MSU Workplan for Central Asia Regional IPM Program

The Collaborative Program

USAID is sponsoring a Collaborative Research Support Program for Integrated Pest Management in Central Asia (IPM-CRSP). The project is designed to foster development of a comprehensive IPM initiative, using an ecologically based and multidisciplinary systems approach. Michigan State University, the University of California-Davis, and ICARDA serve as the host institutions for implementing this collaborative and participatory research-education program, designed to facilitate capacity building in IPM in Central Asia.

IPM Constraints Addressed

Based on the Central Asia regional IPM Forum held in Tashkent Uzbekistan in May 2005, the stakeholders identified the following issues and constraints related to IPM

1. The countries of Central Asia are transitioning from centrally-planned monoculture agricultural systems to more diversified systems to meet the challenges of local food security, environmental quality, and natural resources management. Cotton remains a dominant crop in many of these countries, but the importance of food crops such as wheat, potato, tomato, and fruit crops in the region is growing to enhance local food security and shift from the former policy of monoculture agriculture. As a result, the forum participants identified a need to conduct research on the impact of agricultural diversification on local biodiversity and dynamics of pests and beneficial organisms. This information and knowledge would be useful when re-designing agroecosystems to conserve biodiversity and enhance biologically based pest management. The current emphasis of IPM programs in Central Asia is the augmentation through mass rearing and release of bio-control agents by a network of insectaries known as 'biolaboratories'. There are no programs that promote conservation of natural enemies and biodiversity in the agricultural landscape. Therefore, there is an opportunity to enhance IPM practices via landscape ecology and biodiversity.

2. Highly educated and well-trained human resources are available, however, research facilities and infrastructure need to be upgraded and modernized. For example, there are more than 800 biolaboratories in Uzbekistan alone that rear and provide bio-control agents to farmers. These laboratories have a narrow product line (4-5 species) and their efficiencies can be enhanced. These biolaboratories would also benefit from updated equipment and methodologies to improve their efficiencies. There is also a need to expand the laboratories' product lines to provide better services to farmers, address additional pests, and cover additional crops.

3. Although components of IPM programs are in place, there is a need to integrate these components into IPM packages and crop management programs. There is also a need for coordination among institutions and between countries to benefit from the already existing human resources and experiences. Communication and interaction with IPM specialists outside the region is lacking due to isolation, language barriers and limited financial resources. Therefore, there is need for collaborative projects and networking activities to foster interaction and exchange of knowledge and information. The participants are very eager to develop and strengthen collaborative linkages nationally, regionally and internationally.

4. In the absence of a formal government-run extension system, NGOs, farmer organizations and local universities are providing farmer training, technology transfer and outreach services. There is a lack of ecologically-based IPM approaches in these outreach and farmer training programs. IPM educational packages need to be developed that can be integrated into farmer field schools and other outreach programs.

5. Activities of the CGIAR (ICARDA, CIP, CIMMYT) and other international agricultural research centers (AVRDC) are growing in the region and are serving as excellent partners for the regional IPM program. In addition, the local universities are active in providing IPM education. The government of Uzbekistan has encouraged universities to expand outreach services and education to farmers. The universities would benefit from access to IPM information from outside Central Asia through appropriate linkages and electronic media. The participants at the forum discussed the need for establishing a regional IPM Team that includes and meets the needs of various stakeholders.

Objective: 1.Conduct research on landscape ecology to enhance biodiversity and biological pest management.

Increasing crop monocultures and decreasing landscape diversity are frequently accompanied by a reliance on agricultural pesticides to help suppress crop pests. The specific objectives of this research project are to adapt existing principles and practices of landscape management to enhance IPM for use in Central Asian agricultural landscapes, to research the use of native plants for conserving natural enemy communities and enhance biological control of field crop pests in Central Asia and to investigate and implement the most promising landscape management techniques in partnership with governmental agencies, universities, NGOs and farmers in the region.

