

THE MULTI-DISCIPLINARY VERMONT EXTENSION IMPLEMENTATION PROGRAM ADDRESSING STAKEHOLDER PRIORITIES AND NEEDS FOR 2014-2017

Priority Area: IPM Implementation in Agronomic Crops

Our region now has at least 7 flour mills, 4 malt houses, 2 food grade oil businesses, 18 distilleries, 65 microbreweries and dozens of bakeries using locally grown grains, oilseeds, and hops that are central to their business model. The need for locally grown organic and non-GMO feed grains has continued to increase in recent years. New England boasts highly developed organic dairy and vegetable sectors, yet lags well behind other regions for local grain production. Organic cereal grain acreage has increased in ME and VT, from 300 in 2008 to 3,500 acres in 2013 (MOFGA, LLC and VT Organic Farmers, L.L.C.), demonstrating our region's potential for growth. The acreage of oilseed production has increased to 1,000 acres and the number of hop yards has grown from 5 to 100 within a few years. Pest management is a serious obstacle in the production of cereal grains, oilseed crops, and hops. Over the last five years, farmers throughout the northeast have experienced reduced grain yields and quality due to increased disease pressure from increased rain events. In 2013, farmers reported 25-50% yield and quality loss due to foliar diseases. Grain samples submitted to the UVM Cereal Grain testing lab indicate that 25- 40% of samples are routinely above the 1% DON (vomitoxin) threshold for human consumption. IPM strategies to manage Fusarium Head Blight (FHB) as well as other grain diseases in the region are critical (2014 NEERA Priority). In 2013, we found a high incidence of loose smut in wheat variety trials as a result of infested seed lots. Testing of farmers' seed lots will be essential to keep this disease from further damaging organic grain production. In a 2012 survey of oilseed growers in the northeast, respondents indicated their major concerns were birds, uneven stands, weeds, and lodging. 56% said they were interested in receiving more information about insect identification and management in order to grow a successful crop, and 56% said disease identification and management knowledge would increase their success. An annual stakeholder meeting of Northeast Hops growers has been held since 2011 to identify needs of the fledging northeast hop industry. Through this meeting, 92% percent of attendees identified weed, insect and/or disease control strategies as an important barrier to their hop operation's success. The majority of hop growers have been identified as "beginning farmers" (2014 NEERA Priority) with little to no experience in the area of pest management. This has often led to growers spraying broad-spectrum pesticides without consideration of economic thresholds, beneficial arthropod populations, and other environmental risks. Unless we can overcome the disease and insect issues facing local and organic grain production, it will be hard for farmers to sustain their businesses. From this project, we will learn what disease and pests are plaguing northeast growers, farmers will learn to identify pests in their fields, they will learn if their seed sources are disease free, and they will learn the best agronomic practices to manage cereal grains, oilseeds, and hops to minimize pest damage. We will use the Plant Diagnostic Clinic for help in identifying disease, insect and weed problems in farmers' fields. Our goal is to help farmers design robust local grain systems that successfully address pertinent pest challenges to produce a diversity of food and feed grains for expanding local grain markets.



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CULTIVATING HEALTHY COMMUNITIES
COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Priority Area: IPM Implementation in Agronomic Crops

