPM educational programs in Tajik National University was conducted. SFS on wheat IPM for 12 students (5 female and 7 male) of grade III in the Biological faculty was implemented. The program course curriculum was consisted on 22 hour class/theoretical and 16 IPM practical/field parts.

Gender Issues in IPM

Dr. Racioppi and Dr. Jamal attended a full day training workshop with Dr. Maria Elisa Christie at Virginia Tech University in May. They also made a site visit to Tajikistan in July and August. They met with more than 20 individual experts and development groups, to engage in three focus groups in three villages in two different districts, and to undertake a Rapid Gender Assessment for each site. During the visit to Tajikistan they were able to identify Ms.

Students scouting the wheat pest

Shoira Pahlavonova from Tajikistan to serve as the coordinator of the gender related activities in the region, and to assist with networking and gender related training programs.

Impact assessment of IPM CRSP project activities in Central Asia

As an input into the planning of the impact assessment (IA) activities in Years 2 - 5, an impact pathway analysis worksheet was developed by the IA research team (Dr. Mywish Maredia and Dr. Richard Bernsten from MSU). This impact pathway analysis will be completed by the impact assessment team based on a one-on-one consultation with the project PIs. The outcome will be "impact pathways" for wheat, potato and tomato IPM research components in Central Asia. The goal is to help the researchers lay out the vision of success (impact goal) and a) make them aware of the consecutive steps needed to achieve that vision of success; and b) incorporate these steps as much as possible in their workplan for the remainder of the grant period.