

Title:	Multi-Level Extension Delivery to Support IPM for MA Vegetable and Fruit Growers		
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Program Name: Extension Implementation Program

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{NO DATA ENTERED}

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{NO DATA ENTERED}

Non-Technical Summary

Farmers steward over 523,500 acres, more than 10% of the Massachusetts land base. In 2012, MA farms generated over \$490 million in total sales, 42% of which came from sales of fruits, berries, vegetables, and potatoes. These specialty crop growers operate on a narrow profit margin; the net cash income in MA was \$5,093 per farm in 2012. MA farms are highly diversified; this trait mandates that growers have and maintain a high degree of working knowledge and expertise in pest biology and management across multiple crop systems. Lack of pest control could easily translate into loss of long-term sustainability for specialty crop agriculture in the Commonwealth. The appropriate use of pesticides, in combination with cultural and biological controls, will maintain the longevity of available pesticides, conserve natural enemies, and maximize environmental stewardship. This project will connect "boots on the ground" support that educates growers with hands-on instruction and traditional workshops with the development of an interactive web site that will be used for scouting and reporting. We will use a multi-level approach where we work intensively with individual growers to implement IPM practices on their diversified vegetable and fruit farms, work with multiple farms on IPM field trials to address specific issues, host grower meetings for large audiences on the farms where we work, and extend the information we gain from on-farm work to reach a large multi-state audience. We will implement an educational program focused on monitoring and managing emerging and established insects, weeds and diseases. To do this, we will establish mentoring and partnering relationships with individual farms, provide diagnostic services, develop traditional and web-based tools to deliver information, and establish participatory and demonstration research for crop/pest complexes identified by growers as presenting challenges for IPM implementation. As a result of our whole-farm and grower-directed collaborative approach to IPM problem solving, growers will gain understanding and confidence in cutting-edge, crop-specific strategies. They will learn how to 'put it all together' to have success in both crop health and profitability.

Accomplishments

Major goals of the project

GOAL: Use a multi-level Extension delivery approach to implement IPM on diversified vegetable and fruit farms in Massachusetts.

1. Work intensively with individual MA growers to implement IPM practices on their diversified farms.
2. Works with multiple farms on IPM field trials to address specific pest management concerns.
3. Host grower meetings to exchange and extend information gathered through individual and farm level interactions.
4. Promote and sustain collaborations with other organizations at state, regional, and federal levels to further IPM adoption.

GOAL: Implement an educational program focused on monitoring and managing emerging and established insects, weeds, and diseases.

1. Establish mentoring and partnering relationships with individual farms.
2. Provide accurate diagnostic services.
3. Develop traditional and web-based tools to deliver information.
4. Establish participatory and demonstration research for crop/pest complexes important to MA growers.
5. Support educational efforts across commodities.

GOAL: Evaluate program success and measure impacts.

1. Conduct periodic surveys and interviews to document changes in pest management efforts.
2. Ensure that appropriate pest management information is extended to target audiences.
3. Hold regular meetings with the stakeholder advisory committee to ensure the program is on the right track.

What was accomplished under these goals?

Work intensively with individual growers to implement IPM practices. The fruit and vegetable programs have identified 9 fruit and vegetable farms in MA to facilitate implementation of IPM practices.

Work with multiple farms on IPM field trials to address specific pest management concerns. We have several on-farm IPM field trials this year: "Growing mustard as a biofumigant covercrop": This project is being conducted on 2 farms in MA. One farmer is growing mustard for control of lesion and root knot nematode in strawberry production, and the other farmer is working on control of *Phytophthora capsici* and *Sclerotinia* white mold. The second project is "Silicon nutrition for powdery mildew management in cucurbits" taking place on one farm where we are sidedressing wollastonite for silicon and rating powdery mildew.

Tree fruit team worked with 12 apple growers and their staff in Fall 2014 to assess potential overwintering apple scab ascospore dose; implemented sanitation measures between Fall and Spring; delayed 1st fungicide sprays in Spring where possible; used disease forecasting models; implemented reduced-risk fungicide programs and resistance management practices. The tree fruit team worked with 2 MA growers and 1 VT grower and their staff on a USDA led trial that tested a trap tree approach and a beneficial nematode approach to manage plum curculio in apples.

The Small Fruit team has set out spotted wing drosophila traps across the Commonwealth to monitor for first appearance. On-farm trials include the evaluation of split applications of dichlobenil to improve dodder control on cranberry farms.

Promote and sustain collaborations with other organizations at state, regional, and federal levels to further IPM adoption. Another funded proposal by NEIPM "New England Fruit and Vegetable Pest Scouting Network" (PI K. Campbell-Nelson) has expanded our reach from the EIP project to Rhode Island and Vermont where Extension Educators and summer staff provide the same level on on-farm IPM training to beginning farmers as Massachusetts personnel. We have trained over 100 beginning farmers in IPM scouting and monitoring methods through seasonal IPM Field Walks. We will continue this program with 1 field walk in both VT and RI and 2 in MA.

