



Berry Notes

Prepared by the University of Massachusetts Fruit Team

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UPCOMING MEETINGS

GAP YouTube

UMass Youtube videos (accessed by Smartphone or computer) teaches growers strategies for controlling microbial food safety hazards throughout all phases of production, harvest, and post-harvest handling. This information also prepares growers for the Good Agricultural Practices (GAP) certification process. *Click [here](#) to read more.*

Hop Harvester Trialed at Massachusetts Hop Farm

A prototype of a new small scale, mobile hop harvester developed for New England hops growers was showcased at Four Star Farms in Northfield, just prior to Hurricane Irene on August 25. Dr. Heather Darby and Rosalie Madden from UVM Extension and Chris Callahan from Callahan Engineering led the discussion and demonstration of the hop harvester, being used for the first time in the hop yard at Four Star Farms. *To read the whole article or see video, click [here](#).*

[Massachusetts Farm Disaster Recovery Fund established](#) - Severe weather this summer brought devastation to many Massachusetts farms. Making a bad situation worse, hundred year flooding from Tropical Storm Irene washed away farmlands, farms, livelihoods, families, and in some cases large chunks of rural communities. Coping with a tragedy of this magnitude demands a full court press. The Commonwealth's agricultural community has reacted swiftly to this tragedy and established the Massachusetts Farm Disaster Recovery Fund, a charitable initiative formed under Massachusetts Association of Conservation Districts (MACD) to mitigate suffering and to improve farm lives and communities. *Read more at http://www.ma.nrcs.usda.gov/news/connection/2011-10-07/mass_farm_disaster_fund.html*

STRAWBERRY

Disease Snapshot – Verticillium Wilt

Kerik Cox, Cornell University

Disease Name: *Verticillium* wilt of strawberries

Cause: *Verticillium albo-atrum* & *dahliae*

When to watch for it: Spring to Fall

First line of defense: Avoid planting after vegetables or any other crop with a history of wilt disease. Use disease-free planting stock.

Summary: *Verticillium* wilt is caused by a soilborne pathogen that affects many agronomically important hosts ranging from fruit trees to vegetables. The pathogen infects the roots and spreads through the vascular tissue causing the plant to become stunted and wilt. The wilt begins with the outmost more developed leaves while the younger inner leaves often appear healthy, but stunted. Decline due to *Verticillium* wilt can be slower than other plant pathogens, but the disease can still devastate a planting. In severe infections, it's not uncommon to find diagnostic bluish streaks on the petioles and runners, and in the vascular tissues of the crown. Since *Verticillium* can survive in the soil for many years it's important to avoid planting after vegetables or any other crop with a history of wilt disease. Be specifically mindful of tomato,

eggplant, peppers, pigweed, horse nettle, and stone fruit, as they are common hosts of *Verticillium*. (**Source:** *New York Berry News*, Volume 10 Number 8, Sept 2011)



RASPBERRIES/BLACKBERRIES

Raspberry Variety Review

Courtney Weber, Cornell University

Raspberry varieties are classified as floricane (summer) or primocane (fall) bearing. (A few primocane bearing types are described as everbearing, which produce a small to intermediate fall crop and can be managed in a double cropping system.) Raspberries are naturally biennial with a perennial crown. Primocanes grow the first year, go dormant in fall, get chilled in winter, and fruit the following summer (the primocanes are now called floricanes, which die after fruiting). New primocanes are growing as the floricanes fruit. Floricane varieties must be pruned in the spring to thin the fruiting canes and remove dead canes for better disease management and fruit size. There are red (*Rubus idaeus*), black (*Rubus occidentalis*), and purple (red x black hybrid) raspberry varieties suitable for production in temperate states.

Primocane varieties fruit on the first year's growth in the fall of the year. Currently, [red and some yellow raspberries and blackberries] are available of this type. The strength of fruiting in primocane types varies widely from tips only on some floricane varieties to nearly the whole cane in varieties such as 'Autumn Britten' and

'Himbo Top'. Later primocane varieties such as 'Ruby' and 'Heritage' can have yield reductions from early frosts in more northern growing regions. Pruning in primocane varieties is done by mowing spent canes to the ground before primocanes emerge in early spring.

Currently [most] available black and purple raspberry varieties are floricane bearing with most developed in New York or derived from germplasm from the region.

New raspberry varieties are actively being developed in about 11 public breeding programs around the world with the majority suitable for production in the temperate regions of the U.S. coming from Cornell University ('Heritage', 'Encore', 'Prelude', 'Titan', 'Ruby', 'Taylor'), University of Maryland ('Caroline', 'Anne', 'Jaclyn') and Ag Canada in Nova Scotia ('Nova', K81-6). Increasingly, new varieties from European programs are being introduced in to the U.S. ('Autumn Bliss', 'Autumn Britten', 'Polana', 'Polka', 'Himbo Top' and others). No variety will work well in all locations, soil types, and production systems, but many have proven to be useful

in many different situations. By planting a series of varieties, it is now possible to have fruit from mid to late June until fall frost (or longer with protection) in much of the temperate U.S. with only a short late-summer lag in production. Cornell's newest variety, 'Crimson Giant', released in 2011, extends the season in the fall to the end of October and beyond with large, high quality, bright red fruit.

PRIMOCANE RED RASPBERRIES

Autumn Bliss (Great Britain, Plant Patent #6597) is an early ripening raspberry with large, highly flavored fruit. It ripens 10 to 14 days before Heritage. Much of the crop is produced within the first two weeks of harvest, which is an advantage in northern climates. It produces short canes with few spines. The fruit is dark red and darkens with storage and is fairly soft. It is susceptible to raspberry bushy dwarf virus.

