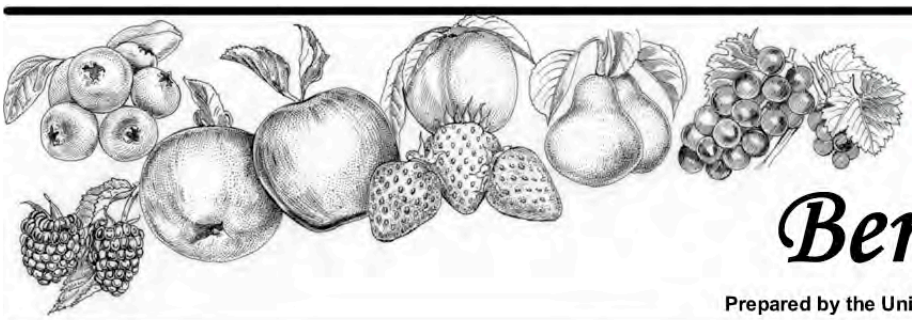

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IN THIS ISSUE:

Time to renew: To those of you who have renewed your subscriptions already, thank you! To those of you who haven't gotten to it yet, now is as good a time as any! Subscription costs remain at $10 per year thanks to the generous underwriting by Nourse Farms. This year we're asking again if you might add a contribution in support of UMass Extension's Fruit Program to your annual subscription renewal. A donation to the UMass Extension Fruit Program will support quality research and educational programming.

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The 2007 New England Vegetable & Fruit Conference a great success! Despite terrible weather on the last day, attendance over the course of the 3 days was 1,335. Conference attendees came from all over New England and also from all around the Northeast and Canada. Of the 124 presentations nearly half (60) were made by growers! And that's not counting the 5 Farmer-to-Farmer sessions. Thanks to all who make this such and excellent conference!

Happy New Year!!

STRAWBERRY

Strawberry Weed Management Update

Rich Bonanno, UMass Extension

Introduction

The 2008-2009 version of the New England Small Fruit Pest Management Guide will be available soon all small fruit growers should have a copy of this publication. Members of the New England Vegetable & Berry Growers Association can receive a copy of this publication free as part of their membership. I do not expect that copies will be available for sale at the Conference but will be available from all 6 New England Extension services.

Major Herbicide Label Changes

The new formulation on the market for paraquat is **Gramoxone Inteon**. This formulation is designed to be safer to the user. However it is still restricted use and the signal word is still "Danger". Gramoxone Inteon contains an "alginate" which is made from seaweed and slows absorption into the bloodstream. There is also an alerting agent that smells like decaying grass, and emetic and purgative, and a green dye. The new formulation also comes with some rate changes. With the old formulation (Gramoxone Max) the rate range was 1.7 to 2.7 pints per acre. Rates for the new formulation are 2.5 to 4 pints/acre.

Chateau (flumioxazin) is registered for postemergence weed control in dormant strawberries. In DORMANT strawberries, the rate is 3 oz/acre. Also apply a crop oil concentrate at 1% or a non-ionic surfactant at ¼% by volume. A residual grass herbicide such as Devrinol (napropamide) or Dacthal (DCPA) is still needed. Chateau will control emerged chickweed, field pansy, and oxalis if sufficient contact is made with the weeds. Chateau will not control all emerged weeds. Scout the field and check the labels. 2,4-D may still be required to control other emerged weeds. Sinbar may still be necessary to provide residual control or early-spring emerging broadleaf weeds and to aid in control of volunteer grain weeds that may be in straw.

Dacthal 75WP (DCPA) is still expensive at $14 per pound. The most common use of this product will be on new plantings.

Sinbar 80 WP (terbacil): Remember that the supplemental label for strawberries has been revised to allow use during the transplant year as well as on soils with between 0.5% and 2% organic matter. During the planting year, Sinbar may be applied at 2 to 3 ounces per acre after transplanting but before new runners start to root. If strawberry plants have developed any new foliage prior to application, irrigation or rainfall (0.5 to 1 inch) is required to wash the Sinbar off the strawberry plants. In late summer or early fall, a second application may be applied at 2 to 6 ounces per acre to control winter annual weeds. This application must also be followed by 0.5 to 1 inch of irrigation or rainfall to wash the Sinbar off the plants. A third application of 2 to 4 ounces per acre can be applied, as usual, after the strawberry plants are dormant and just prior to mulching. For soils with at least 2% organic matter, there is no maximum amount per application; however, no more than 8 ounces of Sinbar can be applied per year. For soils with between 1 and 2% organic matter, a maximum of 4 ounces of Sinbar can be applied at any one time with an annual maximum of 8 ounces per acre. For soils with between 0.5 and 1% organic matter, a maximum of 3 ounces of Sinbar can be applied at any one time with an annual maximum of 6 ounces per acre. Following the establishment year, applications can only be made just after renovation and just prior to mulching. Applications are now allowed, however, on soils with between 0.5% and 2% organic matter using the same guidelines for rates as above. As always, be careful with Sinbar in strawberries, especially with potential overlap of sprayer passes which will double the rate and increase the potential for injury in some varieties. Please consult the new supplemental label for addition information, rates, precautions, etc.