Approach -

1. **Two yearly Field Days** highlighting grain, oilseed, and hops pest management trials, scouting strategies, and pest identification tools. We expect at least 50 stakeholders at each event.
2. **Three yearly Winter Conferences** on pests, diseases, weeds and IPM specific to grain, oilseed, and hops. Webinars will be streamed live from each event (www.uvm.edu/extension/cropsoil/hops/). This event will allow for evaluation of farmers to determine if the project has met impact goals. We expect at least 150 stakeholders at each event.
3. **Web Resources.** We will post conference proceedings and meeting videos to our website (www.uvm.edu/extension/cropsoil). Six pest management information briefs will be published over the course of the granting period, and posted on the UVM Extension hops blog “What’s Hoppening”. Hop blogs will include posts related to pest scouting, pest identification and pest management techniques (crowning, and weed control). Two YouTube videos will be developed; how to reduce downy mildew and cultural weed control strategies. All videos will be posted on the UVM Extension Crops and Soils website and YouTube channel.
4. **Grain Disease survey 2015 and 2016.** Survey 20 New England farms for foliar disease. UVM Plant Diagnostic Clinic will diagnose plant samples. Photographs and information will go in outreach materials. Where FHB is suspected, 100 head samples will be tested at the UVM Cereal Grain Testing lab.
5. **Loose smut seed lot testing.** 100 farmers will be contacted and offered loose smut testing. Farmers will be sent results and info on how to reduce loose smut in fields and seed lots. The goal is to have farmers consider purchasing certified seed to replace their seed lot if loose smut is present.
6. **Three guides to pests in New England.** Guides for oilseeds, grains, and hops will be completed by 2017 and posted online and will include pest id, lifecycle and management tools. A “Hopyard Insect Guide” (NE IPM Center grant) will be updated with new information.

THE MULTI-DISCIPLINARY VERMONT EXTENSION IMPLEMENTATION PROGRAM ADDRESSING STAKEHOLDER PRIORITIES AND NEEDS FOR 2014-2017

Priority Area: IPM Implementation in Specialty Crops: Apples

Apple orchards comprise approximately 90% of total acreage planted to fruit in Vermont (NASS 2012) and generate approximately \$20 million in annual revenue annually (VTFGA 2013). Apple growers in Vermont have a critical need for IPM information, with an evolving complex of over 10 disease, 30 arthropod, and diverse weed pests that require season-long management programs that integrate cultural, biological, and chemical strategies in a horticultural and economically-appropriate framework. Among those pests are increasing incidence of fire blight, apple scab fungicide resistance, and codling moth that threaten orchard sustainability (Northeast IPM Tree Fruit Working Group 2012). The activities performed under this proposal will provide transdisciplinary extension information to Vermont apple growers including arthropod, disease, horticulture, and weed management strategies that address IPM needs in an economic, environmental, and socially sustainable framework. The VT Apple IPM Program is considered a regional leader on organic orchard management practices, and we will continue to provide this expertise to underserved organic and small-scale tree fruit growers through this proposal (Berkett 2012). Bradshaw assesses the apple industry's IPM needs in VT by serving as past president of the Vermont Tree Fruit Growers Association. He recently developed, with grower input, a VT Apple Industry Strategic Plan. He is a member of the Northeast Tree Fruit IPM Working Group, an active group that surveys NE growers on their IPM needs and issues and meets annually in VT to set extension priorities for the crop based on the member's experiences and the growers' input. Bradshaw is also involved with the Northeast Eco Apple Working Group, NEWA and the Great Lakes Fruit Growers. The VT Apple IPM Program is committed to increasing IPM implementation in commercial orchards across the state by delivering an integrated extension program that addresses priorities identified by growers, IPM advisors, and other industry service providers (VTFGA 2013). Program priorities are also tailored to address regional needs through collaboration with members of the Northeast IPM Tree Fruit Working Group (Northeast IPM Tree Fruit Working Group 2012) and publication of a regional IPM guide (Cooley, Autio et al. 2014). Apple growers indicate that past information provided by the Vermont IPM Program has resulted in: reduced pesticide applications (94%), improved efficacy of pest management practices (100%), reduced worker exposure to pesticides (76%), improved farm profitability (71%), and improved quality of life (76%) (Bradshaw 2014). Surveys of growers who utilize IPM information from Network for Environmental and Weather Applications (NEWA) indicate an average savings of \$19,500 in spray costs and reduction in crop loss of \$264,000 annually (Carroll, Petzoldt et al. 2007).



