**DELAWARE INFORMATION NETWORK**
**FOR PESTICIDES AND ALTERNATIVE STRATEGIES**
**Grant Proposal**
**Project Type D: Pest Management Tactics Survey**
**Crop Profiles and Pest Management Strategic Plans**

## PROJECT DESCRIPTION

### A. Problem, Background and Justification

*Pest Management Tactics Survey*

Data from a survey conducted in 2002 revealed the Green Industry in Delaware employs over 6,000 people and the economic output impact expressed in 2004 dollars was $448 million. The sale of trees and tree care services in Delaware had output impacts of $90 million and employed about 1,000 people (Hall et al. 2006. The economic impact of the Green Industry in the United States. HortTech 16 (2):345-353). To help address the needs of the Green Industry in Delaware, this summer the University of Delaware Cooperative Extension Service hired Dr. Brian Kunkel for the new position of Ornamental IPM Specialist. Kunkel has been contacted to comment on current pesticide usage and pest issues in nurseries already by different agencies and IPM groups. Kunkel has conducted preliminary surveys during pest control workshops; however, there is a need for a comprehensive survey to be conducted using standard techniques that ensure gathering of reliable information. The information gathered by this survey will enable Kunkel to address pest and pest control priorities in the mid-Atlantic region and make accurate recommendations to growers regarding IPM programs available.

*Crop Profiles*

From 1999 to 2005, 13 Crop Profiles were written for Delaware commodities. In 2006, cancelled pesticides were removed from the Profiles. In the winter of '06-'07 seven of the Profiles will be revised as part of the current IPM Partnership Grant. As part of this proposal, the remaining Profiles will be revised in the winter of '07-'08. Because US-EPA refers to Crop Profiles when making regulatory decisions, there is a need to ensure that information in the Profiles is accurate and up-to-date.

*Pest Management Strategic Plans*

From 2003 to 2005, three Pest Management Strategic Plans were written in Delaware for Delaware, Eastern Shore Maryland and New Jersey: lima bean, spinach, and processing cucumbers. As part of the current IPM Partnership Grant, a PMSP Workshop will be held in January, 2007 for watermelon in Delaware, Eastern Shore Maryland, New Jersey, Virginia, and North Carolina. As part of this proposal, the University of Delaware IPM coordinator, Joanne Whalen, has identified green pepper as a crop at risk and as a candidate for a new PMSP for Delaware, Eastern Shore Maryland and New Jersey. Green pepper is a major commodity for Delaware and neighboring states. The US Census of Agricultural Data

(http://www.hort.purdue.edu/newcrop/cropmap/delaware/delawaretotals.html ) shows that Delaware had 34 sweet pepper growers with 45 acres of peppers in production in 1997. According to the National Agricultural Statistics Service, in 2005 New Jersey had 3,200 acres in production (http://www.nass.usda.gov/). Data is not available for Maryland.

Agriculture is a major industry in Delaware. According to the National Agricultural Statistics Service, in 2005 fresh vegetable production was valued at $14,713 thousand and processing vegetable production was valued at $18,695 thousand (http://www.nass.usda.gov/). Because of Pesticide re-registration and new registration requirements under FQPA, there continues to be a need for US/EPA to obtain information on pesticide use and needs within Delaware and the mid-Atlantic region. The Tactics Survey, Crop Profile and PMSP activities described in this proposal will facilitate information transfer and permit informed regulatory decision-making ensuring that growers have the pest control products they need to maintain production.

**B. Objectives and Anticipated Impacts**

1. Conduct a mail-in survey of Ornamental pest control tactics in Delaware, Eastern Shore Maryland, western New Jersey and southern Pennsylvania.

