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New England Vegetable & Fruit Conference – The NEV&F Conference was a great success earlier this month. Excellent attendance was demonstrated by many sessions having standing room only in their venues. The trade show featured over 100 vendors, many of them new this year. Farmer-to-Farmer sessions were also a great success. Check out the NEV&FC website for proceedings and pdf files of many of the presentations. Several are included in this issue of Berry Notes. See you in 2017!

2016 Mass Aggie Workshop Series now posted – The 2016 line-up is set. This popular hands-on workshop series kicks off in January with ‘*Pruning Apple Trees for Homeowners & Enthusiasts*’ and wraps up in April with ‘*The 100-Square-Foot, 25-Tree, 5-Variety Backyard Apple Orchard Fruiting Wall!*’ Along the way you can learn about ‘*Growing & Pruning Blueberries*’, ‘*Apple Tree Grafting*’, ‘*Pruning Raspberries & other Bramble Fruit*’, and ‘*Invasive Plants in Massachusetts*’, among other topics. Check out the [Mass Aggie registration site](#) and see what you might like to learn more about.

Introduction to HACCP Workshop - January 12 - 14 - UMass Amherst Campus, 243 Chenoweth Laboratory - Conference Room

This course covers the fundamentals of HACCP (Hazard Analysis Critical Control Point) taught by certified International HACCP Alliance instructors. This particular course will have an emphasis on fresh-cut produce, beverages (including juice and cider), baked goods, and dairy products. The concepts will be reinforced by breakout group activities in which participants will have the opportunity to prepare a HACCP plan. All participants will receive an International HACCP Alliance certificate issued through the University of Massachusetts upon successful completion of the course.

Course topics will include: HACCP overview · Prerequisite Programs · Overview of the Seven Principles · Sanitations and SSOPs · Biological, Physical, and Chemical Hazards · Conducting a Hazard Analysis · Determining Critical Control Points · Establishing Corrective Actions · Establishing Monitoring · Establishing Verification & Validation Procedures · Documentation Practices & Record Keeping · Regulatory Issues · Auditor Expectations - [Click to here to register.](#)

STRAWBERRY

Matted-Row Strawberry Variety Trial Results

Kathy Demchak, Penn State Univ.

It's the time of year when many growers are figuring out what varieties to include in their strawberry orders. For an impartial view of the performance of some of the newer cultivars, here are the first harvest year results from a matted-row trial at the Penn State Horticulture Research Farm at Rock Springs.



'Malwina' strawberry plant - bred in Germany. Photo: Kathleen Demchak

The experiment was established in 2014 and included 9 cultivars, including 'Earliglow' and 'Jewel' as standards for comparison, 4 advanced selections from the breeding program at Cornell and 3 advanced selections from the breeding program at Rutgers. Some of the varieties/selections were bred for plasticulture, but given the way they produced runners on plastic, we decided to try them out in matted row production also. Rows were on 4' centers, and plants were originally planted 2' apart.

The harvest season was fairly wet, and it seemed like the foliage almost never completely dried out. This was especially problematic with a couple of the very vigorous cultivars, and is reflected in the high percentage of fruit loss to gray mold that they had. We also had a hot spell in the middle of June, which likely spurred on some fruit anthracnose development, which was problematic for other cultivars. I guess the good part in all of this was that it turned out to be a good year for testing disease susceptibilities. No fungicides or insecticides were sprayed during harvest, and only one insecticide application was made during the summer primarily for Japanese beetle foliar feeding.

SUMMARY CHARACTERISTICS OF EACH VARIETY Standards

'Earliglow' and 'Jewel' performed as expected – yields were good, flavor was good, and other than Jewel having more common leaf spot than most of the other plants, they

had no particular disease susceptibilities. For comparison with the rest of the cultivars, total yield was 8004 lb/a for 'Earliglow', and 12,745 lb/a for 'Jewel'. With 'Earliglow', 53% of the fruit was marketable, with gray mold and some tarnished plant bug damage being the primary reasons for unmarketable fruit. For 'Jewel', 63% of the harvest was marketable, with gray mold being the primary reason for unmarketable fruit. Mean berry weight was 10.0 g/berry for 'Earliglow', and 11.3 g/berry for 'Jewel'.

Order of ripening

This was a little difficult to sort out this year, as almost everything started to ripen at once. 'Earliglow' was the first variety to ripen, with 'Jewel' less than a week behind (!).

'Galletta'

'Galletta', from the breeding program at NC State, was bred for plasticulture. It began ripening right after 'Earliglow', and wasn't great for matted row - at least, not the first year. Yields were low at 4711 lb/a, but this berry had the largest size of all of the named cultivars at 13.5 g/berry. Berry size for the first 3 harvests was over 20 g/berry, and berries were nicely firm with good flavor and color. It bounced back after renovation, runnering well and filling the beds in very nicely, so we'll see if the yields come up next year.

'Laurel'

'Laurel', from AAFC-Nova Scotia, was also early. Total yield was high, at 10,379 lb/a, with 61% marketable fruit, and nice-sized berries averaging 11.0 g/berry. They were nearly twice this size for the first few harvests. The plants were very vigorous, and with our wet season, gray mold was the main reason for unmarketable fruit. Flavor was good, but not outstanding. Despite the vigor, the plants themselves were among the most disease resistant in the planting, with very little common leaf spot or leaf scorch. This is definitely one variety worth trying out.

