Cornell University
College of Agriculture and Life Sciences

New York Berry News

Volume 15, Number 2 *Spring 2016 Edition*

FROST PROTECTION: TIPS AND TECHNIQUES

Kathy Demchak, Department of Horticulture, Pennsylvania State University

Damage from freezes and frost is of concern from bud break in the spring through flowering and fruit set. The blossoms are tender and are the plant part most commonly damaged by low temperatures. Since loss of the blossoms means a loss of fruit for the year, frost protection is of great concern.

Critical Temperatures for Frost Damage

Damage occurs when water in the plants' cells freezes, thus causing the cells or cell parts to rupture. The temperature at which this occurs depends on the water content and concentration of water vs. solutes in the plant tissue. Therefore, the temperature at which damage occurs varies with the crop and growth stage. **Table 1** lists commonly-accepted critical temperatures for strawberry and blueberry blossoms at different stages of bud development. These values are not absolute, and within reason, it is better to err on the side of safety when protecting crops from frost damage.

Table 1. Critical temperatures (degrees F) for cold damage of flower buds based on stage of development. Note with blueberries, there is considerable variability in temperatures at which damage was reported for these growth stages.

Strawberries	Critical temp.	***Blueberries***	Critical temp.
Bud emergence	10	Bud swell	15-20
Tight bud	22	Tight cluster	18-23
"Popcorn"	26	Separate flowers visible	22-25
Open blossom	30	Late closed blossom	25-26
Green fruit	28	Open blossom	27
Petal fall	28		

Sources: Strawberry Critical Temperatures - K. Perry and B.C. Poling, North Carolina State Univ.; and Richard Funt, Ohio State Univ.; Blueberry Critical Temperatures - Fruit Crop Advisory Team Alert, Vol. 18, No. 3. "Protecting Blueberries from Frost", E. Hanson and M.Longstroth, Michigan State Univ.

Types of Frosts and Freezes

Radiant frosts and freezes occur on calm, clear nights with no cloud cover. Heat is lost from the soil and plants, and radiates back to the sky. *Advective freezes*, sometimes called windborne freezes, are caused when a cold air mass moves into the region accompanied by a lot of wind. It is difficult to protect against this type of freeze.

Frost Protection (Continued)

Environmental Factors Affecting Frost Occurrence and Protection

Air temperature is the measurement used for initiating or stopping frost control practices, and can be taken with either a dry-bulb or wet-bulb thermometer. *Dry-bulb temperatures* are the type commonly referenced in literature and in weather forecasts. *Wet-bulb temperatures* are obtained from a thermometer that is covered with a wet wick. Air is moved over the bulb causing evaporative cooling to occur. The wet-bulb temperature is useful because it essentially is what the plant temperature will be once the irrigation is started and evaporative cooling has taken place.

Wind speeds of more than a few miles per hour can make frost protection difficult, especially in an advective freeze. Light breezes, however, tend to mix the air and can increase temperatures at ground level in the case of radiational frosts. Temperatures tend to be more uniform even across a distance of miles when windy conditions exist.

The *dew point* is the temperature at which the relative humidity reaches 100% as the air cools. At this point, water vapor in the air condenses into fog or dew, which gives off heat, slowing the temperature drop. The risk of having a frost becomes greater as the dew point becomes lower. If the dew point is below freezing, so that condensation and heat release does not take place until below freezing, temperatures can drop to damaging levels extremely rapidly. In this case, the white crystals typically seen in a frost or freeze may not form, a condition sometimes referred to as a "black frost".

Relative humidity is the amount of moisture contained in the air relative to the maximum amount that could be held. It changes with temperature and can change quickly with the air mass.

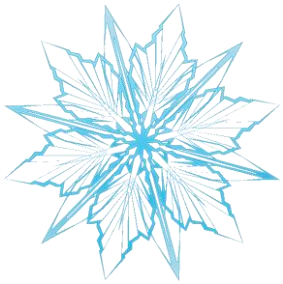
Site-Specific Effects on Frosts/Freeze Occurrence

Site selection is the most important step for frost or freeze protection of a small fruit crop. The best site is one downwind from or closely surrounded by a large body of water. Topography also affects frost occurrence. Cold air is heavier than warm air, and therefore flows downhill. Temperatures are often higher at the tops of slopes, while cold air which collects in the lower areas (frost pockets) is often 4° to 5°F lower. South-facing slopes are generally warmer than those facing north, but plants on south-facing slopes will also come out of dormancy earlier, possibly negating this benefit in many instances.

