The New York Berry News

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What's Inside

Currant Events: Raspberry harvest is at its peak about mid-July and blueberries aren't far behind. In this issue we cover raspberry and blueberry pests in some detail. We devote a particularly large portion of this newsletter to blueberry diseases because of the difficulty I (and I assume others) have in diagnosing them. By now, June-bearing strawberries are ready for renovation; last months issue of the NY Berry News covered this topic in detail. However, we've been experiencing some pretty dry weather over the last few weeks and it appears that this trend may continue at least for the next week. To protect your strawberries from the harshness of renovation, it would be a good idea to assure that your strawberries are well watered prior to renovating. Which then raises a related question: How healthy are your plants? This is the time of year to find out and Marvin Pritts tells us just how to do it.

Pesticide News: **Elevate 50WDG** fungicide has been granted NY registration for use on caneberries (red and black raspberries, blackberries, and loganberries) and bushberries (blueberries, gooseberries, currants and huckleberries). Elevate is labeled for the control of gray mold. The recommended labeled rate is 1.5 lb/acre with applications beginning at 10% bloom and continuing every 7 days or when conditions are necessary until harvest. Elevate has a 0 day PHI and a 12 hour REI. For resistance management, avoid making more than 2 consecutive applications. If 2 consecutive applications were made, use an alternative fungicide for the next two applications before continuing with Elevate. Do not apply more than 6 lbs of Elevate per acre per season.

Quadris 2.08F fungicide has been granted full NY registration for use on strawberry. Quadris is labeled for the control of the diseases anthracnose, powdery mildew, and seedling root rot (caused by *Rhizoctonia solani*). Quadris applications should begin prior to disease development and continue throughout the season on a 7-10 day schedule at the labeled rate of 6.2-15.4 fl oz/Acre. Applications may be made by ground, air or chemigation. The following restrictions apply: Do not apply more than two sequential sprays of Quadris before alternating with a fungicide that has a different mode of action (such as Captan); do not make more than four applications of Quadris per acre per crop year; and do not apply more than 1.92 quarts per acre per season. Quadris may be applied up to and including the day of harvest.

Summer Arthropod Pest Management

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

Over the spring and early summer we have covered most of the arthropod pests you might run into during the entire season in the berry news so I don't have a lot of new information to share in the July issue. But it is worth reviewing some of the major culprits you could run into from mid-summer to fall. Adult Japanese beetles have been active for the past couple of weeks. They live in the soil as immature grubs for most of their lives, feeding on the roots of plants, particularly grasses. But around July 4 we start to see the attractive adults active in our yards and agricultural fields. The adults are busy doing 3 things from July through August; feeding, mating and laying eggs. The adults have a broad diet, including the leaves and

sometimes fruit of small fruit crops like grapes, raspberries and blueberries. We do not have very good estimates of the economic threshold for Japanese beetle on small fruit crops. Its likely raspberry, grape and blueberry plants can handle a fair amount of foliar feeding. Direct feeding damage to fruit is another thing again. Several broad-spectrum insecticides are effective in controlling adult Japanese beetles such as carbaryl (Sevin) and fenpropathrin (Danitol), although you should refer to the pest management guidelines and the EPA label to make sure the product is labeled for the particular crop of concern. One thing to keep in mind when chemically treating for adult Japanese beetles is that they are very mobile and can re-colonize a field fairly quickly.

Two-spotted spider mite is another pest that we frequently see during the mid summer when temperatures are up and rainfall is down. These mites feed on the foliage of a number of different kinds of plants and can be a problem on strawberries, raspberries, gooseberries and currants. Although they are around all season, dry and hot conditions may promote large populations that can cause significant injury. Also, broad-spectrum insecticides targeted at other pests can kill off natural enemies of spider mites, particularly predatory mites, thereby promoting outbreaks. Keep your eyes open for whitish stippling injury or bronzing on leaves. We do not have good estimates for economic thresholds for spider mites on small fruit crops other than strawberries, and even on strawberries, we need to refine our values. Conservatively, if you are seeing one or more adult spider mites per leaf on more than 50% of the leaves, you may be looking at a problem. Chemical control options vary for the different crops. Hexythiazox (Savey) has been recently registered for mite control on brambles (prior to 2002 we had no miticides registered for raspberries). Savey kills eggs and immature mites and is most effective when used before populations get really large. Predatory mites, purchased from a commercial supplier, are also an option, but like Savey, they work best when released when spider mite populations are still relatively low.

Briefly, below are some of the other arthropod pests to be aware of during the mid-summer.

— Raspberry —

As fruit ripens, tarnished plant bug continues to represent a threat, as are cane borer and picnic beetles. Also keep an eye out for symptoms of feeding by potato leafhopper. The greenish adult hoppers inject toxins into leaves as they feed, sometimes causing leaves to curl and to reduce shoot growth. The adult raspberry crown borer makes its appearance in late July and August. The adult is a very attractive moth that superficially resembles a yellow jacket. You may notice the adults resting on foliage during the day. It's the larvae, though, that cause the major problem. Reddish-brown eggs are placed on foliage in August and September. After hatching the larvae find a protected place near the base of the cane to spend the winter. The next spring the larvae enter the crown and roots where they spend the next year. In the second year the larvae continue to feed until early summer, at which time they form pupae and then emerge as adults in late summer to start the cycle over again. During the growing season look for withering, wilting and dying canes, often with half-grown fruit. Destroying these canes may help reduce crown borer populations. Note that no insecticides are currently registered in New York for control of crown borer. Finally, late in August or September keep an eye out for injury on canes originating from egg laying activity of tree crickets. The female inserts eggs in canes, leaving long rows of punctures that can weaken the cane.

— Blueberry —

Blueberry maggot will continue to be a concern for blueberry growers while there is fruit in the field. If you have a problem with maggot you need to continue treating for them on a regular basis until the end of harvest. Late June and into July is also a time when you might see damage from the blueberry stem borer, a beetle. The damage is caused by the larva of a beetle. The eggs are deposited on small stems near the tip. After hatching, the legless grub tunnels into the stem and continues down the cane. The larva stays with the stems for three years. Tunneling in canes reduces vigor and weakens the plant. This pest is generally not a serious problem and is managed through selective pruning of weak shoots.

