The New York Berry News

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What's Inside

Currant Events: The record warm temperatures we experienced in late April pushed many small fruit crops ahead of schedule. This may have been viewed as a fortunate event if this record warmth didn't happen to be followed by a killing frost. Some early-season varieties and row-covered strawberries were beginning to bloom, or at least had well- developed flower buds, may have suffered significant frost damage. The extent of the damage will not be fully know for at least another week. Another concern is the rain; it just won't stop! Not only has this significantly delayed planting...but it has also prevented the timely application of fungicides. And with strawberries almost certainly reaching 10% bloom this week...a critical spray may be substantially delayed! Moreover, prolonged wet weather increases the likelihood of gray mold on blueberry. However, a timely section 18 for Topsin-M may provide some relief (apply 1 lb/acre Topsin-M plus captan 50w (5lb/A) at 7-10 day intervals during this wet weather). This issue of the NY Berry News focuses on insect, disease, and weed pests during bloom. We also introduce in this issue weekly weather stats provided by the NY Ag Statistics Service.

Pesticide News: **Confirm 2F** (Dow), an insect growth regulator with specificity against many lepidopteran pests, has now received NY DEC approval for use on blueberries with the principal target pest being the cranberry fruitworm. This is a timely decision given continuing restrictions on the use of Guthion. Another Dow product, **Spintor 2SC**, has also received DEC approval for use in blueberries. I have not had much experience with either of these materials although based on information out of New Jersery (courtesy of Dr. Sridhar Polavarapu), Confirm is probably the better choice for cranberry fruitworm because of its longer residual activity. In other news, a new miticide from Uniroyal (**Acramite**) has received a federal EPA label for use in a number of fruit crops including strawberries. Note that this material has **NOT** yet been approved by NY DEC and therefore is not legal to use in New York. Representatives of the company expect to submit the petition for Acramite to the DEC sometime this summer but the earliest it would be available is next field season. *From: Greg English-Loeb*

The EPA has granted a section 18 for the use of **Topsin®M WSB** Fungicide (EPA Reg. No. 4581-377 or 73545-8 or 4581-408) on blueberry in New York, Connecticut, Indiana, Michigan, New Jersey, Ohio and Pennsylvania. The exemption permits preharvest applications for control of Mummyberry, Botrytis Blossom Blight, Anthracnose Fruit Rot, Phomopsis Twig Blight & Canker, and Fusicoccum Canker. Under the exemption, Topsin-M can be applied at the rate of 1.0 lb product per acre with applications beginning at green tip and repeated on a 7-10 day interval. A maximum of three (3) applications may be made by ground or aerial application and no more than 3 lb. product per acre may be applied per year. A worker re-entry interval (REI) of 12 hours and a pre-harvest interval (PHI) of 7 days must be observed. Topsin-M may not be applied through any type of irrigation system. A copy of the Topsin-M WSB Section 18 can be obtained in PDF format at: http://www.nysaes.cornell.edu/pp/extension/tfabp/pestnews.shtml. This label must be in the possession of the user at the time of pesticide application. Any adverse effects resulting from the use of Topsin M WSB under this emergency exemption must be immediately reported to your State Department of Agriculture. The section 18 expires September 30, 2002.

The New York State Department of Environmental Conservation has registered **Phostrol Agricultural Fungicide** (EPA Reg. No. 55146-83) in New York State. This is an initial registration in New York State for this product and a major change in labeled use pattern for the active ingredient mono and dibasic sodium, potassium, or ammonium phosphite. The active ingredient has been registered previously in New York State for antimicrobial uses. Phostrol Agricultural Fungicide is proposed for use on a number of crops including strawberries, caneberries, and blueberries. Its main use is against diseases caused by *Phytophthora* spp. The product may be applied to listed crops at 5-7 day intervals throughout the growing season and there is no maximum annual rate.

Small Fruits Twilight Meeting: Agenda and Contact Info.

Following is the preliminary agenda for the Small Fruits Twilight Meeting scheduled for June 25, 2002 at the Cornell University's New York State Agricultural Experiment Station at Geneva. **Please register in advance by contacting Kathleen Morabito at (315) 787-2234 or at kmm64@cornell.edu.** There is no charge for attending.

5:30pm	Registration begins
6:00	Introductions
6:05	Strawberry variety trial- Dr. Courtney Weber
6:35	Strawberry pest management- Dr. Bill Turechek, Dr. Greg English-Loeb, and Dr. Marvin Pritts
7:05	Early raspberry varieties- Dr. Courtney Weber
7:20	Raspberry pest management- Dr. Bill Turechek, Dr. Greg English-Loeb, and Dr. Marvin Pritts
7:50	Other small fruits research, grower questions, and open discussion

The meeting will be held at the experiment station's Darrow Farm on Gates Road. Gates Road is approximately 3 miles west of the experiment station off of County Road 4 (this is North Street in Geneva which runs between Hedrick Hall and Jordan Hall heading west out of Geneva). The Darrow farm is approximately 1 mile south of County Road 4 on Gates Road. Signs will be posted. For more information contact Dr. Weber at caw34@nysaes.cornell.edu or at (315) 787-2395.

Arthropod Pest Management During Bloom

Greg English-Loeb, Dept. of Entomology, Cornell University, Geneva, NY

Management of arthropod pests begins in earnest as the temperatures increase and the growing season gets under way.

— Strawberry —

During the prebloom period the strawberry bud weevil (clipper) is the main arthropod pest to watch out for (Figure 1). In recent years we have learned that many strawberry cultivars, such as Jewel and Seneca, can tolerate a fair amount of bud loss from this pest, although at sufficient densities, it can still be a problem. As a rough rule of thumb, treat for clipper when you observe more than one clipped primary or secondary flower bud or more than 2 tertiary buds per truss, on more than one truss per foot of row. Note that once flowers are open they are no longer at risk from clipper.

Figure 1. Strawberry bud weevil

If spittlebug is a problem, Guthion applied at 1 lb/acre for spittlebug will also prevent clipper damage. Thiodan applied for spittlebug will also control some tarnished plant bug nymphs. Recent data show that U-pick customers are willing to accept a spittle bug mass density of 1 spittlebug mass per linear foot of row without complaints. This pest is typically not targeted for control in NY.

