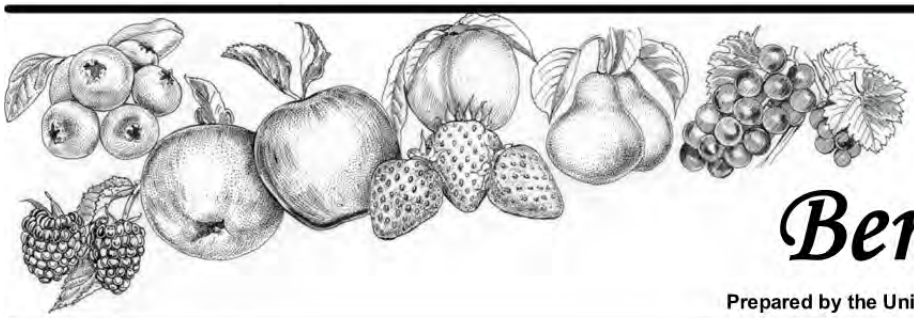

UMass Amherst EXTENSION

Berry Notes

Prepared by the University of Massachusetts Fruit Team

October 2009 Vol. 21, No. 10

www.umass.edu/fruitadvisor/berrynotes/index.html

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IN THIS ISSUE:

Current Conditions:

Strawberry are approaching dormancy. See article in this issue about mulching for winter protection. Now is a good time to review pest management practices and make note of successes and failures. Good record keeping is key to good decision making. Some late season weed management practices can be applied when plants are fully dormant. **Highbush Blueberry** plantings are quiet now. Rogue out bushes flagged for any virus or systemic disease infection. Organize pest management records for the season to prepare for ordering materials and supplies for next year. **Summer raspberry** plantings are preparing for dormancy. Take note of pest management successes and failures in order to plan for next season. **Fall raspberry** harvest has ended in most locations with the cold weather. As with other crops, keep and organize good records of what worked and what didn't in order to prepare a good plan for next season. **Grape** harvest has ended in many locations or will be ending soon. Jotting down notes on pest management, especially for diseases in a year like this, will help in developing plans for next season. Note also areas where disease incidence was high in order to prepare scouting and management plans for next season.

Blueberry/Cranberry Weed Management online Webcast

Nov. 4th , 2009, 12:45 – 2:00 pm.

IPM for Dodder in Cranberries Hilary Sandler, University of Massachusetts

New Approaches to Blueberry Weed Management Dr. Eric Hanson, Michigan State University

Register by contacting Laura McDermott at lgm4@cornell.edu.
Or go to www.fruit.cornell.edu/Berries/webinarindex.htm

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a two-week period, September 23, 2009 through October 6, 2009. Soil temperature and phenological indicators were observed on October 6, 2009. Accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments from the beginning of the current calendar year. This information is intended for use as a guide for monitoring the developmental stages of pests in your location and planning management strategies accordingly.

Region/Location	2009 GROWING DEGREE DAYS			Soil Temp (°F at 4" depth)	Precipitation (2-Week Gain)
	2-Week Gain	*Total accumulation for 2009*	*Total accumulation for 2008*		
Cape Cod	153	2478	2,739	68˚F	4.50"
Southeast	117	2334	2,625	60˚F	2.52"
East	157	2629	--	64˚F	1.96"
Metro West (Waltham)	110	2423	--	58˚F	1.70"
Metro West (Hopkinton)	136	2687	2,713	60˚F	2.35"
Central	86	2245	2,402	50˚F	1.26"
Pioneer Valley	101	2333	2,567	59˚F	2.20"
Berkshires	92	2528	2,806	57˚F	2.85"
AVERAGE	119	2457	2,642	60˚F	2.41"

(***Source**: UMass Extension 2009 Landscape Message #25 October 9, 2009*) *-- = information not available*

STRAWBERRY

Mulching Strawberries for Winter Protection

Rich Marini and Kathy Demchak , Penn State University

Mulching strawberries is an old practice that helps protect the plants from low temperature injury during the winter and keeps the ripening fruit clean. This summer Kathy Demchak and I observed winter injury in the crowns of plants in strawberry fields that were not mulched until mid-winter. Although few plants were killed, the injury appeared severe enough in some plants that yield was probably reduced. For strawberries grown on raised beds, the potential for cold injury is high because soil heat may quickly dissipate from the increased surface area of the beds relative to the soil volume. Covering raised beds with plastic or row covers likely retards heat loss, but I am not aware of soil temperature data for raised beds with different types of covers. This article is intended as a review of the information on mulching strawberries and on low temperature injury, so growers understand how and when to effectively mulch their plantings.

In the late summer and early fall, strawberry plants enter a physiological stage referred as “dormancy”. There are different phases of dormancy, but that discussion is beyond the scope of this article. Although dormant plants do not appear to be growing, the buds continue to develop throughout the winter. The initial stages of dormancy are triggered by decreasing day length and declining temperatures, but strawberry plants do not become hardy until November. The term “hardiness” refers to the plant’s ability to resist low temperatures. As strawberry plants become dormant, new leaf development ceases, the leaf petioles become more horizontal, resulting in the “flattened” appearance of dormant plants, and older leaves turn red. Plants become hardy upon exposure to freezing temperatures and strawberry plants continue to increase in hardiness until January. In late winter, after being exposed to sufficient chilling, the plants start to lose cold hardiness in response to warming temperatures. Upon exposure to sufficient heat, the plants begin to grow.

Mulch should be applied after the plants have attained substantial cold hardiness, but before low temperatures injure the plants. A rule of thumb, supported by research data from several locations, is to apply mulch after three consecutive days when the soil temperature is 40°F or lower at a 4-inch depth. This usually occurs after several hard frosts in the low 20’s, and in Pennsylvania this usually occurs between mid-November and mid-December, depending on location.

Strawberry plants are covered with straw to insulate plants from low temperatures, to prevent temperature fluctuations that can lead to frost heaving, and to minimize plant desiccation. Mulch also delays soil warming in the spring and minimizes exposure to spring frost by delaying bloom. Following bloom, mulch helps with weed control, conserves soil moisture, and helps keep fruit clean. Several types of loose materials have been successfully used as mulch, but straw is most common in the northeastern U.S. Hay should be avoided because it contains weed seeds. For matted rows, about 2.5 to 3 tons of mulch per acre, providing a 2- or 3-inch-layer, is typically applied on top of the plants. Doubling this amount of mulch is typically suggested for raised beds. Snow is an excellent insulator and snow combined with mulch is even better. My Master's research at the University of Vermont involved laboratory experiments where plants were exposed to various temperatures to determine critical temperatures for plant growth, as well as survival of plants and flower buds. In a field experiment non-mulched strawberry plants were compared with mulched plants. When the air temperature was -4°F, the temperature of non-mulched crowns was 1.5°F but the temperature of crowns under straw mulch plus 8" of snow was 30°F.