— Strawberry —

Renovation is around the corner for June-bearing strawberries. After renovation is a good time to treat for cyclamen mite if this mite pest has been a problem for you. Use lots of water. There are not any major arthropod pests attacking foliage after renovation, although keep an eye out for spider mites. We currently do not have a good sense of whether spider mites can cause significant injury during this time period. On the one hand, the plants tend to be somewhat resistant to mites. On the other hand, the plants are busy initiating flower buds for the next year and may be more sensitive to spider mite injury than during the spring. Research is under way to develop an improved assessment of the economic threshold for spider mites at different times during the season.

— Currant & Gooseberry —

As mentioned above, keep an eye out for spider mite damage during the hot and dry period of the summer.

Managing Diseases of Blueberry

Bill Turechek, Dept. of Plant Pathology, Cornell University, Geneva, NY

As we are in the beginnings of blueberry harvest, this article will summarize some of the most common diseases we might expect to see during harvest. Blueberry diseases are often difficult to diagnose. This is particularly true when blueberries are planted on marginal sites, subjected to winter injury, or are suffering from nutrient deficiencies. This is simply because plants under stress can exhibit symptoms that are similar to many diseases, particularly on foliage or woody tissue.

Cankers and twig blights: Two of the most common diseases affecting blueberry canes are *Fusicoccum canker* and *Phomopsis canker* (Fig 1). Fusicoccum canker begins as small reddish lesions typically centered around leaf scars that expand to form a characteristic bull's-eye pattern. Portions of the cane above the canker may wilt and die under stressful conditions, such as when the weather is warm and dry. The disease is most common in the northern parts of the state (i.e., north of the NYS thruway). Phomopsis canker and twig blight (see article below) is characterized by dark brown to black discoloration of green woody tissue. The disease may spread through the cane to the crown causing the entire cane to collapse. The disease can be easily confused with twig blight caused by *Botrytis cinerea*. Pruning and burning diseased canes as they appear is the primary means of managing these two diseases. Winter-injured wood and weakened plants are more susceptible to attack than healthy plants. Horticultural practices should focus on maintaining plant vigor growing during the season and minimizing winter injury. In plantings with a history of either disease, be prepared to apply a delayed dormant application of lime sulfur at the rate of 5 gal/A next year to reduce the disease pressure during the season.

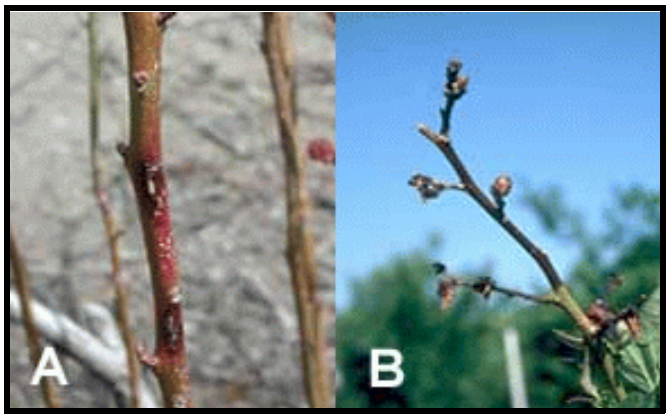

Figure 1. A) Characteristic bull's-eye lesions of fusicoccum canker; B) Phomopsis tip blight.

Botrytis blossom and twig blight is a disease that is common in years when rainy weather occurs during bloom. Virtually all young and tender tissues of the plant are susceptible to attack; older tissue is resistant to infection. Infected blossoms and young shoots turn brown and become covered with a fuzzy gray mass of spores. Fruit can become infected as well, however, symptoms do not typically develop until the fruit have been harvested. Managing this disease requires application of fungicides during bloom period. Captan and Benlate, which are applied at bloom for control of mummy berry and/or anthracnose, will protect against botrytis.

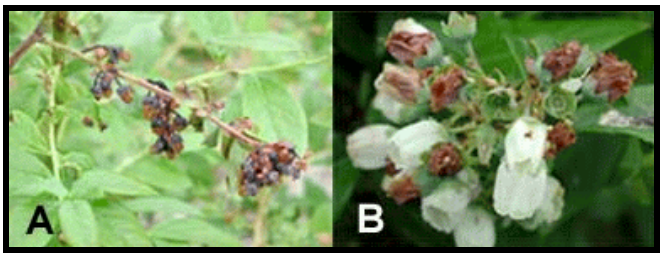

Figure 2. Botrytis blossom blight.

Fruit rots: Mummy berry, anthracnose, and alternaria fruit rot are the most common fruit rots occurring in New York; *mummy berry* is the most serious of these. In early spring, infected berries produce a mushroom-like structure called an apothecia in which the primary inoculum (i.e., ascospores) are formed. Ascospores are disseminated by wind and rain and infect emerging leaf buds and shoots. Infected shoots and leaves wilt, turn brown and die; this is the shoot blight phase of the disease. Its appearance is similar to, and sometimes confused with, frost damage. Infected shoots produce conidia (a second kind of spore) that infect the blossoms. Blossom infections are not evident until the fruit begins to ripen later in the season when the berries begin to shrivel and turn a pinkish color (Fig 3). Infected berries eventually fall to the ground, shrivel, and turn dark brown in which they will serve as the source of primary inoculum the following spring. These are the "mummy berries".

Figure 3. Characteristic shriveling of mummy berry infected berries.

Anthracnose, also known as 'ripe rot', occurs less frequently than mummyberry in New York. The disease is caused by the same fungus that causes anthracnose on strawberry. The fruit rot appears just as the berries start to ripen at harvest and often begins as a softening and sinking of the berry at the blossom end of the fruit.

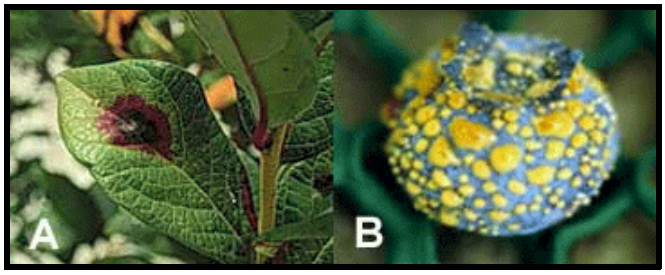

Figure 4. (A) Foliar symptoms of anthracnose and (B) copious amounts of spores.

