Title:	The Transdisciplinary Vermont Extension IPM Program Addressing Stakeholder Priorities and Needs for 2013-2016

Sponsoring Agency	NIFA	**Project Status**	COMPLETE
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Program Code: QQIPM **Program Name:** Extension Integrated Pest Management -

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Comparison of Three Organic Apple

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Non-Technical Summary

The Vermont EIPM Program (VT EIPM) uses a comprehensive, trans-disciplinary approach to address essential IPM needs by diverse stakeholders by reducing potential risks to human health and the environment through sustainable pest management systems. To meet the IPM needs of Vermont stakeholders, the 2013-2016 VT EIPM Program will focus efforts in the following Program Emphasis Areas: Agronomic Crops, Specialty Crops (apples, cold climate grapes, greenhouse, landscape), Communities, and Pest Diagnostic Facilities. These areas are closely integrated with a research base and are extremely well matched with the expertise at the University of Vermont (UVM). Each Program Emphasis Area involves extensive collaboration with grower associations, state/federal agencies, and regional/national institutions.

The need for current and impactful IPM information for new and established stakeholders, crops, and pests is vital for Vermont's agricultural and urban communities. To deliver this information we will use websites, blogs, newsletters, workshops, field days, one on one education, listserves, courses, email correspondence and webinars.

Accomplishments

Major goals of the project

The Vermont EIPM Program (VT EIPM) uses a comprehensive, trans-disciplinary approach to address essential IPM needs identified by stakeholders to advance the goals of the National IPM Roadmap by reducing potential risks to human health and the environment through sustainable pest management systems.

To meet the IPM needs of Vermont stakeholders, the 2013-2016 VT EIPM Program will focus efforts in the following Program Emphasis Areas: Agronomic Crops, Specialty Crops (apples, cold climate grapes, greenhouse, landscape), Communities, and Pest Diagnostic Facilities.The 2013-2016 VT EIPM Program Emphasis Areas reflect the diversification of agriculture in the state.

IPM Implementation for Agronomic Crops will address stakeholder-identified IPM issues in field corn, forages, small grains and oilseed crops. IPM weed management will also be a priority in this area. IPM Implementation for Specialty Crops addresses stakeholder-identified IPM priorities and needs for the high value, specialty crops of apples, cold climate grapes,

greenhouse, and a new group of stakeholders representing the landscaping industry. The IPM needs of the diverse stakeholder community of home gardeners will be addressed through the IPM Implementation in Communities. A new Program Emphasis Area, IPM Support for Pest Diagnostic Facilities, will serve as an overarching resource for all the Vermont stakeholders represented by the different Program Emphasis Areas

What was accomplished under these goals?

Each facet of the VT IPM program has accomplished goals toward reducing potential risks to human health and the environment through sustainable pest management systems.

Agronomic IPM

- The UVM Cereal Grain Testing Lab found 78% were above the 1 ppm FDA allowable threshold for human consumption.
- A first report of stripe rust for NE was reported by farmers asked to report significant issues with leaf diseases

Apple IPM Program (including organic apple IPM):

- Survey of growers revealed 88% would adopt reduced-risk IPM strategies as a result of the Apple IPM Program.

Cold Climate Grape IPM Program:

- Survey (2012) of growers revealed 87% would adopt a new IPM practice as a result of the Grape IPM Program.

Greenhouse IPM

- 91% of the attendees at 3 greenhouse IPM workshops learned new IPM techniques they intend to use in the coming year;
- 100% of the growers taking part in the IPM First program use natural enemies now compared with 53% before entering the program.
- 77% of participating growers in IPM First program now use plant-mediated IPM systems as compared with 50% at the start.
- In a 2014 survey at the Tri-state Greenhouse IPM workshop, 68% used biocontrol; similar to 2013 and 40% of the growers used plant-mediated IPM systems compared with 34% in 2014.

