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IN THIS ISSUE:

SHORTS:

2011 New England Vegetable & Fruit Conference a great success: The 2011 NEV&FConference held from Dec. 13-15 drew a record attendance of 1,700 over the three days. The trade show also hit a new high with 114 vendors. There were 36 educational sessions and 10 farmer-to-farmer sessions. Thanks to all who helped pull this together and to all who attended. Time to start planning for 2013!

New UMass Fruit Team Website Launched: An updated and redesigned website for the UMass Extension Fruit Team has been launched at http://extension.umass.edu/fruitadvisor/. Information for Massachusetts (and New England) fruit growers will now appear on this new site. This will include links to important publications, archived newsletters, meeting announcements, important pest alerts, weather data, forecasts and pest models, and more. Please set your browser to this new link in place of the old one.

Do you own woods? Hit hard by the recent storms? Attend the upcoming WOODS FORUM to discuss caring for your woods today and planning for the future of your land. Share your questions, concerns and advice. Hear other landowners' experiences and meet local forestry and conservation professionals. The forum will be held **Thursday, January 26, 6:30 - 8:30pm at the West Brookfield Town Hall, 2 East Main St/Route 9, West Brookfield, Mass.** Hosted by MassConn Sustainable Forest Partnership and UMass Amherst. Space is limited, please save your spot today! RSVP: Tyler Van Fleet, Coordinator, 207-939-7674 or **tyler.vanfleet@gmail.com**.

Innovative Strawberry Growing Ideas

Cathy Heidenrdich, Cornell University

What are some of the newer ideas in strawberry production in the Northeast and Canada? Are they meeting with success?

Not Your Father's Matted Rows

Plasticulture Strawberries

Ohio growers are having success using plasticulture production systems for strawberries. They are growing June-bearers and day-neutrals on black plastic using a 2-row per bed system. The typical production cycle is 2 years. NY growers continue to experiment with plasticulture strawberries – both June-bearers grown in perennial systems and day neutrals grown as annuals or on a 2 year cycle. These are both grown on traditional black or white plastic mulch or on biodegradable mulch. Not all attempts have been successful but much progress is being made. Fertility issues affecting fruit quality, varieties and production systems suitable for NY are still under investigation.

Both Quebec and Ontario are having excellent success with plasticulture production of day neutrals. Annual production systems using day neutrals are established in June using dormant crowns, and harvested from June until frost. These plantings were initially carried over for a spring crop but berry size was small. To capture earliness without compromising fruit size, a second production system was adopted where fall plantings are established using plug plants. There is some risk associated with fall planting as plants not sufficiently established tend to be more prone to frost injury. Wind breaks and/or fencing is used to encourage snow accumulation to protect plants during the winter.

Fields for fall or spring planting are fumigated in late summer before being fitted with raised beds/plastic. This allows for the earliest spring planting. The beds are 4-ft wide and 10" high and are covered with black plastic mulch. Two drip tapes run down each row under the plastic. Plants are spaced 8" in row and 16" between rows on the plastic (20,000 plants/A). 'Seascape' is the variety under production in these systems. Fall planted plug plants are overhead watered 2 times a day in addition to trickle irrigation during the first 2 weeks after planting. This is especially critical during warm August weather. Pre- emergent applications of Chateau and Sinbar are made only in the 2.5' wide alleyway area between the beds to help avoid any potential injury to the transplants. Runners are removed weekly. Pest issues include Tarnished Plant Bug, Two-Spotted Spider Mites, Powdery Mildew and Gray Mold. Harvest begins in early June; berries are picked every 2 days while they are bearing.

More information:

1. Dale, A. and Pritts, M. 1989. Day neutral Strawberries.
2. http://www.omafra.gov.on.ca/english/crops/facts/89-099.htm
3. Nourse, Nate. 2012. Plasticulture 2012: June-bearing and Everbearing Strawberry Production with Dormant Plants. http://noursefarms.com/assets/2012-4_plastic.pdf
4. Poling, B., Krewer, K., and Powell Smith, J. 2005. Southeast Regional Strawberry Plasticulture Production Guide. http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2005culturalguidepart1bs1.pdf

Hydroponic Strawberries

Interest in hydroponic strawberry production is growing in NY and across the Northeast. Both commercially available and owner/operator designed systems are currently in use in the field and under protected production in high tunnels. Stackers - Commercial systems like hydrostackers are popular. The typical field stacker operation is a 1⁄4 acre plot with 15,000 plants growing in an artificial potting medium. Each "stack" has 5 Styrofoam planting units that hold 4 plants each. These are assembled in rows with weed barrier below. Automated irrigation/fertilization/pesticide application systems are in place at the top and mid-level of each row of plants. Varieties under production include 'Seascape' and 'Albion'. Berries are typically harvested from mid-June to late October. Most operations are U- pick. Berry stems are cut with scissors allowing berries to drop gently into baskets (both scissors and baskets with liners provided). Alternatively, they may be purchased pre-picked from the farm stand. Some growers also sell at local farmers markets; berries not suitable for marketing as fresh fruit are often used to make value-added products also sold through the farm stand. Pest issues for this type of production system include American Robins, Gray Mold, Powdery Mildew, Tarnished Plant Bug, Leaf rollers/Skeletonizers and Two-Spotted Spider Mites. Vertical growing systems are also being used in commercial and DIY high tunnels. Pest issues here are minor compared to field production and chiefly include Two-Spotted Spider Mites and Powdery Mildew. *More information:* Hydro-Stacker Vertical Hydroponic Growing Systems - http://www.hydrostacker.com/ and Verti-gro - http://vertigro.com/.

DIY Hydroponic Systems - One enterprising NY grower designed and built his own hydroponic system and has used it successfully with both tomatoes and strawberries. Using lengths of square PVC pipe he plumbed an 8-row system in his high tunnel. 4 inch diameter holes were drilled at evenly spaced intervals along the pipe. Pipes are connected using T's. Dormant strawberry plants were

planted in 4 inch open mesh weave pots filled with pebbles. These are set into the hole in the pipes. Water and nutrients are circulated through the system on a regular basis.

High Tunnel Strawberries

Day Neutrals - The season extension aspect of day neutrals is magnified when grown in a tunnel. Additionally, strawberries can fill valuable space where other crops would simply not fit. If they are treated as annuals, they just go into a regular rotation with other veg crops. Several production schemes are in use, including traditional matted rows, plasticulture, soil socks, hydroponics, etc. *More information*: Jett, L. 2006. Growing Strawberries in High Tunnels in Missouri. http://www.hightunnels.org/PDF/Growing_Strawberries_in_High_Tunnels.pdf; Rowley, D., Black, B., and Drost, D. 2010. High Tunnel Strawberry production. http://extension.usu.edu/files/publications/publication/Horticulture_HighTunnels_2010-01pr.pdf.

