

Northeastern IPM Center – IPM Partnership Grants – 2010 – Proposal Project Description

SECTION 1. a.:

Project Directors: William M. Coli (P.D.) and William A. Miller (Co-P.D.)

Project Title: Northeastern Region IPM Evaluation Working Group, Year 2

Project Type: IPM Working Group

SECTION 1. b.: Project Summary

State IPM Coordinators, Extension Educators, Faculty researchers, other agency staff and others are in need of assistance planning programs whose impacts are quantifiable, and/or documenting impacts of previously conducted programs. The primary objective of the Working Group is to assist regional IPM Program professionals to better understand and utilize available techniques to document short-, intermediate-, and long-term impacts of adoption.

The Working Group will continue to function as two distinct sub-groups: one focused on agricultural IPM and one on Structural IPM in multi-family housing. Agricultural sub-group participants will meet face to face to complete development of an IPM Guideline for soybeans relevant to the states of Delaware, Maryland, Virginia and West Virginia. With separate NEIPMC funding, Agricultural sub-group members will also participate in converting the completed Soybean IPM Guideline to a Dillman Method mail survey for measuring soybean grower IPM adoption levels. This separately-funded survey will be administered beginning in January, 2011.

The structural group will participate in a face to face meeting to discuss developing and deploying an on-line Survey Monkey™ instrument for housing authorities, health departments, grantees and selected others in the Northeast with the intent to catalogue existing types of impacts data. With such data in hand, this sub-group will discuss the feasibility of acquiring external funding to deploy a large-scale assessment of IPM impacts in multi-family housing as a component of National IPM Evaluation Group (NIPMEG) activities.

Overall impacts of the proposed activities will be to document IPM adoption in two very different focus areas, and to identify needs for future research and/or extension activities.

SECTION 1. c.: Background and justification

Section 1.c.i: The Problem/challenge

Private and public sector adoption of IPM during the 1980's through 1990's was widespread. An increase in use of such key IPM practices as pest population sampling and action thresholds as well as an understanding of the benefits of natural enemy conservation, classical bio-control and resistance management, often coincided with a dramatic reduction and/or optimization of pesticide use. IPM adoption, coupled with significant regulatory actions by USEPA, additionally resulted in a movement away from older, riskier pesticides. Nonetheless, a 2000-2001 report from the Government Accounting Office (GAO) noted that total pounds of pesticide used had increased over the preceding 6 years and stated that: "A related management shortcoming of the federal IPM initiative is that USDA has not devised a method for measuring the environmental or economic results of IPM implementation." (Stephenson, 2001 p 15).

Section 1.c.ii: The specific need

Thus, it is critical that IPM practitioners nationally be able to document not simply IPM activity, but IPM impacts as well. In addition to the need identified in the GAO study, the Northeast Research, Extension, and Academic Programs-IPM (NEREAP-IPM) Coordinating Committee has also identified a clear need for a focused effort to develop consistent means to document positive impacts of IPM to date, and to measure progress toward the goal of reduced risk IPM.

An additional indicator of need is the fact that more and more granting agencies now require evidence of an impact assessment plan. Land Grant researchers and educators, with a typical focus on disciplines such as entomology, plant pathology and weed science, are not ideally prepared to design and conduct impact assessments. The experience of the Project Director over the past several years has indicated that IPM domain experts value and utilize available help in planning for and actually conducting program evaluation. Renewed funding of the Northeastern Region IPM Evaluation Working Group will provide a needed forum for experienced individuals to cooperate within the region on documenting extent and impacts of IPM use, and report findings to USDA, granting agencies, and key stakeholders.

Section 1.c.iii: Who will benefit?

The principal intended beneficiaries are Land-Grant faculty and staff and participants from other agencies who will better understand program planning and assessment tools that can be used to document impacts of IPM activities. Participating in guideline development and adoption measurement will also help these individuals to identify research and educational needs relative to their private sector target audiences. IPM researchers and educators will thus be enabled to provide justification for ongoing or new IPM activities to granting entities.

Farmers, housing facility managers, grounds keepers, pest management consultants, and agency policy-makers will also benefit by better understanding the economic, environmental or human health benefits of IPM. This knowledge change will make it more likely that they will adopt research-based, reduced-risk pest management materials and tactics they may currently not be using.

Section 1.c.iv: Review of ongoing or recently completed work.