Mulch is typically removed in early spring when plants begin to show signs of growth or new leaf emergence under the mulch. Earlier mulch removal will allow the soil to warm, resulting in earlier plant growth and bloom, which is susceptible to spring frost. The mulch should be removed with rakes or pitchforks in small plantings or with various types of mechanical rakes in larger plantings. A little mulch should remain on the plants and this will work its way to the soil surface to help keep fruit dry and clean, but most of the mulch is pull to the row middles for weed control.

More on winter injury

The cold hardiness of strawberry plants varies with cultivar and weather conditions before and during a cold event. Dormant plants will lose some of their hardiness if exposed to warm temperatures for just one or two days. Rapidly declining temperatures are more injurious than gradually declining temperatures.

A strawberry crown is actually a short stem. The tissue in the crown center (the pith) is called the medulla and is storage tissue composed of unspecialized cells called "parenchyma". To the outside of the medulla is the vascular cambium. The vascular cambium is a bright white thin layer of tissue forming a cylinder running the length of the crown. The cambium is responsible for the horizontal growth or thickening of the crown. The cambium produces xylem cells to the inside that act as a pipeline to allow water to flow from the roots to the leaves, runners, flowers and fruit. The cambium produces phloem cells to the outside, which allows for the vertical movement of sugars and other materials within the plant. The tissue at the base of the medulla is most sensitive to low temperature injury and the cambium tissue is most tolerant to low temperatures. Tissue browning in the crown is indicative of low temperature injury. As injury increases, browning extends from the base to the top of the medulla and the browning becomes darker. Often the entire medulla can be chocolate brown, but as long as most of the cambium is white, the plant will survive. However, when the lower half of the medulla was dark brown, yield was reduced by about 45% compared to non-injured plants and this occurred when crowns were exposed to about 18°F. About 50% of the plants were killed by exposure to 14°F. The effect of freezing 'Catskill' strawberry plants to various temperatures on subsequent growth and fruiting is summarized in Table 1.

Table 1. Temperatures needed to influence different aspects of 'Catskill' growth and development.

Response	Maximum temp (°F) that caused response
Crown tissue browning	17˚F
5% plant mortality	17˚F
50% plant mortality	14˚F
Reduced leaf emergence	24˚F
Reduced leaf size	10˚F
Increased runner production	17˚F
Reduced bloom	17˚F
Reduced plant dry weight	10˚F

Some of the older cultivars, such as 'Catskill' and 'Sparkle' were quite tolerant of low winter temperatures, but to my knowledge the newer cultivars have not been evaluated for cold hardiness. Kathy Demchak had a small 2-year-old cultivar trial on plasticulture at Rock Springs that was not well mulched with straw last winter, but were covered with only row covers. So I evaluated them for crown injury and some of the results are shown in Table 2. Each branch crown on 5 plants in 4 replications was cut longitudinally and the percentage of the medulla with brown color was recorded and the darkness of the brown color was rated on a scale of 1 (no browning) to 3 (very dark brown). I had never evaluated cold injury in older plants with multiple crowns. These plants had between 4 and 9 crowns and I was surprised to see that the center crown, associated with the original mother plant, was most sensitive to cold injury. There was no plant mortality for 'Evie 3', whereas 'Albion' and 'Seascape' had the most crown mortality with 7% mortality. Browning of the original crown and the branch crowns was not very strongly related. For the original crown, 'Everest' had the most browning, whereas a selection from North Carolina State University and 'Evie 3' had the least tissue browning. For the branch crowns, 'Seascape' had the most injury and 'Everest' had the least injury. Kathy set

out some extra plants for me this spring and this winter I hope to evaluate the cold hardiness of some of these cultivars using controlled freezing techniques.

Table 2. Severity of oxidative browning of crown tissue in six strawberry cultivars in 2009. Percent browning refers to the average extend (%) of the crown tissue that was brown.

	Original crown		Branch crown		Live original crowns (%)
Cultivar	Medulla browning (%)	Brown rating	Medulla browning (%)	Brown rating	
Albion	74	2.5	21.6	1.3	93
Evie 2	72	2.2	34.7	1.2	98
Evie 3	32	1.7	14.3	0.5	100
Everest	80	2.3	7.3	0.7	94
NCSU selection	30	1.3	10.9	0.5	95
Seascape	73	2.6	43.8	1.6	93

(***Source**: Fruit Times Vol. 28, No. 9, September 29, 2009*)

RASPBERRY

Floricane Removal in Raspberries and Blackberries

Kathy Demchak, Penn State University

Prior to the mid 1990's, recommendations said to remove floricanes right after fruiting. Around that time, research with 'Titan' red raspberries showed that the plants had less winter injury when canes were removed during either December or early March, rather than in September. This was presumably because the plants had the opportunity to move carbohydrates from the spent canes to the crown, thus increasing the plants' carbohydrate reserves, which increased the plants' ability to tolerate cold temperatures. This is probably of most value in situations where winter injury is a problem.

However, in certain other situations, such as when cane diseases are an issue, it may be more valuable to remove the floricanes along with the disease inoculum on them, and improve air circulation. This is especially important for growers who are growing under low-spray, no-spray, or organic systems where cultural controls to manage diseases take on critical value.

So, here's what I'd like growers to do, both to decide whether to remove canes now, and to help with managing diseases. Take a look at your planting, and see whether you can see symptoms of cane diseases. Look for gray sunken lesions on canes (anthracnose), purplish to dark brown areas (cane blight or spur blight on various brambles and Gnomonia stem canker on blackberries). Lesions that are large, expanding, or numerous are especially worrisome. If your canes look healthy, you can leave the floricanes there. If you have disease symptoms out there, or you've been delaying floricane removal in past years but suspect that disease symptoms are getting worse over time, take the floricanes out now. This practice should be re-evaluated each year, as conditions for disease development will differ from year to year.

If you see disease symptoms, fungicides applied after taking the floricanes out will help. Certain Captan formulations, Pristine, and Cabrio are labeled for use in the fall for anthracnose and spur blight control. Additional information on disease symptoms and epidemiology, along with rates and labeled formulation of fungicides for post-harvest use are listed in the Mid-Atlantic Berry Guide for Commercial Growers [and New England Small Fruit Pest Management Guide].