'Herriot'

'Herriot', from the breeding program at Cornell, apparently wasn't suited to our warmer conditions. The yield was on the low side (5767 lb/a total), and only 32% of the fruit was marketable due to a truly impressive susceptibility to fruit anthracnose. Berry size was good, however, at 12.8 g/berry. Next year we'll likely try spraying more and see what happens to anthracnose incidence.

'Sonata'

'Sonata' was one of the top yielders, though it definitely was more productive when we had it in plasticulture.

Yields were similar to those from 'Jewel', at 12,434 lb/a, with 56% of the fruit marketable, and an average berry size of 10.5 g/berry. It had very little trouble with foliar diseases, but because of vigorous foliage, gray mold was problematic on the fruit. Flavor was decent.

'Rubicon'

'Rubicon' plants were likewise extremely vigorous. Rubicon was bred from varieties that survived Jim LaMondia's and Richard Cowles' "death plots" that they used for black root rot research at the Conn. Ag. Expt. Station. Total yield was decent at 8244 lb/a, but the percentage marketable fruit was low at only 43%, primarily because the plants were so vigorous that the foliage never dried out so gray mold was problematic. The fruit also suffered a fair amount of damage from tarnished plant bugs. Berries were nice-sized (10.9 g on average), but they were light in color and on the tart side. The light color might come from one of its parents, 'Idea', which some of you may remember from a little over a decade ago.

'Mayflower'

'Mayflower' total yields were average at 7846 lb/a, but this cultivar had a higher percentage of marketable fruit (62%) than most. 'Mayflower' was somewhat susceptible to fruit anthracnose and tarnished plant bugs, perhaps because of its late harvest season when tarnished plant bug populations were higher, and berries were on the smaller side averaging 10.5 g/berry. 'Mayflower' was quite late, but its main characteristic of note was unusual flavor which different people described as "spicy", "floral", or "tangy" and usually "needs sugar". The berries were pretty with large caps, but the variety's susceptibility to leaf scorch often resulted in lesions on the caps.

'Malwina'

'Malwina', from Germany, is later than any other strawberry I've ever seen. We picked our first ripe fruit on June 22, and we stopped harvesting it on July 15 so we could renovate the plots. At that point, its fruit was just trickling in. It produced very few runners, so the beds were not very well filled in, resulting in low total yields of 4353 lb/a. Fruit size averaged 10.5 g/berry, and 62% of the fruit was marketable. Fruit losses were due primarily

to fruit anthracnose and tarnished plant bug injury, again likely prevalent because of the late harvest season.

Cornell advanced selections

Among the 4 Cornell advanced selections, one produced extremely high yields of 14,579 lb/a with large fruit averaging 11.9 g/berry. The percentage of fruit harvested that was marketable was low, however (53%) because of significant susceptibility to fruit anthracnose, similar to the degree experienced with 'Herriot', and also gray mold. Another selection was extremely vigorous with very good yield (11,250 lb/a) but had small berries (10.1 g – similar to 'Earliglow'). Two others were lower in yields and percent marketable fruit due to gray mold susceptibility.

Rutgers advanced selections

The 3 Rutgers advanced selections got everyone's attention for an assortment of reasons. These cultivars were developed for use in the plasticulture system with flavor being the primary breeding objective. Plants were very small when planted and had difficulty becoming established, so I'll want to see how they do in their second harvest year. All had very good flavor, except for one brief spell when flavors became a little "off".

One selection in particular was very vigorous, produced decent yields despite the slow start, and after renovation was in second place for runner production of all 16 cultivars or selections. The most interesting characteristic of this selection was its very unusual long narrow shape, so it might take some creative marketing to encourage consumer acceptance, or perhaps people will just need to sample the berries. The two other selections had lower yields, but very good flavor. All 3 of these selections were included in a plasticulture variety trial at the SE Research and Extension Center. We'll discuss the results from that trial next month.

The disclaimer is that varieties perform differently in different locations. It's still always worth trying out at least a few plants of each variety on your own farm.

Thanks to Retha Sellmer, Steve Gleason, and our summer students for assistance with planting care, harvest, and data collection and analysis and to the Pennsylvania Vegetable Growers Association for funding this trial!

(Source: PA Fruit Times, Dec. 4, 2015)

RASPBERRIES/BLACKBERRIES

Nutrient Management in Brambles

Bernadine Strik, Oregon State University

Brambles or "caneberries" (raspberry and blackberry) are important crops in the United States with a reported 11,900 acres of blackberry in 2005 and 16,400 and 1,650 acres of red and black raspberry in 2014, respectively.

There were also 495 and 663 acres of organic blackberry and raspberry, respectively, in the United States in 2008.

The unique growth habit of caneberries, where nutrients are accumulated in the primocanes, crown, and roots and

are lost in the fruit, floricanes, and leaves (in autumn), makes nutrient management somewhat difficult. In the spring, growth of fruiting laterals and fruit is very dependent upon nutrient reserves stored in the floricanes, crown, and roots and on additional nutrients available from soil or new fertilizer. However, new primocane growth in the spring is most dependent on nutrients available in the soil or from fertilization. Good nutrient management programs are thus important for sustained growth and production.

