# New York Berry News

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Well, you may not be getting much for your gas dollars these days but NYBN is definitely value-packed this month with lots of articles to help you get the growing season off to a good start!. There is so much information in fact we had to move last month's promised plasticulture strawberries article to the June issue.

Don't miss out on the opportunity to see various on-farm demonstration trials this summer – check the calendar and news briefs for details. More opportunities to come as the summer progresses!

## CURRANT EVENTS

**May 21, 2008:** *Early Season Berry Workshop:* Swistack Farm, Verona, NY. News brief below with details and directions.

**May 22, 2008**: *Strawberry Cultivation Equipment Demonstration:* Green Acres Fruit Farm, 960 Manitou Rd, Rochester, NY. News brief below with details and directions.

**June 9, 2008:** Eastern NY Berry Growers' Field Meeting, Schoharie and Albany County area. See news brief below for details.

**June 12, 2008:** *Getting Ready to Grow Raspberries: Raspberry Killed Sod Demonstration***,** Ithaca, NY. See news brief below for details.

**July 9, 2008**: Forced Air Cooling Workshop. Gro-Moore Farms, Rush, NY. Mark your calendars now. More information forthcoming in the June NYBN.

**July 10, 2008**: Forced Air Cooling Workshop. Schoharie Valley Farms, Route 30, Schoharie, NY. More information forthcoming in the June NYBN.

**July 16, 2008**: *Cornell Weed Days* (Freeville, NY) *Strawberry herbicide demonstration trial* (Cornell Orchard), *High tunnel raspberry and blackberry tour* (Ithaca NY). Details to follow in the June issue.

**July 14-16, 2008**: *The 9th International Vaccinium Symposium* will be held at Oregon State University in Corvallis. In addition, a pre-conference tour is scheduled to tour blueberry, cranberry, and lingonberry production in the area. Although this is a scientific meeting with researchers from all over the world presenting, some industry members may wish to attend. **Early registration ends April 11**. For more information: http://oregonstate.edu/conferences/vaccinium2008/.

**July 23, 2008:** *Day Neutral Strawberry Workshop* held in conjunction with the Pennsylvania Vegetable Growers' Association's Vegetable and Small Fruit Field Day at Rock Springs, PA. Details below.

**September 23, 30, October 7, 14, and 21:** *Building a Successful Small Farm Operation* in Orleans County. Contact Paul Lehman of Niagara County CCE or Lynn O'Brien of Allegany/Cattaraugus County CCE for more information.

**June 22-26, 2009**: *The 10th International Rubus and Ribes Symposium. Zlatibor, Serbia*. Save the date!

**August 20-21, 2008:** *NASGA Annual Summer Tour*. Columbus, Ohio. For more information: Kevin Schooley, 613 258-4587 or email: kconsult@allstream.net or go to http://www.nasga.org/.

# CHATEAU REGISTERED FOR USE IN NEW YORK STRAWBERRY FIELDS

*Chris Benedict and Robin Bellinder, Department of Horticulture, Cornell University, Ithaca, NY 14853*

**General Information**
A new herbicide with the active ingredient flumioxazin was recently registered (April 2008) for use in New York. The product comes in two formulations, WDG (51) and SW (51), of which *only the WDG is registered in strawberries*.

Chateau is classified as a PPG inhibitor and plants emerging from treated soils become necrotic and die shortly after expose to sunlight. Post-emergent applications tend to be localized to the tissue present at application and not trans-located to new growth. Chateau is a highly residual, pre-emergence herbicide with some post-emergent activity on young weeds (<2 leaf). **The strength of Chateau is pre-emergence control of annual broadleaf weeds and is less effective on annual grasses**. Under low annual grass pressure, control of grasses like large crabgrass and yellow foxtail may be acceptable.

**Use Pattern (Max. 3 oz per year)**
**Pre-transplant** – Maximum rate of 3 oz./A and must be made 30 days *prior* to transplanting and plants *must* be transplanted into plastic. Should be mixed with a post-emergence product such as glyphosate and can be used as part of a stale seed-bed program.

**Pre-emergence (Dormant)** - Maximum rate of 3 oz./A applied while plants are dormant. Chateau can be mixed with crop oil concentrate, at 1% v/v, or non-ionic surfactant, at 0.25% v/v, to help control emerged broadleaf weeds.

**Hooded/Shielded to Row Middles** - Maximum rate of 3 oz./A applied to row middles only. Applications should occur prior to weed emergence and before fruit set. Applications after fruit set may result in spotting and Chateau should not be mixed with an adjuvant under this use pattern.

**Sources**:
1. Derr, Jeffrey. January-February 2005. Virginia-Vegetable, Small Fruit and Specialty Crops Newsletter. Volume 4, Issue 1
2. Senseman, S.A.(ed.). 2007. Herbicide Handbook: Ninth Edition. Weed Science Society of America.

## *Early Season Berry Workshop*

Swistack Farm

**6644 Greenway New London Rd, Verona, NY**
**Wednesday May 21st, 12:00 noon**

Cathy Heidenreich, Western NY Berry Extension Support Specialist and Kerik Cox, Cornell fruit pathologist will be joining local berry growers at Swistack's farm at 12:00pm on Wednesday May 21st. Participants will be able to view Paul's 12 acres of strawberries and 3 acres of blueberries. Cathy and Kerik will lead discussions on scouting techniques for weeds, insects, and diseases of berry crops. They will show participants how to identify these pests, determine if they are an economic risk and discuss alternatives for their control. Don't miss this "hands on" experience and learn how to protect your berries from the most common insects and diseases in our region.

If you are interested in attending the workshop please contact Cindy at 315-736-3394 ext 124.

**Directions**: take the NYS Thruway to exit 33 (Verona/Rome), make a right traveling east on Rte 365, go approximately 4 ¼ miles and make a left on Greenway New London Rd. The Swistack farm is on the right approximately 1 mile from Rte 365.

# STRAWBERRY CULTIVATION EQUIPMENT DEMONSTRATION

## Thursday, May 22, 2008

3:00 – 4:30 PM

## Location: 960 Manitou Rd., Rochester, NY 14612

**Hosted by**: Craig Michaloski, Green Acres Fruit Farm
**Sponsors**: Lake Ontario Fruit Team, NYFVI Berry Project, NYS Berry Grower's Association, Cornell Small Fruit Program Work Team

Tired of all that hand weeding and hoeing? Wondering if you should add a piece of cultivation equipment to your strawberry weed control arsenal? Not sure which one might best suit your operation?

Join us for a demonstration of various types of strawberry cultivation equipment including a Buddingh finger weeder, Eco (Regi) weeder, and Hillside cultivator. These pieces of equipment will be demonstrated in a new strawberry planting established the week of May 2nd 2008.

Craig and his crew will be available during and after the demonstration for discussion and questions regarding the various pieces of equipment. Informational brochures are being provided by the equipment manufacturers.

Copies of the SARE publication "Steel in the Field: A Farmers Guide to Weed Management Tools" will also be available for purchase ($10).

**Directions from east:** Get to 390N, take exit for Latta Rd (RT 18), turn left on Latta, turn right on Manitou, go 1.1 Mi. north.
**From west:** Take Route 104 to Manitou Rd., Spencerport, turn left on Manitou (RT 261), go 3 miles north.
Or get to Lake Ontario Parkway and exit at Payne Beach Rd from west or Manitou exit from east, and go 4.3 miles south.

# BERRY GROWERS FIELD MEETING(S)

## Monday, June 9th 2008

*Join **Cornell fruit pathologist Dr. Kerik Cox**, and **NYS IPM fruit specialist** **Dr. Juliet Carroll** at several local berry farms in the Schoharie and Albany County area. Disease and insect scouting and management, ongoing research and new resources will be among the topics covered.*

***Each stop will focus on a slightly different crop and pest complex.***
***You may attend all of the farm stops or just one!***

*There is no cost for this program, but please pre-register by calling 518-885-8995, and let us know where you'll be meeting us.*
*NYS DEC Pesticide Applicator recertification credits will be available.*

**10:00 am – Bohringer's Fruit Farm**, 3992 State Rt. 30, Middleburgh, NY 12122. Broad array of berries to look at here, the focus will be on strawberry and raspberry pest management. Weed control options at renovation and in the fall will be discussed.

**Bohringer's Fruit Farm** is located on route 30 just south of Middleburgh, NY. Middleburgh is about 8 miles south of Schoharie, NY and you can get to Route 30 via I-88 at Exit 27 or Route 20. Take Route 30 south from both those exits.

**12:00 pm – Scotch Ridge Berry Farm**, 5092 Scotch Ridge Road, Duanesburg, NY 12056. We will be focusing on blueberry pest management at this stop. Learn about how to use insect traps as a way to predict problems with fruit fly and blueberry maggot. A brief discussion of Ribes pest management as well.
**Scotch Ridge Berry Farm** is located in Duanesburg on Scotch Ridge Road. From route 20 in Duanesburg you would take CR-127 (Duanesburg Churches Rd) north for .5 mile, then take a right at CR-70 (Scotch Ridge Rd) and go for 1.4 miles. Look for the farm on your right down.

**3:00 pm - Feura Farm**, 210 Onesquethaw Creek Rd., Feura Bush, NY 12067. We will touch on strawberry and raspberry weed and pest management. We will learn how to scout both these berries for pest problems.

**Feura Farm** is located on Onesquethaw Creek Road in Feura Bush. Feura Bush is southwest of Albany, Glenmont and Delmar. You can get there by following Route 32 south into Feura Bush then turning left onto Rowe Rd, then a quick right onto Onesquethaw Creek Rd.

**5:00 pm - Indian Ladder Farm,** 342 Altamont Rd., Altamont, NY 12009. Learn more about pests and diseases of blueberries and brambles. We will also be taking a look at the raspberries grown in a high tunnel. Indian Ladder has strawberries both in and out of a hoop house – some of which are being grown in raised planting trays where nutritional issues are of interest.
**Indian Ladder Farm** is located on Rt. 156 (Altamont Rd.) east of Altamont. Altamont is west of Albany and Guilderland and slightly north of Voorheesville. Rt. 156 connects Voorheesville and Altamont.

This meeting is being co-sponsored by the Northeast Area Fruit Program and the Department of Horticulture. It is supported by Cornell Cooperative Extension, New York Farm Viability Institute, New York Berry Growers Association and the cooperating growers.

**Directions:** These directions are intended to get you in the general vicinity. If you don't have access to MapQuest or GPS, then bring a map! If you intend to go to several stops, there will be directions available for the consecutive locations. We look forward to seeing you at these field meetings.