Not Your Mother's June-bearers

Day Neutral Strawberries

Unlike their June-bearing cousins that fruit once a season, day neutral strawberries flower and fruit continuously (for the most part) from mid-June until frost. They may be grown either in traditional matted row systems or in plasticulture or hydroponic systems. The first commercial day neutral strawberry varieties were released in the early 1980's by the Maryland Agricultural Experiment Station in conjunction with USDA-ARS. These were 'Tribute' and 'Tristar'. Other releases followed from the University of California Davis Breeding program, including 'Seascape' (1991) and 'Albion (2004)' which are the mainstays of day neutral production in the

Northeast. 'Other new day neutral releases from the UC Davis breeding program ('Monterey', 'Pacific', 'Palomar', 'Portola', and 'San Andreas', 2009) have not been fully evaluated under NE growing conditions. One eastern NY grower who has trialed Portola and Monterey reports Portola looks to have the MOST promise, although Monterey is also good, but a bit late and not enough yield. Portola kept going even when Seascape petered out a bit.

You may also be asked information about growing cuttings and planting in the summer (Chandler) simply because many small growers in New England and eastern NY have such high value markets and are selling produce all winter long. Those very early season berries really bring a LOT of money and are worth just putting in a bit so that they can capitalize on them. *Alpine Strawberries* Alpine strawberries (*Fragaria vesca*) are a gourmet type strawberry also known as "Fraises des bois" (woods strawberries). They have recently come back under consideration as a potential commercial strawberry crop for sale to gourmet market outlets such as high end restaurants. They are available in red, white or yellow fruited open pollinated varieties. Fruits are small but highly fragrant. These berries are labor intensive in terms of harvesting. *More information:* Wellik, M. Growing Gourmet Strawberries Commercially. http://www.thestrawberrystore.com/GrowingGourmetStrawberriesCommercially.pdf

Other Bright Ideas...

Strawberries on Raised Beds

Growers in western NY often have rocky heavy clay soils to deal with. Strawberry production is problematic for these growers because of drainage issues and root rot diseases. One commercial berry operation has gone exclusively to raised bed production for strawberries. This system, in conjunction with the use of resistant varieties, has made commercial strawberry production possible and profitable for their operation.

The next 2 bright ideas attempt to address weed control during the establishment year of perennial matted row strawberries while reducing cultivation and herbicide inputs and improving soil health.

No-till/Zone-till Strawberries

A 2009 Cornell University project focused on controlling weeds in strawberries during the establishment year by transplanting dormant berry plants into a killed cover crop (Winter rye, *S. cereale,* 80 lb/A). Results from this project indicated this technique showed great promise but revealed a significant barrier. Most growers had difficulty planting through the killed cover crop. This resulted in

slower establishment during the first month and caused skips.

Another related Cornell project nearing completion compares no-till, zone till and conventional tillage strawberry production. An Unverferth ripper/stripper was used to create a 6" tilled zone in the cover crop and the berries were planted in that zone. Its sub-soiler loosens soil deeply followed by coulters and a rolling basket that prepare a6-10" wide seedbed. This technique allows the longer rooted strawberry plant to be correctly planted while still having minimum soil disturbance between the rows. By only tilling this narrow area, the chance of new weed seeds being brought to the surface for germination is reduced. Because the strawberry plants will get off to a good start, they should out-compete weed competitors in the tilled zone. The addition of the shank allows for improved water drainage therefore reducing disease pressure from soil borne diseases like Phytophthora fruit rot. The use of reduced tillage tools usually requires a single trip across a field for it to be fitted for planting – an important advantage that translates into less labor, reduced fuel consumption and a decreased risk of soil compaction.

Strawberries and Biofilm

Biotelo mulch film was used in Cornell research and demonstration trials on grower strawberry farms for planting year weed management trials. This mulch is made of Mater-Bi, a thermoplastic material mainly derived from corn starch. The mulch is certified compostable and is IFOAM approved for use by European organic farms. Novamont, the maker, has not yet pursued approval for use in U.S. organic systems. The MaterBi mulch is an embossed mulch film manufactured using the same technologies used to produce conventional plastic mulch film. Mater-Bi's physical and chemical properties are similar to those of traditional plastics, but Mater-Bi mulches biodegrade at a rate similar to pure cellulose. Biofilms degrade as soon as they are stretched during field application and continue to break down in soil after incorporation. For the demonstrations, we used a .6 mil Biotelo mulch film. The rolls were 48" wide and 5000' long. As of November 2008, the cost is $400/roll.

Biofilm decomposes more quickly when applied to soils with high organic matter content, so growers with plantings on sandy soil thought breakdown was slow. One Long Island grower in particular saw very little decomposition after 16 weeks. This is a problem as strawberry runners could not root through the intact biofilm. Growers with more organic soils were happier with the rate of decomposition and the degree of weed suppression. These growers reported that they did not need additional in-row herbicides, tilling, or hand labor during the first year growing season. Further, they felt that the berries grown on biofilm were more vigorous than the conventional matted row plant. *Sources of Biofilm*: Biobag USA, www.biobagusa.com, 1-800-959-2247 or Dubois Agrinovation, www.DuboisAg.com, 1-800-667-6279.

Strawberries and Bird Netting

One last comment on a probable production change is netting for birds in strawberries. Bird damage in strawberries was a HUGE concern this year in the Northeast region, and many growers are planning on netting strawberries in 2012. Remember, the scale of the planting is so much smaller in this area, that this type of intervention is not unreasonable for the value of the crop. (***Source**: 2011 New England Vegetable & Fruit Conference Proceedings*)

RASPBERRIES/BLACKBERRIES

Managing Fertility in Bramble Crops

Laura McDermott, Cornell University

Basic Soil Fertility Concepts Managing plant and soil fertility in bramble crops is important for optimum production. Nutrient management is not an easy proposition as it varies from farm to farm, and even from site to site on the same farm. Soil variability, along with differences in management practices and weather make it impossible to have a menu driven protocol for farmers to follow. Farmers need to make changes according to specific situations and in order to do that they need to know the basics of nutrient management as it pertains to bramble crops.

The nutrient availability of soils is less understood by farmers than the physical differences between soil types i.e. water and nutrient retention. Soil nutrient tests are used to measure the plant-available nutrients in the soil. They do not measure the total nutrients in the soil, which often is significantly higher than what is available. The type of soil influences how much nutrients are available. If soil particles are small (clay), soil nutrient availability is higher, but those same soils may contain high levels of certain nutrients that block availability of certain nutrients.

Nutrients are available to plants as individual ions with either a positive charge (cation) or a negative charge (anion). The charge impacts how the ion behaves in the soil, for instance ammonium (NH4+) is retained by soil adsorption and nitrate (NO3-) is often leached despite the fact that both of these forms of N are available to plants.

