New York Berry News

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What's Inside

Raspberries and blueberries are on the agenda for July and August. Summer-bearing raspberries are being harvested right now. It is important to recognize that raspberries ripen quickly and non-uniformly. If the ripening berries are infected with *Botrytis cinerea* (gray mold) the spores they produce will likely infect berries ripening later. The key is to pick the crop frequently (every 2 days) and completely to remove all marketable (and very susceptible) fruit and overripe berries. So far, I haven't seen as much gray mold as I would have expected to see give the wet spring; this was the case for strawberries as well. However, if you find yourself in a situation where you need to protect your berries Switch, Elevate, and Rovral are excellent fungicides. All have a pre-harvest interval (PHI) of 0 days, Switch and Elevate have a re-entry interval (REI) of 12 hr, and Rovral has an REI of 24 hr.

Strawberry renovation should be nearly complete by now or on the agenda to be done soon, i.e., no later than August 1st. Be sure that the plants are well-watered before renovation, or they may have a difficult time recovering. As plants begin regrowth, this is the time for a foliar nutrient analysis. In this issue of the NYBN, Marvin Pritts details just how this is done. Also in this issue, we cover foliar disease management as summertime tends to be the season where these diseases can take-off!

Blueberries are closing in on peak harvest. Last month's issue of the NYBN covered methods for protecting fruit form berry rots. In this month's issue Marvin Pritts will discuss tactics for protecting your berries form birds.

Upcoming Meetings

July 27-28, 2004: *Centennial Fruit field Days & Equipment Show*, Geneva, NY. For sponsorship and exhibitor information, contact Alison DeMarree at 315-589-9698 or AMD15@cornell.edu. (See Article Below). For registration or for more information contact Nancy Long @ 315-787-2488.

August 3-4, 2004: *Use of High Tunnel Technology*, University of New Hampshire Horticulture Farm, Durham, NH. To sign up for the workshop or for more information contact Bill Lamont, Phone: 814-865-7118 or E-mail: wlamont@psu.edu (see article below for more details).

August 10-12, 2004: *Empire Farm Days*, Rodman Lott & Son Farms, Seneca Falls, NY. For more information call 877-697-7837, or visit www.empirefarmdays.com

August 18-20, 2004: *NASGA's Summer Tour*, Quebec City, Canada, for more information you may call Patricia Heuser at 814-2383364 or visit www.nasga.org/meetings/04summertour/promo.htm. See below for more details!

September 25-October 2, 2004: *Haygrove's North American Grower Tour of England's High Tunnels*, London, UK. For more information call 866-HAYGROVE.

Cornell To Host Centennial Fruit Field Days and Equipment Show

Dena Fiacchino, Cornell Cooperative Extension of Oswego County, Oswego, NY

Cornell University will host the Centennial Fruit Field Days and Equipment Show at the New York State Agricultural Experiment Station in Geneva, NY on July 27 and 28 from 8:00 am - 4:00 pm. Fruit growers, consultants, and industry personnel are invited to tour field plots and learn about the latest research and extension efforts being carried out by researchers on the Geneva and Ithaca campuses. The focus will be on all commodities key to New York's $300 million fruit industry: apples, grapes, raspberries, strawberries, peaches, pears, cherries, and nectarines.

"The event celebrates a century of fruit breeding and technology innovation at Cornell's College of Agriculture and Life Sciences, which this year is celebrating its 100th year as the New York State College of Agriculture," said Terence Robinson, associate professor of horticultural sciences and one of the organizers. "On July 27, we will focus on tree fruit technologies and demonstrations and July 28, we will focus on grape and small fruit production". In addition to the field trials, an international array of equipment will help growers determine which technologies are best for orchard or vineyard. Representatives from various companies will advise growers on the latest technologies. Each day, the Cornell pesticide application technology team will demonstrate different methods of improving deposition and testing sprayers, including tips about nozzle orientation.

The event will be held on the Station's Fruit and Vegetable Research Farm South, 1097 County Road No. 4, 1 mile west of Pre-emption Rd. in Geneva, NY. Signs will be posted. Attendees will be able to select from tours of apples, stone fruits, small fruits, and grapes. *Admission is free* and *lunch is provided*, courtesy of industry sponsors. Pre-registration is encouraged. The last Fruit Field Day was held in Geneva in 2000 and brought in 425 representatives from nurseries, the New York State Department of Agriculture and Markets, the United States Department of Agriculture, Cornell Cooperative Extension, fruit processors, as well as growers from Western New York, the Hudson Valley, Central New York, the Finger Lakes, Ontario, and neighboring states. Organizers this year expect over 500 attendees.

The event is co-sponsored by the New York State Agricultural Experiment Station and the New York State Horticultural Society. For sponsorship and exhibitor information, contact Alison DeMarree at 315-589-9698 or AMD15@cornell.edu.

NASGA's Seventh Annual Summer Tour

This is the NASGA tour you've been waiting for! Travel writers say that "Québec City is as historic as it is picturesque" and "the most European City on this continent." The ambiance, the food, the attractions, the culture, and the lovely people of Québec would be enough to make this tour worth taking, but it won't disappoint growers eager to learn either. Québec's climate and landscape present unique challenges to the berry grower. With visits to 11 farms and farm markets, the NASGA Summer Tour will expose you to the techniques these hardy growers have employed to create a thriving region of berry production and marketing. From nursery operations to u-pick farms, and from plasticulture to using snow cover for winter protection…you'll experience strawberry, blueberry and bramble production and marketing the Québec way. Among the stops on the tour will be Production horticole Demers, the farm of NASGA member Rejean Demers and one of the "Showcase" farms at the 2004 North American Berry Conference. The tour schedule includes fun time with a visit to the old city of Québec and a lovely evening dinner cruise on the St. Lawrence River. However, you can be sure you'll want to plan at least one extra day in your trip to see the many features of our host city. In Québec you'll find all the charm of a European city, but without some of the travel worries. Although you'll be surrounded by French culture, most people in Québec are bi-lingual so it is easy to communicate everywhere. You can get there fairly easily by car, by air at Jean-Lesage International Airport, or by rail via Rail Canada with connections to Amtrak. And based on the current exchange rate, you'll also find lots of shopping bargains and plenty of places to shop. The tour will fill up fast, so be sure to pre-register early. For more information you may call Patricia Heuser at 814-2383364 or visit www.nasga.org/meetings/04summertour/promo.htm to download a program brochure and registration forms.