# GETTING READY TO GROW RASPBERRIES

*Raspberry Killed Sod Demonstration*

**Thursday, June 12, 2008**

3:00 – 4:30 PM

**Location: 5027 Dubois Rd., Ithaca, NY 14850**

**Hosted by**: Dan Clement, Dan's Berry Farm
**Sponsors:** South Central Ag Program, NYFVI Berry Project, NYS Berry Grower's Association, Cornell Small Fruit Program Work Team

Learn the best ways to prepare your land to grow raspberries, one of the most profitable crops around.

Cover cropping the year before planting is a is a good way to reduce weeds, improve soil structure, and add organic matter to the soil. Using annual rye is one option for a preplant raspberry cover crop.

What if you could kick your rye cover crop benefit up a notch by continuing to use it in spring and early summer as a method to further suppress weeds? Planting brambles into mowed or killed sod may be a way to do that.

New grower Dan Clement has established one section of his new raspberry planting using just such a technique. He has planted two varieties of fall-bearing raspberries (Jaclyn and Himbo Top) in side-by-side rows using conventional and killed sod methods. He has also installed a drip irrigation system and removable T trellis over his fall raspberries for ease of pruning (mowing). Other berry crops in his new planting include summer-bearing raspberries, blueberries, currants, and gooseberries.

Join us for a tour of this new planting and a discussion of the potential benefits and drawbacks of the killed sod system. Handouts will be available for those interested detailing the killed sod planting method for raspberries.

**Directions:**
**From Ithaca**: Take Route 96 north towards Trumansburg. Take the first right just past the hospital onto Dubois Road. Travel approximately 3.4 mile north on Dubois to number 5027. It's a gray and white house on the left. The berry planting is on the same side slightly further along. Roadside parking.

# DAY-NEUTRAL STRAWBERRY PRODUCTION WORKSHOPS TO BE OFFERED

*Kathy Demchak, Department of Horticulture, Penn State University, University Park, PA 16802*

As part of a NE SARE project, we're planning for a couple of educational events on the topic of day-neutral strawberry field production this summer and fall. The first one will be scheduled in conjunction with PVGA's Vegetable and Small Fruit Field Day at Rock Springs, PA on July 23rd, and will last about 2 hours or so. Depending on grower interest level, we also may schedule a longer stand-alone event this fall. These meetings are being scheduled during the growing season so you can see the plants and growing system (for day-neutrals, this is until the end of October). We'll get together a mailing list and send out information as plans solidify. You can send back the form below, send me equivalent information on another sheet of paper (if there's something on the back of this that you still want to read!), or send me the info via email.

Even if you feel that you don't have time to attend this year but are interested in the topic, please send me your contact information, since we'll have some educational material that we can send you later this year.

Please send paper copies of the information to Kathy Demchak, 102 Tyson Building, University Park, PA 16802 or emails to kdemchak@psu.edu. Thanks!

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Your name _____ Farm name _____

Mailing address _____

_____

Phone number _____ Email address (if applicable)_____

What is your level of interest/experience with day-neutral strawberries? (check one)
___ Thinking about growing day-neutrals ___ Currently growing day-neutrals
___ Have some limited experience with day-neutrals

Topics of interest or questions to address during the event
_____

_____

Your expected level of participation
___ Would definitely want to attend a workshop if possible. If you checked this, please also answer:
___ would prefer a short 2-hr event on July 23rd at the PVGA Field Day at Rock Springs, or,
___ would like a separate in-depth workshop on the topic early this fall, 4-6 hrs

___ Would like to have information mailed to me, but probably would not attend an educational event

Thanks again – feel free to send along any additional input on this topic also.
_____

_____

# NEW DECISION TOOL AVAILABLE TO MAKE CHOOSING A COVER CROP FAST

*Thomas Björkman, Horticultural Sciences Department, Cornell University's New York State Agricultural Experiment Station, Geneva, NY 14456*

***(Editor's note**:* While this decision tool was developed with vegetable crops in mind, we asked Dr. Björkman if it would be applicable to berry crops as well. "I think it would work well for berry growers. Their rotations are a bit different, but the tool would allow a strawberry grower, for instance, to choose a verticillium suppressor if that's their main concern, or a weed suppressor that goes in after the strawberries get pulled out. I'm less familiar with brambles and bushes but I don't see why it wouldn't work well.")

New York Vegetable growers have a new tool available to make it easy to select a cover crop. It's challenging to keep track of which cover crops are good for various situations. Even growers who want to try a new cover crop find they don't have time to research them when the opportunity to use one arises. The new decision tool will speed that process. If a grower has an idea of why they need a cover crop and a particular window in the rotation, they should be able to enter those goals and come away with growing instructions in less than five minutes.

I developed this tool with the help of many colleagues with cover crop expertise using funding from the New York Farm Viability Institute. The tool is designed to complement the new Cornell Soil Health Test, so that growers whose prescription is to use a cover crop can fill that prescription easily.

The tool uses the information the growers are most likely to have in hand. Usually, they have a particular management objective, whether from the soil health test or their own observations. There is usually also a time during the season when there is an opportunity to put a cover crop between cash crops.

The first step of using the tool is to enter one or more of the three criteria: management goal, planting time, and duration. Clicking "Search" quickly brings up the main candidates and some key information to help choose. These searches are fast enough that it's easy to tweak the criteria and search again to see what comes up.

The second step it to look at the candidate cover crops to see whether they are compatible with the existing rotation, whether the price is appropriate, whether the necessary equipment is on the farm, and similar deciding factors. Simply clicking on the name of the cover crop brings up the production instructions.

The third step is to review the production instructions. Most run about a page and include where to buy seed, how to plant, when to terminate the crop and how. It also has some of the tricks that experienced hands have passed on. A click on the cover crop name on this page brings up a PDF file that can be printed out. We have made the instructions as complete as we can, so that each step can be carried out reliably by any reasonably experienced farmer. To keep the instruction to the point, they contain neither general information nor research results. There are other publications that provide such information, in particular the new Third Edition of "Managing Cover Crops Profitably."

As an example, a grower might be interested in reducing surface hardness in a field to be harvested in mid-August. The search turns up two hits, Forage Turnip and Hairy Vetch. Since this field had cabbage in it the previous year, the turnips are rejected because that's too soon to plant another crucifer. Hairy Vetch will not only help with surface hardness, but will also fix nitrogen and suppress spring weeds. Going to the instructions, the page describes 1) the key factors in land preparation (break compaction, have adequate P and K); 2) the seeding rates of hairy vetch and an oats or rye nurse crop to reduce root rot pressure; 3) the late August through September planting window; and 4) the termination by mowing or incorporating in late May when the vetch flowers.

Not every combination of management goal and time results in a hit. The cover crops included in the tool are only those that are readily available and relatively inexpensive. Nevertheless, there are cover crops available for any time of the year. There are those that are best raised for a year or so, to those that are done in a bit over a month. A substantial number of management goals are included. Some, such as increasing organic matter, can be met by many cover crops, others, like suppressing verticillium, are met only by one cover crop. The tool will be expanded as current research projects yield more results.

The online decision tool can be accessed at http://miniurl.org/nycctool. The shortcut to the relevant page on the Cornell vegetable cover crop site is (www.nysaes.cornell.edu/hort/faculty/bjorkman/covercrops/).

# USDA TO VISIT AG OPERATIONS ACROSS THE STATE

During the upcoming June Area Survey, the New York Field Office of the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) will be out and about accounting for hundreds of acres of land throughout the state. As part of the nationwide survey, NASS representatives will be knocking on the doors of producers on selected tracts of land to collect information about their land uses and agricultural activities.

"The June Area Survey is one of the largest and most comprehensive surveys conducted each year by NASS," explained Stephen Ropel, director of the NASS New York Field Office. "By providing an in-depth look at land uses and agricultural activities, the survey provides the most timely, accurate and useful information on the current condition of U.S. agriculture."

"Understanding that the information we gather is only as good as the source it comes from, we are counting on the most reliable, frontline source of information for this survey, the producers themselves," added Ropel.

During the first two weeks of June, NASS representatives will visit selected areas of land in New York and conduct personal interviews with the owners and operators of any farm or ranch on that land. NASS will collect information on crop acreage, biotech crop acreage, grain stocks, and livestock inventory, cash rents, land values, and value of sales.

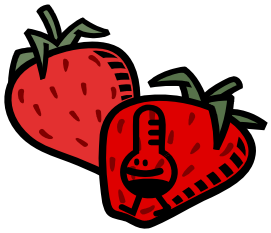
The information from the June Area Survey will be used extensively by NASS in its ongoing survey and estimation programs. The survey provides direct data, or is a critical component, for a host of NASS reports, including: the monthly Crop Production report, annual Acreage report and inventory reports for cattle, hogs and pigs, and sheep and goats.

As with all NASS surveys, information provided by respondents is confidential by law. "NASS safeguards the confidentiality of all responses and publishes only state- and national-level data, ensuring that no individual operation or producer can be identified," stated Ropel. All reports are available on the NASS web site: www.nass.usda.gov.

For more information on NASS surveys and reports, call the NASS New York Field Office at 1-800-821-1276.

# MAY BERRY BAROMETER

*HELPING TO KEEP YOU UP TO THE MARK!*



*Cathy Heidenreich, Western NY Berry Extension Support Specialist, Department of Horticulture, Cornell CALS, Ithaca, NY 14853*

Who could have predicted a season opener where we went from the mid 40's to 85 degrees in some locations across the state in one week's time?! Talk about rapid a warm up! Now that temperatures are somewhat back to normal and the growing season well on its way frost is the critical issue for berry crops in bloom.

## ALL BERRY CROPS:

1. **Frost protection –** Set up and test overhead irrigation systems. Get floating row cover ready for application. Review critical temperatures at which berries are damaged. Be sure weather equipment is functioning properly.
2. **Fertilization –**In light of skyrocketing fertilizer costs, now might be the best time to modify equipment to make banded/directed fertilizer applications to immediate planting areas only as opposed to broadcast applications. Another money saving idea would be to get set up to apply nitrogen through existing irrigation systems, reducing or eliminating fuel costs for mechanical application. Make the first of 2 nitrogen split applications this month for blueberries, raspberries and currants and gooseberries. Rates and other money-saving ideas are detailed in the fertilizer article that follows.
3. **Weed management** – Record efficacy of any pre-emergent applications. Scout for newly emerging weeds. Procure any needed mulch materials.
4. **Pest management**
    a. Set up monitoring systems as needed: sticky cards, traps, etc. Scout! Record pest frequency and locations.
    b. If you see problems developing, check out the berry diagnostic key for help in identifying the culprits. http://www.hort.cornell.edu/diagnostic/.
    c. See the articles following by Greg Loeb and Kerik Cox for crop specific concerns and management suggestions.

5. **Irrigation** – Set up record-keeping system to note dates and amounts of water applied. Be sure to record local rainfall amounts and dates as well. Strawberries and raspberries typically need 1-2" per acre per week; blueberries 1"/A per week. Currants and gooseberries typically need ½"/A per week.