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Priority Area: IPM Implementation in Specialty Crops: Apples

Approach -

Specific priorities identified for this program include IPM tactics for of fire blight (pruning, sanitation, appropriate chemistry), codling moth (degree day models, reduced-risk pesticides), and apple scab fungicide resistance mitigation (fungicide classes, spray coverage, sanitation) in Vermont orchards. We will also highlight the Plant Diagnostic Clinic as a resource for insect, weed and disease diagnosis and IPM recommendations since many apple growers are not aware of this resource.

1. Extension Outreach Education. IPM information for apple growers will be distributed via electronic communications platforms including a program website and email lists with over 350 subscribers. At least 12 newsletters, blog posts, and/or factsheets containing time- and crop-sensitive IPM information including arthropod, disease, and weed management as well as horticultural, food safety, risk management, and orchard economics issues will be published each season. At least one specific, topical factsheet or article will be posted to eXtension annually to further extend the reach of the program to growers within and beyond the state of Vermont. At least one on-farm workshop will be held annually to demonstrate IPM practices. Outreach communications will integrate site- and region-specific weather and pest models provided by the Vermont network of Cornell University's Network for Environmental and Weather Applications (NEWA) to provide timely information to growers. Growers will be provided with one-on-one consultations when necessary to provide specific information applicable to unique farm operations. Bradshaw will contribute to annual revisions of the New England Tree Fruit Management Guide and with planning and presentations at regional grower meetings such as the VT Tree Fruit Growers Annual Meeting and New England Fruit and Vegetable Meetings.

2. Apple IPM Guideline Assessment. A selected group of advisory stakeholders will participate in a survey of crop-specific IPM practices practiced in their orchard operation (<http://extension.umass.edu/ipm/guidelines/ipm-guidelines-apple>).

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Priority Area: IPM Implementation in Specialty Crops: Grapes

Vermont vineyard acreage was estimated at 175 acres in 2013, and new vineyards are being planted rapidly (Vermont Sustainable Jobs Fund, 2013). While vineyard acreage may appear low compared to other specialty crops, the value of the wine grapes in Vermont is significant. With vineyards at full production producing 10 tons of fruit /ha, and at a price of \$15 per bottle, the potential value of the present acreage of Vermont-grown grapes when converted to wine is nearly \$10 million. Grape growers must manage numerous disease, weed, and insect pests in their vineyards which, if left unmanaged, can destroy an entire season's crop (Isaacs, 2007). Because grapes are a relatively new crop to Vermont, many growers are inexperienced with IPM concepts, safe and efficient use of crop protection materials, and pest (especially disease) identification. Those needs will be addressed as program priorities. The Vermont Grape IPM Program is committed to increasing IPM implementation in commercial vineyards across the state by delivering an integrated extension program that addresses priorities identified by growers, IPM advisors, and other industry service providers in the North Central region which includes similar cultivars and growing conditions to Vermont (Isaacs, 2007). Program priorities are also tailored to address regional needs through collaboration with members of the Northern Grapes Project and NE-1020 Winegrape Cultivar Evaluation Project. Grape growers indicate that past information provided by the Vermont IPM Program has resulted in: reduced pesticide applications (70%), improved timing of pest management practices (74%), and improved economic impact of pest management (70%) (Berkett, 2012). Surveys of growers who utilize IPM information from Network for Environmental and Weather Applications (NEWA) indicate an average savings of \$19,500 in spray costs and reduction in crop loss of \$264,000 annually (Carroll, Petzoldt et al. 2007).



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Priority Area: IPM Implementation in Specialty Crops: Grapes

Approach -

Specific priorities identified for this program include improved grower identification of grape diseases (anthracnose, phomopsis, downy mildew, powdery mildew), selection/operation of spray application equipment for small and beginning vineyards, and general IPM practices. We will also highlight the Plant Diagnostic Clinic as a resource for insect, weed and disease diagnosis and IPM recommendations since many grape growers are not aware of this resource.