In order to gain benefits from fertilization, crop management—from selecting certified plants to good irrigation and pest management—must be appropriate and timely. Proper fertilization or excess fertilizer will not compensate for poor growth that is caused by other management problems, or disease, weed, or insect problems. Soil properties such as low pH and/or poor drainage can limit plant growth and yield.

The goal of fertilizing any high-value crop is to supply the plant with ample nutrition in advance of demand, thereby removing nutrient limitations to yield and quality. Important considerations include the economic return from the fertilizer investment, environmental stewardship, and government regulations. A fertilizer application should produce measurable changes in plant growth or nutrient status, or otherwise benefit the crop in a measurable way. The increased fruit yield or quality produces a return on the investment.

Growers, with the assistance of local Extension agents and field representatives, should consider the nutrient needs of each field or type of caneberry (e.g., summer-bearing or primocane-fruiting cultivars). Key questions that need to be answered with regard to any nutrient management program are: How much nutrient should be applied? When is the best time to apply the nutrient? What is the best source of the nutrient for the plant? And what is the best method to apply the nutrient?

Soil and tissue sample analyses help in determining appropriate nutrient applications. Keeping records of weather, yield, disease and insect problems, and nutrient application rates and timing will help in interpreting soil and tissue analysis data over time. Observations of annual growth (visual assessments of cane number, diameter, and height, and fruiting lateral length), leaf color, and fruit quality (amount of rot, drupelet set, and firmness), in addition to yield, will also help in adjusting nutrient management programs as needed.

Soil sampling. Soil testing is important to adjust nutrients prior to planting, if needed. This not only gets the plants off to a good start, but incorporation of nutrients or amendments is very effective for those that are immobile or do not move readily into the rooting zone with a surface application (e.g. lime). Take soil samples well in advance of planting so that pH can be adjusted if needed

(e.g. sample in early fall for spring planting) –it takes time for incorporated lime or sulfur to react and change soil pH. Use the deficiency levels of nutrients in the soil in Table 1 as a guide. A range in deficiency levels is provided, as there is no absolute value and ideal levels may depend on growing region or soil type. If a nutrient is not listed, no standards are available and plant tissue nutrient status should be used to assess nutrient needs after planting. Any needed nutrients should be applied as a broadcast application to the entire field and then incorporated.

Table 1. Suggested nutrient levels for soil in caneberry plantings

Nutrient	Deficient at less than (ppm)
Phosphorus (P; Bray)	20 to 40
Phosphorus (P;Olsen)	10 to 20
Potassium (K)	150 to 350
Calcium (Ca)	1,000
Magnesium (Mg)	120
Manganese (Mn)	20 to 60
Boron (B)	0.5 to 1.0

As soil pH increases, the solubility of Fe, Zn, and Mn decreases. The concentration of Mn and Fe can reach levels that are deficient, causing yellowing of leaves. While the ideal caneberry soil has a pH between about 5.6 and 6.8, commercial production is possible on sites with pH values slightly higher or lower. As soils become alkaline (pH values above 7.0), deficiencies of Fe, Mn, B and Zn can occur.

After planting, periodic soil analyses can be helpful in diagnosing problems, such as low or high soil pH or the presence of excessive salts. Collect soil samples every two to three years to monitor changes in soil nutrient status. In established fields, sample soil at the same time of year, so that years can be more easily compared. Soil pH fluctuates over the season. Do not collect soil samples in spring, right after fertilization has occurred. The irrigation wetting front, fertigation, and band applications of fertilizer affect soil sample results. Collect soil samples in the plant row (where the fertilizer is applied) and, in drip irrigated fields, sample within a few inches of a drip emitter in all sub-sample locations. If mulch is present, remove the mulch layer before taking the soil sample.

Tissue testing. Leaf tissue analysis provides information on the nutrient content of the plant. The results of tissue analysis, when compared with published standards, indicate which elements the tissues contain in adequate, deficient, or excessive amounts. Routine tissue analysis can help in detecting low nutrient concentrations before visible symptoms or yield reduction occur. Tissue analysis is a valuable tool to help diagnose visible plant problems and to evaluate fertilizer programs. Sometimes,

even when the soil nutrient content is adequate, the plant is not able to take up the nutrients required (e.g., when soil pH is incorrect; in dry or waterlogged soils; during cool weather; and under certain cultural issues such as with too much or insufficient irrigation). However, using tissue test results to anticipate current-season fertilizer needs does not work well for perennial crops such as caneberries. In part, this is due to the minimal short-term effects of fertilizer on yield. Changes in tissue nutrient concentrations may not be observed for 1 to 2 years after fertilization. In addition, primocanes, which respond to new fertilizer nutrients, do not fruit until the following year in summer-bearing types. Delays in plant uptake are common, particularly when relatively immobile materials, such as phosphorus, potassium, and lime, are topdressed. The only exception is for correction of micronutrient deficiencies (e.g. boron) and N deficiency, where corrections can be made quite quickly. However, in general, leaf testing is more of a tool to assess how the nutrient management program may need to be changed for sustainable growth and production.

