

The *Feed the Future Innovation Lab* for
Integrated Pest Management

Annual Report

2014–2015

November 5, 2015

**IPM IL | Integrated Pest Management
Innovation Lab**

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IPM Innovation Lab Host Countries



Asia

Bangladesh
Nepal
Cambodia
Vietnam

Africa

Ethiopia
Kenya
Tanzania

Program Partners

Bangladesh

Virginia Tech
Pennsylvania State University
Ohio State University
Bangladesh Agricultural Research Institute (BARI)
Bangladesh Agricultural University (BAU)
Mennonite Central Committee (MCC)
Grameen Krishok Sohayak Sangstha (GKSS)
Ispahani
Agricultural Value Chain Project

Nepal

Virginia Tech
Pennsylvania State University
Ohio State University
City College of New York
iDE
National Agricultural Research Council
Department of Agriculture

Center for Environmental and Agricultural Policy Research, Extension and Development
Himalayan College of Agricultural Sciences and Technology
KISAN
Agricare
IUCN
Tribhuvan University
Agriculture and Forestry University

Cambodia

Virginia Tech
Pennsylvania State University
Ohio State University
North Carolina A&T University
National IPM Program
General Directorate for Agriculture
Royal University of Agriculture
University of Battambang,
iDE

Vietnam

Virginia Tech
University of Florida
CABI
Washington State University
Cuu Lon Delta Rice Research Institute
Southern Horticultural Research Institute (SOFRI)
Plant Protection Research Institute
Plant Protection Department
Vietnam National University of Agriculture
Nong Lam University
Can Tho University
Fruit and Vegetable Research Institute

Ethiopia

Virginia State University
Virginia Tech
Ethiopian Institute of Agricultural Research (EIAR)
Haramaya University
Oromiya Bureau of Agriculture
Tigray Bureau of Agriculture
CABI

Kenya

Project not awarded yet

Tanzania

Project not awarded yet

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I. Executive Summary

The official award of the cooperative agreement of the IPM Innovation Lab to Virginia Tech was given on November 17, 2014. The Request for Application (RFA) released by the USAID in April 15, 2014, has identified Cambodia and Nepal for vegetable crops IPM, Cambodia and Burma for rice IPM and Vietnam for exportable fruit crops IPM in Asia. Since the RFA gave us flexibility to involve an additional host country, we included Bangladesh for vegetable IPM, as already we had 15 years of involvement in that country. In Africa, Ethiopia, Kenya, and Tanzania were included for vegetable and grain crops IPM. In addition, the RFA called for empirical assessment of climate change and biodiversity as well as modeling spread of invasive species.

We visited all the host countries involved in this program and met with the USAID missions to obtain their views on the crops addressed, and on local, regional and international coordinators to be included in the RFA. We have formed a Technical Advisory Committee (TAC) of six members including the AOR. Eight RFAs were released for concept notes. The TAC reviewed the concept notes and recommended top two to be developed into full proposals. Final proposal was selected based on the review recommendations of the TAC, input from the missions and ME.

So far, four proposals have been approved by the Agreement Officer and are in the process of implementation. Additional four proposals are in the review process and are expected to be implemented in early FY 2016.

II. Program Activities and Highlights

A set of eight RFAs released for sub-awards is listed in Table 1 below.

Titles of RFAs Released	Date of release	Closing date	Number of Concept Notes Received	Number of Full Proposals Requested/Reviewed
IPM for Exportable Fruit Crops in Vietnam	Dec. 18, 2014	Jan. 30, 2015	5	2
Invasive Species – Modeling for South American tomato leafminer, <i>Tuta absoluta</i> and Groundnut leafminer, <i>Aproaerema modicella</i> (<i>simplexella</i>)	Feb. 11, 2015	March 27, 2015	6	3
Biological control of the invasive weed, <i>Parthenium hysterophorus</i> in East Africa	Jan. 28, 2015	March 13, 2015	4	1

Modeling for Biodiversity and Climate Change	Jan. 28, 2015	March 13, 2015	6	1
Innovative scientific research and technology transfer to develop and implement Integrated Pest Management strategies for rice pests in Cambodia	March 1, 2015	April 15, 2015	2	2
Vegetable Crops and Mango IPM in Asia	Mar. 30, 2015	May 15, 2015	3	2
Grains Crops IPM in Africa	May 20, 2015	June 19, 2015	4	2
Vegetable Crops IPM for East Africa	June 2, 2015	July 3, 2015	4	2

