

# Berry Notes

Prepared by the University of Massachusetts Fruit Team

Sept. 15, 2003, Vol. 15, No. 17

<http://www.umass.edu/fruitadvisor/berrynotes/index.html>

## Volume 15-- 2003

*Berry Notes is edited by Sonia Schloemann with articles written by other contributors with attribution; sources are cited. Publication is funded in part by the UMass Extension Agriculture and Landscape Program. Questions can be directed to Sonia Schloemann at 413-545-4347, sgs@umext.umass.edu. Please cite this source if reprinting information that originates here.*

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## **Strawberry**

### **Strawberry Fall Check-List**

*Sonia Schloemann, UMass Extension*

**General:** Flower bud initiation deep in the crown of the plants is happening now, determining next years yield. So, maintaining good plant health into the fall is important. In addition to keeping up with the fertilizer program, suppressing leaf diseases improves the ability of the plant to carry on photosynthesis and store starch in the crowns. Don't let leaf spot or powdery mildew get ahead of you. Narrow the rows to about 12" and cultivate the alleys in fruiting fields and new plantings for the last time before mulching. Plant winter rye in plowed down fields as soon as possible in order to get good establishment and growth before winter.

**Nutrition:** Nitrogen fertilizer should be applied to bearing beds in early September to bring your seasonal total up to 100-120 lbs/acre. Most growers apply about 70-80 lbs of nitrogen on at renovation. The fall application should provide another 30-50 lbs (more on soils with low organic matter content). This stimulates good root growth in the fall and supplies nitrogen needed for flower bud initiation. New fields need to have a total of 80 - 100 lbs/acre of nitrogen with about 40 lbs applied in the fall. Ammonium nitrate (35% N) is a good fertilizer for the fall application.

If your leaf tissue analysis shows deficiencies in magnesium or boron, early fall is a good time for foliar applications of Epsom salts

(15lbs/100gal/acre for magnesium) and Solubor (3lbs/100gal/acre) for boron. Don't make these applications on hot humid days, however, or phytotoxicity could result. Read the labels.

**Weeds:** Weed management in the early fall is limited to cultivation and hand weeding/hoeing. The only herbicide you should consider using is Poast™ for controlling grasses. Poast™ will only work on relatively small grasses. Big clumps of crabgrass will have to be pulled by hand. However, quackgrass can be knocked down by cultivation or mowing and then treated with Poast™ when new growth is less than 6" high. One note of caution; Poast™, which is used with a crop oil surfactant, can injure strawberry foliage in cold weather. I would recommend its use as a spot treatment at this time of year rather than a broadcast treatment of the whole field. Weed management later in the fall can include applications of preemergent materials such as Devrinol™ and Sinbar™. For more information on fall weed management, read on below.

**Diseases:** Clean up severe infections of leaf spot and powdery mildew. Healthy leaves are important at this time of year

to supply the plant with the energy to produce flower buds for next year's crop and to store energy in the roots for the first flush of growth next spring. Apply Ridomil Gold™ or Alliette™ in September or early October in areas where Red Stele has been identified. It is best to apply these materials when the soil is beginning to cool but before heavy fall rains begin.

**Insects:** Check fields for infestations of leafhopper or aphids. Generally, plants can take a fair amount of feeding by these insects, but heavy infestations can be a problem. And, aphids in particular, can vector virus diseases and should not be allowed to build up especially when they are in the winged form and can disperse to other fields.

## **Fall Herbicide Applications for Strawberries**

*Bruce Bordelon, Purdue University*

A number of herbicides can be used on strawberries during late summer and fall to prevent weed germination, kill emerged weeds, and provide residue control until the following spring. The key set of weeds you need to control during this period are fall germinating winter annuals such as chickweed and shepherdspurse. You may also need to control wheat, oats, or rye that come from seed in the straw mulch that you apply for winter protection.

**Devrinol** (napropamide) is a preemergence herbicide. It can inhibit rooting of daughter plants so it should be applied after early forming daughter plants have rooted. Late forming (after late August) daughter plants do not contribute to yield and Devrinol can be applied before these plants root. Devrinol must be applied before winter annuals and small grains emerge. Devrinol provides excellent control of small grains and some winter annuals such as chickweed. Devrinol must be moved into the soil by cultivation or water after application.

**Dacthal** (DCPA) is a preemergent herbicide that can be used in new plantings or immediately after renovation. It provides good control of many grasses and some broadleaves such as purslane and lambs quarter. Like Devrinol, it must be applied before weeds emerge.

**Sinbar** (terbacil) is primarily a preemergent herbicide but it has some postemergence activity against small susceptible weeds. Fall applications of Sinbar should only be applied after the strawberries are completely dominant. If Sinbar is applied to actively growing strawberries, injury can occur. Cultivars differ in tolerance to Sinbar. In general, less vigorous cultivars have greater injury. Applications are most effective when applied to the soil and activated by rainfall or irrigation. Sinbar provides excellent control of many winter annual weeds. Fall applications of both Devrinol and Sinbar will persist to the following spring.

**Poast** (sethoxydim) is a post-emergent, grass active herbicide. The grasses must be actively growing. Thus, Poast should be applied in late summer or early fall before plants become dormant. Also make sure that you scout your fields to determine which grass weeds are present. Summer annual grasses, such as foxtails and crabgrass, will be killed by fall frosts, and do not require Poast applications for control. Poast is more effective against annual than perennial grasses. Poast can be used in the fall to suppress perennial grasses such as quackgrass; control early emerging small grains, and kill winter annual grasses such as wild oats and downy brome.

A systemic, post-emergence broadleaf herbicide, **2,4-D**, can be applied when strawberries are dormant to control some winter annuals. 2,4-D provides good control of many mustards and shepherdspurse, but is not very effective against chickweed. The herbicide should be applied to actively growing weeds. Be careful of 2,4-D drift causing injury to non-target plants.