Activity: Initiate collaborative research on landscape ecology in Central Asian agro-ecosystems

An IPM CRSP Research fellow led teams of collaborators to collect Central Asian native plants for testing and use in agricultural system for attracting beneficial insects. Participants covered more than 3000 km2 and collected more than 60 local nectar plants in Tajikistan and Kyrgyzstan. Research plots were established in Tajikistan to test 24 known native plants that have the potential to provide habitat for beneficial insects (Table1). A similar study was conducted in Kyrgyzstan on 10 native plants (Table 2). The research experiment was a randomized block with four replications. Plants were established in 1 square meter and 5 m apart. A flowering, May through September 2007, arthropods were sampled weekly. The experiment site was located at the Institute of Zoology and Parasitology, the Academy of Sciences of Tajikistan.

Table 1. List of plant species established at the research plot in Tajikistan, 2006.

##	Family	Genus and species	Common Name	Plant Type

1	Tamaricaceae	*Tamarix arceuthoides Bunge*	Tamarix	shrub
2	Rosaceae	*Rosa canina L.*	Dog rose	subshrub
3	Asteraceae (Compositae)	*Silybum marianum l.*	Silybum	forb
4	Lamiaceae (Labiatae)	*Ziziphora interrupta Juz.*	Interrupta	forb
5	Lamiaceae (Labiatae)	*Mentha asiatica Boriss.*	Horse mint	forb
6	Fabaceae (Papilionaceae)	*Glycyrrhiza glabra L.*	Licorice	forb
7	Malvaceae	*Alcea nudiflora (Lindle) Boiss.*	Alcea	forb
8	Apiaceae (Umbelliferae)	*Dacus carota L.*	Wild carrot	forb
9	Lamiaceae (Labiatae)	*Salvia sclarea L.*	Clary or Europe sage	forb
10	Apiaceae (Umbelliferae)	*Conium maculatum L.*	Poison hemlock	forb
11	Scrophulariaceae	*Verbascum songaricum Schrenk*	Mullein	forb
12	Capparaceae (Capparidaceae)	*Capparis spinosa L.*	Caperberry, caperbush	shrub
13	Cruciferae	*Barbarea vulgaris*	Barbarea	forb
14	Asteraceae (Compositae)	*Pyrethrum carneum*	Pyrethrum	forb
15	Asteraceae (Compositae)	*Achillea filipendulina Lam.*	Fernleaf yarrow	forb
16	Asteraceae (Compositae)	*Calendula officinalis L.*	Marigold	forb
17	Apiaceae (Umbelliferae)	*Anethum graveolens L.*	Dill	forb
18	Apiaceae (Umbelliferae)	*Coriandrum sativum L.*	Coriander	forb
19	Apiaceae (Umbelliferae)	*Foeniculum vulgare Mill.*	Sweet fennel	forb
20	Guttiferae	*Hypericum scabrum L.*	Hypericum	forb
21	Lamiaceae (Labiatae)	*Hyssopus seravschanicus (Dubjan)* Parij	Hyssop	forb
22	Lamiaceae (Labiatae)	*Ocimum basilicum L.*	Sweet basil	forb
23	Balsaminaceae	*Impatiens balsamina L.*	Balsam	forb
24	Lamiaceae (Labiatae)	*Melissa officinalis L.*	Melissa	forb

Plant species were divided into two categories according to their bloom period: mid season (15 June through 25 August) and late season (15 July through 31 October) (table 2). The most numerous taxon by order were Hymenoptera included following families Braconidae, Aphidiidae, Chalcidoidea, Cynipoidea, Ichneumonidae, Sphecidae and Vespidae, Diptera (Syrphidae and Tachinidae) and Heteroptera (Anthocoridae and Nabidae. Most of numerous taxon by family were Syrphidae, Anthocoridae, Coccinellidae, Chalcidoidea, Sphecidae, Braconidae and Ichneumonidae.

Tableb 2. List of plant species established at the research plot in Kyrgyzstan, 2007.