Arthropod Pest Management Update

Greg English-Loeb, Department of Entomology, Cornell University, Geneva, NY

In previous articles in the Berry News over the spring and early summer we have reviewed most of the arthropod pests you might run into during the entire season so I don't have a lot of new information to share in the July issue. But it is worth listing out some of the summer pests that may be showing up at your farms.

Blueberries

Blueberries are just starting to be harvested in our area. At this time you may find some berries with larvae of **cranberry fruitworm** (webbing between blueberries, frass, green larva), but the time for controlling them is past. The larvae will drop to the ground and form a cocoon, waiting for next spring to complete development and start a new cycle.

Blueberry maggot, on the other hand, is just getting going and will continue to be a concern for blueberry growers while there is fruit in the field. The blueberry maggot overwinters in the ground as a pupa (the immature stage before becoming an adult fly). Emergence begins around mid-June and continues through much of the summer. Even though the blueberry maggot only has 1 generation per season, adults appear over an extended time period (emergence is not very synchronized). Indeed, under some environmental conditions, pupae can stay in the soil for 2 or even 3 years before emergence. After emergence, adult females need to feed for 7 to 10 days before they start laying eggs. Eggs are inserted under the skin of ripening berries. Eggs hatch in a few days and the larvae feed and develop for around 20 days before dropping to the ground to pupate. During the early part of larval development there are no obvious external symptoms on

the blueberry that it is infested. Later the berry may become soft and appear to ripen early. An important part of controlling blueberry maggot is learning when emergence begins. Yellow sticky cards, baited with a food source for the adult flies (protein hydrolysate and ammonium acetate) can be used to detect the first flies of the season. These traps are commercially available. Place traps along the edge of the planting or in woods near wild blueberries to better estimate when activity begins. If you have a problem with maggot you need to continue treating for them on a regular basis until the end of harvest. Insecticide options include Guthion, Malathion, Imidan, Sevin or pyrethrin.

Late June and into July is also a time when you might see damage from the **blueberry stem borer**, 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. **Japanese beetle** adults are emerging about now and feed on the leaves of a number of different fruit crops, including blueberries. They will also feed on fruit and cause injury. Sevin (carbaryl) is labeled for Japanese beetles on blueberries.

Raspberries

As fruit ripens**, tarnished plant bug** continues to represent a threat, as are cane borer and picnic beetles. **Potato leafhoppers** (both adults and immatures) continue to be showing up in New York farms. They feed on a lot of different crops including many small fruits like strawberries, raspberries, and grapes. Typical symptoms include yellowing of leaf margins and distorted and possibly stunted leaves. Raspberries are pretty sensitive to potato leafhopper feeding. The adult potato leafhopper is iridescent green and wedge-shaped while the nymph is usually green and moves sideways in a unique manner when disturbed. 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, including the crown, may help reduce crown borer populations. Currently there is only one insecticide labeled for raspberry crown borer (Guthion) and it will not be available after 2005. It is best used in the spring against larvae at the base of canes. I should also 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. They seem to be most problematic in dry sites and/or in mild growing areas such as the Hudson Valley and Long Island. Look for the white speckling on the leaves that indicates some feeding by spider mites. As of a few years ago there is now a miticide registered in New York for control of TSSM (Savey WP). Predatory mites can also provide control of TSSM. 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.

Strawberries

Harvest has ended for most of you and you are moving on to renovation. Post renovation can be a good time to go after **cyclamen mite**, if this tiny arthropod has been a problem for you. After mowing and as new foliage begins to grow apply something like Thiodan (endosulfan) in an abundance of water (200 gallons per acre) in order to insure thorough coverage. **Strawberry sap beetle** larvae are completing development at this time and entering the pupal stage. It is unlikely an insecticide can get to the larvae. Quickly getting to renovation, however, may help reduce survivorship of some larvae or pupae. Whether this translates into lower populations next season is not known. After pupating the new adults likely move out of strawberry fields. Where they go, though, is not completely clear. We suspect that they find other types of ripe and over ripe fruit that has dropped to the ground where they may initiate a second generation. Research is ongoing to see how important these alternative crops are in promoting problems with strawberry sap beetle. 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.

Currants and Gooseberries

Keep an eye out for **spider mite** damage during the hot and dry period of the summer. We are still observing **currant aphid** on some plantings, although populations and damage symptoms should be declining.

The Blueberry Bird Problem: Options for Control

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

Birds are a major pest of fruit crops such as cherries, blueberries and some grape varieties. In a recent survey, blueberry growers in the northeastern United States estimated that nearly 30% of their crop is lost to bird depredation. Across the country, 10% of the blueberry crop is probably lost - at a cost of $10 million. Since the loss of Mesurol, no effective chemical repellent has been available. Netting is expensive and difficult to install, so most growers would like to avoid using it if possible.

For the past several years, with the cooperation of Paul Curtis, wildlife management specialist in the Department of Natural Resources, we have been examining the effectiveness of chemical repellents and audio scare devices for birds in blueberries and cherries. What follows is a summary of our experiences with these new technologies.