**Gramoxone Extra** (paraquat) can be applied as a directed spray between strawberry rows, using shields to prevent contact with strawberry plants. Gramoxone is a nonselective herbicide, so it will kill or severely injure strawberries it contacts. Gramoxone is a restricted use pesticide and is extremely toxic to animals including humans. It provides excellent control of annual grass and broadleaf weeds. Gramoxone does not extensively translocate in plants so it does not control perennial weeds. Weeds should be actively growing when Gramoxone is applied.

In conclusion, there are a number of herbicide options that can be used on strawberries during the fall. Select herbicides that will control problem winter annuals and small grains. Herbicides such as Devrinol and Sinbar can provide residue weed control until spring. (*Source: Facts for Fancy Fruit, FFF03-11 September 12, 2003*)

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## Blueberry

### Highbush Blueberry Fall Check-List

*Sonia Schloemann, UMass Extension*

**General:** Blueberry plants should be encouraged to harden off for the winter. This means no nitrogen fertilizer at this time. Flag bushes that show premature reddening of leaves compared to others of the same variety. This can be an indicator of infection with virus or other pathogens. If you haven't done it already, make some notes on observations from this year that might be helpful in coming years (e.g., variety performance, sections of the field that did well or poorly, how well some practices worked, or didn't, etc.). Relying on memory isn't always accurate enough. Nothing can replace a detailed field history when trying to diagnose problems.

**Nutrition:** Hold off on any nitrogen fertilizers. Based on leaf tissue tests and soil tests, sulfur, lime, and some fertilizers can be added now. Apply these before fall rains begin and also before adding any supplemental mulch to the plants.

**Weeds:** As with other small fruit crops, now is a good time to do a weed survey and map the weed problems in your planting. This information will be very useful in tailoring your weed management plan so that is effective and not wasteful. A late fall application of

Casoron (dichlobenil) for preemergent control of broadleaf weeds next spring should be made only when temperatures are below 40°F, preferably just before rain or snow.

**Diseases:** Weak plants can easily be detected this time of year because they tend to turn red earlier than healthy bushes. Upon finding weakened bushes, try to determine the reason for weakness. Is the root system damaged? If so, is it likely from a disease infection or root damage by voles or grubs? If the roots are healthy, could a crown borer (Dogwood borer) be the culprit? Or is stunt disease the cause? Or Scorch? Accurate diagnosis is the first step in resolving the problem and avoiding spread. Enlist the help of specialists if you have trouble determining the cause of problems.

**Insects:** The main worry now is for sharp-nosed leafhopper which is the vector for stunt disease. If you have determined that you have bushes infected with stunt disease in your planting, an application of malathion to the infected bushes and any immediately surrounding bushes should be made to control leafhoppers BEFORE removing the infected bushes. Failing to do this will likely cause the spread of the disease to clean bushes even after infected bushes have been removed. More on this below.

### Leafhoppers and Stunt

*Gary C. Pavlis, Rutgers University*

Each year in August and September this newsletter includes many sections about Stunt disease and Leafhoppers. Usually it's just a note on the timing of controls or a description of symptoms. It has been a while since a complete run-down of the problem with Stunt and Leafhoppers has been presented.

Stunt disease of blueberry plants is caused by a phytoplasma as previous stated. Phytoplasma are microscopic organisms that have no definite shape, unlike uniformly shaped types of bacteria or viruses. The phytoplasma of stunt disease live mostly in the transport tissues of the plant, primarily in the phloem.

Leafhoppers of many species feed on plants by piercing the surface of leaves or stems and sucking juices from the phloem tissues. Any leafhopper feeding in the phloem of a stunt-infected blueberry plant has the potential to pick up some stunt phytoplasma's in its meal. Fortunately, only one species of leafhopper is known to be able to harbor these phytoplasma's in its body and transmit them to other plants. This is the blueberry sharp-nosed leafhopper, *Scaphytopius magdalensis*. This leafhopper feeds and reproduces on a relatively wide range of blueberry cultivars and on the wild blueberry which grows nearly everywhere in the pinelands of New Jersey. Sharp-nosed leafhoppers are not pest unless the following steps are completed:

- 1) They must feed on stunt-infected plants.
- 2) They must move to healthy plants.
- 3) They must feed long enough to transmit the phytoplasma to the plants.

Stunt disease will spread quickly if these three steps are favored by the particular situation in a blueberry field. Disrupting any of these steps to a sufficient degree can reduce the spread of stunt disease.

Of course, getting rid of all leafhoppers in an area would halt the spread of stunt disease. This is a very impractical solution, since the wild blueberry plants in our area provide for a large population of leafhoppers in the areas around our cultivated fields. We can't control the development of these populations, so we must defend our cultivated plantings from them. We do this with insecticide treatments, made during

the periods when adult leafhoppers are active. Only adult leafhoppers have wings and the ability to move great distances, so these are the real pests in the stunt disease problem.

Pesticides can affect only the second and third steps of stunt disease spread listed above. Leafhoppers are either killed before they reach healthy plants or they die before feeding long enough to transmit the phytoplasma to a new plant. Errors in detecting the presence of adult leafhoppers and problems with the timing of pesticide treatments make it difficult to achieve 100 percent stunt control by chemicals alone.

This is why the roguing of disease bushes provides an important factor in stunt disease control. Stunted bushes are easy to find especially when symptoms become bold in the fall. Attacking the stunt disease transmission cycle at steps one, by the removal of infected plants, is both simple and very effective.

Remember that it is highly recommended to spray stunt-infected plants with a short residual insecticide like Sevin or Malathion before the plant is removed. This will keep any phytoplasma carrying leafhoppers on the infected plant from dispersing to healthy plants when the infected bush is disturbed during removal. (*Source: The Blueberry Bulletin, Vol. 19, No. 29, Aug. 28, 2003*)

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## Brambles

### Raspberry Fall Check-List

*Sonia Schloemann, UMass Extension*

**General:** Encourage hardening off of canes in summer bearing varieties of red and black raspberries and blackberries by avoiding nitrogen fertilizers and supplemental watering at this time. Do not remove spent floricanes until later in the winter unless they are significantly infected with disease. Fall bearing raspberries can still benefit from irrigation in dry weather to help maintain fruit size.