This guide is available as a hard copy through most county Extension offices ($18), or on-line for free at http://pubs.cas.psu.edu/freepubs/MAberryGuide.htm. You can also order a printed copy from Penn State's Publication Distribution Center by calling 814-865-6713 fort $18 plus tax and a $5 shipping and handling.

(***Source**: Fruit Times Vol. 27, No. 9, Sept. 30, 2008*)

BLUEBERRY

Blueberry Viruses – Protecting our Industry

James J. Polashock and Peter OUdemans, Rutgers Univ.

The Michigan blueberry community recently announced the detection of two blueberry viruses that were previously unreported in that state (see the Associated Press report in the Philadelphia Inquirer

http://www.philly.com/philly/business/57680397.html).
The first virus, Blueberry Scorch Virus (BlScV), is known to be prevalent in the blueberry growing regions of the Pacific Northwest and in several states on the East Coast including New Jersey. It was first described here as Sheep Pen Hill Disease in the early 1970s. BlScV causes a blossom blight that gives affected bushes a 'scorched' appearance. The disease can also cause a dieback of young twigs and affected bushes may exhibit a red 'line pattern' on mature leaves late in the season. The disease is known to be aphid transmitted and infected plants can remain asymptomatic for years after infection.

The second virus, Blueberry Shock Ilarvirus (BlShV), has only been reported from the Pacific Northwest. Blueberry Shock (sometimes called necrotic shock) causes a blighting of flowers and young leaves and may lead to defoliation in early summer. This virus is pollen transmitted and is vectored by bees during the flowering period. Pollen transmission occurs when virus-

infected pollen fertilizes the flowers of a healthy bush. BlShV-infected plants often appear to recover in 2-5 years, but remain infected and can continue to transmit the disease through

pollen. Infected pollen can survive in the bee hive for up to one week and there is potential for spread through distribution at the hive while in or near an infected area.

There are several ways growers can help prevent virus infection and spread in their fields.

Prevention is the best method for virus control. If you can prevent introduction of virus infected material on to your farm you will save yourself significant trouble.

Sanitation is the second best method. If virus infected material is discovered it should be completely removed. Root systems and crowns from infected plants regenerate infected plants.

It is strongly recommended that you purchase cuttings and plants only from trusted and certified sources.

Plants purchased from questionable sources should be quarantined or monitored closely for at least four years to be sure they are free of disease.

Plants derived from tissue culture should not be considered guaranteed virus free. If the original source materials for the tissue cultured plants were infected, the resulting tissue cultured propagules can remain infected. Furthermore, 'tissue cultured' plants are usually potted and hardened off in greenhouses prior to shipping and can therefore be subject to infection prior to shipping.

If you are propagating from your own mother plants, be sure to have them routinely tested for important viruses.

Plants infected with either BlScV or BlShV, as with most plant virus infections, can not be cured. Plants suspected as having an infection should be tested immediately and removed if confirmed to be positive.

If a virus with a known vector is detected in a field (such as the BlScV transmission by aphids), approved IPM methods must be used to control the vector(s) and limit spread in and around the affected fields.

There are a few services that will test for blueberry viruses. The NJ Department of Agriculture provides a nursery certification program that involves BlScV testing. Testing companies such as Agdia (http://www.agdia.com/) provide a standardized blueberry panel as well as an extended blueberry panel (http://www.agdia.com/testing-services/Blueberry.cfm) which offers testing for 8 typical and 17 rare viruses known to infect blueberry. (***Source**: Blueberry Bulletin, Vol. 15, No. 23, Sept. 28, 2009*)

Soil pH is More Important than Fertilizer for Blueberries

Molly Shaw, Cornell Cooperative Extension

Most farmers know that blueberries perform well in acidic soils. What may be news is that keeping soil pH low is even more important than fertilizer applications when it comes to getting good yields on most soils.

We initiated a Blueberry Nutrition Survey in the summer of 2007 because blueberry farmers in the South Central NY area use diff erent fertilizer programs that vary widely from the standard (as recommended in the Blueberry Production Manual, see Figure 1 for growers' fertilizer rates), and most of those farmers weren't sure how well their individual programs were working. Fifty percent of the farms involved did not take regular leaf or soil samples to measure bush nutritional status.

The results of the survey were used to correlate the widely varying fertilizer regimes with bush health and yield. We used soil and leaf mineral analysis to take a "snapshot" of the nutritional status of blueberries on 10 farms to determine how past fertilization practices were affecting the health and yield of the bushes. This was not a controlled study where we could conclude cause and effect relationships between fertilizer and yield, since many management and site factors were different between farms. What we were able to do was to draw correlations between nutrient status and management inputs and from there make recommendations for management adjustments.

Farm	leaf N (%)	#N/A/yr	#K/A/yr	#P/A/yr	SOM%
1	1.8	65	0	0	2.3
2		7	0	0	3.0
3	1.74	52	0	0	4.1
4	1.67	20	0	0	5.3
5	1.58	25	0	0	4.7
6	1.92	88	0	0	5.6
7	2.06	13	11	42	4.8
8	2.2	165	22	35	3.7
9	1.73	87	0	17	3.8
10	1.52	64	92	0	8.7

Figure 1. Fertilizer rates used on 10 blueberry farms in the Southern Tier of NY. Growers' nitrogen applications (averaged over 3 years) ranged from 7 lbs/A actual N to 165lbs/A actual N. (Actual N per acre means that if you put 100 lbs of urea on an acre of blueberries you've really only applied 46 lbs of actual nitrogen, because urea is 46% nitrogen by weight). Some growers used ammonium sulfate, others used urea; 15-15-15 and MAP were applied on one occasion each. Six growers calculated the actual nitrogen/A they wanted, while the other four did not apply their fertilizer with a target N rate in mind.

Soil and leaf samples were taken on 10 area blueberry farms in July, 2007, just before and during harvest. Seven of the 10 farms were on relatively heavy clay-silt loam soils such as Volusia that are typical of the upland soils in South Central NY. Two were on gravelly soils, while the remaining farm was on fertile, well drained river flats soil. Samples were analyzed for mineral nutrient content by the Cornell Nutrient Analysis lab. A yield estimate was taken at the same time as the nutrient samples. Bluecrop was sampled wherever possible, but Blueray was sampled in a couple of instances where Bluecrop wasn't present. Growers were surveyed about their fertilizer program, weed, insect, and disease control, irrigation, mulching and pruning over the last three years. Comparing yields on heavy versus lighter soil types showed no significant difference in our small sample size.