In caneberries, primocane leaf tissue nutrient concentration changes throughout the season. The recommended time of sampling leaves for tissue analysis is related to a period of time when the leaf nutrient concentration is most stable. In addition to changing over

the growing season, tissue nutrient levels will also change with location or age of the leaf and what type of leaf it is. For example, results from floricanes leaves will be different than primocane leaves and older primocane leaves will have different levels of many nutrients than younger leaves. Always sample cultivars separately as they differ in nutrient concentration. Collect leaves that are free of disease or other damage if possible and a sample that represents the entire block/field. In summer-bearing raspberry and blackberry, collect primocane leaves in late-July to early August. In primocane-fruiting blackberry, collect primocane leaf samples during the bloom to green fruit stage of development.

In summer-bearing caneberry cultivars, sample the most-recent, fully expanded leaves from primocanes –about 1 ft from the tip of the cane. In primocane-fruiting cultivars, sample fully-expanded leaves from below the fruiting tip (red raspberry) or from primocane branches (blackberry & black raspberry). Compare primocane tissue samples, taken at the correct time, with published sufficiency levels (Table 2).

If a nutrient is deficient and observations of growth or plant performance indicate fertilizer is needed, apply the correct product (source of nutrient) and at the right time to make the nutrient available for plant uptake.

Table 2. Recommended primocane leaf nutrient sufficiency levels for raspberry and blackberry when sampled in late-July to early-August in Oregon, May to August in California, and the first week of August in northeastern United States. In Oregon, the recommendations are to use whole leaves –petioles included –and to leave them unwashed. In California, there are no specifications for leaf petioles or washing. In the northeast, recommendations include petiole removal and leaf washing.

Nutrient	Oregon ^z	California ^y	Northeastern U.S. ^x
Nitrogen (%)	2.3 to 3.0	2.0 to 3.0	2.0 to 3.0
Phosphorus (%)	0.19 to 0.45	0.25 to 0.40	0.25 to 0.40
Potassium (%)	1.3 to 2.0	1.5 to 2.5	1.5 to 2.5
Calcium (%)	0.6 to 2.0	0.6 to 2.5	0.6 to 2.0
Magnesium (%)	0.3 to 0.6	0.3 to 0.9	0.6 to 0.9
Sulfur (%)	0.1 to 0.2	-	0.4 to 0.6
Manganese (ppm) ^w	50 to 300	50 to 200	50 to 200
Boron (ppm)	30 to 70	30 to 50	30 to 70
Iron (ppm)	60 to 250	50 to 200	60 to 250
Zinc (ppm)	15 to 50	20 to 50	20 to 50
Copper (ppm)	6 to 20	7 to 50	6 to 20

^zHart et al. (2006); ^yBolda et al. (2012); ^xBushway et al. (2008).

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(Source: 2015 New England Vegetable & Fruit Conference Proceedings. www.newenglandvfc.org/2015_conference/7_2_Strik.pdf)

Weed Control and Fertility in Organic Blueberry Production Systems*Bernadine Strik, Oregon State University*

Oregon is a leading production region in the U.S. for blueberry and blackberry. While the amount of organic production of these crops on organic farms in the U.S. was relatively small (3%) when last surveyed in 2008, the Pacific Northwest accounted for 40% to 50% of the total area planted to these crops. Our positive research results from long-term certified organic production systems trials (5-year and 9-year trials in blackberry and blueberry, respectively) have had some impact on organic production in our region. In blueberry, certified organic area has increased from an estimated 2% of total planted acreage in 2006 to about 20% in 2015.

Our blueberry trial was designed with input from an advisory committee and included treatments to evaluate the impact of planting method, cultivar, mulch, and fertilizer source and rate. The one-acre research trial was planted in October 2006 and was “transitional” in the establishment years, but was certified organic in the first cropping year (2008) – a typical pattern for commercial growers. The planting was considered mature in the eighth growing season (2014). There were 48 treatment combinations of planting method (raised beds of ~ 1 ft high or flat ground), fertilizer rate and source (a “low” and a “high” rate of either feather meal or fish emulsion), mulch type (sawdust alone; compost topped with sawdust, or weed mat), and cultivar (Duke or Liberty). Plants were spaced 30 inches apart in the row with 10 ft between rows. A grass was grown between rows. The plants were irrigated by drip, and irrigation rate was adjusted to maintain soil water content at similar values across treatments.

The granular feather meal (ranging from 11% to 13% N, depending on product or batch) or fish emulsion (4% to 5% N) fertilizers were applied initially at “low” and “high” rates of 25 and 50 lb N/acre, respectively, during the first few years of establishment (2007–2009) and then increased incrementally as the planting matured to 65 and 125 lb N/acre, respectively, by 2013. In 2007–14, feather meal was broadcast on top of the organic mulches or under the weed mat (around plants from 2007–2010 and opened for application to the in row area from 2011–2014) with half of the total nitrogen (N) applied in March and the other half in May. Fish emulsion was diluted with 10 parts water (v/v) and was applied by hand as a drench around the base of the plants in 2007–2009, side-dressed with a sprayer on each side of the row in 2010, and injected through the drip system (fertigated) in 2011–14 in seven equal applications every 2 weeks from mid-April to early July.

