

**IPM Partnership Grants Proposal
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Development of Northeast Regional Interactive Tree Fruit IPM Guidelines**

Summary

Traditionally, land grant institutions have produced printed manuals of IPM Guidelines annually that are important resources for stakeholders involved with various types of commodities. It is becoming increasingly difficult for these institutions, particularly in the Northeast region, to produce either traditional printed or web-based pest management guidelines annually for stakeholders because of shrinking financial resources. For example, the New England States decided not to produce a regional set of guidelines for tree fruit for the 2006 growing season, and to purchase printed manuals from Cornell University designed for NY growers. Several years ago, Cornell University began a project to produce collaborative, digitally based, Pest Management Guidelines that can be marketed as printed manuals, web based electronic information, or marketed for printing on demand. The goals of this project are: 1) To index, organize, and digitize the content of the current tree fruit guidelines in a form that is consistent with the production of other Guidelines at Cornell University so that it can be searched, printed, presented on the web, or distributed on CD's. 2) To invite the community of experts and stakeholders throughout New England to help design the structure of a regional Tree Fruit Pest Management Guideline publication based on local needs and information. 3) To create an open digital format with appropriate metadata to enhance the development of future Tree Fruit Pest Management Guidelines that will more fully integrate IPM decision making tactics and pesticide information. 4) To develop a collaborative web site to solicit input from regional stakeholders. The organization, digitization, and redesign of printed and web based tree fruit information that can be customized according to regional needs will immediately impact stakeholders throughout the Northeast involved with this commodity group. The continued development of this system will enhance the future integration of pest management information and tactics such as digitally based decision trees, computer models of pest development and management strategies, and sampling and monitoring systems with PMEP's data base of pesticide information. The model system proposed for development in this project can eventually be expanded to include other commodities produced in NY and surrounding states. The information management techniques developed for producing the IPM Guidelines will also be used in the production of the national portal for wildlife damage management for eXtension system. This cross fertilization of information management techniques will make it possible for the IPM Guidelines to be used in the next generation of content projects for the eXtension system.

Project Description

The preparation of pest management guidelines and recommendations for various commodities has traditionally been an important activity of land grant universities. For many years this information has been extensively utilized by extension agents, growers, and other agricultural stakeholders throughout the United States. Originally, these guidelines were primarily based on using pesticides to solve pest control problems. Therefore, the preparation of these guidelines was a collaborative project between researchers conducting efficacy trials for various pesticides and extension personnel using this information to develop a set of pesticide recommendations based on some set of criteria. This process has changed radically in the 21st century.

Information sources have mushroomed. Academic researchers are doing fewer efficacy trials of new pesticides. Legal and legislative restrictions on the use of chemicals are greater than ever. University budgets, have been cut and extension agents are being asked to do more with less.

The general philosophy of pest control has also changed dramatically with a modern emphasis on utilizing the principles of integrated pest management to control the pest complex in an agricultural landscape. Growers are advised to use sampling and monitoring systems based on research-defined economic injury levels whenever possible to determine when and if pesticides should be applied and to integrate other tactics such as plant resistance, cultural controls, and biological control into management systems. Consequently, guidelines have expanded to include all of this IPM information as well as crop management techniques, soil and plant nutrition, cultivar selection, and other important information that can be utilized into an even more comprehensive system of integrated crop management.

It is also becoming increasingly difficult to deliver this information to agricultural stakeholders in the modern world who are increasingly utilizing digital information delivery systems. Traditionally, print publications were the primary mechanism to deliver information to extension personnel, growers and other stakeholders. Information is now available on the web, CDs, DVDs, tapes, databases, PDAs, as well as on other mediums. Bringing all this information together for an agricultural commodity in a specific area and then organizing information that can be utilized throughout an entire growing region is a huge challenge. The solution to this problem is to build a semantic web of metadata that describes the attributes of the different types of content related to IPM and to customize this information to be relevant to regional needs.

Producing pest management guidelines in this current environment of shrinking financial resources, increasing regulatory restrictions, and increasing consumer concern about safety of the food supply and the quality of the environment has been challenging and expensive for most land grant universities and fewer and fewer Guidelines are being produced. However, there is still a major need for such information in order to help growers throughout the United States use cost effective IPM programs that are acceptable to concerned consumers, regulatory agencies, and will be preserve the quality of the environment.

During the last several years, the extension program at Cornell has been actively involved in improving the development and production of Pest Management Guidelines for all major groups of commodities produced within the state. This new system, which is based on collection of digital content provides for a much higher level of author collaboration, stakeholder involvement, organization of information, and administrative review. This final collection of

digital content can be easily used to generate products for print distribution or to be available electronically on the web.

This system has been extremely challenging to develop and implement. Learning how to collaborate on line takes training and technical support to learn how to login to a system and use its features. More training is needed for authors and extension agents. Opening up resources to stakeholder input requires a level of trust and maintenance of political correctness in an already sensitive area. New policies have to be created when sharing information interactively with the public. Organizing information means rethinking the way information is currently presented and it is often difficult to get people to shift to a new scheme. Nor is it clear what level of administrative and technical review is necessary to insure that the information in the Guidelines is scientifically and legally accurate. Consequently, not all of the guidelines currently prepared by Cornell are completely integrated into digital content.