Lessons Learned from the Survey

1. Soil nutrient levels and leaf nutrient levels are not well correlated. The Blueberry Production Manual recommends using a soil test to determine soil pH, and then to use a *leaf analysis* to determine if the bush is actually getting enough of the other nutrients to grow optimally. This implies that the soil nutrient levels determined by a soil test can't be used alone to develop good fertilizer recommendations.

Sure enough, in our study we found no correlation between levels of nutrients in the soil and the levels measured in the blueberry leaves, except for Zn (Figure 2). No correlation means, for example, that low magnesium in the soil was not associated with low magnesium in the leaves. Despite the low soil test magnesium level, the leaf level magnesium level showed that the bush actually had enough magnesium for optimum growth. The soil levels didn't match the leaf levels for P, K, Ca, Mg, Fe, or Mn. Cu and Boron were not measured in the soil. Nitrogen level from the soil test is known to not be a good predictor of N available to the plant in any crop, since the regular soil test only shows a snapshot of the N available at the time the sample was taken, and does not predict the N release from the soil for the rest of the season.

The idea that the soil nutrient levels determined from a soil test do not explain blueberry plant nutrient levels has been a difficult concept for many farmers to accept. An allegory can be used to explain. Nutrients in the soil can be looked at like the food in a child's home. A number of factors influence whether that child eats the food and is nourished by it. Simply having food in the cupboard is not enough to assure that the child is getting proper nutrition. A doctor would look at the child's growth and appearance to determine if that child is adequately fed. If the child isn't growing right even a blood sample (likened to the leaf analysis) would be occasionally taken to try to pinpoint a cause. Similarly many factors affect how many nutrients a blueberry plant actually takes up including soil pH, root health (wetness, drought, disease), weed pressure, etc. Blueberry plants actually take up many nutrients via their symbiotic root fungi, called

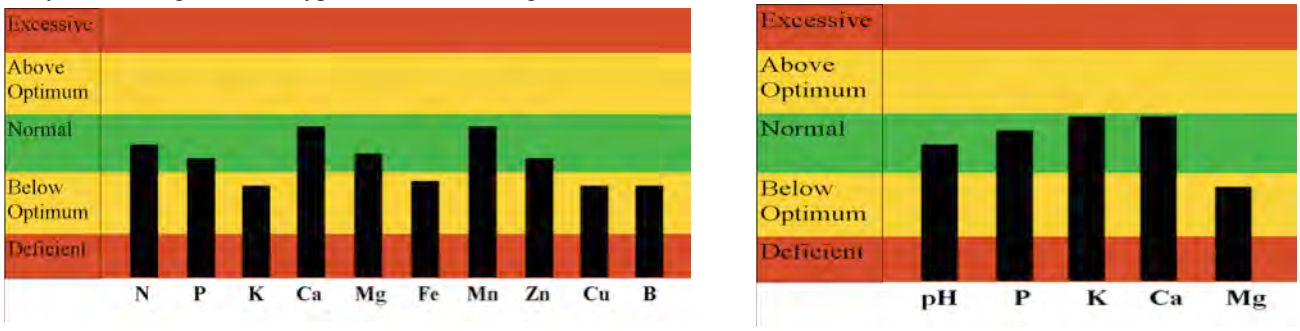

Figure 2. A representative leaf analysis result (left) and soil sample result right).

mycorrhizae, so factors that affect the symbiont also affect the blueberry.

How can a nutrient level be in the "adequate range" in the soil but "low" in the leaves? If the soil pH is too high, many nutrients aren't in the chemical forms that the blueberry plant can pick up, so there can be adequate amounts in the soil but not enough in the leaves. Also, if the blueberry plant happens to be growing rapidly, either because of a N application or because of the time of year, nutrient levels in the leaves can be diluted in the expanding leaves and appear to be low in the leaf sample while levels in the soil are quite adequate. It is for this reason that leaf samples should be taken just before or during harvest, when the spring flush of growth is over and the leaf expansion factor is minimized.

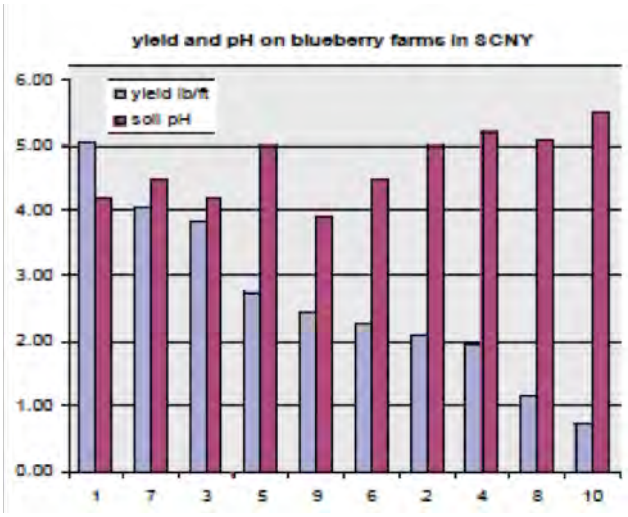

Figure 3. Soil pH and yield of 10 blueberry farms in South Central NY state) (correlation of soil pH and yield = -0.687, p-value = 0.028).

Conversely, how can a nutrient level be "low" in the soil while the leaf test shows that the blueberry plant has enough of this nutrient? This can happen when the bush is growing slowly for some reason, be it a deficiency in another nutrient, improper pruning, winter damage or poor root growth. In this case the plant isn't growing very fast so even the low amount of nutrient in the soil can keep up with the demand by the plant.

The mismatch between soil test results and leaf test results mean that although the soil test is important to determine pH, the soil test alone can't be used to determine if the bush has enough of any one nutrient.

2. Lower soil pH was correlated with higher yield. It turns out that the only soil factor we measured with a strong correlation with yield was soil pH (see Figure 3). Farms with lower soil pH tended to have higher yields. That itself is reason enough to keep close tabs on the soil pH in blueberry plantings and justifies a soil pH test. In fact, Gary Pavlis, the blueberry specialist at Rutgers

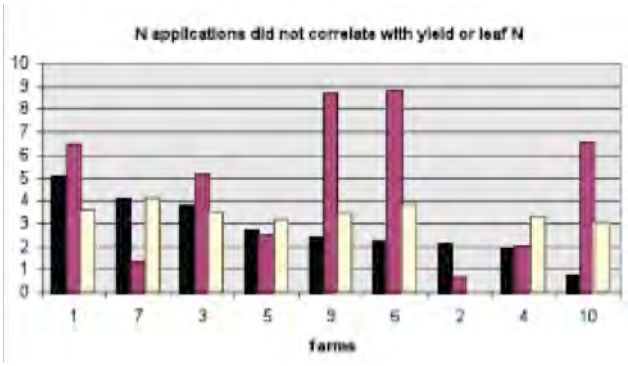

Figure 4. Yield, nitrogen fertilization and leaf nitrogen level of 10 farms in South Central NY state. Higher nitrogen applications did not correlate with higher yield or higher leaf N. Farm #8 is omitted from this chart as an outlier. It's 165lb/A N application rate was too high to fit on the graph.