Landscape IPM

- Evaluations for the biocontrol workshop showed that 87% of the attendees learned new techniques they intend to use in the coming year, including predatory midges for aphids and predatory mites for spider mite. 62.5% of the attendees made new contacts they will use in the future. The program was ranked at 4.2 out of 5.
- A survey of landscapers/nursery growers was conducted and results were compiled (Respondents: VT: 33.3%; ME: 27.8%; NH: 38.9%). Key results: **Issues:** major arthropod pests: aphids, spider mites and scale; major diseases: botrytis, powdery mildew, sod mold; major animal problems: slugs, deer; major production issues: fertility; **Pesticide use:** 28% used non-restricted insecticides monthly, 17% used them weekly. 22% used non-restricted fungicides monthly and 11% used them weekly. 17% used restricted use insecticides monthly, and 22% used them occasionally. 22% used restricted use fungicides occasionally; 33% used restricted use herbicides occasionally. **Use of IPM Practices:** 56% scouted plants; 44% test their soil, 33% use sticky cards, 6% use habitat plants. **Biological Control:** 11% release parasites or predators or use microbial fungicides, 6% use nematodes or microbial insecticides. **Sources of information for landscapers:** 72% from reference books, 67% from the web, 56% from fact sheets, 44% from State Dept. of Ag, other landscapers, or local workshops, 39% from Univ. plant diagnostic labs, 33% from Extension specialists or at regional conferences. **What would help with IPM adoption:** 56% workshops, 44% fact sheets, a local website: 33%. **Limits of biocontrol use:** 28% Lack confidence they work, 22% lack of knowledge about how to use them, and that they are not compatible with pesticides. Results will serve as a bench mark to assess future program impacts.

Consumer IPM

- 30% of students enrolled in the Master Gardener Course were introduced to IPM for the first time in this course, prior to the first lecture 52% reported that they were "unsure" whether they use any IPM practices in their gardens, after the Plant Pathology lecture 95% reported that they will utilize at least one IPM practice in their garden this year, 95% reported learning something new about plant pathology, 96% reported learning something new about soil science, 41% reported that they will have a soil test done this year, 38% reported that they will compost this year, and 67% do not use any pesticides in their gardens.

Pest Diagnostics

- 66.6% of the growers attending a hot water seed treatment workshop reported none to minimal knowledge about hot water seed treatment before the workshop, with 100% reporting moderate or considerable knowledge after the workshop. 100% said they had used hot water seed treatment minimally before the workshop and 100% said they would use in the future on some crops.

• 91% of clients in 2013 and 90% of Plant Diagnostic Clinic clients surveyed in 2014 responded the information provided by the PDC helped them use integrated pest management strategies (cultural practices and use of least toxic pesticides as a last resort) to manage pest /disease problem. 85% reduced the use of pesticides as a result of the information they received from the PDC in both years.

What opportunities for training and professional development has the project provided?

A new IPM website was developed highlighting our Vermont IPM programs http://pss.uvm.edu/EIPM/

Agronomic IPM

• The UVM Cereal Grain Testing Lab tested Northeast growers' grain for DON contamination from FHB infection. We posted a FHB alert to 500 growers through the Northern Grain Growers Association newsletter and our website.
• Bi-weekly scouting was conducted on new regional specialty crops: sunflowers and hops. Incidence and severity of several pests including banded sunflower moth, sunflower maggot, leafhopper, two spotted spider mites, and aphids on hops were recorded. Email and blogs sent to 360 Northeast hop and oilseed growers.
• Prevalence of leaf diseases on small grains is on the increase. In 2013, farmers were asked to report significant issues with leaf diseases. Many diseases were identified including a first report of stripe rust for NE. Informational materials were distributed to 500 growers through the Northern Grain Growers Association newsletter and our website.
• Field day held at Borderview Research Farm highlighted grain production and research. Leaf diseases and FHB issues were highlighted. Factsheets on stripe rust and info were distributed; 75 attendees.
• Leaf diseases of perennial grass hay crops assessed during the summer and fall on two grass species/cultivar trials.
• Winter meeting in 2013 highlighted disease issues in corn, soybeans and grass hay. Leaf blights, molds, and grass rust were the focus of the presentations; 82 attendees.