Also during the prebloom period (and extending through harvest and sometimes after renovation) two-spotted spider mite can be a problem in some plantings (see Figure 4). Look for whitish or yellowish stippling on leaves (see Figure 5). The current threshold is 5 mites per leaf or about 25% of leaflets have at least 1 mite. This is likely a conservative threshold for a healthy planting and research currently being conducted should provide a better estimate.

Tarnished plant bug (TPB) is the key insect pest of strawberries during bloom to near harvest. Both adult bugs and the nymphs cause injury (deformed fruit) but nymphs are probably of the greatest concern for June-bearing cultivars (Figure 2). The economic threshold is half a nymph per flower cluster (you sample by tapping cluster over a white plate and counting nymphs that fall off). It is worth sampling for this pest on a regular basis since it varies in population size from place to place and from one year to the next (see next article). Spraying a pesticide when nymph counts are below threshold costs you money and can kill beneficial arthropods unnecessarily.

Figure 2. Tarnished plant bug nymph on a blossom

Cyclamen mite is a potentially serious pest that seemed to show up in more fields than usual last year. The mites get active in the spring with populations peaking after bloom. The mites like to feed on young leaf tissue (just as the leaves are unfolding). The mites themselves are difficult to see without a good hand lens. Cyclamen-damaged leaves tend to be stunted and crinkled. Prior to bloom or after renovation are good times to treat for this pest. Use lots of water for thorough coverage.

Two more insect pests deserve mention at this time. The first is strawberry sap beetle (SSB). This small, brownish beetle seems to be increasing as a pest in New York strawberries (Figure 3). Both the adult beetles and the larvae feed on ripe and overripe fruit. We still are exploring the best ways to control SSB. Two pyrethroids are labeled in New York for its control: Dantitol and Brigade. Good coverage is likely to be important for its control.

Figure 3. Strawberry sap beetle

Rootweevil (there are several species) is the last strawberry pest I want to discuss in this issue. The larvae feed on roots and crowns and when abundant can cause serious damage to plantings. Beds with heavy infestations show distinct patches or spots that appear stunted and have reduced yields. Chemical control is targeted at the adults that emerge in mid to late June. Look for characteristic adult feeding damage on leaves (notching from the edge) to help determine timing. The adults feed for a few days before starting to lay eggs. Some growers have also had success controlling rootweevil larvae using parasitic nematodes. These can be applied either in the spring (late April and early May) or in the fall. Use sufficient water to get good penetration.

— Raspberry —

There are a number of potential pests of raspberries to be concerned with during this time period (early prebloom to postbloom). As mentioned in the April newsletter, be on the alert for feeding damage from the adult raspberry fruitworm (a beetle, light brown in color) on foliage and fruit buds. The larvae of this beetle pest feed inside flower buds and young fruit. Adult feeding damage on foliage creates a skeletonized appearance somewhat similar to the feeding damage caused by larvae of raspberry sawfly (pale green caterpillar-like body with many long hairs). Both the fruitworm and the sawfly appear during the prebloom period.

Tarnished plant bug (TPB) is another potential problem for raspberry growers during the period from bloom to harvest. Both the adults and their nymphs can cause deformed fruit, although the deformities are not as obvious in raspberries as in strawberries where TPB is also an important pest. We do not have a good estimate of the economic threshold for TPB in raspberries but a rough guide would be 10 to 20% of canes infested with adults or nymphs. Raspberry cane borer and related beetle species make their appearance during this period. The adults emerge in the spring, mate and start laying eggs. Larvae bore into canes and during the season and for some species, the next season, they cause injury and death to canes and potentially entire crowns. The best time to kill adults is during the late prebloom period (for summer-bearing raspberries), although note that the red-necked cane borer is the only species that has an insecticide labeled for it (methoxychlor). During the season remove wilted shoot tips below the girdled stem (two rows of punctures around an inch apart) where the egg of the raspberry cane borer has been placed. During the dormant season remove and destroy canes with swellings. Another pest that can cause serious injury to canes and the crown is the Raspberry crown borer. The larvae of this moth feed at the base of the cane and into the crown over a two-year period. The first signs of a problem often appear during fruit maturation. The withering of and dying of canes, often with half matured fruit, can be a symptom of feeding damage at the base. Canes with these symptoms should be removed during the growing season. The adult moth actually does not

appear until later in the summer (early August). It is actually a very attractive moth that superficially resembles a yellow jacket. No insecticides are currently registered in New York for control of crown borer.

Finally, I should mention two-spotted spider mite (TSSM) as a potential pest. These tiny spider-like arthropods can become very numerous on foliage, causing white stippling on leaves (Figure 4). They seem to be most problematic in dry sites and/or in mild growing areas such as the Hudson Valley and Long Island). As of this year there is now a miticide registered in New York for control of TSSM (Savey WP). Predatory mites can also provide control of TSSM. These beneficial mites are frequently naturally present in raspberry fields, especially where few broad-spectrum insecticides are used, but can also be purchased from a supply house.

Figure 4. Two-spotted spider mite and webbing.

— Blueberry —

Cranberry Fruitworm and Cherry Fruitworm are the main blueberry arthropod pests in the spring and early summer. These moths overwinter as fully-grown larvae. They pupate in the spring and begin flying in late May and early June (around the time of flowering). Egg laying begins at around petal fall with eggs being placed at the base of newly set fruit. A sex pheromone is available to monitor the flight activity of adult cranberry fruitworm (Great Lakes IPM, www.greatlakesipm.com, 989-268-5693). Two applications of an insecticide such as Confirm or Guthion, starting at petal fall and 10 days later, is required for sites with heavy pressure. Research in New Jersey indicates that in areas of moderate pressure, one application 5 to 7 days after petal fall provides as good control as two applications. Other pests to keep an eye out for are plum curculio (notice crescent-shapped scar created from egg-laying on young fruit), leafrollers (larvae make shelters by silking together terminal leaves), and blueberry tip borer (larvae bore into stem causing shoot tips to die back).