Select 2EC (clethodim) is a newer grass herbicide registered in strawberry. It is applied at 6 to 8 ounces per acre. It is effective on small, actively growing grasses. It has improved activity over Poast on cool-season and perennial grasses. Add 1 qt/100 gal spray of crop oil concentrate. Repeat application at 14 days for perennial grasses. Ammonium sulfate can be added at 2.5 lb/acre to improve activity on perennial grasses. Do not apply within 4 days of harvest. Select will not kill old established grasses. Avoid spraying on hot humid days or some crop burning will result.

Roundup Ultra (glyphosate) is now sold as **Roundup Weather Max**. It is a newer formulation with improved activity on perennial weeds. Roundup is primarily used to control perennial weeds during the summer and fall prior to planting.

Late Summer Planting of Oats

Also in strawberry, growers have been experimenting with using oats as a living or dead mulch. The purpose of this is to add organic matter and to help hold added mulch in the late fall from blowing away. It is not a weed management option. Some tips to follow. They include planting in mid-

August at a rate of 100 lb/acre either broadcast or banded. Use of Sinbar, Devrinol (napropamide), or Dacthal at renovation will adversely affect the germination and growth of the oats. If possible, band the herbicides only in the row so that the oats can establish between the rows. Herbicide applications or other weed control options may still be required after establishment. Look for the oats to grow at least 18 inches tall. The oats will winter kill

Using Row Covers Instead of Straw Mulch
Growers that use row covers for winter protection should take extra precaution to insure that winter annual, biennial, and perennial weeds are not present in strawberry field during the winter months. Row covers will increase daytime temperatures and cause these weeds to grow at a much faster rate than if they were under straw mulch. This is especially true in the Spring before the covers are removed.

Specific Timings to Control Weeds
Late Fall/Winter: after the strawberries are dormant.

1. Apply Chateau or Formula 40 (2,4-D) to emerged weeds.
2. Apply half the annual rate of Sinbar
3. Apply half the annual rate of Devrinol

Spring Weed Management: up until bloom

1. The only common herbicide options at this time would be either Poast or Select for emerged grasses. Either will control volunteer rye or other small grains that emerged in the spring from seeds in the winter mulch.

Renovation Options:

1. Formula 40 applied just after the last harvest to control, emerged broadleaf weeds.
2. Apply half the annual rate of Sinbar after mowing and tilling.

Late Summer: prior to the emergence of winter annuals

1. Apply half the annual rate of Devrinol to control winter annuals before they emerge.

Cultivation
During the establishment year, cultivation is an important tool until daughter plants start to grow and root.

The most common time for using cultivation in established strawberry fields is from renovation until daughter plants start to root. If herbicides have been used, cultivations should shallow to avoid diluting the herbicide. Even when herbicides are not used, cultivations should not be deeper than 1 to 2 inches to avoid damaging crop roots and drying out the soil. (***Source**: 2007 New England Vegetable & Fruit Conference Proceedings*)

RASPBERRY

Raspberry – Spur Blight

Jay W. Pscheidt, Oregon State University Extension

Cause: *Didymella applanata*, a fungus. The disease is found in western Oregon and Washington on red raspberry, 'Loganberry', and 'Youngberry'. The 'Willamette' cultivar of red raspberry is readily infected by spur blight but also is tolerant and can produce a satisfactory crop even if disease incidence is high.

From early April, mature black fruiting bodies (perithecia) can be found in the gray affected areas of cane tissue. Perithecia discharge ascospores in favorable (wet) weather, continuing perhaps until the end of June. Ascospores infect leaves on fruiting-cane laterals and on emerging primocanes. Under very favorable conditions, the fungus may infect laterals and pedicels directly.

Symptoms: Numerous brown necrotic spots (centered on veins) form on fruiting-cane leaves when rainy weather persists into late spring. Infected leaves become chlorotic and drop prematurely when the disease is severe. In contrast, infected primocane leaves develop brown V-shape lesions. The fungus then grows through the petiole to the cane and invades cane tissue around the bud, producing a brown-purple diseased area. Buds also may be reduced in size even if the fungus has not grown through the petiole. Buds on infected canes are more susceptible to winter injury, and fruiting laterals may be stunted. If the disease spreads along the canes (as in the Ashland, OR district) young canes turn brown up to 20 inches from the ground. Infected areas tend to turn gray in winter.

During the winter, infected canes turn gray.

Cultural control:

1. Remove and destroy old fruiting canes after harvest.
2. Keep plant rows narrow.
3. Practice good weed control.
4. Control early primocane growth.
5. Plant resistant or tolerant cultivars.

Chemical control:

1 Late dormant or delayed dormant application.

a. Lime sulfur (29%) at 10 to 12 gal/100 gal water. Polysul, Lily Miller Dormant Spray for Disease, and Bonide Lime Sulfur Spray are registered for home use. 48-hr reentry.