Chemical repellents. Methyl anthranilate is chemically similar to the major flavor component of Concord grapes, and is manufactured in large quantities by food processors. Birds are repelled by its taste, and since it is generally regarded as safe for human consumption by the FDA, it would seem to be a viable alternative to Mesurol. This product is now registered for use in blueberry plantings (Bird-Shield and Rejex-It). However, we have found several problems with this material. First, it is a volatile compound and has a short residual on exposed fruit. We have found good repellency for about 3 days, but the material loses its effectiveness later. Similar results have been reported from Oregon and Florida. Second, to repel birds, a large amount must be consumed in one bite. It is less effective when applied uniformly as it would be with an air blast sprayer. Although methyl anthranilate works well as a goose repellent in turf, our expectation is that these formulations will not be widely used in fruit plantings until further improvements to the formulation are made.

Sugar. Applications of sugar syrup have been shown to repel birds from blueberry plantings. The exact mechanism of repellency is unknown, but may relate to the inability of many bird species to digest disaccharides. (Most bird-dispersed fruits contain simple monosaccharide sugars.) The sugar is applied when the fruits begin to turn blue, and reapplied after episodes of rain. We dissolved 230 lbs of sugar in 21 gallons of hot water, yielding 40 gallons of solution. Olympic Spreader Sticker was added at 310 ppm. Birds damage was 50% less where sucrose was applied. Although each treatment cost $40 - $50 per acre, and we applied sugar 4 times during the season, the total expense ($160) was far less than the losses to birds that an adjacent field experienced. In field trials, the sugar also repelled birds, although an increase in Japanese beetles and yellow jackets was observed in treated plots.

Audio scare devices. Distress tapes, cannons and firecrackers are audio devices to which birds rapidly acclimate. They are effective for only short periods of time unless moved regularly and supplemented with visual scare devices. Recently, a new electronic device named "Bird-Gard" has been developed with digitized, species specific bird distress calls. The device we tested emitted distress calls of crows, robins and starlings every minute during daylight hours. We tested the device in two blueberry fields with high bird pressure, and found it to be effective for about 7 to 10 days. In one field, we added hawk models after a couple of weeks and observed a reduction in feeding. When the device was turned off, feeding increased dramatically. A new version of the Bird-Gard includes a shriek of a hawk prior to the distress calls, and elicits calls randomly. These modifications seem to enhance the effectiveness of the device.

Even though feeding by certain bird species was reduced, many birds still fed in the plantings, especially ground-feeders like sparrows and finches. Because blueberries ripen over such a long period of time, the birds have ample opportunity to habituate to the sounds. Furthermore, species composition changes over time, so sounds that work early in the harvest may not work at the end of the season. One blueberry grower reported that an owl model was very effective for him. The owl mounts on a bearing on top of a post, allowing the owl to swivel in the slightest breeze. In addition, the owl emits a loud shriek at intervals, powered by a solar cell. Combinations of audio and visual scare devices seem to be most effective.

Others. We have surrounded a planting with strobe lights, but found they were not effective. We also tested "Bye-Bye Birdie" - a device from Japan that looks like a bird, but contains a powerful magnet purported to disrupt the natural sense of direction of birds, which they purportedly avoid for distances up to 70 ft. After hanging many of these magnets over a blueberry field, we found them to be ineffective. In addition, we tested a special machine that laid out a sprayable "biodegradable" netting. It is effective on vegetable crops for insect control, and seemed to have potential for blueberries as well. However, the application was too slow and likely to be uneconomical.

Bottom line: Combinations of visual and audio scare devices with taste deterrents are the most practical substitute for netting at this time.

Foliar Nutrient 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.

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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.

The Organic Way – Selecting Green Manure Crops for Soil Fertility

Elsa Sánchez, Assistant Professor of Horticultural Systems Management, Pennsylvania State University, State College, PA

In organic growing the philosophy behind soil fertility is to feed the soil and the soil in turn will feed the cash crop. Cover crops, green manures, animal manures and sound crop rotations are used to improve and/or maintain soil fertility. This article focuses on the use of green manures.

Green manures are crops that are turned into the soil while they are young and succulent, rather than harvested, to improve the organic matter content. As the organic matter is decomposed nutrients are released that can be used by subsequent crops. Several factors influence the release of nutrients from green manure crops including soil temperature and moisture and placement. In general, nutrient release will be slower at lower soil temperatures because the soil organisms that breakdown organic matter have lower biological activity or work slower at lower temperatures. Nutrient release is slower when soil is dry or waterlogged for the same reason. When green manure crops are not turned into the soil and left on the soil surface, breakdown and release of nutrients will be relatively slow due to drying of the plant tissues. When the green manure crop is incorporated into the top 6-8 inches of the soil, it will breakdown more rapidly because this is the area of the soil where most of the organisms that breakdown plant tissues are. When the green manure crop is soil incorporated deeper than 8 inches, it will decompose more slowly because lower oxygen levels at deeper soil depths limit the number of organisms that breakdown plant tissues.
Selecting a green manure crop to incorporate into a cropping rotation involves three steps:

1. Decide on the purpose of the green manure crop.
2. Identify a planting niche.
3. Select a green manure crop that meets your goals.

Green manure crops can be used to provide nitrogen, increase the organic matter content and/or scavenge nutrients in the soil. Legume species are the best choice for adding nitrogen to the soil because they are able to establish relationships with bacteria in the soil that turn nitrogen in the atmosphere into a form that the plant can use. As illustrated in the table below, legume species differ in the amount of nitrogen they can add to the soil.

Legume Species	Nitrogen-fixing Capacity
Alfalfa	*High**
Hairy vetch	*High*
Cowpeas	*High*
Crimson clover	*Moderate*
Field peas	*Moderate*
White clover	*Moderate*
Red Clover	*Moderate*
Common Bean	*Low*

*High = greater than 150 lb/acre/yr; moderate = 50 to 150 lb/acre/yr; low = less than 50 lb/acre/yr. Table adapted from Northeast Cover Crop Handbook.