The NY IPM program at Cornell originally led the effort to evaluate and develop these methods to improve the production and distribution of the Pest Management Guidelines and secured additional funding to facilitate this process. Cornell's Pest Management Education Program (PMEP) reviewed information about pesticides listed in the guidelines to check the registration status of recommended pesticides on each commodity within the state prior to its publication. The final distribution of these guidelines is currently under Cornell's Media Services Group. It is becoming increasingly difficult for this current infrastructure to continue this operation and to receive adequate financial support. Therefore, during 2006, the overall responsibility for the preparation, distribution, and sales of the Guidelines will be assigned to Cornell's Pest Management Education Program (PMEP). This program currently prepares, distributes, and markets an extensive set of Pesticide Training and Certification manuals to agricultural stakeholders in NY and throughout the Northeast. PMEP also maintains an extensive web site with information about pesticides, pesticide safety, and current labels for all material registered in NY. Centralization of the Guidelines within this program will facilitate the continued integration of IPM information, pesticide education and training, current registration and pesticide labels, and allow stakeholders to obtain integrated information about IPM, crop production, and pesticides from a single source.

In order to continue the development of a digital content of comprehensive information for web based and printed IPM guidelines, tree fruit has been chosen as a model system. The tree fruit system is heavily specialized in apple production throughout the Northeastern region. Apples was originally designated as one of the commodities to receive federal funding to develop applied IPM systems in the early 1970's. This commodity group was selected because high levels of pesticides were applied and the complex of insect pests and diseases throughout the Northeast is particularly severe and extensive. Considerable progress has been made in developing new technology and recommendations for IPM on apples in NY and throughout the Northeast. Therefore, this commodity group can be used to develop a more advanced system for integrating IPM tactics and pesticide information that can be distributed in printed or digital form to growers and other stakeholders. It is particularly timely to develop a program for preparation of regional Tree Fruit Pest Management Guidelines for this commodity group because in 2005, researchers and extension personnel from New England decided not to prepare their own regional publication, but to purchase Guidelines from New York. The primary reason for their

decision not to continue to prepare this regional material was a lack of adequate staff, funding, and infrastructure. There is still considerable interest from stakeholders throughout the New England region in having up to date guidelines customized to suit their particular needs. The researchers and extension personnel in these states are committed to working with the NY program in the development of regional guidelines for this commodity group (see attached letters of support).

OBJECTIVES AND ANTICIPATED IMPACTS

The specific objectives of this project are:

1. To index, organize and digitize the content of the current tree fruit guidelines in a form that is consistent with the production of other Guidelines at Cornell University so that it can be searched, printed, used on the web, or distributed on CD's.
2. To invite the community of experts and stakeholders throughout New England to help design the structure of a regional Tree Fruit Pest Management Guideline publication based on local needs and information.
3. To create an open digital format with appropriate metadata to enhance the development of future Pest Management Guidelines for tree fruits that will more fully integrate IPM decision making tactics and pesticide information.
4. To develop a collaborative web site to solicit input from regional stakeholders.

The organization, digitization, and redesign of printed and web based tree fruit information that can be customized according to regional needs will immediately impact stakeholders throughout the Northeast involved with this commodity group. The continued development of this system will enhance the future integration of pest management information and tactics such as digitally based decision trees, computer models of pest development and management strategies, and sampling and monitoring systems with PMEP's data base of pesticide information. The model system proposed for development in this project can eventually be expanded to include other commodities produced in NY and surrounding states. The information management techniques developed for producing the IPM Guidelines will also be used in the production of the national portal for wildlife damage management for eXtension system. This cross fertilization of information management techniques will make it possible for the IPM Guidelines to be used in the next generation of content projects for the eXtension system.

APPROACH AND PROCEDURE

Objective 1. Organization and digitization of current Tree Fruit Guidelines-The entire Tree Fruit Guide will be hierarchically organized in chapters and sections so that each section and subsection has a consistent and logical format. Descriptive information will be added to each section so that it can easily be searched, indexed, and sorted for educational and instructional use and for administrative review. The document will be created in a template in Microsoft Word that is also compatible with ten other IPM Guidelines. This information can be delivered to stakeholders in a variety of forms. It can be printed, presented on web sites, or distributed on

CD's. The information base can also be used to create smaller, specialized publications for any type of media by combining and deleting different sections of the whole. Editing and revising the Tree Fruit Guidelines will result in a new publication or publications for 2007.