Extension, even recommends that the New Jersey growers check their soil pH every spring and fall.

3. More nitrogen fertilizer did not correlate with a higher yield. The standard recommendation from the Highbush Blueberry Production Guide (NRAES) is to apply 65 lb/A of actual N to mature bushes in the form of ammonium sulfate or urea, and to adjust the applications of other nutrients based on leaf analysis results.

We found no correlation between leaf N levels and the amount of N applied. Neither were there correlations between leaf N and yield nor applied N and yield. This means that applying more nitrogen didn't lead to more nitrogen in the leaves or to higher yield, in our survey (see Figure 4). With our group of growers, a lack of nitrogen didn't appear to be limiting blueberry growth or yield, and farms applying higher rates of nitrogen didn't have higher yields.

4. None of the nutrients tested in leaves seemed to be limiting yield in our survey. In general, higher yielding farms did not have higher nutrient levels in the leaves (there was no correlation between leaf nutrient levels and

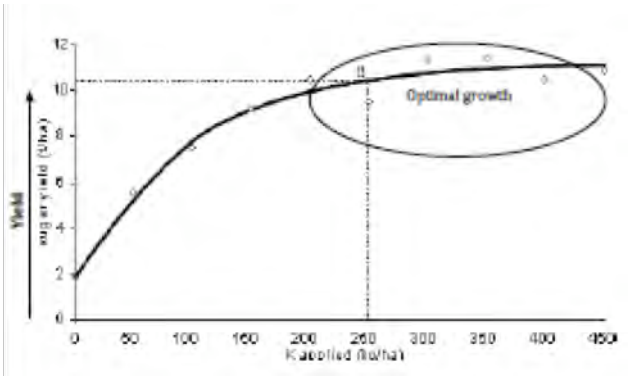

Figure 5. A sample yield/response curve shows that at in the optimal range, increasing the nutrient level available to the plant does not significantly increase plant yield. Therefore, in the optimal range, yield and nutrient application rate no longer correlate.

yield). Phosphorus was the one exception, showing a weak correlation between measured leaf levels and yield, even though most growers' leaf analysis showed P to be in the optimal range. This might indicate that the low end of "optimal" Cornell P range is actually still a little low, but our result may not be significant and we cannot draw conclusions from only one season of surveying.

Blueberry Nutrition Questions and Answers

1. Q. If leaf nutrient analysis is supposed to be a more accurate look at bush nutritional status than soil analysis, then why didn't leaf nutrient levels correlate with yield?

A: Plant growth generally follows a yield response curve (Figure 5). Many times a lack of correlation between yield and fertilizer (or yield and leaf levels) can be explained with the plant growth/nutrient response curve. When the nutrient in question is anywhere in the optimal region, increasing amounts of that nutrient don't increase yield, thus correlation with leaf levels and yield or with fertilizer applications and yield are not apparent. We suspect that in general, nutrient levels in our region are in the optimal range and are not limiting to blueberry yield.

2. Q: If soil pH and yield are significantly correlated (yield goes up as pH gets lower), then why don't we see higher nutrient levels in blueberry leaves grown on a lower pH?

A: Growth rates are variable between the farms. If low pH stimulates greater growth, then nutrient levels in leaves of the rapidly growing plants could be diluted rather than enhanced.

3. Q: How can the soil nutrient analysis indicate a low level of a nutrient (Mg, for instance), and the leaf nutrient analysis indicate Mg is adequate?

A: This can happen when the plant isn't growing very fast, so Mg uptake keeps up with demand—even though soil levels are low.

4. Q: If leaf nutrient analysis indicates a nutrient level is "satisfactory", wouldn't higher than just "satisfactory" be better?

A: The "satisfactory" level is a place where additional applications of that nutrient are unlikely to make a measurable difference in growth or yield. So, yes, the ideal may be a little higher than the lowest value of the satisfactory range, but one is unlikely to see a measurable response by applying more.

5. Q: If a soil nutrient analysis shows high K, but K is low in the leaf nutrient analysis, what is the explanation?

A: This is common in blueberries where either the soil is clayey and root growth is limited (blueberries have a hard time with root proliferation in clay soils), or where boron is low. Boron is used for auxin synthesis during root growth. Less root growth means less nutrient uptake. Higher than ideal pH can also contribute to this problem.

6. Q: If leaf Mg level is a little low, and soil pH is fine (4.5 or even lower), how can a grower increase Mg levels in the plant?

A: Epsom salts (magnesium sulfate) add magnesium without changing the pH. Sulpomag is also a good source of magnesium, while also adding some potassium. Price them out (dollars per pound actual Mg) and use the least expensive.

7. Q: If a grower increases N fertilizer applications, can't he expect better yield?

A: Not as indicated by our study. If nitrogen isn't limiting as shown by the leaf test, then it's not going to help to add more.

8. Q: If yields are on the low end, but the soil nutrient analysis shows that pH is fine, and the leaf nutrient analysis shows adequate levels of all nutrients, what is the explanation?

A: Plants that aren't growing very fast will often have high levels of nutrients since the nutrients accumulate and have no place to go. This doesn't mean that yields will also be high. Plants that are growing rapidly and producing lots of yield will often have low leaf values because the nutrients don't accumulate in leaves and used in other parts of the plant. Length of growing season, soil constraints on root growth, and winter injury can also contribute to low yield.

9. Q: If leaf N levels were low and the plants were fertilized with N resulting in other nutrients now appearing low, what is going on?

A: The plants likely weren't growing well because of low N. The N fertilizer stimulated the plant began to grow more which diluted the levels of nutrients in the leaves, even N. Suddenly many nutrients appear to be "deficient" but in reality, it is because the plant is growing rapidly and the existing nutrients are diluted—irrespective of soil values.

10. Q: If iron is low in the leaf nutrient analysis, but soil pH is 4.5, what should be done?

A: Cornell uses 70 ppm iron as the low end of the normal range, while the Blueberry Production Guide uses 60 ppm as the low end of the normal range. If your value shows up above 60 ppm and your pH is low enough, that's

probably not a problem. If it's lower than 60 and your pH is 4.5 or lower, be aware that Al, which is more readily available at lower pH's, competes with Fe for uptake, and could be contributing to the deficiency.

