



# Berry Notes

Volume 14, 2002

Prepared by the University of Massachusetts Fruit Team

Nov. 2002, Vol. 14, No. 18

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

*Berry Notes is edited by Sonia Schloemann with articles reprinted from other sources. Authors and sources are always cited. Publication is funded in part by the UMass Extension Agroecology Program and grower subscriptions. A text version can be e-mailed to you if you contact Sonia Schloemann at 413-545-4347, sgs@umext.umass.edu. Please cite this source if reprinting information.*

## IN THIS ISSUE

### MESSAGE FROM THE EDITOR

#### STRAWBERRIES

- Strawberry and Potassium

#### BLUEBERRIES

- Fall Activities

#### BRAMBLES

- Caneberries are Healthy Fruits

#### RIBES

- Flavor of 'Titania' Exceeds Expectations

#### GRAPES

- Lime Time!
- Comparing the Cost of Lime Materials
- Mg/Ca Content of Lime Materials
- Pruning Grapevines

#### GENERAL

- Decontaminating and Storing Vineyard Sprayers
- Private Schools: New Market for Local Produce
- USDA Organic Cost Share Program
- Business Planning Courses Slated
- Risk Management Program Planned

#### MEETINGS

## Message from the Editor:

**Resource for Finding Berry Nurseries:** Winter is the time to take stock of the year that has just past and plan for the year to come. One of the important jobs during this time is evaluating the performance of varieties that are grown and selecting varieties for new plantings. It seems like a good time to remind people of the resource available at Cornell University for looking up nurseries that carry specific varieties of small fruits that you may be searching for. On the internet, go to <http://www.hort.cornell.edu/departement/faculty/pritts/sfruit/index.html>. This site will allow you to look up specific varieties of berry crops and then locate the nurseries that carry that variety.

**Berry Information on the Web:** While I'm at it, I'll also recommend the Cornell Berry Crops website which has very good information on it, including the online version of the New York Berry News, a very informative newsletter. It can be found at: <http://www.nysaes.cornell.edu/pp/extension/tfabp/index.html>.

## Strawberries

### Strawberry and Potassium

*Christoph Kessel, Horticulture Crop Nutrition, OMAFRA, Guelph, Ontario*

One question asked this past season was: "Why does my leaf analysis show a potassium deficiency but the soil test shows adequate soil potassium?"

It can be difficult to relate soil and tissue analysis results to each other. It is important to remember that leaf analysis is a snapshot of what is in the leaf at the time of sampling. Many soil and environmental factors can affect nutrient concentrations. There are two points to consider when reviewing your analyses. First of all, soil and environmental conditions affect potassium uptake. Secondly, the potassium concentrations in the leaves and in the plant will change over the season.

Potassium moves to the plant root by diffusion. This describes the movement of potassium in soil solution (high potassium concentration) to the plant root (a lower

concentration). Potassium diffusion and uptake can be hampered by low soil temperature, damaged roots, poor soil aeration, low soil moisture, and low clay and organic matter content.

Potassium concentration in the leaves and plant changes over the season. The optimum range for strawberry leaf analysis is 1.5-2.5% (OMAFRA Publication 360, Fruit Production Recommendations, 2000-2001). This range is valid for fruiting plants sampled around July 1. Results from samples taken earlier in the season will be difficult to compare to this range.

Several studies have regularly analyzed strawberry leaf nutrient concentrations during the growing season. They have shown that potassium concentrations are higher prior to flowering and lower after harvest. For example, one study reported a 1.26% potassium at the beginning of July. By the middle of August, the concentration dropped to 0.93%. In a

study from British Columbia, 2.45% potassium was reported in mid May, 1.61% in July and 1.49% in September. Increasing soil potassium levels through soil applied potassium fertilizers increased foliar potassium concentrations. However, the concentrations were still observed to decrease between flowering and post-harvest. Although monitoring foliar potassium seems to indicate a declining potassium concentration, the overall plant potassium concentration increases during the season.

To manage your soil potassium, complete a soil test and provided ideal growing conditions to maintain root health and maximize root uptake of potassium. More

information on strawberry fertility is available from OMAFRA Publication 360, Fruit Production Recommendations (\$10.00 plus GST) and Publication 611, Soil Fertility Handbook (\$35.00 plus GST). To obtain a copy of either publication, please:

call 1-888-466-2372, follow the telephone menu to "Publications",

contact the OMAFRA website [www.gov.on.ca/omafra](http://www.gov.on.ca/omafra), or Email [products@omaf.gov.on.ca](mailto:products@omaf.gov.on.ca).

(*Source: All Ontario Berry Grower, Volume #00.11 – November 2000*)

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## Blueberries

### Fall Activities

*Gary Pavlis, Rutgers University*

**Roguing:** Roguing of diseased bushes should be progressing. This is important in all varieties but should be done with extra care where blocks of Bluetta or Weymouth are located close to Blueray or Bluecrop. In the Pemberton area where there is still an appreciable acreage of Rancocas, varieties adjoining this old variety should be carefully inspected. In such situations there seems to be a more rapid spread of stunt disease. The Rancocas is very resistant to this virus disease but it is susceptible and may be a source of the disease without showing symptoms vividly. After many years of harboring the disease some Rancocas bushes are now clearly exhibiting stunt symptoms. All old plantings of Rancocas should be carefully rogued. Remember to spray diseased bushes before removing them. It is necessary to kill the leafhoppers and it is more efficient, more economical, and wise from the standpoint of conservation of beneficial insects to spray individual bushes rather than entire fields.