As the plant absorbs the ammonium cation, it excretes one H+ proton so that there is a neutral charge in the plant. As those positively charged protons accumulate in the soil, the soil pH (a measure of soil acidity) drops and thus alters the availability of other plant nutrients. This is when lime and sulfur come into use. Bramble crops need a soil pH of 6.0 – 6.5, forgiving really, but when even the type of fertilizer one uses could alter the ability of the plant to access nutrients it becomes clear that soil fertility management is a challenging endeavor.

Diagnosing Nutrient Problems Visual diagnosis is the most common means of detection of fertility problems, but it is the least reliable. Plant symptoms like poor plant vigor, pale leaf color, and distorted fruit are also symptoms of some pest and cultural problems as well as the result of many different nutrient deficiencies or toxicities. Designing a nutrient program by visual symptoms alone will likely be ineffective. Instead, growers should become familiar and comfortable with laboratory analyses. Consistent use of soil tests and foliar analysis can reveal the information necessary for good nutrient management.

116• Soil Tests estimate the amount of nutrients available to plants. In order to be effective, soil test samples must be taken correctly. Farmers should be mindful of soil changes within a field and understand that in those cases, two soil tests should be done. Soil tests should be conducted in the fall of the year prior to planting. This allows nutrients and other amendments to be added and incorporated adequately before planting begins. Nitrogen is the exception to this rule. Soil test results from one lab to another cannot be compared because the extraction methods vary. Similarly, the extraction methods used for macronutrients are not appropriate for estimating levels of micronutrients, and often micronutrients cause the most problem in bramble plantings.

• Plant Tissue Testing measures the exact amount of nutrients in the plant part that was submitted at that point in time. Recommendations are based on the levels of these nutrients at specific times of the year. Depending upon the lab that you choose, sufficiency levels for a relatively "minor" crop like brambles may or may not be based on known ranges for raspberries/blackberries. However, if you refer to known sufficiency ranges separate from your lab, you can ensure that you are basing your management on research supported data. See Table 1. for sufficiency ranges.

• Plant sap testing is a new way to track N availability without waiting for results, but this does require time and regularity.

Table 1. Sufficiency ranges for foliar nutrient level in bramble leaves in midsummer (perennial systems).*

Nutrient	Deficient below	Sufficient	Excess
N %	1.9	2.0-3.0	4.0
P%	0.20	0.25-0.40	0.50
K %	1.3	1.5-2.5	3.5
Ca %	0.5	0.6-2.0	2.5
Mg %	0.25	0.6-0.9	1.0
S%	0.35	0.4-0.6	0.8
B (ppm)	23	30-70	90
Fe (ppm)	40	60-250	350
Mn (ppm)	35	50-200	350
Cu (ppm)	3	6-20	30
Zn (ppm)	10	20-50	80

* Raspberry and Blackberry Production Guide: For the Northeast, NRAES-35

A combination of soil testing and tissue analysis along with good visual observation of the crop response to fertilizer is the best approach to assessing nutrient status. Growers should test the soil prior to planting and make amendments according to recommendations. When the plant reaches maturity, conduct a foliar tissue test a minimum of every other year. Conduct soil tests every 3 years. Be alert for problems or changes that occur to the crop during the growing season.

Nutrients Required for Optimum Growth

Nitrogen makes up 2-3% of bramble plant dry matter. According to Table 1, if bramble leaf nitrogen is less than 1.9% N the plant is deficient and likely not very productive. Signs of N deficiency are yellow leaf color

and/or tips of older leaves turning red. N toxicity is a problem if the tissue test reveals greater than 3% N resulting in plants that appear too vigorous, with few flower buds.

In newly planted fields, Calcium Nitrate is the fertilizer of choice because it has a readily available form of N that does not volatilize. In established fields ammonium nitrate supplies a quick Nitrate response and a slow release response due to the ammonium. This material has become less available than in the past, due to its explosive characteristics. Urea then is the least expensive N source, but it is subject to volatilization unless incorporated. Foliar urea can only be used in small doses, less than 2 pounds per acre of actual N. For information on N guidelines for berries, refer to Table 2.

Table 2. Nitrogen guidelines for raspberries*

Age of Planting (yrs)	Amount/Timing (actual N)	N source	Comments
Summer-bearing			
0	25-35 lb/A 4 weeks after planting	Calcium nitrate	Avoid touching plants with fertilizer after planting
1	35-55 lb/A May, or split between May and June	Urea, ammonium nitrate	Use higher amount on sandier soils or if using irrigation
2+	40-80 lb/A May or split between May and June	Urea, ammonium nitrate	Use higher amount on sandier soils or if using irrigation
Fall bearing			
0	25 lb/A 4 weeks after planting and in August	Calcium nitrate	Avoid touching plants with fertilizer after planting
1	50-80 lb/A split between May and June	Urea, ammonium nitrate	Use higher amount on sandier soils or if using irrigation
2+	70-100 lb/A split between May and June	Urea, ammonium nitrate	Use higher amount on sandier soils or if using irrigation. Adjust in response to leaf analysis

* Raspberry and Blackberry Production Guide: For the Northeast, NRAES-35

The other macro nutrients critical to bramble growth and development are Phosphorus (P) and Potassium (K). Uptake of both of these nutrients is primarily through diffusion, so the increased advantage of a large plant root mass will aid uptake. Berries tend to have a low demand for P relative to other crops, and given that soil pH impacts P availability – pH needs to be close to 6.5 - most fields in the Northeast are not deficient. Too much P however, can interfere with micronutrient uptake. When applying P through a drip system, be aware that many sources of P are incompatible with other fertilizers.

Brambles have a relatively high demand for K and the availability of the K in the soil is very dependent on soil chemistry. Increasing soil organic matter will help to increase the exchange capacity of the soil. Pre-plant incorporation of K is the most effective, while fertigation can be used to supply potassium during the season to established plantings. Potassium levels in leaves tend to fluctuate during the season dropping as crop load increases. Adding K during the season is sometimes necessary. Potassium sulfate or potassium magnesium sulfate are the best sources of potassium for brambles. Muriate of potash is inexpensive, but it has chloride in it that causes problems with brambles.

More specific information about micro nutrients and soil management can be found in the Raspberry and Blackberry Production Guide – NRAES-35. (***Source**: 2011 New England Vegetable & Fruit Conference Proceedings*)

BLUEBERRY

Organic Blueberry Production Research Project: Roots

Luis Valenzuela-Estrada et al, Oregon State University

Introduction - Highbush blueberry roots are relatively shallow compared to other perennial fruit crops (Fig. 1). The roots are generally located in the top 1.5 feet (~0.5 m) of soil and are most concentrated near the soil surface. Nutrients are absorbed mostly through the finest roots. The average size of these fine roots is only about 20–75 micrometers in diameter (Valenzuela-Estrada et al., 2008). In comparison, a human hair is about 80 micrometers in diameter.