When growing a green manure crop to increase the organic matter content in the soil, non-legume species or mixtures of grasses and legume species are good options. The tissues of legume species have a low carbon to nitrogen ratio, which results in a relatively quick release of nitrogen as the plants breakdown. Because of this they add nitrogen relatively quickly to the soil but the amount of organic matter contributed to the soil is limited over the long-term. Green manure crops grown to increase the soil organic matter content are generally those with large above-ground plant canopies and include annual ryegrass, cereal rye, triticale, sorghum/Sudan grass and hairy vetch. Green manure crops can also be grown to scavenge nutrients left in the soil after the cash crop is harvested and thereby prevent the loss of those nutrients through leaching. In this case, select a crop with a large, deep root system that develops quickly because deep-rooted crops can recycle nutrients from deep in the soil. Options include small grains, cereal rye, triticale, rapeseed, annual ryegrass, oil seed radish, mustard and some legume species.

Once the purpose for growing the green manure crop is decided, the next step is to identify where the green manure crop fits into a cropping rotation. If it will be grown in the fall, cool season crops including vetches, peas, annual and perennial clovers, ryegrass or barley are good choices. If it will be grown in the late spring or summer, warm season crops including sorghum/Sudan grass, cowpeas or buckwheat are good choices. Land can be devoted exclusively to growing a green manure crop or it can be interplanted or undersown along with the cash crop.

These are some final tips to consider when selecting a green manure crop. Determine characteristics that are undesirable and avoid plants with those characteristics. For example, some plants with large above ground canopies are difficult to manage if the proper equipment is unavailable. Also, consider cost and seed availability in the final decision. Finally, it can be difficult to find a green manure crop that meets all soil fertility goals and likely trade-offs will have to be made.

References

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2. Managing Cover Crops Profitably 2nd Edition. 1998. Sustainable Agriculture Network. http://www.sare.org/publications/covercrops.htm.
3. Sarrantonio, M. 1994. Northeast Cover Crop Handbook. Rodale Institute, Emmas, PA.
4. Please mail or email ideas for future column topics or thoughts on organic production to Elsa Sánchez, Department of Horticulture, Penn State University, University Park, PA 16802 or elsasanchez@psu.edu.

Summer Management of Foliar Diseases of Strawberry

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

Foliar diseases are often overlooked because most do not appear in appreciable levels until after harvest or renovation. However, serious outbreaks of any of the diseases discussed below can seriously impact the vigor, winter hardiness, and even the production of a planting. At this point, it is not well understood when is the most critical time to manage disease or how much foliar disease can a strawberry planting tolerate. Until we have a better understanding, though, we currently work under the assumption that severe infection in the summer (greater than 30% disease) is enough to impact the health of the plant and possibly result in the damage discussed above (this is based on some preliminary work done in my lab). In problem fields, I suspect that one or two well-timed fungicide applications in the summer months may be all that is needed to keep disease from reaching levels that may impact production.

Leaf spot is caused by the fungus *Mycosphaerella fragariae*. It is one of the most common and widespread diseases of cultivated strawberry. It is also the cause of black seed; a disease of the fruit that can occur when warm and wet conditions occur during bloom. Prior to the development of resistant cultivars, leaf spot was the most economically important disease of strawberry. However, since many commercially grown cultivars are not completely resistant to leaf spot, this disease is still significant on a number of cultivars including 'Honeoye', 'Idea', 'Marmolada', 'Jewel' 'Raritan', and 'Kent'.

Leaf scorch is caused by the fungus *Diplocarpon earlianum*. It is a common disease of strawberry throughout the northeast. Epidemics occur normally from August to October. Leaf scorch can markedly reduce vegetative growth, weakening plants and resulting in a sharp reduction of growth of shoots and roots, a reduction in the number and vigor of crowns, and quite possibly fruit yield. Severely infected plants may die from environmental stresses, such as heat, cold or drought. Like leaf spot, losses vary depending upon cultivar susceptibility.

Leaf blight is caused by the fungus *Phomopsis obscurans*. The disease affects primarily older foliage in late summer and, like leaf scorch, can result in reduced plant vigor and yield in the following season. (It also can cause severe defoliation in nursery production areas in the southeastern US.) Leaf blight is particularly destructive to slow-growing or weak plants. In the Northeast, it seldom damages young, runner plants, and rarely attacks the fruit like it does in the South. The spread of *P. obscurans* is favored by frequent rains, overhead irrigation, and heavy dews. Little spread occurs during hot, dry weather in the summer, although symptoms may continue to develop during this period.

Powdery mildew is caused by the fungus *Sphaerotheca macularis*. Disease severity is most pronounced in areas that experience high humidity and moderate temperatures through the growing season, such as the coastal and Great Lakes regions of the US. Like most of the foliar diseases mentioned, severe outbreaks of powdery mildew can weaken plants leading to an increase in winter-injury and a reduction in yield. The disease has been prevalent after renovation in plantings at Geneva for the past few years.

Angular leaf spot is caused by the bacterium *Xanthomonas campestris* pv. *fragariae*. In New York, it doesn't appear that this disease is as widespread as the ones discussed thus far. The disease severely affects the foliage, and often attacks the calyx (i.e., the sepals on fruit) or the crown of the plant. In a planting of Kent at Geneva, the angular leaf spot pathogen was isolated from a number of fruit calyxes showing the symptoms of "brown cap". How prevalent this symptom is across NY, and whether its cause is due primarily to this organism or a secondary invader has yet to be determined. Nonetheless, the disease is often left uncontrolled (mainly because there are no real control options) and, seemingly, this has little impact on the planting the following year.