2 Spray at bloom or when new shoots are 8 to 10 inches long. Repeat 2 weeks later and after harvest. A combination of both Captan and iprodione has been very effective in western Washington.

a. Abound at 6.2 to 15.4 fl oz/A. Do not apply more than 2 sequential applications or more than 6 applications per year. May be applied on the day of harvest. 4-hr reentry.

b. Cabrio EG at 14 oz/A. Do not apply more than twice sequentially or more than four times per year. May be used at harvest. 24-hr reentry.

c. Captan 80 WDG at 2.5 lb/A. Do not apply within 3 days of harvest. 72-hr reentry.

d. CaptEvate 68 WDG at 3.5 lb/A Do not apply more than 2 consecutive application, within 3 days of harvest or more than 17.5 lb/A/season. 72-hr reentry.

e. Elevate 50 WDG at 1.5 lb/A can be used even though pest is not on the label. Do not use more than 6 lb/A/season. Can be used up to and including the day of harvest. 12-hr reentry.

f. Iprodione-based products plus another fungicide with a different mode of activity. Can apply the day of harvest. Tank-mix with other registered fungicides and limit to two (2) applications per year. 24-hr reentry.

- Iprodione 4L AG at 1 to 2 pint/A.

- Rovral 4 Flowable at 1 to 2 pint/A.

g. Pristine at 18.5 to 23 oz/A. Do not use more than 2 consecutive applications or more than 4 times/year. Can be used day of harvest. 24-hr reentry.

(***Source***: *Oregon State University Online Guide to Plant Disease Control; http://plant-disease.ippc.orst.edu/*)

BLUEBERRY

Blueberry Weed Management

Rich Bonanno, UMass Extension

The primary goal of weed management is to optimize yields by minimizing competition between the weeds and the crop. Weeds reduce yields by competing with the crop for water, light, and nutrients. Weeds also harbor insects and diseases and encourage vertebrate pests. Timely cultivation, wise use of herbicides, and never permitting weeds to go to seed are integral parts of a good weed management system. Many of the weeds found in these fields are difficult-to-control perennial weeds that are not common in annual crop culture. New plantings usually have fewer perennial weed problems than older plantings. Annual and biennial weeds can also exist in these fields. Fields should be scouted at least twice a year (spring and fall) to determine specific weed problems. The selection of a weed management tool should be based on specific weeds present in each field.

The most important weed management strategy is employed prior to planting that is, eliminating all perennial weeds. Fields that have been dormant or have been in pasture may have perennial weeds that at well established. Fields that have been in cultivation are less likely to have established perennial weeds in them. Common perennial weeds include common dandelion, Canada thistle, stinging nettle, field

bindweed, field horsetail, goldenrod, and quackgrass. Once these perennial weeds become established or remain established in a berry field, they are very difficult to remove. The most common way to remove perennial weeds is with Roundup (glyphosate) applied in the fall prior to planting. Perennial broadleaf weeds should be treated after flowering but prior to a killing frost. Perennial grasses can be treated well into November.

Cultural weed management in blueberry plantings includes mulching, cultivation, and soil pH management. Mulching is a major weed management tool in blueberry production. Mulches that are free of weed seeds and placed thickly enough can be very effective at reducing or eliminating most annual weeds from the crop row. They are seldom effective on perennial weeds, however. Use of cultivation is difficult and often is counter productive in blueberry plantings. It destroys surface feeding roots and does not work well where mulches are used. All cultivations should be timely and shallow to minimize crop root injury, to minimize loss of soil moisture, and to avoid repositioning new weed seeds to the soil surface. The low pH soil that blueberry plantings thrive in is not a good environment for most weed species. Keeping the soil pH at the right level will help to reduce weed pressure.

The areas between the crop row is usually maintained with a mowed cover of sod, clover, weeds, or a combination of these. This cover is used primarily for erosion control and to improve trafficability in the field.

Several herbicides are labeled for use in this crop. Herbicides can be broadcast or applied as a directed spray to the base of the crop. With a band treatment, only 1 to 2 feet on either side of the row is treated. With banding, less herbicide is needed in each acre. For example, a 3 foot band (1.5 feet on either side of the row) where rows are spaced 9 feet apart will require only on third the amount of herbicide normally required for a broadcast treatment. Where mulches are used in combination with herbicides, use the lowest recommended herbicide rate to avoid crop injury. Herbicides registered in highbush blueberry production are listed below. "A" shows the advantages of each herbicide while "D" lists the disadvantages of each herbicide.

Soil Applied

Annual grasses and <u>some</u> broadleaf weeds

Devrinol (napropamide): A= good control of most annual grasses and small seeded broadleaf weeds, very safe on new growth D= residual is 12 weeks which can be short, needs moisture to avoid breakdown on soil surface

Surflan (oryzalin): A= good control of most annual grasses and small seeded broadleaf weeds, safe on new growth, does not require moisture to avoid breakdown D= Residual is 12 weeks which can be short

Annual grasses and <u>many</u> broadleaf weeds

Solicam (norflurazon): A= good control of most annual grasses and many broadleaf weeds, safe on new growth D= residual is 12 weeks which can be short, needs moisture to avoid breakdown on soil surface

Many broadleaf weeds

Sinbar (terbacil): A= good control of many broadleaf weeds, some postemergence activity as well D= leaching issues but most applications are banded which minimizes use