Recommendations Based on Our Work

1. Test the soil, adjust pH to 4.5 or lower. In our sample of 10 South-Central NY blueberry growers, some of the highest yielding farms had pH's below 4.5.

2. Use shoot growth as a measure of Nitrogen status. The bottom line is how well the plant grows and produces shoots for next year's crop. If new shoot growth is less than 1 ft long and you are already applying the recommended 65lb/A of actual nitrogen, use a leaf test to determine if any other nutrients are limiting.

3. And remember, as Gary Pavlis (Rutgers Extension Blueberry Specialist) says, "If you aren't doing a good job pruning, fertilizing is just icing on a bad cake."

Acknowledgements

Many thanks to Marvin Pritts, Cornell Unversity Berry Specialist, for his extensive input into this project and this article. (***Source**: New York Fruit Quarterly, Vol. 16. No. 4. Winter 2008*)

GRAPE

Ripening Cold-Hardy Cultivars

Anna Katharine Mansfield, Cornell University

A small but growing segment of *Veraison to Harvest* readers – many in the North Country, but others scattered throughout the state- are working with the relatively new University of Minnesota cultivars, and several have contacted us about harvest parameters.

As interspecific hybrids with *Vitis riparia* ancestry, these grapes have decidedly different harvest chemistries than the *V. vinifera* or native grape varietals commonly grown in New York, and consequentially are often harvested well before optimal conditions are achieved. To aid these industry members, a quick review of key parameters for **Frontenac, Frontenac gris, La Crescent, and Marquette** are provided below as a guide. The cold and rainy conditions we've seen in much of the state this year may make the optimal values a long shot, but we have seen some promising results in the Finger Lakes; a research sample of Marquette, sourced from a cooperator in Trumansburg, was harvested on September 30 at 24.5°Brix and 11.7 TA.

Titratable Acidity (TA): While soluble solids are the common benchmark for harvesting V. vinifera and native varietals, the extreme acidity found in Frontenac, Frontenac gris and La Crescent means that titratable acidity is often a better metric for ripeness in these grapes, or at the very least, a parameter that should be monitored in the field. As with soluble solids, the best way to get an accurate measurement is from an appropriately selected 100 berry sample, which should be analyzed via titration with NaOH.

For **Frontenac** and **Frontenac gris**, the fruit isn't ripe until TA is below 15 g/L- and the lower, the better. Monitoring in the UM research vineyard suggests that both of these cultivars initially show the expected rate of acid reduction during harvest, but very often go through a period where soluble solids continue to rise, but acid remains fairly stable. This condition seems to last for a few days to a week, but is followed by another ripening period that results in significant TA reduction. In very warm climates (like southern Missouri) this second drop can actually result in acids that are too low, but nothing of the sort has been observed in MN or NY fruit.

Ripe La Crescent fruit should have lower TA than Frontenac, with 13 g/L or so considered optimal. Compared to the other three cultivars, Marquette has fairly low acid, but the 10 g/L commonly seen in ripe fruit does seem extreme when your reference point is V. vinifera.

Soluble Solids: In addition to high acid, UMN varietals show their V. riparia ancestry in the high soluble solids achieved at ripeness. In all four cultivars, a soluble solids level of 25°Brix are the average achieved at ripeness, with Frontenac and Frontenac gris often reaching 26-27°Brix. If allowed to raisin, Frontenac has been recorded at harvest as high as 30°Brix, so late-harvest and dessert wine styles are possible. While these high soluble solids may be a worry for producers concerned about high ethanol content, one strategy to handle this, at least with the white varietals, is to stop fermentation to leave some residual sugar. La Crescent and Frontenac gris are both aromatic whites that show well in an off-dry style, and even Frontenac, when made as a rosé or light red, can show enhanced fruit character if RS is at low or sub-threshold levels.

Other factors: Though it's a little late to worry about it now, it is important to note that with Frontenac and Frontenac gris proper management of vigor throughout the season is a key factor in achieving appropriate reduction of acid and green, hybrid flavors. Overcropping is a common mistake, and while both vines can partially ripen fairly large crops, around 4 tons/acre (on high bilateral cordon) is generally recommended.

In short, the most common advice for cold-hardy cultivar ripening is "let it hang." If vigor has been properly controlled, the acid should continue to drop, even if it seems stable for a period. Many growers make the mistake of panicking and harvesting too early, when a

little patience would have resulted in acids much closer to those desired. With Frontenac, especially, bird netting is often necessary to protect fruit during this time, and raisining is common (and no reason for alarm- the fruit profile that develops is often seen as desirable.) For more information about both the viticultural and enological aspects of these winegrapes, visit http://www.grapes.umn.edu/wine.html. (***Source**: Veraison to Harvest, #4, October 2, 2009*)

GENERAL INFORMATION

Specialty (minor-use) crop pesticide prioritization in the 2009 IR-4 Food Use Workshop

Satoru Miyazaki, John Wise, and Bernard Zandstra, Michigan State University

Due to the current review of crop protection chemicals under the Food Quality Protection Act and the high cost to industry of product registration, specialty crops (formerly known as minor crops) and sometimes, minor uses on major crops are at risk of having few available pest management products or being lost for pest management. To mitigate this problem IR-4 (Interregional Research Project No.4), primarily funded by USDA-CSREES, facilitates pesticide registration for specialty crops by conducting field residue trials, and occasionally, efficacy trials. Specialty crop research needs are prioritized each year during a national workshop since resources are limited. The primary objective of this workshop was to have the participants identify the most important research projects for the 2010 IR-4 research program.

Research priorities for the year 2010 field residue program for fruits, vegetables, field crops and herbs grown in the United States and Canada were assigned at the Food Use Workshop held September 15-16 in Cleveland, Ohio. The workshop was attended by specialty crop/use researchers, extension specialists, representatives of commodity and industry groups across the country, and personnel from EPA, USDA, IR-4 plus the AAFC (Canadian counterpart of minor use program), and PMRA (Canadian counterpart of U.S. EPA) personnel.