Autumn Britten (Great Britain) is early ripening with large, firm, good flavored fruit. The fruit tends to be dark and darken in storage. It is taller than 'Autumn Bliss' with better fruit quality but lower yields. It produces sparse cane numbers.

Caroline (University of Maryland, Plant patent #10,412) is a large, good flavored, conical fruit. The fruit will darken with storage. It produces tall upright canes. The short fruiting laterals can be challenging to pick, but yields are very good for the fall. It has moderate to good resistance to Phytophthora root rot.

Crimson Giant (Cornell University-NYSAES, Plant patent applied for) is the latest release from the Cornell program and has large, bright red fruit with a conical shape. The berries are firm and flavorful. It ripens after 'Heritage' and extends the season until late October or later with high tunnels. There is a significant risk to the crop from early frost with outdoor production.

Heritage (Cornell University-NYSAES) is considered the standard for fall bearing varieties. These tall, rugged canes have prominent thorns and can be very high yielding if the complete crop can be harvested. The primocane crop ripens relatively late. Fruit is medium-sized and has good color and flavor, firmness, and good freezing quality. It is resistant to most diseases. Due to its late ripening, this variety is not recommended for regions with cool summers or a short growing season with frost before September 30 unless high tunnels or other cold protection is used.

Himbo Top (variety 'Rafzaqu') (Switzerland) produces good quality, large fruit. The fruit is bright red with good flavor. Plants are vigorous and upright and medium in height with very long fruiting laterals that require trellising. Sucker production is somewhat sparse leading to moderate yields.

Jaelyn (University of Maryland, Plant Patent #15647) is an early season variety with large firm berries ripening 2 weeks before Heritage. The fruit is dark red with superior flavor and will darken with storage. The fruit is very long conical and adheres tightly until fully ripe. Plants are vigorous and erect but susceptible to yellow leaf rust. Potato leaf hoppers show a strong preference for this variety and can cause significant damage.

Joan J (Great Britain) is an early season variety with very firm fruit with a thick texture. The fruit is conic and dark red and will darken with storage. The canes are vigorous, upright and spineless making picking easy. Yield and fruit size is very good. The fruit skin is thin and can be damaged easily, especially in high temperatures.

Josephine (University of Maryland, Plant Patent #12,173) fruit is large with very good flavor ripening in the late season. Berries are firm and cohesive. The color is dark red. Plants are upright and vigorous needing little containment trellising. It is resistant to leaf hopper and Phytophthora root rot. This variety will extend the season in a high tunnel system.

Polka (Poland) has medium large primocane fruit that ripen in the mid-fall season. The fruit is somewhat soft with good quality and a shiny red appearance. It is a vigorous variety with good sucker production. Potato leaf hoppers so a strong preference for this variety and can cause significant damage.

PRIMOCANE YELLOW RASPBERRIES

Anne (University of Maryland, Plant patent #10,411) produces large, conic, pale yellow fruit that ripen mid- to late season. It has very good flavor and texture. Tall upright canes sucker sparsely requiring higher planting density. It is resistant to Phytophthora root rot but susceptible to leaf hoppers and rust.

Kiwigold (New Zealand, Plant patent #11,313) and **Goldie** (cv. Graton Gold) (California, Plant Patent #7,625) are amber sports of Heritage, similar in all characteristics except fruit color. Fruit blushes pink when overripe with Goldie slightly darker. The fruit is medium-sized and has good flavor and firmness and ripens relatively late. They are resistant to most diseases.

FLORICANE RED RASPBERRIES

Early Season

Boyne and **Killarney** (sibling varieties from Manitoba) perform very similarly. Both have are early season with small to medium sized fruit with good eating and freezing quality but can be somewhat dark and soft. The plants are spiny and produce many suckers. They have excellent winter hardiness but are susceptible to anthracnose. Boyne is moderately resistant to late yellow rust and tolerant to Phytophthora root rot and crown gall, but is susceptible to raspberry fireblight. Killarney is

moderately resistant to Phytophthora root rot and is susceptible to mildew.

Prelude (Cornell University-NYSAES, Plant Patent #11,747) is the earliest summer fruiting variety available. The fruit is medium sized, round, and firm with good flavor. It is very resistant to Phytophthora root rot and has good cold hardiness. A moderate fall crop is large enough to warrant double cropping. It is the best early season variety available for the northeast.

Mid Season

Canby (Oregon) canes are tall, nearly spineless, and moderately productive. The fruit ripens mid-season, is medium to large in size, firm, and bright red with excellent flavor. It has moderate to poor cold hardiness, and buds may winter kill in cold climates. It is susceptible to Phytophthora root rot. It is also susceptible to powdery mildew making it unsuitable for tunnel production.

Moutere (New Zealand) is large fruited variety with very firm fruit. The canes are vigorous and tend to weep with the heavy fruit load. The fruit is light red with a waxy, dull appearance. The yields are very high but the flavor is poor. Hardiness in NY has been good.

Nova (Nova Scotia) is vigorous and upright with long, fruiting laterals. The canes have very few spines. The fruit ripens in mid-season and is medium sized, bright red, firm, and somewhat acidic in taste. It is considered to have better than average shelf life. The plants are very hardy and appear to resist most common cane diseases, including rust. It will set a late fall crop.

Titan (Cornell University-NYSAES, Plant patent # 5404) produces large canes with very few spines with suckers that emerge mostly from the crown, so it is slow to spread. It is susceptible to crown gall and Phytophthora root rot but is extremely productive. Fruits ripen mid to late season and are extremely large and dull red, with mild flavor. Berries are difficult to pick unless fully ripe. With only fair hardiness, Titan is for moderate climates. It is resistant to the raspberry aphid vector of mosaic virus complex.