1. Extension Outreach Education. IPM information for Grape growers will be distributed via electronic communications platforms and email lists with over 350 subscribers each year based on stakeholder input and will include time-sensitive articles and a blog of vineyard observations during the growing season which will encourage practices that promote IPM in vineyards. At least 12 newsletters, blog posts, and/or factsheets containing time- and crop-sensitive IPM information including arthropod, disease, and weed management as well as horticultural, food safety risk management, and vineyard economics issues will be published each season. At least one specific, topical fact-sheet or article will be posted to eXtension annually to further extend the reach of the program to growers within and beyond the state of Vermont. At least one on-farm workshop will be held annually to demonstrate IPM practices. Outreach communications will integrate site- and region-specific weather and pest models provided by the Vermont network of Cornell University's Network for Environmental and Weather Applications (NEWA) to provide timely information to growers. Growers will be provided with one-on-one consultations when necessary to provide specific information applicable to unique farm operations. Bradshaw will contribute to presentations at regional grower meetings such as the VT Grape and Wine Council Annual Meeting and New England Fruit and Vegetable Meetings.

2. Grape IPM Guideline Assessment. A selected group of advisory stakeholders will participate in a survey of crop-specific IPM practices practiced in their vineyard operation. (<http://extension.umass.edu/ipm/guidelines/ipm-guidelines-wine-grape>).

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Priority Area: IPM Implementation in Specialty Crops: Greenhouse

In 2012, the VT value of sales from nursery and greenhouse crops was \$118 million (USDA 2013a). There were 4,551 farms involved in the floriculture industry which comprised 62% of the total farms and 23% of the revenue from sales. From 2007-2012, the market value increased 80%, and the number of farmers involved in this industry increased by 12%. The value of nursery and greenhouse crops in ME and NH in 2012 was \$474 million and \$101 million, respectively (USDA 2013b,c). There were 4,899 farms involved in the floriculture industry in ME, and 2,356 in NH comprising 60% of the total farms and 62.1% of the revenue from sales of this commodity. From 2007-2012, the market value increased 45% in ME and 4% in NH (USDA 2013b,c). Ornamental crops are a critical component of many vegetable farms in NE, some receiving >20% of their revenues from bedding plants. Ornamentals have minimal tolerance for pests and diseases. This industry is one of the heaviest pesticide users on an active ingredient/sq.ft. basis. Growers' heavy reliance on chemical pesticides is not sustainable, nor desirable from an economic, human health, or environmental perspective. The cost to produce high quality greenhouse ornamentals is rising. Growers need help implementing IPM to weather current economic and pest challenges. The Tri-State Greenhouse IPM Advisory Group, comprising growers, researchers, Extension personnel and State Agriculture Agency staff, was established in 1997 to address stakeholder IPM needs in ME, NH and VT. Through this collaboration, grower surveys from IPM workshops and one-on-one consultations have shown adoption of IPM has increased significantly; the use of biocontrol increased from ~20% in 2007 to over 70% in 2014 (Skinner & Sullivan 2014). Growers' needs assessments were conducted in ME, NH and VT workshops and through personal interviews to guide future IPM activities resulting in the focus of this proposal. The overall goal of the Greenhouse Ornamentals IPM program is to enhance environmental sustainability and profitability of the greenhouse ornamentals industry in ME, NH and VT by increasing growers' adoption of IPM. The focus of this 3-year program, based on stakeholder responses from previous Tri-State Greenhouse IPM workshops, is to increase adoption of plant-mediated IPM systems, a cost-effective IPM tactic using aphid banker plants, habitat plants and trap plants to reduce pest populations and costs of production through bio-controls. Two approaches will to increase adoption of plant mediated IPM systems.