**Disease Identification:** A few growers have asked me to provide them with information so that they are more able to identify the typical blueberry diseases such as *Alternaria*, anthracnose, *Phomopsis*, botrytis and mummy berry. I should just explain that the ability to positively identify a disease comes largely from experience. I once spent a few days looking at thousands of plants and tagging those with stunt while I was working on my masters degree in Arkansas. This experience was very early in my career and I accompanied Dr. Jim Moore from Arkansas and Dr. Al Stretch, USDA Pathologist. As a result of this experience, I have never forgotten what stunt looks like. This experience was invaluable and a grower who is not sure about disease ID should invite someone to his field who can spend some time and help him with identifications. This ability is critical in the choice of cultural and pesticide decisions.

Another aid to Disease ID are extension publications. The Highbush Blueberry Production Guide has photos and descriptions that will be of great value in disease ID Also, Michigan State produces one called 'Blueberry Diseases in Michigan', Extension Bulletin E- 1731. Write Michigan Cooperative Extension, Michigan State University, East Lansing, MI 48824. There is also the new Compendium of Blueberry and Cranberry Diseases. This is an excellent resource for growers and researchers alike. This manual is produced by the American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121-2097. It should be realized that there are many times where disease ID is impossible without the help of their cooperative extension office in these cases. To access a web site for disease ID visit <http://www.fvs.cornell.edu> and select "Resources" then select "Berry Diagnostic Tool."

**Nut Sedge:** I visited a farm infested with nut sedge with our Weed Specialist last week and picked up a few things that maybe useful to growers fighting this weed. You may recall that I have recommended Sinbar for the control of this weed. Actually, I stated that Sinbar will do a good job if applied at the maximum rate but only on high organic matter soils. Applications are made as late as possible because nut sedge germinates about May 1. A combination of Solicam and Sinbar will result in early suppression by Sinbar until July 4th, and then Solicam will kick in. The grower I visited last week did all this and still has a major problem. Dr. Brad Majek, our weed specialist, pointed out that Sinbar is very soluble and will not work when a trickle irrigation system is present, i.e. trickle + nut sedge = Roundup in early August. In addition, growers who have trickle systems would get better weed control from their herbicides if they would limit water applications in early spring when herbicides are first applied and are present. It actually might be a good idea to place the trickle tube at a 6 inch depth since herbicides work primarily in the top 6 inches of soil. Doing this may greatly decrease weed problems with trickle irrigation. (*Source: The Blueberry Bulletin, Vol. 18, No. 21, Oct. 30, 2002*)

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## Brambles

### Caneberries are Healthy Fruits

<http://www.oregon-berries.com/cx15/nutra2.htm>

People know that fruits and vegetables are good for them, but only recently are scientists determining why. Fruits and vegetables offer more than just good taste, they provide many familiar and unfamiliar nutritional qualities. Beyond their vitamin and mineral content, fruits, such as berries, are now known to contain other protective influences, including many compounds relating to phytochemicals; naturally occurring compounds with the potential for protective effects on health and disease. In recent years, exciting research has identified powerful phytochemicals found in fruits, bringing them into the nutraceutical spotlight.

The term nutraceutical, coined in 1989, refers to "substances that may be considered food or part of a food and provide medical or health benefits, including prevention and treatment of disease." The movement to nutraceuticals (a.k.a functional foods) is one that could represent the most significant trend affecting the food industry during the next decade.

Both the National Cancer Institute and the USDA estimate that the average American is consuming less than the recommended daily amount of fruit. This presents an opportunity to fill the gap with new products designed with fruit. The many known and unknown benefits yet to be investigated provide a powerful incentive for increased fruit consumption.\

The demand for nutritionally enhanced foods continues to grow, due in part to the baby boom generation's fear of age and infirmity. As the nutraceutical category grows, food industry leaders are taking a long hard look at this particular food business. Manufacturers are gearing up for the next surge in product development, whether formulating completely new categories or exploring the existing market of nutritional supplements and herbal teas.

Studies of the nutraceutical properties in fruits such as raspberries are significant for professionals in the food industry who are marketing to an increasingly knowledgeable and health-conscious consumer. Vitamins and minerals are well recognized as necessary to good health. Now, scientists are excited about the extraordinary properties of numerous naturally occurring phytochemicals such as anthocyanins and ellagic acid contained in berries.

Ascorbic acid and beta-carotene (and other carotenoids) are powerful antioxidants, which help protect the body's cells from oxidative damage. By blocking oxidative damage to cells, antioxidants have the potential to protect against abnormal cell replication, considered a primary step in the development of cancer.