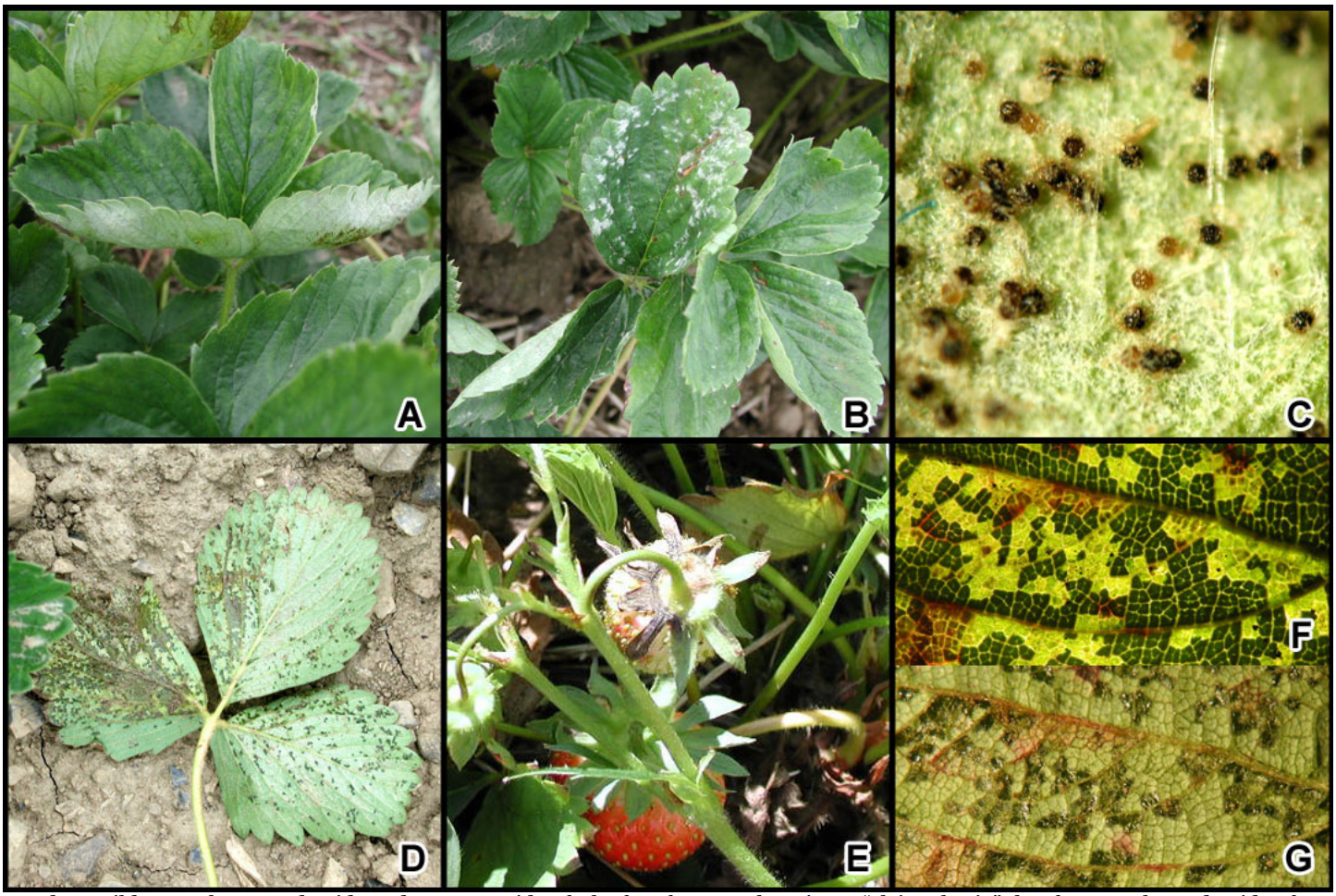
Management of foliar diseases: Once regrowth begins after renovation, there are a number of options growers have to effectively manage foliar disease. Nova 40W is labeled for control of leaf spot, leaf blight, and powdery mildew and is a very effective against these diseases; I have not seen data to support its efficacy against leaf scorch. Applications should begin when disease appears and continue on a 14 to 21 day schedule or, better, when conditions favor disease development. Often, the first application can wait until after harvest. If disease pressure was serious prior to renovation, growers should make a note to consider beginning treatment before renovation next year. If repeated applications are necessary, it is recommended that Nova 40W be alternated with a tank mix of Topsin-M plus Captan.

If anthracnose fruit rot was (or has been) a problem, growers should use a fungicide that also has activity against this disease, such as Captan or Abound. The fungus is capable of attacking the petioles of young leaves as they emerge after renovation. Fungicide applications at this time serve to protect the leaves from attack and reduce the pathogen population that can overwinter and cause outbreaks next season. Abound has good activity against anthracnose and powdery mildew. In trials conducted in Ohio, Abound was shown to have excellent activity against leaf blight as well. Captan will have good to excellent activity against anthracnose as long as coverage is maintained.

Fixed copper products are the only real option for managing angular leaf spot. Copper can be applied on 14-21 day schedule, but growers should be aware that as few as 3 successive applications of copper can result in phytotoxicity on some varieties, quite possibly doing more damage than disease itself. The collective experience of many small fruit pathologists in the Northeast is that treatment is often not necessary, as this disease can appear in epidemic from one year

but often not the next.

Lastly, a number of cultural practices can be used to help manage disease. New plantings should be established in sites with light, well-drained soil, with good air circulation and full exposure to the sun. In matted-row systems, runner plants should be carefully spaced when filling rows and the entire planting should be kept free of weeds to improve air circulation and reduce drying time for leaves. Removing and burning all debris at renovation (after harvest) helps to reduce overwintering inoculum of all leaf pathogens.