— Currant & Gooseberry —

Imported current worm, when present, can cause considerable injury to foliage. The adult, which becomes active in the spring, is wasp-like in appearance (indeed its in the wasp group, but part of a primitive line called sawflies that are herbivorous as larvae). Eggs are laid along the midrib or on the undersides of the leaves. Larvae of the first brood appear in spring, shortly after leaves are out. They initially feed in colonies but as they become larger, feed singly. A second brood of larvae is produced in early summer and in some years a partial third brood is produced later in the summer. Another currant and gooseberry pest to be on the look out for in the spring is the currant borer. A relative of the raspberry crown borer, the adult moth has clear wings, blue-black body with yellow markings resembling a wasp. The adult emerges in the spring, mates and begins laying brownish eggs on the bark of canes. After hatching, larvae burrow into canes and begin feeding within the pith. No insecticides are labeled for currant borer although removal of weak canes in the spring and fall will help keep populations down. Other pests that might be observed attacking currants and gooseberries in the spring to early summer include the currant stem girdler (lays an egg in shoot tips and then girdles stem below) and gooseberry fruitworm (larvae feed inside young fruit, sometimes weaving portions of stems together with silk).

Sampling for Arthropod Pests of Strawberry

Greg English-Loeb, Dept. Entomology, NYSAES, Cornell University and Juliet Carroll, NY State IPM Program, NYSAES, Cornell University

A good IPM program for any given pest incorporates several key components: knowledge of the biology and ecology of the pest, a method for estimating its abundance (sampling), a set of management alternatives (chemical, biological, mechanical, cultural) and an estimate of the economic threshold (which incorporates, among other things, knowledge of the economic value of the crop, economic and environmental costs of different control options, and relationship between pest density and damage). In this article, however, I want to focus on sampling. Why is sampling important? You probably have a pretty good idea about which pests might show up in your plantings and even approximately when during the season, but that does not mean they will appear or that they will become sufficiently abundant that it makes economic sense to do something about them. Sampling plus a well worked out economic threshold helps provide this critical information. The information is critical because there are negative consequences to using an insecticide, for example, when it is not necessary (e.g. expense, selection for resistance, harm to beneficial organisms). Similarly, there are negative consequences to not initiating a control action when it is necessary.

Several years ago Dr. Joe Kovach, as coordinator of the NY IPM Fruit Program, initiated an effort to develop sampling protocols for key arthropod and disease pests of strawberries. Joe, along with Wayne Wilcox, Art Agnello, and Marvin Pritts, published a sampling guide in 1993 (Strawberry IPM Scouting Procedures, NY State

IPM Program, Number 203b) that you can purchase through Cornell Media Services (607-255-2080). Although some things have been updated since this guide was published, it is still a useful resource. Here I will summarize sampling protocols for three arthropod pests of strawberries that you may be finding in your plantings in the near future: clipper weevil, tarnished plant bug, and spider mites. For each of these potential pests, it is important to sample enough places in the planting to provide an overall assessment of abundance and potential injury. If you only sample in one place you may, by chance, hit a hot spot and decide to treat when not necessary. Or you may, by chance, choose the one spot where the pest is rare and decide not to treat when you really should.

Clipper Weevil

It is most efficient to monitor the damage caused by the clipper (clipped buds) rather than the weevil itself (Figure 5). Adult clippers become active in the spring

Figure 5. Clipper weevil damage

when temperatures get above 65 F. Damage often first appears along the edge of a field near woods. The sampling unit for clipper is the number of flowering inflorescences with significant damage. What constitutes significant depends on cultivar and which buds are clipped. Toleratant cultivars can experience considerable bud loss without any loss in yield (e.g. Seneca, Mohawk, Mira, Jewel) while others are much less able to compensate for damage (e.g. Northeaster, Honeoye). **For tolerant cultivars the threshold is an average of more than one primary or secondary flower bud clipped or more than two tertiary flower buds per truss, on more than one injured truss per foot of row. For the less tolerant cultivars, an average loss of more than 1 bud per foot of row could result in economic loss.** You should assess several (6 to 10) different sections within the planting, making sure to include sites along the edge and in the interior. At each location, categorize the number of damaged trusses for a 3-foot section (about a meter) for a total of 18 to 30 feet. Compute an average number of damaged trusses (or buds for less tolerant cultivars) per foot of row.

Tarnished Plant Bug

The sampling plan for tarnished plant bug (TPB) focuses on the nymphs (the immature stage of the insect) because for June-bearing cultivars most of the injury probably comes from the nymphs. TPB overwinter as adults. In the spring, as strawberry plants begin to flower, the adults move into the field and begin feeding and laying eggs. The feeding action of adults and nymphs cause fruit to become deformed (cat-faced) and generally unmarketable for fresh market. The easiest way to sample for TPB nymphs is to tap flower clusters over a white pan or paper plate. The tapping action causes the nymphs to fall off into the pan where they can be counted. Sometimes you will also collect green aphids that can look somewhat like TPB. However, TPB nymphs are more active than aphids and lack cornicles on the end of the abdomen (2 short tubes). Start sampling for TPB as soon as flowers appear and continue sampling until near harvest (once or twice per week). At each sampling period select 15 clusters from 5 sites (3 clusters per site). **The economic threshold for TPB is more than 0.5 nymphs per flower cluster or 4 or more clusters with one or more nymphs out of 15 clusters.**

Two-spotted Spider Mite

Spider mites overwinter in the field as adult females. As temperatures warm in the spring the females start laying eggs. Depending on the year and the site, mite populations can build to damaging levels during the flowering period of established plantings. Less frequently, we observe significant damage from spider mites after renovation (Figure 6). A good hand lens is essential for sampling for spider mites because they are, individually, quite small (0.5 mm long or 0.2 inches). To sample for spider mites, walk diagonally across the

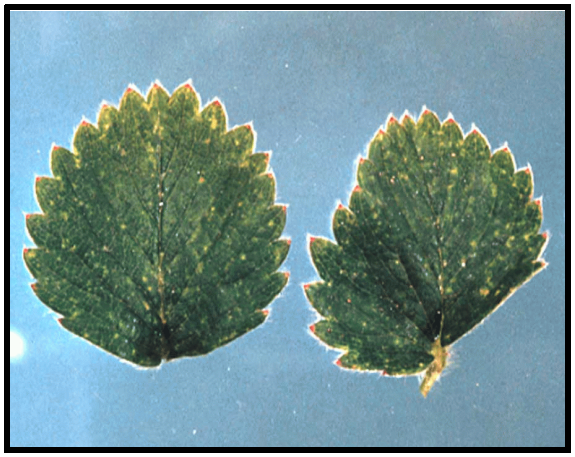

Figure 6. Two spotted spider mite damage

field, randomly picking one mature, fully expanded leaflet every other row, until 60 leaves are collected. **The current recommended economic threshold for spider mites is 25% of the leaflets with one**

or more mites, which corresponds to about 5 mites per leaflet. The threshold of 5 mites per leaflet may be somewhat conservative and research is underway to better define the impact of spider mites. Note that both established and new strawberry plantings can be infested with spider mites and should be monitored.