Anticipated Impacts (See attached Logic Model)

| | |
|---|---|
| *Short Term:* | Survey is conducted and analyzed. |
| *medium Term:* | UD Extension will have the information needed to make control recommendation to growers and draft IPM programs for ornamentals. |
| *Long Term:* | Ornamentals will be grown using the most effective pest control methods with the least amount of pesticide. |

2. Revise the remaining 6 Delaware Crop Profiles.

Anticipated Impacts (See attached Logic Model)

| | |
|---|---|
| *Short Term:* | Profiles are produced and posted to the web. |
| *medium Term:* | Pesticide Regulators use information from Delaware when making pesticide regulatory decisions. |
| *Long Term:* | Pest control methods will be available for Delaware commodities. An adequate and affordable food supply will be available. |

3. Write a Pest Management Strategic Plan for green peppers in Delaware, Eastern Shore Maryland and New Jersey.

Anticipated Impacts (See attached Logic Model)

| | |
|---|---|
| *Short Term:* | The PMSP is produced and posted to the web. |
| Medium Term: | Pesticide Regulators will use information from Delaware when making pesticide regulatory decisions. |
| *Long Term:* | Pest control methods will be available for Delaware commodities. An adequate and affordable food supply will be available. |

A priority of the IPM Roadmap is to develop alternative tactics for production agriculture that have major economic benefits as well as protect public health including workers and the environment. The Delaware Information Network for Pesticides and Alternative Strategies will work towards realizing this priority.

## C. Approach and Procedures

1. *Pest Management Tactics Survey*

Kunkel will ask the Information Network Advisory Committee and other subject matter specialists to determine which ornamental plants should be surveyed. Mail lists of approximately 300 ornamental growers will be obtained from subject matter specialists. Kunkel will meet with UD evaluation expert, Dr. Tom Ilvento, to design the confidential survey instrument and establish the survey procedure. The survey will ask for major insect, disease and weed pests for each ornamental plant included in the survey. The survey will ask for chemical and non-chemical control measures for each pest. For each pesticide used, the survey will ask for the average number of times the chemical was applied and the average rate of application. The survey will ask for the per-cent of crop grown with chemicals and the per-cent grown with alternative methods. Kunkel will compile survey results and write the final report. Program records will be maintained on the progress of the survey.

The mail survey approach will use the Tailored Design methodology developed by Dillman (Mail and Internet Surveys: The Tailored Design Method, 2nd Edition, Dillman, Don A. John Wiley & Sons, New York, 2000), which uses a combined strategy of good questionnaire design, pre-testing, reduction of respondent burden, and multiple mailings to generate the highest possible response rate. The Tailored Design Method (previously called the Total Design Method) is the standard methodology for mail survey instruments, including the U.S. Census of Population. The response rate goal for this project will be 52 percent. For this survey we will use a pre-letter which will discuss the importance of the project and the need for response. This will be followed by a series of prompts for those who are slow in responding to the survey (via a post card reminder and a second mailing).

*Data and Methods*

Five elements have been identified by Dillman that are crucial to high response rates for a survey. Not every survey effort can include all five elements, but the highest response rate will be achieved if all of these elements are used together. The elements include:

1. Respondent-friendly questionnaire
2. Four contacts by First Class Mail with an additional "Special" Contact
3. Return envelopes with real First-Class stamps
4. Personalization of correspondence
5. Token prepaid financial incentives

Research has shown that response rates can increase by 40 percentage points with

multiple mailings when compared to a single mailing. The key to a multiple mail approach is to track those who respond from those who did not yet responded. The tracking mechanism will be a randomly assigned Identification Number (ID). The subject is told of the ID number and its purpose, and that the link between the ID number and the subject will be destroyed after the survey process has been completed. When a survey is returned the ID is compared to the Master List and that subject is removed from the master list. Only the non-respondents are sent a new mailing. Experience has shown that the efficiency of reminder mailing diminishes after the third mailing of the survey and cover letter is sent. When the final mailing is completed the master list is destroyed and the linkage between the ID number and a name or address is destroyed.