Objective 2. Development of regional New England Tree Fruit Pest Management

Guidelines- The creation of a New England Guideline will require the capability to regionalize and localize crop and pest management information. This information must be coded into the metadata that describes each section of the Tree Fruit Guidelines. In the production of the new Tree Fruit Guidelines, a metadata code will be inserted in each section so the information can be searched and sorted according to the region in which it is applicable. A collaborative web site will be developed using MS SharePoint technologies so researchers and extension personnel from New England can input and edit information for regions outside of New York State. PMEP personnel will set up specific training sessions to ensure that potential users in NY and New England can readily use the SharePoint program. This information can be inserted and edited throughout 2006 and eventually used to create the regional guidelines for the 2007 growing season.

Objective 3. Development of future digital systems for Pest Management Guidelines-The open digital formats created in this project can be organized so that users have access to simple checklists that can be formatted in decision trees for choosing pest management tactics and selecting appropriate pesticides. This will ensure that growers consider all available IPM options before deciding to apply a pesticide for control of a pest and that their final selection of a chemical is most compatible with IPM considerations, economic benefits, and regulatory label restrictions. Other web-based information such as pest developmental models and management models for specific pests can also be integrated into a system for enhancing pest management decisions. Hyperlinks or automatic references to the PMEP database can be placed in pesticide tables in the Guidelines so that pesticide labels and specific comments about each material can be viewed on line.

Objective 4. Soliciting input from Stakeholders-SharePoint technologies will be used to interactively gather stakeholder input by using discussion boards, surveys, and other online tools. Stakeholders from NY and throughout New England will be invited to participate by email, telephone, or by print notification. These concerns and needs will be addressed and used to make the Tree Fruit Guidelines a more effective IPM tool in the future.

PROJECT TIMETABLE

	Internal team	External outreach
Phase one 3 months	Covert all the content in the tree fruit guide to MS Word text and tables.	Develop collaborative web site for author participation.
Phase two 3 months	Create new semantic structures where necessary in the guide to facilitate completeness, compatibility with other guides, and reusability. Begin working with PMEP on data structures.	Develop collaborative web site for stakeholder participation.
Phase three 3 months	Produce a prototype of the final publication using the new digital format. Invite stakeholder and regional review.	Develop collaborative web site with northeast region for input on customizing a regional publication.
Phase four 3 months	Finalize 2007 guideline for digital and print distribution complete with all the author changes and stakeholder additions, revisions, and changes.	Release the Guideline in print and on the web.

EVALUATION PLAN

There are clear and measurable outcomes for the Tree Fruit IPM Guidelines digital conversion project. All of the authors of the Tree Fruit Guidelines must participate in the process. Interactions on the collaborative websites are measured and logged along with survey and discussion topics. User and stakeholder requests will be published and archived on the project site. A printed Guideline and website will be produced at the end of the project.

Beyond measuring author and stakeholder involvement, there will be several production quality print publications, a website, and a CD rom product from the digital content. It will be easy to measure the impact of these products and a report will be given of print and CD sales and web hits. The consistency of Tree Fruit Guidelines with the other IPM Guidelines will facilitate the sharing of critical content and all of the Guidelines will be affected by improving data sharing with PMEP at Cornell. The improved efficiencies and new procedures can be propagated to all of the 2007 Guidelines.

COOPERATION OF INSTITUTIONAL UNITS AND COLLABORATORS

NYS IPM Program; Juliet Carroll, Fruit IPM Coordinator-will provide support by providing access to IPM content resources that can be used to enhance the Tree Fruit Guidelines. The IPM program will also help to formulate models and checklists of effective IPM decision making steps. She will also coordinate the solicitation of input from tree fruit pathologists at Cornell University.

Cornell Cooperative Extension; Raj Smith, Academic Consultant & Web Programmer-will provide the software expertise and hardware used in the production of the other Cornell IPM Guidelines.

Entomology Department, Cornell University, NYSAES; Arthur Agnello, Professor of Entomology and Coordinator of Tree Fruit Pest Management Guidelines-will assist in preparation of current guidelines in the standard digitized format, and coordinate the presentation of entomological IPM information and insecticides and acaricides recommendations.

Pesticide Management Education Program; Harvey Reissig, Director; William Smith, Senior Extension Associate; Ronald Gardner, Senior Research Associate; Michael Helms, Extension Support Specialist-will provide the overall leadership and coordination of the project. The program personnel will interact with collaborators from other units or institutions to facilitate their input and coordination of data. They will oversee the preparation and organization of the data into printed Guidelines and web presentations.

The Department of Natural Resources; Raj Smith, Academic Consultant & Web Programmer - will provide support and personnel to create metadata in conjunction with the Wildlife Damage Management eXtension project under the direction of Paul Curtis.

New England Collaborators; Lorraine Berkett, Plant and Soil Science, Univ. of Vermont; Jon Clements, Univ. of Mass. Extension; Daniel Cooley, Dept. Plant, Soil, Insect Sci, Univ. of Mass.; Heather Faubert, Plant Science Dept, University of Rhode Island; Glen Koehler, Pest Management Office, University of Maine; Lorraine Los, Dept Plant Science, Univ. of Conn-will provide input and assist in revision of current Tree Fruit Guidelines to customize the data to be appropriate to their specific locations. This group will oversee the final organization of data for publication in a New England Tree Fruit Pest Management Guide.