## STRAWBERRIES:

*Established plantings:*

1. **Frost protection** – We are at risk now through the end of the month for frost. An in depth article by Marvin Pritts follows on frost protection of strawberries.
2. **Weed management** – Poast or Select for perennial grasses; Stinger for dandelions and thistles; Prowl H20 for banded applications between rows. Check the berry pest management guidelines and product labels for details (http://ipmguidelines.org/BerryCrops/).

*New plantings:*

1. **Plant establishment** –
    a. Apply a pre-emergent herbicide after the soil has settled around the roots of the strawberries.
    b. Apply 30 lb/A actual nitrogen (calcium nitrate) in early June.
    c. Runners need good soil contact to root. Keep the 18" planting strip weed free by hand weeding or using cultivation equipment for good runner establishment. Direct runner plants from aisles back into planting row area.
    d. Remove flower clusters and blooms as they emerge to promote good plant establishment.
    e. Strawberries typically need 1-2 inches of water per week either in the form of rain or irrigation.

## BLUEBERRIES:

*Established plantings:*

1. **Pollination** – Wild bees are efficient blueberry pollinators but cannot always be depended upon due to fluctuating population numbers. A quick rule of thumb is to look for 4-8 bees foraging per plant at any on time during the warmest part of the day. Where bee activity is less than desired, honeybees can be moved in quickly and in large numbers. Hives should be set at about 5% bloom (before 25% bloom) and left until petal fall. See the *NRAES Highbush Blueberry Production Guide* for details on needed hive densities and placement.
2. **Frost protection** – We are at risk now through the end of the month for frost. An in depth article by Mark Longstroth follows on frost protection.
3. **Pest Management** – Here's a little gem which is pocket-sized and very handy to help with field id: *Pocket Guide to IPM Scouting in Highbush Blueberries* from Michigan State University. For purchasing information contact: Media Distribution, 385 Kottman Hall, 2021 Coffey Rd., Columbus, Ohio 43210-1044, phone: 614-292-1607, fax: 614-292-1248, e-mail: pubs@ag.osu.edu *($9 plus S&H).*
4. **Weed management** – Gramoxone or Scythe before new cane emergence.

*New plantings:*

1. **Plant establishment** –
    a. Gently rub off emerging flower buds between the palms of the hands to promote good plant growth and establishment.
    b. Apply Devrinol after planting before seedling weeds emerge. Till or water in within 24 hours.

## RASPBERRIES AND BLACKBERRIES:

*Established plantings:*

1. **Weed management** - Gramoxone or Scythe before new cane emergence.

*New plantings:*

1. **Plant establishment** –
    a. Apply Devrinol after planting before seedling weeds emerge. Till or water in within 24 hours. Follow any special instructions when making applications (gal/acre, psi, shielded application only, etc.). Remember to include any adjuvant(s) listed on the label.

## CURRANTS AND GOOSEBERRIES:

*Established plantings:*

1. **Pollination** – Wild bees and other insects are efficient pollinators but cannot always be depended upon due to fluctuating population numbers. Where bee activity is less than desired, honeybees can be moved in quickly and in large numbers. Hives should be set at about 25% bloom at a density of 1-2 hives per acre. Locate hives in the centers of fields. Mow weed and ground cover flowers before introducing bees.
2. **Weed management** - Gramoxone or Scythe before new cane emergence.

*New plantings:*

1. **Weed management** - Hand-weeding or spot applications to control weeds.

# FROST PROTECTION IN STRAWBERRIES

*Marvin Pritts, Department of Horticultural Sciences, Cornell University's College of Agriculture and Life Sciences, Ithaca, NY 14853*

Strawberry growers can ensure a full crop of berries only if they exert some influence on temperature during the year. Temperature control is especially important during the winter and early spring when flowers are susceptible to frost. Of all the factors that negatively affect strawberry production, frost can be the most serious. Frost can eliminate an entire crop almost instantaneously. Strawberries often bloom before the last frost free date, and if a frost occurs during or just prior to bloom, significant losses can result. The strawberry flower opens toward the sky, and this configuration makes the flower particularly susceptible to frost damage from radiational cooling. A black (rather than yellow) flower center indicates that frost damage has occurred.

Strawberry growers occasionally delay the removal of straw mulch in spring to delay bloom and avoid frost. Research has demonstrated, however, that this practice also results in reduced yields. Also, applying straw between the rows just prior to bloom will insulate the soil from the air. This will increase the incidence of frost injury as solar radiation will not be absorbed by the soil and reradiated at night. If additional straw is to be applied between the rows in spring, delay its application for as long as possible before fruit set.

Photo left shows frost damaged blossoms and buds on the left and healthy blossoms and buds on the right.)

Overhead irrigation is frequently used for frost control because flowers must be kept wet during a freeze in order to provide protection. As long as liquid water is present on the flower, the temperature of the ice will remain at 32°F because the transition from liquid to ice releases heat. Strawberry flowers are not injured until their temperature falls below 28 °F. This 4 degree margin allows the strawberry grower to completely cover a field with ice and yet receive no injury from frost. However, if insufficient water is applied to a field during a freeze event, more injury can occur than if no water was applied.

Several principles are responsible for the ability of ice to protect strawberry flowers from injury. First, although pure water freezes at 32 °F, the liquid in the strawberry plant is really a solution of sugar and salt. This depresses the freezing point to below 32 °F. Also, ice crystals need nucleators to allow them to form initially. Certain bacteria serve as nucleators. Sometimes, in strawberry flowers, the bacteria that allow ice to form are absent, allowing the freezing point to be lowered. The temperature of the applied water is usually greater than the temperature of the plants, so this serves to warm the flowers before heat is lost to the air. As long as liquid water is continually applied to the plants, the temperature under the ice will not fall below 32 °F. When one gallon of water freezes into ice, 1172 BTUs of heat are released.

Several factors affect the amount of water that is required to provide for frost protection, and the timing of application. At a minimum, apply water at 0.1 - 0.15 in/hr with a fast rotating head (1 cycle/min). Water must be applied continuously to be effective. A water source of 45 - 60 gal/min-acre is required to provide this amount of water. Choose nozzle sizes to deliver the amount of water required to provide protection under typical spring conditions in your location. Under windy conditions, heat is lost from the water at a faster rate, so more water is required to provide frost protection. For every gallon of water that evaporates, 7760 BTUs are lost. The application rate then depends on both air temperature and wind speed (see Table 1).

**Table 1.** Water application rate (in/hr) for a given humidity and wind speed.

| | Wind Speed | | | | |
|---|---|---|---|---|---|
| **Temp (F)** | **0-1** | **2-4** | **5-8** | **10-14** | **18-22** |
| *Relative humidity of 50%* | | | | | |
| 27 | 0.10 | 0.20 | 0.30 | 0.40 | 0.45 |
| 24 | 0.10 | 0.30 | 0.35 | 0.45 | 0.60 |
| 20 | 0.15 | 0.35 | 0.45 | 0.60 | 0.75 |
| 18 | 0.20 | 0.40 | 0.50 | 0.65 | 0.80 |
| *Relative humidity of 75%* | | | | | |
| 27 | 0.05 | 0.10 | 0.20 | 0.25 | 0.25 |
| 24 | 0.10 | 0.20 | 0.30 | 0.35 | 0.40 |
| 20 | 0.10 | 0.25 | 0.40 | 0.45 | 0.60 |
| 18 | 0.15 | 0.30 | 0.45 | 0.55 | 0.70 |

FROSTPRO Model; North Carolina State University

Under windy conditions, there is less chance of flower temperatures falling below that of the air because of the mixing of air that occurs at the boundary of the flower. Winds are beneficial if the temperature stays above the critical freezing point, but detrimental if the temperature approaches the critical point. Less evaporation (and cooling) will occur on a still, humid night. Under extremely windy conditions, it may be best not to irrigate because the heat lost to evaporation can be greater than the heat released from freezing.

*Stage of Development:* Strawberry flowers are most sensitive to frost injury immediately before and during opening. At this stage, temperatures lower than 28 °F likely will injure them. However, when strawberry flowers are in tight clusters as they are when emerging from the crown, they will tolerate temperatures as low as 22 °F. Likewise, once the fruit begins to develop, temperatures lower than 26 °F may be tolerated for short periods. The length of time that plants are exposed to cold temperatures prior to frost also influences injury. Plants exposed to a period of cold temperatures before a frost are more tolerant than those exposed to warm weather. A freeze event following a period of warm weather is most detrimental.

*Flower temperature:* The temperature of all flowers in a field is not the same. Flowers under leaves may not be as cold as others, and those near the soil generally will be warmer than those higher on the plant. On a clear night, the temperature of a strawberry flower can be lower than the surrounding air. Radiational cooling allows heat to be lost from leaves and flowers faster than it accumulates through conduction from the surrounding air.

Soil also retains heat during the day and releases heat at night. It is possible that on a calm, cloudy night, the air temperature can be below freezing yet the flowers can be warm. Wet, dark soil has better heat retaining properties than dry, light-colored soil.

*Using row covers:* Row covers modify the influence of wind, evaporative cooling, radiational cooling, and convection. Because wind velocity is less under a row cover, less heat will be removed from the soil and less evaporative cooling will occur. Also, relative humidity will be higher under a row cover, reducing heat loss from evaporation. In addition, convective and radiational heat loss is reduced because of the physical barrier provided by the cover. Plant temperature under a cover may eventually equal that of the air, but this equilibration takes longer than with uncovered plants. In other words, row covers do not provide you with additional degrees of protection, but they do buy time on a cold night as flower temperatures will fall less rapidly inside a cover. Often the temperatures fall so slowly under a row cover that irrigation is not needed. If irrigation is required, less water is needed to provide the same degree of frost protection under a row cover. Water can be applied directly over the row covers to protect the flowers inside.