	Family	**Genus and species**	**Common Name**	**Plant Type**
1	Rosaceae	*Rosa Sp.*	Dog rose	subshrub
2	Lamiaceae (Labiatae)	*Mentha silvestris L.*	Horse mint	forb
3	Malvaceae	*Alcea nudiflora (Lindle) Boiss.*	Alcea	forb
4	Lamiaceae (Labiatae)	*Salvia sclarea L.*	Clary or Europe sage	forb
5	Lamiaceae (Labiatae)	*Origanum vulgare L.*	Oregano	forb
6	Apiaceae (Umbelliferae)	*Conium maculatum L.*	Poison hemlock	forb
7	Liliaceae	*Eremurus Sp.*	Eremurus	forb
8	Asteraceae (Compositae)	*Achillea filipendulina Lam.*	Fernleaf yarrow	forb
9	Lamiaceae (Labiatae)	*Hyssopus seravschanicus (Dubjan)* Parij	Hyssop	forb

10	Lamiaceae (Labiatae)	*Melissa officinalis L.*	Melissa	forb

Insects were divided separately into natural enemies, herbivores, other and was identified to family, and counted. Insects from any parasitic or predaceous family, or genus or species within a family known to be parasitic or predaceous, were included as natural enemies. Insects were counted as herbivores if they were a member of a family known to be broadly herbivorous. Attractiveness here is based on the number of natural enemy arthropods collected per sample; therefore, it includes both arthropod attraction to the plant and subsequent retention on it.

Several of the plants tested in this preliminary trial were very attractive to a variety of natural enemy taxa. Initial tests revealed that seven plant species were most attractive to natural enemies of pests in Tajikistan, whereas five were most attractive in Kyrgyzstan. These species are being evaluated in the selected agricultural systems in Tajikistan and Kyrgyzstan.

The concept of Landscape Ecology has been introduced to FFS through introduction of 5 nectar plants into vegetables crop in Tajikistan and results published as chapter in two modules of IPM in FFS.

Objective: 2.Enhance efficiency, products line, and crop usage of Central Asian biolaboratories

Since the 1980th *Amblyseius mckenziei* and *Amblyseius cucumeris* are the main entomophages which have been colonized and widely applied against spider mites, thrips and white flies and in greenhouses crops in former Soviet countries. The most common spider mite found in Uzbekistan is two-spotted spider mite *Tetranycus urticae* (Alimukhamedov et al, 1986). This is the most harmful and wide spread pest of cotton, fruit and vegetable crops (tomato and cucumber). Thrips are serious pests of onions throughout the Central Asia. While both the onion thrips (*Thrips tabaci*) and western flower thrips (*Frankliniella occidentalis*) can attack onions, generally the onion thrips is more common and serious. Thrips damage to bulb onions results in both loss of yield and reduction in storage quality while green onions loose their marketability. White fly *Bemisia tabaci* and *Trialeurodes vaporariorum West*, transmit African cassava mosaic, tomato yellow leaf-curl, tomato mottle, and other crops. In Central Asia *T. vaporariorum West* is mainly considered as greenhouse pest and occurs on red pepper, beans, tomatoes, cabbages and berries.

The overall goal of this component is to work with Central Asian researchers to conduct study of predator mite's colonization in Kyrgyzstan and Uzbekistan biolaboratories, estimate predator mite species' ability to suppress number of pests on vegetable and fruit crops, and study optimal conditions for predator mite colonization in laboratory.

Activity: Improving efficiency and expanded product lines of biolaboratories in the central Asia region.

The initial focus of this component was on evaluating mass rearing and release of predatory mites of the Acari family, Phytoseiidae, which are successfully utilized in the United States, Europe and Middle East for control of spider mites, thrips and whiteflies. After obtaining an importation permit from the government of Uzbekistan, two species of Phytoseiid mites were brought to Central Asia for further study: *Amblyseius cucumeris* and *Amblyseius swirskii*. *A. cucumeris* is generally regarded as safe to release by the European and Mediterranean Plant Protection Organization (EPPO) standards (OEPP/EPPO, 2002) which provide guidelines to national authorities in the EPPO region (including Europe, North Africa, Russia, Turkey,

Israel and Jordan) on the introduction and release of exotic biological control agents, so as to identify and avoid hazards for agricultural and natural ecosystems. These standards are based on extensive previous knowledge and experience of the use and introduction of entomophages sufficient to indicate the absence of significant risks.