Late Season

Encore (Cornell University-NYSAES, Plant patent # 11,746) is one of the latest summer fruiting raspberry varieties available. It produces large, firm, slightly conical berries with very good, sweet flavor. The fruit quality is considered very good. It is moderately susceptible to Phytophthora root rot and has good cold hardiness.

K81-6 (Nova Scotia) produces canes that are medium tall with spines only at the base. The fruit is very large with good flavor that ripens very late summer with average firmness. It is resistant to late yellow rust but is

susceptible to leaf curl virus and raspberry fire blight. It has shown good cold hardiness in NY trials.

Octavia (Great Britain) is a new late season variety that promises to close the summer gap before primocane varieties begin. The fruit is large and generally round shaped and light red. The flavor is poor to average with adequate sun. The canes are semi-spineless with good resistance to aphids and cane botrytis. It is susceptible to spur blight, raspberry bushy dwarf virus and Phytophthora root rot.

BLACK RASPBERRIES

Black Hawk (Iowa State University) fruit is small and glossy with good firmness. Plants are vigorous, similar to wild types. The canes are relatively hardy, and resistant to anthracnose. Yields are moderate. This variety is generally falling out of favor due to its small fruit and wild growth habit.

Bristol (Cornell University-NYSAES) fruit is medium to large and firm, with excellent flavor. Plants are vigorous, high yielding for black raspberry and hardy. It is susceptible to anthracnose and tolerant to powdery mildew.

Haut (USDA-ARS, Maryland) fruit is large sized but soft. The dark shiny black color makes them very attractive. It ripens over a long period producing good yields. The plants are vigorous and upright with good productivity.

Jewel (Cornell University-NYSAES) fruit is large, firm, glossy, and flavorful. Plants are vigorous, erect, hardy, and productive. This variety appears to be more disease resistant than others including resistance to anthracnose.

Mac Black (Michigan) ripens medium large berries 7-10 days later than most varieties. The fruit is large, moderately firm and flavorful. The canes are vigorous, erect, and hardy.

PURPLE RASPBERRIES

Brandywine (Cornell University-NYSAES) ripens later than most red varieties and are large, reddish-purple, and quite tart. Berries are best used for processing. This is a high yielding variety. Canes are very tall with prominent thorns, and suckers grow only from the crown so the plant will not spread. It is susceptible to crown gall but partially resistant to many other diseases.

Royalty (Cornell University-NYSAES, Plant patent # 5405) is the most widely planted purple variety. Fruit ripen late and are large and reddish-purple to dull purple when fully ripe. Berries tend to be soft but sweet and flavorful when eaten fresh. It is excellent for processing and can be harvested when fruit is red for fresh eating. Canes are tall and vigorous, with thorns, and are extremely productive. Royalty is immune to the large raspberry aphid, which decreases the probability of

mosaic virus infection, but is susceptible to crown gall. (Below left: "Polka"; below right "Autumn Britten")

(Source: New York Berry News, Volume 10 Number 8, Sept 2011)



BLUEBERRY

Flower Bud Formation in Blueberries – Reproductive Physiology 101

Excerpt by Robert Gough from "The Highbush Blueberry and its Management; 1994"

[Editor's Note: In researching this topic I ultimately concluded that I had to 'go to the source' and see what Bob Gough had written about it. Below is an excerpt from his iconic book. Sadly, the next thing I discovered was that he had just passed away on Sept. 14th. As such, this reprint of his writing is without his expressed permission, but I hope he doesn't mind. He helped a lot of blueberry growers throughout New England before he took his talents to Montana. All the best Bob.]

By way of explanation, some concern has been expressed about whether or not blueberries will have set fruit this season due to the continuous rain, especially late in the season. While I don't know if there will be reduced fruit set as a result, I thought it a good opportunity to learn a little about how blueberries set their flower/fruit buds. Beyond that, we'll just have to wait and see what Mother Nature gives us next season. In the meantime, get yourself a copy of Bob's book.

Flower Buds

Initiation

The initiation, or induction, of flower buds is a biochemical signal leading to anatomical alteration (differentiation) of a vegetative apex into a reproductive one (i.e., a chemical command that "tells" the apex to stop producing leaves and begin producing flowers). Because the exact time of initiation is controlled by weather and cultural practices, it will vary slightly among years and planting sites. Gough et al. (1978a,b) reported that floral differentiation of several cultivars occurred between the end of July and the end of August in the northeastern United States. These dates correspond to between 60 and 90 days after bloom. Actual initiation, therefore, occurred sometime before.

Most fruit and nut species do not initiate flowers in response to photoperiod, although this phenomenon does control other aspects of their growth. Seasonal physiologic age, measured from some event (like date of bloom) or from other factors mentioned above, triggers

induction. A blueberry shoot will not form flower buds until it has experienced its last flush of growth and its final apical abortion.

Factors Affecting Initiation

Carbohydrate-to-Nitrogen Ratio

Although the ration of carbohydrate to nitrogen (C:N) is not primarily responsible for the initiation of flower buds, as once thought, it does influence it. If supplies of supplies of nitrogen are excessive in relation to carbohydrates – as would result directly from over-fertilization or indirectly from shade, cloudiness, or defoliation because of decreases in photosynthesis – then flower bud formation is decreased. In Florida, defoliation of shoots in August substantially reduced the number of flower buds formed when compared to defoliation of shoots in October (Lytene 1992). Drought and high temperatures, because they can interfere with nitrogen uptake, can also reduce initiation. Generally, moderate amounts of nitrogen fertilization and strong shoot growth result in the best initiation.



Cool Conditions

Cooler summer temperatures, especially if days are bright, can result in an accumulation of carbohydrates that may increase the number of flower buds formed.

