

A COMPREHENSIVE, INTERDISCIPLINARY VERMONT EXTENSION IPM PROGRAM ADDRESSING STAKEHOLDER PRIORITIES AND NEEDS FOR 2010-2012

Program Emphasis Area: IPM Implementation in Agronomic Crops

With over 95,000 acres planted in 2009, corn harvested for silage is the most important field crop grown in Vermont with almost all of it used to support Vermont's dairy farms. In addition, acreage in small grains has increased over the past few years due to an interest in local food grade markets (i.e., flour) as well as organic grain for Vermont's growing organic dairy sector. Based on prior surveys of stakeholders, silage corn IPM education was identified as a critical need, including IPM of western and northern corn rootworm, European corn borer, and northern leaf blight. A more recent concern in the Northeast is the western bean cutworm. To date there has been no monitoring in Vermont and limited monitoring in the Northeast. The pest has been identified in New York and Quebec. Fusarium head blight is currently the most important disease facing small grain producers in New England (Bergstrom and Darby, pers. comm.), resulting in loss of yield, shriveled grain, and, most importantly, mycotoxin contamination. In North America, Fusarium head blight is predominantly caused by the species *Fusarium graminearum* (sexual stage, *Gibberella zeae*). Rotation and crop residue incorporation have been shown to affect disease incidence, and it is thought that reductions in tillage have contributed to regional epidemics. Specific IPM educational goals for these key agronomic pests (insects/diseases) are to: (i) increase the knowledge and awareness of stakeholders concerning pest identification, crop damage symptoms, pest biology and life cycles, and pest management options (i.e., 75% of stakeholders participating in the program will report an increase in knowledge/awareness); (ii) collect and summarize data from across Vermont on the incidence and impact of these identified pests/disease from field scouting and monitoring reports to be used in the proposed IPM educational programs for stakeholders; and (iii) develop and update educational programs (meetings, media, radio, television) and written materials (fact sheets, web articles) based on the most recent IPM monitoring data and understanding of the levels of pest incidence and damage found in Vermont. The primary stakeholders for the agronomic IPM program are crop producers and dairy/livestock farmers (most often being one and the same); other stakeholders are agriculture service providers (AGSP) which include certified crop advisors, crop and dairy product dealers, and federal/state agency personnel who work closely with corn and small grain producers. By conducting an extensive IPM program for field corn and small grains in Vermont, stakeholders will be provided with sound, locally-derived advice for implementing pest management decisions that will 1) reduce unnecessary use of pesticides 2) reduce unnecessary use of Bt corn, and 3) increase farmer income by reducing these added input costs and increasing yields. Ultimately this will result in reduced potential for pest resistance and human health risks.

Approach -

1. Extension Outreach Education. In the winter of 2010, fact sheets will be produced that outline the issues, goals and objectives of the project. Information about the primary targeted insects/diseases (western and northern corn rootworm, European corn borer, western bean cutworm, northern corn leaf blight, Fusarium head blight in small grains) will be written or updated from past fact sheets. These will be posted on the program website (<http://pss.uvm.edu/vtcrops/?Page=pest.html>) and also presented at various crop, dairy/forage and pest man-



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agement extension meetings that are held in the winter months. Also, one field day per year will be conducted to highlight pest identification and scouting procedures. A report of each season's monitoring results (2010, 2011, 2012; see No. 2 below) will be written in October/November of each respective year, published on the program web site, sent to participating farmers and agricultural service providers (AGSP) and also be presented at winter extension meetings.