*Survey Protocol*
Our step by step procedures are as follows:

1. Assign a random ID number to each person on our mailing list. The ID number is used to track response to the survey.

2. Send a pre-survey letter to each person indicating the purpose of the survey, the importance of their participation, the time frame when a questionnaire will be sent to them, issues of confidentiality, and that their participation is voluntary. We will also be using a gift incentive (such as, a unit of Pesticide Applicator re-certification credit for those who complete the survey and/or a gift certificate for $2 off the next Horticultural Industry Expo) in the mailing and the subject will be notified that a token of appreciation will be included with the survey mailing.

3. Within a few days, we will send a cover letter, questionnaire, gift incentive and a postage paid return envelope to each person in the sample. The ID number is written on the survey and the subject is told of its presence and purpose in tracking those who responded.

4. Within a week a reminder postcard is sent to all subjects

5. As surveys are returned the Master List is updated and all respondents are removed from the list.

6. Two weeks after the mailing of the reminder postcard, a fourth contact is made to only those who have not yet responded using a second full mailing of a cover letter (slightly revised), questionnaire, and return envelop.

7. As surveys are returned the Master List is updated and all respondents are removed from the list.

8. Two weeks later a final contact is made to those who have not yet responded with a cover letter, questionnaire, and return envelop.

*Issues Concerning Consent and Confidentiality.*
The cover letter and the survey instrument will clearly state that participation is

voluntary and confidential. We will work under the assumption that if a person is notified that their response is voluntary, their response to the survey it is a declaration of consent. Any release of information, even in summary form, will not be specific enough that a person might be able to guess the owner of a specific response or set of response patterns.

Once the mailings have been completed, the completed surveys will be coded into a SAS file and merged with existing public data, the data will be cleansed of the identification numbers, and linkages with names and addresses. The paper surveys will be stored in a locked file cabinet under the protection of the PI for a period up to one year. Thereafter they will be destroyed. The data files will be held under the direction of the PI.

Timetable:

| Task | Start | Complete |
|---|---|---|
| select ornamental to be surveyed | upon initiation of grant: 4/1/07 | 5/1/07 |
| Design survey instrument | 5/1/07 | 7/1/07 |
| Conduct survey mailings | 7/1/07 | 9/1/07 |
| analyze results | 9/1/07 | 12/1/07 |
| Write report | 12/1/07 | 3/1/08 |
| Submit report to NE IPM Center | 3/1/08 | 3/31/08 |

2. *Crop Profiles*

King will transmit Crop Profile sections to the University of Delaware subject matter specialists and ask for revisions. Instructions will be given to add new pest species, new pesticides, new crop varieties and new production practices. Instructions will be given to delete cancelled pesticides, crop varieties that are no longer grown and production practices no longer used. Specialists will be asked to check pesticide use rates, acreage, efficacy, and formulations. King will compile revisions, rewrite commodity production information, cultural practices, and worker activities. Program records will be maintained on the progress of crop profile revisions.

Timetable:

| Task | Start | Complete |
|---|---|---|
| Rewrite production information, cultural information, worker activities | 4/1/07 | 10/1/07 |
| Send insect, disease, weed sections to subject matter specialists for revision | 10/1/07 | 1/1/08 |
| Compile revisions | 1/1/08 | 3/1/08 |

| | | |
|---|---|---|
| Submit completed profiles to NE IPM Center | 3/1/08 | 3/31/08 |

3. *Pest Management Strategic Plan*

King will secure a venue for the green pepper PMSP Workshop for January, 2008 and arrange food service. King will ask University of Delaware Extension agents and specialists for lists of green pepper growers in Delaware. King will ask Project Directors in Maryland and New Jersey for lists of green pepper growers, crop consultants, and subject matter specialists. King will invite growers, crop consultants, and subject matter specialists from Delaware, Maryland Eastern Shore, and New Jersey to the January 2008 workshop, as well as representatives from the NE IPM Center, US-EPA, EPA Region 3, NE IR-4, and state Departments of Agriculture.

King will write a draft green pepper PMSP from crop profiles available from Delaware and New Jersey. Guidelines for PMSP development provided by the NE IPM Center will be followed. King will transmit the draft PMSP to Extension subject matter specialists for review of their sections. King will compile review comments into a final draft document.