**Nutrition:** Based on soil and tissue test results, apply non-nitrogen containing fertilizers and lime as needed. For example, Sul-Po-Mag or Epsom Salts can be applied now so that fall rains can help wash it into the root zone for the plants.

**Weeds:** Now is a good time to do a weed survey and map of problem areas, so that you can use this information to develop an effective management strategy. A late fall application of Casoron (dichlobenil) for preemergent control of broadleaf weeds next spring should be made only when temperatures are below 40°F, preferably just before rain or snow.

**Diseases:** Fall bearing raspberries can suffer fruit rot problems due to increased moisture present in the planting (more frequent precipitation, longer dew retention, longer nights) late in the growing season. The majority of this fruit-rot is *Botrytis cinerea*, gray mold. Captan 80 WDG is now labeled for use on brambles. Go to [www.umass.edu/fruitadvisor](http://www.umass.edu/fruitadvisor) for a copy of the label. Remaining stocks of Benlate can not be used in PYO plantings. Rovral remains with a 0 day phi, but resistance is a concern if this product is overused.

Elevate is a new material that can be alternated with Rovral. It can only be used up to 4 times per season to avoid the development of resistance. Frequent harvesting and cull-harvesting are the best practices, but are expensive and impractical in many cases. Thinning canes in dense plantings can also help.

Scout summer bearing brambles to look for powdery mildew and treat if necessary. See the *New England Small Fruit Pest Management Guide* for recommended materials and rates. If Phytophthora root rot has been identified in a field, treat the affected area with Ridomil Gold™ or Alliette™ in September or early October. This timing is important to get the material in place in the root zone before the onset of cool wet weather (and soil) in the fall.

**Insects:** Now is the time to check plantings for crown borers. Adults of this pest look like very large yellowjacket, but is actually a moth. They are active in the field in August and September laying eggs. Scout the fields for crown borer damage by looking for wilting canes. This symptom can also indicate Phytophthora root rot, so when you find a plant with a wilting cane (or two), dig up the plant and check the roots for brick red discoloration in the core of the roots (phytophthora) or the presence of a crown borer larvae in the crown. Rogue out infested crowns and eliminate wild bramble near the planting, since they will harbor more of this pest. Insecticide applications can be made to the canes in October and to the crowns (in a drench application) in early spring. See the *New England Small Fruit Pest Management Guide* at [www.umass.edu/fruitadvisor](http://www.umass.edu/fruitadvisor) for details.

## What's Wrong With my Raspberries?

Michael Annemiek Schilder, Michigan State University

This article is meant to give some pointers how to distinguish rots and other disorders on raspberry fruit. Before, during and after harvest, several pathogens can attack raspberries. The most common of these is Botrytis fruit rot (also called gray mold). In a wet year, the Botrytis fungus can gobble up many of the choicest berries before we even get a chance to taste them. Gray mold is a good description, because the berries tend to be covered with a grayish mold, which is made up of the mycelium and spores of the fungus. Sometimes berries are stuck together, as the fungus moves from an infected berry to healthy neighboring berries. Gray mold may also be a problem after harvest as it can turn a pint of beautiful raspberries into a moldy mass in a few days, sometimes even overnight. Elevate or Switch applied right before harvest (they both have a PHI of 0 days) will reduce post-harvest Botrytis rot incidence.

Another berry rot that you may encounter in storage is Cladosporium rot, caused by the fungi *Cladosporium herbarum* and *Cladosporium cladosporioides*. This fungus appears as a velvety, olive-green mold on collapsing drupelets. This rot is not as common as gray mold, but becomes more apparent when gray mold is absent. Visible growth is usually restricted to overripe or damaged fruit. Growth of these fungi may continue at normal fruit storage temperatures. Cabrio or Nova (both have a 0-day PHI) will reduce Cladosporium rot levels.

Certain cultivars, e.g., Caroline, are susceptible to late leaf rust, caused by the fungus *Pucciniastrum americanum*. The spores of this fungus are visible as a yellow, powdery substance on individual drupelets and can render the berries unmarketable. The fungus also causes yellow pustules on the leaves and spends part of its life cycle on white spruce. Symptoms usually show up later in the season and tend to be more severe in dense plantings, which impede air circulation. The spores are wind-disseminated but can also be spread from infected to healthy fruit during harvest. The fruit is susceptible to infection at all stages of development. Luckily, we now have Nova and Cabrio to control this disease. These fungicides should be applied during fruit development or as soon as the first symptoms of the disease are showing up on the leaves. (*Source: Michigan Fruit Crop Advisory Team Alert, Vol. 18, No. 17, Sept. 9, 2003*)

## Fall Weed Management for Brambles

Courtney Weber, Cornell University

Summer brambles are often pushed to the background during the fall as so many other crops demand attention in this busy season, but weed problems requires year round vigilance. In bramble plantings, maintaining weed free aisles through permanent sods or cover crops is the best way to reduce you weed load within the row as well. If not done already, now is the time to be planting the aisles.

For a permanent sod, a companion grass mixture is probably the best bet. A mixture of fine-leaf fescues, perennial ryegrasses, or bluegrass forms a thick sod, which holds up to traffic and needs infrequent mowing. Be sure the seed mix does not contain a broadleaf herbicide such as 2,4-D because brambles are very sensitive. Once established, be sure to prevent the grass from spreading into the row with by banding grass-selective herbicides in the spring.

For row centers maintained as bare earth, a fall cover crop can reduce weed load and add organic matter to the soil. Cover crops compete with fall germinating weed seeds and reduce erosion over the winter. They also act as mulch in the spring, which retains moisture and smothers germinating weeds. Buckwheat, oats, or rye can be fall planted and either die in the winter or can be mowed or sprayed in the spring. Deep tillage is to be avoided as raspberry roots can be damaged and weed seeds will be uncovered. Once the aisles are taken care of, it is time to consider herbicides to control winter annuals and spring weeds.