Tree fruit team collaborated with UME and UNH and Extension in ME and NH to extend the apple scab project to 10 growers in those states. Tree fruit team collaborated with Skybit, AgRadar, and NEWA to maintain and expand access to weather data and pest management forecasting models for MA and New England growers (> 100 growers). Fruit team cooperated with MDAR, 2 regional IPM consultants, the Arnold Arboretum, and Barnstable County Extension to trap and to track brown marmorated stink bug in MA. Tree fruit team collaborated with USDA scientists on plum curculio project. Tree fruit team collaborated with CT Extension on project to collect plant tissue damaged by fire blight and test for resistance to antibiotics.

Establish mentoring and partnering relationships with individual farms. The IPM team has identified and begun working with 9 farms in MA to as mentor farms and 3 as partner farms.

Provide accurate diagnostic services. Each mentor and Partner farm receives 2 diagnostic samples submitted to the UMass Disease Diagnostic Lab. The Diagnostic lab reports processing 36 vegetable and 23 small fruit samples. Tree fruit team diagnosed 11 plant samples damaged by diseases and 15 samples damaged by insects.

Develop traditional and web-based tools to deliver information. We have made good progress toward this goal to date. We have staging server running at <http://invasives.zigbop.io/> where new functionality is demonstrated, experimented with, and

refined before being deployed to a production server at <http://ipm-scouting.com/>. Currently we have working versions of a grower intake form that collects the basic information for partner farms and defines IPM goals, including specific actions to be undertaken by both the grower and extension personnel. These forms are viewable, searchable, and editable on a web dashboard. We also have completed a basic scouting form that scouts can use on farm visits. Each scouting form includes a section for recommendations, as well as image or video uploads, and basic data such as the scout name, weather conditions, crop stage, etc. Each scouting form is related to a particular farm, and can be related to one or more of the goals outlined in the farms IPM plans. All forms can be easily exported to PDF to allow for printing or emailing to growers.

Next steps include add a button to automate the task of emailing forms to growers and other contacts, adding screens for viewing, sorting, and exporting data and reports. We hope to finish most of that functionality in a basic form by the end of year 1, and make iterative improvements based on feedback from growers, scouts, and extension personnel over the next two years. Some of the likely improvements for year 2 include adding a 'reminders' system so extension personnel can specify follow-up activities from scouting forms and adding some 'alert' functionality to alert growers to pest conditions in their area when necessary.

We continue to provide weekly articles and pest alerts via Vegetable Notes May-September and monthly during the off-season. Fruit team continued to develop webpage, email, and text message information delivery for spotted wing Drosophila and brown marmorated stink bug detection and management.

Conduct periodic surveys and interviews to document changes in pest management efforts. A survey was conducted at our Advisory meeting on March 4, 2015 to assess grower priorities for the year, and we will conduct end of season interviews with mentor farmers to measure changes in IPM practices in Fall 2015. Priorities identified by Advisory Meeting farmer attendees were: Boots on the Ground, more Extension staff visits, Field Walks for Scouting training and Twilight meetings, Basil Downy Mildew, bird damage in sweet corn, organic late blight management, and cabbage aphids research, and professional development training for Ag Service Providers in making videos for online education.

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

Host grower meetings to exchange and extend information gathered through individual and farm level interactions. Between September 2014 and June 2015, Extension personnel hosted the following grower meetings: Twilight Meeting on Food Safety, IPM and the Commonwealth Quality Program, 45 people in attendance, 34 farmers and 11 Ag Service providers; IPM Advisory Group Annual Meeting, March 2015, North Grafton, MA, 28 people in attendance (8 UMass fruit and veg program staff, 4 ag service providers, and 16 farmers) and a workshop on Greenhouse Biocontrols.

UMass Fruit Team hosted the annual winter meeting of the Massachusetts Fruit Growers Association, January 2015, Belchertown, MA. Dr. Dave Rosenberger was the guest speaker; gave a presentation on fire blight in apples, approx. 125 attending. Tracking Apple Scab Maturation to Improve Scab Management"; Clarkdale Fruit Farm, Deerfield, MA, May 19, 2015, approx. 30 attending. Grower talks at fruit tree growers twilight meetings, 3 meetings each month, April and May 2015, average attending 30 The following were hosted by cranberry extension in East Wareham, MA and vicinity: Summit meeting December 2014, 46 attendees; Research and Extension Update, January and February (make-up meeting), 176 and 31 attendees, respectively; Pesticide Safety and IPM training, April 2014, 76 attendees; Dodder management discussion group, March 2015, 13 attendees; Scale, disease, and weed workshop, May 2015, 16 attendees; Cranberry fruit rot and fruitworm management, June 2015, 22 attendees.