During the green pepper workshop, the draft document will be projected and edited section by section. A representative of the NE IPM Center will be asked to facilitate the workshop. King will compile the draft revisions and prepare a final draft document. King will post the final draft document to the University of Delaware web and request workshop attendees to review and comment on the draft. After the review, King will submit the final PMSP to the NE IPM Center. Program records will be maintained on the progress of the PMSP production.

Timetable:

| Task | Start | Complete |
|---|---|---|
| Secure workshop venue | upon initiation of grant: 4/1/07 | 9/1/07 |
| Obtain list of invitees | 9/1/07 | 10/1/06 |
| Invite participants | 10/1/07 | 11/1/07 |
| Prepare draft PMSP | 10/1/07 | 11/1/07 |
| Route draft to subject matter specialists | 11/1/07 | 12/1/07 |
| Incorporate comments and prepare workshop draft PMSP | 12/1/08 | 1/1/08 |
| Conduct workshop | 1/1/08 | 2/1/08 |
| Incorporate edits and comments into final draft PMSP | 2/1/08 | 3/15/08 |

| | | |
|---|---|---|
| Transmit final PMSP to NE IPM Center | 3/15/08 | 3/31/08 |

**D. Evaluation Plans (see attached logic models):**

*Short Term:*

Program records will be examined to determine: (1) if the ornamental pest management tactics survey was conducted and analyzed, (2) if the selected crop profiles were revised according to schedule, and (3) if the green pepper PMSP was produced according to schedule. The USDA web will be examined to determine if the revised crop profiles and green pepper PMSP were posted.

*Medium Term.*

Program records will be reviewed to determine if Kunkel has information needed to make ornamental control recommendations. King will ask IR-4 and US-EPA if they used information from the Delaware Crop Profiles and the green pepper PMSP when making regulatory decisions.

*Long term:*

Kunkel and King will ask University of Delaware Cooperative Extension Agents and Delaware State University Cooperative Extension Agents to list those commodities for which pest control products/ methods were lacking during the duration of this grant. Kunkel and King will also ask agents to list those commodities for which pest control products/ methods were adequate.

**COOPERATION AND INSTITUTIONAL UNITS INVOLVED:**

University of Delaware Cooperative Extension

UD Department of Entomology and Wildlife Ecology

UD Department of Plant and Soil Science

UD Department of Food and Resource Economics Statistics Laboratory

The Stat Lab provides statistical consulting to graduate students, faculty, staff and researchers throughout the University of Delaware, as well as agencies and companies in the region. It is jointly supported by the Statistics Program of the Food and Resource Economics Department and Research & Data Management Services of the IT-User Services. The mission of the Stat Lab is to train students of the Statistics Program to interact effectively with investigators from a variety of disciplines, to enhance the quality of experimental and other research at the University by providing high-quality statistical advice, and to encourage collaborative research between statisticians and investigators from other disciplines both within and outside of the University of Delaware