Figure 1. Root ball of a "Duke" blueberry plant. The plant was dug up in October 2007 after one growing season. Photo credit: Bernadine Strik, Oregon State University.

Highbush blueberries grow best on well-drained soils that have a high organic matter content and a pH of 4.2–5.5 (Strik et al., 1993). Blueberry plants, however, are relatively intolerant of high soil salt content, which is often measured as soil electrical conductivity (EC). Soil EC reflects the amount of nutrients, including nitrogen, in the soil solution. High EC values indicate an excess of nutrients that can damage the roots, stunt plant growth, and—in severe cases—kill the plants.

Objective and Research questions

Objective: Evaluate the effects of organic management systems on soil water and nutrient availability and the distribution of blueberry roots. The management systems being compared include flat vs. raised planting beds, sawdust mulch vs. weed mat (used for weed control), and two different rates of organic fish fertilizer: 25 and 50 lb/acre of N (29 and 57 kg/ha of N).The timing of new root development is also being examined. The knowledge of when new root growth occurs will be useful for determining when and where irrigation water and fertilizers should be applied.

Methods of investigation - Roots are monitored in this study by way of a series of digital photographs, which are taken in the soil every two weeks (Fig. 2). The photographs are taken inside clear plastic tubes, referred to as minirhizotrons, which are installed near the plants at a depth of approximately 2 feet (60 cm). From these images, information is gathered about when new roots appear and when old roots die, the total number of new roots produced on the windows, root diameter and length, and any changes in root color.

The fertility available to the roots is monitored using plant-root simulator probes (PRS probes). The PRS probes absorb nutrients in a manner similar to plant roots and are used to evaluate the total amount of soil nutrients available to the plants. Soil solution is also being analyzed. Soil solution is extracted with syringe-like devices called suction lysimeters. The lysimeters are buried at two different soil depths, 6–10 inches (15–25 cm) and 14–18 inches (35–45 cm), which represent the predominant rooting depth and below, respectively. The pH, EC, and nitrogen (nitrate and ammonium) concentration of the soil solution is then determined in the laboratory. Finally, soil water content is measured at 0–30 cm depth by time-domain reflectometry (TDR).

Findings to date

Root growth - After the first three years of the experiment, the plants produced more roots (1) in raised beds than in flat beds, (2) with sawdust mulch than with

Figure 2. [left] Minirhizotron camera used to photograph roots of a blueberry plant in the field at the OSU North Willamette Research & Extension Center. [right] An image of blueberry roots taken with the minirhizotron camera. Roots are highlighted (red line = first-order root; green line = second-order root) using computer software designed to measure root characteristics. Photo credit: Luis Valenzuela, Oregon State University.

weed mat, and (3) with the lower rate of fish fertilizer than with higher rate of fertilizer (Fig. 3). Plants on raised beds and grown with less fertilizer also produced deeper roots (Fig. 4). In 2009, during the third year after planting, a flush of new root growth was observed immediately after fruit harvest (data not shown).

Figure 3. Effects of bed type (A), weed control method (B), and amount of organic fish fertilizer (C) on new root production in "Duke" blueberry. Different letters above the bars indicate a significant difference at P = 0.05.

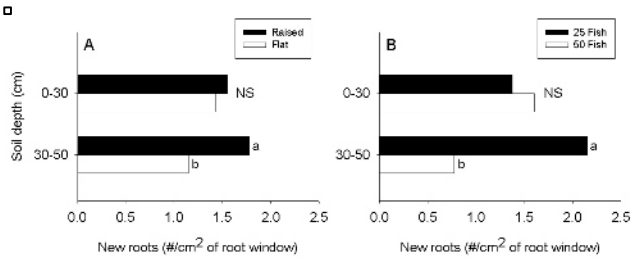

Figure 4. Effects of bed type (A) and amount of organic fish fertilizer (B) on the depth of new root production in "Duke" blueberry. Roots were measured at 0–30 cm (0–12 in.) and 30–50 cm (12–20 in.) soil depths. Different letters beside the bars indicate a significant difference at P = 0.05 and NS = non-significant.

Soil pH - While soil pH was higher under weed mat than under sawdust mulch (data not shown), soil solution pH was about a unit lower under weed mat than under sawdust mulch (Fig. 5). This was unexpected because Douglas fir sawdust has a pH of about 4.1 and therefore is usually thought to lower soil pH.

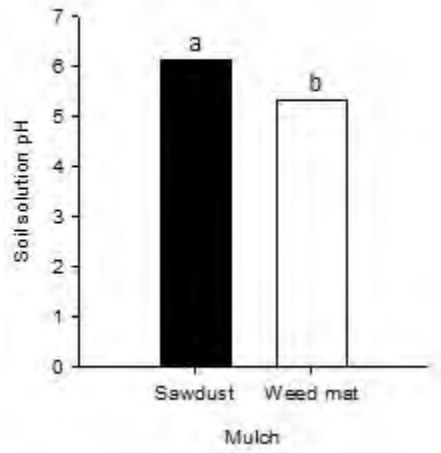

Figure 5. Soil solution pH under weed mat and sawdust mulch. Different letters above the bars indicate a significant difference at P = 0.05.

Soil EC - Soil solution EC level was very low (less than 0.3 mS/cm) at both the low and high fertilizer rates, which indicates both rates were low enough to avoid salt injury to the plants. Blueberries are considered sensitive to soluble salt concentrations above 2 mS/cm.

Soil N - Total nitrogen (nitrate and ammonium) availability was higher, as expected, when more fertilizer was applied, but was similar in raised and flat beds, as well as under sawdust mulch and weed mat.

Soil water content - Although more irrigation water was applied to raised beds than to flat beds, raised beds with sawdust mulch generally had lower soil water content than raised beds with weed mat, or than flat beds with sawdust or weed mat (Fig. 6). Differences in irrigation and soil water content often affect soil chemistry and root dynamics and therefore may account for some of the differences in root production observed in the present study. For example, less soil water content in the raised beds may have resulted in more root production in the beds (Fig. 3A). Lower soil water content may have also increased root production under sawdust (Fig. 3B), although daytime soil temperature was also lower under sawdust, particularly in late July and early August after harvest (data not shown).