Establish participatory and demonstration research for crop/pest complexes important to MA growers. See items mentioned under "IPM field trials" above.

How have the results been disseminated to communities of interest?

Support educational efforts across commodities. We make biweekly farm visits with fruit and vegetable Extension specialists meeting together with the farmer to provide IPM training in collaboration.

Ensure that appropriate pest management information is extended to target audiences. We write recommendations for both organic and conventional growers in our newsletters. We regularly host events and give recommendations based on audience attending.

Hold regular meetings with the stakeholder advisory committee to ensure the program is on the right track. March 4th, 2015 Brigham Hill Community Farm. 28 people in attendance. (8 UMass fruit and veg program staff, 4 ag service providers, and 16 farmers). See "Surveys and Interviews" above.

Newsletters

Berry Notes: 2014-2015, Volume 26-27. S. G. Schloemann, ed.

<https://extension.umass.edu/fruitadvisor/publications/berrynotes>. Circulation approx 450 annually. Seasonally relevant

marketing, research, and IPM including pest alerts, scouting results, and reminders for timely management activities.

IPM Berry Blast, 2014-2015. S. G. Schloemann, ed. Six to twelve issues annually. Circulation approx.. 450 annually. A periodic e-message that highlights specific, timely pest issues.

Cranberry Station Newsletter: In 2014-2015, 5 issues/ year. Sandler, H.A., M. Sylvia, A. Averill, eds. <http://www.umass.edu/cranberry/pubs/newsletter.html>. Reached 327 recipients in 2014-15, primarily in MA but also national and international. Weekly IPM pest alerts were issued from May to August as a phone message and at <http://www.umass.edu/cranberry/cropinfo/ipmmessage.html>.

Healthy Fruit: 2014-2105. J. Clements, ed. Newsletter published weekly to 100 paid subscribers, March to October and as needed for alerts year-round, 23 issues/year. Includes pest alerts, meeting announcements, fact sheets and updates to the New England Tree Fruit Management Guide. <https://extension.umass.edu/fruitadvisor/publications/healthy-fruit>.

Fruit Notes: Autio, W. and W. Cowgill, editors. 2014-2015. Published quarterly at the Stockbridge School of Agriculture, UMass.<http://extension.umass.edu/fruitadvisor/publications/fruit-notes>.

Vegetable Notes, Volume 26-27, 2014-2015. R.V. Hazzard, K. Campbell-Nelson, S. Scheufele, & L. McKeag, eds. Published weekly May-September and monthly in winter, with timely pest alerts and articles to a broad spectrum of vegetable farmers state and region-wide. Email subscription list reached 2000 in 2014. <http://extension.umass.edu/vegetable/>.

New England Grape Notes. Vol. 9-10, 2014-2015. S. Schloemann, ed. 6-10 issues published yearly from April-November with horticultural and pest management information for grape growers in New England. Approximately 300 subscribers. <http://newenglandwinegrapes.org/>.

UMass Extension Cranberry, Tree Fruit, Small Fruit and Vegetable FACT SHEETS

Cranberry: <http://www.umass.edu/cranberry/pubs/factsheets.html>

Fruit: <http://extension.umass.edu/fruitadvisor/fact-sheets>

Vegetable: <http://extension.umass.edu/vegetable/soil-crop-pest-management>

Websites & pest alerts

To provide a portal to IPM information on diverse commodities, our IPM website (<http://extension.umass.edu/ipm>) was updated to serve as a gateway to IPM information on vegetable (<http://extension.umass.edu/vegetable/>), fruit (<http://extension.umass.edu/fruitadvisor/>) and other commodity websites.

Invasive Pest IPM: Fruit/Spotted Wing Drosophila and Brown marmorated stink bug network and alert system: Data from the statewide reporting network is gathered into a centralized web page which disseminate alerts and management updates to multiple channels automatically (email, cell phone, web page posting, facebook, etc.).

Webpages located at:

<https://extension.umass.edu/fruitadvisor/brown-marmorated-stink-bug>

<https://extension.umass.edu/fruitadvisor/spotted-wing-drosophila>

Sample Alerts:

<http://extension.umass.edu/fruitadvisor/alerts/2014-brown-marmorated-stink-bug-bmsb-fall-update>

<https://www.facebook.com/umassipmteam>

See also workshops/professional development and training noted above.

