

Feed the Future Innovation Lab for Integrated Pest Management



Request for Concept Note

Invasive Species – Modeling for South American tomato leafminer, Tuta absoluta, and Groundnut leafminer, Aproaerema modicella (simplexella)

Table 1. Calendar of activities

Activity	Date
Issuance of request for concept note	February 9, 2015
Deadline for questions	February 25, 2015
Deadline for receipt of concept notes	March 27, 2015
Review and selection of concept notes for promotion to full proposals	April 17, 2015
Requests for full proposals sent	April 24, 2015
Deadline for submission of full proposal	May 15, 2015
Proposal winner announced	May 29, 2015

This request for concept notes is issued by Virginia Tech, the Management Entity of the Feed the Future Innovation Lab for Collaborative Research on Integrated Pest Management (IPM IL). The Virginia Tech IPM IL is funded by the U.S. Agency for International Development under cooperative agreement AID-OOA-L-15-00001. The Virginia Tech IPM IL management entity offices are located at the Office of International Research, Education and Development, Virginia Tech, 526 Prices Fork Road, Blacksburg, VA 24061. For additional information please contact Dr. R. Muniappan, IPM IL Director, 540-231-3516, Email: <rmuni@vt.edu> Website: <<http://www.oired.vt.edu/ipmcrsp/>>



1. Background

The **Feed the Future (FtF) Innovation Lab for Integrated Pest Management (IPM IL)** is a USAID-funded program that supports Integrated Pest Management Research, technology transfer, and capacity building in relation to small-holder farming systems. Virginia Tech was awarded a five-year cooperative agreement on November 25, 2014, to serve as the management entity of the IPM IL. The IPM IL is now inviting the submission of concept notes designed to develop and implement Invasive Species – Modeling for South American tomato leafminer, *Tuta absoluta*, and Groundnut leafminer, *Aproaerema modicella (simplexella)* combined with human and institutional capacity building activities. Project activities may be proposed for four and one-half years (June 1, 2015 to November 16, 2019). Following evaluation of the concept notes, full proposals will be requested from a short-list of applicant(s).

Crop losses due to pests (insects, diseases, weeds, nematodes, birds, and rodents) are a major constraint to alleviating poverty and improving nutrition in Asia. Most estimates of production and post-harvest losses due to pests range from 30 to 40 percent. Improper use of pesticides poses a serious threat to health and biodiversity. IPM is a decision support system that uses evidence-based information to reduce losses due to pests, minimize reliance on synthetic pesticides, and foster the long-term sustainability of agricultural systems.

Integrated Pest Management (IPM) is defined as a dynamic crop, location, and season-specific program that combines all available compatible tactics that impart profit, safeguard environmental and human health, encompass cultural sensitivities, and ensure social acceptance. The IPM IL in the previous phase identified several invasive species including arthropods, plants, nematodes, fungi, bacteria, viruses, and others. The spread of invasive species is one of the greatest threats to ecological and agricultural well-being of the earth. Invasive species cost the U.S. as much as \$120 billion a year in damages, and the U.S. government spent \$2.2 billion in 2012 trying to prevent, control, and sometimes eradicate them. The South American tomato leafminer, introduced accidentally to Spain in 2006, has already invaded European, Mediterranean, and Middle Eastern countries. It has recently reached Senegal and Gambia in West Africa and Ethiopia, Kenya, and Tanzania in East Africa. It has also spread to Panama and Costa Rica in Central America. Because this pest is of quarantine importance and a serious threat to tomato production, the U.S. and countries in Africa, Asia and Central and North America are concerned about its possible invasion. The groundnut leaf miner, a key pest of groundnut (*Arachis hypogaea*) and soybean (*Glycine max*) in Indo-Asian countries, was accidentally introduced in Uganda from Asia in 1996. Since then it has spread to most of Eastern and Southern Africa and is likely to invade the rest of Africa in the near future.

Applicants are referred to the IPM IL website for additional information about the IPM IL:

<http://www.oired.vt.edu/ipmcrsp>

The new IPM IL will develop, implement, and scale up IPM packages for selected crops and address invasive species. As part of the overall IPM IL program, a project, *Invasive Species – Modeling the spread of South American Tomato Leafminer, Tuta absoluta (Lepidoptera: Gelechiidae), and Groundnut Leafminer, Aproaerema modicella (simplexella) (Lepidoptera: Gelechiidae) in Asia and Africa* will be addressed.