The need for better documentation of IPM impacts has also been clearly noted by Antle and Capalbo and colleagues (2003). Describing an IPM Guideline (listing all the components of an IPM system) and using these to measure extent of IPM adoption are well established methodologies to do just that (Hollingsworth and Coli, 2001; Cowles, 1999; Boutwell and Smith, 1981; Benbrook, et al., 1996; Calvin et al., 1992; Coli and Hollingsworth, 1996; McDonald and Glynn, 1994; Tette et al, 1987; Vandeman et al., 1994; Rajotte et al, 1987; Cross and Dickler, 1994; Coli et al., 2008).

IPM Guidelines, also known as IPM Elements (Cornell University, 2007; IPM Institute, 2007 a), IPM Standards (IPM Institute, 2007 b) and IPM Protocols (Owen et al., 2000) are a categorized list of all relevant, research-based practices that constitute an IPM system for a particular crop or site. Robertson et al. (2005) used an identical approach to assess the level of adoption of integrated pest management (IPM) by South Carolina cotton growers. Zalom and colleagues at

UC Davis have conducted surveys of IPM adoption in almonds on 2 different occasions approximately 10 years apart, enabling them to track changes in IPM practices used over time. (Brodt et al., 2005). Guidelines/Elements or protocols have now been developed for a wide array of crops/sites in several states (e.g., Hawaii, Massachusetts, New Jersey, New York, and Ohio).

In addition to measuring adoption, many published individual case studies have investigated economic aspects of implementation in a research mode (Waibel, 1999; Day and Greitens, 2003) as well as a range of other benefits including reductions in actual pesticide residues, reductions in pest-related allergens, and comparable costs compared to sites receiving regular pesticide applications (Williams *et al.*, 2005; Lame, 2005; Gouge *et al.*, 2006; Nalyanya *et al.* 2009).

A standardized set of impact indicators and related measures are now available nationally on the *IPM.gov* web site for Working Group members and other IPM specialists to use (Coli, et al. 2008) in evaluating IPM programming. With separate funding, Coli and Miller are currently leading the multi-agency National IPM Evaluation Group (NIPMEG), whose purpose is to use existing models and tools to document positive impacts of IPM.

Now that the agricultural sub group has completed a working draft of a soybean IPM Guideline for the mid-Atlantic states (**See Appendix A**), the initial building blocks are in place leading to an adoption survey and documentation of end-user behavior and condition changes consistent with national evaluation activities. Similarly, although the housing sub-group saw no need to develop structural IPM Guideline (examples already exist), they have reached consensus to use a modified version of survey instruments developed for the national evaluation project to plan for a large scale impact assessment in multi-family housing in a year or two. Such documentation is critical to defend the continued need for federal IPM research and extension funding. If funded, this proposal will help Northeastern states to move in that direction.

Section 1.c.v: Applicability to other regions

As noted above, the Working Group activities are integrated well with processes being used at the national level, and, as such are applicable to all other regions.

Section 1.d: Objectives and Anticipated Impacts

A principal objective of the project remains the completion and stakeholder review of a regionally-appropriate IPM Guideline for soybean in the mid-Atlantic region. Related to this objective is design and execution of a large-scale Dillman Method mail survey of soybean growers in Delaware, Maryland, West Virginia and Virginia for which external funding has been received.

A second objective is to help the urban/community pest management systems subgroup to prepare a large-scale impact assessment survey.

An overall objective is to increase WG participant understanding of, and ability to use, existing program planning and evaluation tools, including how these can aid in planning/conducting program evaluation and competing more effectively for competitive grant funding from entities that increasingly demand evidence of documented impacts.

Because the Working Group will not be validating IPM strategies, training growers, creating a web site, etc., we anticipate no direct impacts of the sorts given as examples in the table on page 7 of the RFA (i.e., financial benefits, hiring IPM personnel, changed use of pesticides, etc.). However, the Guideline itself, as it undergoes review and modification by mid-Atlantic soybean growers prior to publication and subsequently, will be a valuable teaching tool when programming for growers, crop consultants and other field personnel. The adoption survey will serve as a needs assessment to indicate where further research or extension emphasis should be placed.

Other anticipated impacts of the project are several, and include: Improved regional coordination and cooperation to document IPM adoption and impacts; enhanced ability of WG participants, other IPM Specialists, and IPM consultants to encourage further adoption of IPM by demonstrating concrete, local examples of positive economic, health or environmental outcomes; enhanced ability to plan for future evaluation when designing new programs; increased opportunities for end users to present themselves as “good stewards” by documenting their use of IPM; increased public awareness of IPM benefits to society as a whole; and, enhanced policy-maker support for maintaining or increasing amount of available IPM funding.