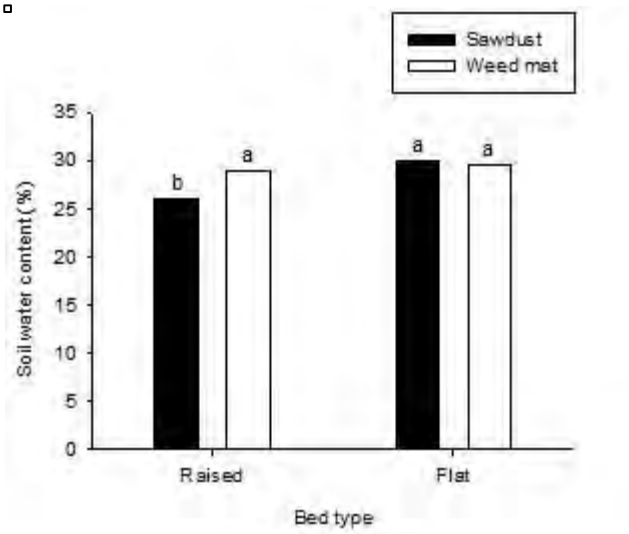

Figure 6. Soil water content measured at a depth of 0–30 cm in flat and raised beds covered with sawdust mulch or weed mat. Values were averaged over the 2009 season. Different letters indicate a significant difference among treatments at P = 0.05.

References and Citations

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http://extension.oregonstate.edu/catalog/pdf/pnw/pnw215.pdf) (verified 26 January, 2011).

Valenzuela-Estrada, L. R., D. M. Eissenstat, L. E. Ruth, and V. Vera-Caraballo. 2008. Root anatomy, morphology, and longevity among root orders in *Vaccinium corymbosum* (Ericaceae). American Journal of Botany 95: 1506–1514. (Available online at http://www.amjbot.org/cgi/content/abstract/95/12/1506) (verified 27 January, 2011).

Additional Resources

Waisel, Y., A. Eshel, and U. Kafkafi (ed.) 2002. Plant roots: The hidden half. Third edition. CRC Press, Boca Raton, FL.

This is an eOrganic article and was reviewed for compliance with National Organic Program regulations by members of the eOrganic community. Always check with your organic certification agency before adopting new practices or using new materials. For more information, refer to eOrganic's articles on organic certification.

*(**Source**: eExtension Organic Agricutlure website: http://www.extension.org/pages/32763/organic-blueberry-production-research-project:-roots)*

GRAPE

Grapevine Nutrition 101

Kevin Ker, Brock University

To develop a good vineyard nutrient management plan requires one to do a self check to establish what is happening, why and what can be done to change things.

1. Goals and Objectives: What are your goals for the vineyard?

a) Better yields - overall or per vine

b) Better fruit quality at harvest - Brix, TA, pH, fruit colour, flavours???

c) Better efficiency in production – reduce inputs or improve labour efficiency

d) Improve vine health – winter survival, better cane selection, reduce pest impact

e) Responding to vine signs or symptoms of problems starting or progressing

To answer the above questions requires some self assessment of the vineyard health and productivity. This may require the collection some additional information, however in many cases much of the information is already in your possession. What type of information do I already have on hand?

Vineyard Facts - Cultivar, rootstock, spacing, training system, pruning practices; Awareness of areas of missing vines (this impacts on efficiency and economics);Topography; Climatic variables; Soil management; Signs or Symptoms of problems or areas of excellent vine health/productivity

Vineyard performance - Historical yields; Fruit quality at harvest; Within vineyard variables; Current nutrient program; Costs of inputs

Grapevine nutrition needs to look at the vines as individuals but also as part the bigger group (kind of like cows in a herd). The productivity of each vine impacts on the overall yield but you cannot spend an excessive amount of time or money on a few individual vines at the expense of the entire vineyard. What is needed is to achieve the best fit or a program that works for the majority and is viable instead of spending extra money on a treatment of the whole block just to improve the few vines that are not performing up to standards. In many cases, underperforming vines may be a result of poor pruning, or poor soil attributes or they may just be poor vine. Before applying any extra sprays or nutrients you need to be sure what is the real problem causing the signs or symptoms you are seeing.

From a nutrition standpoint you need to understand:

- What are the critical nutrient elements necessary for premium production?
- What do I have right now at my site?
- How can I assess what I need or do not need?

2. Critical or Essential elements

- **Nitrogen** - Most essential element of plants; Part of chlorophyll molecule to allow for photosynthesis – Sunlight into Wine!; Part of genetic building blocks; Part of enzymes regulating vine growth rates and functions
- **Phosphorus** - Stimulates flowering and fruiting; Stimulates root development; Fruit composition and wine quality; Resistance to disease; Uptake of other nutrients; Part of plant enzymes and proteins; Important part of reproductive growth – part of genetic memory of the vine; Involved in formation and translocation of sugars and starches; Part of seed maturation – important for fruit ripening!
- **Potassium -** Water uptake from roots; Water retention in the plant; Movement of carbohydrates (sugars) throughout the plant (berry accumulation);

Carbohydrate metabolism; Nitrogen uptake, cell growth and structure; Vine Hardiness

- **Calcium** - Key component in cell walls; May influence berry skin durability; Allows for cell division and elongation (berry size increase!); Involved with seed formation; Component of vine structural strength
- **Magnesium** - Essential part of chlorophyll molecule; Aids in formation of sugars and flavour compounds; Helps with enzyme activity; Part of protein formation

Assessing What is There

For most growers, observing the plant growth and fruiting characteristics is the most common method of first identifying if there are issues in the vineyard. Most people respond to signs or signals of poor vine performance and look immediately to correct them with some form of supplemental application or treatment.

You should be aware of the impacts of the " unseen" factors that can significantly impact vine health and nutrient uptake . These include: soil pH, soil texture, soil moisture, organic matter levels and rooting depth. Before doing anything, it is vital to understand that nutrient availability and plant response is a dynamic situation not a stationary or static position. Over the season the plant is going through a substantial number of changes and demands depending on where it is in the growth cycle.

There are two perspectives to looking at vine nutrition;

1. What is available for the vine to take up (the soil or "buffet table")?
2. What is the vine actually getting (the tissue or "patient blood test")?

Soil and Tissue sampling can help in the decision making process. They can provide data to:

- Establish base levels of nutrients
- Diagnose problem areas
- Monitor nutrient levels
- Assist in establishing fertilizer and lime requirements

Being aware of the ever changing demands of the vine is important as is the awareness of how each element acts or reacts in the soil system and the mobility of the element within the vine after it has been taken up by the root system.

What can soil tests do for me?

- General composition of the soil
- Soil pH at time of sampling
- Assist in planning fertilization program for the future

However there are limitations – they do not take into account nitrogen content fluctuation over season. They can only provide a relative amount and availability of nutrients but do NOT tell us what the vine is actually taking up and they cannot fully reflect what perennial crops such as vines may take out of the soil for permanent plant structure (roots, trunks etc) .

What about Tissue Testing?