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Priority Area: IPM Implementation in Specialty Crops: Greenhouse

Approach -

1. **IPM First for Greenhouse Ornamentals**, a statewide individualized grower program, which includes underserved growers in southern and northern VT. Each year, 8-10 growers interested in expanding their use of IPM will be recruited to take part in "IPM First." One grower from each operation will be identified to work on IPM linked to this program. All new growers will complete a pre-training survey to identify their current level of knowledge of plant-mediated systems and basic IPM competence with pest management. Program leaders will review the responses with growers to identify specific measurable objectives and select the appropriate plant-mediated system(s) applicable to their operation. UVM personnel will visit each grower monthly to provide one-on-one instruction and support on selecting, adopting and using plant-mediated IPM systems. Each operation will be given a binder with factsheets on the IPM systems, insect and biological control id, disease id and management, fertilizer and nutrition information and scouting forms.

2. **Tri-State Greenhouse IPM Workshops**. IPM workshop for growers offered in ME, NH and VT. From past workshops, >90% of participants learned new IPM techniques they will use in the coming year which will reduce their use of chemical pesticides. Attendees will take part in hands-on IPM demonstrations and receive IPM information packets focusing on plant-mediated IPM systems. Growers will be made aware of the Plant Diagnostic Clinics in each state as a resource for disease, insect and weed diagnosis and IPM recommendations. Presentations and information on plant-mediated systems will be posted and expanded upon on the Greenhouse IPM website and through the GreenGrower listserv.

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Priority Area: IPM Implementation in Specialty Crops: Landscape

As of 2002, over 145,000 businesses in the US were classified as landscaping services, and over 700,000 people were employed in some type of landscaping services companies. Landscaping and lawn maintenance services are estimated to have generated \$11 billion nationally (Delaney 2002). The Global Industry Analysts estimated that the landscaping services market would reach \$80 billion by 2015. Since USDA does not compile data on the landscaping industry, there is limited information on its value in VT, ME or NH. Chemical pesticides are used heavily to manage pests and diseases for lawns, golf courses and landscape ornamentals, and these compounds are a significant source of pollution in our region. Attendees at greenhouse IPM workshops in ME, NH and VT from 2011-2014 consistently asked for sessions on landscape-related topics: IPM and diseases of perennials, IPM for outdoor ornamentals, esp. Japanese beetles (both adults and white grubs) and weed id and management. This request for information on IPM reveals a significant gap in training within the Green Industry. A survey of landscapers in ME, NH and VT is currently in progress, to compile stakeholder IPM needs and knowledge on insect, weed and disease issues, current management practices, pesticide use and extent of IPM adoption by the target audience. The survey will provide information on what landscapers need to adopt IPM, data on number and acreage of landscape operations in the tri-state region and what pesticides are used. Baseline data from the survey will allow the assessment of impact of Extension outreach over time. The results from this survey will drive future programming to address grower needs. This initiative addresses priorities of “increasing collaboration among regions to use resources effectively, disseminate guidelines on management for white grubs and increase knowledge of weed identification and management” (2014 NEERA Priority). We will also focus efforts on IPM and disease basics in the landscapes. This program also links to priorities of the NE IPM Center: strengthening the knowledge “Tool Box” and addresses priorities listed in the National Road Map for IPM, to improve overall benefits from adoption of IPM, reduce human health risks from chemical pesticides and minimize adverse environmental effects from management. This project addresses the National IPM roadmap goal of adoption and implementation priority to: “Ensure a multi-directional flow of pest management information by expanding existing and developing new collaborative relationships with public and private sector cooperators.”