2. Overview

The IPM IL invites the submission of a concept note from U.S. universities, CGIAR institutions, and host country research institutions that may lead to an invitation to submit a full proposal to lead the project on *Invasive Species – Modeling for South American Tomato Leafminer, Tuta absoluta, and Groundnut Leafminer, Aproaerema modicella (simplexella)*. Some illustrative institutions and universities for collaboration are: Peanut and Mycotoxin Innovation Lab, Horticulture Innovation Lab, USDA-APHIS, CABI, AVRDC, *icipe*, ICRISAT, IITA, CIP, ASARECA, National Agricultural Research Institutes and Universities in the U.S.A., Africa, Asia, Australia and Europe, Russell IPM, ISCA Technologies Inc. (Riverside, CA), Bio-Control Research Laboratories (BCRL, India), and others.

The project will:

- a. Develop universal models for predicting the spread of groundnut leafminer and South American tomato leafminer in the next 5, 10, and 15 years.
- b. Include geo-spatial technologies, taking in to consideration biology, life table, host plants, natural enemies, and other biotic factors.
- c. Inform countries yet to be invaded by these insects of the impending danger of invasion and recommend appropriate regulatory and control measures.
- d. Involve appropriate host countries in the institutional and human capacity building activities.
- e. Plan and conduct project economic and gender impact evaluations.

3. Research and Activity Priorities

The overall IPM IL has four program objectives:

- Advance IPM science and develop IPM technologies, information, and systems for sound sustainable intensification;
- Improve IPM communication and education, and the ability of the practitioners to manage knowledge, resulting in widespread adaptation, adoption, and impact of ecologically-based IPM technologies, practices and systems;
- Provide information and capacity building to reform and strengthen policies and national institutions that influence pest management; and
- Develop and integrate sustainable resource-based local enterprises into national regional and global markets.

The overall purpose of the project is to model the spread of two invasive insect species, namely the groundnut leafminer and the South American tomato leafminer. Specific activities will include identification of groundnut leafminer species in East Africa, possible sources of their/its introduction, possible spatio-temporal nature of spread in Africa. The model for the South American tomato leafminer should include prediction of its spread in Europe, Africa, Asia, and Central and North America. Favorable consideration will be given to activities that involve scientists from developing countries. A portion of

the budget may be reserved for activities in support of areas identified through the IPM IL research sub-award competition. Such activities would necessarily be described after the sub-awardee is selected, and that process will take place after the successful application is selected. To facilitate the development of models, the project requires a strong representation of entomology, network dynamics and simulation, agricultural economics, and gender analysis.

Applicants must demonstrate the ability to propose a conceptual approach for modeling invasive insect pests. Familiarity with geo-spatial modeling encompassing insect biology, dispersal, natural enemies, socio-economic factors, local and international transportation, trade, and other related considerations is desirable.

4. Capacity Building

The project should include human and institutional capacity development at both the scientist and institutional levels. Details regarding the number of trainees, disciplines, location of training, and efforts to ensure gender parity of trainees, as well as the need for training of host country nationals, should be described in the concept note. Collaboration with host country universities is encouraged and may include curriculum development, academic support consistent with research programming, short courses, and other activities that support improved institutional capacity.

Outreach activities aimed at the end-user are required for all projects. These activities can occur via direct contact with end-users by project investigators or through third party organizations such as host country extension services, host country universities, NGOs (non-governmental organizations), and NARS (National Agricultural Research Systems). Use of mass media (radio, TV, newspapers), workshops and demonstrations, for technology dissemination and scaling up is encouraged.

5. Gender

USAID policy requires that gender issues be addressed as appropriate for all USAID-funded activities and that gender differences and inequalities be integrated into the project design. The application must present a gender analysis that discusses important gender issues relevant to appropriate IPM research, development and extension activities. The application must explain how gender considerations and equality issues will be integrated into the design, implementation, management, knowledge sharing, capacity building, and monitoring and evaluation of the project.

6. Project Design and Evaluation

The project must describe a results framework, including monitoring and evaluation, which is consistent with the overall objectives of the IPM IL supporting research, knowledge sharing, and capacity building. The project must be in compliance with USAID's Environmental Compliance Procedures described in Title 22 of the Code of Federal Regulations, Part 216 (22 CFR 216 http://www.usaid.gov/our_work/environment/compliance/22cfr216) and provide evidence of compliance with all relevant financial accounting procedures, regulatory compliance, responsible conduct of research, and the U.S. Agricultural Terrorism Act of 2002.