The study of rearing 3 species predator mites: *A. mckenziei, A.cucumeris* and *A. swirskii* in different conditions was initiated with researchers of the Kyrgyzstan Center on Production of Biological Facilities for Plant Protection and the Uzbek Scientific Research Institute for Plant Protection. Of the Phytoseiids introduced, only *A. cucumeris* has been successfully colonized under conditions present in the biolaboratories in Uzbekistan and Kyrgyzstan. Currently, this species is being reared at both the Uzbekistan Institute for Plant Protection and the Kyrgyzstan Centre on Biological Facilities Production for Plant Protection. Results to date suggest promise for its application to commercial crops. Our studies have revealed the optimal condition for rearing these predator mites, and the optimal predator: prey ratios for their mass rearing in culture. For example, we established that the optimal predator: prey ratio on the prey mite, *Acarus siro*, is 1:5 for *A. swirskii* and 1:7 for *A. cucumeris*, and on *Tyrophagus putrescentiae* it is 1:7 for *A. swirskii* and 1:10 for *A. cucumeris*. *A. swirskii* is the most tolerant to low humidity and has the most cannibalism and aggressive features compared to *A.cucumeris* and *A. Mckenziei*

In the fall of 2006, scientists of the Kyrgyz biolaboratory conducted plots trials of *A. cucumeris* on onions and in winter, 2006-07 on flowers in laboratory greenhouses against *Thrips tabaci*. The density of thrips on the onion crop was very high, about 10 per leaf, and the entomophages could not suppress the pest population. However, good results were obtained on flowers in the greenhouse release as the thrips population was low when the predators were introduced. With the establishment of *A. cucumeris* mass rearing there is now the potential for their application for management of spider mites, thrips and whiteflies on cotton, vegetable, fruit and greenhouse crops.

Objective: 3.Develop and implement IPM extension/outreach and university education programs

Integrated pest management (IPM) is a comprehensive approach that utilizes all available tools and methods for the management of pests (insects, disease and weeds). IPM is a knowledge and information intensive. The goal of the IPM extension/outreach and educational programs will be to:

- To further develop the capacity of ATC of RAS, Kyrgyzstan and Winrock International in the region to become regional centers for training of trainers in Central Asia.
- Develop a pool of trainers that can support Farmer Field Schools (FFS) and other outreach activities.
- Using the Training of Trainers (ToT) approach, integrate new information, teaching tools and methodologies into existing IPM curriculum.

Activity: Initiate development of IPM training modules/materials that can be integrated into crop management training programs offered by the NGOs and government institutions.

The Outreach Component of the IPM CRSP Program in Central Asia has estbalished working relation with the following institutions: Kyrgyz Agrarian University, Tashkent State Agrarian University, Samarkand Agricultural Institute, Institute of Microbiology of the Uzbek Academy of Sciences, Kazakh National Agrarian University, Tajik Research Institute of Plant Protection and Quarantine, Andijan Agricultural Institute of Uzbekistan, Biology-Soil Institute of the Kyrgyz Academy of

Sciences, Institute of Zoology and Parasitology in Tajikistan, Institute of Zoology of the Uzbek Academy of Sciences.Through the outreach, the IPM CRSP in Central Asia works with these instituions in implementing FFS, Student Field School, developing IPM Extension Bulletins or other materials (see publications).

Based on the feedback received when implementing the FFS in Tajikistan, a booklet for FFS has been developed . It covers topics such as seeds preparation and conservation, seeding, ecological analysis of vegetables in the field, botanic pesticides, ecological analysis of nectariferous plants in the field, etc. All these mentioned topics are new for FFS in Kyrgyzstan as well as in Tajikistan.

In Collaboration with the AVRDC-CAC of the World Vegetable Center, a pocket brochure on weeds in vegetable crops in Central Asia has been developed by the IPM CRSP. Various photos of 35 most common weeds have been taken and described, and will be published in Russian.

In collaboration with the Tajik Agricultural Academy of Science, the IPM-CRSP has opened a Farmer Field School (FFS) where 13 women and 2 men have been trained. Six faculty members from the Tajik State Agrarian University have been selected to become the Master-trainers through the IPM-FFS.