Apple IPM Program (including organic apple IPM):

• 10 'Apple IPM Alerts' were disseminated to over 100 growers subscribed to the Apple IPM email listserv and archived on the Apple IPM website; 448 visits.
• 10 'Organic Apple IPM Observations' distributed to over 100 organic stakeholders and archived on the Organic Apple IPM website; 313 visits.
• Apple workshop organized in collaboration with the Vermont Tree Fruit Growers Association; 65 growers attended.
• Updated and maintained Apple IPM website; 992 new visits
• Updated and maintained Organic Apple IPM website; 215 new visits.
• Incorporated IPM information into a newly developed Practical Guide for Organic Apple Production; 1084 new visits.
• Organic and IPM Apple Demonstration Orchards were maintained and used as a resource for educational purposes.
• Provided 64 one-on-one consultations regarding growers' apple IPM questions by phone, email, or in-person.

Cold Climate Grape IPM Program:

• 9 'Grape IPM Updates' disseminated to over 200 growers subscribed to the Grape IPM email listserv and archived on the Cold Climate Winegrape IPM website; 571 visits. 36 additional posts made to mailing list on IPM and production-related topics.
• Updated and maintained the Grape IPM website pages; 284 new visits.
• Provided 35 one-on-one consultations regarding grape growers' IPM questions by phone, email, or in-person.

Greenhouse IPM

• 1,200 hits on the UVM Greenhouse First IPM website since 2013.
• 35 growers from 15 commercial greenhouse operations received one-on-one education on pest and natural enemy identification, scouting, sanitation, pesticide rotation, development or refinement of biological control programs, use of plant-mediated IPM systems, and strategies for reduction of costs associated with implementing IPM and biological control. Over 150 one-on-one IPM consultations occured during this time period. Over 300 growers attended the Tri-state Greenhouse IPM workshops, Over 675 growers and greenhouse stakeholders rec'd educational info about bio control and IPM topics.
• New IPM practices were adopted by participants; use of sticky cards, trap plants for early pest detection, routine scouting, banker plants for natural enemies, sanitation and rouging of infested plants and refinement of biological control and pesticide programs.
• The number of applications of chemical pesticides made by participating growers was reduced at all locations. Growers relied more on biological control or spot sprays.
• All growers participating in the program used some form of biological control. Growers at 3 operations switched from a conventional chemical pesticide-based program to relying primarily on biological control.

Landscape IPM

• A survey questionnaire was developed to collect key information on the major pests and diseases and how to increase IPM adoption. Types of landscape operations, acres, types of pesticides used will be surveyed. The survey has been

circulated at several state and regional educational events (VT, NH, ME), and is available on the web.

- 5 growers at 3 sites were recruited to receive individualized support.
- 30 site visits were arranged in which growers received one-on-one consultation to assess pest problems and develop IPM approaches for them.
- 180 landscapers and nursery growers took part in seminars and workshops on IPM and biological control for landscape settings and nurseries.
- 15 landscapers for regional educational facilities learned about the threat of exotic invasive pests in the New England region and what they can do about it.

Consumer IPM

- 160 students enrolled in the Master Gardener Course which included three basic IPM lectures: Plant Pathology & IPM and Soil Science and Composting and Entomology.
- 159 plant disease and insect specimens were routed through the Master Gardener Helpline in 2013 for identification and IPM recommendations. Helpline volunteers assisted 1,029 callers with home horticulture questions, and answered 315 emails. Two advanced IPM trainings and two training webinars were provided and archived on the MG website for all volunteers.
- In 2013, the Master Gardener Helpline volunteers began fielding email questions sent to the state office with a new Master Gardener Helpline email account. A pilot of a new online log form as a means of accepting consumer questions for the Helpline was completed in 2014.
- 700 active Master Gardener volunteers participated in a variety of vetted, science-based outreach programs with strong educational components about garden and landscape pest identification and management using IPM strategies. 12,485 hours of education provided valued at $276,418 (based on the Independent Sector valuation of a volunteer hour). Volunteers are forming connections with schools, agricultural fairs, farmers markets, community gardens, prisons, libraries, hospitals, condo associations and garden centers. Three advanced IPM training webinars have been provided to continue to meet the needs of these stakeholder communities.
- The Master Gardener website serves as a site for consumers and gardeners to access current and emerging insect and disease information on a timely basis, including new IPM pest factsheets on problems important to consumers including spotted wing drosophila, impatiens downy mildew, late blight. Both basic and advanced IPM topics are addressed.
- The Master Gardener Blog is ongoing