Biennial Bearing

Once common in apples, biennial bearing rarely occurs in blueberries. An exceptionally heavy crop of fruit can drain the plant's supply of carbohydrates and reduce flower bud formation. The following year, only a light crop can be produced, draining fewer nutrients and leaving more available for heavy flower bud production. The cycle is thus perpetuated over the years. This condition has been observed in some cultivars, such as the 'Darrow,' but never as pronounced as in the apple.

Pruning

Severe or improper pruning can result in highly vegetative, lush new growth that will set few flower buds.

Scoring or Ringing

Slicing through the bark only, and completely around the stem, in midsummer will slow vegetative growth and sometimes force flower buds to form.

Bending

Bending branches may encourage flower bud formation, but is impractical on a large scale and results in malformed growth.

Growth Regulators

Some growth regulators, such as SADH, increase flower bud formation in the blueberry (Hapitan et al 1969; Gough and Shutak 1978) [*Editor's Note: SADH is the active ingredient in Alar®, a product no longer in production. It's unclear at this writing if other hormone products are suitable for this use.*]

Development

The impulse for flower bud initiation begins at the shoot apex and moves basipetally (i.e., down the stem). In the northeastern United States, most shoots have completed flower bud formation at their top node by early September. Formation at the fifth node from the top, and at lower nodes, is completed a few weeks after that; the greatest rate of formation occurs in mid-September (Gough and Shutak 1978). As described above, flower buds continue to differentiate and increase in length through the end of October and in the width through November. They remain dormant throughout the winter, then begin a rapid increase in size in March. The ends with bloom several weeks later."

In conclusion, the conditions this summer were not ideal for flower bud formation, but it is far from clear whether or not there will be problems next year. We've had rainy summers before with unmemorable effects. Never-the-less, this is a good review of what the bushes need in order to initiate flower/fruit buds and worth keeping in mind. If flowering is reduced, we'll have gained some wisdom to help explain what may have happened. ~ Sonia

GRAPE

Fall Fertilization

Alice Wise and Lailiang Cheng, Cornell University

Fall fertilization may be feasible this year with harvest a little earlier than normal and green functioning canopies. Applying nutrients now gives them time to move through the root zone, especially important for lime, potassium and calcium. The need for nutrients is determined by soil and petiole analysis as well as vineyard manager experience and observations. It is not always straightforward, thus experience plays a very important role. Cost might factor in as well.

****Lime** – Application now allows tweaking in the spring if necessary. Heavier doses can be applied in fall. A major lime application in spring can induce nutrient imbalances especially in young plantings. Consider dolomitic (high Mg) lime if Mg is low.

****Gypsum** – Soils with adequate pH but low calcium benefit from gypsum (calcium sulfate). Typical rates are 1 t/a or less. Pelletized is available and easier to handle though more expensive.

****Boron** – Boron is applied in minute quantities (up to several lbs./a of product applied under the trellis) thus it is best to soil apply with the herbicide sprayer or to have a custom blend made with another nutrient such as K and/or N. If spun on, the rate should be adjusted accordingly. In the research vineyard, soil results came back at 0.1 ppm with petioles 35-45 ppm (sufficiency range is usually 25-50). Given tight budgets and adequate B in petioles, we are electing to skip it for now.

****Potassium** – K applications are necessary every few years especially with large crops in dry years i.e. 2010. It is usually broadcast rather than spread under the trellis. Organic sources are available though can be pricey. We tried greensand as an organic source of K and found it to be excruciatingly slow release.

****Nitrogen** – Some growers have used this strategy successfully. If trying fall N, do it earlier rather than later and try to leave untreated sections of vineyard for

comparison. Cornell grape nutritionist Lailiang Cheng suggests that a fall application of foliar urea might be a good alternative to ground application. This should be applied to green canopies at least 7-10 days before a hard frost.

****Compost** – Many sandier vineyard blocks would benefit from compost application. It does take money and effort to get it on, but we have found it beneficial for the

research vineyard. The need for nitrogen is reduced as the compost slowly releases N over 2-4 years. If the compost is not well composted (it has a high C:N ratio), fall application would prevent the competition for N between vines and soil microbes. (**Source:** *Long Island Vegetable & Fruit Update, No. 28, Sept. 30, 2010*)

GENERAL INFORMATION

Fall Weed Control for Berry Crops		
Planting Year Blueberries	October	Low rate Princep
	Late November	Kerb before ground freezes. Casuron for grasses & broadleaves – apply uniformly
Established Blueberries	September into October	Sinbar after harvest, Devrinol, Solicam (if not applied in spring), Surflan, Princep
	November	Kerb for grasses. Casuron if needed
Planting Year Raspberries	October	Low rate Princep but not on tissue culture plants
	Late November	Apply Casuron uniformly for grasses or broadleaves
Established Raspberries	September into October	Sinbar, Devrinol, Solicam (if not applied in spring), Surflan, Princep—high rate if not used in spring.
	November	Casuron if needed
Planting Year Strawberries	October	cultivate
	Late November	Devrinol at 8lb.A and or Sinbar, then mulch for winter protection
Established Strawberries	September	Dacthal, Sinbar, Devrinol for winter annuals. Stinger for thistles.
	Early November	2,4-D if the weather is warm
	Late November	Devrinol at 8 lb/a and/or Sinbar. Chateau for marestail, nightshade, morning glory. Mulch for winter protection
<i>(Source: Capital District Veg & Small Fruit Program Weekly Update, Vol. 3, Issue 25, Oct. 5 2011)</i>		

Cover Crops for Fall

Thomas Bjorkman, Cornell University

By late September and October, most vegetables are harvested and there is more time to think about cover crops. But it is also too late to establish the best choices, which are planted earlier in September. Here are some options for planting later in the fall.