During warm and wet weather, salmon to orange-colored spores can ooze from infected berries and these are disseminated by splashing water where they can infect healthy berries (Fig 4B). The fungus is also capable of infecting leaves where it causes brown-black necrotic lesions that vary in size and shape from small and circular to large and irregular (Fig 4A). It has been suggested that at least 12 hours of continual wetness is required at temperatures of 59 to 85 F in order for these spores to germinate and cause infection. In my opinion, a 12 hour wetting period is probably a good estimate of what is required for infection to occur at cooler temperatures. However, when temperatures exceed 80 F the wetting period needed for significant infection is probably much shorter. Based on studies done with strawberry, a 3-6 hour wetting period when temperatures are in excess of 80 F could lead significant infection.

Alternaria fruit rot is not as common as anthracnose. Berries infected with *Alternaria* tend to develop a soft, watery rot as the fruit begins to ripen and a green to black mat of fungus forms at the calyx end of the fruit (Fig 5). The fungus can also infect leaves causing irregularly shaped, brown to gray spots 1-5 mm in diameter. Spores produced on the leaves are probably the primary source of inoculum for fruit. However, once the disease appears on fruit, they are an equally if not a more important source of inoculum because of the fruit to fruit contact.

Figure 5. Dark gray discoloration of the calyx end of alternaria infected blueberries.

Ideally, management of the fruit rots begins at bloom and continues up to harvest. An application of Benlate 50WP or SP (1 lb/A) or Topsin-M (1 lb/A) PLUS Captan 50WP (5 lb/A) or 80WP (3 lb/A) is a good tank mix that targets, to some degree, all three fruit rots. Benlate has protectant activity against mummyberry, i.e., the blossom blight phase (it is ineffective against the shoot blight phase targeted in early spring), and phomopsis twig blight. Benlate also has antisporulant activity against anthracnose. Benlate is NOT a good protectant nor does it offer "kickback" activity against anthracnose. Benlate can not be applied more than 3 times prior to harvest, it can not be applied to container-grown blueberries, and it can not be used in a PYO operation once it has opened to customers. Topsin-M is similar to and is intended to replace Benlate once its use becomes illegal. This year a section 18 for Topsin-M has been granted for New York and a number of other states in the northeast and midwest. You can obtain a copy of the section 18 by visiting: http://www.nysaes.cornell.edu/pp/extension/tfabp/pestnews.shtml. Captan should be used strictly as a protectant. Captan can be applied up to the day of harvest, however, it has 96 hour reentry interval and a 48 hour early reentry interval.

Viruses: *Shoestring virus* is the most widespread virus of highbush blueberry. The virus is vectored by the blueberry aphid and can be transmitted by infected aphids from spring until leaf drop. Plants which become infected with the virus do not show symptoms for 4 years; however the plant can still pass the virus to healthy plants via its vector. The characteristic symptom of infected plants is the "shoestring" or elongated appearance of infected leaves that may be seen across the entire plant or on clumps of leaves around the crown of the plant (Fig 6C). Some leaves may also show a reddening or even an oak leaf type pattern (Fig 6A). Red streaks 3-20 mm are found often on current or 1 year old shoots. Red streaking is also symptomatic on blossoms, however this symptom may be confused with the reddening of blossoms that is normal for certain varieties such as 'Blueray' (Fig 6B).

Red ringspot virus is, at least, a graft transmitted virus. The virus apparently is vectored in nature, but the vector(s) is unknown. The virus produces distinct symptoms in a number of varieties including 'Blueray', 'Bluetta', 'Burlington', 'Cabot', 'Coville', 'Darrow', and 'Earliblue'. Red ringspots 3-6 mm in diameter on older leaves and stems is the characteristic symptom (Fig 7A, C); younger leaves do not exhibit symptoms. The foliar symptoms can sometimes be confused with powdery mildew infections, but can be differentiated from powdery mildew by noting that the underside of leaves of infected plants show no symptoms (Fig 7B). Ringspots may also form on fruit of certain varieties such as 'Rancocas' (Fig 7D).

Blueberry stunt is caused by a phytoplasma (a virus-like pathogen) and is vectored by the sharpnosed leafhopper. The phytoplasma causes stunting of new growth which is plainly visible in the summer (Fig 8A). At this point, the leaves may also show signs of yellowing (chlorosis) around the edges and in between lateral veins. By autumn, however, the chlorotic regions turn bright red (Fig 8B). Infected plants will appear

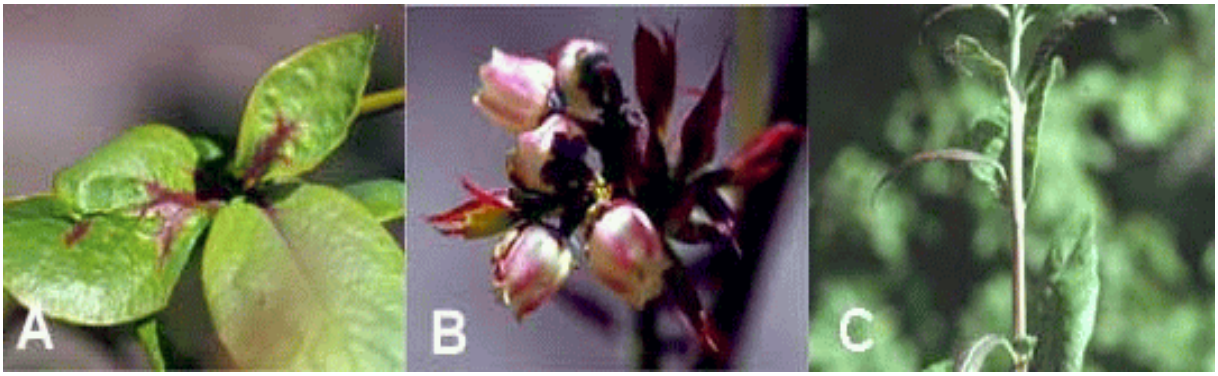

Figure 6. (A) Shoestring symptoms on leaves; (B) red streaking on blossoms; and (C) elongated leaves.