The national IPM Roadmap sets goals to evaluate IPM impacts in numerous places (see: http://www.northeastipm.org/whatis_ipmroadmap.pdf). The WG will support goals of the national IPM roadmap by bringing together a motivated core group of domain experts to help evaluate impacts of IPM in the region.

Section 1.e.: Approach and Procedures

The P.D. and Co-P.D. will provide overall coordination for Working Group activities over a twelve-month period beginning March 1, 2010. Because members have diverse interests and foci, the WG will continue to function as two sub-groups, one focused on agriculture and one on multi-family housing. Although in funding year 1 we attempted to conduct business via several conference calls only, we now anticipate the need for 1 to 2 face-to-face meetings to be held (using remaining Year 1 funding). One will likely be held in the mid-Atlantic region in late winter, 2010 and the other in the Boston area on a similar time line. Prior to the Ag. sub-group meeting, participants will seek out feedback on the draft Guideline from producers, crop consultants and other industry representatives. Then, assuming we are able to secure external funding, a Dillman Method mail survey (see Hollingsworth and Coli, 2001) will be implemented to measure actual adoption. The survey will ask questions about IPM tactics now in use and will also ask retrospective questions in an effort to determine changes in practice use (Intermediate Term Behavioral Impacts).

The meeting of the Housing sub-group will focus on reviewing results of a survey to determine what sorts of impacts data are currently being collected, as well as of existing models (e.g., Mark to Market, Orkin self assessment, etc.), to plan for a large-scale (potentially national) assessment of impacts in concert with the NIPMEG effort .

Additional conference calls and email exchanges will occur as well to further the WG activities

Assuming successful acquisition of external funding, the agricultural sub-group, with expertise and facilitation by the P/D. and Co-P.D., will design the adoption survey, using the Soybean IPM

Guideline as its basis, beginning immediately upon availability of funds (anticipated as summer, 2010). So as to not conflict with grower activities, and to allow soybean Extension staff to provide advance publicity, the survey will be deployed after fall harvest, analyzed, summarized and published in Extension media in early winter, 2010.

Because development of the initial multi-family housing survey is underway (using year 1 funding), we anticipate on-line distribution of the instrument will occur in early 2010. The meeting of the housing sub-group, (again with year 1 funding) will be scheduled after results are summarized and analyzed. Subsequently, (anticipated as summer, 2010), the sub-group will meet again to develop plans for and participate in refinement of the initial survey instrument for a potential national impact assessment.

Section 1.f.: Evaluation Plans

Inputs needed: Time, human resources, funding for personnel, travel and telephone

Target Audiences: Land grant (1862 and 1890) research and extension faculty and staff, state Dept. of Agriculture staff, private consultants, soybean growers, multi-family housing managers and tenants, public health agency staff, policy makers

Activities: WG meetings and conference calls, surveys

Outputs: Soybean IPM Guideline, plan for large-scale impact assessment for multi-family housing

Short term knowledge impacts for growers: In the context of its use in educational programming, the IPM Guideline will help mid-Atlantic soybean growers increase their knowledge of lower risk IPM tactics, of the value of IPM to conserving non-target organisms, of conservation programs to protect non-target organisms, and of their knowledge of cost effectiveness and efficacy of IPM tactics such as proper pest identification, pest biology, and scouting techniques.

Short term knowledge impacts for agricultural sub-group members: Members will increase their knowledge of how to develop an IPM Guideline and use it in educational programming, of designing and using surveys to measure the extent of IPM adoption of soybean IPM in their region, and of future research and extension needs of soybean growers.

Short term knowledge impacts for housing sub-group members: Members will better understand what types of impacts data are currently being collected or that could be collected, and will better understand the efficacy of IPM tactics for multi-family housing

Intermediate term behavioral impacts: Because the Working Group will not be directly conducting education of external target audiences, it is impossible to predict behavioral changes that might occur on the part of such groups (e.g., soybean growers, housing agency staff). However, surveys will provide baseline data against which future practice change can be measured.

Long term condition change impacts: Similarly, long term changes in target audience condition can not be directly assessed by the Working Group unless grants funds are sought in subsequent years. Over time, periodic surveys of tactic use changes and reference to third party data may provide some evidence of long-term impacts of IPM.