Soil moisture has an effect. Moist soil holds more heat and radiates heat back to the environment for a longer time than dry soil. If the soil is dry, plantings should be irrigated a day or two ahead of an expected cold snap to allow time for heat to be captured.

Soil texture and compaction are also factors, as heavier soils with more clay retain heat better than sandy soils. Sandy soils are also often lighter in color and hence tend to reflect more sunlight, rather than absorbing it in the form of heat.

Ground cover affects the amount of heat absorbed by and released from the soil. A bare, undisturbed moist soil with no ground cover can release enough heat to raise the temperature 2 to 3 degrees in the plant canopy as compared to a sod-, grass-, or straw mulch-covered soil.



Post-harvest Care to Enhance Blueberry Crop Value

Craig Kahlke, Cornell Cooperative Extension – Lake Ontario Fruit Program

Small fruit has garnished excitement in the US recently, and sales in the berry category have gone up every year, and blueberries of all types are no exception. Blueberries' role as a superfood with high levels of antioxidants have pushed consumer sales. Consequently, overproduction is occurring, particularly in the Eastern US. Proper post-harvest care can extend shelf life and marketing window, which can help growers with the increased competition. Fortunately, blueberries are among the hardiest of small fruit, and with proper harvest, cooling, and packing, fresh market berries can store commercially for 2-8 weeks, depending on numerous factors. Rapid cooling using forced-air soon after harvest can cool product much quicker than static cooling and keep berry quality high significantly longer. In addition, for larger volumes of blueberries, modified atmosphere packaging in the form of pallet shrouds can extend the shelf life 4-8 weeks for most varieties.

Forced-air cooling (FAC) is a relatively inexpensive method of removing heat from blueberries quickly. FAC is accomplished by exposing packages of produce in a cooling room to higher air pressure on one side than on the other. This pressure difference forces the cool air through the packages and past the produce, where it picks up heat, greatly increasing the rate of heat transfer. Depending on the temperature, airflow rate, and type of produce being cooled, forced-air cooling can be from 4 to 10 times faster than room cooling.

Below is a link which displays this idea in Powerpoint format. In this talk, a small FAC cooling system will be shown, and resources will be shared to allow growers to build their own FAC system. The use of modified atmosphere packaging will be discussed as well.

CCE of Niagara County
#585-735-5448 email:**cjk37@cornell.edu**

This is a summary of a talk given at the *New England Vegetable and Fruit Conference*.
To see the original summary, along with others, visit:
http://www.fruit.cornell.edu/nybn/newslettpdfs/2016/KahlkeNEVFC12-15-15.pdf

Upcoming Events!

March 24, 2016

Cornell Cooperative Extension
Saratoga County

Cornell Berry Production Workshop
CCE Saratoga County
http://enych.cce.cornell.edu/event.php?id=508

More info on pages 9-11

April 1, 2016

Berry Processing Workshop
Eastern New York Commercial Horticulture
Pre-Registration BY MARCH 28
http://enych.cce.cornell.edu/event.php?id=527

April 5 or 6, 2016

Work Protection Standard & DEC Special Permit Training: Wayne Co. (5th) & Orleans Co. (6th)

Pre-Registration is Required by April 1, 2016
http://lof.cce.cornell.edu/event.php?id=540

August 13-17, 2016

International Strawberry Symposium
http://www.iss2016-quebec.org/

August 17-18, 2016

NASGA Summer Tour
http://www.nasga.org/

Spotted Wing Drosophila: Winter Biology

Anna Wallingford and Greg Loeb. Dept. of Entomology, Cornell University, Geneva, NY

Spotted wing drosophila (SWD) is a serious pest of small fruits. This invasive fruit fly lays her eggs under the skin of growing and ripening fruits of cultivated and wild host plants. The species was first confirmed in the northeastern US in 2011 and has caused serious crop losses in New York state every year since its arrival. Populations tend to stay very low through the spring which makes June-bearing strawberry and earlier ripening varieties of blueberry and summer raspberry crops less vulnerable to infestation. However, fly numbers increase very rapidly through the summer and later ripening varieties of blueberry and raspberry are affected. Fall-bearing raspberries begin to ripen at a point in the growing season when SWD populations are so high, frequent insecticide applications are necessary to control this pest for the life of the crop. Good chemical control often requires weekly foliar applications and good resistance management calls for alternating use of several modes of action. Aside from being very costly, many growers are suffering under "spray fatigue" when attempting schedules that provide good control SWD in fall-bearing raspberry.