**Rules of thumb**

1. Store sufficient water for 2 or 3 consecutive nights of frost protection
2. Use small diameter nozzles (1/16 - 3/16 in. diameter)
3. A 30 X 30 ft. staggered spacing of nozzles is preferable
4. Use metal sprinklers to minimize icing
5. Minimum rotation of once per minute

*Turning on the water:* Since cold air falls to the lowest spot in the field, a thermometer should be located here. Place it in the aisle at the level of the flowers, exposed to the sky, and away from plants. Air temperature measured at this level can be quite different from the temperature recorded on a thermometer at the back of the house. The dewpoint temperature measured in the evening is often a good indication of how low the temperature will drop on a clear night, and is related to the relative humidity. Air temperature will fall less if the humidity is high. If the air is very dry (a low dewpoint), evaporative cooling will occur when water is first applied to the plants, so irrigation must be started at a relatively warm temperature. Most local weathermen can provide the current dewpoint, or it can be obtained from World Wide Web-based weather information services

**Table 2.** Starting temperature for frost protection based on dewpoint

| Dewpoint | Suggested starting air temperature |
|---|---|
| 30 F | 32 F |
| 29 F | 33 F |
| 27 F | 34 F |
| 25 F | 35 F |
| 24 F | 37 F |
| 22 F | 38 F |
| 20 F | 39 F |
| 17 F | 40 F |

If the air temperature falls below 34 °F on a clear, calm night, especially before 3 A.M., it would be wise to start irrigating since flower temperatures could be several degrees colder (Table 2). On the other hand, if conditions are cloudy, it may not be necessary to start irrigation until the temperature approaches 31 °F. If conditions are windy or the air is dry, and irrigation is not turned on until the temperature approaches 31 °F, then damage can occur due to a drop in temperature when the water first contacts the blossom and evaporation occurs. Therefore, the range in air temperatures which indicates the need for irrigation at flowering is normally between 31 °F and 34 °F, depending on cloud cover, wind speed and humidity, but can be as high as 40 °F. Admittedly, these numbers are conservative. Flowers can tolerate colder temperatures for short periods of time, and irrigation may not be needed if the sun is about to rise. Obviously, one does not want to irrigate too soon since pumping is expensive, and excess water in the field can cause disease problems.

*Turning off the water:* Once irrigation begins, it should not be shut off until the sun comes out in the morning and the ice begins to slough off the plants, or until the ice begins to melt without the applied water.

*Waterless frost protection agents:* Future solutions to frost protection could lie in waterless methods, such as genetically engineered bacteria that do not promote the formation of ice. However, to date, these materials have not been consistently effective, so they are not recommended as the sole basis for frost protection.

# USING SPRINKLERS TO PROTECT BLUEBERRIES FROM SPRING FREEZES

*Mark Longstroth, MSUE District Extension Educator, SW Michigan*

Many Michigan growers use sprinkler systems to protect blueberry flowers from spring freezes. Sprinklers are very effective under certain circumstances but can actually increase injury if used at the wrong time. Sprinklers used for irrigation do not protect below 23-24°F. If the system fails due to cold or wind the blueberries will get much colder than in areas where you are not sprinkling. When you use sprinklers to prevent freezing injury, you are using the energy that water releases when it freezes, and changes from a liquid to a solid, to keep the temperature in the ice right at the freezing point 32°F. As long as you keep the ice WET, the ice temperature will stay at 32°F. If the ice dries out and water starts to evaporate from the ice the ice will get colder than the air temperature as it evaporates. The temperature will fall to the dewpoint (wet bulb temperature).

## Protection with Sprinklers

If you understand that you need to keep the ice wet, and when your system will fail to keep the ice wet, you will understand how to use your sprinklers to prevent freeze injury. The freeze protection from sprinkler systems is limited by the irrigation rate. Most sprinkler systems in Michigan blueberries are designed to provide about 0.12 to 0.15 inches of water per hour. This volume protects plants to about 22° F with no wind or 24° to 25° F with a light wind.

*(Photo courtesy Brookside Farms)*

More water is needed to protect at lower temperatures and higher wind speeds, see Table 1. Since you do not know what the wind speed will be several hours from now I suggest only trying to protect to 25° F.

*(Photo courtesy Brookside Farms)*

Most irrigation systems cannot easily be changed to deliver more water and protect to lower temperatures. Increasing the operating pressure is not advisable because the volume is not increased substantially (You need to increase the pressure 4 times to double the output). Higher pressure can break lines and reduces the uniformity of application. Larger nozzles can be installed in some systems, but only if the capacity of the system, mainlines, well and pump can handle the added volume. For example, 9/64-inch nozzles that deliver 0.12 inches water per hour require 60 gallons per minute per acre of blueberries. Switching to 5/32-inch nozzles would deliver 0.15 inches per hour but requires 68 gallons per minute per acre. Irrigation systems are not designed to apply enough volume to protect from temperatures in the low.

**Table 1.** Irrigation rate (inches/hour) needed to protect fruit buds under different wind and temperature conditions. (U of Florida Ext. Circ. 287)

| Temp (°F) | Wind speed (mph) | | |
|---|---|---|---|
| | 0-1 | 2-4 | 5-8 |
| 27 | .10 | .10 | .10 |
| 26 | .10 | .10 | .14 |
| 24 | .10 | .16 | .30 |
| 22 | .12 | .24 | .50 |
| 20 | .16 | .30 | .60 |
| 18 | .20 | .40 | .70 |
| 15 | .26 | .50 | .90 |

## Critical temperatures

Growers should only use sprinklers to protect blueberry from freezing, at around bloom time. The temperature range where sprinkler can protect the crop is relatively narrow from 24 to 32 F. This narrow temperature range is also the range that will hurt blueberry open flowers. When blueberries begin to grow in the Spring the buds can handle very cold temperatures.

Swollen buds can tolerate 15-20° F. The lower end of the range is where almost all the flowers are killed and the upper end is where damage begins to occur. At "early pink bud" (individual flowers are visible in bud), injury occurs between 18° and 25° F. These are temperatures colder than you can protect to with an irrigation system.

In “late pink bud”, when the flowers have separated in the cluster but the flower petals are still closed, 25-28° F is lethal. This is in the range where we can protect but if there is a wind or the temperature gets a little colder than predicted we could cause more damage than if we had not turned on the system. Once we turn on the system we need to keep it on until the temperatures are above freezing or you will cause a lot of damage as the temperature of the ice goes down colder than outside the irrigated area.
*(Photo courtesy Mark Longstroth)*

It is because of this narrow margin of error that I recommend that growers only try to protect at bloom when the temperature range that will cause damage is well inside the range that we can protect to with an irrigation system. Fully open flowers are killed between 28° and 31° F. Right after bloom when the petals fall, is the most sensitive, 31° F will damage green fruit.

Dr. Mike Mainland from North Carolina State University provided a useful rule of thumb during a workshop in 2003. He suggested not even attempting frost control until at least a few flowers in the field are open. He reasons that most flowers are tight enough to tolerate 22-24F until the first flowers open, so protecting before the first bloom is not useful. This rule of thumb is especially useful when there is a wide difference the emergence of buds on a shoot. If most of the flower buds on a shoot are terminal (at the end of the shoot) and are opening at the same time, then you might want to frost protect in late pink bud. But there is no reason to try and protect flower buds at temperatures below 23 or 24F.
*(Photo courtesy Mark Longstroth)*

Another consideration is wind. Don't attempt to frost protect if the combination of wind and temperature will exceed to capacity of your system to protect (see accompanying table). If the temperature gets colder or if it is windy, we have a safety margin and our system can still protect the blueberries. If we were operating the system at the edge of its effectiveness it is more likely to fail. Dr. Mainland suggested studying the weather forecast closely, and hanging colored flagging in the field to indicate wind strength.

## When to turn on the System

Table 2. Starting temperature for overhead sprinkler freeze protection based on the dew point of the air.

| Dew point | Start irrigation at |
|---|---|
| 26 F | 34 F |
| 25 to 24 | 35 |
| 23 to 22 | 36 |
| 21 to 20 | 37 |
| 19 to 17 | 38 |
| 16 to 15 | 39 |

Once you have looked at the field and see open flowers and checked the weather and see that the temperature is supposed to get down to 26° F. You need to decide if you are going to turn on the system that night. I would not turn on the system if the temperature were forecast to fall below 24° F. If windy conditions (more than 10 MPH) were forecast I would not turn on the system at all. When you turn the system on and start to irrigate the air temperature will fall in the field. This is because the water is evaporating and cooling the air. The dryer the air, the greater the temperature falls. How dry the air is will dictate when you turn the system on. This can be calculated from the dew point, which is measured with a wet bulb thermometer on a sling psychrometer.

Once you start the system it is necessary to keep it running until the ice starts to melt on its own. If your system fails and the ice dries out and begins to evaporate it will change from a blueberry heating system to an effective refrigeration system that can significantly reduce your crop. As long as water drips from the ice the system is working. If the ice is clear, this indicates the system is working properly and the water is freezing uniformly.

## When can I stop irrigating?

Stop irrigating when the ice is melting and temperature is rising. Ice breaking free from branches indicates water is forming under the ice and it is likely safe to quit. Normally this is when temperatures are above freezing and rising. Beware of sudden dips in the temperature soon after sunrise.

## Soil surface considerations

Some frost avoidance can be gained by keeping the soil surface clean of vegetation, moist and packed. Moist soils have a large capacity to capture and store heat energy during sunny days, and release heat to maintain air temperature during

cold nights. Weeds, sod, and plant residues insulate the soil from the sun and reduce heat capture. In addition, tall grass and weeds raise the effective ground level. This is important since cold air is heavier than warm air, and settles along the ground and in the lowest areas of fields. If fields are covered with foot tall grass or weeds, flower buds a foot higher in the canopy may be injured during a frosty night. Mowing fields with tall weeds is worthwhile.

Another consideration is that moist soils have a higher heat capacity than dry soils, and packed soils absorb more heat than recently cultivated soils. It is not worthwhile to cultivate just before a frost. Some growers attempt to irrigate during the day prior to predicted frosts in order to increase the water content of the soil Wet soil will absorb more heat. This may be of some value if water is applied early in the day, and there is ample sun to warm the wet soil. Irrigating late in the day or on cloudy days will not increase soil temperatures and provide more heat at night. The bottom line is that clean, moist, and packed soil surfaces absorb the most radiant energy during the day, and protect from frost by releasing this heat during the night.

*(Reprinted with the author's permission from: http://web1.msue.msu.edu/vanburen/bbsprink.htm.)*

# SAVING YOUR FERTILIZER DOLLAR

*Steve Reiners, Department of Horticultural Sciences, Cornell University's New York State Agricultural Experiment Station, Geneva, NY 14456*

*(Editor's note: Our thanks to Steve for letting us reprint this article, which is modified from the original vegetable version to be more reflective of berry crops.)*

The cost of fertilizers has reached record levels this spring and growers are rightfully asking how they can maintain yields and save on their fertilizer bill. Here are some suggestions.

**1) Soil test**. Not only does this reveal the soil's nutrient status, it will let you know if your pH is optimum. For most berry crops, the ideal soil is a well-drained, sandy loam with a pH of 6.2 - 6.8 and a moderate to high organic matter content (>3%). For blueberries, the ideal pH is between 4.2 and 4.8 and the ideal soil is a loamy sand with high organic matter (>4%). Planting in soils with a pH out of the preferred range will result in poor nutrient uptake by the target crop. Be sure to modify the pH with lime or sulfur to ensure that the appropriate range is obtained.