Section 1.g.: Cooperation, Institutional Units and Key Personnel Involved

Participants represent research and extension staff from Cornell, Delaware, Maryland (U. Maryland and U. Maryland Eastern Shore), Pennsylvania, West Virginia, Virginia, Maine as well as others from the Maryland Department of Agriculture, The Northeastern IPM Center, the University of Texas School of Public Health, the Boston University School of Public Health, Region I US EPA, the Baltimore City Health Department, Audubon International, The Holyoke (MA) Housing Authority, the Boston Housing Authority, and the consulting businesses Rivard's Resources: IPM and McConnell Agronomics.

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Appendix A. December, 2009 Draft Soybean IPM Elements

November 9, 2009 DRAFT

Mid-Atlantic States Soybean IPM Elements

The Mid-Atlantic Charts that follow contain current pest management and cultural practices for soybeans. The intention is to form a general working definition of Integrated Pest Management (IPM) on soybeans grown in the Mid-Atlantic. Although a checklist could be used for a number of purposes, the first planned use of this document is to develop a system of assessing how far along the IPM continuum growers are, and if their operation has adopted enough core practices to qualify them as IPM practitioners under these guidelines.

Please evaluate this document and its six sub headings (Educational, Pre-plant, At-plant, In-season, & Post-harvest) as a checklist of possible IPM practices. There is a point value associated with every IPM practice; the higher the number the more important the practice. Growers should only count the points of activities they perform on a crop. The goal is to accumulate 80% of the points in each of the six areas **and / or** 80% of the total points available, which is simply the sum of the scores from each section (comprehensive).

This document is intended to help growers identify areas in their production system that possess strong IPM qualities and also point out areas for improvement. Growers should attempt to incorporate the majority of these specific techniques into their usual production practices, especially in areas where they fall short of the 80% goal.

Primary Pest, Environmental and Cultural Concerns in MidAtlantic Soybean

Weeds	Diseases	Insects/mites/slugs	Nematodes	Environmental/Cultural
Annual grasses	Brown Spot	Bean Leaf Beetle	Soybean Cyst	Soil Moisture
Annual broadleaf weeds	Bud Blight	Corn Earworm	Root-knot	Soil Fertility
Perennial weeds	Charcoal Rot	Dectes Stem Borer		Soil Structure
Resistant biotypes	Downy Mildew	Grasshoppers		Soil temperature
Familiarity with major Soybean	Frog Eye	Green Cloverworm		Tillage

Herbicide Groups				
	Pod and stem blight	Mexican bean beetle		Weather Patterns
	Purple Seed Stain (Cercospora)	Slugs		
	Rust	Soybean Aphid		
		Stink bugs		
		Twospotted spider mites		

Educational IPM Considerations

Education	Activity	Points
	Producer/IPM Practitioners stays current with pest and crop production issues pre-season, during the season and post season through newsletters, winter meetings, in-season field days, classroom trainings, reading current extension publications, personal contact with professionals, etc.	25

Marginal adoption

0 pts



20 pts Goal



Full adoption

25 pts

Pre-plant IPM Considerations

Management	Activity	Points
Fertility	Soil tests for nutrient concentrations, pH and lime requirement have been done on fields within the last 1-3 years depending on the soil type by a soil testing laboratory.	5
	Apply compost, fertilizers or manure according to soil test recommendations.	5
	Conserve organic matter with no-tillage, minimum tillage or cover crops where feasible. (depends on soil texture, soil moisture and drainage, soil temperature, pest issues and lay of the land)	5
Equipment	Application equipment is calibrated at the beginning of the season.	5

	Avoid cross contamination between production areas by cleaning equipment	5
Crop Systems	Avoid planting continuous soybeans based on multiple pest considerations.	25
	Maintain accurate records of planting dates, field locations, varieties, fertilizer and spray applications.	5
Disease	Use soybean cyst nematode resistant varieties in fields with soybean cyst nematodes, but only if used in combination with a crop rotation sequence designed to reduce nematode populations.	5
	Consider the impact of surface and subsurface drainage issues on disease and nematode management.	5
Weed	Weed control programs and herbicide rates are selected based on tillage, soil factors, knowledge about weed populations (species composition and severity) and future field use.	5
	Cultural practices are manipulated to minimize weed populations and maximize competitiveness of the crop. (examples: narrow spacing, timely planting, etc.)	10
	Rotation of herbicide mode of action over years and crops is practiced to minimize the risk of development of herbicide-resistant weed populations.	5
Insects	Consider planting time, tillage and weed management where slugs are present and where slugs and seed corn maggot have been a problem in previous seasons.	10
	Consider row spacing for potential in-season insect management considerations (example: Dectes stem borer)	5