2. Agronomic Monitoring for Current and Emerging Pests. For each year of the project, extensive monitoring will be conducted for target agronomic pests. In the winter/spring of 2010, farmers and AGSP will be identified as project volunteers. Volunteers will be of two types. The first group will include farmers and AGSPs that have agreed to be "watching and looking" for various field pests and symptoms throughout the next three growing seasons. Starting in early May of each year, this group will receive biweekly communication via email (or post cards if necessary) providing them with timely information concerning the targeted pests/disease. Any other issues that may come up such as pest outbreaks will also be included. These "timely reminders" will also be posted on the program website. Volunteers will be able to contact program personnel via an email and/or by phone. All the information will be gathered once a week summarized and posted on the program website (<http://pss.uvm.edu/vtcrops/?Page=pest.html>). In some cases, a report may be followed-up with a field visit to confirm a particular issue. The second group of volunteers will include corn and small grain growers who are willing to allow project staff to directly monitor and sample their fields for the targeted insects/diseases. Approximately 50 cornfields on 20 farms will be monitored for northern corn leaf blight, European corn borer, corn rootworms and western bean cutworm following recommended protocols (Cox and Smith, 2009; DiFonzo and Jewett, 2009). Field selection will be based on factors such as years in continuous cropping, past observed symptoms, and location. For western bean cutworm, we plan to focus on the northwestern part of Vermont since there is evidence that it is moving into the Northeast from the mid-west U.S. and Ontario. The information gathered on western and northern corn rootworm will be added to an ongoing database for corn rootworm (Bosworth, 2004) and a new database will be initiated for the other pests. This information is not only useful to the grower but also will be used to promote the concepts of IPM and discuss the real rather than perceived risks of these insects/diseases.

Background to Approach -

Dairy production is the major agricultural industry in Vermont. Over 85% of Vermont's crop acreage is devoted to field crop production. Historically, a great deal of outreach, education, and research has been conducted on managing the major economic insect pests of forage and grain crops (corn rootworms and European corn borer). However, insect and disease complexes are beginning to change as a result of changes in weather, pesticides, and new crops grown in the area. For example, the past three years have had higher than average rainfall seasons. In addition, many farmers are starting to grow value-added crops such as wheat for local bakeries. The acres of cereal grain crops have increased 10 fold over the last 5 years. These new crops bring new insect and disease challenges to the producer. As a result of changes in pest problems there is an increased demand for more biological information on these the various species, with the ultimate goal of developing profitable, environmentally sound IPM programs. Several of the new and emerging insects and diseases of concern in Vermont are described below.

Within the past four years, many fields have been identified to have northern corn leaf blight (NCLB), which is caused by the fungus *Exserohilum turcicum*. The damage from NCLB is often associated with wet seasons (Lipps and Mills, 2002). A major risk factor is when corn is no-till planted into or near infested corn debris; however, even without that risk, spores can travel long distances by high air currents (Bergstrom, 2009). One concern is that some seed company representatives are now discussing the idea of applying fungicides to protect the corn (Darby, pers. comm.). There are hybrid differences in resistance to NCLB depending on the races of the fungi that are present. These differences needs to be documented and is thus part of the proposed IPM monitoring program.

Another emerging pest of concern is the western bean cutworm (*Loxagrotis albicosta* Smith). Historically, the western bean cutworm was only a pest in the western Corn Belt. However, over the past several years, it has become established in the Midwest and continues to move steadily from west to east. Last season the first western bean cutworms were identified in western New York and Quebec. There has been no monitoring in Vermont, however, presence in surrounding areas signifies a need to monitor and educate farmers. Corn growers need to be aware of the potential for this corn insect pest to make its way into Vermont. The western bean cutworm is a severe pest of corn, affecting both crop yield and quality. Unlike other cutworms, the western bean cutworm is a late-season pest of corn. It feeds primarily on corn ears, chewing and scarring kernels, predisposing the ear to fungal and mold infections.