Rye

Rye is the cover crop that will provide winter soil protection when sown late in the season. It will use any mild fall days to develop a root system that will hold saturated soil together at snowmelt. It must be carefully

managed in the spring to prevent excessive growth and suppression of crops.

Winter soil protection requires significant fall growth. The later you plant rye, the smaller the plant will be over the winter. It is possible to compensate by increasing the seeding rate from the 80lb/ac used in mid-September. By early October, it can take as much as 250 lb/ac. This seeding rate should be incentive to get the seed in the ground sooner. Drilling gives a few more days of growth compared to broadcasting on the surface. It also lets the plants anchor better to reduce frost heaving.

Wheat

Wheat will provide a small amount of growth, but generally little soil protection in the winter. It is also

prone to frost heaving in the spring. It may have value as a nurse crop for frost seeded medium red clover.

Spelt

Spelt has a little more tolerance of cold and wet soil than regular wheat, so the stand tends to be better. It is not as tolerant as rye, but is easier on the following crop. Spelt heads a few days earlier than wheat, which can be helpful when controlling it in spring. When drilling spelt, make sure the drop tubes are smooth and straight so that they don't clog with the light seed.

If fall is getting on and there is crop residue in the field, it may be preferable to frost seed mustard or medium red clover very early in spring. (*Source: Cornell [Cover Crops for Vegetable Growers](#) webpage*)

Plan Now For Winter Storage Of Pesticides

Christina Curell, Michigan State University Extension

For farmers, the busiest time of the year is the fall. Adding something else seems to be intolerable, for those farms that have extra pesticides winter storage needs to be added to the long chore list. The best way to ensure that there is no chance of pesticide problems is to return any extra product to a pesticide dealer. If returning pesticide to a dealer is not an option, farms need to have proper pesticide storage. When pesticides are not properly stored there is a chance that products could freeze, containers could be compromised, posing a threat to people, livestock, and the environment.

The easiest way to reduce the risk of pesticide exposure to humans, livestock, and the environment is to have proper pesticide storage. The ideal storage is one that is separate from any other activities. The building should be locked, have a spill kit and a chemical fire extinguisher. The floor should be sealed, with concrete curbs to contain any spills. The building should be clearly marked as pesticide storage. If a farm is unable to dedicate a building for pesticide storage at the very least there should be a cabinet dedicated to storing pesticides. As with the building, the cabinet needs to be locked and clearly labeled as pesticide storage.

Once the storage location is set farmers need to be concerned with how they store pesticides. Shelving units should be metal or plastic with a lip. Wood should not be used since it will absorb spills. It is also important to put any dry formulations on the top shelves above any liquids to prevent cross contamination if liquid containers leak.

Pesticides should be separated by type i.e. herbicides, insecticides, fungicides, etc. The oldest product should be in front so that it will be used first next spring. It is also very important that all pesticides are clearly labeled. If the label is missing or unreadable contact your chemical dealer or visit the [Crop Data Management System](#) to obtain a new label. Remember to affix the label on the container.

There are instances when a farm has outdated, unusable, or even banned pesticides. In these cases pesticides can be taken to a [Clean Sweep](#) site. Clean Sweep accepts unwanted pesticides and disposes of them properly. This is a free service funded through the [Michigan Department of Agriculture and Rural Development](#) to all residents in Michigan. [Note: for a list of state Clean Sweep coordinators, see: www.epa.gov/opp00001/regulating/disposal_contacts.htm]

To find out more information on proper pesticide storage get a copy of "On-farm Agrichemical Storage and Handling", [Michigan State University Extension](#) bulletin E-2355 from the MSU [Extension Bookstore](#). For more information on storage of pesticides and a guide for proper storage temperature of common pesticides obtain a copy of University of Wyoming Extension bulletin MP-93.5, "Cold Weather Storage and Handling of Liquid Pesticides." (*Source: Michigan News for Agriculture, Oct. 5, 2011*)

Winterizing Your Drip Irrigation System

Bill Lamont, Penn State University

Pumpkin, broccoli, potato and apple harvest signals to me that cooler weather is coming around the corner. Having worked many years with irrigation systems and drip irrigation systems in particular, I wanted to share

with you some tips on winterizing irrigation systems so that it will be ready for next spring. Drip irrigation systems all use valves, filters, plastic fittings, PVC pipe, poly pipe, or layflat hoses that can easily burst if water

freezes inside any of these components. I know this from personal experience and it can drive you crazy. This can prove costly to replace or repair.

Winterizing a drip irrigation system will take about fifteen minutes to an hour, and is best done before the first freeze. A little of your time spent now will result in a low maintenance irrigation system that will reduce the need for replacing frozen parts. In extremely cold winters, freezing temperatures can severely damage your irrigation system and all the main water lines.

The goal in winterizing your drip irrigation system is to shut off the water supply to the system, and flush all of the water that is left in the system from the backflow device, valves, filters, main lines, sub-lateral lines, sprinklers, drippers, and drip line.

One way to make sure that the system will not freeze (flat terrain) is to install automatic drain valves in the lowest point of the system. The drain valve assures that any water in the line will drain out. This is extremely important. Also in a drip irrigation system, I like to run some chlorine (2 PPM) through the system and then flush it out thoroughly to clean everything up before storing it for the winter.

About the parts of the irrigation system:

Pumps

Always drain a pump by opening the lowest plug or drain outlet (replace with drain valve). Make sure to check that no water is left inside.

Drain plugs usually are extremely difficult to remove, not to mention difficult to get to, making an unpleasant project out of a simple task.