Late fall is a good time for herbicide applications in brambles. Casaron is probably the most effective option. However, it is expensive and can be difficult to apply. It is a fine granular formulation and care needs to be taken to ensure even coverage within the row. A Casaron specific spreader or hand spreading on a wind free day is recommended. Application should not be done until daytime temperatures are below 45/F in late fall or winter. Casaron can be used in conjunction with very good weed control. Devrinol can be applied in late fall or early spring and needs to be washed in within 24 hours as sunlight will break it down. It is a preemergent herbicide and works on germinating seeds. Princep is effective at a single high rate for quack grass in the fall or the application can be split between the fall and spring at a lower rate for other weeds. Princep should not be used on plantings less than 6 months old, tissue culture plants less than 1 year old, or the

variety 'Royalty'. Other herbicides available for fall application are Solicam, Surflan, and Sinbar but are not commonly used due to expense and variety sensitivity.

A weed management program that anticipates problems helps to avoid emergencies during the season and ensures a long life for bramble plantings. Effective weed control in brambles is possible without undue hand weeding but requires vigilance throughout the year. (*Source: New York Berry News, Vol. 1, No. 7, Sept. 2002*)

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## Grape

### Grape Fall Check-List

*Sonia Schloemann, UMass Extension*

**General:** Harvest evaluations are underway for early varieties and sparkling wine. Check fruit for sugar, acidity and pH twice weekly to keep track of ripening.

**Nutrition:** Apply only lime and non-nitrogen containing fertilizers at this time according to soil and petiole analysis done earlier in the year. Contact me for more information on petiole analysis.

**Weeds:** As with other small fruit crops, now is a good time to do a weed survey and map the seed problems in your vineyard. This information will be very useful in tailoring your weed management plan so that it is effective and not wasteful. A late fall application of Casoron (dichlobenil) for preemergent control of broadleaf weeds next spring should be made only when

temperatures are below 40°F, preferably just before rain or snow. Should only be used on well established vines.

**Diseases:** Powdery and downey mildew and Botrytis bunch rot can be problems at this time. Generally berries are less susceptible to black rot this late in the season. Don't forget to control the mildews even after harvest, if there is a significant level of infection in the vineyard. Failure to control it now can effect overwintering and productivity next season.

**Insects:** Now is the time to assess the effectiveness of Grape Berry Moth management practices used this year. Evaluate each block for low, medium, or high levels of infestation this year, taking note of hot-spots within blocks. This will be the first step in your risk assessment protocol for next year.

### New Grape Disease Fact Sheets Now Available

Thanks to the combined efforts of Wayne Wilcox (author), Juliet Carroll (editor), Karen English-Loeb (Web Master), and myself (Grant Writer and Overall Project Coordinator) along with funding from NYS Ag and Markets and the NYS IPM Program we are able to provide you with updated versions of the Black Rot and Grapevine Powdery Mildew fact sheets.

One big difference you will find with these new fact sheets, along with all others updated in the future, is that they will not be available in the printed form you are all used to. Instead, these fact sheets are available only in an electronic format that can be accessed via the web. If you do not have access to the web you can get a copy by contacting me and I can get you one for a small charge.

The electronic format allow for easy printing from the web along with the ability for more frequent review and updating. Removing the need to print hard copies of a fact sheet also removes the need to sell enough to recoup the costs of production prior to revising the fact sheet and reprinting it. As an example, both the Black Rot and Grapevine Powdery Mildew fact sheets were last updated in 1984. Wayne is currently working on revising both the Phomopsis Cane and Leaf Spot and Botrytis fact sheets. With the electronic format of the fact sheets we are planning on a yearly review of fact sheets during our annual review of the NY and PA Pest Management Guidelines for Grapes.

You can view the new the new fact sheets using the following addresses

**For Grapevine Powdery Mildew use:**

[http://www.nysipm.cornell.edu/factsheets/grapes/diseases/grape\\_pm.pdf](http://www.nysipm.cornell.edu/factsheets/grapes/diseases/grape_pm.pdf)

**and for Black Rot use:**

[http://www.nysipm.cornell.edu/factsheets/grapes/diseases/grape\\_br.pdf](http://www.nysipm.cornell.edu/factsheets/grapes/diseases/grape_br.pdf)

For best results when printing off the web adjust your printer settings (you will typically see if you press the properties or set up buttons). With my Lexmark X85 color printer at the office and the X73 I have at home I had the best luck in getting both quality text and pictures when I used the setting of photo mode and selecting natural color. I found that using the auto function where the printer chose which is best did not do a very good job in choosing the correct colors or producing crisp text.

While the electronic format of the fact sheets may seem alien to some of you, it is keeping with the movement of the grape industry as a whole towards the use of computers in the gathering and dispersal of information. If you have any questions or comments on this new format please give me a call (716) 672-6830 or e-mail me at thw4@cornell.edu.

NOTE: The new fact sheets are produced using Adobe Acrobat to create PDF files. The advantage is that these files can be downloaded, read and easily printed by any computer or operating system - all formatting and pictures are retained in the documents and they are generally smaller than word processing files.

If you do not currently have Adobe Acrobat Reader on your computer, you will need to download and install a free copy of the software. The Adobe Acrobat Reader software is available at: <http://www.adobe.com/products/acrobat/readstep.html>

Follow instructions to download and install these files. You will then be able to open, read and print the fact sheets, MSDS sheets, etc. using your computer. (*Source: Lake Erie Regional Grape Program Crop Update September 11, 2003*)

## **Foliar Fertilization of Grapevines**

*R Hans Walter-Peterson, Cornell University*

There seems to be a growing interest in foliar fertilizers lately as growers look for new and different (better?) ways to manage their vineyards. Here in the Lake Erie region, they seem to be getting some more attention this year due to the unusual conditions that many growers have found themselves in, and new practices that have been used to deal with them. Concern about a cooler than normal year, combined with significantly higher than average crops in many vineyards, has led to concerns about ripening. The use of mechanical thinning in many vineyards this year has caused concern among some growers about the health of vines after this practice is done.