Proposals approved

By the end of FY 2015, four projects were approved by the Agreement Officer and the other four are in various stages of review. Projects approved and in the process of implementation are:

1. Biological control of the invasive weed, Parthenium hysterophorus in East Africa.
2. Modeling for Biodiversity and Climate Change.
3. Vegetable Crops and Mango IPM in Asia
4. IPM for Exportable Fruit Crops in Vietnam

III. Key Accomplishments

The Management Entity visited Bangladesh, Cambodia, Ethiopia, Kenya, Nepal, Tanzania and Vietnam and consulted with USAID missions before issuing the RFAs. We set up the TAC and reviewed all the concept notes and proposals received. Agreement Officer's approval for four projects have been obtained and are in the process of implementation.

Other accomplishments include forecasting to Nepal and Bangladesh of the impending danger of invasion of *Tuta absoluta* and assisting Tanzania in management of *T. absoluta*.

IV. Research Program Overview and Structure

Technical Advisory Committee consisting six members including the AOR has been set up to review concept notes and proposals. To monitor the program implementation, a web portal has been developed.

V. Research Project reports

a) Biological control of the invasive weed *Parthenium hysterophorus* in East Africa

- i. **PI:** Wondi Mersie
- ii. **Lead Institution:** Virginia State University

iii. **Collaborators:**

Ethiopia: Ambo University; Amhara Regional Agricultural Research Institute; Ethiopian Institute of Agricultural Research; Haramaya University; Oromiya Agricultural Bureau; Tigray Regional Agricultural Research Institute.

Kenya: Kenya National Museum, CABI.

Tanzania: Sokoine University, CABI.

Uganda: Makerere University, CABI.

South Africa: Agricultural Research Council- Plant Protection Research Institute (Weeds Division).

iv. **Description:**

This project builds on the accomplishments of the two previous USAID-IPM CRSP/ IPM IL-funded parthenium projects to abate the spread and impact of the weed in east Africa. Specific activities are: 1) scale-up the rearing and release of the two approved bio-control agents, the leaf-feeding beetle *Zygogramma bicolorata* and the stem-boring weevil *Listronotus setosipennis* in parthenium infested areas of Ethiopia; 2) evaluate the establishment and impact of these released agents on parthenium, crops and biodiversity; 3) evaluate new parthenium bio-control agents for their safety to non-target plant species under quarantine and, if specific to the weed, seek a permit for their release; and 4) assist scientists in Kenya, Tanzania and Uganda in the implementation of biological control measures against parthenium in their respective countries.

b) Strengthening production and export of Vietnamese fruit crops through innovative and market-orientated IPM

- i. **PI:** Nguyen, Van Hoa
- ii. **Lead Institution:** Southern Horticultural Research Institute (SOFRI)

iii. Collaborators:

Washington State University, Virginia Tech, University of Florida F;

iv. Description:

This project targets four exportable fruit crops, namely, dragon fruit (*Pitaya*, *Hylocereus* spp.), mango (*Mangifera* spp.), longan (*Dimocarpus longan*) and lychee (*Lychee chinensis*). These four key crops collectively represent the major portion of Vietnamese fruits exported.

c) **Participatory biodiversity and climate change assessment for integrated pest management in the Chitwan-Annapurna Landscape, Nepal**

i. **PI:** Nir Krakauer

ii. **Lead Institution:** The City College of New York (CCNY)

iii. Collaborators:

USA: Colorado State University.

Nepal: Agriculture and Forestry University; Tribhuvan University; Agriculture and Forestry University, Ecological Service Center

iv. Description:

This project would assess biodiversity in several categories linked to agricultural resilience and sustainable pest control across an altitude transect in the Chitwan-Annapurna Landscape of central Nepal.

Scientists will establish automatic weather stations and conduct surveys to provide data for spatial modeling of biodiversity changes with climate.

Researchers will utilize existing study sites for this transect whenever possible to build on already collected data and local relationships.