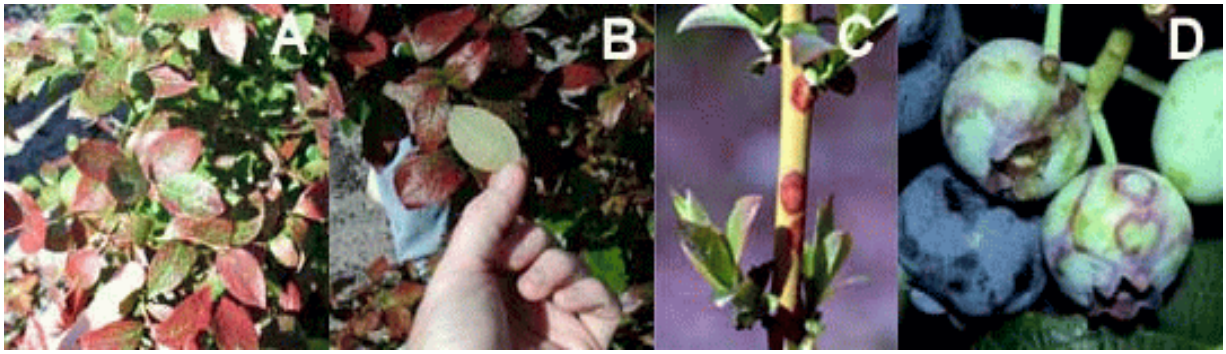

Figure 7. (A) Red ringspot symptoms on upper leaf surface; (B) virtually no symptoms on the underside of the leaf; (C) distinct ringspots on young woody tissue; and symptoms on fruit (not common).

bushy after several years of growth because of the shortening of the internodes.

Necrotic ringspot, caused by tobacco ringspot virus, is vectored by the dagger nematode (Xiphinema americnum). Like many viral diseases, the symptoms vary among cultivars, but affected bushes decline slowly over the years and are unproductive. On some varieties, irregular, necrotic leaf spots approximately 2-3 mm in diameter form (Fig 9A-B). Leaf spotting may or may not occur with leaf crumpling, stunting or rosetting of the leaves.

Blueberry scorch virus is a serious pathogen of blueberry that is becoming more prevalent in the northeast (see article beloe). The disease has caused major losses in New Jersey blueberry production and has recently been reported in Massachusetts. At this time, the disease has not been found in New York but growers and scouts are strongly advised to be on the lookout for symptoms. Sonia Schloemann suggests "If you notice aphids on your plants, especially if you also have noticed a blossom blight/twig blight condition selectively on 'Berkeley', 'Weymouth', 'Pemperton' or 'Dixi'. 'Blueray' appears to exhibit different symptoms where just a dramatic leaf yellowing is found. 'Bluecrop' may not exhibit very noticeable symptoms, but may suffer lower yields." The article below provides greater information about the nature of this disease. Managing viral diseases starts at nursery. Only plants certified free of virus should be purchased and new plants should not be planted adjacent to plantings affected with any of these viruses. In the field, management starts with correct identification. Once a disease has been correctly identified as being caused by a virus, infected plants are typically rogued thereby removing sources of virus from the field. This may not be very effective for managing shoestring due to its long latent period. For insect vectored viruses, such as the shoestring, blueberry stunt, and blueberry scorch viruses, controlling the vector can limit the spread of the virus through the planting.

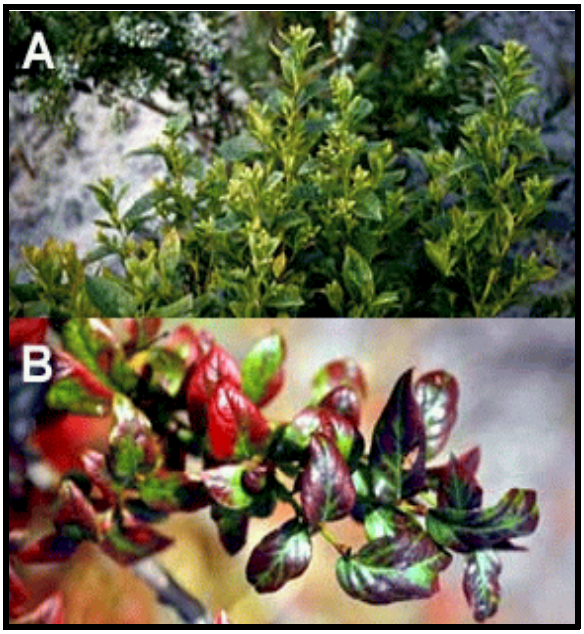

Figure 8. (A) Stunting of new growth, typically seen in summer; and (B) reddening of the foliage in fall.

Figure 9. Foliar symptoms of necrotic ringspot, caused by the tobacco ringspot virus.

Twig Blight: A Common Site in Michigan Blueberries

Annemiek Schilder, Dept. of Plant Pathology, Michigan State University, East Lansing, MI

Phomopsis twig blight infections are a common sight now in Michigan blueberries. 'Jersey' is especially susceptible. The disease is caused by *Phomopsis vaccinii,* a fungus that overwinters in infected canes. In the spring, the spores are rain-splash dispersed from cankers and old twigs to the new twigs. Prolonged wet periods and wounding predispose plants to infection. The symptoms consist of dead flower and fruit clusters and a dark brown, spreading discoloration of the twig tissue. This dark brown lesion can spread an inch per week and will kill any fruit clusters along the length of the lesion. Eventually, the fungus can grow down the twig into cane tissues. Phomopsis twig blight symptoms are sometimes confused with botrytis blight. Botrytis infections are often characterized by a gray, fuzzy mold on the affected plant part, and there is no dark brown discoloration of the twig. Botrytis can also blight leaves. Botrytis is favored by cool, wet conditions. This year, phomopsis lesions were seen developing in healthy-looking twigs that were collected from various blueberry fields around the Holland area in March. The twigs were placed in a jar with water on the lab bench. Up to 10 percent of the twigs started to show symptoms after a week. The infections seemed to be originating from fruit buds, which subsequently died, and then spread throughout the entire twig. Eventually the whole twig died. Since similar symptoms appeared in the field in April and early May, much earlier than typical spring infections show up (May/June), it appears that these infections took place last year, possibly during August or September when the new fruit buds formed. Previous research showed that phomopsis can release spores all season, from April to September. The bud infections probably remained dormant in the buds until spring temperatures were conducive to growth of the fungus.