Fusarium head blight is currently the most important disease facing small grain growers in the Northeast (Bergstrom and Darby, pers. comm.), resulting in loss of yield, shriveled grain, and, most importantly, mycotoxin contamination (McMullen et al 1997). In North America, Fusarium head blight is predominantly caused by the species *Fusarium graminearum* (sexual stage, *Gibberella zeae*). Rotation and crop residue incorporation have been shown to affect disease incidence, and it is thought that reductions in tillage have contributed to regional epidemics. Spores of *Gibberella zeae* are primarily transported by air currents, making it difficult to control. More than 80% of farmers in Vermont have lost a small grain crop to head blight over the last 4 years. It is important to provide farmers with up to date information on cultural strategies that will help them minimize disease risk as well as current varietal tolerance information.

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Program Emphasis Area: IPM Implementation in Specialty Crops - Apples (including Organic Apple IPM)

Apples are an important agricultural commodity in Vermont's rural communities and working landscape. Of all the different fruits grown and harvested for sale in Vermont, apples comprise approximately 91% of total acreage planted to fruit (USDA NASS, 2008). The apple industry generates jobs and supports communities and businesses across the State of Vermont and is an important part of the state's diversified agriculture. Apple orchards are complex ecosystems that require intensive management to produce high quality fruit. Tree growth and fruit production are intricately affected annually by the diverse biotic and abiotic factors within the environment which include numerous insects, mites, plant pathogens, weeds, and vertebrates. Effective IPM is critical in profitable and sustainable apple production. Vermont apple growers want up-to-date information on effective IPM practices and tools, including organically-acceptable practices, so that they can incorporate them into their pest management programs to reduce economic, health, and environmental risks. The Vermont Apple IPM Program is committed to increasing IPM implementation in commercial orchards across the state by continuing to deliver an integrated extension program that addresses the IPM priorities identified by growers, their advisors (i.e., IPM consultants) and other industry service providers. These stakeholders actively provide input and are an integral part in the development of the Vermont Apple IPM Program which includes standard and organic apple IPM components. [Note: For the New England region, Vermont is the leader in the development of organic apple IPM extension resources.] Stakeholder-requested information is provided via a multidisciplinary website, newsletter, blog, presentations, workshops, orchard tours, demonstrations, and one-on-one education. A specific target goal of the Apple IPM Program is to have at least 67 % of organic and standard apple growers in the state report that the program has increased their knowledge of IPM and they have adopted at least one new IPM practice and/or reduced-risk alternative each year. The Vermont program is well-coordinated with other apple programs in New England to avoid duplication; many collaborative ventures exist in the region such as the New England Tree Fruit Management Guide with different states having specific responsibilities (e.g., Vermont provides organic apple IPM information), a regional bird management publication, joint twilight grower meetings, regional grower conferences, and a regional IPM workshop for extension personnel, private consultants, and researchers (which is held in Vermont).

Approach -

1. Apple IPM Websites (Standard IPM and Organic IPM). Websites for both standard apple IPM and organic apple IPM will be enhanced each year based on stakeholder input and will include time-sensitive articles and a "blog" of orchard observations during the growing season which will encourage disease, arthropod and weed monitoring, scouting, and other IPM practices (e.g., conservation of beneficials and cultural practices to prevent or mitigate disease, arthropod, and weed problems).



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2. Organic Apple IPM Demonstration. Organic Apple IPM will be demonstrated in two certified organic apple orchards at the UVM Horticulture Farm. Each orchard is planted with five apple cultivars that growers have identified as important to the future of the apple industry; the orchards also represent the two types of orchard systems growers use in switching to different cultivars: (i) planting a new orchard with nursery-purchased trees or (ii) top-grafting an older, established orchard with new cultivars. Disease and arthropod management decisions will be based on the integration of arthropod life cycles, disease cycles, IPM trap monitoring, analysis of environmental conditions for disease and arthropod development (e.g., degree day modeling), monitoring of beneficials, and using established thresholds to determine if intervention is warranted. An assessment will be conducted of inputs and resulting fruit quality and yield. The site will be open to the public (Monday-Friday) and used for specific workshop/tours during the growing season in each year.