More than 160 people attended the two-day meeting for each discipline session. Participants were provided with a complete list of all pesticides "nominated" with desired priority (i.e.; A or B rating) by regions for consideration prior to the meeting. This "nomination" process, introduced three years ago, greatly streamlined project selections and allowed the participants to spend more time reviewing only the worthy projects. As a group they ranked products based on need, performance, safety, availability of alternatives and compatibility with the IPM program. Only a limited number of projects could be assigned "A" (entomology [17], weed science [18], plant pathology [20]). An "A" priority guarantees IR-4 to begin the field residue program immediately the following season, with expectations that a complete data package be submitted to the EPA within 30 months. Fourteen fruit projects important for Michigan were assigned A priorities. (See the accompanying table). Any "B" priority projects must be upgraded to A priority either by a Priority Upgrade Proposal (PUP) or by regional upgrade. The following new candidate priority "A" projects listed are preliminary until affirmed at the IR-4 national planning meeting on October 27 – 29, 2009. A complete listing can be found on the IR-4 web-site (**http://www.ir4.rutgers.edu**).

Priority A's for Fruits

Insecticides and Bird Repellent		
Commodity	**Chemical**	**Reasons for Need**
Cherry	ANTHRAQUINONE*	Birds; Gulls, Starlings, Wax Wings
Cherry	FENPYROXIMATE	Two-spotted Spider Mites
Caneberry	ACETAMIPRID	Root Weevils, Aphids, Japanese Beetle
Blueberry	ANTHRAQUINONE*	Birds; Starlings, Wax Wings& Robins
Blueberry	TOLFENPYRAD	Cranberry Fruitworm, Plum Cuculio, Blueberry Maggot
Grape	BIFENTHRIN	Grape Root Borer
Strawberry	ABAMECTIN	Imported Fire Ant
Herbicides		
Commodity	**Chemical**	**Reasons for Need**
Pear	CLOPYRALID	Canada Thistle, Goldenrod, Wild Aster
Peach	SIMAZINE**	Weeds
Caneberry (Blackberry)	QUINCLORAC	Field Bindweed, Hedge Bindweed, Barnyardgrass, Canada Thistle, Large Crabgrass

Caneberry (Raspberry)	FLUAZIFOP-P-BUTYL	Weeds
Blueberry	QUINCLORAC	Field Bindweed, Hedge Bindweed, Barnyardgrass, Canada Thistle, Large Crabgrass
Grape	QUIZALOFOP	Grasses, Johnsongrass
Strawberry	**PROHEXADIONE CALCIUM††**	**Reduce runner growth & increase yield**
Strawberry (Perennial)	FOMESAFEN	Weeds
Fungicides		
Commodity	**Chemical**	**Reasons for Need**
No A priority***		

*The Anthraquinone cherry and blueberry projects are pending EPA decisions on the researchable status of this compound.

**The Simazine/peach project was given A priority at the workshop, but now we don't have to do any residue trials, so this is off the A priority list.

***Although the Kasugamycin/Peach project to control bacterial spot was strongly supported by the group, the EPA representative cautioned that an additional use of Kasugamycin must be justified that there is no other alternative. It is currently B priority.

†† Prohexadione Calcium (trade name Apogee®) is a growth regulator, not an herbicide, and its proposed use is for runner suppression especially where strawberries are grown on plastic.

(***Source**: Michigan Fruit Crop Advisory Team Alert, Vol. 24, No. 18, September 22, 2009*)

Transitioning to Organic Crop Production

Vern Grubinger, Univ. of Vermont Extension

There's a lot of interest in organic agriculture these days, as the market for organic products continues to grow. According to the Organic Trade Association in 2005 consumer sales of organic products in the U.S. increased to $14.6 billion, up more than 17% from the year before. Sales of organic fruits and vegetables grew by 11% in 2005, to $5.4 billion.

In addition to increasing sales, the number of organic farms has grown, to well over 8,000 nationwide. These farms have pretty much dispelled the perception that organic farming is too difficult, too risky, or too expensive to be practical. Of course, some crops are easier than others to grow organically.

If you're considering a switch to organic farming, the 32-page booklet "Transitioning to Organic Production," published by the Sustainable Agriculture Network, can help you sort out the issues. It's available for free at: www.sare.org/publications/organic.htm or by calling (301) 504-5411. Below are some highlights from that publication.

Before you transition. Think it through carefully. Converting to organic production is not a decision to take lightly. Examine your motivations as well as the things you will have to do differently.

Farmers who convert to organic production only for economic reasons often fail. It may be harder to improve profits than you think, even with higher prices for your products, because of the production changes that must occur. The transition period can be particularly difficult because of the need to develop and implement new management skills. You should be prepared to deal with short-term financial setbacks if some yields drop and some costs increase during the transition period.

Does organic fit your philosophy? Successful organic farmers want to learn how to work with natural systems to solve problems. This includes implementing relatively complex crop rotations, creating beneficial insect habitats, and using cultural practices to improve soil fertility, manage weeds and control pests rather than simply substituting organically accepted fertilizers and pesticides for conventional materials.

Farmers considering a transition to organic farming should think about the following questions, drafted by the Ohio Ecological Food and Farming Association: Do you enjoy walking your fields on a regular basis? Can you distinguish pests from beneficial insects? Are you curious about why things happen on your farm? Can you tolerate a field that is not weed free? Do you have the patience to trade short-term economic returns for longer-term "ecological" credits while building soil health?

It's also important to take stock of what resources are available to help you with the transition. Are there local organic growers you can work with? How about Extension agents? To whom will you market your organic products? Is your family supportive of the change?

Getting started. Identify the organic certification organization that you would likely work with – it's probably one based in your state, and get in touch with them to find out about the application process for certification. If you haven't already, familiarize yourself with what practices and materials are allowed and which ones are not under the national organic standards. (See the

National Organic Program web site for more information: www.ams.usda.gov/nop/)

One of the best ways to prepare to implement organic production techniques, and avoid reinventing the wheel, is to find out what successful farmers are doing. One way to do that is to attend organic farming workshops and conferences. There's a wealth of these taking place this winter (see below for organic farming organization contact information).

Soil fertility. Promoting soil health and fertile soil is a key to organic farming. Organic farms try to avoid reliance on bagged fertilizer inputs, instead seeking fertility from cover crops, animal manures and/or compost to enhance the long term capacity of the soil to support crop growth. Building soil organic matter and improving soil quality is often cited as the most critical step for a successful conversion to organic farming. It may take several years for the soil to improve, depending on its current condition, so start adding organic amendments sooner rather than later. You can do this well in advance of becoming certified as an organic farm.

Pest control. Biological pest control is complex, involving complicated interactions among crop rotations, intercropping combinations, planting schedules and beneficial habitats. What strategies or systems are already in place on your farm? What new ones can be implemented? If these strategies are not enough to minimize pest pressure, there are organically-allowed pesticides available. Get familiar with what they are, which pests they are labeled for, and what they cost. The goal of course is to avoid organic pesticide use as much as possible.