Phomopsis twig blight incidence can be reduced by pruning out and destroying infected canes and twigs, which act as inoculum sources. Captan + Benlate or Ziram + Topsin M are the best fungicide choices for controlling phomopsis twig blight. Other fungicides, such as Bravo and Indar, also provide some control. The critical period for control is between green tip and petal fall. The above observations suggest that protection of blueberry bushes may be needed after harvest as well, especially if there is a lot of rain in late summer. More research is needed to understand this aspect of the disease. (*Source:* Michigan Fruit Crop Advisory Team Alert, Vol. 17, No.11, June 18, 2002. Reprinted from the Massachusetts Berry Notes, June 20, 2002) .

Blueberry Scorch Virus

Peter Oudemans, Blueberry & Cranberry Research Center, Rutgers University, Chatsworth, NJ

Blueberry scorch is a virus disease that is increasing greatly in frequency in New Jersey. The pathogen causes flowers to die without being fertilized and can result in major crop losses. In Burlington and Atlantic counties fields with 70-90% of the plants infected have been observed. Thus this disease represents a serious threat to the blueberry industry.

Growers and scouts should watch for development of scorch at this time and flag all suspect bushes. Symptoms are easily seen during bloom. Growers should be aware if this disease is present on the farm and where the infected bushes are located. Mark locations of the disease on a farm map and monitor these areas next year. When suspect bushes are found they should cut back and removed. Aphid scouting and management should be made high priority in fields with infected plants.

Symptoms of the disease vary depending on the cultivar. In 'Weymouth' the classic symptoms of scorched blossoms and a Phomopsis-like dieback are commonly seen. In other cultivars such as 'Duke' and 'Bluecrop' the blossom scorch is less common and fruit may appear to set but will not develop. The plants may also appear chlorotic (yellowing similar to nitrogen deficiency) and partially defoliate. The disease may be easier to see by standing back from the bushes rather than close inspection. Shortly after the bloom period is over plants will begin to recover. Even though symptom expression may not occur every year, infected bushes remain a source of inoculum in the field increasing the possibility for disease spread.

Figure 10. (A) Dieback and scorching of young woody growth and (B) foliar symptoms of blueberry scorch virus.

A virus causes blueberry scorch. Viruses are among the smallest pathogens of plants. They cannot be cultured like bacteria and fungi and are too small to be seen through a light microscope. They are usually detected using antibodies used in kits that give a color reaction. Diagnosis by symptoms is the fastest method but often needs to be verified through a diagnostic kit. For viruses to infect a plant they must enter a living plant cell through a wound. In the case of blueberry scorch, aphids can carry the virus on the sucking mouthparts or the stylus and inject the virus into the cell while feeding on plant sap. Once inside the cell the virus begins to multiply and spread to other cells in the plant. Eventually, the entire plant becomes infected and develops symptoms. Once a plant is infected it does not recover. Although infected plants may appear healthy during some years the infection is persistent and will greatly reduce berry production over the long term. Furthermore, the infected plants represent a source of inoculum that can be transmitted to healthy plants. For these reasons, it is a very good practice to remove infected plants.

Transmission of the virus is most likely by aphids. Although no experiments have been conducted to prove this directly, transmission by of the virus by aphids to other plants from infected blueberries has been accomplished. In addition, transmission of other similar viruses is also accomplished through aphid transmission. In addition, plant virologists have been unable to transmit the virus between blueberry plants using infected plant sap. This suggests that mechanical transmission by pickers, pruners, or harvesters is also unlikely. Another very important point regarding transmission is the role played by infected cuttings. For example, since mother plants are often not allowed to flower they probably do not show symptoms. If cuttings are used from these infected plants it is likely that the resulting transplants will also be infected. This is an excellent way to introduce scorch into a field. Therefore, testing mother plants for viruses is an excellent sanitary practice that will have major beneficial effects on the establishment of new fields. Testing kits are currently available for the eastern strain of the virus. (*Source:* Blueberry Bulletin, Vol. 17, No. 4, May 3, 2001; Reprinted from Massachusetts Berry Notes 2001, Vol. 13, No. 14)

Control of Botrytis Gray Mold in Brambles

Annemiek Schilder, Dept. of Plant Pathology, Michigan State University, East Lansing, MI

Botrytis gray mold is the most serious and common fruit rot disease of raspberries and blackberries. It is caused by the fungus *Botrytis cinerea*, which also infects numerous other crops, including strawberries, grapes and ornamentals. It is especially severe during prolonged rainy and cloudy periods just before and during harvest. Typically, fall raspberries are more prone to gray mold because of the cool, wet conditions prevailing during fruit development and ripening. Fruit infections also tend to be more severe in the interior parts of the canopy and on fruit clusters close to the ground, due to the higher humidity and reduced airflow.

The fungus overwinters as minute black bodies (sclerotia) in plant debris, including old canes and leaves. In spring, the sclerotia produce large numbers of microscopic spores, which are spread by wind to susceptible plant parts. The spores infect young blossoms, berries, and even leaves and canes when there is sufficient moisture. Only a few hours of moisture, provided by rain, dew, or irrigation water, are needed for infection under optimal conditions (70-80 F). The fungus usually enters the fruit through the flower parts where it remains inactive (latent) within the tissues of the infected green fruit. As the fruit matures, the fungus becomes active and rots the fruit.

So while infection occurs at bloom, symptoms are not usually observed until harvest. Symptoms are rapidly enlarging, light-brown areas on the fruit. Infected berries become covered with gray, dusty growth of the fungus containing millions of spores, hence the name "gray mold." Healthy berries can also become infected by contact with diseased berries. For instance, one sporulating berry in a cluster can infect the entire cluster. Wounds can also predispose berries to infection. Under favorable conditions for disease development, healthy berries may become a rotted mass in 48 hours.

Cultural methods are very important for control of botrytis gray mold. Choosing a site with good airflow can considerably reduce humidity in the canopy. Low-density plantings and narrow rows and trellising can also reduce a buildup of humidity. Good weed control and moderate fertilizer to avoid lush growth are also important. Selecting a resistant cultivar or, at the minimum, avoiding highly susceptible cultivars will help to reduce the need for control measures. During picking, avoid handling infected berries, since spores can be transferred to healthy berries. Timely harvesting and rapid post-harvest cooling can also help to reduce losses to botrytis gray mold.