3. Presentations/Workshops. Working in collaboration with the Vermont Tree Fruit Growers Association, the Northeast Organic Farmers Association in Vermont (NOFA-VT) and other stakeholders, two workshops will be organized and presentations made on the most pressing IPM issues in standard and organic apple production each year.

4. One-on-One Education. Grower-specific IPM information will be provided during on-site farm visits and through email/phone consultations each year.

5. Joint Regional Publications. Dr. Berkett will continue to work collaboratively with Dr. Alan Eaton of the University of New Hampshire who is leading the development of a Bird Management Guide and will continue to contribute to the organic apple IPM section of the New England Tree Fruit Management Guide over the next three years.

6. Evaluation of effectiveness/impacts. Stakeholders participating in each component of the Vermont Apple IPM program will be asked to evaluate the program and provide input into its future directions. Each year, surveys will be constructed to identify changes in knowledge and practices and to determine how these changes have impacted economic costs and environmental and health risks.

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Program Emphasis Area: IPM Implementation in Specialty Crops - Cold Climate Winegrapes

The cold climate winegrape industry is rapidly expanding; it is a 'new' crop in Vermont and in the region that offers significant value-added and agri-tourism economic opportunities. The newly emerging industry is at a critical stage in establishing production practices. With the continued 'explosion' of new people who are starting winegrape vineyards with limited or no background in agriculture, it is imperative to not only continue the cold climate winegrape IPM program but also expand educational outreach and training demonstrations so the growers start from the beginning to make pest management decisions that minimize health, environmental and economic risks. The Vermont Cold Climate Winegrape IPM Program has become the acknowledged resource in northern New England for IPM information. Currently, there are 200 stakeholders (growers, state and federal agency personnel, ext. personnel, and industry reps.) from Vermont and beyond that have requested to receive cold climate winegrape IPM information on a regular basis. Stakeholder-requested information is provided via a multidisciplinary website, newsletter, presentations, workshops, vineyard tours, demonstrations, and one-on-one education. Collaborative relationships have developed with extension educators in the 'warmer' New England states to ensure that programs are being developed that complement each other. New collaborative efforts are developing between Vermont and Northeast and Midwest universities in planning and implementing overall cold climate winegrape extension efforts, with Vermont taking an active role in IPM development. Through addressing the educational priorities identified by stakeholders, the goals of the Vermont Cold Climate Winegrape IPM Program are to (i) increase knowledge of how to use IPM strategies and techniques effectively; (ii) increase knowledge on how to prevent pest management problems; (iii) provide education that allows growers to determine if pesticides are needed in vineyards; and (iv) if pesticides are warranted, provide education which will allow growers to make informed pesticide decisions which will reduce economic, health and environmental risks. A specific goal of the program is to have at least 67 % of winegrape growers in the state and region report that the program has increased their knowledge of IPM and they have adopted at least one new IPM practice and/or reduced-risk alternative each year.

Approach -

- 1. Provide IPM education via the Vermont Cold Climate Winegrape IPM website** (<http://pss.uvm.edu/grape/IPM/>). In particular, the website will include time-sensitive newsletter articles and a "blog" during each growing season which will encourage disease, arthropod and weed monitoring, scouting, and other IPM practices (e.g., conservation of beneficials and cultural practices to prevent or mitigate disease, arthropod, and weed problems).
- 2. Vineyard IPM Demonstration.** The vineyard at the UVM Horticulture Farm will be the site each year of a demonstration of the most current IPM strategies and practices, with optimal use of reduced-risk techniques and



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tools. The vineyard was planted in 2007 with the winegrape varieties: 'Frontenac', 'LaCrescent', 'St. Croix', 'Marquette', 'Prairie Star', 'Corot Noir', 'Vignoles', and 'Traminette'. Disease and arthropod management decisions will be based on the integration of current knowledge of varietal susceptibility (Berkett, 2008; Smiley et al., 2008), analysis of environmental conditions for disease and arthropod development (Berkett, 2009a), conservation of beneficials, application of resistance management strategies (Berkett, 2009b), and the use of pest risk assessment models to minimize pesticide use (Martinson et al., 1991). An assessment will be conducted of inputs and resulting fruit quality and yield across the eight winegrape varieties. The site will be open to the public (Monday-Friday) and used for a specific workshop/tour during the growing seasons.