7. Project Reporting

An annual work plan, budget, semiannual activity report summarizing results, impact analysis and results, trip reports, and research reports and summaries will be part of the reporting requirements. The IPM IL staff, USAID staff, and IPM IL technical advisory committee will review and provide feedback. Amendments or changes may be suggested during the annual review with respect to program and budget. Funding for the overall IPM IL budget, and hence for the subcontracts, is allocated on an annual basis. The project should have contingency plans in place for a 10% cut in funding to demonstrate abilities to achieve outcomes under an uncertain Federal fiscal environment.

8. Concept Note Information

Eligibility

U.S. universities as defined under Section 296 (d) of Title XII of the Foreign Assistance Act, CGIAR centers, and host country institutions are eligible to apply as the lead institution for a period of 4.5 years. IPM IL will subcontract with the selected institution, which will then subcontract with collaborating organizations, at least one of which must include a U.S. university if not led by one. The institution making the application will be responsible for negotiating into sub-agreements with all collaborating organizations and for accounting to the Virginia Tech IPM IL Management Entity for all program accomplishments, expenditures, and reporting requirements. The concept note should identify the nature of any collaborations, the distribution of labor and activities between collaborating organizations, and the budget allocations among collaborating organizations.

The IPM IL strongly encourages concept notes from, or for concept notes to include, qualified Minority Serving Institutions. These include, but are not limited to, Historically Black Colleges and Universities, Predominantly Black Institutions, Hispanic Serving Institutions, Tribal Colleges and Universities, and Asian American, Native Alaskan and Pacific Islander Serving Institutions.

Importance of Human Resource and Institutional Capacity Development

Human and institutional capacity building (HICD) are core objectives and concept notes should indicate how this will be strengthened. There should be a demonstration of meaningful collaboration in research and training between a Lead institution and one or more Host Country institutions (public research institutions, universities, NGOs, etc.). Other partners such as U.S. universities and public and private sector research institutions (CGIAR, International agencies etc.) may also be subcontracted.

Project Funding, Budget Guidelines, and Cost Sharing

Approximately US\$ 0.8 million is available through November 16, 2019 for the project. The concept note must contain a summary budget with projects and subcontracts clearly delineated using the [budget template](#). Applicants are required to provide non-federal cost sharing which equals or exceeds any overhead earned on host country sub-awards. Favorable consideration will be given to proposals that further leverage project funding. At least 50% of the proposed budget should be spent to support host country activities. Travel costs for host and U.S. scientists should be included and explained.

Format and Evaluation of Concept Notes

Concept notes must be in English with narrative portions prepared in MS Word with Times New Roman font size 11 and 1.15 line spacing. The summary budget tables must be prepared in Microsoft Excel

utilizing the [budget template](#). Page size should be 8 ½ x 11” with 1” margins. Table 2 lists the guidelines for submission of concept notes.

Table 2. Guideline for submission.	
Component	Description
Title Page	Title; name, institution address, email, phone, and fax for lead PI at lead institution; lists members, total project budget, timeframe, and funds requested from IPM IL.
Executive Summary	Maximum one page
Narrative Description	Describes the project membership with clearly identified roles and responsibilities of all members. Focal topics and geographic areas, and research needs should be clearly articulated. Opportunities for supporting research sub-award projects, capacity building, knowledge sharing, and strategies for addressing gender issues should be described. Provide a management and staffing plan.
Anticipated Results	Provide a narrative description referring to the results framework with clear indicators of measuring project results.
Expected Impacts	Describe expected impacts and how they will be measured.
Activity Plan	Provide a timeline of activities over the 4.5-year life of the project
Budget	Provide a summary budget sheet and for the project lead institution and all project members that will receive funding. The format specified by IPM IL must be used.
Budget Justification	Provide a one-page justification/explanation of budget expenditures.
References	List references used in the concept note narrative
PI Qualifications	In one page, provide a description of the qualifications of the PI at the project lead institution and for all relevant members in the project.
Curricula Vitae	Provide the CV for each PI/collaborator whose participation is described in the concept note.

Page length and order of sections-The total page length of the concept note, excluding title page, one-page summary budget, one-page budget justification, reference list, PI qualifications, and CVs, is 6 pages. Assemble all sections of the concept note into a single file and convert to a single pdf file for submission. The sections should appear in the following order: 1) title page, 2) executive summary, 3) narrative description, 4) anticipated results, 5) expected impacts, 6) activity plan, 7) budget, 8) budget justification, 9) references, 10) PI qualifications, and 11) relevant CVs.

9. Selection Process

An independent Technical Advisory Committee will review and score all proposals according to the following criteria (Table 3). Input may be sought from ad hoc reviewers, host country institutions, USAID Missions, and other relevant development organizations in making the final selection.