Growers have been approached with an array of materials to spray on their vines that are purported to help alleviate these problems. While there are certainly materials out there that can be applied to the foliage that will provide nutrients to the grapevine (e.g., epsom salts for magnesium), growers should be thinking very hard about why the material is needed, and what information and research is out there to show that the products do what those who are selling them claim that they do.

### **Why do you need it?**

In some fruit crops, foliar application of nutrients has been shown to alleviate certain disorders, such as the use of calcium for bitter pit in apples. For the most part, however, foliar applications of nutrients should be used to alleviate particular deficiencies that have been identified in grapevines by means of petiole sampling. For example, several growers have recently reported that basal leaves in certain areas of their vineyards are yellowing and/or senescing even though we are still most likely almost a month away from harvest. While chlorotic or necrotic tissue on basal leaves can be a symptom of a nutrient deficiency, it is by no means exclusive of other problems (e.g., disease, excessive canopy shading). Another way to think of it may be for a grower to ask, "Do I have a problem in my vineyard that needs this material, or is this material looking for a problem in my vineyard?"

### **Micronutrients vs. Macronutrients**

Nutrients such as iron, zinc, manganese, copper and boron are called micronutrients because they are required by the plant in relatively small quantities. Because of this, micronutrient deficiencies can be addressed by means of foliar nutrient applications, where the leaves are able to absorb the small quantities that are required for normal plant metabolism. Based on the petiole tests that come through our office, the most common micronutrient deficiency we see in the Lake Erie region is boron, which can be addressed by applying a material such as Solubor to either the foliage or the soil (my recommendation is usually that this material be applied to the soil, as the window between boron deficiency and toxicity can be quite narrow). Because of the acidic soils over much of our region, and the use of fungicide materials that contain some of these elements, we rarely see other micronutrient deficiencies. Areas with soil pH values above 7, such as the northern portion of Niagara County, are generally more prone to developing micronutrient deficiencies. Again, the best way to diagnosis this is by means of petiole testing.

The case for using foliar fertilizers to supply macronutrients to the vine is much more uncertain than that for micronutrients. These elements are called macronutrients because they are needed by the plant in larger quantities. The quantities required, in fact, will often times be greater than the amount of nutrients that the vine could absorb through its leaves. Think about it - the vine has organs and tissues that have very distinct functions. The leaves are where photosynthesis takes place, providing sugars and carbohydrates for use by the plant. The root system is designed to provide the nutritional needs of the grapevine, and are much more capable of taking up any supplemental materials that we provide to the vine. So it would seem to make sense to place fertilizers containing macronutrients (N, P, K, Ca, Mg) where they can be most effectively absorbed into the plant. As mentioned before, epsom salts (magnesium sulfate) can be applied to the foliage to alleviate a magnesium deficiency in a given year. However, application to the soil would enhance the pool of magnesium available for uptake by the plant over multiple years.

Dr. Peter Christensen, retired extension viticulturist at the University of California's Kearney Agricultural Center and the one of the world's foremost experts on grapevine nutrition, has written an excellent article on foliar fertilization of grapes where he summarizes the current research on the topic (you can find the article at <http://cetulare.ucdavis.edu/pubgrape/ng694.htm>). In it, he cites a number of studies that found that the use of foliar sprays to provide macronutrients such as nitrogen, phosphorous, potassium and calcium had little or no effect on nutrient deficiencies or petiole values. This would seem to make sense for these nutrients, which are usually needed in quantities greater than what can be absorbed through the leaves. Trying to provide these elements in sufficient amounts to the vine through the leaves might be compared to trying to fill a glass of water by using an eyedropper.

With all of that said, there seems to be enough interest in some of these materials for us to do some trials to see if they do what they claim to. We are currently planning on conducting a couple of trials this fall with one of these materials. If it appears that this material has some kind of effect on vine and fruit development and fruit maturity, we will consider conducting some further studies with this and possibly other materials. We will keep you updated on the progress of these trials as we get results.

*i>Christensen, P. Foliar Fertilization of Grapevines. University of California Cooperative Extension, Tulare County. Publ. #NG6-94. (Source: Lake Erie Regional Grape Program Crop Update, Sept. 11, 2003)*

### **Late Season Spraying And Its Effect On Fermentation:**

*Thomas Henick-Kling and Alice Wise, Cornell University*

All pesticides have a days to harvest restriction, also called a preharvest interval (PHI). If a product is labeled 14 days PHI, this means it cannot be used within 14 days of harvest. With many growers, the application of bird netting in late August effectively ends the spray season.

From a winemaking standpoint, one of the primary concerns about late season sprays is that potential residues may inhibit fermentation. Interesting that some winemakers consider this an issue, others discount it. It is known that antifungal agents –fungicides - used in the vineyard can also inhibit yeast. After all yeasts are also fungi.

Sulfur is often demonized as the reason for "stuck fermentations". Yeasts have the ability to convert elemental sulfur into H<sub>2</sub>S. If the residual elemental sulfur in the must is  $\geq 1$  ppm (although some sources claim it takes  $\geq 5$  ppm), it may lead to H<sub>2</sub>S formation and off-odors in the wine. Think "rotten egg". Consequently, a late application of sulfur, particularly if no rain occurs between the spray and harvest, may lead to H<sub>2</sub>S problems.

Copper can also be inhibitory to yeast and bacteria (malolactic fermentation is a bacterial fermentation). Non-lethal doses of copper can cause stress on the yeast which can cause incomplete fermentations and release of undesirable metabolites, all leading to wine aroma defects. Generally this occurs only with very high residual copper concentrations.