3. Presentations/Workshop. Working in collaboration with the Vermont Grape and Wine Council and other stakeholders, a workshop will be organized and presentations made on the most pressing IPM issues each year.

4. One-on-One Education. Grower-specific IPM information will be provided during on-site farm visits and through email/phone consultations throughout the project.

5. Evaluation of effectiveness/impacts. Stakeholders participating in each component of the Vermont Cold Climate Winegrape IPM Program will be asked to evaluate the program and provide input into its future directions. Each year, surveys will be constructed to identify changes in knowledge and practices and to determine how these changes have impacted economic costs and environmental and health risks.

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Program Emphasis Area: IPM Implementation in Specialty Crops - Vegetable & Berries

In 2007, Vermont had 6,571 vegetable farms, the second highest number of farms in New England (USDA NASS, 2008). Many vegetable farms incorporate a berry component in their mix of crops to increase farm profits and to diversify field operations. Tomatoes (field and greenhouse) and strawberries remain the most lucrative crops for Vermont vegetable and berry growers. When growers are polled, the insect/disease complex in tomato greenhouses is always listed as a continual challenge. Crop losses from late blight in tomatoes and potatoes, downy mildew in cucurbits, rising pressure from Phytophthora species in an increasing number of crops, strawberry root rot complexes and Lepidopteran pests of sweet corn have all been listed as top priority pests by Vermont growers and by the Vegetable Working Group for the Northeast (NE) IPM Center. The Vermont Vegetable and Berry IPM Program will educate growers on emerging IPM strategies and practices to address the high priority pests/diseases in tomato, strawberries and cucurbits. The program will continue to work with sweet corn growers to increase the adoption of sweet corn insect trapping to monitor Lepidopteran pests and reduce unnecessary pesticide applications. The Vermont Vegetable & Berry IPM program will continue to contribute to the regional IPM priorities for New England, participating in the Small Fruit IPM Working Group and the Vegetable IPM Working Group of the NE IPM Center. The specific goal of the Vermont Vegetable and Berry IPM Program is for 85% of the participants (of meetings, workshops, onsite visits, newsletters, websites with IPM video clips, etc.) to increase their knowledge of IPM practices and to adopt at least one practice which leads to reduced pesticide use in each year of the program.

Approach -

- 1. One-on-One Education.** The Vegetable and Berry IPM Program will work with the UVM Plant Diagnostic Clinic to provide stakeholders with rapid, accurate and low cost pest diagnosis. The program will provide IPM information for vegetable and small fruit growers developed from the most current IPM strategies and practices including the use of reduced-risk pesticides and alternative practices. On-site farm visits, email, and phone consultations about pest identification and management using IPM strategies will be key components of the Vegetable and Berry IPM program. Up to 20 on-site farm visits will be made throughout the state to discuss emerging pest issues and IPM strategies. To assess impacts of the program, growers that were visited or had submitted pest identification and management inquiries during the growing season will be surveyed. An assessment will be conducted as to whether the growers gained knowledge in vegetable and berry pest identification and whether they implemented IPM strategies and practices as a result of the on-site visit or pest query. The results will be evaluated, compiled and reported.
- 2. Presentations/Workshops/Twilight Meetings.** Current and emerging IPM strategies and practices for vegeta-



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ble and berry pest problems will be presented throughout the year in at least three grower twilight meetings in the summer, at the annual NOFA (Northeast Organic Farmers Association) meetings, New England Vegetable and Berry Meetings and Vermont Vegetable and Berry Growers Association meetings during the winter. These meetings will always incorporate stakeholder evaluations and request input for future program direction. The results will be evaluated, compiled and reported.