Some Final Comments about Sampling and Thresholds

Sampling for arthropod pests is important to do even where we do not have well established sampling protocols or economic thresholds. The more you know about what is going on in your field the better informed decisions you can make. Cyclamen mite is a good example. We do not know how many mites it takes to cause economic injury nor do we have an efficient way to estimate their abundance. But as a grower, you can help your bottom line by scouting your fields for symptoms of cyclamen mite feeding damage. If you have some, you can take appropriate steps. One final point about economic thresholds. Think of them as guides for when control of a particular pest may be required. But the threshold will vary depending on the condition of your plants. Vigorous plants can tolerate more mite damage, for instance, than stressed plants. Also if prices for fruit are up, then you may want to use a slightly lower threshold (it makes economic sense to pay for a control measure at lower pest densities) whereas if prices are down, a higher threshold may be appropriate.

Using Fungicides to Control Strawberry Fruit Rots

Source: Adapted for New York from Mike Ellis, OSU/OARDC Plant Pathologist, Fruit ICM Newsletter

The most common fruit rots on strawberry in New York are: Botrytis fruit rot (gray mold), caused by *Botrytis cinerea*; leather rot caused by *Phytophthora cactorum*; and anthracnose fruit rot, caused by *Colletotrichum acutatum*. Especially in wet growing seasons, successful strawberry production may depend on the simultaneous control of all of these diseases. Generally, all three diseases do not occur simultaneously in the same planting, but this can occur. Botrytis fruit rot or gray mold is the most common disease and generally requires some level of fungicide for control each year. Leather rot is a problem in years with excessive rainfall or in fields with poor drainage that have standing water (all of these diseases are a problem in situations such as this). Many growers do a good job of controlling leather rot by planting on sites with good soil drainage and maintaining a layer of straw mulch to prevent contact of berries with soil. In years with excessively wet weather or on sites with problem soil drainage, fungicides may be beneficial for leather rot control. Anthracnose is a problem in years with warm to hot temperatures combined with prolonged rainfall prior to and during harvest. Anthracnose is generally not a problem in most plantings; however, when it does develop, it can be devastating. Quadris has good to excellent activity against anthracnose. **Quadris has recently been registered for use strawberry and is expected to receive labeling in New York soon (i.e., it is not labeled yet).**

Figure 7. Strawberry fruit infected with gray mold.

As previously mentioned, Botrytis or gray mold is the most common disease and is probably the easiest to control with effective fungicide use. Most fruit infections by Botrytis occur only during bloom. Therefore, most growers that apply fungicide during bloom generally do a good job of controlling Botrytis and do not need to apply fungicides pre-bloom or during harvest. If anthracnose and leather rot are not a problem, fungicide sprays during bloom only are generally all that is required. Obviously this is an ideal situation in relation to reducing costs and overall fungicide use.

In plantings and in growing seasons (warm and wet) where anthracnose or leather rot are problems, the need for a more intensive fungicide program is greatly increased. The following information provides guidelines for developing an effective fungicide program for control of the major fruit rots in New York.

Prebloom: In most years, there is generally little or no need for fungicides prior to bloom. If weather is exceptionally wet from rain or overhead irrigation from frost protection, some early season fungicide may be required prior to bloom. Applications of Captan or Thiram alone at the highest rate (Captan 50WP, 6 lb/A; Captec 4L, 3 qts/A, Thiram 75WDG, 4.4 lb/A) should be effective in reducing inoculum buildup of all three diseases. A seven day application interval should be sufficient.

During Bloom: This is the critical period for control of Botrytis. In addition, in fields infested with *Colletotrichum* (anthracnose), the fungus may be able to build up inoculum on symptomless (apparently healthy) foliage during warm, wet weather. Increased inoculum could result in increased fruit infections if weather remains favorable for disease development. The main fungicides for control of Botrytis are Topsin-M 70WSB and Elevate 50WG. Both of these materials have

excellent efficacy for control of Botrytis. I also recommend that these materials be tank-mixed with Captan or Thiram during bloom. Captan and Thiram are protectant fungicides that provide some additional control against Botrytis (gray mold), anthracnose fruit rot, and leather rot. In addition, mixing the materials should also aid in reducing the risk of fungicide resistance development.

For successful Botrytis control, it is important to provide fungicide protection throughout bloom. Remember that early blooms (king bloom) may be your largest and best quality fruit, so protection needs to be started early (at least 10% bloom...this should be happening right about now!). The number of bloom sprays required depends upon the weather. If it is hot and dry, no fungicides are required. All of the fruit rot diseases discussed here require water on the flowers and fruit in order to infect. If it is very dry and overhead irrigation is used for supplemental water, irrigation can be applied in early morning so that plants dry as fast as possible. Keeping plants dry reduces the need for fungicide application. Unfortunately, most years are not this dry and fungicides are generally applied on at least a 7-day schedule through bloom. If it is extremely wet, a shorter interval (4-5 days) may be required in order to protect new flowers as they open. Although Botrytis is the primary pathogen we are trying to control during bloom, the selection of the proper fungicides should also aid in reducing the buildup of anthracnose as well. This is important to remember in plantings where anthracnose is a problem or threat.

Post Bloom Through Harvest: As bloom ends and green fruit are present, the threat from Botrytis infection is generally over. Green fruit are resistant to Botrytis. If you got Botrytis infection in fruit during bloom, it will not show up until harvest as fruit start to mature. At this point, it is too late to control it.

Figure 8. Sunken, dry lesion characteristic of anthracnose.