Reproductive diapause in SWD could provide some respite to spray fatigue as the shortening daylengths and cooler temperatures experienced by flies in the fall will trigger a pause in normal reproductive development until environmental conditions improve. Diapausing flies experience changes to their metabolism that improve overwinter survival, like a halt in egg production in exchange for improvements to starvation and cold tolerance. This suspension in egg production was observed by capturing SWD females in the Finger Lakes region of New York and dissecting them to see if they carry eggs (**Fig. 1**). A strong decline in egg-carrying females was seen from September to October and no eggs were found in dissected females by December (**Fig. 2**). This is a similar pattern observed in Oregon, Italy, and Japan, associated with shortening daylengths (< 14 h) and sustained cool temperatures (<55°F). While this suspension in egg production may come too late in the season for many fall crops, those growers who extend their season in high tunnel systems should take note.

Immature SWD that are growing into adults during the fall also experience cooler temperatures. Development is slowed when larvae experience cooler temperatures and long periods of near freezing temperatures can kill immature stages. This emphasizes the importance of post-harvest refrigeration of fruit headed to market.

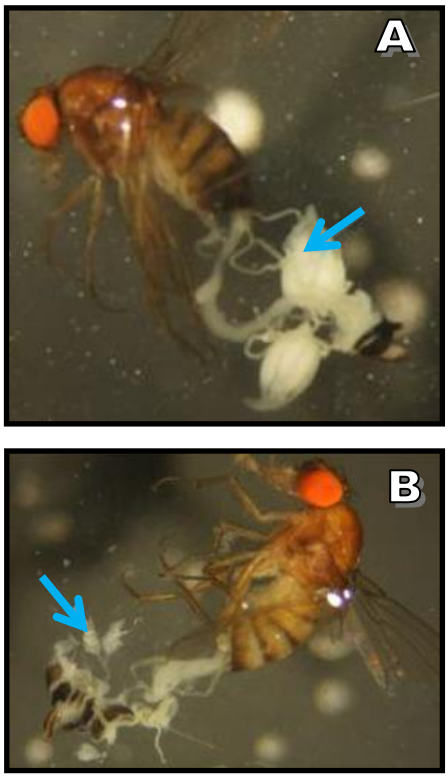


Figure 1:
Dissected ovaries containing several mature eggs (A) and completely undeveloped ovaries (B).

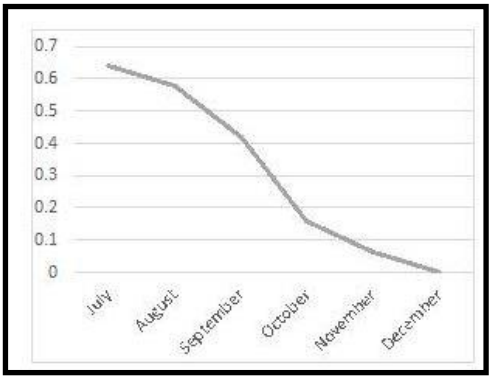


Figure 2:
Proportion of field-captured females carrying mature eggs through the fall of 2014.

Spotted Wing Drosophila Continued...

However, temperatures that do not kill larvae act to make them stronger as the slowed development at moderately cool temperatures (50-60°F) results in larger, darker adults (**Fig. 3**). These winter forms, or "wintermorphs," are better at tolerating cold, starvation, and desiccation which contributes to their chance of overwinter survival. Like the lab flies reared at 50-60°F, flies captured from the wild in October and November are also larger and darker and are far more cold tolerant than the summer forms.

Whether or not SWD successfully overwinters in the northeastern U.S. remains a point of speculation. Even with acclimation, SWD is susceptible to low temperatures and can be killed by short exposures to temperatures below 23°F. Winter temperatures in New York regularly drop below this lethal threshold, however temperatures at the soil surface are maintained just below freezing, especially with snow cover. Acclimated flies selecting a protected overwintering location may rarely experience acutely lethal temperatures. Although overwintering site selection behavior is still unclear, searches in Oregon have found individual flies under tree bark, inside tree collars, under leaf litter, in dropped apple fruit, and one lucky fly under a board in a greenhouse (Dreves). Flies that find themselves under tree bark are likely to experience ambient temperatures and therefore lethal temperatures during New York winters.