Just like building up your soil fertility, getting to effective pest control with little or no pesticide use takes time. Existing pest cycles need to be disrupted, and pest populations reduced. It helps to have a good understanding of the life cycles of the insects, weeds and diseases that are present on your farm and what can be done to interrupt these cycles.

IPM practices, such as scouting fields for pests and monitoring insect populations with pheromone traps where appropriate have an important place on organic farms. It's also good to get some experience spotting natural predators and parasites in the field.

Crop rotation. Rotation is perhaps the most important management tool in the organic farming toolbox, because it helps address soil fertility as well as pest management issues. Often the biggest challenges during transition are maintaining an adequate supply of nitrogen for adequate crop growth, and keeping weeds under control. Think carefully about how to accomplish these goals using crops and green manures in a rotation.

With long-term perennial crops, such as tree fruits, rotation is not an option and that helps explain why these are some of the more challenging crops to grow organically. In this case, cultural practices such as sanitation and variety selection become even more important to organic producers.

How best to transition? Some growers experiment with organic production on a small scale, perhaps a single field or greenhouse, before deciding whether to pursue certification. That's probably a good idea. Other growers take on a few organic practices at a time, such as use of compost and cover crops, or cultivation and flaming for weed control, and implement them on all or most of the farm to gain familiarity with how to best use them. That's a good idea too. Growers can also go whole hog and transition the entire farm to organic all at once. That can work if you're already familiar with organic practices and markets, and your systems are most of the way there, but it can be risky if you are changing many parts of your production system at once.

Some Organic Certification Organizations in the Northeast:

Connecticut NOFA*: (203) 888-5146, ctnofa@ctnofa.org, www.ctnofa.org

MOFGA* (207) 568-4142, mofga@mofga.org, www.mofga.org

NOFA Massachusetts: (978) 355-2853, nofa@nofamass.org, www.nofamass.org

NOFA New Hampshire (603) 224-5022, nofanh@innevi.com, www.nofanh.org

NOFA New Jersey: (609) 737-6848, nofanj@aol.com, www.nofanj.org

NOFA New York: (607) 652-NOFA,office@nofany.org, www.nofany.org

NOFA Rhode Island: (401) 364-0050, nofari@nofari.org, www.nofari.org

NOFA Vermont: (802) 434-4122, info@nofavt.org, www.nofavt.org

PCO* (814) 364-1344, pco@paorganic.org, www.paorganic.org

*Northeast Organic Farming Assn. *Maine Organic Farmers and Gardeners Assn. *Pennsylvania Certified Organic

(***Source***: *Vermont Vegetable and Berry Page/Fact Sheets*)

UPCOMING MEETINGS:

October 15, 2009. *Cornell 4th Annual Raspberry and Blackberry High Tunnel Tour*, 1 to 4 PM, East Ithaca Farm, Maple Avenue, Ithaca, NY. For more information: Cathy Heidenreich mcm4@cornell.edu or 315-787-2367.

October 30, 2009. *NE IPM Berry Webcast Series #3*: **Strawberry Weed Control: products overview, cultural approaches**. Connections for each webcast are limited to 70 participants so register now by contacting Laura McDermott, lgm4@cornell.edu or calling 518-746-2562. Check the web site for additional program and group viewing location details: www.fruit.cornell.edu/webinar.

November 4, 2009 *Blueberry/Cranberry Weed Management Webinar***. -** 12:45 – 2:00.
IPM for Dodder in Cranberries Hilary Sandler, University of Massachusetts
New Approaches to Blueberry Weed Management Dr. Eric Hanson, Michigan State University
For more information or to sign up go to: http://www.fruit.cornell.edu/Berries/webinarschedule.htm.

Nov 7 & 8, 2009. *15th Annual Franklin County Cider Days*, at various locations. For complete program of activities go to www.ciderday.org.

November 18, 2009 *Blueberry/Cranberry Disease Management Webinar*. 12:45 – 2:00.
Blueberry Viruses Dr. Annemiek Schilder, Michigan State University
Important Cranberry Diseases in the Northeast Dr. Frank Caruso, University of Massachusetts
For more information or to sign up go to: http://www.fruit.cornell.edu/Berries/webinarschedule.htm.

December 2, 2009 - 12:45 PM EST Blueberry/Cranberry Production
Blueberry Site Preparation and Fertility Considerations Dr. Gary Pavlis, Rutgers University
Overcoming Blueberry Pollination Challenges Sonia Schloemann, University of Massachusetts
For more information or to sign up go to: http://www.fruit.cornell.edu/Berries/webinarschedule.htm.

December 7-10, 2009. *North American Strawberry Grower's Association Annual Meeting and Conference*, Grand Rapids Michigan. For detailed information go to: http://www.nasga.org/.

December 14, 2009. *GAP Training***.** Center of New Hampshire Radisson, Manchester NH. 1:00 pm-5:30 pm. This meeting will introduce the basics of USDA/FDA's GAP (Good Agricultural Practices) Certification Program for wholesale fruit and vegetable growers. For info, contact Shirley Mietlicki-Floyd at 413-545-4420 or mietlicki@umext.umass.edu or Becky Grube at 603-862-3203 or becky.grube@unh.edu.

December 15-17, 2009; *New England Vegetable & Fruit Conference*, Radisson Hotel, Manchester, NH. For more information visit www.newenglandvfc.org.

December 9, 2009 *Blueberry/Cranberry Insect Management Webinar*- 12:45 – 2:00
Winter Moth: A New Blueberry Pest Robert Childs, University of Massachusetts
Japanese Beetle Management Dr. Roger Williams, Ohio State University
For more information or to sign up go to: http://www.fruit.cornell.edu/Berries/webinarschedule.htm.

January 25-27, 2010. *Empire State Fruit and Vegetable EXPO/NYS Farmer's Direct Marketing Association Annual Conference*. OnCenter, Syracuse, NY. Mark your calendars – berry session Wednesday January 27th.

February 2-4, 2010. *Mid-Atlantic Fruit and Vegetable Convention*, Hershey Lodge, Hershey, PA. For more information visit http://www.mafvc.org/html/.

June 22-26, 2011. *10th International Rubus and Ribes Symposium, Zlatibor, Serbia***.** For more information contact: Prof. Dr. Mihailo Nikolic, Faculty of Agriculture, University of Belgr, Belgrade, Serbia. Phone: (381)63 801 99 23. Or contact Brankica Tanovic, Pesticide & Environment Research Inst., Belgrade, Serbia. Phone: (381) 11-31-61-773.

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