For some of our portable drip irrigation trailer units (engine and pump located on a trailer) and with drip irrigation systems fed from a pond or a stream, drain the suction line. That is pull it out of the water, drain it and cover the open ends to prevent creatures from making it a winter home. Also the open end of the pump where the suction line connects needs to be covered so that rocks, pebbles, nutshells, leaves, and animals from mice to snakes can find their way into the impeller. Simply covering open ends will save time and headaches. This I also know from personal experience.

Valves and valve assembly

I also know from personal experience that gate and ball valves will not tolerate freezing. A gate valve, when closed, traps water in the bonnet. A ball valve holds water inside the ball. If the valve is closed when water is in the line and the line is drained without opening this valve, the water trapped above the gate or inside the ball will freeze and have no place to expand. The signs of freezing are very distinctive: a ball valve will burst the side out, and a gate valve will split its bonnet,

packing nut, or have a hairline crack down its side. To replace a three-inch brass gate valve is not cheap.

With solenoid valves it is best winterized by leaving them open for the winter. The manual bleed lever on the valves varies by model and manufacturer, but is usually a thumb type screw on top of the valve or lever on the side of the bonnet (cover).

Automatic control valves such as pressure reducing, pressure relief or combination valves, containing external control tubing, pilots, and other parts will require special care to thoroughly drain. If the entire unit can be easily removed from the pipe, it may be simple to store the unit in an inside location for the winter. This is the method that I prefer. If removing the valve or valve assembly is not practical, then from the pressure-reducing valve remove the control tubing connections in the lower part of the valve to drain all the parts of water. The valve bonnet should also be loosened or removed to remove all the water from the top of the diaphragm by un-tightening the screws on the top of the bonnet.

Valve assemblies such as battery operated controllers or AC valves with filter, pressure regulator, and swivel adapter; also require special care to thoroughly drain. If the entire assembly can be easily removed from the pipe, it may be simple to store the assembly unit from the controller to the pressure regulator in an inside location for the winter. If removing the filter assembly or valve assembly is not practical, the valve bonnet should be loosened or removed to remove all the water from the top of the diaphragm, the filter cap should be removed from the filter, and remove the filter cover and screen to make sure that no water is left inside any part of the assembly.

Drip Tape

First disconnect the drip tape from the laterals and in most cases it is disposed of as it is considered an annual expensed item.

Poly pipe hose and vinyl layflat hose

Poly pipe and layflat hose have to be drained. Layflat or poly pipe hose can be lifted few feet at a time and section-by-section, making sure that any water left in the hose will drain out. After you finish draining the layflat hose or poly pipe hose and the micro tubing or connectors, make sure to close the ends of the hoses using the hose ends. The layflat hose definitely is easier to roll up and can be automated on a spool than the poly pipe hose.

Summary

The best prevention I have found once the system is drained completely is to take those parts of the system that are prone to damage inside a building. That is the nice thing with our trailer mounted portable pumping

and filtering units used at the Horticulture Farm, which can be drained and then moved into a building for storage during the winter. The vinyl layflat hose or poly pipe hose with connectors is cleaned up and rolled up

and stored so the mice and rodents will not bother it. We are ready for the spring. (*Source: Penn State Veg & Small Fruit Gazette, Oct. 2011*)

Spotted Wing Drosophila Attacking Fruit Crops in Pennsylvania and Surrounding States

Kristie Auman-Bauer, Pennsylvania IPM Program

A new fruit pest has been trapped in seven southern and central counties in Pennsylvania, and maggot-infested fruit are also being reported, threatening grapes, berries, and tree fruit crops.

Spotted Wing Drosophila (SWD) is a small vinegar fly that is damaging tree fruit and berry crops in the eastern United States, and can potentially attack many fruit species such as cherries, plums, peaches, some apple varieties and Asian pears, says Dr. David Biddinger, entomologist at the Pennsylvania State University Fruit Research and Extension Center. The greatest potential for damage, however, is probably to the many types of berry crops, especially strawberries, cranberries and grapes. Native to Southeast Asia, the fly was first detected in the western United States in 2008. Recently, Biddinger was scouting in a five-acre site of late season yellow and red raspberries in southern PA and discovered that between 30 and 50 percent of the fruit was infested with SWD larvae. "Unlike other vinegar flies that target damaged or overripe fruit, SWD females will attack any soft-skinned healthy fruit to lay its eggs," Biddinger explains. He reported it appeared the fruit was being infested with larvae just before the fruit ripened.

A grower from Berks County reports significant losses in blackberries, raspberries and white peaches, but the damage has not been confirmed as all coming from SWD since damage from stink bugs look similar. In addition to Pennsylvania, entomologists in Connecticut, North Carolina, Virginia, West Virginia and New Jersey are reporting SWD in vinegar traps, and some report significant fruit loss. The sustained, cool, wet weather in the eastern part of the country this season has delayed harvest of many late season crops leading to more over-ripe fruit than usual and consequently more fruit flies of all types. "With over 180 species of vinegar flies in the US, it is difficult to determine if the larvae are from SWD unless they are reared to adults or traps are used to monitor SWD populations," says Biddinger. Biddinger explains it is important for growers to be able to identify the pest and to learn about monitoring and management of SWD. "Identification is key, but because of its small size and because of several similar fruit flies in our region look very similar, it can be difficult. Over a thousand fruit flies may come to a single vinegar trap with only a