As new fruit form through harvest, the threat of anthracnose fruit infection increases (Figure 8). In many plantings, anthracnose is not present or is not a problem. In these plantings no additional fungicide should be required after bloom through harvest. Unfortunately, you cannot determine if anthracnose is a problem until you see it. Often, this is too late to control it. In plantings with a history of anthracnose fruit rot, or if the disease is identified in the plantings, fungicides with efficacy for anthracnose control may be required from the end of bloom through harvest. Remember, anthracnose is favored by warm to hot wet weather. In addition, anthracnose appears to be a greater problem in plastic culture and day-neutral plantings, not particularly common in New York.

Fungicides for Leather Rot Control

As previously mentioned, emphasis for leather rot control should be placed on the use of cultural practices, such as planting on well drained sites or improving water drainage in the planting and a good layer of straw mulch to prevent berry contact with the soil. When needed, the following fungicides are labeled specifically for control of leather rot.

Figure 9. Strawberries infected with leather rot.

Ridomil Gold is labeled for control of Red Stele (caused by *Phytophthora fragarieae*) and Leather Rot (caused by *Phytophthora cactorum*). The label for perennial strawberries reads as follows: "Established Plantings: Apply Ridomil Gold EC at 1 pt. per treated acre in sufficient water to move the fungicide into the root zone of the plants. Make one application in the spring after the ground thaws and before first bloom. A second application may be applied after harvest in the fall. Note: Although not labeled for leather rot control, the early spring application for red stele control should provide some control of leather rot. For supplemental control of leather rot, an application may be made during the growing season at fruit set. This application at fruit set (as green fruit are present) has been very effective for leather rot control.

Aliette 80WDG is labeled for control of Red Stele and Leather Rot. For Leather Rot, apply 2.5 to 5 lb/A. Apply as a foliar spray between 10% bloom and early fruit set, and continue on a 7-14 day interval as long as conditions are favorable for disease development. Applications can be made the same day as harvest (PHI=0 days). Do no exceed 30 lb product per acre per season.

Table 1 provides suggestions for developing a fungicide program for simultaneous control of strawberry fruit rots. Remember these are only suggested guidelines for a fruit rot control program. It is always the grower's

responsibility to read and understand the label. For the most current pesticide recommendations in New York, growers are referred to Pest Management Guidelines for Small Fruit Crops.

The extensive use of Captan in this program could result in problems with visible residues on fruit. This needs to be considered, but under heavy disease pressure for anthracnose a high level of Captan usage may be required. The Captec 4L (flowable) may result in less visible residue than the Captan 50W (wettable powder). Alternating Captan with Quadris rather than combining Quadris with Captan in every other spray should be helpful in reducing visible residues. The use of Quadris alone in the last spray or two before harvest should aid greatly in reducing visible residues.

As mentioned previously, leather rot should be controlled by good soil drainage (no standing water) and a good layer of straw mulch to prevent berries from soil contact. If leather rot is a threat or a problem, fungicides may be required. Quadris has excellent activity against Phytophthora diseases on other crops. Although not on the label and I have seen no data to support this idea, Quadris may have some activity for control of leather rot in addition to anthracnose and Botrytis gray mold. If applied at the time suggested here (green fruit through harvest) for anthracnose, Quadris may be beneficial for control of leather rot as well. We (i.e., Mike Ellis et al.) are currently conducting research to determine the efficacy of Quadris for leather rot control. (*Remember: Quadris is not labeled for use in NY yet, but we expect it to be very soon.*)

Table 1. Suggested fungicide schedule for managing berry rots in the New York.

Fungicide and Rate/A	Comments
Prebloom Captan 50 WP, 6 lb. or Captec 4L, 3 qt. or Thiram 75WDG (4.4 lb)	Prebloom applications should be required only if excessive water from rain or irrigation is a problem early in the season. Fungicides here could help reduce build-up of *Botrytis* and *Colletotrichum* inoculum. In dry or more "normal" seasons, fungicide is probably not required until bloom starts.
During bloom Elevate 50WG (1-1.5 lb.) or Topsin-M 70WSB (1 lb.) **plus:** Captan 50WP (4-6 lb.) or Captec 4L (2-3 qt.) or Thiram 75WDG (4.4 lb.)	This is the main time to control *Botrytis*, and if temperatures are high, *Colletotrichum* could build up in the planting. The addition of Captan or Thiram provides additional protection against both diseases and may aid in reducing fungicide resistance development. Topsin-M and Elevate are both excellent for control of Botrytis, but have no activity against anthracnose. Where anthracnose is not a threat, these fungicides will provide excellent Botrytis control. When combined with the high rate of Captan or Thiram, the combination should provide some level of anthracnose control. Elevate or Topsin-M should not be applied more than twice before alternating with a fungicide of different chemistry. This is to aid in reducing fungicide resistance development.
Post bloom-Harvest Quadris 2.08F (6.2-15.4 fl oz.) **tank-mixed or alternated with:** Captan 50WP (3-6 lb.) or Captec 4L (1.5-3 qt.)	As green fruit develop, the threat of anthracnose infection increases. Quadris is probably the most effective material for anthracnose control. If anthracnose is a problem, the highest label rate should be used. This may be the best time to use Quadris. If the risk of anthracnose is high or the disease has been observed in the planting, Quadris plus Captan should be applied 7 days after the last bloom spray for Botrytis. If anthracnose remains a threat, sprays should probably be repeated on a 7 day interval through harvest. As harvest approaches, Captan should be removed from the program. Captan applied close to harvest could result in visible residues on fruit and this can be a big problem. Quadris applied alone should result in minimal visible residues on fruit and can be applied on the day of harvest (0-day PHI). Remember, these preharvest sprays are required only if anthracnose is a threat or problem.

Weed Management in Matted Row Strawberries

Courtney Weber, Dept. of Horticultural Sciences, Cornell University, Geneva, NY

Weed control is probably the single most important factor determining longevity of matted row strawberry plantings in the northeast. It is critical for growers to successfully manage weeds in spite of limited herbicide availability and the high cost for hand weeding. A truly integrated approach to weed control is needed including chemical control, hand weeding, and cultural practices to successfully control weeds.