Based on assessment and modeling results and community stakeholder consultations, scientists will carry out gender-sensitive participatory training for increasing smallholder resilience to climate and other stressors via soil, water and nutrient management that promote biodiversity and the flow of ecological services.

d) **Innovative Scientific Research and Technology Transfer to Develop and Implement Integrated Pest Management Strategies for Vegetable and Mango Pests in Asia**

- i. **PI:** George Norton
- ii. **Lead Institution:** Virginia Tech

iii. **Collaborators:**

USA: Virginia Tech, Ohio State University, Penn State University, Washington State University, North Carolina A&T University

Bangladesh: Bangladesh Agricultural Research Institute, Bangabandhu Shiekh Mujibur Rahman Agricultural University, Bangladesh Agricultural University, Agricultural Value Chain Project.

Nepal: iDE; Agricultural and Forestry University; Himalayan College of Agricultural Sciences and Technology (HICAST); National Agricultural Research Council (NARC); Center for Environmental and Agricultural Policy Research, Extension, and Development (CEAPRED)

Cambodia: iDE; Ministry of Agriculture, Forestry and Fisheries; Royal Agricultural University, General Directorate of Agriculture.

VI. **Associate Award Research Project Reports**

Integrated Pest Management Program for Vegetable Crops in Banke and Surkhet Districts of Nepal.

USAID Mission in Nepal. Award No: AID-367-LA-13-00001

i. **Project Description:**

Technology transfer of IPM components and packages developed for high value vegetable crops like tomato, cucumber, eggplant, bitter melon, and others in Kathmandu and Pokhara to Banke and Surkhet districts in Terai.

ii. **Collaborators:**

International Development Enterprises (iDE), Centre for Environmental and Agricultural Policy Research, Extension, and Development (CEAPRED), Himalayan College of Agricultural Sciences and Technology, Knowledge-based Integrated Sustainable Agriculture and Nutrition (KISAN), and National Agriculture Research Council (NARC).

iii. **Achievements:**

- Technologies demonstrated: soil solarization, use of plastic trays and coconut pith for raising seedlings, covering seedlings with nylon nets in the nurseries, setting up pheromone traps, drip irrigation, mulching with plastic sheets and application of *Trichoderma*.
- Participation in Agricultural Fairs at Bunke and Surkhet.
- Encouragement of local entrepreneurs for production of Tricho-compost.
- A farmers' field day was conducted at Banke in collaboration with KISAN and CSISA projects.
- Training of agrovets at surkhet on the benefits of bio-pesticides.
- Training of KISAN project technicians on adoption of IPM components and packages.
- Conducted a workshop on plant disease diagnostics.
- Training Bhutanese scientists and expansion of IPM programs to Bhutan.
- *Tuta absoluta* workshop was conducted to sensitize administrators, scientists and extension agents on its impending invasion.
- 25,546 farmers are adopting IPM technologies.

iv. **Capacity Building:**

- Two undergraduate students from the Himalayan College of Agricultural Sciences and Technology completed their theses.
- Expansion of IPM IL activities to Bhutan.
- Training of agrovets.
- Assisting private companies in *Trichoderma* production.
- Popularizing the use of plastic trays, coconut pith, *Trichoderma*, nylon netting, drip irrigation, and pheromone traps.

v. **Lessons Learned:**

- Need for training of agrovets on benefits of bio-pesticides.
- Need to assist private companies that produce bio-pesticides.
- Training of technicians of value chain projects.
- Training of scientists in diagnostics.

VII. Human and Institutional Capacity Development

a) Short-term training

Type	Location	Date	Female Participants	Male Participants	Total Participants
<i>Tuta absoluta</i> workshop	Kathmandu, Nepal	3/15/15	10	40	50
<i>Tuta absoluta</i> workshop	Dhaka, Bangladesh	6/1/15	5	35	40
<i>Tuta absoluta</i> workshop	Jessore, Bangladesh	6/2/15	10	50	60
<i>Tuta absoluta</i> workshop	Addis Ababa, Ethiopia	4/15/15	5	45	50
Trichoderma workshop	Arusha, Tanzania	7/2015-7/23-15	13	15	28
<i>Tuta absoluta</i> workshop	Arusha, Tanzania	7/21/15	20	83	103
<i>Tuta absoluta</i> workshop	Sokoine, Tanzania	7/22/15	10	30	40