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

We will continue our outreach efforts in publications, workshops, and one-on-one mentoring. We will conduct end-of-season interviews to assess the activities of Mentor Farmers in achieving their established (pre-season) goals. We will engage with our IT consultant to ground-truth the software package that is being developed. We will meet with our Stakeholder Advisory Group in the winter to adjust activities as needed, based on their input. We will make presentations and network with vegetable and fruit growers at the New England Vegetable and Fruit Conference in December, 2015 in Manchester, NH. We will meet with our regional collaborators to make plans for the 2016 season.

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	2	0	0	0	2
Professional	0	0	0	0	0
Technical	2	0	0	0	2
Administrative	0	0	0	0	0
Other	0	0	0	0	0
Computed Total	4	0	0	0	4

Student Count by Classification of Instructional Programs (CIP) Code

{NO DATA ENTERED}

Target Audience

Beginning and women farmers, Diversified growers, Conventional and Organic growers, Extension staff, IPM consultants and scouts, Ag service providers, Farm managers and decision-makers, Newsletter subscribers, Workshop and meeting attendees, Industry representatives

Products

{Nothing to report}

Other Products**Product Type**

Educational Aids or Curricula

Description

New England Vegetable management guide 2016-2017 edition. over 108,000 site visits since Sept 2014 with an average of 2 minutes per visit.

Product Type

Educational Aids or Curricula

Description

Vegetable Notes, Vol 26, Issue 22 through Vol. 27 Issue 7. 11 publications reaching over 2,000 growers and ag service providers from Maryland to Ontario.

Product Type

Instruments or Equipment

Description

Hot water seed treatment (service for farmers in EIP project). Seed treated for 1 farm and 2 other treated seed themselves.

Product Type

Educational Aids or Curricula

Description

Healthy Fruit Newsletter. 100 subscribers. <https://extension.umass.edu/fruitadvisor>

Product Type

Software or NetWare

Description

Invasive pest IPM: fruit/spotted wing drosophila and Brown marmorated stink bugs network and alert system; multiple channels: email, mobile phones, web page posting, facebook. <https://extension.umass.edu/fruitadvisor/brown-marmorated-stink-bug>

Product Type

Educational Aids or Curricula

Description

facebook pages for IPM of fruit and vegetables. <https://www.facebook.com/umassipmteam>

Product Type

Educational Aids or Curricula

Description

New England Tree Fruit Management Guide, 2015. <https://extension.umass.edu/fruitadvisor>; adapted from Cornell University and cooperatively edited by Extension scientists in all New England states.

Product Type

Educational Aids or Curricula

Description

Botrytis scenario on red raspberry fact sheet: <https://extension.umass.edu/fruitadvisor>

Product Type

Instruments or Equipment

Description

Training growers and staff to use and maintain Rainwise weather stations; on-farm at 5 locations in MA; by telephone and in person. 14 growers engaged thus far.

Product Type

Software or NetWare

Description

Training growers and staff to use disease and insect forecasting models via NEWA, Skybit, and/or AgRadar. On-farm at 6 locations, twice monthly in person or by phone. Approximately 16 people so far in 2015.

Product Type

Educational Aids or Curricula

Description

Cranberry 2015 Chart Book: Management guide for Massachusetts. UMass Extension Publ. Sent to 400 growers. <http://scholarworks.umass.edu/cranchart/207/>.

Product Type

Educational Aids or Curricula

Description

Cranberry Newsletters. 2 issues in 2014 and 4 issues in 2015. Sent to 350 growers. <http://www.umass.edu/cranberry/pubs/newsletter.html>

Product Type

Other

Description

Cranberry Crop Summit. Discussion group with 46 stakeholders regarding pest management and other crop issues.

Product Type

Other

Description

Cranberry Research and Extension Update meeting. 176 attendees plus 31 attendees at make-up meeting.

Product Type

Other

Description

Pesticide Safety Workshop, East Wareham. 74 attendees.

Product Type

Other

Description

Dodder management discussion group, East Wareham, MA. 13 attendees.

Product Type

Other

Description

Scale, disease, and weed management workshop, Carver, MA. 16 attendees.

Product Type

Other

Description

Cranberry fruit rot and fruitworm management, East Wareham, MA. 22 attendees.

Product Type

Other

Description

Extension IPM Advisory Group Annual meeting, North Grafton, MA. 28 attendees.

Product Type

Educational Aids or Curricula

Description

Backpack sprayer calibration fact sheet. <http://www.umass.edu/cranberry/pubs/factsheets.html>

Product Type

Educational Aids or Curricula

Description

Berry Notes, Volume 26-27. approximately 450 subscribers.

Product Type

Educational Aids or Curricula

Description

IPM Berry Blast. 6-12 issues annually to a circulation of approximately 450 people.

Product Type

Educational Aids or Curricula

Description

New England Grape Notes. 6-10 issues per year to approximately 300 subscribers.

Changes/Problems

{Nothing to report}