Tissue tests are like blood tests for people. They can be very helpful but also have limitations. They provide:

- General concentration in tissue at the time of sampling
- Results will be **variable with tissue selected and time of season selected**
- Nitrogen content will fluctuate over season
- Plant stresses not taken into consideration – e.g. drought, excessive crop level, recent pruning, shading
- Does NOT tell you what is available in the soil

Tissue tests can be very helpful in diagnosing or providing confirmation of deficiencies observed and assist in the development of plans to match soil programs with plant responses. Remember plant demands vary over the season and many times short term deficiencies rectify themselves without any intervention!

Now I Have Some Numbers, Now What? There are many different "ranges" in the literature cited as being deficient or adequate or excessive. These values are averages developed over time from any samples from specific regions or locations and are meant as guides. The most useful set of numbers are those that you develop for your own location. I highly recommend that a plan of sampling be developed that is systematic and occurs over a number of years. It is also requires sampling from the best locations and the best vines on your farm. It is from these "best producers or sites that you can develop your own set of target numbers for tissue and soil tests for your vineyards.

Basic rules to remember

1. Make a **good site map** for you and others to follow
2. Collect **data for your site** – no two locations are the same
3. **Compare your onsite values** – good balanced growth versus poor areas
4. **Be consistent** – same time each year and general locations for sampling
5. Match the application to **real need** not "suspected" need
6. Nutrient applications are **not cheap** –especially when blending in micronutrients
7. Foliar fertilizers are okay when really needed but a **luxury expense** when not really necessary
8. All purpose foliar mixtures can be expensive band aid treatments (buying lots of **things you likely do not really need** or want)
9. Read, think and ask questions – trust what you already know and have seen! (***Source****: 2011 New England Vegetable & Fruit Conference Proceedings*)

Elderberry Production in Missouri

Patrick Byers, University of Missouri Extension

Cultivars Several elderberry cultivars are available commercially, including Adams 1, Adams 2, York, Nova, Scotia, Kent, and Johns. Of these, in our trials Adams 2 has consistently outperformed all others. Recommendations from other regions include all these cultivars. A large portion of the commercial fruit crop, especially in the Midwest, is harvested from wild plants. Two selections from the Midwest, Wyldewood and Bob Gordon, were released in 2010-11 and are available from several sources.

'Wyldewood' elderberry is a new cultivar being developed in Missouri.

Propagation Elderberries are easy to propagate. Root cuttings (pencil diameter or slightly smaller, 4-6 inches long) may be dug in early March before growth begins. The cuttings are placed horizontally in a flat or pot, covered with .75 to 1 inch of a light soil or soilless medium, and kept warm and moist. Often a single root cutting will produce 2-3 plants. Dormant hardwood cuttings root easily. Collect 3-4 node cuttings before growth begins in the spring, and place the basal 2 nodes below the surface of a well drained soil or medium. Be sure that the cutting wood is not cold damaged. A dip of the basal end of the cutting in an IBA rooting powder may increase rooting. Sprouted hardwood cuttings and softwood cuttings are also easily rooted, provided provision is made to maintain high humidity around the cuttings until rooted. An intermittent mist system works well. A rooting hormone dip may be beneficial. Cuttings of 2-3 nodes root well. Remove a portion of the foliage from softwood cuttings (we usually leave only the 2 basal leaflets of each leaf). Softwood cuttings typically root well until about July 1; rooting percentage drops as the summer progresses.

Establishment Elderberries tolerate a range of soils, but do best in a moist, well drained soil. Choose a site that is in full sun. Bare root 1 year plants dug from a nursery work well for planting establishment. Recently propagated container-grown plants may be used to establish plantings during the same season. Plantings may be established from dormant cuttings stuck directly in place in the orchard, but rooting percentage may vary. Berming may benefit plant performance. Plants are spaced 4 feet apart in the planting row, with 10-12 feet between rows.

Pruning American elderberries produce fruit on shoots older than one year, and also produce suckers from the crown or root system which will bear fruit the first year. Plants may be pruned selectively, leaving a mix of young and older shoots. However, with many cultivars we have learned that the average size of panicles when shoots are renewed annually is significantly larger, suggesting that current season suckers produce larger though fewer panicles. Most of the panicles on these plants were harvested in two harvests, over a period of two weeks.

Fertilization and irrigation We apply nitrogen annually to the elderberry plantings. Mature plantings receive 60-80 pounds of nitrogen, applied at budbreak in late March – early April. We apply other nutrients every second year if needed based on a soil test (using blackberry recommendations), using a complete fertilizer as the nitrogen source. Elderberries are not drought tolerant, and we irrigate the plantings during dry periods. We use trickle irrigation. The plantings are also mulched, to help conserve soil moisture.

Elderberry pests While elderberries are relatively pest resistant, we have noted several potential problems in our plantings. An unidentified stem borer causes wilting and dieback of new shoots in April and May. Japanese beetle adults feed on foliage. The adult elder borer, also known as the elderberry longhorned beetle, has been collected from plantings in Missouri. The larva of this beetle bores into the woody parts of the plant. Stink bugs are routinely noted on ripe panicles, but the amount of damage is unknown. A potentially damaging pest is the eriophyid mite, present across Missouri. This mite causes a cupping and crinkling of the foliage, and can cause abortion of florets and young fruit. The economic impact can be severe. Fall webworms were also noted in the Mount Vernon planting. An unidentified leaf spot disease, which usually is noted in midsummer, can cause premature leaf drop and occasionally defoliation. Birds of several species will feed on elderberry fruit; those selections with pendulous panicles appear to be less attractive to birds.

Elderberry harvest, yields, and juice parameters Elderberry harvest takes place in late July, August, and early September. Entire panicles are clipped and harvested when all berries are fully colored. The panicles on current season's shoots ripen later than panicles on older wood. A bush with shoots of mixed age will ripen fruit over a 3 week period. We harvest plants at weekly intervals. Berries may be removed from the panicle by freezing the entire panicle and shaking off the fruit. The berries may be refrozen and processed as needed. Several studies suggest that average yields are around 1200 lb/acre in the first year and 8500 lb/acre in the second and succeeding years. We do not know how long a planting will remain productive; our oldest plantings have produced into year 7.

Uses and markets for elderberry fruit and flowers At present, most of the elderberries grown in the Midwest are harvested for processing markets. Several wineries produce elderberry wines from the fruit, and the flower panicles are used to flavor wines or drinks. Dried blossoms are used in teas. Jelly and jam are produced from elderberry juice or blends of elderberry and other fruits. Elderberries contain high levels of antioxidants, and elderberry juice and concentrate are marketed as nutraceuticals. The pigments in elderberry juice are suitable for colorant use. Fresh or dried fruit are used in baking and energy bars.