b) Long-term training

Name	Gender	University	Degree	Major	Graduation Date (month/year)	Home Country
Elli Travis	F	Virginia tech	MS	Agricultural Economics	8/2015	USA
Emma Shirey	F	Virginia tech	MS	Agricultural Economics	12/15 (expected)	USA
Naworaj Acharya	M	Penn State	PhD	Entomology	5/15	Nepal
Nagendra Subedi	M	Ohio State University	PhD	Plant Pathology	5/15	Nepal
Mafruha Afroz	F	BSMRAU / Ohio State University	PhD	Plant Pathology	In progress	Bangladesh
Ana-Sofia Avelar	F	University of Arizona	MS	Plant Pathology	8/15	USA
Evan McCarthy	M	Virginia tech	MS	Agricultural Economics	8/15	USA
Ahsanuzzaman	M	Virginia Tech	PhD	Agricultural Economics	6/15	Bangladesh
Sadique Rahman	M	Virginia Tech/ Bangladesh Agricultural University	PhD	Agricultural Economics	In progress	Bangladesh
Arjun Khanel	M	Tribhuvan University/ Virginia Tech	PhD	Agricultural Economics	In progress	Nepal
Vanessa Carrion	F	Virginia Tech	PhD	Agricultural Economics	12/15	Ecuador

VIII. Technology Transfer and Scaling Partnerships

Several workshops were conducted on (1) the the isolation, production and use of the beneficial fungus *Trichoderma* and (2) the management of the South American tomato leafminer *Tuta absoluta*. Refer to section VII (a) for more information.

IX. Environmental Management and Mitigation Plan

No activities to report.

X. Open Data Management Plan

Data management plan was submitted to AOR on (08-31-2015). No data has been generated as no activities have started.

XI. Governance and Management Entity Activity

In the past, IPM Innovation Lab has been developing IPM packages for high value vegetable crops and in the present program it has been expanded to cover fruit crops such as mango, lychee, longan, and dragon fruit, rice, maize and chickpea in addition to vegetables.

The Agreement Officer's Representative (AOR) Dr. John Bowman informed us that we need to meet with respective USAID mission representatives in the host countries to get their views and responses for the crops included in the proposed Request for Applications for sub-awards. Table below lists trips taken to meet with the host country missions and the trip reports are given in appendix A. The mission in Burma was not supportive of our visit as well as implementing rice IPM project in that country.

Destination	Names of Travelers	Dates of travel	Members of Mission/USDA and Local Officials Met
Vietnam	J. Bowman and R. Muniappan	November 26 – December 6, 2014	Mark A. Dries, Michael Ward, Todd Hammer, Ms. Binh Le, Ms. Binh Nguyen, Ms. Nguyen Thi Ha, Mr. Khuong Tran, Mr. Bi Xuan Phong, Ms. Ngo Thi Phuong Dung, Vu Thanh Hai, Nguyen Doc Khanh, Pham Hong Thai, Ha Viet Cuong, Ho Thi Thu Graug, Le Thi Bieh Lien, Dr. Nguyen Quoc Hung, Dr. Trinh Xuam Hoat, Dr. Nguyen Van Liem, Dr. Le Van Nhat, Dr. Nhaw, Mr. Joakim Parker, Dr. Vo thai Dan, Dr. Tim, Mr. Luong Le Cao, Dr. Le Khac Hoang, Mr. Turut, Mr. Dac, Miss Kiew, Mr. Dwight Anthony Wilder, Nathaniel Rettenmayer, Tran Quoc Quan, Vo Thanh Kiet; Dr. Nguyen Huu Dat, Mr. Chu Hong Chau, Ms. Hilu, Dr. Vo Huu Thoai, Mr. Mai Van Tri,