There are a number of factors that influence whether a late sulfur spray – or any other type of spray - will lead to a problematic fermentation. Many enologists call for >30 days between the last spray and harvest. The type of product is important. Micronized sulfurs, for example, are used at lower rates than the dusting sulfurs used on the West Coast. Rainfall is also a factor in east vs. West Coast conditions. Coverage can be a contributing factor. If fruit is free from powdery mildew, minimize the nozzles in the cluster zone and focus on keeping the canopy clean. Use a lower rate of sulfur, 4 lbs./a for example rather than a high rate for the last spray.

Other potential end of season sprays include potassium bicarbonate ( Kaligreen, Armicarb), monopotassium phosphate (Nutrol), hydrogen peroxide (Oxidate), JMS Stylet Oil and the phosphorous acid products. Winemakers may express concern about the first two. Adding excessive amounts of potassium to the must, potentially raising the pH, could be an issue. Again, this is unlikely to be an issue unless a heavy application was made shortly before harvest. No issues come to mind with hydrogen peroxide. JMS Stylet Oil is actually a very good late season spray. Past experience has shown it to do a good job keeping late season powdery mildew to a minimum. It will knock back European red mite as well. There is some evidence that late applications depress Brix (sugar) accumulation via reductions in photosynthesis. To that end, we are conducting a small research project comparing Stylet Oil with other sprays to judge effects on fruit quality. There are no obvious issues with the phosphorous acid products.

Finally, there's the synthetic materials such as the strobilurins and sterol inhibitors. The strobilurins are not the best choice due to resistance issues. Even where canopies look relatively clean, inevitably there may be low levels of powdery mildew. For this reason, if deciding to select from synthetic materials, a sterol inhibitor such as Rubigan might be a better choice than a strobic. From a fermentation standpoint, there appear to be no issues with either group of materials.

Bottom line – don’t spray too late into the season (easy to say, hard to make the call in a season like this); if fruit is clean at this point, don’t target the cluster zone with powdery and downy sprays; and expect rainfall between the last spray and harvest to have an impact. (*Source: LI Fruit & Vegetable Update, No 25, September 5, 2003*)

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## Uncommon Small Fruits: Lingonberry

### Small Fruit with Big Potential Pacific Northwest Leads the World in Commercial Lingonberry Production

*Ross Penhallegon, Oregon State University*

Over the past three and a half years, I have told the story of the Pacific Northwest’s fledgling lingonberry industry here in the pages of Agrichemical and Environmental News (AENews). In “Stalking the Wild (and Not-So-Wild) Lingonberry” AENews Issue No. 165, Jan. 2000), I profiled this humble berry, tracing its European roots and describing efforts to grow it commercially in the United States and Canada. In “The Wide World of Lingonberries” (AENews Issue No. 190, Feb. 2002), I traveled to the lingonberry’s ancestral homeland, visiting Germany, Sweden, Finland, and Estonia, where I sought information on commercial lingonberry production and on markets for the fruit.

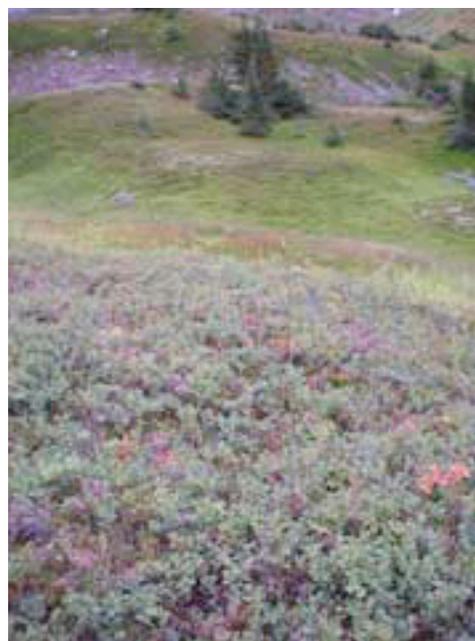
Through my field work at home and away (including a 2002 trip to Alaska, described later in this article), I have learned that the Pacific Northwest (Washington, Oregon, and British Columbia) leads the world in commercial production of lingonberries and is a major player in research on this fruit. The berries grow wild in northern Europe, Asia, and North America, but cultivation is spotty at best. This article describes the state of the industry and the progress we have made since the 2002 article.

### Getting Your Berry Bearings

For those unfamiliar with the lingonberry, it is a small, red fruit borne on



**Wild lingonberries.**



**Wild lingonberries and bilberries on Alaskan hillside.**

low-growing, woody evergreen shrubs. It is also known as cowberry, partridge berry, mountain cranberry, rock cranberry, dry-ground cranberry, lingen, lingberry, fox berry, and red berry, among other monikers. The name “lingonberry” originated in Sweden and is used in Canada and the United States. In Newfoundland it is called partridge berry, while the Scandinavian market prefers the name cowberry.

For the sake of discussion, we can separate the lingonberry into two classifications, the wild (*Vaccinium vitis-idaea* Minus) and the European domestic (*Vaccinium vitis-idaea*). The wild, “Minus” lingonberry is found across the northern hemisphere in forested areas that experience cold winters and warm summers. The plant is quite short, just 3 to 6 inches tall, and produces fruit on a single bloom.

Domestic lingonberries are plants that have been crossbred for production characteristics. Breeding has taken place primarily in Europe. They can grow 8 to 16 inches in height, have two blooming periods, and produce more fruit than the wild variety.

## Where the Wild Ones Are

Most of the lingonberries consumed worldwide are the wild-picked, Minus varieties. Wild lingonberries can be found in Canada, Scandinavia, Poland, China, and Russia, and approximately twenty other northern countries.

In August 2002, after presenting a paper on lingonberries at the International Society of Horticulture Science conference in Toronto, Canada, I headed north to Alaska. The 49th state is a rich berry-growing region; over 115 wild berry varieties grow there, from wild strawberry to salmonberry, from bunchberry to bearberry. And, of course, lingonberry.