Additional information on elderberry, including yields, juice qualities, and results of research projects, is available from the author. (***Source**: 2011 New England Vegetable & Fruit Conference Proceedings*)

GENERAL INFORMATION

Important Message from the Massachusetts Farm to School Project

Lauren Wetherbee, Mass Farm to School

We were unable to source enough product to meet institutional demand in 2011. Even without harsh weather, we don't believe that there would have been enough fresh produce available to satisfy the needs of the schools, colleges, and hospitals with whom we work.

During the 2011-2011 school year, **217** school districts and **81** colleges and private schools in Massachusetts preferentially purchased local foods. This translated to **$1.32** million in gross farm income for the 42 farms we surveyed.

We have every reason to believe that the demand from schools, hospitals, colleges and other institutions will continue to grow and will continue to be profitable for Massachusetts farmers.

At the Mass. Farm to School Project, we offer free technical assistance to farmers interested in exploring and expanding profitable institutional sales. We would be delighted to talk with you about the possibilities of growing for this expanding market and to share information with you about the most popular products, successful sales models that farms have created around the state, and customers who have expressed significant interest.

Contact us at **413-253-3844** or by writing **info@massfarmtoschool.org**. We'd love to talk with you.

Impact of Cornell Soil Health Program on Soil Management Practices in New England

Bianca Moebius-Clune et al, Cornell University

Degraded soils in the Northeastern U.S. have become prevalent because management practices usually focus on directly "feeding the crop" with ready nutrients through fertilizers, and less so on "feeding the soil" so that it can feed the crop. Degraded soils become less resilient to more extreme temperatures and precipitation events brought on by climate change. Compaction, disease pressure, lacking resilience to droughts and intense rainfall, loss of organic matter, surface crusting, erosion, increasing inputs with stagnant or declining yields and other problems are common on Northeast farms, and result from ignoring physical and biological soil properties and the need to manage these along with nutrient contents. As agronomically essential soil functions and processes are degraded, this significantly impacts agricultural productivity and the environmental sustainability of agriculture.

Standard chemical soil analysis has been hugely successful in helping growers manage nutrient constraints to cropping, but physical and biological soil constraints that impact crops had been largely ignored by soil testing services until the first version of the Cornell Soil Health Test (CSHT; http://soilhealth.cals.cornell.edu/) became available to the public in 2006. It is available in its current form since 2007, and the team is working on making expanded packages available in the future. This test was

developed in NY State (NYS) for use in the Northeast in response to increasing concerns from growers. The CSHT measures, rates and interprets an integrative set of 15 physical, biological, and chemical indicators that represent agronomically important soil processes. Growers receive a color-coded report that provides information about which soil processes are constrained. The grower can then adapt soil management to specifically choose management strategies that promise to alleviate identified constraints.

The following developments by the Cornell Soil Health Team will be discussed:

1. Interpreting a Cornell Soil Health Report
2. A four-step process to guide management
3. decisions based on a CSHT report
4. Impact in New England thus far
5. Manual, resources

1. Interpreting a Cornell Soil Health Report

The CSHT report (Figure 1.) identifies constraints in agronomically essential soil processes (indicators and

159rating is explained in our manual). A lower rating means the process is functioning less well. The rating system is as follows: Each measured value receives a rating from 0-100. Ratings of 70 and above indicate optimal functioning (in green), while medium scores (>30, but <70, in yellow) indicate marginal functioning.

CORNELL SOIL HEALTH TEST REPORT (COMPREHENSIVE)

Name of Farmer: GATES FARM RESEARCH TRIAL				Sample ID:
Location:				**Agent:**
Field/Treatment:				**Agent's Email:**
Tillage: PLOW TILL				**Given Soil Texture: SILTY**
Crops Grown: SWEET CORN/BEANS/CORN GRAIN				**Date Sampled:** 06-May-08
	Indicators	**Value**	**Rating**	**Constraint**
PHYSICAL	Aggregate Stability (%)	17	18	aeration, infiltration, rooting
PHYSICAL	Available Water Capacity (m/m)	0.21	85	
PHYSICAL	Surface Hardness (psi)	48	93	
PHYSICAL	Subsurface Hardness (psi)	214	79	
BIOLOGICAL	Organic Matter (%)	2.6	25	energy storage, C sequestration, water retention
BIOLOGICAL	Active Carbon (ppm) [Permanganate Oxidizable]	615	50	
BIOLOGICAL	Potentially Mineralizable Nitrogen (µgN/ gdwsoil/week)	7.8	9	N Supply Capacity
BIOLOGICAL	Root Health Rating (1-9)	6.6	38	
CHEMICAL	*pH	7.0	100	
CHEMICAL	*Extractable Phosphorus (ppm) [Value <3.5 or >21.5 are downscored]	10.0	100	
CHEMICAL	*Extractable Potassium (ppm)	58	72	
CHEMICAL	*Minor Elements		100	
	OVERALL QUALITY SCORE (OUT OF 100):		64.1	**Medium**

Measured Soil Textural Class:==> silt loam
SAND (%): 41.4 SILT (%): 50.6 CLAY (%): 8.0

Ratings below 30 indicate constraints in soil processes that need to be addressed. The constraints column shows what about the soil is not functioning properly when the indicator rating is red.

2. Four-Step Process to Guide Management Decisions Based on a CSHT Report

A key concept in soil health assessment is that indicators measured in the CSHT represent how well agronomically important soil processes are functioning in the soil. For example, when aggregate stability receives a low rating (Fig. 1), this means that soil crumbs fall apart easily in the rain, and this means that problems with aeration, infiltration, shallow rooting, surface crusting and erosion are likely.

The question then is – what can a grower do to alleviate such a problem? It is important to understand that a CSHT report is a guide to management, rather than a prescription (such as nutrient recommendations). Soil health constraints generally require a more integrated and long-term approach, and there are usually many different management approaches that can mitigate the same problem. Also one management practice can affect multiple indicators. What works on one farm is not necessarily feasible or ideal on another, and so report information must be adapted situationally. It is also important to remember that soil health changes slowly over time (on the order of several years to decades).

We have developed a four-step process, to help growers (often in collaboration with their extension educators or consultants) make management decisions that will alleviate identified soil constraints. Fig. 2 (below) shows an example of this process. The grower, in Step 1, lists the constraints identified in the CSHT report (Fig. 1) and then, in Step 2, lists potential management options for those constraints. Examples of such options, such as those listed in Fig 2, Step 2, can be found on page 52 of the Cornell Soil Health Assessment Training Manual (available online, see below). For example adding or growing fresh organic matter and reducing tillage will both improve low aggregate stability and low biological activity. In Step 3, the grower then, considers relevant opportunities (such as having access to diverse equipment, and being willing to try anything) and limitations of the farm and field (such as being far from a dairy farm, and thus having no access to manure, etc). Combining the agronomic science (Steps 1 and 2) with the realities on the ground (Step 3), the grower can then plan short- and/or long-term management strategies that will be feasible on that field.