Antioxidant characteristics in berries appear to be due largely to the fruit's anthocyanin content. Anthocyanins are compounds acting as pigment that provide color to fruits, such as raspberries, cherries, cranberries and blueberries. Recently, there has been new research looking at its activity as an antioxidant and its potential health benefits. Research shows anthocyanins may be linked to improving vision, controlling diabetes, improving circulation, preventing cancer and retarding the effects of aging, particularly loss of memory and motor skills.

The health benefits of pigments such as anthocyanins have become an active area of interest within the food and nutrition field.

The anthocyanin content of caneberries ranges between 20-60 mg/100 g of red raspberries; 214-428 mg/100 g of black raspberries; 83-326 mg/100 g of blackberries; 109 mg/100 g of Marionberries; and over 160 mg/100 g of Boysenberries. This compares to the anthocyanin content of many other fruits, including apples (1-10 mg/100 g), peaches (5 mg/100 g) strawberries (7-75 mg/100 g), plums (5 mg/100 g), cranberries (45-100 mg/100 g), and blueberries (25-495 mg/100 g).

One of the phytochemicals present in berries is ellagic acid. Ellagic acid is a member of the family of phenolic compounds, which influence the quality, acceptability and stability of foods by acting as flavorants, colorants or antioxidants. In its natural form in fruits, ellagic acid is bound to glucose and possibly may protect plants against microbial infections.

Ellagic acid was reported to exhibit anticarcinogenic activity by blocking various reactions and metabolic pathways associated with the development of cancer cells in Nutrition Reviews (Nutr Rev 1995;53:49-58). This active substance appears to block various hormone reactions and metabolic pathways associated with the development of cancer. Ellagic acid is found in many fruits, but is exceptionally high in raspberries and blackberries. Levels are about five or six times higher than those in apples, pears and plums. Raspberry juices were found to contain an average concentration of 30 ppm or approximately 30 mg/liter (Rommel, A, et al, American Chemical Society; 1992:259-286). In addition to ellagic acid, research is currently underway to further explore the role of other phenolic compounds including the flavonoids which are widely distributed in grains, fruits, vegetables and herbs.

The health benefits of flavonoids have become an active area of interest within the food and nutrition field. Raspberries have been shown to be a good source of the flavonoids quercetin and kaempferol. Quercetin possesses both anticarcinogenic activity and acts as an antioxidant to inhibit

LDL oxidation (Smith, TJ and Yang, CS, American Chemical Society; 1994;17-48). As antioxidants, quercetin and kaempferol can prevent lipid peroxidation by several mechanisms, including scavenging lipid peroxidation-initiating radicals, binding metal ions, scavenging lipid

peroxyl radicals and inhibiting enzymatic systems responsible for free radical production (Kandaswami C and Middleton E Jr., AOCS Press, pp 174-203, 1997). There has also been studies looking at the effect of quercetin as an agent that blocks the release of histamine, speculating that there may be an association between quercetin and allergies.

Berries have also been valued for their basic nutritional profile and contain significant amounts of dietary fiber and Vitamin C (ascorbic acid) and smaller amounts of Vitamin A (beta carotene), B vitamins and minerals, all of which are important to optimal health. They are naturally low in saturated fat, cholesterol, calories and sodium, and are rich in a wide array of minerals. They are also a good source of both soluble and insoluble fiber.

Raspberries and blackberries, for example, contain 4-6 grams of fiber per 100 grams, which is higher than most other fruits including bananas, pears and even apples with skin. High fiber intakes are believed to help in the prevention of heart disease and colon cancer.

Consumer health and food industry interest in nutraceuticals largely stems from U. S. health statistics: what we eat is implicated in six of the 10 leading causes of death in the United States (heart disease, cancer, stroke, diabetes, atherosclerosis, and liver disease). A plant-food based diet high in fruits, vegetables, whole grains and legumes is believed to be protective against these diseases and important to overall health. The recent discovery and identification of phytochemicals in fruits and vegetables lends strength to this belief. As a result, the American Dietetic Association now recommends getting phytochemicals from food, such as berries, rather than supplements.

There are other properties that are less well studied but have origins in historical folklore. Raspberry leaves prepared as a tea have been thought to help shape the uterine muscles and has been used as a preparation for childbirth. Blackberries have been used as a remedy for simple diarrhea. Its astringency is thought to make it a useful ingredient in a gargle for red and swollen throats and has been used to treat mouth sores.

As scientists continue to focus on phytochemical research, the future holds promise for more nutraceutical discoveries.

### **Variety Specific Information**

#### **Blackberries / Marionberries (*Rubus laciniatus* / *Rubus ursinus*)**

Blackberries were used medicinally up to the 16th century as treatment of infections of the eye and mouth.

**Anthocyanins** - Blackberries are characterized by one major pigment: cyanidin-3-glucoside and in some cases cyanidin 3-rutinoside. The total anthocyanin concentration is reported as 148 mg/100 g fruit. Marionberries have both cyanidin 3-glucoside and cyanidin 3-rutinoside with a total anthocyanin concentration of 109 mg/100 g fruit.

**Phenolics** - Similar to raspberries, blackberries are relatively high in the phenolics, hydroxybenzoic acid and chlorogenic acid.