Princep (simazine): A= good control of many broadleaf weeds, some postemergence activity as well D= leaching issues but most applications are banded which minimizes use

Annual and perennial broadleaf weeds

Velpar (hexazinone): A= good control of many tough broadleaf weeds including wild brambles and goldenrod D= highly leachable, growers should not use this product every year and should band sprayed

Casoron (dichlobenil): A= good control of many annual and perennial broadleaf weeds, granule formulation is more effective than wettable powder, granule formulation reduces leaching concerns D= granule formulation is difficult to apply

Postemergence contact:

Annual and perennial grasses

Fusilade (fluazifop): A= very safe on crop, good control of annual grasses D= fair control of perennial grasses and cool season grasses

Poast (sethoxydim): A= very safe on crop, good control of annual grasses D= fair control of perennial grasses and cool season grasses

Grasses, annual broadleaf, perennial burndown

Scythe (pelargonic acid): A= safe on the crop, fast and effective weed burndown D= very expensive, offensive odor, contact only, no residual activity, brief control of perennial weeds

Gramoxone (paraquat): A= safe on the crop, fast and effective weed burndown D= very expensive, offensive odor, contact only, no residual activity, brief control of perennial weeds

Flaming can also be included in this category. Advantages and disadvantages are similar as with the above two herbicides. In addition, cost and effectiveness are intermediate between the above two herbicide options.

Postemergence translocated:

Grasses, annual and perennial broadleaf

Touchdown (Sulfosate): A= very effective on annual and most perennial weeds D= potential for crop injury, no residual activity

Roundup (glyphosate): A= very effective on annual and most perennial weeds D= potential for crop injury, no residual activity

Other options

Cultivation: A= effective on all emerged weed growth D= not effective in wet soils, not effective when mulch is used, quick regrowth of perennial weeds

Mulches: A= effective on annual weeds when applied at the right thickness D= not effective on perennial weeds, not effective when adjacent weeds drop seeds and contaminate mulch

Overall, weed management options are sufficient and effective. Using mulches and herbicides in the crop row combined with mowing in the row middles results in the most effective control of weed pressure, minimizes competition with the crop, and maximizes crop yield. (***Source**: 2007 New England Vegetable & Fruit Conference Proceedings*)

GRAPE

Cultural Practices for Disease Control in Grapes

Michael Ellis, The Ohio State University

The use of any practice that reduces or eliminates pathogen populations or creates an environment within the planting that is less conducive to disease development should be used. Certain diseases, such as viruses, Eutypa dieback, and crown gall, cannot be directly controlled with pesticides at the present time. Therefore, cultural practices are the major means for their control. When fungicides or other control agents are required, any practice that opens the plant canopy, such as shoot thinning, leaf removal, berry and cluster thinning, and pruning and shoot positioning, can greatly increase the efficacy of the fungicide program by allowing better spray penetration and coverage. These practices also have a direct effect on vine microclimate.

Vine Microclimate

Vine microclimate refers to the climate within the leaf canopy of the vineyard. In relation to disease management, the most important elements of the vine microclimate are relative humidity, ventilation, the temperature of the air and of vine tissues, and the intensity and quality of light. In general, factors that increase relative humidity also increase fungal diseases. Factors that increase ventilation (air movement) of the vine canopy generally reduce disease incidence and severity by lowering the humidity, shortening periods of leaf and fruit wetness, and aiding spray penetration and coverage.

Cultural practices should be carefully considered and implemented into the disease management program, whenever possible. Here are some cultural practices to consider.

Use Virus-Indexed Planting Stock

Always start the planting with healthy virus indexed nursery stock from a reputable nursery. The importance of establishing plantings with virus indexed nursery stock cannot be overemphasized, since the selection of planting stock and planting site are the only actions a grower can take to prevent or delay the introduction of most virus diseases. Plants obtained from an unknown source or a neighbor may be contaminated with a number of major diseases that reputable nurseries work hard to avoid.

Select the Site Carefully

Site selection can have a direct effect on vine microclimate. A site that provides for maximum air drainage, which promotes faster drying of foliage, can substantially reduce the risk of black rot and downy mildew. In the northern hemisphere, north-facing slopes receive less light than south-facing slopes. Therefore, vineyards on north-facing slopes may dry more slowly and be at a higher risk for disease development. Avoid planting the vineyard adjacent to woods that will prevent sunlight from reaching the vines during any part of the day.

Woods act as a windbreak that may be beneficial in preventing shoot breakage in high winds, but woods may also reduce air movement (ventilation) in the vineyard which results in prolonged wetting periods. Close proximity to woods can also increase the risk of introducing certain diseases and insect pests into the vineyard.

Planting rows in a north-south row orientation should be the grower's first choice for maximum light penetration. However, rows planted in the direction of prevailing winds will promote better air movement, which results in faster drying of foliage and fruit. Rows should never be planted parallel to a steep slope where erosion could be more of a problem than pests.

Good soil drainage is also extremely important. Avoid sites that are consistently wet during the growing season. These soils may have an impervious subsoil or other drainage problems. Such sites will usually result in unsatisfactory vine growth and yields, in addition to providing a humid microclimate that is conducive to disease development. In some situations poor drainage can be corrected by tiling prior to planting.