Several fungicides are labeled for control of botrytis in raspberries. Fungicide sprays during bloom are important to prevent pre-harvest infections, while post-harvest infections can be reduced by sprays closer to harvest. Elevate is a relatively new, reduced-risk, protectant fungicide with a zero-day PHI that provides good control of pre- and post-harvest gray mold. Since only four applications may be made per season (and only two consecutively) because of the risk of resistance development, Elevate should be alternated with fungicides with a different mode of action. My recommendation is to save Elevate for critical sprays, for example, during wet periods at bloom and for sprays closer to harvest. Other fungicides that may be used in the spray program are Benlate (if any stocks are left), which has a three-day PHI; Rovral, which has a zero-day PHI; or Nova, which has a zero-day PHI. Some growers have experienced poor control with Rovral, which may indicate that Rovral-resistant *Botrytis* strains are present in their fields. Nova was found to significantly reduce post-harvest gray mold and Cladosporium rot (green-looking fuzzies) in a small plot raspberry trial in Michigan. (*Source:* Michigan Fruit Crop Advisory Team Alert, Vol. 8, No. 13, July 9, 2002)

Foliar Leaf Analysis

Marvin Pritts, Dept. of Horticulture, Cornell University, Ithaca, NY

Plant tissue analysis is used to measure directly the amount of nutrients in various plant parts, and for established perennial crops, is usually a better indicator of nutrient status than a soil test. Recommendations are based on the levels of 13 essential nutrients in your leaves at a specific time of the year (usually mid-summer). Unlike visual diagnoses, foliar nutrient analysis can alert the grower when nutrient levels are approaching deficiency so corrective action can be taken before problems occur. They also alert the grower if fertilizer is being over-applied. Unlike soil tests, foliar analysis provides accurate results for all essential mineral nutrients, not just for the 4 or 5 reported in soil tests.

For strawberries, recommendations are based on newly expanded leaves collected after renovation in late July or early August. Other sampling times or plant parts may prove to be more appropriate for certain nutrients, but until more detailed studies are done, foliar samples collected in mid-summer are the standard because nutrient levels fluctuate little then. For raspberries, select fully expanded primocane leaves in early August. For blueberries, select young leaves exposed to full sun in late July.

Collect at least 50 leaves, remove their petioles, and wash them in distilled water. Dry them, place them in a paper bag, and send them to the laboratory for analysis. Samples should be representative of the entire field. If a particular area of the field looks poor or has been fertilized differently from the rest, sample it separately.

A leaf analysis, including nitrogen, costs $28. Results should return from the lab within 2 - 3 weeks. Many nutrients can be applied in fall, and the recommendations will provide details on when to apply particular nutrient fertilizers and in what quantities. The leaf analysis is accurate only if the soil pH is within an acceptable range (5.5 - 7.0 for raspberries and strawberries; 4.0 - 5.0 for blueberries).

Conduct a foliar tissue analysis every other year. The soil pH should be monitored regularly, and a complete soil test performed every three years. Always be alert for any unusual appearance of leaves, and for unexplained reductions in growth or yield. Sampling kits for are available through Cornell Cooperative Extension educators. You can also obtain sampling kits directly from the lab.

Nutrient and Elemental Analysis Lab
Dept. of Horticulture
Cornell University
Ithaca, NY 14853
(607) 255-1785.

Acknowledgments: Figures 4B, 6A, 6B, 7C, 7D, 8A, 8B, and 10A are courtesy of Peter Oudemans of Ruger University; Figures 1B, 3, 4A, 5, 6C, 9A, and 9B were stolen from Marvin Pritts' Berry Diagnostic Tool found at: http://www.hort.cornell.edu/department/faculty/pritts/BerryDoc/Berrydoc.htm.

Check out the 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?

Send inquiries to:

Dr. William (Bill) Turechek
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New York State Agricultural Experiment Station
690 W. North Street
Geneva, NY 14456

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WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, JUNE 16th, 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	89	51	65	-2	106	593	71	1.15	0.27	10.08	1.72
Glens Falls	90	49	63	-2	91	487	57	2.2	1.43	11.64	3.29
Poughkeepsie	89	50	65	-3	104	576	5	0.92	0.01	13.94	4.03
Mohawk Valley											
Utica	87	51	65	1	105	488	28	1.36	0.38	15.79	6.39
Champlain Valley											
Plattsburg	80	46	59	-6	65	412	-27	4.15	3.39	11.64	4.31
St. Lawrence Valley											
Canton	78	44	60	-4	72	400	25	2.85	2.08	13.55	5.98
Massena	76	41	58	-6	60	378	-31	2.82	2.08	11.05	4.25
Great Lakes											
Buffalo	82	57	67	2	120	509	22	0.51	-0.33	10.68	2.75
Colden	83	52	65	3	108	411	38	0	-0.98	11.99	2.4
Niagara Falls	84	55	67	3	124	477	-28	0.42	-0.42	10.48	2.53
Rochester	87	56	68	5	128	584	87	2.52	1.82	12.4	5.47
Watertown	82	48	62	0	87	408	35	2.05	1.39	11.48	4.75
Central Lakes											
Dansville	88	52	68	3	125	539	54	1.25	0.34	10.16	2.41
Geneva	87	53	66	2	112	499	34	2.16	1.25	10.86	2.98
Honeoye	87	54	67	3	121	498	17	1.39	0.48	11.54	3.76
Ithaca	88	49	66	3	111	473	58	2.71	1.8	13.96	5.74
Penn Yan	86	51	67	3	117	540	75	1.59	0.68	9.19	1.31
Syracuse	90	53	67	4	124	595	92	3.87	2.97	14.56	5.98
Warsaw	81	51	64	3	97	390	51	2.99	1.95	17.06	7.88
Western Plateau											
Alfred	86	52	66	5	116	456	76	1.7	0.64	13.38	4.52
Elmira	87	50	67	4	122	548	102	1.87	0.96	13.33	5.45
Franklinville	84	49	66	6	111	376	88	0.89	-0.14	12.65	3.56
Sinclairville	89	49	67	6	121	424	81	0.96	-0.14	14.51	4.32
Eastern Plateau											
Binghamton	85	52	65	2	105	486	57	1.87	1.03	13.17	4.76
Cobleskille	87	51	63	0	91	453	62	0.91	-0.07	11.62	2.44
Morrisville	83	50	63	1	91	358	-8	2.03	1.05	14.79	5.8
Norwich	90	47	64	3	102	426	33	1.98	1	13.74	4.42
Oneonta	88	54	67	5	117	504	150	1.17	0.19	14.4	4.37
Coastal											
Bridgehampton	82	52	62	-4	85	500	55	1.25	0.41	12.82	3.06
New York	92	55	70	-2	139	902	141	0.79	-0.03	10.6	1.1