**Fiber** - Blackberries are high in fiber (5.3 g/100 g,) which has been shown to help reduce the risk of certain cancers.

#### **Red Raspberries (*Rubus idaeus*)**

**Ellagic acid** - Ellagic acid has anticarcinogenic effects against a wide range of carcinogens in several tissues. Significant inhibition of colon, esophageal, liver, lung, tongue, and skin cancers have been shown in rats and mice by in vitro and in vivo mutagenicity and carcinogenicity investigations. Ellagic acid is a possible chemopreventative agent, also in human carcinogenesis.

**Quercetin** - Quercetin is the primary flavonol found in raspberries. It has been found to be a potent anticarcinogen against skin, colon and mammary cancers in rodents. Quercetin may also inhibit the induction and progression of human cancers.

**Anthocyanins** - Anthocyanins are flavonoids with antioxidant activity. The anthocyanin content ranges between 20 and 60 mg/100 g fruit. The types of anthocyanins present are primarily cyanidin-3-glucoside, cyanidin-3-sophoroside, cyanidin-3-rutinoside, cyanidin-3-glucosylrutinoside

**Phenolics** - Catechins, benzoic acid and cinnamic acid are phenolic acids present in raspberries.

**Fiber** - Raspberries are high in fiber (6.8 g/100 g) which has been shown to help reduce the risk of certain cancers.

#### **Black Raspberries (*Rubus occidentalis*)**

**Ellagic acid** - Researchers at Ohio State University have found that feeding rats diets containing black raspberries helped prevent them from developing tumors when they were exposed to a tumor-causing chemical. They believe that this effect may be due to the ellagic acid present in black raspberries.

**Anthocyanins** - The anthocyanin content ranges between 214-428 mg/100g fruit. The types of anthocyanins present are primarily cyanidin 3-sambubioside and cyanidin 3-xylosylrutinoside.

#### **Boysenberries (*Rubus ursinus x idaeus*)**

**Anthocyanins** - Total anthocyanin content is over 160 mg/100 g fruit consisting of cyanidin 3-sophoroside, cyanidin 3-glucoside, cyanidin 3-glycosylrutinoside and cyanidin 3-rutinoside.

**Fiber** - Boysenberries are high in fiber (3.9 g/100 g), which has been shown to help reduce the risk of certain cancers.

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(Source: *Nutraceutical Bulletin*, Volume 3, Issue 1, May 1999)

## Ribes

### Flavor of 'Titania' Exceeds Expectations

*Chris Granstrom, New Haven, VT*

I'm writing to put in a good word for the flavor of Titania black currants, which sometimes is thought of as being inferior to other varieties. That's not what I found.

This year I picked Titania late -- the berries were starting to fall on the ground. To be exact, they were at 16-17 brix. I steam extracted the juice (with a Finnish steamer), put the hot juice into containers that were already 2/3 full (by volume) of white sugar. The hot juice instantly

dissolved the sugar, and the syrup has all the rich, deep, musky black currant flavor that you could wish for. It's every bit as good as the German and Swedish syrups I've tasted. My only complaint is that some of the syrup has gelled in the jar. I think the late harvest is the key to the good flavor.

Just passing this along for what it's worth.

### Read On....

*Elisabeth Berkley, West Long Branch NJ*

I am sure Dick McGinnis will be happy to hear this and I think it's great that Titania turns out to be having such excellent flavor.

Titania is one of the varieties that are being approved for planting here in NJ.

### And On.....

*Dick McGinnis,*

You got that right Elisabeth. But, then, we already knew that it has good flavor. It is more mild than Ben Alder and Ben Lomond but that is a good thing for North American consumers who are not familiar with this new flavor.

Chris, the gelling of your fruit comes from the very high level of pectin. You can compensate by obtaining some pectinase from your local wine supply store. A very

small amount is required. Run your fruit through a food processor, add the pectinase, let it sit for a few hours and then steam it. Your yield will be greatly increased.

(Source for the above three correspondences: *The International Ribes Association Listserve*: <http://www.msu.edu/user/sleightd/tira/>)

## Grapes

### Lime Time !

*Hans Walter-Peterson, Cornell University*

I know many of you are still wrapping up harvest, but it's time to think about what lime applications you might need to make to your vineyards this fall before the snow flies - and the ground freezes. Many of you, through various services, have soil samples taken in your vineyards to determine, among other things, the soil's pH and therefore how much lime you need to apply to neutralize some of that acidity.

When you get a recommendation for lime application, make sure that you know the assumptions that are

associated with that recommendation. One such assumption that is often included with a lime recommendation is that the liming material you use has an Effective Neutralizing Value (ENV) of 100%. When you purchase liming materials, the manufacturer and/or supplier should be able to provide you with the ENV so you can calculate how much material you actually need to use in your vineyard.