If nematodes have been a problem in previous crops or nematodes are suspected to be a problem on the site, a soil analysis to determine the presence of harmful nematodes should be conducted. Nematodes are most likely to be a problem on lighter (sandy) soils. Nematode sampling kits

and instructions for taking samples can be obtained through your county Extension office.

Avoid Excessive Fertilization
Fertility should be based on soil and foliar analysis. The use of excessive fertilizer, especially nitrogen, should be avoided. Sufficient fertility is essential to produce a crop, but excessive nitrogen can result in dense foliage that increases drying time in the plant canopy.

Control Weeds In and Around the Planting
Good weed control within and between the rows is essential. From a disease control standpoint, weeds in the planting prevent air circulation and result in the fruit and foliage staying wet for longer periods. For this reason, most diseases caused by fungi are generally more serious in plantings with poor weed control than in those with good weed control.

Manage the Canopy
Any cultural practice that alters vegetative growth and canopy density has an effect on vine microclimate. Most cultural practices are chosen primarily to enhance yield or fruit quality rather than to influence the microclimate. However, practices, such as shoot thinning, pruning, and positioning, have a direct impact on vine microclimate. Increasing cluster thinning and decreasing pruning stimulates vegetative growth and hence reduces light exposure and ventilation within the canopy.

Shoot thinning, leaf removal, and summer pruning are frequently done specifically to reduce canopy density, so as to increase fruit exposure to light, improve ventilation, and aid spray coverage. Leaf removal in the fruiting zone of the canopy is important for optimal control of Botrytis bunch rot. This is a common practice in California vineyards and has been shown to be effective in Midwestern vineyards as well. Shoot positioning is usually done to ensure canopy separation of divided canopies or to enhance light exposure of the renewal zone of the vine; it also decreases vegetative growth and canopy density and increases light exposure of fruit.

Avoid Winter Injury
Wounding by freeze injury is important in the development of crown gall. If winter injury is reduced, crown gall may not become an important problem.

Practices such as hilling or burying vines of cold sensitive cultivars are beneficial. Proper pruning practices and proper crop loads for maximum vine vigor will result in stronger plants that are less susceptible to winter injury. Controlling other diseases, such as downy and powdery mildew, is also important in preventing winter injury and crown gall.

Practice Sanitation (Removal of Overwintering Inoculum)
Vineyard sanitation is an extremely important part of the disease-management program. Most pathogens overwinter (survive from one season to the next) in old diseased plant material, such as mummified fruit, leaves, and infected canes or trunks, within the vineyard. Removal of old, infected wood, tendrils, and clusters with mummified berries from the vines and wires greatly reduces overwintering inoculum of several diseases.

Wild grapes in nearby woods and fence rows also are sources of disease inoculum and insects. Removal of these wild hosts is beneficial to the disease management program. This especially applies to abandoned vineyards adjacent to managed sites with respect to contamination from powdery and downy mildews. (***Source**: Organic Small Fruit Disease Management Guidelines*)

GENERAL

Fungicides for Use in Organic Production Systems

Michael Ellis, the Ohio State Univerisity

The following is a brief description of some disease control materials that are commonly or traditionally used in organic production systems. Copper fungicides, elemental sulfur and liquid lime sulfur are the old "standard" fungicides, and have been used for many years in organic production systems.

Note: Prior to using any material in the organic system, it is important that the grower consult his/her organic certification agency or program to be positive that use of the material is permitted.

Copper Fungicides
When different formulations of copper are dissolved in water, copper ions are released into solution. These copper ions are toxic to fungi and bacteria because of their ability to destroy proteins in plant tissues. However, because copper can kill all types of plant tissues, the use of copper fungicides carries the risk of injuring foliage and fruit of most crops. Factors promoting this injury include: 1) the amount of actual copper applied, and 2) cold, wet weather (slow drying conditions) that apparently increases the availability of copper ions and, thus, increases the risk of plant injury. Because of the potential to injure plants and to accumulate in soil, the use of copper fungicides in conventional production systems has largely been replaced with conventional fungicides that are generally safer to plant tissues and often more effective.

Several terms are used when discussing copper as a fungicide. The original material used was copper sulfate (also known as blue vitriol or bluestone). When this material was combined with lime in the French vineyards, the combination became known as Bordeaux mixture.

Bordeaux Mixture

Bordeaux mixture is a mixture of copper sulfate and hydrated lime in water. It has long residual action and has been used for years to control many diseases, including downy mildew and powdery mildew of grape. It can be made (mixed) on site by combining copper sulfate with spray grade lime. It is also commercially available as a dry wettable powder.

Fixed Copper Fungicides
Following the discovery and use of Bordeaux mixture, several relatively insoluble copper compounds or fixed coppers were developed. Fixed copper formulations release less copper ions and are generally less injurious to plant tissues (safer to use) than Bordeaux mixture, but their use is still limited because of their potential to injure plants and lack of compatibility with other pesticides. Some of the more common commercial formulations of fixed copper include C-O-C-S, Kocide 101, Tribasic Copper sulfate, Champ, and Tenn-Copp 5E. There are several fixed copper fungicides registered for use on small fruit.