A summary leaflet/flyer in Russian covering the ecologically-based IPM approach with highlights of IPM CRSP regional project was developed and sent to more than 40 private and government institutions in Tajikistan and Kyrgyzstan. Discussions are underway with the Tajik to introduce IPM in their agricultural education curriculum. State Agrarian University

In collaboration with TSAU, the IPM-CRSP has developed a manual on creation and training of ToT and FFS. In addition, both partners will be conducting a training of trainers of scientists from various universities including the Andijan Agriculture Institute, Namagan and Fergana Universities and the Nunkun. TSAU in collaboration with the IPM-CRSP developed special brochures of pest calendars during vegetable production. Three pest calendars were developed for cabbage, carrot and tomato. State University

In addition, a manual on pest management in organic agriculture is being developed and will be widely distributed to agricultural universities and NGOs in the Central Asia region. In collaboration with the Advisory Training Center in Kyrgyzstan (Ms. Petra Geraedts and Ms. Gulnaz Kaseeva) a manual on FFS management has been developed and published. This document will be useful to government institutions, NGOs and International agencies planning to open FFS.

Activity: Develop an inventory of IPM educational resources and a directory of IPM specialists in the region

A database of IPM scientific in Central Asia (Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan) has been developed. This database is available in electronic version both Russian and English and has been sent to Tashkent State Agrarian University, Kyrgyz Biology-Soil Institute, Kazakh National Agrarian University, Kazakh Research Institute of Plant Protection, and Andijan Agricultural Institute.

Objective: 4.Develop and implement regionalization and globalization strategy

We recognize the importance of networking and linkages among various stakeholders and institutions

working on IPM within the region and globally to help facilitate the transfer of technology, information and knowledge. We will make all possible efforts and avenues to share the research results and IPM information to IPM stakeholders in the region beyond these two countries. Our two partners - ICARDA and Winrock International have well-established regional networks in central Asia, and they will serve as excellent vehicles for regionalization and globalization. We will use the following strategy to foster interactions, cooperation and linkages among various stakeholders.

Activity: Membership in the International Association of Plant Protection Sciences (IAPPS)

- The three IPM CRSP team members and 10 other IPM specialists from Uzbekistan, Tajikistan, Kyrgyzstan, Turkmenistan and Kazakhstan have been provided membership in the International Association of Plant Protection Sciences (IAPPS).

Activity: Facilitate participation in regional IPM meetings and forums organized by ICARDA, Winrock International and other NGOs.

- The three IPM CRSP team members regularly attend regional meetings/conferences to present the USAID IPM-CRSP project activities.
  - In March 2007, Dr. Tashpulatova attended a two-week training course on sunn pest in Tajikistan.
  - Dr. Nurali Saidov attended a joint workshop of ICARDA, the Central Asia and Caucasus Association of Agricultural Institution (CACAAI) and the Global Forum on Agricultural Research (GFAR). The goal of the forum was to design and develop a research need program for Central Asia and Caucasus in the area of genetic resource management, natural resource management and socio-economic, policy and capacity building.
- Dr. Barno traveled to Samarqand to visit a private Biolab for initiating research collaboration and Drs. Aitmatov and Saidov visited the Samarqand Agrarian Institute for future research collaboration.

Activity: Facilitate participation of IPM specialists from the region in the MSU's International Agroecology, IPM and sustainable agriculture short course.

- Three participants from Tajikistan, Kazakhstan and Kyrgyzstan attended the International Short Course IPM at MSU. The objective of the training is to build human capacities of institutions collaborating with the Central Asia IPM-CRSP Program. Below is the list of the three participants and their affiliation:
  - Dr. Abdussator Saidov, Institute of Zoology and Parasitology of the Tajik Academy of Agricultural Science in Tajikistan
  - Ms. Gulnaz Kaseeva, Advisory Training Center of the Rural Advisory Services (ATC-RAS)in Kyrgyzstan
  - Dr. Zhanna Issina, Kazakh Institute of Plant Protection in Kazakhstan
- N. Saidov, Barno Tashpulatova and Murat Aitmatov attended the Tenth Meeting of the Steering Committee of the CGIAR Program for Central Asia and the Caucasus. May 29-30, 2007. Dushanbe, Tajikistan.