Powdery mildew on the **A,** underside and **B,** upper side of a leaf surface. **C,** The minute "cleistothecia" that form on the underside of powdery mildew affected leaves in autumn. Angular leaf spot on **D,** the underside of a leaf and **E,** on the calyx ("black cap"). Angular leaf spot as it appears on a leaf via **F,** transmitted and **G,** reflected light.

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?

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WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, JUNE 13th, 2004

	Temperature				Growing Degree Days (*Base 50*)			Precipitation (*inches*)			
	High	*Low*	*Avg*	*DFN*[1]	*Week*	*YTD*[2]	*DFN*	*Week*	*DFN*	*YTD*	*DFN*
Hudson Valley											
Albany	93	45	66	1	117	685	197	0.43	-0.45	7.84	-0.19
Glens Falls	91	39	63	-1	94	529	129	0.13	-0.64	8.72	0.69
Poughkeepsie	94	44	68	2	127	716	179	0.02	-0.89	8.59	-0.95
Mohawk Valley											
Utica	90	41	64	1	102	559	129	0.45	-0.53	12.25	3.24
Champlain Valley											
Plattsburgh	88	41	63	-2	92	453	45	0.2	-0.54	8.87	1.84
St. Lawrence Valley											
Canton	84	37	63	1	90	440	91	0.99	0.22	9.01	1.74
Massena	85	39	64	2	96	455	74	0.43	-0.29	8.25	1.75
Great Lakes											
Buffalo	83	44	66	2	112	574	119	0.66	-0.18	10.37	2.77
Colden	86	40	63	2	95	496	149	0.32	-0.66	12.03	2.84
Niagara Falls	86	42	66	1	110	531	58	0.32	-0.51	8.64	1.03
Rochester	89	42	65	1	104	560	93	0.77	0.07	8.95	2.3
Watertown	84	36	62	-1	83	440	93	0.05	-0.63	6.66	0.19
Central Lakes											
Dansville	88	39	63	-2	94	524	71	0.31	-0.6	11.87	4.46
Geneva	89	42	64	0	99	542	107	0.33	-0.56	10.24	2.7
Honeoye	87	36	63	-3	91	549	100	0.56	-0.33	11.81	4.38
Ithaca	90	39	63	1	95	570	183	0.64	-0.26	12	4.13
Penn Yan	90	43	65	2	107	609	174	0.08	-0.81	10.31	2.77
Syracuse	91	45	66	3	114	639	166	0.1	-0.78	12.54	4.33
Warsaw	87	40	63	3	94	481	166	0.35	-0.67	12.96	4
Western Plateau											
Alfred	88	39	63	2	92	542	188	0.37	-0.68	12.38	3.93
Elmira	89	36	62	-3	86	592	176	0.01	-0.88	9.97	2.43
Franklinville	84	32	61	2	81	457	191	0.13	-0.88	12.22	3.53
Sinclairville	86	41	64	3	97	522	203	0.51	-0.57	12.61	2.86
Eastern Plateau											
Binghamton	86	44	64	1	98	578	177	0.1	-0.74	9.1	1.03
Cobleskill	88	40	64	2	96	523	158	0.5	-0.48	10.42	1.62
Morrisville	89	40	63	2	89	418	77	0.63	-0.35	10.25	1.63
Norwich	91	38	63	1	92	537	170	0.22	-0.76	10.45	1.51
Oneonta	89	42	65	4	103	608	278	0.31	-0.67	11.81	2.16
Coastal											
Bridgehampton	83	47	64	-1	100	455	41	0.06	-0.79	12.37	2.98
New York	94	59	72	3	158	862	144	0.12	-0.69	9.62	0.48

1. *D*eparture *F*rom *N*ormal
2. *Y*ear *T*o *D*ate: 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 20th, 2004

	Temperature				Growing Degree Days (*Base 50*)			Precipitation (*inches*)			
	High	***Low***	***Avg***	***DFN[1]***	***Week***	***YTD[2]***	***DFN***	***Week***	***DFN***	***YTD***	***DFN***
Hudson Valley											
Albany	85	49	71	5	152	837	226	0.08	-0.76	7.92	-0.95
Glens Falls	84	39	68	4	128	657	149	0.12	-0.61	8.84	0.08
Poughkeepsie	89	53	73	5	161	877	215	1.88	1.02	10.47	0.07
Mohawk Valley											
Utica	82	45	68	3	124	683	144	1.52	0.54	13.77	3.78
Champlain Valley											
Plattsburgh	85	43	69	3	133	586	65	0.68	-0.06	9.55	1.78
St. Lawrence Valley											
Canton	81	42	67	4	120	560	114	0.63	-0.14	9.64	1.6
Massena	84	42	68	4	128	583	100	0.42	-0.35	8.67	1.4
Great Lakes											
Buffalo	81	46	68	2	129	703	132	0.87	0.03	11.24	2.8
Colden	82	43	67	4	119	615	174	1.26	0.28	13.29	3.12
Niagara Falls	83	43	68	2	126	657	68	0.54	-0.28	9.18	0.75
Rochester	82	44	67	2	122	682	106	1.17	0.47	10.12	2.77
Watertown	77	40	66	3	110	557	116	1.41	0.78	8.07	0.97
Central Lakes											
Dansville	83	43	67	2	123	647	80	1.29	0.38	13.16	4.84
Geneva	87	47	68	3	131	673	127	1.08	0.18	11.32	2.88
Honeoye	85	43	68	2	126	675	110	1.21	0.3	13.02	4.68
Ithaca	83	42	67	4	123	693	204	0.58	-0.33	12.58	3.8
Penn Yan	86	49	69	4	135	744	198	0.35	-0.55	10.66	2.22
Syracuse	85	46	69	4	135	774	190	0.79	-0.12	13.33	4.21
Warsaw	80	42	65	3	105	586	183	1.34	0.32	14.3	4.5
Western Plateau											
Alfred	83	42	67	5	123	663	214	1.23	0.14	13.61	4.07
Elmira	85	43	69	4	134	726	202	1.67	0.76	11.64	3.19
Franklinville	82	39	66	5	114	571	225	1.26	0.23	13.48	3.76
Sinclairville	82	42	67	5	122	644	236	1.33	0.23	13.94	3.09
Eastern Plateau											
Binghamton	80	43	67	3	124	702	197	0.27	-0.57	9.37	0.46
Cobleskill	82	45	68	5	128	651	189	0.22	-0.76	10.64	0.86
Morrisville	81	44	67	5	122	540	108	0.67	-0.31	10.92	1.32
Norwich	84	45	67	5	122	659	197	0.39	-0.59	10.84	0.92
Oneonta	86	48	70	7	138	746	327	0.38	-0.6	12.19	1.56
Coastal											
Bridgehampton	83	55	70	4	139	594	66	0.1	-0.74	12.47	2.24
New York	91	59	77	6	188	1050	179	0.54	-0.3	10.16	0.18