Cambodia	J. Bowman and R. Muniappan	December 7 – 13, 2014,	Mr. William Bradley, Dr. Faith Bartz, Dr. Dennis Lesnick, Mr. Edwin Dekorte, Mr. Sambath Sak, Mr. Sophea ly, Dr. Sandra Stajka, Mr. Mark Hickey, Mr. So Khan Rithykun, Ngin Chhay, Mr. Kang Kea, Mr. Heng Chhunly, Rector Ngor Bun Then, Vice Rector Men Saron, Dr. Thavrak Hun, Mr. Meas Piseth, Mr. Thou Vathena, Mr. Nou Keosothea, Mr. Sam Vitou, Mr. Hem Chantou, Mr. Brian Woody, Mr. Claudius Bredehoeft, Dr. Ty Channa, Dr. Khay Sathya, Mr. Hun Yadana, Dr. Philips Charlesworth, Ms. Rebecca Black, Mr. Sean Callahan, Mr. Ing Ina, Mr. Phousana, and Mr. Tong Seng.
Bangladesh	R. Muniappan and E. Heinrichs	March 7-10, 2015	Dr. Shawkat Begum, Mr. Mir Ali Asgar, Dr. Mohammad Hossain, Dr. Shahadath Hossain, Mr. Yousuf Mian, Mr. Mark Tegenfeldt, Mr. Aniruddha Roy, Mr. Mohammad Sayed Shibly, Dr. Shahidur Bhuiyan, Dr. Morris Ogutu, Dr. William Levine, Mr. Bani Amin, Ms. Fawzia Yasmeen, and Mr. Ashraf Uddin Ahmed.
Kenya	J. Bowman and R. Muniappan	February 7-13, 2015	Mr. Andrew Read, Mr. Patrick Boro, Dr. Lusicke Wasilwa, Dr. Miriam Otipa, Mr. Samuel Njiaha, Mr. John Wademje, Mr. Moses Njiriri, Mr. S.J.N. Muriuki, Mr. John M. Ndungu, Mr. Anthony Nyangu, Mr. Steve New, Mrs. Juliana Kimanthi, Mr. Brian Mbithi, Dr. Bhis Das, Dr. Jack Adundu, Dr. Jane Ambuko, Dr. William Maina Muiuru, Dr. Christopher Prideaux, Dr. Sunday Ekesi, Dr. Sevgan Subramanian, Dr. Rajender Saini, and Ms. Sophie Walker.
Ethiopia	R. Muniappan and B. Gebrekidan	February 14-22. 2015	Mr. Million, Dr. Kassuhan Zewdie, Dr. Aster Yehannes Chakiso, Dr. Mulageta Negari, Dr. Million Eshete, Dr. Mekasha, and Mr. Dagnachew Bekele, Dr. Gashawbeza Ayalew, Dr. Kalpana Sharma, Dr. Kindu Mekonnen, Dr. Bayeh Mulatu, Dr. Ngussie Tadesse, Dr. Solomon Haile-Mariam, Dr. Berga Lemaga, and Dr. Eshetu Derso.
Nepal	R. Muniappan and E. Heinrichs	March 11-13, 2015	Dr. Luke Colavito, Mr. Sulav Paudel, Ms. Danielle Knueppel, and Mr. Belay Mengistu.
Tanzania	J. Bowman, R. Muniappan and B. Gebrekidan	May 9-17, 2015	Dr. Thomas Dubois, Mr. Andreas Gramzow, Dr. Fekadu Dinsa, Dr. Jason Smith. Mr. Hassan Mndiga, Ms. Jacqueline Mkindi, Dr. Brigitte Nyambo, Cornel Massawe Dr. Richard Pluke, Dr. Mateete Bekunda, Dr. Festo Ngulu, Dr. Johnson Odera, Mr. Chidege Maneno, and Mr. Larry Jacobs, Dr. Elizabeth Maeda, Mr. David Benafel, Mr. Victor Mgoo, Dr. Amon Maerere, Dr. Rhodes Makundi, Dr. Mutawala, Dr. Delphin Mamiro, Dr. Robert Mabagala, Ms. Esther Mally, Mr. Aristaricki Lymo, Dr. Peter Sseruwagi, Mr. Harish Dhutia, Ms. Farida Karimjee, and Mr. Nsami Elibariki

XII. Other Topics

A Technical Advisory Committee meeting was held on 8/5/15 in Pasadena, CA.
Attendees included:

1. Lawrence E. Datnoff,
2. Buyung Hadi
3. R. Muniappan
4. Amer Fayad
5. Zara Shortt

XIII. Issues

XIV. Future Directions

We will be implementing all the eight sub-awards in full force.