3. Newsletters/Publications. Newsletter articles will be written on pest outbreaks, pest identification and IPM management strategies and practices for vegetable and berry growers on a biweekly schedule and published in the Vermont Agency of Agriculture's newsletter AgReview (<http://www.vermontagriculture.com/Agriview/index.html>). Vermont vegetable and berry growers who are certified pesticide applicators will also receive IPM information through the bi-annual Pesticide Applicator Report (<http://pss.uvm.edu/pesp/>). This newsletter, co-authored with the Vermont Agency of Agriculture, addresses IPM issues, new pesticide chemistries, and other pest management topics.

4. IPM video clips. Ten IPM video clips will be produced on new and emerging disease and insect pests during the growing seasons for the next 3 years. These will be available through the Plant Diagnostic Clinic Website (<http://www.uvm.edu/pss/pd/pdc/>), and the VT Master Gardener website (<http://www.uvm.edu/mastergardener/>) and presented at meetings. A follow-up evaluation will be conducted to assess grower adoption of this emerging tool for IPM education.

5. Evaluation of effectiveness/impacts. Stakeholders participating in each component of the Vermont Vegetable and Berry IPM Program will be asked to evaluate the program and provide input into its future directions. Each year, surveys will be constructed to identify changes in knowledge and practices and to determine how these changes have impacted environmental and health risks.

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Program Emphasis Area: IPM Implementation in Specialty Crops - Greenhouse Ornamental Plants

Greenhouse ornamentals have provided a lucrative means of crop diversification to supplement traditional vegetable and fruit farms (First Research, 2007). In Vermont, ornamentals rank 2nd in market value of agricultural product sales (USDA NASS, 2008). Presently, the greenhouse ornamentals industry is changing and growers face new economic and production challenges. The cost of producing high quality greenhouse ornamentals has risen, while customers' ability to pay more has declined. Vermont is known for its small family farms which represent a vital component of the working rural landscape. They are sustained by diversification, and greenhouse ornamentals are a critical component. Without this vital revenue source, more farms will be lost. While all growers use some aspects of IPM, now more than ever growers need help implementing more advanced IPM techniques, such as biological control, to get through the current complex economic and environmental challenges. The goal of the Vermont Greenhouse Ornamental IPM Program is to enhance environmental sustainability and profitability of the greenhouse ornamentals industry in Vermont by increasing growers' implementation of advanced IPM techniques that minimize production costs and reduce reliance on chemical pesticides. A pilot IPM educational program called IPM First for Greenhouse Ornamentals was established in July 2009 with EIPM funds to encourage growers to implement advanced IPM methods. This current proposal addresses stakeholder priorities identified in 2009 and specifically includes more workshops and providing site visits. It is expected that growers participating in this program will increase their adoption of IPM, including use of biological control, while decreasing pesticide use. This will be documented with follow-up evaluations. Also, the successful collaborative Tri-State Greenhouse IPM Workshops will continue over the next three years. It is anticipated that participating growers will reduce their pesticide use by 25%, thereby minimizing associated health and environmental risks of production. In addition, while most growers who attend the workshops will increase their IPM knowledge, it is expected that 20% will implement at least one new IPM tactic presented.

Approach -

1. Individualized IPM Education Program. The "Greenhouse Manager's Guide to IPM in Northern New England" will serve as the foundation for the IPM First for Greenhouse Ornamentals (Parker et al., 2008). Six VT commercial greenhouse growers who produce spring bedding plants will be enlisted to take part (including those enlisted in 2009). At least one person from each operation will be identified to work 0.5 day/wk on IPM activities related to this program. The UVM Extension Entomologist (M. Skinner) will meet with each grower/owner and designated staff person to identify past and current pest problems and determine what IPM strategies are in use and what additional advanced ones are appropriate to implement. An IPM Action Plan will be devised, tailored to that operation, including scouting protocols, a data recording system and advanced IPM tactics (e.g., indicator or habitat plants, biocontrol release schedule, list of compatible pesticides). A plant pathologist (T. Schmalz) of the VT Agency of Agric. will provide disease management recommendations for each site. A biological control specialist (C. Glenis-