small percentage being SWD since many types of flies are attracted to vinegar." SWD are approximately two to three mm long with yellow-brown bodies and red eyes. Adult males have two distinctive dots on the wings and brown bands on the abdomen. The females look similar but do not have the wing dots or bands and have large, saw-like ovipositor for inserting eggs into fruit. Biddinger says identification of SWD should be confirmed by him or other experts. "Now that Pennsylvania has confirmed the presence of SWD, identification can be made quickly by Sven Spichiger, entomology program manager at the Pennsylvania Department of Agriculture, or can be forwarded through local extension offices to myself or Kathy Demchak at Penn State." SWD adults thrive at cool temperatures in the spring and fall, but growth and reproduction are greatly slowed during hot summer weather. Females live two to nine weeks, lay two to three eggs per fruit and can lay more than 300 eggs total, showing high potential for large-spread fruit infestation if not controlled. During egg-laying, rot and fungal diseases can also affect the fruit, further contaminating the fruit at harvest. Infected fruit are difficult for growers to detect, since the only symptoms at first seem to be a small pin-prick from egg-laying. These turn into small scars and indented soft spots and bruises before the fruit eventually collapses from the internal feeding of the larvae or disease. SWD larvae are white, without a distinctive head and easier to detect against darker fruit, such as cherries or red raspberries. Up to 13 generations have been found in parts of Japan, but detections were not found in PA this year until after cherry harvest, so we may have fewer generations. Trap captures have continued to build since then with flies moving to new crops as the fruit began to ripen.

Biddinger suggests growers use integrated pest management (IPM) methods of monitoring using apple cider vinegar traps suggested at <http://extension.psu.edu/ipm/agriculture/fruits/spotted-wing-drosophila> or Michigan State University <http://www.ipm.msu.edu/SWD/SWD-monitor.htm>.

Biddinger has not found the yellow sticky cards recommended to be placed in some of the trap designs to be worth the cost and effort and often just gum up the flies making identification more difficult. Flies in the traps will drown in the vinegar bait and can be sieved

out with a tea bag strainer or cheese cloth and then stored in alcohol for identification.

Regardless of the crop, Biddinger says control of this pest will be dependent controlling the flies before they lay eggs and sanitation of infested or left over fruit on the crop. Selection of varieties or management practices such as mowing of raspberries that could give earlier harvest dates might avoid the rapid increases of SWD that comes with the cool weather of the fall. "The biggest difference between SWD and other vinegar flies is that they can attack the crop much earlier with their impressive switch-blade of an ovipositor, but like other flies they can continue to develop on rotting fruit on the ground for months after harvest. Wild raspberries, blackberries, cherries, and grapes are likely to be reservoirs of SWD populations that will move into crops from the edges in the future."

SWD trap catch thresholds for spraying and management plans for this new pest have not been established anywhere yet. Insecticides labeled for use on specific crops may list fruit flies as pests they

control, but generally these will mean fruit flies of another family such as apple maggot, cherry fruit flies and blueberry maggot. Many of the currently registered insecticides labeled for these other fruit flies should also control SWD, but care must be taken to stay within the pre-harvest limitations of the pesticide used. Check with a product representative or your local horticultural extension agent or entomologist for further information.

For more information on spotted wing Drosophila, please visit <http://extension.psu.edu/ipm/agriculture/fruits/spotted-wing-drosophila> or <http://sites.google.com/site/spottedwingdrosophila/>.

Penn State researchers will provide updates on the SWD situation in Pennsylvania as its presence is confirmed in various counties throughout Pennsylvania and as research continues. (*Source: Penn State Veg & Small Fruit Gazette, Oct. 2011*)

Penn State Stink Bug Monitoring Tool Expands Nationwide

Kristie Auman-Bauer, Pennsylvania IPM Program

Brown marmorated stink bugs (BMSB) have become a major threat to fruit orchards and vegetable and grain fields across the country, but a newly expanding web monitoring tool developed by Penn State researchers will help growers report their stink bug problems and eventually help drive pest management decisions. BMSB feeds on many different crops and has few effective natural enemies in the United States, allowing its populations to grow unchecked. In apples alone, BMSB caused an estimated \$37 million in crop losses in the mid-Atlantic region in 2010. BMSB are native to Asia and were first detected in Pennsylvania in the late 1990s. During the winter BMSB looks for a warm place to live, many times invading private homes, becoming a general nuisance and causing a foul odor. According to John Tooker, assistant professor of entomology in the College of Agricultural Sciences, after emerging from overwintering sites, BMSB move onto ornamental plants, and into orchard, vegetable, and grain crops. "This summer in southern Pennsylvania we have seen large populations in corn and soybean fields, and the bugs continue to trouble fruit and vegetable growers," he said. "In grain crops infestations of the bugs have been spotty, but local populations can be pretty high, like twenty bugs on a single corn plant, and there is a concern that as autumn approaches and field crops senesce stink bugs will move into fruit crops like apples, which are harvested later in the year."

The free web-based tool, developed in collaboration with the Pennsylvania Department of Agriculture, can be found at <http://stinkbug-info.org/> online. The goal of the tool is to give growers more information about the population dynamics of the brown marmorated stink bug." The tool will also allow people to report where they see large populations, and the hope is that we can use this information as an early warning system to alert growers of the large populations," Tooker explained.

Tooker developed the tool with Douglas Miller, associate professor of geography and director of the Center for Environmental Informatics in the College of Earth and Mineral Sciences. Miller and his team have been able to expand the capabilities of the tool nationwide, so fruit and vegetable growers, field-crop growers, nursery operators and homeowners in the 48 contiguous states can report the location and size of infestations and the estimated dollar value of damages, if any, caused by the pest. The website also acts as a portal for information about the stink bug, including photos, a description and management tips for homeowners. "In the short term, data collected could provide an early warning for growers about where stink-bug populations are occurring so they can take appropriate action to protect their crops," said Tooker. "In the long term, we hope to learn more about how the pest spreads and moves between crops, with an eye toward developing better management strategies."