On the other hand, those flies that spend the winter at the soil surface under snow cover or even in man-made structures will stand a better chance and surviving the cold. Chronic cold tolerance laboratory studies found that wintermorph flies could survive several months of 33.8°F (Shearer et al.). These flies need only tolerate starvation and avoid desiccation. By shifting energy use from egg production to fat storage in the fall, a diapausing wintermorph fly is more capable of surviving for months at a time. A darker exoskeleton also means a thicker exoskeleton which aids in desiccation resistance. So overwintering is theoretically possible.

Entomologists and cold climate biologists are currently working to determine if there is a northern limit for SWD winter survival and whether or not summer infestations are from local overwintering populations or if they are migrating from milder, southern climates. This information could help with predicting the arrival or severity of yearly infestations.

Figure 3:
Size and color comparison between summermorph (above) and wintermorph flies (below) in female and male SWD.

Spotted Wing Drosophila Continued …

A revised and altered overview of these methods are shown below.
For the full methods or further questions contact Anna Wallingford or Greg Loeb.

Objective 1:
Evaluate survival of cohorts of winter morph adult SWD through winter dormant period at different geographic locations in NA.

Background
There is growing body of data quantifying acute and chronic effects of cold temperature/desiccation/starvation on developmentally acclimated adult SWD (winter morphs) typical of winter periods in temperate North America. However, research groups have had less success evaluating survival of winter morph SWD in the field, in part, because it was unclear where they overwinter. Although more data are required, preliminary results from several programs indicate that winter morph SWD seeks out leaf litter and branch material compared to bare soil or beneath shelters when confronted with cold temperatures. In addition, there have been a few instances where SWD have been collected in the spring in emergence cages placed in areas with leaf litter. With this background, the purpose of this objective is to evaluate survival of cohorts of winter morph SWD in leaf litter + small branches verses soil in southern, central and northern parts of its North American distribution.

Methods
The basic idea is to establish a population of simulated winter morphs in the lab. From these flies, place cohorts into 2 gallon containers with one of the two following treatments: either fill bottom half with field collected soil topped with 6 inches of leaf litter + 4-6 small diameter dead branches (1 inch diameter) collected from field study site or full of field collected soil without leaf litter or branches. A study site is characterized by being in a wooded area adjacent to small fruit that contains leaf litter and other plant debris. A total of 24 containers will be placed at each study site, settled into the ground such that the top of the container in even with ground level. Containers (pots) should have excessive drainage holes to prevent flooding and set up prior to ground freezing but no later than early November. In mid-December place 200 winter morph flies in each container (half male, half female) and cover with mesh screening (size less than 1 mm). Every two weeks, collect 2 containers of each soil treatment and return to lab to determine number of live flies. Place containers in separate screen cages (bug dorms) under room temperature (approximately 25 C) and 24 hour light. In each cage hang yellow sticky card. After 1 week quantify number of flies on sticky card and dead inside cage (but outside of container).
Use two two-channel hobo data logger at each location, with one probe placed 6 inches below surface and one probe at surface of 1 container of each soil treatment. Download data at each collection period. Place data loggers in containers harvested last.

Analysis:
Number live SWD at each collection as function of container soil treatment, time and site plus interactions. Alternative approach would be to use percent live over time as function of soil treatment and site using regression survival fitting procedures.

New NYSBGA Communications Manager

In January of 2016, Cara Fraver was hired as the Communications Manager of the New York State Berry Growers Association. Each month, she'll be writing the newsletter to keep you up-to-date with the latest research regarding SWD, cultural practices, and marketing strategies available to berry growers across the state. She will also be working to expand the reach of the NYSBGA in print and online media. She has a mix of agricultural experience, including non-profit program management, starting and running a commercial vegetable operation and a season working with Cornell Cooperative Extension's ENYCHP. After a season of monitoring SWD traps and trials with Laura McDermott around the Capital District, she has a fascination with these pests and is excited for the opportunity to stay current on research around this insect.

Please contact her at NYSBGA@gmail.com if you have an idea for an article in the newsletter, suggestions for expanding the reach of the NYSBGA or to rejoin for 2016!

http://www.hort.cornell.edu/grower/nybga/index.html

ENYCHP- Small Fruit Regional School

Mark your calendars!