1. *D*eparture *F*rom *N*ormal
2. *Y*ear *T*o *D*ate: 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 27th, 2004

	Temperature				Growing Degree Days (*Base 50*)			Precipitation (*inches*)			
	High	*Low*	*Avg*	*DFN*[1]	*Week*	*YTD*[2]	*DFN*	*Week*	*DFN*	*YTD*	*DFN*
Hudson Valley											
Albany	84	46	66	-4	111	948	202	0.66	-0.18	8.58	-1.13
Glens Falls	83	41	62	-6	87	744	117	0.57	-0.13	9.41	-0.05
Poughkeepsie	84	50	68	-2	129	1006	208	0.15	-0.71	10.62	-0.64
Mohawk Valley											
Utica	83	45	61	-7	79	762	103	0.65	-0.32	14.42	3.46
Champlain Valley											
Plattsburgh	84	45	62	-6	86	672	28	0.63	-0.07	10.18	1.71
St. Lawrence Valley											
Canton	82	40	61	-5	80	640	86	0.35	-0.42	9.99	1.18
Massena	83	39	61	-6	79	662	65	0.89	0.12	9.56	1.52
Great Lakes											
Buffalo	78	48	62	-7	86	789	89	0.41	-0.4	11.65	2.4
Colden	79	45	60	-5	74	689	144	0.49	-0.47	13.78	2.65
Niagara Falls	80	49	63	-6	93	750	34	0.63	-0.13	9.81	0.62
Rochester	82	46	62	-6	86	768	71	1.01	0.31	11.13	3.08
Watertown	82	38	59	-7	67	624	77	0.87	0.3	8.94	1.27
Central Lakes											
Dansville	81	44	61	-8	76	723	32	0.48	-0.41	13.64	4.43
Geneva	84	51	63	-5	95	768	99	0.29	-0.55	11.61	2.33
Honeoye	81	45	63	-6	90	766	72	0.67	-0.16	13.69	4.52
Ithaca	83	41	61	-6	81	774	173	0.24	-0.64	12.82	3.16
Penn Yan	83	49	63	-5	93	837	168	0.05	-0.79	10.71	1.43
Syracuse	84	48	63	-5	89	863	157	0.7	-0.21	14.03	4
Warsaw	77	44	59	-6	62	648	147	0.32	-0.65	14.62	3.85
Western Plateau											
Alfred	81	40	59	-6	68	731	179	0.78	-0.27	14.39	3.8
Elmira	82	39	62	-6	85	811	169	0.17	-0.71	11.81	2.48
Franklinville	79	41	58	-6	55	626	191	0.46	-0.52	13.94	3.24
Sinclairville	79	45	60	-4	74	718	210	0.47	-0.58	14.41	2.51
Eastern Plateau											
Binghamton	80	45	62	-5	88	790	170	0.07	-0.77	9.44	-0.31
Cobleskill	81	47	62	-4	88	739	169	0.48	-0.5	11.12	0.36
Morrisville	78	44	61	-4	79	619	85	0.64	-0.28	11.56	1.04
Norwich	83	41	61	-5	77	736	167	0.19	-0.72	11.03	0.2
Oneonta	86	44	62	-3	88	834	315	0.39	-0.59	12.58	0.97
Coastal											
Bridgehampton	78	50	67	-2	120	714	59	0.27	-0.53	12.74	1.71
New York	84	53	73	-1	162	1212	176	1.3	0.46	11.46	0.64

1. *D*eparture *F*rom *N*ormal
2. *Y*ear *T*o *D*ate: 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 4th, 2004