The calculation is very simple:

$$\text{Actual rate} = (100 / \%ENV) \times \text{recommended rate}$$

Assume you get a recommendation to spread 2 tons/acre on a vineyard, and the material you will use has an ENV of 80%. The amount you will need to actually spread is:

$$(100/80) \times 2 = 2.5 \text{ tons/acre}$$

If you have questions about the recommendations you get, make sure to get in touch with the individual who

made it. Suppliers should be able to answer questions about the materials you are buying from them. Get the information you need to make sure you're applying the proper amount of material to maintain a good soil environment for your vines. (*Source: Lake Erie Regional Grape Program Crop Update October 15, 2002*)

## Comparing Costs of Lime Materials

*Hans Walter-Peterson, Cornell University*

Last week, I put out some information on the Effective Neutralizing Value (ENV) of lime and how to use that when determining how much material to actually apply to your vineyard. This week, I want to take this a step further.

When comparing costs of different materials, use the material's ENV and the cost per ton of the material in the following formula:

$$\text{Cost per ton of lime} / \text{ENV (as a decimal)} = \text{Cost on 100 ENV basis}$$

For example, Vendor A is selling a dolomitic limestone product with an ENV of 90 for \$30/ton. Vendor B is

selling another dolomitic lime with an ENV of 75 for \$25/ton. To determine the most cost-effective option, compare the cost of each product on the same basis, that being 100 ENV. In this case:

$$\text{Vendor A: } \$30 / 0.95 = \$31.58/\text{ton (100 ENV basis)}$$

$$\text{Vendor B: } \$25 / 0.75 = \$33.33/\text{ton (100 ENV basis)}$$

While the cost for Vendor B's product may appear cheaper on the surface, it will cost you more to achieve the same amount of acid neutralization as Vendor A's product. (*Source: Lake Erie Regional Grape Program Crop Update, October 29, 2002*)

## Magnesium/Calcium Content of Lime Materials

*Hans Walter-Peterson, Cornell University*

In addition to neutralizing acidity in the soil, lime is an inexpensive way to add magnesium and/or calcium to the soil. To determine how much of each of these elements you are adding by liming your vineyard, find the percentages of calcium (Ca), calcium oxide (CaO), magnesium (Mg), and magnesium oxide (MgO) that are in the material you are using (it is New York state law that these analyses be available for liming materials).

Let's say the lime material you are planning on using contains:

Calcium: 20%  
Magnesium: 13%  
Calcium oxide: 32%  
Magnesium oxide: 18%

To determine the amount of calcium that will be provided by calcium oxide, multiply the percentage by 0.71. To determine the magnesium from magnesium oxide, multiply by 0.60. In this example, then:

$$\text{Calcium oxide: } 32\% \times 0.71 = 22.7\% + 20\% \text{ (pure calcium)} = 42.7\% \text{ Ca}$$

$$\text{Magnesium oxide: } 18\% \times 0.60 = 10.8\% + 13\% \text{ (pure magnesium)} = 23.8\% \text{ Mg}$$

So for every ton of this material that is spread, you will be adding about 854 lbs (2000 lbs x 0.427) of calcium and about 476 lbs (2000 lbs x 0.238) of magnesium. (*Source: Lake Erie Regional Grape Program Crop Update, October 29, 2002*)

## Pruning Grapevines

*Susanne Howard, Southern Missouri State University*

Winter pruning can be a fruit grower's least favorite chore. It has to be done no matter what nature decides to throw at you. You can gain a much better attitude about grape pruning if you keep in mind your pruning goals and the steps involved to achieve your goals.

The way a plant is pruned depends largely on the training system used, especially where grapes are concerned. Home growers often train their plants to cover an arbor or other type of support and they might not be concerned

with getting as much fruit as possible from their plant. Pruning in this case should consist mainly of shortening canes to stay within the trellised area and out of the way, and of removing some canes entirely (cut them off right at the trunks) to "thin out" the area covered by the vine.

For commercial growers or home growers who wish to have a consistent crop from year to year, it is important arrive at and maintain a balance between fruiting and vegetative growth. Leaving too many shoots to grow on a vine might increase

yield for the first year, but the plant will have a very dense canopy.

This dense canopy will restrict airflow and light exposure on the inside of the canopy. If you have ever seen a plant with such a canopy, you might have noticed that the leaves on the inside, which were covered by several layers of other leaves, were yellow or had even dropped off. These leaves cannot produce food for the plant.

The effects of the overly dense canopy do not end there, however: the buds in the axils of the shaded leaves are also shaded. These buds will be less fruitful because of the shading, and since they will produce next year's crop, the yield will be lower. And what happens to the fruit? It is also covered by several layers of leaves, and might ripen more slowly. Red grapes might have less intense coloring. Worst of all, there is no air movement under all those leaves, keeping the fruit wet for a long time after each rainfall. So you have warm, dark, wet conditions that are just right for fungus growth. And there are lots of different fungi out there to take advantage of those conditions. This all translates into more disease on the fruit and on the leaves. So you think spraying is the answer, right? Well, consider this: these overlapping leaves, especially if still slightly wet, act like shingles on the roof of your house, whose main purpose it is to keep water (or the spray solution) out! In other words, overly dense canopies can reduce the effectiveness of any sprays that you apply, simply by preventing the spray from reaching its intended target. To prevent the growth of dense canopies, grapes are pruned until it seems like there is 'hardly any wood left'!