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, JUNE 23rd, 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	86	49	67	-2	122	715	66	0.65	-0.19	10.73	1.53
Glens Falls	86	45	65	-2	103	590	49	0.3	-0.41	11.94	2.88
Poughkeepsie	88	50	67	-2	118	694	-6	0.35	-0.49	14.29	3.54
Mohawk Valley											
Utica	87	48	67	1	117	605	33	0.83	-0.15	16.62	6.24
Champlain Valley											
Plattsburg	86	48	64	-3	101	513	-42	0.49	-0.23	12.13	4.08
St. Lawrence Valley											
Canton	85	47	65	1	106	506	30	0.73	-0.04	14.28	5.94
Massena	85	46	64	-1	100	478	-37	0.45	-0.32	11.5	3.93
Great Lakes											
Buffalo	86	50	68	1	126	635	28	0.38	-0.46	11.06	2.29
Colden	85	44	64	0	98	509	39	0	-0.98	11.99	1.42
Niagara Falls	85	45	66	-2	113	590	-34	1.36	0.56	11.84	3.09
Rochester	88	49	68	2	125	709	99	0.1	-0.6	12.5	4.87
Watertown	85	44	64	0	99	507	37	0.1	-0.52	11.58	4.23
Central Lakes											
Dansville	86	46	66	-2	113	652	51	0.14	-0.77	10.3	1.64
Geneva	87	48	67	1	119	618	38	0.14	-0.74	11	2.24
Honeoye	88	45	67	-1	117	615	14	0.17	-0.72	11.71	3.04
Ithaca	86	44	66	2	112	585	65	0.27	-0.64	14.23	5.1
Penn Yan	86	49	67	2	122	662	82	0.18	-0.7	9.37	0.61
Syracuse	88	50	68	3	129	724	106	0.22	-0.69	14.78	5.29
Warsaw	84	46	64	2	101	491	61	0.16	-0.84	17.22	7.04
Western Plateau											
Alfred	85	46	65	2	106	562	85	0.25	-0.83	13.63	3.69
Elmira	85	45	65	-2	105	653	97	0.32	-0.59	13.65	4.86
Franklinville	84	42	62	0	86	462	92	0.22	-0.79	12.87	2.77
Sinclairville	88	42	64	2	101	525	89	0.15	-0.93	14.66	3.39
Eastern Plateau											
Binghamton	81	46	65	-1	107	593	56	1.07	0.23	14.24	4.99
Cobleskille	87	47	65	2	110	563	71	0.35	-0.63	11.97	1.81
Morrisville	79	44	63	-2	90	448	-12	0.52	-0.45	15.31	5.35
Norwich	86	44	65	1	104	530	38	1.14	0.18	14.88	4.6
Oneonta	88	46	65	2	107	611	164	0.45	-0.53	14.85	3.84
Coastal											
Bridgehampton	81	47	65	-2	110	610	47	0.26	-0.58	13.08	2.48
New York	89	63	74	2	167	1069	151	0.1	-0.74	10.7	0.36

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, JUNE 30th, 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	93	55	74	5	170	885	99	1.71	0.89	12.44	2.42
Glens Falls	90	47	72	5	153	743	80	0.68	-0.01	12.63	2.87
Poughkeepsie	92	58	75	6	177	871	33	0.99	0.11	15.28	3.65
Mohawk Valley											
Utica	91	56	74	7	166	771	76	3.21	2.26	19.83	8.5
Champlain Valley											
Plattsburg	87	50	70	3	143	656	-25	1.5	0.8	13.63	4.88
St. Lawrence Valley											
Canton	84	49	70	5	142	648	62	1.29	0.52	15.57	6.46
Massena	85	50	69	3	138	616	-15	2.44	1.69	13.94	5.62
Great Lakes											
Buffalo	86	62	75	7	174	809	71	0.01	-0.78	11.07	1.51
Colden	87	56	72	7	154	663	86	0	-0.94	11.99	0.48
Niagara Falls	88	60	74	6	170	760	6	0.12	-0.62	11.96	2.47
Rochester	91	60	76	9	182	891	158	1.12	0.42	13.62	5.29
Watertown	84	50	70	6	146	653	74	0.35	-0.19	11.93	4.04
Central Lakes											
Dansville	89	57	74	7	171	835	107	0.43	-0.44	10.62	1.09
Geneva	88	62	74	6	168	786	80	1.7	0.88	12.7	3.12
Honeoye	88	57	73	5	162	777	45	1.34	0.53	13.05	3.57
Ithaca	88	53	72	7	158	743	108	1.01	0.15	15.24	5.25
Penn Yan	88	62	74	7	171	833	127	0.86	0.04	10.23	0.65
Syracuse	92	59	76	8	181	905	163	0.74	-0.17	15.52	5.12
Warsaw	85	58	71	8	150	641	110	0.64	-0.31	17.86	6.73
Western Plateau											
Alfred	88	56	73	8	160	722	139	1.23	0.19	14.86	3.88
Elmira	89	54	73	6	160	813	135	1.64	0.78	15.29	5.64
Franklinville	84	53	71	8	146	608	145	1.79	0.83	14.66	3.6
Sinclairville	94	52	73	9	163	688	150	0.48	-0.56	15.14	2.83
Eastern Plateau											
Binghamton	85	56	72	6	156	749	95	1.89	1.05	16.13	6.04
Cobleskille	89	52	72	7	152	715	113	1.31	0.35	13.28	2.16
Morrisville	86	54	71	6	147	595	30	1.69	0.78	17	6.13
Norwich	89	53	72	8	159	689	88	1.17	0.26	16.05	4.86
Oneonta	89	58	73	9	161	772	223	1.72	0.74	16.57	4.58
Coastal											
Bridgehampton	88	58	75	7	176	786	93	0.02	-0.76	13.1	1.72
New York	95	70	81	8	220	1289	203	1.01	0.17	11.71	0.53