**2) Take nitrogen credits**. Cover crops, manures, previous crops and even the soil organic matter (SOM) provide nitrogen. Figure about 20 pounds of N for every one percent SOM. A legume cover crop incorporated prior to planting will likely give 40 pounds of N minimum, with two to three times that amount in a well established, legume sod. Even that field of cereal rye that was planted last fall has N in it, scavenged from last year's applications. Figure on 10-20 pounds of N once the rye begins to break down.

**3) Don't apply N preplant**. For nitrogen management growers must continue to rely upon scheduled fertilizer applications as large fluctuations in N that occur from week to week make estimating its availability with soil test and even leaf analysis of limited value. See tables 1 and 2 below for timing and amount of N necessary for berry crop production.

**4) Don't let N blow in the wind.** Broadcast applications of urea or ammonium based fertilizers have an increased chance of being lost through volatilization than do incorporating or knifing these same products into the soil. Any tillage or applicator that puts the nitrogen in the soil rather than on the soil improves efficiency of the nutrient. Applying N through drip irrigation systems or covering fertilizer with mulch is an easy way for berry growers to reduce volatilization.

**5) Use foliar testing to promote best nutrient efficiency.** Foliar tissue testing is the most reliable way to measure a plants nutrient load. Using a combination of soil testing, tissue analysis, scheduled fertilizer applications and observation of crop response is currently a grower's best approach for managing nutrients in berry fields.*

**6) Reduce tillage.** The quickest way to burn off organic matter is with conventional tillage. This puts lots of oxygen into the soil and microbe populations explode, at the expense of SOM. The perennial nature of berries and their relatively shallow roots makes cultivation a poor choice for weed control in berry crops; if you are using cultivation as a means of controlling weeds, you might want to reconsider.

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**7) Don't over apply P**. If your soil level is high and you are planting when soils are still cool, use no more than 20 pounds of actual P/A as a starter. This will help the plants get established until soil P becomes available as the soil warms in the spring. If planting in warm soils after June 10 on high P soils, no additional P may be needed. For transplants on plastic mulch, a high P soluble fertilizer in the transplant solution may be enough on high P soils.

**8) Fertilized Mulched Acre.** When using plastic mulch, think "Fertilized Mulched Acre" or FMA. Let's say you are planting on 5 foot centers, with the plastic mulch covering 3 feet and bare ground between the rows covering 2 feet. To figure the FMA, take the area of soil covered by mulch (3') and divide by the row center distance (5'), which gives 0.6 or 60%. If the soil test calls for 100 pounds of actual N per acre, you can cut this amount to only 60 pounds if you apply the N only to the area covered by the plastic. In this situation, you are only applying fertilizer where it will be used by your crop, not by weeds growing between rows.

**9) Soak up residual N this fall**. Planting a rye (or rye/vetch) cover crop after removing a planting can hold on to nitrogen that would otherwise be lost. Tilling in the cover crop next spring will return that captured N to the soil surface.

**Table 1. Nitrogen guidelines for berry crops.**

| Crop | Age of planting | Amount/timings (actual N) | N source | Comments |
|---|---|---|---|---|
| **Strawberries** | | | | |
| | 0 | 30 lb/A, early June | calcium nitrate | Be sure plants are growing well prior to application. |
| | | 30 lb/A, early Sept | ammonium nitrate or calcium nitrate | |
| | 1+ | 70 lb/A, at renovation<br>30 lb/A, early Sept | ammonium nitrate, urea, calcium nitrate | Adjust fall amount based on leaf analysis. |
| **Raspberries and Blackberries (summer-bearing)** | | | | |
| | 0 | 25-35 lb/A, 4 weeks after planting | calcium nitrate | Avoid touching plants with fertilizers after planting. |
| | 1 | 35-55 lb/A in May or split between May and June | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. |
| | 2+ | 40-80 lb/A, in May or split between May and June | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. |
| **Raspberries (fall-bearing)** | | | | |
| | 0 | 25 lb/A, 4 weeks after planting | calcium nitrate | Avoid touching plants with fertilizers after planting. |
| | 1 | 50-80 lb/A, split between May and June | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. |
| | 2+ | 70-100 lb/A, split between May and June | urea or ammonium nitrate | Use higher amount on sandier soils or if irrigation is used. Adjust with leaf analysis. |
| **Blueberries** | | | | |
| | 0 | Do not fertilize newly planted blueberries<br>*Split between May and June* | | Soil should be adjusted to pH=4.5 prior to planting. |
| | 1 | 15 lb/A | ammonium sulfate or urea | Use ammonium sulfate where soil pH is >5.0 |
| | 2 | 20 lb/A | | |
| | 3 | 25 lb/A | | |
| | 4 | 35 lb/A | | |
| | 5 | 45 lb/A | | |
| | 6 | 55 lb/A | | |
| | 7+ | 65 lb/A | | |

**Table 1. Nitrogen guidelines for berry crops.**

| Crop | Age of planting | Amount/timings (actual N) | N source | Comments |
|---|---|---|---|---|
| **Currants and Gooseberries** | | | | |
| | 0 | 25 lb/A, 4 weeks after planting | calcium nitrate | |
| | 1 | 50-80 lb/A, split between May, June, August | calcium nitrate | |
| | 2+ | 70-100 lb/A, split between May and early August | calcium nitrate | |

**Table 2. Nitrogen sources and calculation of actual N.**

| Fertilizer | % actual N in fertilizer |
|---|---|
| Ammonium nitrate | 34.0 |
| Ammonium sulfate | 20.5 |
| Calcium nitrate | 15.0 |
| Diammonium phosphate | 17.0 |
| Potassium nitrate | 13.0 |
| Urea | 46.0 |

To calculate the actual amount of fertilizer to apply, divide the desired amount of actual N by the percent N in the fertilizer and then multiply the result by 100. Apply the total amount of fertilizer in a 3-foot band in the row (1 foot for strawberries).

Example: Calcium nitrate, actual N 30 lbs/A on strawberries

Calculation: (30 lbs/A actual N ÷ 15 percent N in Calcium nitrate) x 100 = 200 lbs/A Calcium nitrate

* The appropriate protocol for sampling berry crops for a foliar test is listed below:

*Strawberries*: Sample the first fully expanded leaves after renovation or within the first 6 weeks after harvest.

*Raspberries*: Collect 30 newly expanded leaflets from primocanes in early August.

*Blueberries*: Collect 30 newly expanded leaves from well-exposed branches in late July..

*Currants and Gooseberries*: Collect 30 newly expanded leaves from well-exposed branches in late-July.

Wash dirt off leaves, blot off excess water and place leaves in a paper bag. Allow the leaves to air dry and then send to Cornell Nutrient lab. Enclose a check for $29 along with the proper forms which are available from your local CCE office or you can download them from the web. Request routine tissue analysis ($17) and *Kjeldahl nitrogen* ($12). See http://cnal.cals.cornell.edu/ for information and submission forms.

# CHEMICAL NEWS FOR SMALL FRUIT CROPS

*Greg Loeb, Department of Entomology, Cornell University's New York State Agricultural Experiment Station, Geneva, NY 14456*

There actually have not been major changes in insecticide and miticide availability over the last year or two. Perhaps the most important change relates to patents. The patents have ended for several small fruit insecticides leading to the marketing of generic materials, often at lower costs. The active ingredients are the same but they can differ in inert materials and formulations. I am aware of two generic materials for the pyrethroid insecticide bifenthrin (Capture and Brigade, FMC Corporation) that include caneberries on their labels: Bifenture EC (EPA # 70506-57) and Fanfare 2EC (EPA # 66222-99). The important pests included on these generic labels are root weevils and spider mites. They do not include Raspberry Crown Borer whereas Capture and Brigade do list this important pest. The pyrethroid insecticides have broad-spectrum activity against moths, beetles, leafhoppers, and even some activity against mites. They are also quite

hard on beneficial arthropods. I wanted make mention of one other pyrethroid insecticide, Danitol. It has updated its label recently and now includes blueberry, gooseberry, and currant in addition to strawberry. Some blueberry and gooseberry pests listed are blueberry maggot, cherry and cranberry fruitworm and Japanese beetle. For currant, cane borer is included.

The neonicotinoid insecticide imidacloprid has also come off of patent protection. Alias 2F (EPA # 264-758-66222) is a generic to the soil applied systemic insecticide Admire 2F and Pasada 75 WSB (EPA # 264-761-66222) is a generic version to the foliar applied Provado Solupak 75 WSP. Provado and Admire and these generics are labeled for use on strawberry, bushberry (blueberry, currant, gooseberry, and others) and cranberry. The target pests are adult Japanese beetle and white grubs for bushberry, aphids and whiteflies for strawberries, and scarab grubs and flea beetle larvae for cranberry. The neonicotinoids are particularly good against sucking insects such as aphids and leafhoppers but also have activity against some beetle species and even moths depending on the product (see the labels).

Another neonicotinoid insecticide, Assail 30 SG [acetamiprid, EPA # 8033-36-70506, Caution signal word, REI = 12 hrs, DTH = 1 d] has recently expanded its label to include small fruit crops (strawberries, high and low bush blueberries, caneberries, gooseberries, currant, and several others), **although this has not yet been approved for NY**. Acetamiprid tends to have a broader spectrum of activity than imidacloprid. Some of the insects included on the label are aphids, whiteflies, blueberry maggot, cherry and cranberry fruitworm, flea beetle, Japanese beetle, plant bugs, sap beetles, and thrips (see the new label for details).