As mentioned before, the way you prune is determined by the training system. The most commonly used training system in Missouri is the high cordon system, which is a spur-pruned system. If you are using this system, you should have one or two trunks trained straight up and perpendicular to a wire at about 6 feet from the ground where two horizontal cordons, supported by the wire, start. This is your permanent 'framework' that always remains in place, unless a trunk or cordon has to be replaced due to injury or other reasons. All canes grow from the cordon, and when they are trimmed back, they are called spurs, giving the pruning method its name. During winter pruning, most canes are completely removed, cut off flush with the cordon. All dead, diseased, broken, very thin or very thick and long canes are removed like that.

The remaining canes are then thinned out further, until only 4-5 canes per foot of cordon remain. Half of these canes are then shortened to about 5 nodes (or buds) each and are called fruiting spurs. When counting the buds, the one closest to the cordon does not count (it will most likely not be fruitful). The other half of the canes are shortened to 2 nodes. These very short spurs are called renewal spurs. The shoots growing from them will eventually be next years fruiting spurs. The buds on these

renewal spurs are also not counted when determining the total number of buds left on the plant.

To figure out exactly how many buds to leave on a plant, pruning formulas have been developed from experience in growing the same cultivar of grape for many years. The numbers used in these formulas are different for different cultivars of grapes. They reflect factors like the number of clusters borne per shoot, the size of the clusters and whether the buds directly on the cordon will bear fruit. An all-purpose example for the pruning formula is 20+10.

To use any pruning formula, the weight of the one-year-old canes has to be determined. This gives you an idea how vigorously the plant was growing last year. The more vigorous, the more buds will be left on the plant. If your plant had a pruning weight of 2 1/2 pounds and you are using the general formula of 20 + 10, 20 buds are left on the plant for the first pound of pruning weight, determined by the first number in the pruning formula. Then there are 1 1/2 pounds of additional pruning weight to consider: the 1 1/2 pounds are multiplied with the second number in the formula, in this case 10, resulting in 15 more buds to be left on the vine for a total of 35 buds. If 5 buds were left on each fruiting spur, this means there should be 7 fruiting spurs left on the plant, 3 and 4 to each side of the trunk, and these 3-4 spaced out as evenly across the length of the cordon as possible. For each fruiting spur, one or two renewal spurs should be left on the plant also.

To use the formula in the following table, rough prune the plant, leaving several more fruiting spurs on the plant than will be needed. Weigh the one-year old wood that you pruned off. Use the first number for the first pound of prunings, multiply the remaining weight by the second number. Add both numbers together and 'fine tune' the number of buds on the vine.

The table below lists the pruning formula for several cultivars:

<b>Cultivar</b>	<b>Pruning Formula</b>
Seyval blanc	5 + 10
Vidal blanc	15 + 10
American varieties (Norton, Concord, Niagara)	30 + 10
Other American hybrid cultivars	20 + 10

Of course in most vineyards not every single plant will be adjusted this way. For large plantings, divide plants of one cultivar into uniform groups. Weigh a few plants for each group and average the resulting number of buds. Then adjust the number of buds accordingly, using your own best judgment to estimate if a given plant is more or less vigorous than the average, and adjusting the number of buds accordingly up or down.

Considering the temperature fluctuations common in Missouri in late winter/early spring, the rough pruning could be done early in the winter and the 'fine tuning' or adjusting of the numbers of buds left, could be done in late winter, even as late bud break. This way there is a 'reserve' of buds available

in the case of severe freezes around the time of bud break. These late freezes often kill more buds than the low temperatures occurring earlier in the winter.

Hopefully this introduction to pruning should make the process just a bit less confusing. Now, if someone could please appeal to Mother Nature, maybe we could get

through the pruning process without having to prune icicles from the plants at the same time ..... (Source: *The Berry Basket, Volume 5 Number 3 Fall, 2002*)

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## General

### Decontaminating and Storing Vineyard Sprayers

*Andrew Landers, Cornell University*

#### **Sprayer decontamination and maintenance**

Vineyard sprayers must be thoroughly decontaminated, inside and outside, after use. Regular maintenance of spraying equipment will prolong its life and ensure accurate trouble-free operation, enabling spraying to be done with the minimum loss of time and taking full advantage of favorable weather conditions.

NOTE: Read the sprayer manufacturer's instructions before beginning to wash out a sprayer. Wear protective clothing appropriate to the pesticide which has been used, this may include an apron, rubber gloves, boots and face shield.

It is important to clean everything thoroughly, associated equipment such as mixers, the site where filling and mixing is done, and, of course, yourself.

#### **Disposal of pesticide waste**

REMEMBER cleaning up should be done in such a way that washings DO NOT enter public sewers or any water courses, nor fields which have under-drainage and certainly not catchment areas for bore holes or wells.

The safe disposal of pesticide waste is a serious responsibility for sprayer operators. It is important, therefore, that everything should be done to keep to a minimum the amount of waste generated. Remember pesticide waste is of four types: concentrated products, diluted pesticides (including washings), empty containers and contaminated clothing and other materials.