In Anchorage, I saw wild lingonberries in the botanical garden and represented in the dioramas at the Alaskan Culture and Heritage Center. Outside of town, I spotted them near the tiny village of Hope (where local residents compete with grizzly bears for a portion of the harvest), along backroads off Highways 1, 2, 3, and 4 between Anchorage and Fairbanks, and in Denali National Park, growing both in forested settings and out on the tundra. Reminiscent of my lingonberry-hunting visit to Europe, I found only two small commercial growers in Alaska.



**Alaska resident (left) takes intrepid OSU Extension Agent into the wild in search of lingonberries.**

## To Market, To Market

So, who buys lingonberries, and what do they do with them? In Alaska, as in Scandinavia and other parts of Europe where consumption is high, lingonberries are used for jam, jelly, juice, wine, liqueur, candy, and as a baking ingredient in cakes, scones, and the like. They are flavorful, lending themselves to concentrate, and colorful, making them potentially useful as pigment for food coloring. Because they are high in vitamins A and C as well as magnesium and flavonoids, they are considered healthful, even medicinal.

Europeans consume over 180 million pounds of lingonberries annually, and consumption is also strong in Asia. Since most of this demand is met by wild lingonberries, which, with their low growth habit, are difficult to harvest, it would seem that the lingonberry consumers of the world would be “ripe” for a commercial source. The other potential market for the berry is consumers who are as yet unfamiliar with the fruit, but would likely appreciate its taste and health benefits.

## Commercial Production Update

While I cannot yet vouch for the state of commercial lingonberry production in Poland, Russia, or the Far East, my research to date indicates that only Germany, Canada, and the United States cultivate lingonberries today. Washington, Oregon, and British Columbia appear to lead the world in this endeavor.

Commercial lingonberry production in the Pacific Northwest began in the mid-1990s. By the time I wrote my AENews article in January 2000, the main concerns in “growing” the industry were how to produce the berries without pesticides (as such a minor-minor crop would be unlikely to receive much registration attention from chemical manufacturers), how to work with the double bloom of the domestic lingonberry, how to harvest the berries, and how to market the berries.

## Issue 1: Pest Management

As it turns out, the Pacific Northwest lingonberry industry uses almost no pesticides. The fruit has virtually no insect problems and very few disease pressures. Weed control is the most important pest issue, and is accomplished largely through cultural measures beginning with site preparation and maintenance and including good mulching. We have experimented with herbicides in research plots, but production fields have achieved good results by relying on hand weeding, some mechanical cultivation (performed with care, as lingonberry roots form near the soil surface), and, in some cases, establishment of a grass sod between the rows.

In terms of insects, the Western spotted cucumber beetle (*Diabrotica undecimpunctata*), Western striped cucumber beetle (*Acalymma trivittatum*), and the obliquebanded leafroller (*Choristoneura rosaceana*) have been found in Washington and Oregon lingonberry fields, but their feeding has been minor, resulting in no economic damage.

Disease pests are similar to insects in that they exist in Pacific Northwest lingonberries but are managed, for the most part, without use of pesticides. Growers practice good sanitation, choose healthy plants from proven cultivars, and maintain soil health and texture to minimize disease. We have found that adding high amounts of organic matter to the soil increases its permeability and may reduce the number of pathogenic species in the soil due to competition from other soil organisms. Diseases that have been found in the Northwest include leaf spots and twig blights associated with a variety of fungal pathogens, black rot from *Allantophomopsis lycopodina*, ripe rot from *Coleophoma empetri*, damping-off from various *Rhizoctonia* spp., and root rot from *Phytophthora citricola*. Most of these seem to affect a limited number of cultivars and

have not resulted in economic damage. There has been one notable exception. In 2000, we began seeing a problem in some Oregon plantings: the plants had a sunburned appearance and some of the berries were falling off prematurely. When the Oregon State University (OSU) Plant Clinic failed to make positive identification, the USDA Agricultural Research Service laboratory in Beltsville, Maryland became involved. It appears we have discovered a brand-new fungal pathogenic species, *Phomopsis columnaris*. The disease causes progressive twig dieback and eventually results in the whole plant dying. It appears to affect only one cultivar; more research is underway.

### **Issue 2: Leveraging the Double Bloom**

The domestic lingonberry cultivated for production has two blooming periods, March to April and July to August, with fruit ripening in mid-August and early November, respectively. Twenty-one double-bloom cultivars have been planted in the Pacific Northwest and several are showing great promise. While the few commercial fields in Europe (Germany, Sweden) yield 1 to 6 tons of fruit per acre, we have experienced yields of 4 to 21 tons per acre on research plots in the Pacific Northwest.

### **Issue 3: Mechanizing the Harvest**

At present, all commercial lingonberries are hand harvested with berry rakes similar to those used for lowbush blueberries or dryland cranberries. We have located four harvesting machines for consideration, but have not yet investigated modification of the machines nor set trial dates. Three were designed for other fruits (a dryland cranberry picker from Minnesota, a wild blueberry picker from Nova Scotia, and a lowbush blueberry picker from Maine), but might be adapted for lingonberries. A fourth machine was developed in Germany specifically for lingonberries, but it is very large and bulky. Further investigation into these and other options is necessary to determine the feasibility of mechanical harvesting.

### **Issue 4: Marketing**

We touched on this issue earlier. A market exists for lingonberries. In fact, demand exceeds supply. Beyond the many food uses, the berry shows promise for medicinal and pigmentation (food coloring) applications. There are now 23.5 productive acres of lingonberries in Washington, Oregon, and British Columbia; the largest single grower has fewer than three acres. In the near-term future, I see lingonberries remaining a small farm/niche market crop, but as the berry gains recognition, larger acreage will follow. To date, efforts have been focused on choosing the most promising cultivars, improving fruit quality, and increasing per-acre yield. Having succeeded in those areas, acreage will be expanded in the future to accommodate demand for fresh and processing markets.