Cornell Berry Production Workshop

Thursday, March 24th
CCE Saratoga County
50 West High Street
Ballston Spa, NY 12020

Cost will be $20.00 per person which includes a lunch

2.5 – 3 DEC credits have been applied for in categories 1A, 10, 22 and 23

This full day Cornell Cooperative Extension workshop will include detailed discussion in topics such as: berry nutrition, disease, varieties, strawberry low tunnels, and berry pests. An optional pruning workshop will also follow the formal DEC portion of this event. The workshop offers an exclusive opportunity to interact with and learn from Cornell Faculty. Please come and join us!

Speakers will include:

Dr. Marvin Pritts- Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

Dr. Courtney Weber- Associate Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

Dr. Kerik Cox- Assoc. Professor, Plant Pathology and Plant-Microbe Biology Section, School of Integrative Plant Science, Cornell University

Dr. Greg Loeb- Professor, Dept. of Entomology, Cornell University

For registration and more information please contact Laura McDermott at (518)-791-5038 or lgm4@cornell.edu
Or visit our website: http://enych.cce.cornell.edu/event.php?id=508

Cornell Berry Production Workshop

Thursday, March 24th

CCE Saratoga County
50 West High Street, Ballston Spa, NY 12020

Agenda

9:00 – 9:15 Welcome, NYSBGA intro

9:15 – 10:00 (45 Mins) **Using Soil Health Information as a Tool to Address Berry Nutrition** - Dr. Marvin Pritts, Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

This session will discuss soil health in terms of perennial and semi-perennial berry crops. Soil management in terms of biological, chemical and physical characteristics, how to examine those characteristics and steps you can take to improve upon them will be covered. Impact of soil health on overall berry plant vigor, ability to resist pest pressure and productivity will be discussed.

10:00 – 10:30 (30 Mins) **Using low tunnels for fall production of strawberries** - Dr. Marvin Pritts, Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

In ongoing research, low tunnels are proving to be an excellent way to limit the spread of disease and improve overall productivity. This session will explain the findings.

10:30-10:55 (25 Mins) **Identifying Disease in Berry Crops** - Dr. Kerik Cox, Assoc. Professor, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell University

Identification of disease is the first step in a good pest management program. This talk will focus on some of the most common diseases and how to discern one from another.

10:55 – 11:05 Break

11:05 – 11:30 (25 Mins) **Strawberry Varieties** - Dr. Courtney Weber, Associate Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

Characteristics of berry varieties, especially disease resistance, are important considerations when choosing plants. Dr. Weber will summarize the pros and cons of new and older strawberries.

11:30 – 11:55 (25 Mins) **Top Three Insect Pests for Strawberry, Raspberry and Blueberries: and how to identify them** - Dr. Greg Loeb, Professor, Dept. of Entomology, Cornell University

Each berry crop has a number of specific insect and mite pests. The life cycles and best management varies. Dr. Loeb will discuss the top 3 from each category of berry crops.

11:55 – 12:20 (25 Mins) **Raspberry Varieties** - Dr. Courtney Weber, Associate Professor, Horticulture Section, School of Integrative Plant Science, Cornell University

Characteristics of berry varieties, especially disease resistance – and in the case of Spotted Wing Drosophila (SWD control) – time of bearing, are important considerations when choosing plants. Dr. Weber will summarize the pros and cons of new and older raspberry varieties.

Cornell Berry Production Workshop Agenda (continued)

12:20 – 1:00 LUNCH

1:00 – 1:25 (25 Mins) **Managing Diseases in Small Fruit Plantings** - Dr. Kerik Cox, Assoc. Professor, Plant Pathology and Plant-Microbe Biology Section, School of Integrative Plant Science, Cornell University

Disease management is a challenge made more difficult when considering the prospect of fungicide resistance. Management of diseases in a way that will help growers avoid resistance will be covered.

1:25 – 1:50 (25 Mins) **Managing Insects in Small Fruit Plantings** - Dr. Greg Loeb, Professor, Dept. of Entomology, Cornell University

Insect management is a challenge made more difficult when considering the prospect of insecticide resistance – especially in the advent of SWD. Successful insect management while limiting resistance will be the focus of this discussion.

1:50 – 2:20 (30 Mins) **Berry pruning: an effective way to control pests and promote productivity** – Laura McDermott, CCE ENYCHP

Raspberries and blueberries need annual pruning to retain vigor and help control pest problems. With both of these crops pruning is a substantial part of the cultural control of SWD.

2:20 Adjourn formal DEC portion of meeting

2:20 – 2:45 – Travel to Optional Pruning Demo*

2:45 – 3:30 – Pruning Demo

3:30 Depart for home

* timing contingent on finding a grower agreeable to host within a 15 minute drive. I have one in mind that would be on the way home for faculty, but it isn't mandatory that they attend.