Try to keep the volume of tank washings produced to a minimum. Special low volume, inexpensive washing systems are now available which comprise spinning nozzle(s), mounted in the tank. The device can be connected to a hose or water tank and water, after it has passed through the rotating nozzle(s) cascades down the inside of the tank walls (the 2003 edition of the NY and PA Pest Management Recommendations for Grapes published by Cornell and Penn State Cooperative Extension contains examples of rinsing devices).

#### **Preparation for storage**

Sprayer decontamination is detailed in the pesticide application section of the NY and PA Pest Management Recommendations for Grapes published by Cornell and

Penn State Cooperative Extension but an overview is as follows:

- Any spray liquid or contamination left in the tank should be disposed of correctly.
- Remove tank drain plugs or open drain cock.
- Hose down inside the tank and outside, including the tank top, scrub where necessary or use a special low volume washing system.
- Replace drain plug.
- Remove suction, main and in-line filter elements; wash them thoroughly in clean water with a soft brush and replace.
- Remove nozzles, nozzle filters and nozzle manifold end-caps if they are fitted. Soak them all in a bucket of water with appropriate cleaning agent recommended for the cleaning of spray machinery. Scrub clean with a soft brush.
- Part fill the tank and pump out to flush all parts. Ensure you open/close valves during the flushing procedure to clean out crevices. Do this more than once if necessary.
- Refill the tank with clean water or a recommended cleaning agent, there are about a dozen commercial tank cleaners designed to remove or neutralize most of the modern low rate chemicals. If no cleaning agent is recommended, one gallon of household ammonia per 50 gallons of water may be used. Do not use chlorine-based cleaners such as Clorox. Recirculate for 15 minutes, then pump a quantity through the pipes and spray bars. Leave the remainder for as long as practicable, overnight if possible.

- Discharge at least one quarter of the contents of the tank through the system and spray bars. Drain off the rest.
- Check that no deposits remain in the tank or filters. If there are any, they should be hosed down and scrubbed off.
- Repeat steps 8 to 10 using clean water with the appropriate cleaning agent.
- Safely store nozzles and filters, leave valves open and the tank lid loosely closed. Ensure that the sprayer is completely empty of water, particularly the pump. If you are unable to completely drain the system, you may consider using an antifreeze solution. An environmentally safe anti-freeze diluted to 50% may be acceptable, alternatively, RV antifreeze may be used but remember it can't be diluted and so make sure the system is drained of

water. Currently RV antifreeze costs \$2.00 - 2.50/gallon from stores such as Wall Mart etc.

- Hose down the outside of the sprayer, scrubbing if necessary.
- Ensure the sprayer is parked safely and securely.
- Wash down waterproof protective clothing, apron, boots and face shield.
- Wash inside and outside of gloves with soap and water; rinse and dry them.
- Finally thoroughly wash hands, face and neck with soap and water.

#### **Mechanical maintenance**

Lubrication must be carried out prior to storage, check oil levels in the pump. Check the soundness of all mechanical components. Electrical connectors which operate control valves, spray monitors etc need to be

cleaned and a non-conductive grease, available at an auto store, applied to prevent corrosion. Check wheels, wheel bearings and tire inflation.

#### **Storage of sprayers**

Store the sprayer under cover, taking care to prevent dirt and moisture affecting the tank or working parts. Remember, sunlight softens and weakens rubber materials and can degrade plastic materials. Storing in a building also allows you the opportunity to conduct any routine or pre-season maintenance. (*Source: Lake Erie Regional Grape Program Crop Update, October 22, 2002*)

## **Private Schools: New Market for Local Produce**

*Diane Baedeker-Petit, Massachusetts Dept. of Food and Agriculture*

The Department of Food and Agriculture has been awarded a \$28,350 federal grant to explore private schools as a new market for locally grown produce. The grant was awarded through USDA's Federal-State Market Improvement Program (FSMIP).

"Research shows that the majority of Massachusetts consumers prefer locally grown food and want to support our local economy by buying from local farms," explained Commissioner Doug Gillespie. "Despite the favorable climate, little of this consumer preference is currently reflected in the school cafeterias of our state."

That's why the state formed a task force last year to assess the opportunities for Massachusetts farmers to sell their products to schools. Ken Miller, food service director at the Fessenden School, a private school in West Newton, Mass., was a member of that group and an early, enthusiastic supporter of Bay State farms and their products. Miller soon forged a partnership with the Pioneer Valley Growers Association (PVGA).

"The benefits of buying local are clear," said Miller. "We can offer our students produce that is superior in taste, appearance and nutritional value and we help preserve

the quality of life in our state by supporting the local farming community."

"The task group identified private schools as a market sector to pursue because private school food service directors often have more autonomy in decision making," said Commissioner Gillespie. "And, Massachusetts has a significant concentration of private elementary and secondary schools as well as private colleges."

MDFA will survey food service directors' interests and buying habits, and will evaluate methods for increasing parent and student demand for local produce. Business opportunities will be communicated to growers.

David Taylor, Fessenden's interim headmaster, sees long-term advantages in buying local for his students. "When you offer superior quality and nutrition to students it teaches them to make good food choices for a lifetime," said Taylor.