### **Pacific Northwest Industry Moves Forward**

The Pacific Northwest lingonberry industry is still in its infancy, but important strides are being made. A Grower's Guide is undergoing internal review at OSU as of this writing and will soon be available. A Website with resources for the lingonberry grower and general public is under development. A conference scheduled for 2002 was canceled, but the one we held in 2003 drew attendees from as far away as Newfoundland. Forty individuals attended and shared lingonberry insight, information, and (best of all) edibles. By pooling our information resources and expanding on our successes to date, the Pacific Northwest can become an important supplier for world lingonberry demand.

Ross Penhallegon is with Oregon State University's Lane County Extension Service in Eugene. He can be reached at (541) 682-4243 or ross.penhallegon@oregonstate.edu. (*Source: Agrichemical and Environmental News, September 2003, Issue No. 209*)

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## **General Information**

### **End-of-Year Weed Scouting**

*A. Richard Bonanno, UMass Extension*

It is worthwhile to take the time to check your fields for weed problems at this time of year. A quick scouting can alert you to problems that will be expensive to solve if they get out of control and can give you clues that will help you in designing your weed management program for next year.

#### **Things to look for when you scout:**

**How Many? How dense are the weeds?** If weeds are very dense, they may be having an impact on your yields. This is especially true if these weeds emerged early in the season, when competition is greatest. If weeds come into

your field during the period of greatest crop growth, you may want to consider changing your weed management program.

**Which Weeds?** Identifying weeds can help you identify potential problems before they get out of hand, and can help you decide if you need to modify your weed control program. Weeds like yellow nutsedge, hedge bindweed, and quackgrass are spreading perennials, which have underground parts that enable them to spread throughout whole fields. Because these weeds can be very damaging, and are very difficult to control, they are worth "nipping in the bud." In addition, keep an eye out for annual weeds which are new to your field or

increasing in numbers. Some weeds can be very difficult to control in some or all of the crops in your rotation. Galinsoga, for example, is hard to control in cole crops, peppers, and squash. Nightshades are difficult to control in tomatoes for growers who rely on herbicides for control, because they are in the same family as tomatoes. Velvetleaf is hard to control in sweet corn. Spot treatment with Round-up, or hand pulling or hoeing, is worthwhile to eradicate small patches of particularly threatening weeds.

**What worked?** It is also useful to look at the whole field and evaluate the effectiveness of your weed control efforts. If some weeds are generally escaping, identify them. They may point to weaknesses in your herbicide or cultivation program. If mostly grasses, or mostly broadleaves are escaping, it may mean you need to adjust either the rates or the timing of your grass or broadleaf herbicides. You may also find the New England Vegetable Management Guide useful. This manual contains a chart listing the effectiveness of vegetable herbicides on most of the common weeds in New England. You can use this guide to find an herbicide labeled for your crop which might give better control.

**Where are the weeds?** Weeds in the rows or planting holes are much more damaging to crop yields than between-row weeds. Weeds in rows may be an indication that cultivation equipment needs adjustment, or cultivation needs to be done earlier. Mapping weedy spots, and keeping some kind of permanent record of weed surveys, can help you evaluate your weed management over the years.

**What to do now?** Once crop harvest and weed scouting is complete, disk or till the fields to destroy existing annual weed growth and to reduce or prevent weed seed dispersal. If perennial weeds such as bindweed or quackgrass are present, consider an application of Roundup before cold weather arrives. Time spent on these tasks now will greatly improve your level of weed management next season.

### **Yellowjackets on ripe fruit**

*Rick Weinzierl, University of Illinois*

Maurice Ogutu noted a few problems with yellowjackets feeding on ripe fruit ... grapes, apples, raspberries, and late peaches are all among the treats these wasps like to eat as fall nears. By this time of year, populations of yellowjackets are increasing to their annual highs, and great numbers of workers from large colonies are foraging for food (including other insects and ripe fruit) to feed the nest's brood (larvae). Although baits and insecticide sprays can be used in attempts to reduce numbers, very little can be done to really control yellowjackets at this time of year. Timely picking, disposal of over-ripe fruit, screening to reduce wasp access to indoor market areas, and keeping all foods and drinks covered all help, but none of these steps will eliminate problems. Several people have reported that in areas of their market where they provide samples of apples or other fruit, they also scatter cucumber slices on those table tops and that the cucumbers seem to repel the yellowjackets. If you try this, please let us know if you see any benefit. Sprays of insecticides with short preharvest intervals (Sevin = 3 days apples, 7 days grapes; natural pyrethrins = 0 days) can reduce numbers a little bit in apple orchards or grapes where pickers would otherwise risk lots of stings, but such applications are rarely effective enough to offset costs and concerns about visible residues on fruits at harvest. After ripe fruit is abundant in orchards, bait buckets of insecticide-treated over-ripe fruit are mostly ineffective because they do not "out-compete" all the fruit still on trees for yellowjackets' attention. So ... no easy answers to reducing yellowjacket numbers in orchards or around markets. (*Source: Illinois Fruit and Vegetable News, Vol. 9, No. 14, September 11, 2003*)



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## Meetings

Cider Hill Farm

Thursday, October 23, 2003 4:00pm

Glenn and Karen Cook are the owners of Cider Hill Farm. Their farm provides orchard tours, hayrides, cider pressing, animals and pick your own. There will be a talk on the variety of apples that are grown on the farm and about storage of pesticides. One pesticide credit will be given for attending the meeting. Jon Clements Umass Extension Tree Fruit Specialist will be on hand. For questions or more information call Jon Clements at (413) 323-4208 or email [clements@umext.umass.edu](mailto:clements@umext.umass.edu)

For directions visit [www.ciderhill.com](http://www.ciderhill.com)

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*Massachusetts Berry Notes is a publication of the University of Massachusetts Extension Fruit Program which provides research based information on integrated management of soils, crops, pests and marketing on Massachusetts Farms. No product endorsements over like products are intended or implied.*