Sulfur Fungicides
Sulfur is available as liquid lime sulfur and as dry wettable powders or liquid (flowable) formulations of elemental sulfur.

Liquid Lime Sulfur
Liquid lime sulfur can be used at high concentrations as a dormant spray on raspberries and blackberries for control of cane blight, spur blight and anthracnose and on grapes for control of anthracnose. At high concentrations, it should be used only when plants are dormant. It can cause severe damage if applied after green foliage appears. Lime sulfur has a foul odor that many people dislike. It is also registered for use on grapes and caneberries as a more dilute concentration for use during the growing season.

Dry Wettable Sulfurs or Flowable Sulfurs
Sulfur for use as a fungicide is available under many trade names. The microfine wettable sulfurs or flowable sulfurs are usually much less injurious to foliage and fruit than liquid lime sulfur, but their use during hot weather (above 85°F) may result in some leaf burning and fruit damage. Sulfur fungicides are very effective for control of powdery mildew on most fruit crops, but are not highly effective for control of most other fruit crop diseases. Sulfur is very toxic to foliage of certain grape varieties (mainly American grapes) including Concord, Chancellor, DeChaunac and Foch. Sulfur is relatively safe on most other varieties see Table 6, page 68. Applications after the fruit begins to ripen may pose problems during fermentation if the grapes are intended for wine making.

Growers should note that sulfur is lethal to some beneficial insects, spiders and mites. These beneficial insects are natural predators of harmful insects and mites that affect fruit crops. Killing these beneficial insects may increase certain pest problems, especially mites.

Specific comments on fungicide use will be made in the text for each crop where applicable.

"New Alternative" Disease Control Materials for Small Fruit
Many products are currently available or currently being introduced as "biological control agents" or "biopesticides". These include living microorganisms, "natural chemicals such as plant extracts, and "plant activators" that induce resistance in plants to disease. For most of these products, independent evaluations are currently being conducted; however, their effectiveness under moderate to high disease pressure is uncertain. Although many of these new products have great potential for use within organic production systems, their effectiveness needs to be determined in field tests. It is important to remember that registration of these materials for control of a specific disease on a crop is no guarantee that they will provide effective control under moderate to heavy disease pressure. In addition, many products may be effective for only one or a few diseases and most have very limited residual activity (they have to be applied often). It is also important to remember that these are registered pesticides and growers need to be certain that their use is permitted within their organic certification program.

The biological control committee of the American Phytopathological Society has developed a web page for **"Commercial Biocontrol Products Available for Use Against Plant Diseases".** The web page address is: www.oardc.ohio-state.edu/apsbcc/productlist.htm. This web page lists all the products currently available along with information such as registered crops and diseases controlled. It also lists the name of the company that manufacturers or distributes the product along with phone numbers and web site addresses. This site is updated regularly and is a valuable resource for growers interested in these products.

The following are a few of the most common "alternative disease control products currently registered for use on small fruit.

AC10 (*Ampelomyces quisqualis*) is a biofungicide registered for control of powdery mildew in grapes, strawberries, blueberries, raspberries, currants, and gooseberries. *A. quisqualis* is a fungus, that parasitizes powdery mildew fungi. Preliminary results in grapes in Michigan show moderate disease control. Adding an adjuvant such as Nufilm (0.02% v/v) enhances its efficacy. Application should start as soon as susceptible tissue becomes available and continue on a 7 to 14 day schedule. A minimum of 2 sequential applications if needed to maintain the population of *A. quisqualis*. The following chemicals cannot be tank-mixed with AQ10: sulfur and potassium salts of fatty acids.

Armicarb 100 (potassium bicarbonate=baking powder) is a reduced-risk, protectant (contact) fungicide. Armicarb 100 is

registered for control of powdery mildew and other diseases in grapes, blueberries, strawberries, and brambles. Preliminary results in grapes in Michigan indicate moderate control of powdery mildew. Start applications at the first sign of disease and continue on a 7-14 day schedule. The preharvest interval (PHI) on all crops is 0 days.

Galltrol (Agrobacterium radiobactor strain 84) is a biological control product for control of crown gall, caused by Agrobacterium tumifaciens on several tree fruit and nut crops. The active ingredient is the bacterium, Agrobacterium radiobactor strain 84. On small fruits it is effective for control of crown gall on raspberry and blueberry. It is not effective for controlling crown gall on grapes. It is purchased as a pure culture grown on agar in petri plates. The bacterial mass from one plate is diluted into one gallon on non-chlorinated water and plants are treated with a pre-plant dip in the solution or as a soil drench.

Kaligreen (potassium bicarbonate = baking powder) is a reduced-risk protectant (contact) fungicide. Kaligreen is registered for control of powdery mildew on grapes, strawberry, brambles (raspberry and blackberry) and blueberry. It provides good control of powdery mildew when applied on a frequent-protectant program of 7 to 10-day intervals. It has little or no efficacy against most other fungal diseases on small fruit. It is formulated as a micro-encapsulated powder that is mixed in water and sprayed directly on the crop. Kaligreen has a preharvest interval (PHI) of 1 day on all small fruit crops.