	Temperature				Growing Degree Days (*Base 50*)			Precipitation (*inches*)			
	High	*Low*	*Avg*	*DFN*[1]	*Week*	*YTD*[2]	*DFN*	*Week*	*DFN*	*YTD*	*DFN*
Hudson Valley											
Albany	83	52	67	-4	123	1071	180	0.89	0.12	9.47	-1.01
Glens Falls	83	41	64	-5	99	843	86	0.49	-0.18	9.9	-0.23
Poughkeepsie	89	50	69	-3	135	1141	198	0.09	-0.81	10.71	-1.45
Mohawk Valley											
Utica	83	48	64	-5	101	863	74	0.8	-0.11	15.22	3.35
Champlain Valley											
Plattsburgh	79	48	65	-5	105	777	1	0.22	-0.46	10.4	1.25
St. Lawrence Valley											
Canton	80	50	63	-4	93	733	62	0.2	-0.57	10.19	0.61
Massena	81	49	63	-6	92	754	34	0.6	-0.11	10.16	1.41
Great Lakes											
Buffalo	84	52	66	-4	115	904	66	0.04	-0.69	11.69	1.71
Colden	81	48	64	-3	98	787	128	0.36	-0.53	14.14	2.12
Niagara Falls	84	49	66	-5	111	861	8	0.3	-0.38	10.11	0.24
Rochester	83	50	65	-5	105	873	45	0.03	-0.62	11.16	2.46
Watertown	80	46	61	-6	81	705	40	0.32	-0.15	9.26	1.12
Central Lakes											
Dansville	82	46	63	-7	95	818	-5	0.36	-0.44	14	3.99
Geneva	84	53	66	-4	116	884	83	0.02	-0.74	11.63	1.59
Honeoye	84	47	64	-6	102	862	31	0.03	-0.71	13.72	3.81
Ithaca	83	46	64	-4	98	872	150	0.46	-0.38	13.28	2.78
Penn Yan	83	53	66	-3	115	952	151	0.01	-0.75	10.72	0.68
Syracuse	84	49	65	-4	110	973	136	0.04	-0.87	14.07	3.13
Warsaw	78	48	62	-4	86	734	126	0.16	-0.72	14.78	3.13
Western Plateau											
Alfred	82	40	62	-5	87	818	155	0.47	-0.52	14.86	3.28
Elmira	83	43	63	-6	94	905	134	0.75	-0.09	12.56	2.39
Franklinville	82	42	61	-4	77	703	170	0.65	-0.26	14.59	2.98
Sinclairville	82	48	64	-2	98	816	200	0.44	-0.55	14.85	1.96
Eastern Plateau											
Binghamton	79	51	65	-4	105	895	151	0.73	-0.11	10.17	-0.42
Cobleskill	81	48	64	-3	100	839	152	0.76	-0.12	11.88	0.24
Morrisville	79	46	63	-4	91	710	65	0.23	-0.65	11.79	0.39
Norwich	83	44	63	-4	96	832	147	0.78	-0.09	11.81	0.11
Oneonta	84	46	65	-2	102	936	308	0.36	-0.57	12.94	0.4
Coastal											
Bridgehampton	80	51	69	-2	132	846	53	0.19	-0.54	12.93	1.17
New York	90	57	75	0	176	1388	178	0.28	-0.61	11.74	0.03

1. *D*eparture *F*rom *N*ormal
2. *Y*ear *T*o *D*ate: 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 11th, 2004

	Temperature				Growing Degree Days (*Base 50*)			Precipitation (*inches*)			
	High	***Low***	***Avg***	***DFN[1]***	***Week***	***YTD[2]***	***DFN***	***Week***	***DFN***	***YTD***	***DFN***
Hudson Valley											
Albany	84	57	72	0	154	1225	182	1.18	0.47	10.65	-0.54
Glens Falls	84	48	69	-1	135	978	83	1.01	0.38	10.91	0.15
Poughkeepsie	89	55	74	2	168	1309	214	0.27	-0.64	10.98	-2.09
Mohawk Valley											
Utica	85	56	68	-2	128	991	64	1.89	1	17.11	4.35
Champlain Valley											
Plattsburgh	84	49	70	1	143	920	4	0.97	0.34	11.37	1.59
St. Lawrence Valley											
Canton	86	49	69	1	131	864	68	0.86	0.16	11.05	0.77
Massena	88	49	70	2	144	898	46	0.43	-0.27	10.59	1.14
Great Lakes											
Buffalo	88	57	69	-3	133	1037	53	2.44	1.77	14.13	3.48
Colden	83	54	67	0	121	908	130	1.24	0.41	15.38	2.53
Niagara Falls	88	55	69	-2	136	997	-1	0.62	-0.01	10.73	0.23
Rochester	85	56	69	-2	134	1007	40	1.18	0.58	12.34	3.04
Watertown	84	51	68	-1	127	832	40	0.67	0.25	9.93	1.37
Central Lakes											
Dansville	83	53	68	-3	126	944	-19	1.17	0.45	15.17	4.44
Geneva	85	54	69	-2	134	1018	77	0.68	-0.02	12.31	1.57
Honeoye	83	51	68	-4	128	990	13	0.82	0.17	14.54	3.98
Ithaca	85	53	69	1	131	1003	154	1.5	0.73	14.78	3.51
Penn Yan	85	58	70	-1	140	1092	151	0.92	0.22	11.64	0.9
Syracuse	86	56	70	-1	138	1111	134	1.44	0.54	15.51	3.67
Warsaw	81	53	65	-2	107	841	121	1.69	0.9	16.47	4.03
Western Plateau											
Alfred	86	50	67	1	124	941	159	0.83	-0.07	15.69	3.21
Elmira	86	51	69	-1	132	1037	131	1.15	0.36	13.71	2.75
Franklinville	81	49	66	2	114	817	179	0.83	-0.01	15.42	2.97
Sinclairville	84	53	68	2	125	941	211	1.06	0.15	15.91	2.11
Eastern Plateau											
Binghamton	85	55	68	-2	125	1020	144	0.95	0.14	11.12	-0.28
Cobleskill	83	52	68	0	126	965	154	0.65	-0.17	12.53	0.07
Morrisville	84	55	66	-1	117	827	64	2.56	1.72	14.35	2.11
Norwich	86	54	68	0	127	959	150	2.08	1.27	13.89	1.38
Oneonta	85	54	69	4	135	1071	326	1.41	0.5	14.35	0.9
Coastal											
Bridgehampton	83	60	71	1	150	996	57	0.26	-0.44	13.19	0.73
New York	91	68	77	2	193	1581	189	0.81	-0.1	12.55	-0.07

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2. *Y*ear *T*o *D*ate: Season accumulations are for April 1st to date

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