To report an infestation, visitors to the site first register to receive a user name and password. They then will be able to enter information about their infestation, including the county and municipality, date and the number of stink bugs observed per plant or in and around a home. Growers also can report infestations in the two previous seasons to document economic loss.

For more information on BMSB, see the Northeastern IPM Center Regional Pest Alert on BMSB at http://www.hgic.umd.edu/media/documents/publications/Stink_Bug_Pest_Alert.pdf, or Penn State's Department of Entomology's fact sheet at

<http://ento.psu.edu/extension/factsheets/pdf/BrownMarinatedStinkBug.pdf>.

The Pennsylvania IPM program is a collaboration between the Pennsylvania State University and the Pennsylvania Department of Agriculture aimed at promoting integrated pest management in both agricultural and urban settings. For more information, contact the program at 814-865-2839, or go to www.paipm.org.

(Source: Penn State Veg & Small Fruit Gazette, Oct. 2011)

Bee Pastures May Help Pollinators Prosper

Marcia Wood, ARS News Service, Agricultural Research Service, USDA

August 4, 2010 - Beautiful wildflowers might someday be planted in "bee pastures," floral havens created as an efficient, practical, environmentally friendly, and economically sound way to produce successive generations of healthy young bees.

The pesticide-free pastures could be simple to establish, and--at perhaps only a half-acre each--easy to tend, according to U.S. Department of Agriculture (USDA) entomologist James H. Cane. He's based at the Pollinating Insects Biology, Management, and Systematics Research Unit operated by USDA's Agricultural Research Service (ARS) in Logan, Utah. ARS is USDA's principal intramural scientific research agency.

Bee pasturing isn't a new idea. But studies by Cane and his collaborators, conducted in a research greenhouse and at outdoor sites in Utah and California, are likely the most extensive to date. Right: Entomologist James Cane examines wildflowers in a Logan, Utah, test plot. (Photo courtesy Peggy Greb.)



Two bee businesses are already using the findings to propagate more bees.

The research indicates that species of pastured pollinators could include, for example, the blue orchard bee, *Osmia lignaria*. This gentle

bee helps with pollination tasks handled primarily by the nation's premier pollinator, the European honey bee, *Apis mellifera*. Cane estimates that, under good conditions, blue orchard bee populations could increase by as much as four- to fivefold a year in a well-designed, well-managed bee pasture.

Cane and colleagues have studied wildflowers that might be ideal for planting at bee pastures in California. In particular, the team was interested in early-flowering annuals that could help bolster populations of blue orchard bees needed to pollinate California's vast almond orchards. Left: Blue orchard bee on a California five-spot flower, *Nemophila maculata*. (Photo courtesy Jim Cane.)



The research, funded by ARS and the Modesto-based Almond Board of California, resulted in a first-ever list of five top-choice, bee-friendly wildflowers for tomorrow's bee pastures in almond-growing regions. These pasture-perfect native California plants are: Chinese houses (*Collinsia heterophylla*), California five-spot (*Nemophila maculata*), baby blue eyes (*N. menziesii*), lacy or tansy phacelia (*Phacelia tanacetifolia*), and California bluebell (*P. campanularia*).

Cane has presented results of his research to almond growers at workshops.

Read more about the research in the August 2010 issue of Agricultural Research magazine, available online at: <http://www.ars.usda.gov/is/AR/archive/aug10/bee0810.htm>. This pollinator research supports the USDA priority of promoting international food security. (Source: Ohio Fruit ICM News, Vol 14, Issue 16, Sept 28, 2010)

[Editor's Note: Additional information for native pollinator conservation for the Northeast can be found at <http://www.xerces.org/pollinators-northeast-region/> and <http://ento.psu.edu/pollinators>]

UPCOMING MEETINGS:

October 13, 3-7pm – *Fall Crops Twilight Meeting*. Brookfield Farm, 24 Hulst Rd, Amherst, MA. Topics will include: winter storage of fall crops, producing late-season crops in high tunnels, heating greenhouses with a corn furnace, and Brookfield Farm's self-serve winter CSA. For more information, go to <http://extension.umass.edu/vegetable/events>.

November 5, 2011. 8am-5pm. – Fall Hops Conference & Annyal NeHA Meeting. Brown's Brewing Co., 417 River St., Troy NY. Seating limited, registration required. For full program and cost, go to <http://nehopalliance.org/>.

November 6, 2-4pm - *Winter Hoop House Growing*. 217 East Rd. Tiverton, RI. RI Sustainable Ag Program. For more details go to http://cels.uri.edu/sustainableag/SAG_events2.aspx?id=292.

November 11-12, 2011. – *It Takes a Region: A Conference to Build Our Northeast Food System*. Desmond Hotel and Conference Center, Albany, NY. Sponsored by the Northeast Sustainable Ag. Working Group (NESAWG). We will be looking at exciting efforts underway in our region. We will hear and build from the work groups -- including distribution logistics, research, messaging, access & nutrition, and policy advocacy (how do we influence the 2012 Farm Bill?). We will welcome new participants! We'll be addressing pressing issues such as food system worker equity and growing biomass versus food. For more information go to <http://www.ittakesaregion.org/>.

December 13-15, 2011 - *New England Vegetable and Berry Conference*, The Center of New Hampshire Radisson Hotel, Manchester, NH. New England Vegetable & Fruit Conference and Trade Show will be held next December 13, 14, 15 at the Radisson Hotel in Manchester, NH and will include 27 educational sessions over 3 days, covering major vegetable, berry and tree fruit crops as well as various special topics. A Farmer to Farmer meeting after each morning and afternoon session will bring speakers and farmers together for informal, in-depth discussion on certain issues. And a 100+ vendor Trade Show will be open and accessible to attendees. For more details and registration information, go to <http://www.newenglandvfc.org/>.

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