Messenger (harpin) is a reduced risk product registered for use on grapes, blueberries, cranberries, strawberries, brambles, and currants. The active ingredient is derived from a protein produced by certain bacteria. This protein stimulates natural plant defenses. Messenger has no direct effect on pathogens. The efficacy of this material for disease control or suppression has not been sufficiently confirmed. Messenger has a 0 day PHI.

Mycostop (Streptomyces griseoviridis strain K61) is a biocontrol product registered for use on all fruit crops for control of several important pathogenic fungi that cause seed, root, and stem rot and wilt diseases. The active ingredient is the bacterium, Streptomyces griseoviridis strain K61. It is sold as a powder formulation that is mixed with water and applied as a spray or a drench.

Oxidate (hydrogen dioxide) is a broad-spectrum bactericide/fungicide registered for use in grapes, blueberries, cranberries, strawberries, and brambles. It is a rather corrosive material and works by oxidizing fungal and bacterial cells. The efficacy of the material for disease control has not been sufficiently confirmed on several diseases. In one Ohio fungicide evaluation, it provided no control of grape black rot.

Serenade (*Bacillus subtilis*) is a biocontrol product registered for control of powdery mildew, Botrytis bunch rot and sour rot in grapes. Serenade is also reported to provide some suppression of downy mildew. This product needs further evaluation, but preliminary results show a moderate level of control of Botrytis bunch rot and powdery mildew. Serenade did not control grape black rot in Ohio. Good coverage is important for control. Applications are recommended on a 7-10 day schedule. Serenade has no maximum seasonal application rate and has a 0 day PHI.

Trichodex (Trichoderma harzianum) is a biofungicide registered for use on all small fruit crops for control of a wide range of diseases, but primarily for control of Botrytis fruit rot. It is sold as a wettable powder formulation that is mixed with water and sprayed directly onto the plants.

Trilogy (Clarified Hydrophobic Extract of Neem Oil). The label states that Trilogy is a broad spectrum fungicide of certain diseases and controls mites in citrus, deciduous fruits and nuts, vegetable crop, cereal grains and other miscellaneous crops. The label does not state what diseases are controlled on specific crops. Trilogy is registered for use on grapes, strawberry, brambles (raspberry and blackberry), and blueberry. Trilogy is a liquid that is applied for diseases as a 1% solution in sufficient water to achieve complete coverage of the foliage.

As the efficacy of these new materials is tested and validated, they will be included in these guidelines where appropriate.

Efficacy of Disease Control Materials for Powdery Mildew

Powdery mildew is different from most other plant diseases caused by fungi, because the fungus that causes it lives almost entirely on the surface of infected plant parts. The fungus may penetrate only one cell layer deep into the plant. Thus, it is exposed to eradication following topical treatment with a range of products that do not affect many other pathogenic fungi that colonize deeper into infected plant tissues. Research in New York and other locations has demonstrated that many new and “alternative materials can provide effective control of powdery mildew if applied often enough (7 day schedule) through the growing season.

These materials burn out the fungus growing on the surface, but do not provide protection against new infections; thus, repeated applications are important. These materials include: Nutrol (manopotassium phosphate); Kaligreen and Armicarb (potassium bicarbonate-baking soda); oils such as Stylet Oil and Trilogy; and dilute solutions of hydrogen peroxide (Oxidate).

Unfortunately, these materials have little or no effect on many other small fruit diseases. In addition, organic growers need to consult with their certification agency or program to

be sure that any material they use is "certified" or acceptable as organic. (***Source**: Organic Small Fruit Disease Management Guidelines*)

Calculating How Much Compost to Apply to Meet Nitrogen Needs of Vegetables

Elsa Sanchez, *Penn State University*

Two basic methods for calculating compost application rates exist. The first method is presented below and *the second method will be in the next issue of the Gazette*. Both methods require knowing the nitrogen content (the organic and ammonium nitrogen) of the compost. If the nitrogen content needs to be determined, compost analysis kits are available through your local extension office. The second piece of information needed is the nitrogen requirement of the crop to be grown. This information can be found on soil test results or in the Commercial Vegetable Production Recommendations guide.

Method 1

Step 1 – Determine the nitrogen (N) content of the compost in pounds per ton.

The two values you'll need from your compost analysis report are organic nitrogen and the ammonium nitrogen (NH_4-N) from the "as is basis" column. If Penn State's Agricultural Analytical Services Laboratory performed the analysis, organic N will be given as a percent (%) and ammonium N will be given as mg/kg. Convert organic nitrogen from % to pounds per ton by multiplying by 20. Convert ammonium N from mg/kg to pounds per ton by multiplying by 0.002.

Organic nitrogen (%) = x 20 = lbs N/ton of compost

Ammonium N (mg/kg) = x 0.002 = lbs NH_4-N/ton of compost

Example:

Organic nitrogen (%) = 1.1 (from compost analysis report) x 20 = 22 lbs N/ton of compost

Ammonium N (mg/kg) = 1600.0 (from compost analysis report) x 0.002 = 3.2 lbs NH_4-N/ton of compost

Step 2 – Determine how much of the nitrogen that is in a ton of compost will be available to the plants.