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Priority Area: IPM Implementation in Specialty Crops: Landscape

Approach -

- 1. Green Industry IPM ambassadors.** Three landscape/nursery industry stakeholders from different parts of the state will be identified and will receive individualized support through site visits for 3 years to expand their implementation of IPM. They will subsequently assist with promoting IPM to other growers by presenting at workshops and association meetings.
- 2. Regional IPM Workshops for Landscapers.** Workshops will be held annually in Vermont and Maine to reach landscapers across northern New England. These workshops will be limited to 25-35 registrants to encourage audience participation. In year 1 of the project, IPM of white grubs and adult Japanese beetles (Skinner), weed id and IPM management (Bosworth) and disease and IPM basics (Hazelrigg) will be the focus of the training program, which addresses NEERA priorities and needs identified by landscapers in personal interviews. We will also promote the VT and ME Plant Diagnostic Clinics as a resource for help in identifying insects, weeds and diseases in the landscape and nursery. In future years, stakeholder priorities as identified in the landscape survey will be the focus of training. Presentations on these same topics will be given at Green Industry association meetings. At least two handouts on IPM of high priority issues including white grub, disease and weed management per year will be produced and distributed to the Green Industry. Where appropriate, IPM educational materials (white grub id and management, weeds in turf, disease in the landscape, etc) developed for the professional audience will be adapted for the home gardener audience and distributed through the Master Gardener program.
- 3. Development of Landscape IPM webpage.** A landscape IPM webpage will be established, providing the most current information about white grubs and other insect pests, diseases in the landscape, UVM Plant Diagnostic Clinic services, weed management in addition to sound fertilizer and herbicide application.
- 4. Landscape IPM brochure.** To increase awareness of IPM among the public, a color brochure on IPM basics in the landscape including information on the Master Gardener Helpline and UVM Plant Diagnostic Clinic resources, will be distributed widely through the Master Gardener program, garden centers and hardware stores.

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Priority Area: IPM Implementation in Communities

This Priority area program addresses the National IPM roadmap focus areas of “IPM for sustainable communities” and “introduction of new pest management tactics and tools for use in IPM systems,” with the end goals of increasing IPM adoption and improving IPM practices in the home garden and landscape to reduce the use of pesticides. To achieve this goal, this program will educate Master Gardener (MG) volunteers, home gardeners and communities on the basics of IPM to increase adoption of sustainable IPM approaches for management of insects, weeds and diseases to reduce environmental and health risks. Consumers are often quick to resort to over-the-counter pesticides when dealing with unknown pests in their lawns, landscapes, and gardens and often rely on information from potentially untrained ‘big box’ store or garden center staff when making pest management choices. This results in pesticides used incorrectly or unnecessarily. According to a 2008 National Garden Survey, over 36 million households participated in vegetable gardening. In VT, over 90% of gardeners in a 2011-12 UVM survey reported growing vegetables and fruits, generating hundreds of thousands of dollars for the state from the gardening industry. 70% reporting were 50 or older and female. Many at-risk Vermonters rely on gardens for fresh food supplements. Tomatoes are the most popular vegetable in the VT survey, grown by over 95% of respondents. Since 2011, 12% of calls to the MG Helpline were inquiries about tomato fungal diseases. With the correct id and IPM tactics, gardeners were able to avoid the use of fungicides in favor of pruning, staking and increasing fertility. In the case of late blight ids, the gardeners were asked to destroy plants immediately, reducing disease pressure for nearby commercial vegetable growers, potentially saving these growers thousands of dollars. The Helpline also receives a high volume of calls on white grub complex and confusion about proper timing of insecticides. Targeting the proper application time increases control and reduces unnecessary pesticide use. Weed management in lawns is addressed through the Helpline. Identification of weeds and promotion of IPM tactics like soil testing, fertilizing and liming to improve vigor, the use of pesticides is often avoided and hazards to Lake Champlain are minimized. NEERA 2014 identified late blight of tomato as a 2014 “current diseases” priority issue in addition to white grub complexes and specified increasing IPM resources for home gardeners is also a priority. The statewide MG program will be utilized to deliver IPM information through the MG course, toll-free MG Helpline, blogs, website, emails, MG outreach activities, and webinars. Stakeholders include MG volunteers, home gardeners, consumers, hospitals, school gardens, agricultural fairs, community gardens, farmers markets, libraries, prisons, and garden centers. Each of the 766 active MG volunteers has visibility in diverse communities and amplifies the message of using IPM strategies to many more people than could be reached without this established and well-respected program. These 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 15,000 hours were logged by the volunteers in IPM outreach in 2013. The Master Gardener program receives no salaries or funding from UVM Extension. The income from the 13 week MG course with 200 students covers about one third of the costs of the program and outreach. The requested VT EIP funds are critical to allow this vital IPM outreach and education program to continue and expand the IPM message to an important and diverse community of stakeholders including underserved populations comprised of seniors and women.