# INSECT AND MITE MANAGEMENT ON STRAWBERRIES

*Greg Loeb, Department of Entomology, Cornell University's New York State Agricultural Experiment Station, Geneva, NY 14456*

During the prebloom period the **strawberry bud weevil (clipper)** is the main arthropod pest to watch out for. Clipper often is a more severe problem along borders of plantings, near woods. The adults emerge from their overwintering sites (woods or weedy strawberry fields) when temperatures reach 60°F and migrate to strawberry fields to feed on strawberry pollen by puncturing the un open flower. In recent years we have learned that many strawberry cultivars, such as Jewel and Seneca, can tolerate a fair amount of bud loss from this pest without reducing yield, although at sufficient densities, it can still be a problem. As a rough rule of thumb, treat for clipper when you observe more than one clipped primary or secondary flower bud or more than 2 tertiary buds per truss, on more than one truss per foot of row. **Note that once flowers are open they are no longer at risk from clipper.** Lorsban (chlorpyrifos), Brigade (bifenthrin), and Danitol (fenpropathin) are labeled for clipper in New York.
Also during the prebloom period (and extending through harvest and sometimes after renovation) **two-spotted spider mite** can be a problem in some plantings. Look for whitish or yellowish stippling on leaves. Current threshold is 5 mites per leaf or about 25% of leaflets have at least 1 mite. This is likely a conservative threshold for a healthy planting meaning they probably can handle higher densities of mites without causing economic damage. There are several compounds labeled for mites on strawberries in New York: Kelthane [dicofol], Vendex [hexakis], Agri-mek [abamectin], Savey [hexthiazox], Acramite, Zeal Miticide 1, Kanemite, Danitol [fenpropathrin] and Brigade. Acramite is only labeled for nonbearing plantings. Kelthane, Danitol and Brigade are hard on predatory mites. Agri-mek label calls for 2 applications, 2 weeks apart. Note that Kelthane has a status of registered – discontinued which means that it is not being shipped or sold in NY but stock on hand can be used until the registration has lapsed. This is scheduled to occur at the end of 2008. **For all these materials, coverage is very important, especially on the underside of leaves.**

**Tarnished plant bug (TPB)** is the key insect pest of strawberries during bloom to near harvest. Both adult bugs and the nymphs cause injury (deformed fruit) but nymphs are probably of the greatest concern for June-bearing cultivars. The economic threshold is half a nymph per flower cluster (you sample by tapping cluster over a white plate and counting nymphs that fall off). It is worth sampling for this pest on a regular basis since it varies in population size from place to place and from one year to the next. Early-season varieties may escape major damage from nymphs. Also, our research indicates that very productive cultivars appear to experience less significant injury from TPB. Insecticides labeled for control of TPB in strawberries in NY include malathion, Brigade, Danitol, and Pryenone [pyrethrin]. Spraying a pesticide when nymph counts are below threshold costs you money and can kill beneficial arthropods unnecessarily. **Good weed management can help reduce problems with TPB.**

**Cyclamen mite** is a potentially serious pest that seems to cause problems some years and then not be very noticeable in others. The mites get active in the spring with populations peaking after bloom. The mites like to feed on young leaf tissue (just as the leaves are unfolding). The mites themselves are difficult to see without a good hand lens. Look at the base of the mid-vein, top side of leaf, for a very young leaflet. Cyclamen-damaged leaves tend to be stunted and crinkled. Thionex [endosulfan] is labeled for use against cyclamen mites. Use lots of water for thorough coverage. Treatment should be carried out either prebloom or during bed renovation where it is easier to achieve coverage of the crown leaves.

**Strawberry sap beetle (SSB)**. This small, brownish beetle seems to be increasing as a pest in New York strawberries. Both the adult beetles and the larvae feed on ripe and overripe fruit. The larvae are the most worrisome since infested fruit can be picked and sold. We still are exploring the best ways to control SSB. Sanitation in the strawberry field and other fruit crops such as peaches and cherries may help keep populations down. Two pyrethroids are labeled in New York for its control: Dantitol and Brigade. Both pyrethroids are effective under controlled laboratory conditions but their efficacy in the field is spotty. Note that Brigade does not have a preharvest interval while for Danitol it is 2 days. However, Brigade is more expensive. For both materials, good coverage is likely to be important for its control. **Note that SSB does not move into strawberry fields from their overwintering sites until fruit begins to ripen.**

**Spittlebug** starts appearing on leaves, stems, and flowering racemes about bloom time and extending into harvest. They overwinter as eggs in the soil and hatch out as temperatures rise in the spring. The nymphs crawl up the plant and begin feeding on the xylem tissue (the water conducting vessels of the plant). There are not a lot of nutrients in xylem and therefore nymphs need to process a lot of sap, extracting the few nutrients out for their use and excreting the remaining water. This water is frothed into white spittle, which helps protect the nymphs from desiccation and natural enemies. You can often find several nymphs within a spittle mass. Feeding by spittlebugs, if extensive, can stunt plants and reduce berry size. Perhaps more importantly, the spittle masses are a nuisance to pickers. Threshold for spittle bug masses is 1 mass per foot row. Thionex, Provado, Brigade and Danitol are labeled for use against spittlebugs. **Weedy fields tend to have more problems with spittlebugs.**

**Root weevil** (there are several species) is the last strawberry pest I want to discuss in this issue. The larvae feed on roots and crowns and when abundant can cause serious damage to plantings. Beds with heavy infestations show distinct patches or spots that appear stunted and have reduced yields. Drought stress aggravates the injury from larval feeding. Chemical control (Brigade) is targeted at the adults that emerge in mid- to late June. Look for characteristic adult feeding damage on leaves (notching from the edge) to help determine timing. Note that the adults are active at night rather than the day time. The adults feed for a few days before starting to lay eggs. Some growers have also had success controlling root weevil larvae using parasitic nematodes. These can be applied either in the spring (late April and early May) and/or in the fall. Use sufficient water to get good penetration. **Rotation out of strawberries is the best remedy for root weevils.** They are wingless and do not move a great distance. However, new plantings should be placed 50 meters or more from an infested planting.

# SHOWERS BRING MAY DISEASES OF APRIL FLOWERS: SPRING 2008 DISEASE UPDATE FOR BERRY CROPS

*Kerik Cox, Department of Plant Pathology, Cornell University's New York State Agricultural Experiment Station, Geneva, NY 14456*

**Diseases and Timing**
**Showers bring May Diseases of April Flowers: Spring 2008 Disease update for Berry Crops**

**Diseases and Timing**
We're in the heart of spring and summer is fast approaching. Most berry crops are either in bloom or on the verge of bloom and we're finally getting a good bit of rain. In Geneva, the spring cold streak hit when most of our blueberries, raspberries, and currants were in cluster to bloom, and things seem to have slowed a little. Now that we're past dormancy, there is no longer a need for delayed dormant applications of copper and sulfur for tip diebacks and canker diseases. As we enter bloom, other diseases can potentially pose threats.

*Blueberries*: Mummy berry, gray mold, and anthracnose are three major diseases that occur around this time and could require fungicide applications. These diseases need warm rainy weather and don't mandate a fungicide application unless you have them now, or had a severe infection last year. Make sure that you keep an eye out for mummy berries. You should never make a fungicide application if you don't have the disease; however if this disease is present and gets out of control, it's difficult to manage even with the most effective fungicides.

*Brambles*: Not surprisingly, gray mold and anthracnose are also a bloom threat for Brambles. There is usually no need to apply fungicides for gray mold, especially if you have covered plantings or if you're planting black raspberries (which are more resistant to the disease). Conversely, make sure to protect young blossoms in red raspberries, especially if you have bloom as recent rain and warming temperatures favor gray mold. For anthracnose, fungicide applications shouldn't be needed unless you have history of the problem. If you have orange rust of black-fruited brambles, don't apply anything. Quickly dig up the infected plants, including all of the roots, and burn them. If orange rust were a human disease rather than a bramble disease, it would definitely mandate the white suited visitors from the CDC during disease outbreaks.

*Strawberries*: Don't apply fungicides for leaf spot, scorch, and blights unless these diseases really hammered your planting the previous year. The impact of these diseases on the plant's physiology can be questionable. If infections were severe last year, you can make a fungicide application for these diseases, but I'd only recommend one application for these diseases. As with the other small fruit, you can start to have problems with anthracnose and gray mold. If you routinely have these problems, you should consider applying fungicides for bloom infections, particularly if the weather continues to warm and we get more rain. Anthracnose can easily ruin a crop of strawberries

*Currants and Gooseberries*: Powdery mildew can be a problem during this time on European *Ribes* varieties, but you shouldn't have to apply fungicides for this disease unless you've seen it in plantings the previous year. You can apply fungicides for white pine blister rust during this time frame, but see the sections below about fungicide name changes before making applications. Also, if you have rust resistant currant varieties, you may not need to spray at all. Gooseberry anthracnose leaf spot can be very troublesome to manage as even the "Cadillac" fungicides may fail to provide 100% control in severely infected plantings. This is something that we are investigating in our field research trials on fungicide timing.

**New Products and Name Changes:** Few new materials were registered for berry diseases in NY in 2007, but there have been name and formulation changes to some products with critical roles in berry crop disease management. Combine name changes with NY's additional state registration requirements and problems can occur.

*Rally 40WSP* is the replacement product for Nova 40WP and is effectively the same material, just under a new name. Nova 40WP is being discontinued and may not be available by distributors this year. The Rally 40WSP label has most berry diseases covered, but based on my correspondences with the NYSDEC, we will not be able apply Rally 40WSP for white pine blister rust under our 2ee for Nova 40WP.

*Indar 2F* is the replacement product for Indar 75WSP, which just received new supplemental labeling for blueberry diseases. Indar 2F has not been approved by the NYSDEC yet, but our Dow AgroSciences representative indicates that you will still be able to get Indar 75WSP for a little while longer. Interestingly, Dow is now recommending the use of a non-ionic surfactant with applications of the Indar 2F. The active ingredient of Indar 2F is the least 'systemic' (to avoid getting too technical) of the chemicals in Indar's fungicide class. The addition of such an adjuvant like Li-700 or X-77 may improve efficacy of an already excellent fungicide.

*Orbit* has been around for some time as an excellent brown rot fungicide for stone fruit and now is widely labeled on diseases of bush berries and strawberries. It's an effective product in stone fruit and merits use in berries. However, the PIMS database isn't showing the updated label for Orbit. However, Katherine Hetter, environmental chemist in the Pesticide Product Registration Section at NYSDEC, indicates that the berry use registrations have been approved for NY. I've placed a copy of the NY Orbit label on my website. Click here to obtain a copy.

**Organic approved and biopesticide products:** As a whole these materials are fairly numerous and vary widely in terms of efficacy, formulation, and cost. Successful use of these products to control berry disease relies on a well thought out plan of use. To successfully use biopesticides: ensure optimal timing and complete coverage of the crop by the product, do not use biopesticides on a highly susceptible variety, and use them only in moderate to light disease pressure blocks. Even the most potent conventional fungicides will fail when the odds are stacked against them. Below are some the biopesticide/organic-approved products that I've had success with in field trials in Geneva.

*Serenade Max* is a formulated bacterium that prevents disease by producing antimicrobial peptides. Serenade is labeled for several berry diseases, and would be a good choice for an organic approved fungicide for late season applications. I have had good results using this product on bushberry rust and anthracnose. On a moderately susceptible red currant, Serenade Max was as effective as conventional fungicides against white pine blister rust.

*JMS Organic Stylet Oil* is not a biopesticide, but is an environmentally safe minimum-risk, organic-approved fungicide labeled for numerous berry diseases. Its active ingredient is white mineral oil or paraffinic oil. I have had success using this material on powdery mildew, anthracnose, and rust in bushberries. On a seven-day schedule, this material can go "toe-to-toe" with a premium conventional material.