3. Impact in New England

The soil health lab has received over 700 samples from New England since 2007, most from VT (well over 400), over 200 from NH over the last two years, a few dozen from MA, and several from ME. Use of the Cornell Soil Health Test in New England has increased with almost 300 samples received this year from NH, VT and MA. The NH NRCS has integrated the soil health test in their high tunnel program and is making it available through other cost share programs as well. As part of the high tunnel program, soil health is assessed before the high tunnel is put in place, with the goal to tailor tunnel soil management to preventing degradation and improving identified constraints for sustainable long-term tunnel use. We are currently in the process of assessing the impact of our program on New England soil management practices, and will provide a summary of our findings during the presentation.

4. Manual, Resources

a. Manual – the second Edition of Cornell Soil Health Assessment Training Manual is available on our website **http://soilhealth.cals.cornell.edu**

b. Another good reference is the new edition of the book "Building Soils for Better Crops" by Fred Magdoff and Harold van Es. It can be downloaded for free from the SARE website **http://www.sare.org/publications/soils.htm**

Cornell Soil Health Test Report Field Management Sheet

Step 1. Identify constraints, prioritize Identified in the Soil Health Report	• Low aggregate stability (poor soil structure) • Low organic matter(low energy/C storage, low water retention) • Low Active C (hungry soil food web) • Low PMN (low biological activity)
Step 2. List management options Some suggestions found in Table 5 (page 52)	• Add/ grow fresh organic matter • Add stable organics (composts, biochar) • Reduce tillage intensity, Rotate with shorter season crop • Find window for shallow-rooted cover crop
Step 3. Determine site history/ farm background Note here any situational opportunities or limitations	• Far from dairy farm, Short growing season • Soil "addicted to tillage" • Diverse inventory of field equipment • Grower willing to "try anything"
Step 4. Management Strategy 2010 The agronomic science of Steps 1 and 2 combine with the grower realities of Step 3 to create Field Management Plan	• Drill barley/ timothy/ clover mix in spring • Harvest barley, Mow timothy/ clover as green manure • Fall mow, rent ripper for strip till for corn 2011 • Learn about strip tillage • (Build soil for transition to strip till)

Figure 2. Completed management decision worksheet for the CSHT report in Fig. 2.

(***Source**: 2011 New England Vegetable & Fruit Conference Proceedings*)

UPCOMING MEETINGS:

January 16-18, 2012 - *North American Raspberry & Blackberry Growers Annual Meeting and Conference.* Kalahari Resort, Sandusky OH. **For more information:** call 919-542-4037, email info@raspberryblackberry.com, or visit www.raspberryblackberry.com.

January 19, 2012 – *Connecticut Vegetable & Small Fruit Growers' Conference.* Tolland County Ag. Center, 24 Hyde Ave. Vernon, CT. 8:00 – 3:00. $30. 3 Pesticide recertification credits awarded.

January 20-22, 2012 – *NOFA-NY Winter Conference*, Saratoga Hilton and City Center, Saratoga Springs, NY. For detailed program and registration information go to http://www.nofany.org/events/winter-conference.

January 23-26, 2012 – *The Empire State Fruit & Vegetable Expo*. Oncenter Convention Center 800 South State St. Syracuse, NY. For more information go to: https://nysvga.org/expo/

January 28, 2012 – *New England Vegetable and Berry Growers Meeting.* Elks Lodge, 221 Baker Ave, Concord, MA. $10 registration fee. Pesticide recertification credit requested. Take the opportunity to join NEVBGA if you aren't a member yet. For more information contact John Howell at howell@umext.umass.edu.

January 30, 2012 – *Vermont Vegetable and Berry Growers Annual Meeting*. Montpelier VT. For more into go to http://www.uvm.edu/vtvegandberry/meetings/meetlist.html

January 31, 2012 – *CISA Marketing Your Farm Business; Brand Communications*. PotPourri Plaza, 243 King St. Northampton MA. 6:00 – 9:00. For more information go to: http://www.buylocalfood.org/page.php?id=27.

January 31 – February 2, 2012 - *2012 Mid-Atlantic Fruit and Vegetable Convention*, Hershey Lodge and Convention Center. For more information and to register, go to : http://www.mafvc.org/html/

February 6-8, 2012 – *NASGA Annual Meeting and Conference.* Harrah's Las Vegas, Nevada. For more information and to register go to www.nasga.org.

February 7, 2012 – *Massachusetts Farm Winery and Growers Association Annual Meeting*, Publick House, Sturbridge MA. 8am – 5pm. See http://www.masswinery.com/web/?page_id=95 or contact Kim LaFleur at masswinery@gmail.com for more information. 1 pesticide credit available.

February 11-13, 2012 – *NOFA-VT Winter Conference*. University of Vermont, Burlington VT. For detailed program and registration information go to http://nofavt.org/annual-events/winter-conference.

February 14, 2012 - *High tunnel winter growing and seeding meeting*, Slack Hollow Farms, Argyle NY. 10a.m. to 12 p.m. For more information or to register contact Laura McDermott at lgm4@cornell.edu or 518-746-2562. This meeting is free for growers enrolled in the CDVSFP, for others the cost is $10.

February 16, 2012 – *Covers for All Reasons: How to Choose the Cover Crops your Farm Needs*. Old Sturbridge Village Visitors Center Theater, 1 Stallion Hill Rd., Sturbridge MA. 10am – 3pm. $20 includes lunch. Registration required. Contact Heather Faubert, hhf@uri.edu or 401-874-2967 by Feb 9th.

February 16, 2012 - *Hudson Valley Fruit Meeting: Berry Day*. More info available soon.

February 21-22, 2012 - *Ontario Fruit and Vegetable Convention Berry Program.* Embassy Suites, *Scotiabank Convention Center* Niagara Falls. For more information go to www.ontarioberries.com.

February 29, 2012 - *Capital District Vegetable and Small Fruit Growers Annual Winter Meeting*. Albany Airport Inn, 200 Wolf Rd, Albany. 9 a.m. to 3:30 p.m. The cost of the meeting for enrolled members is $30 for the first person and $20 for each additional person from the same farm, or $50 per person not enrolled in the CDVSFP. For more information or to register please contact Marcie at mmp74@cornell.edu or at 518-272-9524.

March 3, 2012 – *NOFA-CT Winter Conference*, Manchester Community College Manchester, CT. For detailed program and registration information go to www.ctnofa.org/events/CAOC/2012/2012_Winter_Conference.html.

March 19, 2012 - NOFA-NH Winter Conference. Exeter High School, Exeter NH. For detailed program and registration information go to http://www.nofanh.org/winterConference.