Limiting Bird Damage in Fruit Crops

Interested in learning how to limit bird and other wildlife damage to your crops?

The Limiting Bird Damage in Fruit Crops workshop webinar videos have been posted online at: https://www.youtube.com/playlist?list=PLoNb8lODb49vWWRgYS9ObLT2zi3vb3JBS

Under the playlist *"Limiting Bird Damage in Fruit: A Vertebrate Damage Management Workshop, Aug 2015"* there are 7 videos available. Each of these videos were presentations given at the workshop and are available to the public through this YouTube playlist.

The videos available are:

1) Bird Species Most Responsible for Damaging Fruit Crops: https://youtu.be/yHzaKDRZiFk

2) Birds in Fruit Crops, Economic and Consumer Aspects of Deterrence: https://youtu.be/QDrz7zW-I3w (available until Sept 1, 2016)

3) Grower Perceptions of Bird Damage to Fruit Crops in NY 2011: https://youtu.be/IXi--g9fH7s

4) Tactics for Managing Deer in Fruit: https://youtu.be/b8_y3HSV4p0

5) Wildlife Management, Bird Resources, Regulations, and Permitting: https://youtu.be/EtkGEnRsGB4

6) Risk factors for bird damage in fruit and mitigation strategies: https://youtu.be/_cmgzerLACQ (until Sept 1, 2016)

7) Scare devices investigated in fruit plantings in NY: https://youtu.be/CF9yritTQ3c

Various other videos are provided through the NYS IPM YouTube channel which can be viewed at: https://www.youtube.com/user/NYSIPM.

Manage blueberry fertility through your trickle system

Trevor M. Hardy. Brookdale Fruit Farm Inc.

Brookdale Fruit Farm Inc. is a 7th generation family owned and operated fruit and vegetable farm located in southern NH. Brookdale's primary markets are Wholesale fruit and vegetables, irrigation and row crop supplies division, retail store locations, and pick your own fruits and vegetables. Brookdale is the largest diversified fruit and vegetable farm in the state of NH and focuses on growing and distributing many different fruit and vegetable products throughout New England. In recent years Brookdale has become the New England leader in the design, implementation, and utilization of drip and fertigation systems for growing fruit and vegetable crops.

Brookdale has had blueberries in production for pick your own since the early 1980's. We currently operate 7+ acres of high bush blueberries for our pick your own market. These varieties include Blue Ray, Patriot, Bluetta, Blue Crop, and Eliot. The first drip irrigation system was installed on this crop in 1985 and was in continuous yearly use until 2013. At that time the original was replaced due to continued mulching of wood chips over the drip tubing and kinking from bush growth, it was easier to pull new lines than fish out the original working lines. Since that realization as a standard practice after mulching the blueberries we walk each row and pull the tubing back on top of the mulch and to the edge of the bush. This allows for an easy visual check at the beginning of each season for leaks and allows the grower to see the water dripping from the tubing. The primary thing to check when considering feeding plants with fertilizer through a drip system is to make sure your drip system does not have any leaks or breaks.

Our blueberries receive a granular application of ammonium sulfate yearly, and the rest of the nutrients are fed throughout the growing season through our drip system. We typically focus on applying 60 to 75% of required nutrients granularly and depending on weather conditions and timing everything else is fed through the drip system. In some very wet springs where it is impossible to get into the blueberry fields to spread fertilizer early, the drip is turned on for the purpose of applying a starter fertilizer. Fertilization with the drip takes place weekly starting around the end of April to the second week of May and continues straight through with weekly applications until the middle of July. The product used for fertilization is a special berry feed blend created by Plant Marvel Laboratories which is used and distributed throughout the Northeast by Brookdale Fruit Farm. This unique berry feed blend is a combination of ammoniacal and urea based nitrogen blended with a micro package and a larger sulfur content to help maintain proper pH for blueberries. This fertilizer is water soluble and available in 25 lb. bags and applied at varying rates through the season ranging from 20 to 35 pounds to the acre.