Pest Diagnostics

- Over 700 disease and insect samples from commercial growers in all sectors of VT agriculture. Samples included stripe rust of wheat (new disease for VT and NE), Phytophthora on Christmas trees, Phytophthora fruit rots, Swede midge, spotted wing drosophila and late blight, basil downy mildew and impatiens downy mildew
- 30 presentations were given in 2013 for commercial Christmas tree growers, field and forage growers, vegetable and berry growers, landscapers, Master Gardeners and the general public on disease/pest issues.
- Four press releases were sent out statewide on impatiens downy mildew, basil downy mildew, late blight and contaminated compost
- Hot water seed treatment workshop (excellent IPM strategy for eliminating seed-borne disease) was offered to vegetable and berry growers.

How have the results been disseminated to communities of interest?

- Agronomy IPM information is distributed through through websites, field days, winter meetings, blogs, websites, YouTube videos, phone calls and emails.
- Apple and Grape IPM information is distributed through newsletters, website, IPM alerts, winter and summer meetings, conferences, site visits, emails and phone calls.
- Greenhouse and Landscape IPM information is distributed through workshops, presentations, site visits, phone calls, emails, factsheets and websites.
- Master Gardener information is distributed through through websites and the Helpline.
- Plant Diagnostic Clinic IPM information is distributed through sample diagnosis (1,000), websites, listservs, factsheets, television, 50 presentations, 30 workshops, 1,000 emails, phone calls and several site visits.
- Greenhouse IPM:Workshops, presentations, site visits, phone calls, emails and factsheets.

What do you plan to do during the next reporting period to accomplish the goals?

{Nothing to report}

Participants

Actual FTE's for this Reporting Period

Role	Non-Students or faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	0.5	0	0	0	0.5
Professional	0	0	0	0	0
Technical	1	0	0	0	1
Administrative	0	0	0	0	0
Other	0	0	0	0	0
Computed Total	1.5	0	0	0	1.5

Student Count by Classification of Instructional Programs (CIP) Code

{NO DATA ENTERED}

Target Audience

Target audiences include commercial agricultural operators and associated industry such as crop consultants, professional pest managers, extension educators, researchers and similar stakeholders. Commercial operators include: new and established grain farmers, apple growers, grape growers, growers of greenhouse ornamentals/cut flowers/vegetables, growers of landscape/perennial/nursery stock, landscape managers/groundskeepers, and product end-users such as brewers, bakers, or millers. Master Gardeners, home gardeners, general public, and communities are also target audiences for portions of this project.

Products

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2015	YES

Citation

Sullivan, C.E.F. and Skinner, M. 2015. Greenhouse IPM Resources: Apps, Printed Publications, Websites and more. Tri-State Greenhouse IPM Workshops, Maine, NH and Vermont

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2015	YES

Citation

Sullivan, C.E.F., Skinner, M. and Parker, B.L. 2015. What have we been up to in 2014? Tri-state Greenhouse IPM Workshops, ME, NH and VT.

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2015	NO

Citation

Sullivan, C.E.F., Skinner, M. and Parker, B.L. 2015. Murdering thrips with marigolds, fungi and mites.UVM Entomology Research Lab.

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2015	YES

Citation

Sullivan, C.E.F. and Skinner, M. Greenhouse Integrated Pest Management Website. http://www.uvm.edu/`entlab/Greenhouse520IPM/UVMGreenshouseIPM.html

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2014	NO

Citation

Skinner, M., Frank, C. and Valentin, R. 2014. Aphid Banker Plant System for Greenhouse IPM, Step by Step. UVM Entomology Research Lab, Burlington, VT

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2014	YES

Citation

Plant Mediated IPM Systems: An option for greenhouses and tunnels. Vegetable Growers News 48: 3

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2013	YES

Citation

Skinner, M., Sullivan, C.E.F., Gouli, S. and Parker. 2013.Granular formulations of Insect-Killing fungi in combination with plant-mediated IPM systems for thrips. American Floral Endowment Special Research Report #216: Insect management.