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Priority Area: IPM Implementation in Communities

Approach -

- 1. MG Course.** A 13 week course with 200 students provided through 11 VT interactive television sites. Three of the 3 hr lectures will be on IPM topics; Insects and IPM (with a thorough discussion of white grubs and management-Skinner), Plant Disease and IPM (with thorough discussion of tomato fungal leaf blights-Hazelrigg), Weed IPM (addressing weeds in lawns-Bosworth).
- 2. MG Helpline.** The MG Helpline is a popular statewide toll-free source for gardeners needing information on current insect, weed and diseases. Over the course of the 2013 gardening season, the Helpline received 1,050 calls, 315 emails (with ability to upload photos and questions in a template) and 160 specimens from home gardeners and consumers.
- 3. Advanced Training Webinars.** As part of the training for the MG volunteers, a webinar series will be offered for training in advanced IPM concepts and emerging insect, weed and disease problems. In a survey of students completing the 2014 MG course, 84% of respondents indicated an interest in participating in advanced training webinars. Three advanced training webinars will be dedicated to fungal diseases of tomato, white grub complexes and turf weed management (Skinner, Hazelrigg, Bosworth). These will be archived and made available on the MG website.
- 4. Factsheets** on white grub complex, tomato fungal blights and weeds in lawns, will be developed by subject matter specialists and made available to the public on the Master Gardener website, and will be provided for MG information tables at fairs and farmer's markets.

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Priority Area: IPM Support for Pest Diagnostic Facilities

By accurate and timely identification of existing and emerging insects, weeds and diseases, including those of high significance, this Priority area program addresses the National IPM roadmap focus areas of “enhancing agricultural bio-security, IPM for sustainable communities and introduction of new pest management tactics and tools for use in IPM systems,” with the end goals of increasing IPM adoption, reducing human and environmental risks, improving IPM practices and reducing input costs. The PDC addresses the 2014 NEERA extension priority of “increasing knowledge and tools for emerging and current pest and disease problems” by providing diagnostics and IPM recommendations. The PDC also addresses the priority of “increasing knowledge in cultural and alternative practices for management of current and emerging pests” and “increasing IPM resources created for the public including home gardeners and urban public.” We also “provide IPM programs and tools for the (underserved) young farmer.” (2014 NEERA Priorities). The PDC is the state-wide resource for commercial growers that provides diagnosis of disease, insect and weed pests and IPM management recommendations. The number of new crop producers unfamiliar with pests (insects, diseases, weeds) and IPM is steadily increasing. New commercial stakeholders often have limited background in agriculture and it is essential to have a facility in the state that can identify existing and emerging pests in a wide range of crops, and provide IPM information for management decisions that minimize environmental, health and economic risks. The MG Helpline, home gardeners and urban consumers, represent expanding audiences requiring diagnostic and IPM information on current and emerging problems (spotted wing drosophila, onion leek moth, Swede midge, white grubs, weeds in lawns, tomato late blight, bed bugs, ticks, etc.) to avoid unnecessary pesticide use. The Plant Diagnostic Clinic (PDC) provides diagnostic backup for the hundreds of calls and samples/photos the Helpline volunteers receive each season. The PDC team is led by a plant pathologist and includes expertise from an entomologist and weed specialist and serves as the overarching resource providing diagnostic support for all the stakeholders and Priority area directors in the VT EIP. The stakeholders in these areas (and those not represented by the VT EIP priority areas) need access to timely, accurate and cost-effective diagnostics to make informed management decisions based on IPM strategies. Several new insect pests, weeds and diseases (including ticks and bedbugs) are emerging and require identification and management to minimize losses and the unnecessary use of pesticides. The PDC is the primary diagnostic facility available to commercial growers, Master Gardeners, home gardeners and the urban consumer in Vermont. The PDC represents Vermont’s interests in the National Plant Diagnostic Network (NPDN) (<https://www.npdn.org>) and receives no operating funding other than the limited funds (less than \$20,000/year) received from NPDN and extension funds for a portion of the director’s salary. All PDC samples are logged and uploaded to the NPDN National Repository (<https://npdn.ceris.purdue.edu>) so emerging insect, weed and disease problems of high significance can be nationally tracked. The PDC director attends all NPDN meetings and trainings. The PD director also participates and contributes to N.E. Small Fruit and Vegetable IPM pest management publications and seeks stakeholder input on local and regional multi-state IPM needs and helps set IPM priorities through her work as past chair and member of NEERA, as Chair of the Small Fruit IPM Working Group and as a member serving on several local and regional grower association boards.