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ter) will give advice on ways to increase use of natural enemies. A consulting agriculture economist will be enlisted to review the IPM Plans and quantify associated costs and benefits. These specialists will meet with each grower annually to discuss the IPM Action Plan. Each greenhouse operation will be loaned standard IPM equipment including: a hand-held data collection device (personal digital assistant), optivisor/hand lens, EC/pH meter for water and soil monitoring, and a max/min thermometer. In addition, up to \$800 will be available to each grower to partially defray costs of biocontrol agents and novel bio-rational pesticides, which the grower would otherwise not purchase. Equipment will remain the property of UVM for use in future training programs. UVM personnel will visit each grower bi-weekly throughout the growing season (Jan. – Jun.) to assess implementation of the IPM Action Plan and suggest adjustments to the Plan. Dr. Skinner will take the leadership role of recruiting grower participants, developing the IPM Action Plan and maintaining general project oversight, summarizing the results and preparing reports. Technical personnel will provide routine monitoring over the season. At the end of each season, meetings will be held with the growers to gather input on program success and determine what aspects of the Plan growers intend to continue independently in the future. A financial evaluation and cost/benefit analysis of the IPM Action Plans will be completed annually, and a summary of grower evaluations will be prepared to improve the program and contribute to the development of a standardized advanced IPM system. It will be distributed to the Tri-State IPM Advisory Group, which is comprised of growers, researchers, Extension personnel and State Agriculture personnel in ME, NH and VT, and will be included in the final impact report. Results from grower evaluations and information on pesticide use will provide direct evidence of the program's impact. Participating growers and their staff will be enlisted to take part in Tri-State workshops so their experiences will demonstrate the success of IPM.

2. Tri-State Greenhouse Grower IPM Workshops. Greenhouse IPM workshops will be held annually each January in Maine, New Hampshire and Vermont (one per state), in a central location to maximize attendance. Margaret Skinner, VT Extension, will serve as the coordinator of the project, working closely with other Extension and State Ag. personnel: Alan Eaton, UNH Extension; James Dill, UME Extension; Kathy Murray, ME Dept. of Agric.; Tim Schmalz, VT Dept. of Agric.; and Chris Rallis, NH Dept. of Agric. These key cooperators will be primary contacts for the project in their respective states, assisting with arranging the workshop venue, lunches and publicity. They also will take part in the workshop as co-presenters and facilitators. Other members of the Tri-State Greenhouse IPM Advisory Group will assist with developing workshop programs. Dr. Skinner will be responsible for workshop mailings, registration and preparing information packets for the attendees. She will coordinate out-of-state invited speakers who will take part in the workshops, and summarize the results of the exit evaluations.

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Program Emphasis Area: IPM for Consumer/Urban Environments