Mulch treatments were: a) Douglas fir sawdust (3” deep to the in-row area); b) yard debris compost (1.5” deep

topped with sawdust (2” deep) (“compost + sawdust”); and c) “weed mat” [black, woven polyethylene ground cover] with sawdust mulch (5 cm) in the 8-inch diameter planting hole. The intent of the compost + sawdust treatment was to have the sawdust mulch act as a barrier to weed seed germination in the more nutrient rich compost layer. The two organic mulches were initially applied just after planting and were then replenished (Jan. 2011 and 2013), as needed, to maintain mulch depth. The solid 1.5-m-wide piece of weed mat, centered over the row, was installed just prior to planting and was replaced with “zippered” weed mat in winter 2010–2011 allowing the weed mat to be opened and granular fertilizers to be applied underneath. Weeds were removed by hand-weeding from plots mulched with sawdust and weed mat (i.e., the planting hole area) and were controlled using OMRI-approved lemon grass oil (Avenger®, Cutting Edge Formulations, Inc., Buford, GA), 20% acetic acid (vinegar) or propane flaming/heat, depending on the year, in addition to hand-weeding in plots mulched with compost + sawdust. Labor and product costs were recorded.

Ripe fruit were harvested by hand approximately every 7 days. In 2011–2014, the planting was sprayed weekly with a spinosad insecticide (“Entrust®SC”; Dow Agro Science, Indianapolis, IN) or a pyrethrin (“PyGanic”®), from when the ‘Liberty’ fruit first turned blue through harvest, to help control Spotted Wing Drosophila [*Drosophila suzukii*]; applications to the early-season ‘Duke’ were not required as insect populations were very low. In 2013–2014, *Bacillus subtilis* (“Serenade®MAX”; AgraQuest, Davis, CA) was applied in spring for control of botrytis, per label rate and recommendations. No other pesticides were required during the study period. Scare alarms (Bird Gard LLC, Sisters, OR) were used for bird control. To determine the returns per treatment, fruit were sold to a commercial organic berry packer (fresh and processed markets).

While mechanical methods of weed control may be possible in flat ground planting systems, plants grown on raised beds averaged 28% more yield than on flat ground. We only recommend planting on raised beds now. In our long-term study, there has been no effect of mulch type on yield or fruit quality – this is good news for growers.

The between-row, grass cover crop was maintained by mowing and the edges by using vinegar (when planting was young) or a string-trimmer (presently). Drip irrigation (only in the row) reduced grass growth in our dry summers. Weed “pressure” in the row increased as the planting aged. Weeds were fewest in the weed mat mulch (only around “planting hole” area) and greatest in the

compost topped with sawdust mulch. Weeds were hand-pulled in all treatments. While Avenger Ag® and vinegar were used as contact herbicides, these products were only effective when weeds were quite small and application was followed by hot, sunny days. Propane heat/flaming was not effective or safe. Hand pulling of weeds was thus needed frequently in the compost + sawdust mulch treatment greatly increasing the weed management costs in this mulch type. While weed mat offered the most economical way to control weeds, plants grown with weed mat required 30 to 50% more irrigation –likely a result of a change in plant architecture and an increase in soil temperature in this treatment. Addition of compost to the mulch layer did provide a source of nutrients to the field (Table 1) and the high pH of the yard debris compost used helped mitigate the decline in soil pH that occurs with fertilization over the planting life. We are continuing to evaluate the impact of these mulches on soil and plant nutrient levels.

We analyzed all of the organic fertilizers used for nutrient content (Table 1). While we applied the products to “hit” a target rate of N based on the percentage of N as stated on the product labels, there was less N in the product and thus lower rates of N were applied. In addition to N, these organic fertilizers also contained high amounts of K (fish emulsion) and Ca (feather meal). The addition of these other nutrients when using organic fertilizer materials or products, even when they are not required by the plants, must be considered in these organic production systems. Available fertilizer sources differ in cost of application and in cost per pound of N. For example, feather meal was applied as a granular product on top of the organic mulch or under weed mat, whereas fish emulsion was successfully fertigated. Costs averaged \$4.50/lb of N for the feather meal and \$8.15/lb of N for the fish.

We observed cultivar differences in plant growth and yield response to fertilizer source and rate during establishment and maturation. When plants were

establishing, fish emulsion increased growth compared to feather meal, likely because N in the fish was more available to plants when needed. In the later years of the study, when the first application of feather meal was done earlier to improve N availability, there was little effect of fertilizer source and rate in ‘Liberty’, on average, whereas ‘Duke’ had greater yield when fertilized with feather meal than with fish emulsion.

When we began our research, the most common production system used in organic fields was growing blueberry on raised beds, mulching with sawdust and fertilizing with fish emulsion. When we compare cumulative yield in our study to this industry standard, ‘Liberty’ had a greater yield when fertilized with feather meal than with fish when sawdust mulch was used, whereas fertilizer source had little impact when compost + sawdust or weed mat mulch were used. In contrast, fertilizer source had a large impact on yield of ‘Duke’ with little effect of mulch. In ‘Duke’, fertilization with the low rate of fish emulsion led to greater yield than with the high rate of fish.

We have also evaluated the adaptation of eight other cultivars to organic production systems over 9 years. Some varieties have been less adapted to the organic systems trialed, indicating growers need to choose wisely to get good production and returns. We have also tested various additional types of organic fertilizers and can now offer growers specific recommendations, including some others that may be applied through the drip irrigation system. Since our research began, weed mat has become very common inorganic as well as conventional blueberry fields in the Pacific Northwest thus reducing costs of herbicides and hand weeding.