*Phosphorous acid products (Phostrol, ProPhyt, Agri-fos, etc)* are biopesticides, but not approved for organic agriculture. The active ingredients of these materials consist of various phosphorous acid salts that inhibit pathogens by boosting plant defenses and through direct action via the release of phosphite ions. I've also had success using these on foliar diseases of bushberries and apples, but most of these products are not yet labeled for foliar diseases. They are labeled for controlling *Phytophthora* root disease problems, and for this use, I strongly recommended using them. Their efficacy against the straminopilous root pathogens (*Phytophthora* and *Pythium)* is well documented, and there is little chance for resistance compared to mefanoxam (a conventional material)

# EFFECT OF WATER PH ON THE STABILITY OF PESTICIDES

*Annemiek Schilder, Plant Pathology, Michigan State University*

Most pesticides are sold in concentrated form and have to be dissolved or suspended in water before they can be applied to crops. This water can come from various sources, such as wells, ponds, rivers, or municipal water supplies. Water naturally varies in the amount of dissolved minerals, organic matter and pH, depending on its source. The pH is a measure of the acidity or alkalinity of water, which refers to the number of hydrogen ($H^+$) and hydroxyl ($OH^-$) ions in a solution. The scale for measuring pH runs from zero to 14. The lower the pH, the more acidic the solution, while a higher pH indicates that the solution is more alkaline. Water at pH 7 is neutral, meaning there are an equal number of hydrogen and hydroxyl ions in the solution. Many areas in Michigan have alkaline water with high mineral/iron content. In addition, the pH of water from natural sources can vary throughout the season.

The pH of water can negatively affect the stability of some pesticides. Under alkaline conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms. In general, insecticides (particularly organophosphates and carbamates) are more susceptible to alkaline hydrolysis than are fungicides, herbicides or growth regulators. The end result is less active ingredient applied and poor pesticide performance. The degradation of a pesticide can be measured in terms of its half life. For example, if a product has a half life of one hour, the amount of active ingredient is reduced to 50 percent in one hour, to 25 percent in the next hour, to 12.5 percent in the next hour, etc. Eventually, the pesticide becomes virtually ineffective. The effect of pH on pesticides varies from product to product and is also moderated by buffering solutions contained in the pesticide formulation. Tank-mixing multiple pesticides can modify the pH of the tank-mix.

The table following this article shows the half life of a number of pesticide products as well as the optimum pH (where known). As you can see from the table, most pesticides are most stable when the spray solution is at a pH of about five. As many water sources are more alkaline than this, it may be necessary to adjust the pH of the spray solution. Do not attempt to acidify solutions containing copper-based fungicides, since copper becomes more soluble at a lower pH and may become phytotoxic to crops. In addition, phosphorous acid and other acid-based fungicides should not be acidified since they already have a low pH and lowering it could cause phytotoxicity. On the other hand, acidifying carbonate salt fungicides, such as Armicarb, may render them ineffective.

**The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, including temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.

Check the pH of the water used for spraying pesticides frequently throughout the season. If you know that your water has a pH of 7.5 or greater, consider lowering the pH, especially if you are applying a pesticide that is sensitive to high pH. The fastest way to determine the pH level of water is to test it with a pH meter or test paper. Paper test strips are the least expensive; however, they can be unreliable and can vary by as much as two pH points. A pH meter will provide the most reliable and consistent readings. Meters are available commercially for $50 to $400.
Adjust the water pH by using a commercially available acidifying/buffering agent before adding the pesticide. Buffering agents, such as Buffercide, Buffer-X, Unifilm B, and LI 700 Acidiphactant, will stabilize a spray solution at a predetermined pH and keep it at that level. Read and closely follow the directions on the label of the buffering agent and make sure that the solution is stirred well before taking a pH measurement. While a pH of five may be optimal, a pH of six is usually satisfactory for many pesticides, especially if they will be sprayed out immediately after mixing. Some buffering agents such as pHase5 or PHT indicate five will have a color indicator when the correct pH is achieved. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, five = pink or red; six = orange; etc. Granulated food grade citric acid may be the most convenient and inexpensive acidifying material and is available in 50-pound bags from suppliers that handle food grade chemicals. Two ounces per 100 gallons has been shown to reduce the pH of tap water from 8.3 to 5.4.

When tank mixing multiple pesticides or foliar fertilizers, check the pH after the products have been thoroughly mixed and adjust the pH as needed. Not all pesticides react the same to the pH of the spray water solution and some products should not be used with buffering agents. Always read pesticide labels for any precautions with respect to pH and potential product incompatibility issues. Apply pesticides soon after mixing and avoid leaving pesticide tank mixes in the spray tank overnight.

*(Reprinted with permission from: Michigan Fruit Crop Advisory Team Alert news letter (MCAT) Vol. 23, No. 1, March 18, 2008)*

**Table to accompany *Effect of water pH on the stability of pesticides* by Annemiek Schilder, MSU Plant Pathology.** (March 18, 2008)

| Product | Active ingredient | Optimum pH | Half Life / Time until 50% Hydrolysis** |
|---|---|---|---|
| **Insecticides/Miticides** | | | |
| Admire | Imidacloprid | 7.5 | Greater than 31 days at pH 5 - 9 |
| Agri-Mek | Avermectin | | Stable at pH 5 - 9 |
| Ambush | Permethrin | 7 | Stable at pH 6 - 8 |
| Apollo | clofentezine | | pH 7 = 34 hrs; pH 9.2 = 4.8 hrs |
| Assail | acetamiprid | 5 - 6 | Unstable at pH below 4 and above 7 |
| Avaunt | indoxacarb | | Stable for 3 days at pH 5 – 10 |
| Carzol | formetanate hydrochloride | 5 | Not stable in alkaline water; use within 4 hrs of mixing. |
| Cygon/Lagon | dimethoate | 5 | pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min |
| Cymbush | cypermethrin | | pH 9 = 39 hours |
| Diazinon | phosphorothioate | 7 | pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days |
| Dipel/Foray | b. thuringiensis | 6 | Unstable at pH above 8 |
| Dylox | trichlorfon | | pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min |
| Endosulfan | endosulfan | | 70% loss after 7 days at pH 7.3 – 8 |
| Furadan | carbofuran | | pH 6 = 8 days; pH 9 = 78 hrs |
| Guthion | azinphos-methyl | | pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs |
| Imidan | phosmet | 5 | pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs |
| Kelthane | dicofol | 5.5 | pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr |
| Lannate | methomyl | | Stable at pH below 7 |
| Lorsban | chlorpyrifos | | pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days |
| Malathion | dimethyl dithiophosphate | 5 | pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs |
| Matador | lambda-cyhalothrin | 6.5 | Stable at pH 5 - 9 |
| Mavrik | tau-fluvalinate | | pH 6 = 30 days; pH 9 = 1 - 2 days |
| Mitac | amitraz | 5 | pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs |
| Omite | propargite | | Effectiveness reduced at pH above 7 |
| Orthene | acephate | | pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days |
| Pounce | permethrin | 6 | pH 5.7 to 7.7 is optimal |
| Pyramite | pyridaben | | Stable at pH 4 – 9 |
| Sevin XLR | carbaryl | 7 | pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day |
| SpinTor | spinosad | 6 | Stable at pH 5 – 7; pH 9 = 200 days |
| Thiodan | endosulfan | 6.5 | 70% loss after 7 days at pH 7.3 to 8 |
| Zolone | phosalone | 6 | Stable at pH 5 – 7; pH 9 = 9 days |
| **Fungicides** | | | |
| Aliette | fosetyl-al | 6 | Stable at pH 4.0 to 8.0 |
| Benlate | benomyl | | pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min |
| Bravo | chlorothalonil | 7 | Stable over a wide range of pH values |

| | | | |
|---|---|---|---|
| Captan | captan | 5 | pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min |
| Dithane | mancozeb | 6 | pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs |
| Nova | myclobutanil | | Not affected by pH |
| Ridomil | mefenoxam | | pH 5 – 9 = more than 4 weeks |
| Rovral | iprodione | | Chemical breakdown could take place at high pH |
| Orbit | propiconazole | | Stable at pH 5 – 9 |
| **Herbicides** | | | |
| Banvel | dicamba | | Stable at pH 5 - 6 |
| Fusilade | fluazifop-p | | pH 4.5 = 455 days; pH 7 = 147 days; pH 9 = 17 days |
| Ignite | glufosinate-ammonium | 5.5 | |
| Gramoxone | paraquat | | Not stable at pH above 7 |
| Poast | sethoxydim | 7 | Stable at pH 4.0 to 10 |
| Princep | simazine | | pH 4.5 = 20 days; pH 5 = 96 days; pH 9 = 24 days |
| Prowl | pendimethalin | | Stable over a wide range of pH values |
| Roundup | glyphosate | 5 - 6 | |
| Touchdown | glyphosate | 5 - 6 | |
| Treflan | triflularin | | Very stable over a wide range of pH values |
| Weedar | 2,4-d | | Stable at pH 4.5 to 7 |

# WEATHER NOTES

## NEW YORK CROP WEATHER SERVICE NOTES

**Week ending April 27th:** For the second week in a row it was a very warm week with dry weather continuing from Sunday into Wednesday as high pressure over the Canadian Maritimes controlled the weather across the state. Showers and a few thunderstorms occurred across western and central New York ahead of a cold front which swept across the state Wednesday afternoon into Wednesday evening. High pressure from the Ohio Valley moved into the state on Thursday into Friday bringing more dry weather. Light rain fell across parts of the state Friday night ahead of a warm front with more widespread rain due to some showers and thunderstorms ahead of a cold front Saturday afternoon into Saturday evening. Some of the thunderstorms over western New York Saturday afternoon produced large hail, damaging winds and heavy downpours. Temperatures for the week averaged 10 to 15 degrees above normal in most areas, with many locations reaching 80 degrees or higher at least once during the week. Despite the dry conditions continuing in many areas, melting snow continued to produce flooding on several rivers that flow out of the Adirondacks.

**Week ending May 4th:** It was a cool and wet week across upstate New York with temperatures below normal and precipitation generally above normal. A low pressure system using Gulf and Atlantic moisture brought a much needed moderate to heavy rainfall to central and eastern New York Monday into Tuesday. Some locations received one to one and a half inches of rainfall. A cool Canadian air mass brought dry and unseasonably cold weather to the region Wednesday and Thursday mornings. Record cold occurred Thursday morning with a widespread freeze where the growing season began in the Finger Lake Region, Mohawk, and Hudson River Valleys. Unsettled weather returned Thursday night through Saturday with scattered showers associated with a warm front. Cloudy and cool conditions persisted into the weekend with maximum temperatures close to 10 degrees below normal. Aside from Long Island, most locations fell below 32 degrees during the week.