Marginal adoption

0 pts



80 pts
Goal



Full adoption

100 pts

At-planting IPM Considerations

Management	Activity	Points
Disease	Plant only well cleaned, high quality, disease-free seed with a germination of 85 percent or greater. Consider seed treatments for seed lots that have 85 percent or better germination only if they are to be planted in cold wet soils. Treat seed if germination is between 75 and 85 percent due	15

	to fungal seed infection.	
Weed	Use weed-free crop seed to minimize spread of weeds.	10
	Using herbicide mixture with multiple modes of action	10
Insects	Consider seed treatments only where the potential for bean pod mottle virus (transmitted by the bean leaf beetle) is high and in fields where there is a history of soil insect pests (example: seed corn maggot), and tillage practices and weather conditions favor their development.	15

Marginal adoption

0 pts

**40 pts
Goal****Full adoption****50 pts****In-season IPM Considerations**

Management	Activity	Points
Equipment	Maintain proper equipment calibration.	10
	Select proper nozzles for proper coverage and application conditions	5
Crop Systems	Rely on scouting, economic thresholds, crop and environmental conditions to determine treatment needs.	15
	Keep records of pest and beneficial populations, pesticide applications, cultural pest management practices, and biological control techniques used.	10
	Consider the impact on the environment, natural enemies and end user quality requirements when making pest management decisions.	10
Insect	Choose one of the following three statements that best describe the type of field monitoring.	---
	Fields are monitored for insect/mite/slug problems on a weekly basis from plant emergence through plant senescence	15
	Field are monitored for insect/mite/slug problems based on IPM calendars which indicate when pests are likely to attack	10
	Fields are monitored for insect/mite/slug problems as a result of information in newsletters and in-season pest alerts	5
Nematode	Fields are sampled for nematodes when symptoms appear in the crop.	15
Disease	Choose one of the following three statements that best	---

	describe the type of field monitoring.	
	Fields are monitored for diseases on a weekly basis from plant emergence through plant senescence	15
	Fields for diseases based on IPM calendars which indicate when pests are likely to attack.	10
	Fields are monitored for diseases as a result of information in newsletters and in-season pest alerts	5
Weed	Choose one of the following two statements that best describe the type of field monitoring.	---
	Fields are scouted weekly from seedling stage to canopy closure for weeds. The weed species, location and severity of the weeds are recorded and used to make management decisions in-season and for the next year.	15
	Fields are scouted for weeds at seedling stage and just before canopy closure. The weed species, location and severity of the weeds are recorded and used to make management decisions in-season and for the next year.	5
Pest Management		
	Insect controls decisions are based on the use of economic thresholds that vary with crop value, control costs, market quality requirements, environmental and human impacts.	15
	Weeds management decisions consider the role weeds play as hosts for insects, mites and slugs.	5
	Weeds management decisions consider the role weeds play as hosts for diseases and nematodes.	5
	Herbicide are used in post-emergence programs are minimized through better timing of application (when weeds are small and actively growing) and cultural practices.	5
	If sequential applications are required, employ different modes of action when available.	5
	The need for spot or rescue herbicide treatments is based on potential yield loss and potential increase in weed seed bank.	5
	Cultivation is minimized through better timing of herbicides (when weeds are small) to avoid soil degradation.	5

Marginal adoption

0 pts



120 pts



Full adoption

150 pts

Goal

Post-Harvest IPM Considerations

Management	Activity	Points
Weed	Use spot treatments of herbicides for perennial weed management	10
	Establish cover crops for weed and or nematode suppression and to scavenge leachable nitrates and other nutrients. Keep field history of disease and nematodes in mind when choosing cover crop.	30
Nematodes	Collect samples for nematode analysis following nematode diagnostic laboratory sampling procedures.	10

Marginal adoption

0 pts



40 pts
Goal



Full adoption

50 pts

Comprehensive IPM Score
(Add scores of previous 6 sections)

Marginal adoption

0 pts



300 pts

Goal



Full adoption

375 pts