I’d like to thank the Research Assistants, Graduate students, scientific colleagues, growers, industry contributors and those who funded the research for all of their support.

Table 1. Nutrients applied to mature blueberry (since 2013) using organic fertilizer sources and mulches.

Fertilizer Source	Treatment name	Target rate (lbN/acre)	Nutrients applied based on actual fertilizer content (as analyzed in a lab)										
			Macronutrients (lb/acre)						Micronutrients (oz/acre)				
			N	P	K	Ca	Mg	Na	B	Fe	Mn	Cu	Zn
Feather meal	"low"	65	58	1.5	2.7	3.6	0.3	0.5	0	7	1	0	5
	"high"	125	112	2.9	5.2	7.0	0.5	1.0	0	14	1	1	10
Fish	"low"	65	60	13	18	0.2	5	45	1	5	2	0	6
	"high"	125	115	25	35	0.4	9	87	2	10	4	0	11
Mulchz	sawdust	2-3" deep	62	5	20	27	5	-	32	-	16	-	0
	Compost	1.5" deep	545	86	305	546	127	-	32	-	385	-	96

^zNutrients applied in volume of sawdust alone and the yard debris compost portion of the compost + sawdust mulch treatment. Mulch was replenished over the study; only one application is provided here.

(Source: 2015 New England Vegetable & Fruit Conference Proceedings.

http://www.newenglandvfc.org/2015_conference/1_3_Strik.pdf)

Grape Rootstocks For Michigan: New Publication With Recommendations For The Region’s Needs

Ron Perry and Paolo Sabbatini, Michigan State Univ.

Michigan vineyard owners have a new bulletin, “[Grape Rootstocks for Michigan](#)” by Michigan State University Extension, to help with selecting rootstocks. This bulletin focuses on the use of grape rootstocks to suppress soil pests, control vegetative and reproductive activities of the grapevine with recommendations for Michigan vineyards. The history of using rootstocks is relatively recent because grapes can readily be propagated via cuttings. The practice of grafting grape scions onto rootstocks was established by the Romans. It was not until the middle 19th century, when the European wine grape industry was devastated by the Phylloxera root aphid, native to eastern North America, that the practice took a global trajectory.

Michigan vineyards need rootstocks that provide some cold tolerance while also resisting Phylloxera and nematodes. This bulletin suggests the best standard and experimental options.

France to identify selections of North American species and their hybrids that could serve to abate the problem. Those early rootstock selections resulted in the foundation of progeny for subsequent contemporary breeding programs and the development of commercial clones. The rootstocks developed in 1880 and in early 1900 still dominate the genetic arsenal available to growers and nurseries today. Unfortunately for growers in the Midwest and Eastern United States, these standard rootstocks address European problems which are primarily calcareous soils, high soil pH, high salinity, drought and Phylloxera. Many regions in Europe, by virtue of appellation rules, are not allowed to irrigate and thus drought tolerance is a critical attribute in rootstock selection. We do not confront many of these problems in Michigan vineyards where our soils are slightly acidic and coarse along with supplying needed moisture via micro irrigation systems.

Our most critical needs are for rootstocks which can influence the canopy to mature early in a season in hopes of providing some cold tolerance and resistance to Phylloxera and nematodes. Rootstock selection can be the most sustainable approach to addressing soil pest problems. There is a general assumption that vines grown on their own roots produce fruit and wine with superior quality compared to those grown on rootstocks. Unfortunately, there is no empirical evidence to support this theory, as discussed in this bulletin. This bulletin suggests the best standard and experimental rootstocks for Michigan and points to the need for establishing future rootstock trials.

For a print copy of the bulletin, purchase publication E3298, “[Grape Rootstocks for Michigan](#),” at the [MSU Extension Bookstore](#). A free PDF and additional content can be downloaded at the [Growing Grapes for Juice and Wine](#) website.

(Source: Michigan Fruit Crop Advisory Team, Dec. 3, 2015)



Extensive experimentation and breeding followed in

GENERAL INFORMATION

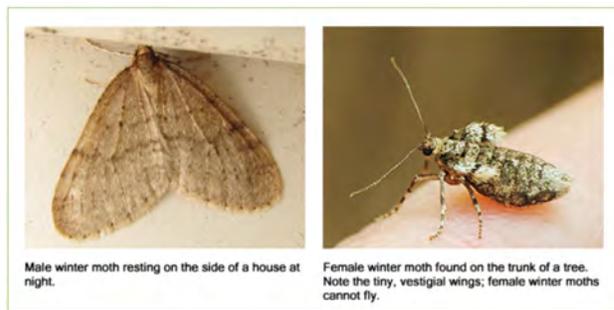
2015 Winter Moth Survey
MDAR Press Release

It's that time of year again: [winter moths](#) and other related species have started to show up at porch lights across the

state. The winter moth (*Operophtera brumata*) is an invasive species first discovered in Massachusetts in the

1990s. Winter moth caterpillars are highly efficient tree defoliators, often stripping the leaves of oaks, maples and other hardwood trees down to lacy skeletons.