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, JULY 7th, 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	93	59	76	6	186	1071	138	0.01	-0.75	12.45	1.67
Glens Falls	93	51	73	6	165	908	113	0	-0.65	12.63	2.22
Poughkeepsie	94	55	75	5	178	1049	64	0	-0.9	15.28	2.75
Mohawk Valley											
Utica	90	57	74	6	171	942	115	0	-0.91	19.83	7.59
Champlain Valley											
Plattsburg	94	54	76	7	183	839	23	0.15	-0.51	13.78	4.37
St. Lawrence Valley											
Canton	91	53	75	9	175	823	117	0	-0.75	15.57	5.71
Massena	91	54	75	7	175	791	34	0	-0.71	13.94	4.91
Great Lakes											
Buffalo	88	56	75	6	178	987	108	0.05	-0.66	11.12	0.85
Colden	88	51	71	5	150	813	120	0	-0.87	11.99	-0.39
Niagara Falls	91	56	76	7	182	942	49	0	-0.66	11.96	1.81
Rochester	92	56	76	8	184	1075	208	0	-0.63	13.62	4.66
Watertown	87	49	73	6	165	818	117	0	-0.45	11.93	3.59
Central Lakes											
Dansville	91	53	73	4	163	998	132	0	-0.78	10.62	0.31
Geneva	91	58	75	7	179	965	124	0	-0.74	12.7	2.38
Honeoye	91	51	73	3	161	938	66	0.02	-0.7	13.07	2.87
Ithaca	91	49	72	5	157	900	142	0	-0.82	15.24	4.43
Penn Yan	91	58	76	7	182	1015	174	0.01	-0.73	10.24	-0.08
Syracuse	93	58	77	8	191	1096	219	0	-0.91	15.52	4.21
Warsaw	85	53	71	7	150	791	151	0	-0.86	17.86	5.87
Western Plateau											
Alfred	90	52	72	7	159	881	184	0	-0.96	14.86	2.92
Elmira	91	49	72	4	158	971	162	0.07	-0.77	15.36	4.87
Franklinville	88	48	70	6	140	748	185	0	-0.89	14.66	2.71
Sinclairville	94	47	72	7	155	843	195	0	-0.96	15.14	1.87
Eastern Plateau											
Binghamton	89	55	72	5	157	906	425	0.45	-0.39	16.58	5.65
Cobleskille	90	55	73	7	165	880	159	0.26	-0.6	13.54	1.56
Morrisville	89	54	72	6	152	747	69	0.14	-0.72	17.14	5.41
Norwich	94	51	72	6	158	847	128	0.01	-0.84	16.06	4.02
Oneonta	94	56	75	10	177	949	289	0.12	-0.79	16.69	3.79
Coastal											
Bridgehampton	95	62	78	9	198	984	150	0	-0.71	13.1	1.01
New York	98	68	83	8	230	1519	256	0	-0.91	11.71	-0.38

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, JULY 14th, 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	88	49	70	-3	138	1209	122	0.26	-0.44	12.71	1.23
Glens Falls	87	43	66	-5	112	1020	85	0.06	-0.57	12.69	1.65
Poughkeepsie	88	48	68	-5	129	1178	39	0.87	-0.04	16.15	2.71
Mohawk Valley											
Utica	85	45	67	-4	117	1059	92	0.16	-0.71	19.99	6.88
Champlain Valley											
Plattsburg	86	53	68	-3	125	964	8	2.61	1.98	16.39	6.35
St. Lawrence Valley											
Canton	88	44	66	-2	116	939	107	0.48	-0.23	16.05	5.48
Massena	82	50	67	-3	122	913	23	2.72	2.02	16.66	6.93
Great Lakes											
Buffalo	86	51	70	-2	140	1127	101	0.05	-0.6	11.17	0.25
Colden	84	44	64	-4	97	910	96	0	-0.81	11.99	-1.2
Niagara Falls	87	49	70	-2	141	1083	43	0	-0.63	11.96	1.18
Rochester	89	51	70	-1	140	1215	208	0.13	-0.45	13.75	4.21
Watertown	81	41	65	-4	109	927	97	0	-0.41	11.93	3.18
Central Lakes											
Dansville	89	44	67	-5	118	1124	121	0.55	-0.15	11.25	0.24
Geneva	87	47	68	-3	125	1090	109	0.01	-0.67	12.71	1.71
Honeoye	88	41	65	-7	105	1043	24	0.06	-0.57	13.13	2.3
Ithaca	86	42	65	-4	110	1010	123	0.06	-0.71	15.3	3.72
Penn Yan	88	49	69	-2	135	1150	169	0.01	-0.67	10.25	-0.75
Syracuse	88	50	68	-3	129	1225	208	0.71	-0.17	16.23	4.04
Warsaw	82	46	65	-2	105	896	142	0.25	-0.52	18.11	5.35
Western Plateau											
Alfred	87	44	65	-3	108	989	173	0.27	-0.61	15.13	2.31
Elmira	88	42	65	-5	109	1080	134	0.09	-0.68	15.45	4.19
Franklinville	84	40	63	-3	90	838	170	1.1	0.26	15.76	2.97
Sinclairville	84	49	65	-3	104	947	183	0.39	-0.52	15.53	1.35
Eastern Plateau											
Binghamton	82	48	66	-4	112	1018	104	0.04	-0.75	16.62	4.9
Cobleskille	87	46	67	-1	121	1001	154	0.08	-0.72	13.62	0.84
Morrisville	86	45	65	-3	109	856	59	0.08	-0.75	17.22	4.66
Norwich	88	42	64	-4	102	949	104	0.13	-0.66	16.19	3.36
Oneonta	87	45	66	-1	115	1064	285	0.17	-0.74	16.86	3.05
Coastal											
Bridgehampton	86	50	71	0	150	1134	151	0.07	-0.62	13.17	0.39
New York	94	63	78	2	195	1714	269	0.43	-0.48	12.14	-0.86

1. *D*eparture *F*rom *N*ormal
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