Fertigation is a bit of a tricky application to design and implement on a drip irrigation system. The typical method of injection used is conducted through a venturi type injector, also known as a mazzei injector. The injector has to be sized properly to operate within the functional flow rate range of the area of crops to be fertilized. If an acre plot of high bush blueberries were to be irrigated and fertilized at a plant and spacing of 6 feet between plants and 12 feet between rows approximately 17 rows would be present per acre. 17 rows at 208 feet long give approximate row footage per acre of around 3600 feet of tubing. That tubing typically has drippers built into it with water dripping every 12 inches at a rate of 0.5 gallons per hour per dripper. The math to equate the flow rate of that acre is as follows ((total row footage / dripper spacing per foot) * flow rate in gallons per hour) / 60 in order to get gallons per minute. ((3600/1)*0.5)/60= 30 gallons per minute of water for an acre of blueberries. Brookdale makes it easy with their premade fertilizer injector assembles with accompanied flow rate ranges to size a fertilizer injector for your application. For one acre application either a 2 x 1 inch injector or a 2 x ¾ inch injector will work. The premade injector assemblies contain 3 check valves to meet the EPA guidelines regarding chemical water injection and prevent any possible back siphoning of fertilizer to the water source. For more information on injection tools and applications please contact Trevor Hardy at **tractortrv@aol.com.**

This is a summary of a talk given at the *New England Vegetable and Fruit Conference*.
To see the full PowerPoint abstract, along with others, visit: http://www.newenglandvfc.org/tuesday_dec_15.html

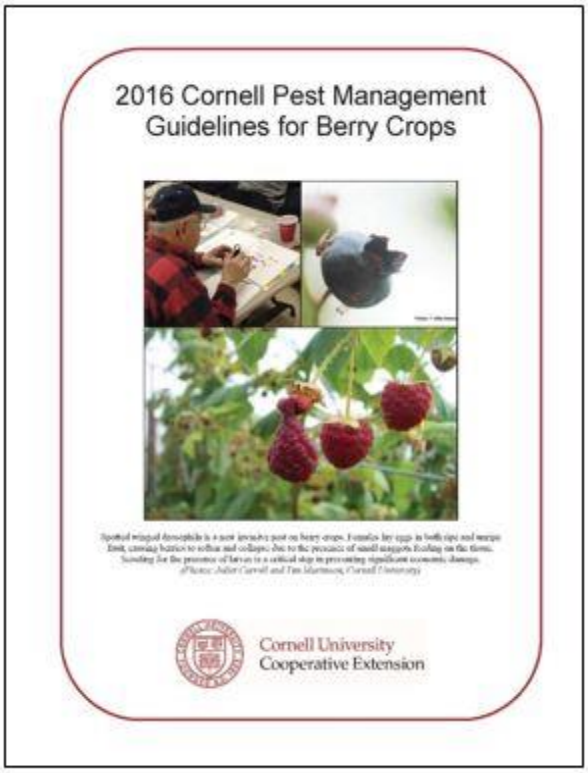
Cornell Pest Management Guidelines for Berry Crops

The **2016 edition** of the *Cornell Pest Management Guidelines for Berry Crops* is now available.

This annual publication provides up-to-date pest management and crop production information for *blueberry*, *bramble* (raspberry and blackberry), *strawberry*, *ribes* (currant and gooseberry), *cranberry*, *elderberry*, and *Juneberry* (Saskatoon) production in New York State. Information on wildlife management and harvesting, handling, and transporting berry crops is also included. This publication has been designed as a practical guide for berry crop producers, crop consultants, ag chemical dealers, and others who advise berry crop producers.

In addition to the annually revised pesticide and crop production information, the following highlighted changes in this edition of the *Berry Guidelines* that will benefit berry producers include:

- **Updated information on spotted wing drosophila control.**
- **Identification of pesticide active ingredients that meet EPA's criteria of acutely toxic to bees.**



The Cornell Guidelines are available as a print copy, online-only access, or a package that combines print and online access.

The print edition of the 2016 *Berry Guidelines* costs $28 plus shipping. *Online-only access* is $28. *A combination of print and online access* costs $39.00 plus shipping costs for the printed book.

Cornell Guidelines can be obtained through your local Cornell Cooperative Extension office or from the Cornell Store at Cornell University. *To order from the Cornell Store, call* **(800) 624-4080 or order online at** http://store.cornell.edu/c-875-pmep-guidelines.aspx

Cornell University Cooperative Extension

TheCornellStore®

Day Neutral Strawberry Fertility and Crop Management – *Guidelines for Northeast Growers*

Laura McDermott. Cornell Cooperative Extension, Eastern NY Commercial Horticulture Program

There are two opportunities for planting Day Neutral (DN) strawberries – spring planting of fall-dug dormant plants, or late summer planting of plugs. Spring planting remains a priority for many growers as it allows them to take advantage of spring soil moisture. Growers use DN varieties to augment June bearers – primarily to follow the larger matted row production, but also to provide early production the second year.