In mid-to-late fall, at a time of year where insect activity is practically at a standstill, these small brown winter moths will be seen across the eastern half of the state, sometimes congregating at porch lights by the hundreds. There are other similar-looking native moths active at this time of year, such as the Bruce spanworm moth and the fall cankerworm moth, but they are typically not seen in such large numbers. While the state does not regulate winter moth, some towns/cities do tree treatments, and the Elkinton Lab at University of Massachusetts Amherst currently has a [biological control program](#) underway.



If you see winter moths this November or December, we'd like to hear from you using the survey below. The information you share will help assess the distribution of this invasive pest in our state.

Click [here for survey](#).

(Source: MDAR Dec./Jan. Farm and Market Report)

Spotted Lanternfly Now Found In Portions of Four PA Counties

Emelie Swackhamer, Penn State Extension

[Editor's Note: Spotted Lanternfly had not yet been found in New England. This article is meant to be informative as growers should be aware of this new pest.] The spotted lanternfly has now been found in one additional municipality in Berks County PA; an additional township in Montgomery County and has appeared in parts of Bucks and Chester Counties. The additional quarantined municipalities include Boyertown Borough, Berks County; Douglass Township, Montgomery County; Milford Township including Trumbauersville Borough, Bucks County; and South Coventry Township, Chester County.

These additions are a result of an ongoing delimiting survey with active participation of local, state, and community partners. New detections allow the spotted lanternfly control program to hone its outreach and control efforts, working to end the spread of the insect.

The quarantine area now covers:

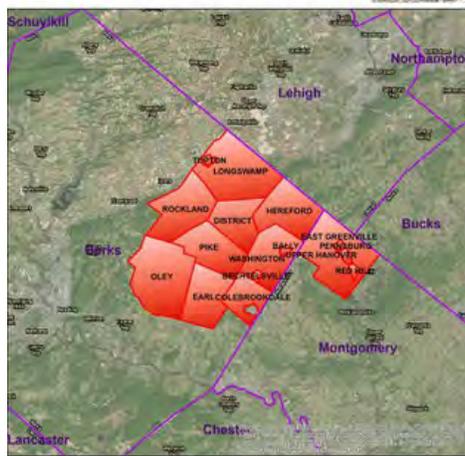
- Berks County - Colebrookdale, District, Earl, Hereford, Longswamp, Oley, Pike, Rockland and Washington townships and the boroughs of Bally, Bechtelsville, Boyertown and Tipton
- Montgomery County - Douglass and Upper Hanover townships and the boroughs of East Greenville, Pennsburg and Red Hill
- Bucks County - Milford Township and Trumbauersville Borough
- Chester County - South Coventry Township

“We are pleased that the residents and businesses in the area continue to be vigilant and turn in specimens of the spotted lanternfly,” said Agriculture Secretary Russell Redding. “This is a key to winning the battle against the pest. The populations of insects are not high in these newly identified townships. With our community partners, we will continue our surveying and control efforts to ensure we are doing everything we can to eradicate this pest.”

While the quarantined areas cover four adjacent counties, South Coventry Township in Chester County is an isolated quarantine area, not directly connected to any other quarantine area. Survey continues in the corridor between South Coventry and the rest of the spotted lanternfly quarantine, making it possible that spotted lanternfly will be detected in those areas as well. Until

Spotted Lanternfly Quarantine Map

Townships Under Quarantine As of Oct 26, 2015



that time, South Coventry Township residents and businesses will face a real challenge to stop movement of potentially infested material at the township borders.

The general quarantine restricts movement of any material or object that can spread the pest. This includes firewood or wood products, brush or yard waste, remodeling or construction materials and waste, packing material like boxes, grapevines for decorative purposes or as nursery stock, and any outdoor household articles like lawnmowers, grills, tarps and other equipment, trucks or vehicles typically not stored indoors.

Businesses in the general quarantine area need to obtain a Certificate of Limited Permit from the department in order to move articles. Criminal and civil penalties of up to \$20,000 and prison time can be imposed for violations by businesses or individuals.

Background, Identification & Damage

The Spotted Lanternfly, which has no known impacts to human health, is an inch-long black, red and white spotted pest and is native to China, India, Japan and Vietnam. It's an invasive species in Korea, where it has attacked 25 plant species which also grow in Pennsylvania.



Figure 1. Lateral view of an adult *Lycorma delicatula*. Photograph by Lawrence Barringer, Pennsylvania Department of Agriculture

Spotted Lanternfly, *Lycorma delicatula*, attacks grapes, apples, pines and stone fruits. It often attaches to the bark of Tree of Heaven (*Ailanthus altissima*) – sometimes referred to as Paradise Tree – an invasive species similar to Sumac that can be found around parking lots or along tree lines. Adults often cluster in groups and lay egg masses containing 30-50 eggs that adhere to flat surfaces including tree bark. Freshly laid egg masses have a grey waxy mud-like coating, while hatched eggs appear as brownish seed-like deposits in four to seven columns about an inch long. Trees attacked by the Spotted Lanternfly will show a grey or black trail of sap down the trunk.

[Editor's Note: In New England, if you collect a specimen that you suspect is Spotted Lanternfly, contact your local Extension Office for instructions for how to confirm what the specimen is.]