Table 3. Criteria used for the evaluation of concept notes

Criteria	Weight
Technical Merit, Including Management and Staffing	30%
Alignment with Target Country Research Priorities, IPM IL Goals and Objectives	20%
Knowledge Sharing and Outreach Activities	10%
Human and Institutional Capacity Development	10%
Gender programming	10%
Monitoring and Evaluation Activities	10%
Past Performance	10%

10. Submission of concept notes

Questions pertaining to concept notes should be sent to Dr. R. Muniappan, email: rmuni@vt.edu by 11:59 pm Eastern Time on **February 25, 2015**.

Concept notes should be submitted to Dr. R. Muniappan, email: rmuni@vt.edu by 11:59 pm Eastern Time on **March 27, 2015**.

Selected References

1. *Aproaerema modicella (simplexella)*

Buthelezi, N.M., D.E. Conlong and G.E. Zharare. 2012. The groundnut leaf miner collected from South Africa is identified by mtDNA CO1 gene analysis as the Australian soybean moth (*Aproaerema simplexella*) (Walker) (Lepidoptera: Gelechiidae). African Journal of Agricultural Research 7: 5285-5292.

Buthelezi, N.M., D.E. Conlong and G.E. Zharare. 2013. A comparison of the infestation of *Aproaerema simplexella* (Walker) on groundnut and other known hosts for *Aproaerema modicella* (Deventer) (Lepidoptera: Gelechiidae). African Entomology 21: 183-195.

Du Plessis, H. 2003. First report of groundnut leaf-miner, *Aproaerema modicella* (Deventer) (Lepidoptera: Gelechiidae) on groundnut, soybean and Lucerne in South Africa. South African Journal of Plant and Soil 20: 48.

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Shanower, T.G., J.A. Wightman and A.P. Gutierrez. 1993. Biology and control of the groundnut leafminer, *Aproaerema modicella* (Deventer) (Lepidoptera: Gelechiidae). Crop Protection 2: 3-10.

Shanower, T.G., J.A. Wightman and A.P. Gutierrez. 1993. Effect of temperature on development rates, fecundity and longevity of the groundnut leafminer, *Aproaerema modicella* (Lep.: Gelechiidae), in India. Bulletin of Entomological Research 83: 413-419.

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2. *Tuta absoluta*

Bloem, S. and E. Spaltenstein. 2011. New Pest Response Guidelines – Tomato leafminer (*Tuta absoluta*). USDA-APHIS, Emergency and Domestic Programs.

Desneux, N., E. Wajnberg, K.A. Wyckhuys, G. Burgio, S. Arpaia, C.A. Narvaez-Vasquez, J. Gonzalez-Cabrera, D.C. Ruescas, E. Tabone, and J. Vasquez. 2010. Biological invasion of European tomato crops by *Tuta absoluta*: ecology, geographic expansion and prospects for biological control. Journal of Pest Science 83: 197-215.

Desneux, N., M.G. Luna, T. Guillemaud, and A. Urbaneja. 2011. The invasive South American tomato pinworm, *Tuta absoluta*, continues to spread in Afro-Eurasia and beyond: the new threat to tomato world production. Journal of Pest Science 84: 403-408.

Pfeiffer, D.G., R. Muniappan, D. Sall, P. Diatta, A. Diongue, and E. O. Dieng. 2013. First Record of *Tuta absoluta* (Lepidoptera: Gelechiidae) in Senegal. Florida Entomologist 96: 661-662.

<http://www.oired.vt.edu/ipmcrsp/workshop-tuta-absoluta-meeting-challenge-tomato-leafminer/>

<http://www.tutaabsoluta.com/>

<http://www.cabi.org/isc/datasheet/49260>

<http://www.oired.vt.edu/ipmcrsp/news-events-media/national-stakeholders-symposium-tuta-absoluta-meeting-challenge-tomato-leaf-miner/>

3. Modeling

Eubank, S, H. Guclu, V.S. Kumar, ,M.V. Marathe, A. Srinivasan, Z. Toroczkai and N. Wang. 2004. Modelling disease outbreaks in realistic urban social networks. *Nature* 429:180-184.

Sporleder, M., H.E.Z. Tonnang, P. Carhuapoma, J.C. Gonzales, H. Juarez and J. Kroschel. 2013. Insect life cycle modelling (ILCYM) software – A new tool for regional and global insect pest risk assessments under current and future climate change scenarios. In, J. Peña (ed.). Potential Invasive Pests of Agricultural Crops, CAB International pp. 412-425.