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2015	YES

Citation

Sullivan, C.E.F. and M. Skinner. 2015. https://www.facebook.com/UVMEntolmologyResearchlaboratory?ref=hl

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2013	YES

Citation

Skinner, M and C.E.F. Frank. 2013. Questions growers should ask suppliers when purchasing natural enemies. Factsheet. UVM Entomology Lab.

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2013	YES

Citation

Skinner, M and C.E.F. Frank. 2013. Questions growers should know before calling biocontrol suppliers. Factsheet. UVM Entomology Lab.

Type	Status	Year Published	NIFA Support Acknowledged
Other	Published	2013	YES

Citation

Frank-Sullivan, C.E. and M. Skinner. 2013 Plant-mediated IPM systems explained. Factsheet. UVM Entomology Lab.

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2014	YES

Citation

UVM PLant Diagnostic CLinic. http://pss.pd/pdc

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2014	YES

Citation

Bradshaw, T. UVM Fruit.http://www.uvm.edu/~fruit/

Type	Status	Year Published	NIFA Support Acknowledged
Websites	Published	2014	YES

Citation

Darby, H. The Northwest Crops and Soils Program webpage.http://www.uvm.edu/extension/cropsoil/grains

Other Products

Product Type

Other

Description

A new IPM website was developed highlighting our Vermont IPM programs http://pss.uvm.edu/EIPM/

Product Type

Data and Research Material

Description

Test Northeast growers' grain for DON contamination from FHB infection

Product Type

Data and Research Material

Description

Bi-weekly scouting on new regional specialty crops: sunflowers and hops

Product Type

Data and Research Material

Description

Farmers asked to report significant issues with leaf diseases

Product Type

Other

Description

Field day highlighting grain production and research

Product Type

Data and Research Material

Description

Assess leaf diseases of perennial grass hay crops on two grass species/cultivar trials

Product Type
Other

Description
Winter meeting in 2013 highlighting disease issues in corn, soybeans and grass hay

Product Type
Other

Description
'Apple IPM Alerts' and 'Organic Apple IPM Observations'

Product Type
Other

Description
Apple workshop in collaboration with the Vermont Tree Fruit Growers Association

Product Type
Other

Description
Apple IPM website and Organic Apple IPM website

Product Type
Educational Aids or Curricula

Description
Practical Guide for Organic Apple Production

Product Type
Other

Description
Organic and IPM Apple Demonstration Orchards

Product Type
Other

Description
One-on-one consultations regarding growers’ apple IPM questions

Product Type
Other

Description
'Grape IPM Updates'

Product Type
Other

Description
Grape IPM website

Product Type
Other

Description
One-on-one consultations regarding grape growers' IPM questions

Product Type
Educational Aids or Curricula

Description
Commercial greenhouse operations one-on-one education

Product Type
Other

Description
Greenhouse IPM workshops with handouts focused on encouraging IPM implementation

Product Type
Other

Description
Expand UVM Greenhouse IPM website to include new IPM information requested by growers.

Product Type
Data and Research Material

Description
A survey questionnaire to collect key information on the major pests and diseases and how to increase IPM adoption.

Product Type
Educational Aids or Curricula

Description
Master Gardener Course including three basic IPM lectures

Product Type
Educational Aids or Curricula

Description
Master Gardener Helpline and advanced IPM trainings for volunteers

Product Type
Other

Description
Master Gardener Helpline new email account and new online log form as a means of accepting consumer questions

Product Type
Other

Description
Master Gardener volunteer outreach programs

Product Type
Other

Description
The Master Gardener website and Blog

Product Type
Other

Description
Diagnose disease and insect samples from commercial growers in all sectors of VT agriculture

Product Type
Other

Description
Presentations for commercial growers, Master Gardeners and the general public on disease/pest issues.

Product Type
Other

Description
Press releases

Product Type
Other

Description
Hot water seed treatment workshop

Changes/Problems

Due to reduction in funds, the scope of the Landscape IPM project was scaled back. The number of landscape professionals recruited to take part in the program was reduced, and sites were primarily limited to Northwestern VT. Workshops were limited to VT. It was challenging to get landscapers to complete the survey.