Organic nitrogen is not directly available for plant uptake. Organic N is converted into inorganic nitrogen for plant uptake as compost is broken down by soil microorganisms. This process is called mineralization. Mineralization rate is influenced by many factors and varies between 10 and 50% a year. Commonly, mineralization rates between 10 and 20% are assumed. However, if conditions favor mineralization, for example 1) if soil temperatures are high because of the use of black plastic, 2) soil moisture is high from irrigation and/or rainfall, 3) soil is frequently tilled and/or 4) the organic matter content of the soil is high, consider assuming higher rates of mineralization. For this step multiply the amount of organic nitrogen in lbs N/ton by an assumed mineralization rate. Add the amount of ammonium N in lbs/ton from step 1 to the result. The Vegetable & Small Fruit Gazette, January 2008 The Pennsylvania State University 14

Organic nitrogen (lbs N/ton of compost) x percent mineralization rate = lbs available N/ton of compost

lbs available N/ton of compost + lbs NH_4-N/ton of compost = lbs available N/ton of compost

Example:

Organic nitrogen (lbs N/ton of compost) 22 x 0.20 (or 20%) assumed percent mineralization rate = 4.4 lbs available N/ton of compost

4.4 lbs available N/ton of compost + 3.2 lbs NH_4-N/ton of compost = 7.6 lbs available N/ton of compost

Step 3 – Determine the amount of compost to apply

For this step first determine the nitrogen needs of the crop in pounds per acre. This information can be found on soil test results or in the Commercial Vegetable Production Recommendations guide. If you have residual nitrogen in the soil from previous nutrient applications or green manure crops, subtract that value from the recommended rate. Then, divide the remaining amount of nitrogen required by the pounds of available nitrogen per ton of compost.

lbs N recommended/acre minus any residual nitrogen Ö lbs available N/ton of compost = tons of compost to apply per acre

Example:

75 lbs N recommended/acre (from soil test recommendations or the Commercial Vegetable Production Recommendations guide and assuming no residual nitrogen) Ö 7.6 lbs available N/ton of compost = 9.9 tons of compost to apply per acre

If you are using a front end loader or manure spreader with a scoop, you can figure out how many 5 gallon bucketfuls fit in your scoop, weigh a 5 gallon bucket of compost, and multiply to determine the weight of compost you are applying per scoop.

The above method will have some built-in inaccuracy because it does not account for differences in weight due to how the compost is packed, or moisture level. A second, more accurate method requires that the bulk density of the compost be determined. It is a more accurate method because it accounts for the moisture level of the compost, and packing. The final value for how much compost to

apply is expressed in cubic yards per acre which can be an advantage if a manure spreader or front end loader is used to spread the compost. This method will appear in the next issue of the Gazette. (***Source**: The Vegetable & Small Fruit Gazette, January 2008*)

Upcoming Meetings:

Jan 15 – 17, 2008. **NJ Annual Vegetable Meeting** at the Taj Mahal in Atlantic City. For more information contract Mel Henninger at henninger@aesop.rutgers.edu .

Jan. 29-31, 2008. (A berry triple header!)

Mid-Atlantic Fruit and Vegetable Convention, Hershey Lodge and Convention Center, Hershey, PA. For more information Contact William Troxell, 717-694-3596.

Annual meeting of the North American Strawberry Growers Association will be held in conjunction with the Mid Atlantic Fruit and Vegetable Convention (above), and the National American Bramble Growers meeting (below). For more information: see news brief below or contact Kevin Schooley at kconsult@allstream.net or visit www.nasga.org.

NABGA Annual Bramble Conference will be in Hershey, Pennsylvania in association with the Mid-Atlantic Fruit and Vegetable Convention and the North American Strawberry Growers Association. For more information contact: Debby Wechsler, 1138 Rock Rest Rd. Pittsboro, NC 27312**, nabga@mindspring.com .**

Feb 7-9, 2008. **Pennsylvania Association for Sustainable Agriculture (PASA) 17th Annual Farming for the Future Conference**. Penn Stater Conference Center, State College, PA. For more information visit www.pasafarming.org .

Feb 12-14, 2008. **Empire State Fruit and Vegetable Expo – "Growing for the Health of New York".** Oncenter Convention Center, Syracuse, NY. Program and registration information: http://www.nysaes.cornell.edu/hort/expo/ . For general Expo information, please contact Jeff and Lindy Kubecka, New York State Vegetable Growers Association, PO Box 70, Kirkville, NY 13082, 315-687-5734, email nysvga@twcny.rr.com or visit http://www.nysaes.cornell.edu/hort/expo/

Feb. 28, 2008. **The 2008 Hudson Valley Fruit Grower School - Berry Session**, Holiday Inn, Kingston, NY. Tree Fruit sessions will take place on February 26th & 27th. There will be a Trade Show on the evening of the 26th. Information will be made available at our web site (http://hudsonvf.cce.cornell.edu/calendar.html#fruitschool), or contact Steve McKay for more information.

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