Figure 10. Dandelion

Chemical control is most appropriate at renovation and during strawberry dormancy in the fall or early spring. By late spring chemical control in strawberries is limited to grass control and to new, non-bearing plantings due to days-to-harvest restrictions and phytotoxicity to actively growing strawberry plants. Sethoxydim (Poast) can be applied for control of grasses less than 6 inches tall and actively growing up until the 7 days to harvest.

Figure 11. Field Pansy

For new fields, the elimination of perennial weeds before planting with cultivation and a broad-spectrum herbicide such as glyphosate (RoundUp) is important for good stand establishment. Also an application of a preemergent herbicide such as napropamide (Devrinol) should give good control of germinating seeds for the first 4-8 weeks. As the residual activity of this herbicide disappears, cultivation becomes the main option until dormancy in late fall. Finger weeders, flex tine cultivators, and rolling cultivators can provide good weed control in new plantings and also help set runners into the row. A grass herbicide such as sethoxydim (Poast) can provide control of actively growing grasses only and may be appropriate for specific weed problems.

Figure12. Groundsel

Hand weeding is important in late spring to clean up any weeds missed by fall and early spring herbicide treatments. Several weeds can be established and flowering by late spring leading to summer weed problems. Dandelions, field pansy (Johnny-jump-ups), and groundsel (see Figures 10-12) can all be flowering and distributing seeds widely at this time. These weeds can develop seeds from open flowers even after pulling or cultivation so the plants need to be removed from the field to eliminate the seeds. Field bindweed is also emerging at this time and needs to be nipped in the bud before it gets out of hand (Figure 13-14).

Figure 13. Field Bindweed

Cultural practices such as mowing border areas and clearing fence rows is important to avoid new weed seeds blowing into fields. Additional straw mulch can also be added to thin areas in fields to keep weed seeds from germinating while also maintaining soil moisture and keeping soil away from developing berries.

Figure 14. Field bindweed flowers

Managing weed pests through an integrated program of chemical control, good cultural practices, and vigilant hand weeding can help ensure the vigorous establishment of new plantings and a long life for matted row strawberry fields in the northeast.

Raspberry Weed Management

Courtney Weber, Dept. of Horticultural Sciences, Cornell University, Geneva, NY

A combined approach using chemical controls, cultural practices, and selective hand weeding can be used to effectively manage weeds in raspberry. Herbicides provide good overall control of most weeds. The key to successful chemical control is a vigorous, healthy stand of canes to crowd out competing weeds within rows. Between row control can be managed using a cover crop with herbicide banding to limit spreading, mulches, cultivation, or broad-spectrum herbicide application.

Figure 15. Canadian thistle flower.

Figure 16. Canadian thistle seed head.

Chemical control is most effective in combination with the establishment of a vigorous stand of canes. In the establishment year, care must be taken to eliminate perennial weeds such a Canadian thistle (Figure 15-16) and field bindweed (see photos) with a broad-spectrum herbicide such as glyphosate (RoundUp) before planting because these weeds can spread from root pieces moved during cultivation. Once established in a planting, they are very difficult to control.

After planting, a preemergent herbicide such as napropamide (Devrinol) should be applied to eliminate germinating weed seeds. Be aware that tissue culture plugs and young canes can show increased sensitivity to many herbicides until they are well established and reduced rates may be needed. Shallow cultivation is also recommended in the establishment year to eliminate young weeds while allowing the new canes to develop. Deep cultivation is not recommended as it can damage the root systems and turn up new weed seed that would not be controlled by the preemergent herbicide. Turf can be seeded between rows late in the summer to crowd out weeds and can be managed successfully by banding with a grass herbicide along the rows as the planting matures. Mulches within the rows as well as in row centers can be used to keep weeds down but care should be taken to maintain soil fertility. Also, in less than optimally drained soils or when growing root rot susceptible varieties, mulches can retain excess moisture and exacerbate root rot problems. Bare ground can also be maintained between rows with shallow cultivation, mowing, and/or broad-spectrum herbicides, but erosion can be a problem. However, special care must be taken to avoid disturbing the raspberry roots with the cultivator, to avoid weed seed development through regular mowing, and to avoid spray drift onto the raspberries when maintaining alleyways.

In established plantings, much of the chemical control is done in the fall or in the spring before bud break. By late spring, chemical control is limited to sethoxydim (Poast) for grass control. Be aware that Poast has a 45 days-to-harvest period in raspberry and by late spring may not suitable for early season varieties that can fruit in June such as Prelude, Killarney, and Reveille. Spot treatments of glyphosate with a wick applicator can be used to treat problem weeds making sure to avoid contact with the raspberries. This herbicide will translocate and kill not only the cane touched but also ones connected by the roots and can be spread not only by the applicator but by treated weeds blowing into the canes while still wet.

A well thought out herbicide program combined with timely mowing and selective hand weeding is an effective integrated approach to weed control in raspberry and can be used to successfully manage weed pests for maximum yields and profits.

Reducing Fertilizer Costs Following Frost Damage

Eric Hanson, Michigan State University and Jim Nugent, Northwest Michigan Horticultural Research Station

Fruit trees, grapevines and blueberry bushes require a certain amount of nitrogen (N) and potassium (K) to support vegetative growth and fruit production. If the fruit are lost to frost damage, the nutrient needs are also reduced. Here are some thoughts on fertilizing following frost damage. The amount of nutrients that accumulate in the fruit of these crops is one estimate of how much fertilizer can be reduced if the crop is frosted out (Table 1). The N content of the fruit ranges from 8 lb per acre (blueberries, cherries) to as high as 50 lb per acre (15 ton per acre peach crop). The K contents range from 8 to 80 lb per acre. In the event of a crop failure, fertilizer rates can be reduced by at least these amounts. Since these plants obtain only part of their nutrients from added fertilizer (the rest from soil reserves), fertilizer rates can be reduced even more in some cases.

Table 1. Nitrogen and potassium removed from fruit plantings in harvested fruit (lb per acre).