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Questions or Comments about the New York Berry News?
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Check out the NYSAES Tree Fruit and Berry Pathology web site at:
**www.nysaes.cornell.edu/pp/extension/tfabp**

**WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, April 27th, 2008**

| | Temperature | | | | Growing Degree Days (*Base 50*) | | | Precipitation (*inches*) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *High* | *Low* | *Avg* | *DFN*[1] | *Week* | *YTD*[2] | *DFN* | *Week* | *DFN* | *YTD* | *DFN* |
| ***Hudson Valley*** | | | | | | | | | | | |
| Albany | 80 | 39 | 62 | 13 | 88 | 149 | 122 | 0.05 | -0.65 | 1.67 | -1.03 |
| Glens Falls | 80 | 32 | 59 | 12 | 69 | 100 | 84 | 0.08 | -0.63 | 1.77 | -0.89 |
| Poughkeepsie | 85 | 39 | 62 | 12 | 88 | 172 | 132 | 0.04 | -0.83 | 2.56 | -0.56 |
| ***Mohawk Valley*** | | | | | | | | | | | |
| Utica | 74 | 36 | 57 | 14 | 53 | 85 | 73 | 0.64 | -0.41 | 3.19 | -0.99 |
| ***Champlain Valley*** | | | | | | | | | | | |
| Plattsburgh | 78 | 33 | 58 | 12 | 61 | 80 | 62 | 0.08 | -0.61 | 1.68 | -0.85 |
| ***St. Lawrence Valley*** | | | | | | | | | | | |
| Canton | 82 | 35 | 61 | 16 | 81 | 113 | 99 | 0.33 | -0.37 | 1.89 | -0.68 |
| Massena | 80 | 35 | 59 | 13 | 66 | 92 | 76 | 0.17 | -0.46 | 1.39 | -1.01 |
| ***Great Lakes*** | | | | | | | | | | | |
| Buffalo | 79 | 41 | 63 | 15 | 95 | 175 | 149 | 0.01 | -0.69 | 1.57 | -1.01 |
| Colden | 80 | 34 | 58 | 12 | 56 | 106 | 92 | 0.07 | -0.79 | 1.47 | -1.94 |
| Niagara Falls | 77 | 36 | 61 | 12 | 78 | 138 | 108 | 0.02 | -0.70 | 1.30 | -1.55 |
| Rochester | 85 | 42 | 63 | 14 | 92 | 174 | 143 | 0.37 | -0.26 | 1.73 | -0.62 |
| Watertown | 82 | 32 | 60 | 14 | 71 | 110 | 94 | 0.89 | 0.26 | 2.79 | 0.53 |
| ***Central Lakes*** | | | | | | | | | | | |
| Dansville | 81 | 36 | 59 | 11 | 67 | 131 | 103 | 0.49 | -0.20 | 1.17 | -1.38 |
| Geneva | 81 | 40 | 60 | 12 | 71 | 120 | 96 | 1.23 | 0.53 | 2.33 | -0.30 |
| Honeoye | 84 | 35 | 61 | 13 | 76 | 124 | 99 | 0.04 | -0.66 | 1.25 | -1.41 |
| Ithaca | 80 | 35 | 59 | 13 | 65 | 109 | 91 | 1.35 | 0.65 | 2.23 | -0.39 |
| Penn Yan | 84 | 40 | 61 | 13 | 81 | 148 | 124 | 0.88 | 0.18 | 1.58 | -1.05 |
| Syracuse | 84 | 38 | 63 | 14 | 90 | 160 | 131 | 1.30 | 0.53 | 2.69 | -0.31 |
| Warsaw | 80 | 44 | 59 | 15 | 68 | 113 | 103 | 0.14 | -0.65 | 1.43 | -1.62 |
| ***Western Plateau*** | | | | | | | | | | | |
| Alfred | 84 | 31 | 55 | 10 | 35 | 69 | 60 | 0.30 | -0.34 | 1.47 | -1.04 |
| Elmira | 82 | 33 | 58 | 10 | 57 | 108 | 87 | 1.31 | 0.67 | 2.39 | -0.02 |
| Franklinville | 82 | 31 | 55 | 11 | 35 | 68 | 61 | 0.35 | -0.42 | 1.77 | -1.19 |
| Sinclairville | 80 | 30 | 57 | 12 | 51 | 93 | 80 | 0.42 | -0.49 | 1.61 | -1.84 |
| ***Eastern Plateau*** | | | | | | | | | | | |
| Binghamton | 76 | 42 | 61 | 13 | 76 | 137 | 119 | 0.39 | -0.38 | 2.03 | -0.78 |
| Cobleskill | 78 | 34 | 57 | 11 | 53 | 88 | 72 | 0.00 | -0.77 | 1.58 | -1.39 |
| Morrisville | 76 | 41 | 58 | 12 | 59 | 96 | 83 | 0.55 | -0.22 | 2.33 | -0.45 |
| Norwich | 78 | 34 | 57 | 10 | 47 | 78 | 62 | 0.20 | -0.64 | 1.34 | -1.69 |
| Oneonta | 82 | 36 | 59 | 14 | 63 | 112 | 99 | 0.33 | -0.53 | 1.88 | -1.24 |
| ***Coastal*** | | | | | | | | | | | |
| Bridgehampton | 75 | 38 | 55 | 6 | 37 | 66 | 49 | 0.00 | -0.91 | 1.56 | -2.02 |
| New York | 77 | 47 | 60 | 6 | 71 | 162 | 88 | 0.03 | -0.88 | 1.78 | -1.63 |

1. *D*eparture *from N*ormal
2. *Y*ear *to D*ate: Season accumulations are for April 1st to date

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

**WEATHER REPORTS OF TEMPERATURES AND PRECIPITATION THROUGHOUT NEW YORK STATE FOR WEEK ENDING SUNDAY 8:00am, May 4th, 2008**

| | Temperature | | | | Growing Degree Days (*Base 50*) | | | Precipitation (*inches*) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***High*** | ***Low*** | ***Avg*** | ***DFN[1]*** | ***Week*** | ***YTD[2]*** | ***DFN*** | ***Week*** | ***DFN*** | ***YTD*** | ***DFN*** |
| ***Hudson Valley*** | | | | | | | | | | | |
| Albany | 65 | 28 | 48 | -5 | 11 | 160 | 104 | 1.90 | 1.20 | 3.57 | 0.17 |
| Glens Falls | 66 | 24 | 46 | -6 | 6 | 106 | 68 | 2.25 | 1.48 | 4.02 | 0.59 |
| Poughkeepsie | 66 | 29 | 49 | -6 | 11 | 183 | 109 | 1.69 | 0.74 | 4.25 | 0.18 |
| ***Mohawk Valley*** | | | | | | | | | | | |
| Utica | 68 | 27 | 43 | -5 | 7 | 92 | 66 | 1.96 | 0.94 | 5.15 | -0.05 |
| ***Champlain Valley*** | | | | | | | | | | | |
| Plattsburgh | 66 | 27 | 46 | -6 | 6 | 86 | 47 | 1.36 | 0.72 | 3.04 | -0.13 |
| ***St. Lawrence Valley*** | | | | | | | | | | | |
| Canton | 74 | 32 | 49 | 0 | 22 | 135 | 103 | 0.92 | 0.22 | 2.81 | -0.46 |
| Massena | 71 | 26 | 49 | -2 | 22 | 114 | 77 | 0.95 | 0.38 | 2.34 | -0.63 |
| ***Great Lakes*** | | | | | | | | | | | |
| Buffalo | 73 | 30 | 49 | -3 | 27 | 202 | 150 | 1.10 | 0.43 | 2.67 | -0.58 |
| Colden | 70 | 25 | 46 | -4 | 18 | 124 | 91 | 0.88 | 0.04 | 2.35 | -1.90 |
| Niagara Falls | 71 | 27 | 48 | -5 | 22 | 160 | 101 | 1.34 | 0.64 | 2.64 | -0.91 |
| Rochester | 75 | 32 | 52 | -1 | 39 | 213 | 151 | 0.65 | 0.02 | 2.38 | -0.60 |
| Watertown | 75 | 29 | 50 | 1 | 25 | 135 | 100 | 1.13 | 0.54 | 3.92 | 1.07 |
| ***Central Lakes*** | | | | | | | | | | | |
| Dansville | 71 | 28 | 50 | -2 | 31 | 162 | 107 | 0.95 | 0.32 | 2.12 | -1.06 |
| Geneva | 67 | 31 | 49 | -3 | 23 | 143 | 94 | 0.73 | 0.05 | 3.06 | -0.25 |
| Honeoye | 77 | 25 | 50 | -2 | 32 | 156 | 106 | 0.36 | -0.29 | 1.61 | -1.70 |
| Ithaca | 68 | 26 | 49 | -2 | 23 | 132 | 93 | 0.69 | -0.01 | 2.92 | -0.40 |
| Penn Yan | 72 | 29 | 52 | 1 | 35 | 183 | 134 | 0.83 | 0.15 | 2.41 | -0.90 |
| Syracuse | 71 | 28 | 50 | -3 | 23 | 183 | 123 | 1.22 | 0.45 | 3.91 | 0.14 |
| Warsaw | 70 | 23 | 44 | -4 | 16 | 129 | 103 | 0.83 | 0.06 | 2.26 | -1.56 |
| ***Western Plateau*** | | | | | | | | | | | |
| Alfred | 74 | 23 | 46 | -3 | 20 | 89 | 64 | 1.55 | 0.92 | 3.02 | -0.12 |
| Elmira | 71 | 23 | 51 | 0 | 36 | 144 | 99 | 1.20 | 0.53 | 3.59 | 0.51 |
| Franklinville | 69 | 23 | 46 | -2 | 19 | 87 | 68 | 1.23 | 0.46 | 3.00 | -0.73 |
| Sinclairville | 67 | 27 | 47 | -2 | 19 | 109 | 80 | 1.41 | 0.54 | 3.02 | -1.30 |
| ***Eastern Plateau*** | | | | | | | | | | | |
| Binghamton | 65 | 30 | 48 | -4 | 15 | 152 | 111 | 1.06 | 0.31 | 3.09 | -0.47 |
| Cobleskill | 66 | 23 | 44 | -7 | 5 | 93 | 58 | 1.47 | 0.70 | 3.05 | -0.69 |
| Morrisville | 65 | 26 | 47 | -3 | 12 | 108 | 77 | 1.26 | 0.49 | 3.59 | 0.04 |
| Norwich | 68 | 24 | 47 | -3 | 18 | 96 | 59 | 1.37 | 0.56 | 2.71 | -1.13 |
| Oneonta | 69 | 26 | 49 | 0 | 18 | 130 | 99 | 1.25 | 0.34 | 3.13 | -0.90 |
| ***Coastal*** | | | | | | | | | | | |
| Bridgehampton | 59 | 30 | 49 | -3 | 7 | 73 | 34 | 1.55 | 0.64 | 3.11 | -1.38 |
| New York | 59 | 44 | 52 | -5 | 18 | 180 | 57 | 1.56 | 0.65 | 3.34 | -0.98 |

1. *D*eparture *from N*ormal
2. *Y*ear *to D*ate: Season accumulations are for April 1st to date

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