The Federal-State Marketing Improvement Program (FSMIP) provides matching funds to state departments of agriculture and other agencies to develop innovative approaches to agricultural marketing. (*Source: Massachusetts Department of Food and Agriculture Farm & Market Report, Vol. 79, No. 5, October-November 2002*)

## **USDA Organic Cost Share Program**

*Diane Baedeker-Petit, Massachusetts Dept. of Food and Agriculture*

The state Department of Food and Agriculture has been awarded funds from the USDA Organic Certification Cost Share Program for reimbursement to organic crop and livestock producers.

Reimbursement is available to operations certified and/or receiving continuation of certification during the period

of November 1, 2002 through September 30, 2003. Payments to eligible producers will be limited to 75 percent of an individual producer's certification costs up to a maximum of \$500.

Newly revised reimbursement forms will be available November 1st and will be mailed to all certified organic

growers. Contact Mary Jordan at 617-626-1750, Mary.Jordan@state.ma.us. (*Source: Massachusetts*

*Department of Food and Agriculture Farm & Market Report, Vol. 79, No. 5, October-November 2002)*

## Business Planning Courses Slated

*Diane Baedeker-Petit, Massachusetts Dept. of Food and Agriculture*

Two farm business planning courses will be underwritten by MDFA this winter, both using the acclaimed NxLevel "Tilling The Soil of Opportunity" curriculum. Over 150 Massachusetts agricultural businesses have taken a similar course in the past five years, with mostly rave reviews. A new, more user-friendly text and workbook was used last year.

Each course is 10 weekly sessions starting in December. Courses are located where there is demand. Possible locations for 2002-03 include Plymouth/Bristol and Worcester/Middlesex counties. Contact Rick Chandler 413-577-0459, [rhandler@umext.umass.edu](mailto:rhandler@umext.umass.edu) (*Source: Massachusetts Department of Food and Agriculture Farm & Market Report, Vol. 79, No. 5, October-November 2002)*

## Risk Management Program Planned

*Diane Baedeker-Petit, Massachusetts Dept. of Food and Agriculture*

The Department anticipates receiving a Risk Management Association grant for an education program during the winter months. MDFA will work cooperatively with UMass and the New England Small Farm Institute.

Topics will include on-farm risk management in general and crop insurance in particular. Contact Rick Chandler at 413-577-0459 or [rhandler@umext.umass.edu](mailto:rhandler@umext.umass.edu) if you

would like to learn more for your commodity group, winter meeting or trade exhibit.

Rick is also seeking examples of how the current Federal Crop Insurance programs work or don't work for Massachusetts farms. Specific examples of successes or failures from your own experience would be very helpful. (*Source: Massachusetts Department of Food and Agriculture Farm & Market Report, Vol. 79, No. 5, October-November 2002)*

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## Upcoming Meetings

December 7, 2002 – **New England Vegetable and Berry Growers Winter Meeting**, Westport, Massachusetts. A Mini Trade Show will accompany the program. Contact: Dominic Marini 508 378-2546.

December 12, 2002 - **Northeast Food and Farm Initiatives Gathering** Gedney Farm in New Marlboro, MA. Contact: Laurie Cadorette, UMass Extension, at 413-448-8285 or [lauriec@umext.umass.edu](mailto:lauriec@umext.umass.edu).

January 7, 2003 – **New England Vegetable and Berry Growers**, New England Fruit Growers Association and the UMass Extension Fruit Program. Sturbridge, MA. . Contact: Dominic Marini 508 378-2546.

January 14, 15, 16 2003 - **Organic Vegetable Production Workshops** New York State IPM Program, Jordan Hall Auditorium, New York State Ag. Experiment Station, Geneva, NY. Contact: Abby Seaman: 315-787-2422, [ajs32@cornell.edu](mailto:ajs32@cornell.edu).

January 16, 2003 – **Connecticut Vegetable & Berry Growers Conference** at the Tolland County Cooperative Extension Center in Vernon, Connecticut. Contact: Jude Boucher 860-875-3331.

February 1, 2003 – **New England Vegetable and Berry Growers**. Waltham Field Station, Waltham, MA. Commercial Members Day-Trade Show. Contact: Dominic Marini 508 378-2546.

February 11, 2003 - **Vermont Vegetable & Berry Growers Association** Annual Meeting, Holiday Inn, Rutland Vermont. Contact: Vern Grubinger, (802) 257-7967 (ext. 13) or E-mail: [vernon.grubinger@uvm.edu](mailto:vernon.grubinger@uvm.edu).

February 15, 2003 - **NOFA-VT's 21st Annual Winter Conference** will be held at VT Technical College Randolph, VT. Contact: NOFA-VT at 802-434-4122 or email us at [info@nofavt.org](mailto:info@nofavt.org).

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*MassachusettsBerryNotesisapublicationoftheUniversityofMassachusettsExtensionFruitProgramwhichprovidesresearchbasedinformationonintegratedmanagementofsoils,crops,pestsandmarketingonMassachusettsFarms.Noproductendorsementsoverlikeproductsareintendedorimplied.*