Pre-plant soil test and site prep should focus on phosphorus levels. Additionally growers should add 50 lb. actual N/acre pre-plant during bed formation usually as a granular blend along with the required P and K. Some growers are prepping fields in the fall to help them get access to fields as soon as possible in the spring. This would mean that some compensation for pre-plant N might be needed. Deer and other critters can also do a number on the plastic mulch, but in many areas it might be worth doing this early especially as they predominately plant the berries by hand. DN strawberries perform best when planted on plastic mulch covered raised beds.

In the spring, flower trusses are removed until the plant reaches a reasonable plant size - 6-8 healthy leaves per crown – which usually translates into sending a crew through twice.

Beginning at heavy bloom to green fruit, soluble fertilizers should be fed through the drip irrigation system at a rate of 3-5 lb. actual N/acre/week. Initially the rate starts at 3#, and then it gradually increases until harvest begins. When harvest kicks in, the weekly N rate may actually go up to 7# N/acre/week, or 1# each day.

Alternate weekly fertilizer source between calcium nitrate ($Ca(NO3)2$) and a greenhouse grade potassium nitrate ($KNO3$, 13-0-44) to provide necessary calcium and potassium along with nitrogen. Recommended K rate is 15 lb. /week. $CaNO3$ is a safe Ca source from a root perspective. Urea can also be used as a N source and later in the season it might be more important as it is less expensive.

Boron is not specifically used, despite the fact that the literature indicates it is very important and most soils in the East are deficient. Many growers are very interested in using foliar nutrients, but the return on investment remains unclear.

DN plantings are mostly annual crops but some growers are holding over the planting for a second season with mixed results. Seascape overwinters well but Albion is quite tricky under northern conditions. The typical overwintering method for Canadian growers is one layer of heavy weight row cover (40 to 50 ml vs. standard 19 ml) with no straw. The heavy cover is more durable, and it lasts at least two years. New York growers still depend on straw.

Most DN fruit is being sold at retail farm stands so yield is important but not as critical as it is for wholesalers as retail growers are receiving a premium price and also need very high quality. The most popular variety is Albion, with a lot of Seascape and San Andreas. San Andreas seems to overwinter better than Albion and has good fruit size, but the first picking may be later than Albion.

#518-746-2562 email: **lgm4@cornell.edu**

About the guide

This two-part nursery guide for berry growers cross references scores of cultivars with the nurseries that sell them.

The nurseries page contains an alphabetized listing of businesses throughout the United States and Canada that have requested inclusion in our listing. If you are a nursery that sells berry crops, see below to find out how to be included on this list.

No endorsement is intended for those nurseries included in the list, nor discrimination for those not listed. The buyer must evaluate nursery quality and reputation through independent means.

How may my nursery be listed?

Contact Marvin Pritts, Craig Cramer, or Nicole Mattoon and provide the following:

- Nursery Name
- Website Address
- Email Address
- Mail Address
- Fax
- Phone
- Cultivars you currently sell
- Cultivars you are not selling this year but sold last year

In addition, we would be glad to receive your catalog each year. Mail or email the information with an attention or subject line **"Berry Nursery Guide"**.

Organic Farming Development/Assistance

The New York State Department of Agriculture and Markets has a webpage available that provides an array of information for organic farmers. Some of the resources it provides are:

- How to become a certified Organic Farm
- Resources on how to market organic products
- Consumer Information
- Finding organic farms and food near you
- Commonly asked questions on organic foods and farming

The webpage also provides Organic Production Guides and information about Organic EQIP.

To access more information please visit: http://www.agriculture.ny.gov/ap/organic/

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See us at:
http://hort.cals.cornell.edu/

New York Berry News (**NYBN**) is a seasonal commercial berry production newsletter provided by Cornell berry team members. It is designed to help promote and strengthen commercial berry crop production in New York State. NYBN is available free of charge in pdf format at: http://www.fruit.cornell.edu/nybn/.

Visit the NYBN web site to view back issues or to subscribe to e-mail notices with a link to the current issue.

More on individual team members and their areas of expertise may be found at: http://www.fruit.cornell.edu/berry/berryteam.htm.

UPCOMING EVENTS all posted on page 4

Questions or comments about the New York Berry News?

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