Crop	N	K	References
Apple	18-20	30-80	1,5,8
Blueberry	8	8	4,6
Cherry	8	16	9
Grape	28	40	2,3
Peach	50	80	7

If the fruit of apples or grapes is lost to frost, N rates can be reduced by 50 percent (on lighter, sandier soils) to

100 percent (heavier, fertile soils) of typical applications. If the entire crop of cherries, peaches or blueberries were lost, N rates can safely be reduced by a third on sandier soils, to as much as a half on heavier soils. Reduce rates proportionately in the case of partial crop failures. The effect of crop loss on K requirements is difficult to estimate. Fruit are strong sinks for K, so the K demand is clearly reduced when no crop is produced. Frost-damaged plantings on heavier soils likely will not benefit from K additions this year. Plantings on sandy soils with a low K reserve or where tissue analysis has indicated a need for K, may benefit from K, but will require lower rates, perhaps half of the typical application. Applications of K could be discontinued this year where K levels in the soil are moderate to high, and an annual maintenance application of K is typically applied.

References:

1. Batjer, L., B. Rogers, and A. Thompson. 1952. Proc. Amer. Soc. Hort. Sci. 60:1-6.
2. Hanson, E. and G. Howell. 1995. HortScience 30:504-507.
3. Hanson, E. (unpublished data). 4. Hanson, E., and J. Retamales. 1990. Proc. N. Amer. Blueberry Res. Work. Conf.
5. Haynes, R., and K. Goh. 1980. Plant and Soil 56:445-457.
6. Retamales, J., and E. Hanson. 1989. J. Amer. Soc. Hort. Sci. 114:920-923.
7. Rogers, B., L. Batjer, and H. Billingsley. 1955. Proc. Amer. Soc. Hort. Sci. 66:7-12
8. Van Slyke, L., O. Taylor, and W. Andrews. 1905. NY Agric. Expt. Sta. Bull. 265:205-223.
9. Vang-Petersen, O. 1984 (Danish study).

Acknowledgements: Figures 1-6 are courtesy of Greg English-Loeb; Figures 8 & 9 were stolen from Marvin Pritts' Berry Diagnostic Tool found at: http://www.hort.cornell.edu/department/faculty/pritts/BerryDoc/Berrydoc.htm. Figures 10-16 are from Dr. John Meade, weed scientist emeritus Rutgers Cooperative Extension.

Check out the new NYSAES Tree Fruit and Berry Pathology web site at:

www.nysaes.cornell.edu/pp/extension/tfabp

Questions or Comments about the New York Berry News?

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WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, APRIL 28, 2002

	Temperature				Growing Degree Days (Base 50)			Precipitation (Inches)			
	High	Low	Avg	DFN[1]	Week	Season[2]	DFN	Week	DFN	Season	DFN
Hudson Valley											
Albany	60	26	42	-9	1	161	134	0.67	-0.03	1.78	-1.01
Glens Falls	57	23	40	-9	0	135	119	0.9	0.19	3.37	0.61
Poughkeepsie	61	27	43	-9	0	155	115	0.82	-0.05	3.03	-0.2
Mohawk Valley											
Utica	58	27	41	-9	0	130	104	1.1	0.26	5.05	1.71
Champlain Valley											
Plattsburg	59	24	39	-9	0	108	90	0.38	-0.31	2.01	-0.6
St. Lawrence Valley											
Canton	58	21	39	-8	0	107	93	0.39	-0.31	2.65	0
Massena	61	26	39	-9	0	100	84	0.43	-0.2	2.73	0.25
Great Lakes											
Buffalo	62	27	41	-9	4	122	96	0.58	-0.12	3.86	1.19
Colden	64	26	38	-10	0	102	88	0.66	-0.2	4.29	0.76
Niagara Falls	60	24	40	-10	2	114	84	0.63	-0.09	4.2	1.25
Rochester	61	29	42	-9	4	159	128	0.53	-0.1	2.76	0.33
Watertown	55	27	39	-8	0	103	87	0.34	-0.29	3.69	1.35
Central Lakes											
Dansville	66	25	42	-8	1	124	96	0.41	-0.28	2.63	0
Geneva	58	29	40	-9	0	126	102	0.58	-0.12	2.16	-0.55
Honeoye	63	27	40	-9	1	122	97	0.63	-0.07	3.54	0.79
Ithaca	60	24	39	-9	0	123	105	1.5	0.8	3.24	0.53
Penn Yan	60	27	41	-8	2	146	122	0.5	-0.2	2.38	-0.33
Syracuse	60	31	42	-8	1	159	130	1.04	0.27	3.62	0.51
Warsaw	60	24	37	-9	0	100	90	0.55	-0.24	2.76	-0.39
Western Plateau											
Alfred	62	26	40	-8	0	109	95	0.76	0.03	3.18	0.28
Elmira	62	23	42	-7	5	136	115	0.79	0.15	2.03	-0.46
Franklinville	63	22	37	-8	0	89	82	0.7	-0.07	3.25	0.19
Sinclairville	63	22	39	-7	0	105	92	0.64	-0.27	4.07	0.5
Eastern Plateau											
Binghamton	56	28	40	-9	0	131	113	1.16	0.39	3.03	0.12
Cobleskille	59	29	40	-8	0	123	107	1.08	0.31	1.87	-1.2
Morrisville	57	23	36	-11	0	95	82	1.17	0.4	3.98	1.11
Norwich	59	24	40	-8	0	116	100	0.61	-0.23	2.15	-0.98
Oneonta	59	24	39	-8	0	127	114	0.84	-0.02	2.52	-0.7
Coastal											
Bridgehampton	57	32	46	-4	2	123	106	1.69	0.78	3.2	-0.51
New York	62	40	50	-5	10	231	156	1.34	0.43	3.12	-0.41

1. *D*eparture *F*rom *N*ormal
2. Season accumulations are for April 1st to date

The information contained in these weekly releases are obtained from the New York Agricultural Statistics Service (http://www.nass.usda.gov/ny/), who in turn obtains information from reports from Cornell Cooperative Extension agents, USDA Farm Service Agency, Agricultural Weather Information Service Inc., the National Weather Service and other knowledgeable persons associated with New York agriculture. Their cooperation is greatly appreciated.

WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, MAY 5th, 2002

	Temperature				Growing Degree Days (Base 50)			Precipitation (Inches)			
	High	Low	Avg	DFN[1]	Week	Season[2]	DFN	Week	DFN	Season	DFN
Hudson Valley											
Albany	65	31	45	-9	1	162	106	0.88	0.18	2.66	-0.83
Glens Falls	68	28	42	-10	0	135	97	1.23	0.46	4.6	1.07
Poughkeepsie	66	34	47	-8	2	157	83	2.05	1.1	5.08	0.9
Mohawk Valley											
Utica	61	32	43	-8	0	130	79	1.31	0.5	6.36	2.21
Champlain Valley											
Plattsburg	65	32	43	-8	0	108	69	2.06	1.42	4.07	0.82
St. Lawrence Valley											
Canton	61	32	42	-8	0	107	75	2.32	1.62	4.97	1.62
Massena	62	30	41	-10	0	100	63	1.51	0.94	4.24	1.19
Great Lakes											
Buffalo	63	31	45	-7	3	125	73	0.9	0.23	4.76	1.42
Colden	70	28	43	-7	1	103	70	1.6	0.76	5.89	1.52
Niagara Falls	62	33	45	-8	1	115	56	0.92	0.22	5.12	1.47
Rochester	62	33	46	-7	2	161	99	0.99	0.36	3.75	0.69
Watertown	56	30	42	-9	0	103	68	1.16	0.57	4.85	1.92
Central Lakes											
Dansville	70	29	45	-7	2	126	71	1.19	0.56	3.82	0.56
Geneva	64	32	46	-6	2	128	79	0.91	0.23	3.07	-0.32
Honeoye	69	29	46	-6	3	125	75	1.03	0.38	4.57	1.17
Ithaca	66	27	44	-7	2	125	86	0.77	0.07	4.01	0.6
Penn Yan	68	33	47	-5	5	151	102	0.33	-0.35	2.71	-0.68
Syracuse	64	33	46	-7	3	162	102	1.25	0.48	4.87	0.99
Warsaw	67	28	42	-6	0	100	74	1.45	0.68	4.21	0.29
Western Plateau											
Alfred	66	28	45	-5	1	110	78	1.04	0.34	4.22	0.62
Elmira	76	26	47	-5	13	149	104	0.73	0.06	2.76	-0.4
Franklinville	68	25	43	-5	0	89	70	0.81	0.04	4.06	0.23
Sinclairville	68	25	43	-6	0	105	73	1.32	0.45	5.39	0.95
Eastern Plateau											
Binghamton	59	31	43	-6	1	132	91	1.17	0.42	4.2	0.54
Cobleskille	63	33	43	-7	0	123	88	1.19	0.42	3.06	-0.78
Morrisville	60	27	40	-10	0	95	64	1.51	0.74	5.49	1.85
Norwich	64	29	42	-9	0	116	79	1.32	0.51	3.47	-0.47
Oneonta	66	31	43	-6	0	127	96	1.41	0.5	3.93	-0.2
Coastal											
Bridgehampton	65	36	49	-4	6	129	90	1.94	1.03	5.14	0.52
New York	67	43	54	-3	34	265	141	1.39	0.48	4.51	0.07

1. *D*eparture *F*rom *N*ormal
2. Season accumulations are for April 1st to date

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WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, MAY 12th, 2002

	Temperature				Growing Degree Days (Base 50)			Precipitation (Inches)			
	High	Low	Avg	DFN[1]	Week	Season[2]	DFN	Week	DFN	Season	DFN
Hudson Valley											
Albany	80	38	58	4	61	223	126	0.19	-0.57	2.85	-1.4
Glens Falls	79	32	56	4	46	181	111	0.37	-0.42	4.97	0.65
Poughkeepsie	78	41	58	3	58	215	93	0.05	-0.93	5.13	-0.03
Mohawk Valley											
Utica	79	37	55	2	41	171	82	0.78	0.01	7.14	2.22
Champlain Valley											
Plattsburg	80	38	55	3	39	147	76	0.09	-0.54	4.15	0.28
St. Lawrence Valley											
Canton	78	36	54	3	35	142	82	0.17	-0.47	5.14	1.15
Massena	77	36	54	2	35	135	66	0.2	-0.36	4.44	0.83
Great Lakes											
Buffalo	76	37	56	3	49	174	84	0.87	0.17	5.63	1.59
Colden	76	31	53	2	32	135	74	1.49	0.72	7.38	2.24
Niagara Falls	74	33	55	1	40	155	55	0.53	-0.11	5.65	1.36
Rochester	81	36	57	3	55	216	111	0.57	0.01	4.32	0.7
Watertown	78	39	54	3	37	140	77	0.17	-0.39	5.02	1.53
Central Lakes											
Dansville	79	34	56	3	46	181	88	0.83	0.2	4.4	0.51
Geneva	79	36	56	2	42	170	84	0.77	0.14	3.84	-0.18
Honeoye	80	31	56	2	43	168	80	0.59	-0.03	5.16	1.14
Ithaca	76	30	54	2	30	155	84	0.54	-0.16	4.55	0.44
Penn Yan	77	34	55	2	39	190	104	0.72	0.09	3.43	-0.59
Syracuse	81	38	57	3	53	215	112	0.98	0.27	5.85	1.26
Warsaw	75	31	52	2	30	130	79	1.09	0.32	5.3	0.61
Western Plateau											
Alfred	76	33	54	3	32	142	80	0.97	0.27	5.19	0.89
Elmira	77	30	55	2	39	188	108	0.62	-0.08	3.38	-0.48
Franklinville	76	30	52	4	25	114	76	1	0.23	5.06	0.46
Sinclairville	75	29	54	4	34	139	85	1	0.16	6.39	1.11
Eastern Plateau											
Binghamton	73	36	54	1	31	163	88	0.84	0.1	5.04	0.64
Cobleskille	77	39	56	4	41	164	99	0.49	-0.28	3.55	-1.06
Morrisville	74	34	52	-1	22	117	57	0.94	0.14	6.43	1.99
Norwich	78	32	54	2	29	145	77	0.84	0	4.31	-0.47
Oneonta	77	36	55	5	37	164	107	0.58	-0.4	4.51	-0.6
Coastal											
Bridgehampton	72	44	56	3	44	173	102	0.01	-0.87	5.15	-0.35
New York	82	51	63	4	93	358	168	0.12	-0.77	4.63	-0.7

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