The goal of the Vermont Consumer/Urban IPM program is to educate Vermont consumers and home gardeners about the basics of IPM in order to increase adoption of science-based, sustainable approaches for managing pests that reduce health and environmental risks. This goal will be achieved by utilizing the very effective Vermont Master Gardener (MG) program, particularly the Helpline (a toll free statewide gardening call center staffed by trained MG volunteers) and other outreach efforts to educate and disseminate IPM information to the diverse communities of stakeholders which include hospitals, schools, condo associations, agricultural fairs, community gardens, farmers markets, libraries, prisons and garden centers. According to the most recent MG statistics, 90% of the Helpline inquiries related directly to IPM basic principles including pest identification and pest management. A subset of these Helpline users (30 people) were contacted at the end of the season and asked whether they: (i) had learned about IPM at the time of their Helpline exchange and (ii) how had they managed the pest that had initiated the call to the Helpline. All respondents (100%) said they learned about IPM practices at the time of the call. Ninety percent (90%) indicated they had used only a cultural practice to manage the pest and 10% indicated they had used a combination of a pesticide and a cultural practice as a result of the IPM information supplied by the Helpline staff. Many of the callers indicated they had been more likely to use a pesticide before they called the Helpline. In 2009, the Helpline fielded over 3,000 calls and email inquiries on landscape and garden insect and disease questions throughout the year. The EIPM funds being requested in this proposal will allow this vital IPM outreach and education to continue to these important and diverse stakeholders. The specific goal of the Consumer/Urban IPM Area of Emphasis is for 85% of the participants (e.g., Helpline users, participants of MG community outreach) to increase their knowledge of IPM and to adopt one practice which leads to reduced pesticide use each year.

Approach -

The Master Gardener (MG) program at UVM will serve as the main vehicle for delivering IPM information and education to home gardeners, consumers, and diverse communities within the general public. EIPM funds will be used to support the following approaches:

- 1. Master Gardener Course.** Approximately 250 adults enroll in the Master Gardener course each year. Three hours of weekly lectures for 13 weeks will be developed and delivered on various aspects of IPM, horticulture, plant disease, entomology, soil health and stewardship, sustainable landscapes, and the safe and judicious use of pesticides.
- 2. Master Gardener Helpline.** Approximately 30 MG volunteers will staff the state-wide toll free Master Garden-



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er Helpline. This extremely popular program uses IPM strategies to answer consumer's pest and disease questions throughout the year. The Helpline receives over 3,000 calls and emails each year.

3. Master Gardener outreach. There are 533 active Master Gardeners in Vermont who volunteer in a variety of vetted, science-based outreach programs all with a strong educational component based on IPM principles. These Master Gardener volunteers are active in the state forming connections and linkages with schools, agricultural fairs, farmers markets, community gardens, prisons, libraries, hospitals, condo associations and garden centers. They will educate Vermonters about garden and landscape pest identification and management using IPM strategies. Over 12,000 hours were logged by the volunteers in IPM outreach in 2009 and it is expected that this will increase over the next three years. The AOE leader and MG Coordinator will ensure that Master Gardeners receive the advanced IPM education they need to continue to meet the needs in these stakeholder communities.

4. Master Gardener website (<http://www.uvm.edu/mastergardener/>). This website serves as a site for consumers and gardeners to access current and emerging insect and disease information on a timely basis. IPM video clips of 10 new and emerging pest and disease problems and their management based on IPM principles will be added in 2010 and in the following 2 years. The IPM video clips will provide a new type of IPM educational tool for the consumer.

5. Evaluation of effectiveness/impacts. Stakeholders participating in each component of the Consumer and Urban IPM Program will be asked to evaluate the program and provide input into its future directions. Each year, surveys will be constructed to identify changes in knowledge and practices and to determine how these changes have impacted environmental and health risks.

Background to Approach -

Consumers are often quick to resort to over-the-counter pesticides when dealing with unknown pests in their lawns, landscapes, and gardens. The gardening public often relies on information from untrained 'big box' store or garden center staff when making pest management choices. As a result, pesticides are used by consumers incorrectly or unnecessarily. A significant challenge is educating the diverse group of consumers on IPM and providing information that will enhance adoption of a science-based, integrated approach to managing pests. A main focus of this area of emphasis is outlining to home gardeners and the general public the basics of IPM, including correct and timely pest identification, pest life cycles and IPM strategies and tools, including non-pesticide alternatives. This will be accomplished by using the very effective Vermont Master Gardener program to educate and disseminate IPM information to the diverse communities of stakeholders through the Master Gardener course, the toll free state-wide Helpline, numerous community outreach programs, and the Master Gardener website with IPM video clips.



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