**KEY PERSONNEL:**

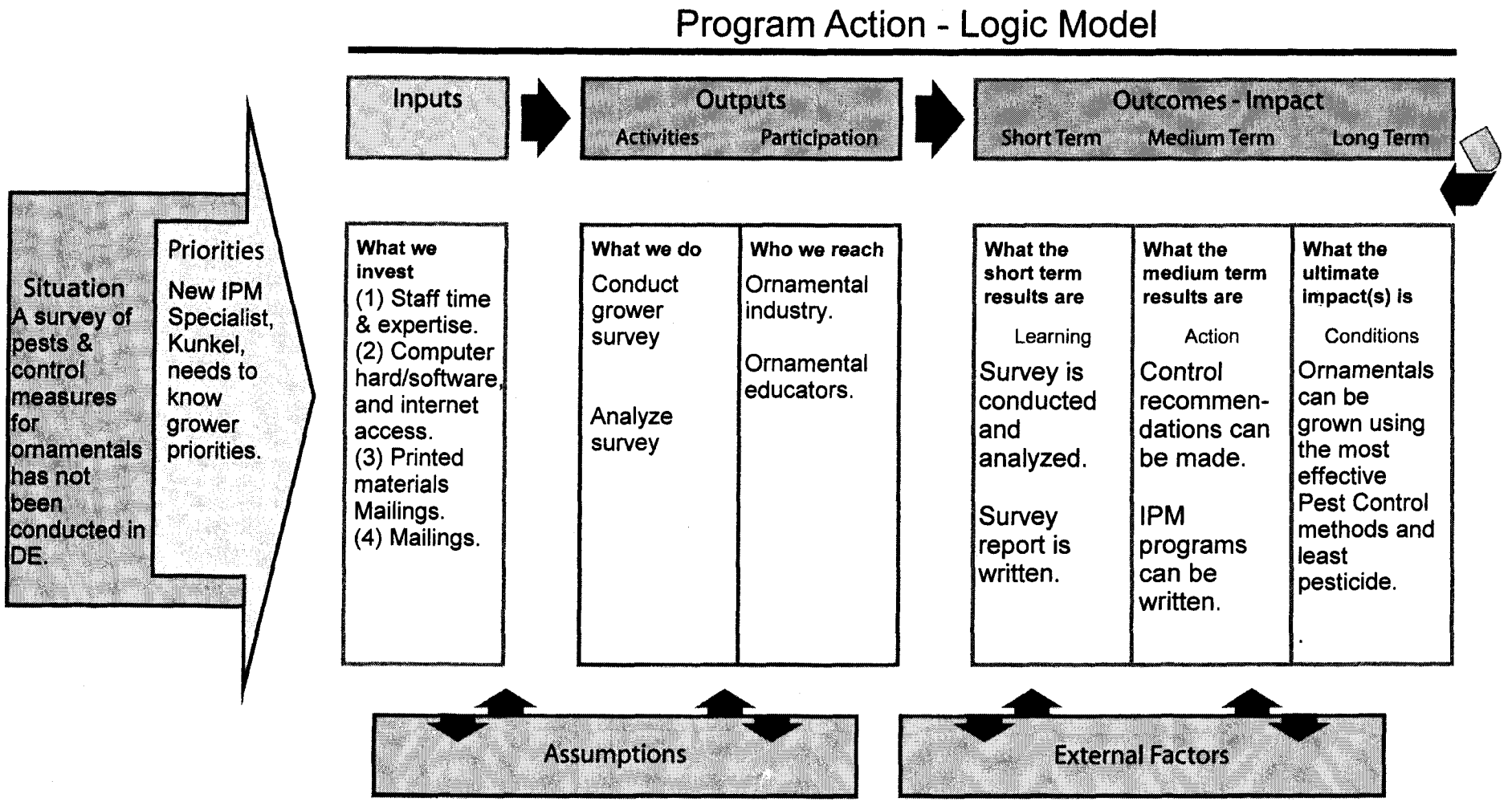
UD Pesticide Coordinator, King, will oversee the grant and prepare reports.
UD Ornamental IPM Specialist, Kunkel, will oversee the Tactics Survey.
UD evaluation expert, Tom Ilvento, will be consulted on the survey design and execution.

UD Specialists Whalen, Mulrooney, VanGessel, and Everts will be involved in writing Crop Profiles and the Delaware sections of the green pepper PMSP.
Subject matter specialists from Maryland and New Jersey will be involved in writing the PMSP.

# PEST MANAGEMENT TACTICS SURVEY FOR ORNAMENTALS

## PROGRAM DEVELOPMENT

*Planning – Implementation – Evaluation*



# DELAWARE PEST MANAGEMENT (CROP) PROFILES AND PEST MANAGEMENT STRATEGIC PLANS

## PROGRAM DEVELOPMENT

*Planning – Implementation – Evaluation*