Figure 2 *Lycorma* adult with wings spread showing colorful hind wing. Photograph by Holly Ragusa, Pennsylvania Department of Agriculture

New to the United States, the invasive insect was first found in Berks County last fall. The department is investigating the quarantined and surrounding areas to assess the spread and impact of the pest. October and November, when the insects are in their adult stage, is the easiest time to scan for and find the pest in a new area. Residents in and around the quarantine areas are encouraged to inspect their properties for spotted lanternfly. Additional townships may be added to the quarantine, but with the identification of each infestation, we come one step closer to controlling spotted lanternfly and the damage it might cause our economy and our environment.

All Pennsylvanians are encouraged to watch for the Spotted Lanternfly and offered the following suggestions:

In months when adults are active, do a quick inspection of your vehicle any time you move in or near a quarantine area, to find any spotted lanternfly hitchhikers.

If you see eggs on trees or other smooth outdoor surfaces: Scrape them off, double bag them and throw them in the garbage, or place the eggs in alcohol or hand sanitizer to kill them.

If you collect a specimen:

First, place the sample in alcohol or hand sanitizer in a leak proof container. Submit the specimen to your county Penn State Extension office or to the department's Entomology Lab for verification. Don't move live specimens around, even within the quarantined area. There are many places under quarantine that do not yet have active populations of spotted lanternfly – you do not want to help them establish a new home base. If you take a photo: Submit photo of adults or egg masses to badbug@pa.gov. If you report a site: Call the Invasive Species report line at 1-866-253-7189 with details of the sighting and your contact information. While Pennsylvanians can submit suspect spotted lanternfly to the department headquarters in Harrisburg or to its six regional office locations, [county Penn State Extension offices are often a closer, faster option.](#)

[For more information about the Spotted Lanternfly](#)

(Source: Penn State Fruit Times, Nov. 2015)

Resistance Management The Topic Of Highly Needed IPM Training Session In The Northeast

NEIPM Press Release

[**Editor's Note:** *This series has been completed but is available online as archived webinars. They are very useful for understanding how resistance management works and can/should be viewed by anyone who applies pesticides.*]

It is not often that attempts are made to unify groups and individuals around a controversial topic, yet that is the goal of a professional development program being offered by the University of Massachusetts. Resistance management has long been a focus of integrated pest management or IPM and now a new series of webinars will attempt bring educators to a common level of knowledge for unifying programs aimed at helping constituents growing fruits and vegetables.

The four part webinar series will include experts discussing general resistance management and specific topics related to fungicide, insecticide, and herbicide resistance using an IPM approach. It is expected that the series will result in increased understanding of pesticide and resistance modes of action, allow participants to better educate growers about resistance management, and promote the use of IPM as a consistent and comprehensive approach to slow the development of pesticide resistance, improve pesticide efficacy and longevity, environmental stewardship, and farm sustainability.

“This has been a topic that Extension professionals have asked for training on and we’re trying to provide that,” says Hilary Sandler, University of Massachusetts Cranberry Station researcher and project leader. In a recent survey, over 90% of respondents from the Extension field were concerned about resistance management issues, yet less than half felt they were well-prepared to teach about it. “We want to change this,” says Sandler, “and one of the best ways is to bring in experts to share the IPM science that is best for addressing resistance issues.”

The upcoming webinars are scheduled to begin on November 30 and will continue through December. The entire webinar series is free and open to Extension specialists, as well as growers, farmers, and anyone working in vegetable and fruit production in the Northeast or across the country. All of the details including registration information can be found at the University of Massachusetts website: http://www.umass.edu/cranberry/newsevents/RM_webinars.html or by contacting Hilary Sandler (hsandler@umass.edu or 508-295-2212 x21).

UPCOMING MEETINGS:

January 4, 2016 – *Making It Happen: Profitability & Success*, 12-5pm. Rutland Area Farm & Food Link, Energy Innovation Center, Conference Room, Rutland, Rutland, VT. \$15 per farm. For more information and to register: <http://www.rutlandfarmandfood.org/workshop>.

January 7, 2016 - *Making It Happen: Profitability & Success*, 12-5pm. Intervale Center. For more information email Maggie@intervale.org.

January 7-9, 2016 – *North American Strawberry Growers Conference*. Savannah International Trade & Convention Center, Savannah GA. For information go to: <http://www.nasga.org/n-american-strawberry-growers-conference.htm>.

January 11, 2016 - *CT Vegetable and Small Fruit Conference* at Maneely’s Conference Center, 65 Rye St, S. Windsor, CT. For more information contact Mackenzie.White@uconn.edu or 860-875-3331

January 16, 2016 – *NOFA – Mass Winter Conference*. Worcester State University. You can learn more about the conference and register at www.nofamass.org/events/wc.

January 22-24, 2016 – *NOFA-NY Winter Conference*. Saratoga Hilton and City Center, Saratoga Springs, NY. For more info see www.nofany.org.

Jan. 25, 2016 - *Vermont Vegetable and Berry Growers Assn Annual Meeting*, Fairlee, VT. For registration information see: <http://www.uvm.edu/vtvegandberry/?Page=meetlist.html>.

Feb. 13-15, 2016 - *NOFA-VT Winter Conference*, Burlington, VT. For registration information see: <http://www.uvm.edu/vtvegandberry/?Page=meetlist.html>.

March 1-4, 2016 - *North American Raspberry & Blackberry Conference*, Williamsburg, Virginia. All-day tour on March 2, educational sessions and trade show on March 3-4. For more information, visit www.raspberryblackberry.com.

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