Objective: 5.Conduct impact assessment of the regional IPM

program

Our regional IPM program will assess economic, environmental (including biodiversity), institutional and gender impacts. The project has identified two socio-economists in the region—Dr. Shuhrat Sattarov (Samarkand Agricultural Institute) and Ms. Nodira Khusanova (Human Resource Development Center, Tashkent, Uzbekistan) who will help to implement the impact assessment activities. They will work closely with the socio-economics team leaders based at MSU and Virginia Tech (Prof. George Norton, leader of the global theme on the IPM CRSP impact assessment). We will seek input from Dr. Richard Bernsten and other specialists at MSU in assessing the socio-economic and gender impacts of this project.

Activity: Initiate baseline survey of pest management practices in Kyrgyzstan and Uzbekistan or Tajikistan

Progress not reported yet.

Training in Progress / Completed

No training numbers entered yet.

Publications

- Barakanova, N., U. Sultanbekov, P. Geradts, and F. Zalom. 2007. Determination of cucumber pests and diseases. Advisory Training Centre of Rural Advisory Service. Bishkek, Kyrgyzstan, 30 pp. (in Russian)

- Barakanova, N., U. Sultanbekov, P. Geradts, and F. Zalom. 2007. Determination of tomato pests and diseases. Advisory Training Centre of Rural Advisory Service. Bishkek, Kyrgyzstan, 30 pp. (in Russian)

- Saidov, N., B. Tashpulatova, M. Aitmatov, D. Baributsa and K. Maredia. 2007. Directory of Integrated Pest Management Specialists and Stakeholders in Central Asia.

- Aitmatov, M. 2007.
  - Calendar of insect pests development and damage to cabbage
  - Calendar of insect pests development and damage to tomato
  - Calendar of insect pests development and damage to carrot

- Aitmatov, M. et al. 2007. Terminological dictionary of the main diseases, pest of the cotton and vegetable crops was published in Latin, Russian and Tajik.

- Aitmatov, M. et al. 2007. Organization and Management of the Farmer Field School on IPM.

- Aitmatov, M., P.Geraedts and N. Saidov. 2007. IPM in Farmers Field School:
  - Module 1. Introduction of FFS, 93 pages. (Russian).
  - Module 2. Biological Control Methods of Main Insect Pest and Disease of Tomato, 104 pages (Russian).

- Maredia, K. and D. Baributsa. 2007. Integrated Pest Management Forum for Central Asia, Dushanbe Tajikistan. CD of Forum Power Point Presentations.

- Aitmatov, M., N. Saidov et al. 2007. Weeds in Vegetable Crops.

Presentations

- Maredia, K., F. Zalom and R. Paroda. Ecologically-Based Participatory and Collaborative Research and Capacity Building in IPM in Central Asia Region. CGIAR Meeting, Washington, D.C. December 4, 2006

- Maredia,K. and D. Baributsa. May 2007.Integrated Pest Management Collaborative Research Support Program (IPM-CRSP), Central Asia IPM Stakeholders Forum, Dushanbe-Tajikistan.

- Maredia, K. and N. Saidov. 2007. IPM CRSP Program in Central Asia. Tenth Meeting of the Steering Committee of the CGIAR Program for Central Asia and the Caucasus. May 29-30, 2007. Dushanbe, Tajikistan.

- Aitmatov, M., G. Bird and W. Pett. May 2007. Strengthening IPM Outreach/ Education in the Central Asia Region,Central Asia IPM Stakeholders Forum, Dushanbe-Tajikistan.

- Saidov, N. and D. Landis. May 2007. Landscape Ecology and Biological Control. Central Asia IPM Stakeholders Forum, Dushanbe-Tajikistan.

- Tashpulatova, B. and F. Zalom. May 2007. Enhancing the Efficiency and Product Lines of Biolaboratories in Central Asia. Central Asia IPM Stakeholders Forum, Dushanbe-Tajikistan.