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COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Priority Area: IPM Support for Pest Diagnostic Facilities

Approach -

1. Disease/insect/weed diagnostics. The PDC will provide new and established stakeholders with accurate diagnosis and IPM recommendations. Clients will include those from commercial growers (agronomic, apple, grape, greenhouse, landscape, nursery, vegetable, berry, etc.), Master Gardener Helpline, the gardening public and urban consumers. Approximately 600 samples will be processed and IPM recommendations delivered each year. The 2013 PDC survey showed 91% of stakeholders who submitted a sample that was identified by the PDC used IPM strategies as a result of the diagnosis. Growers (84%) indicated they reduced the use of pesticides as a result of the information they received from the PDC.

2. Targeted Stakeholder Groups. Apple and grape growers have traditionally not taken full advantage of the PDC. Many apple and grape growers may not be aware of this diagnostic service since most pest inquiries were handled by the (newly retired) apple/ grape specialist in the past. Landscapers in the southern part of VT have not taken advantage of the PDC. We will target these 3 groups through presentations and grower listservs to make them aware of the Clinic's services.

3. Extension Presentations/Workshops. The PDC team will present at least 10 talks/workshops each year addressing current and emerging insect, weed and diseases using IPM tactics in commercial crops (VT Vegetable and Berry Growers Assoc., VT Tree Fruit and Grape Growers Assoc., Landscape IPM workshops, the VT GreenWorks Nursery/ Landscape Assoc., field and forages meetings, VT grain growers and organic association meetings (NOFA-VT). For the Master Gardener program, the entomologist, weed specialist and plant pathologist will each deliver the 3 hr general lecture on IPM and their subject matter specialty for the MG course and a one hour webinar (white grubs, tomato fungal disease, weed id and IPM management). They will also develop educational materials on white grubs, tomato fungal blights and weed id and IPM management for distribution by the MG program. We also will provide and focus evaluation efforts on 3 IPM outreach workshops for the vegetable and small fruit growers in Year 1, since these stakeholders were not targeted in one of our Priority areas; Hot Water Seed Treatment- hands-on workshop for commercial vegetable growers (Hazelrigg), Weed IPM Management for Vegetable/Small Fruit Growers (Bosworth) and IPM Scouting in Vegetable crops for Beginning Farmers (Hazelrigg). Targeted workshops for evaluation in Years 2 and 3 will be determined through stakeholder input and needs. Hazelrigg will contribute a column, "From the PDC" to the bi-weekly VT vegetable and berry listserv (750 VT and N.E. growers) on current insect/ disease problems with IPM information. The PDC also provides information on insect, weed and disease outbreaks, id and IPM management strategies for MG volunteers, home gardeners and urban consumers through television, factsheets, listservs, MG blogs, websites, webinars, articles and newsletters.