Plasticulture Strawberry Flowering, and Fertilization
By Gordon Johnson, DE Extension Vegetable & Fruit Specialist; gcjohn@udel.edu

If growers have not done so already, plasticulture strawberries should be cleaned to remove dead leaves and other dead plant material prior to flowering. Winter injury has left many dead leaves that will serve as a major source of Botrytis spores during bloom (the critical stage for infection). Dead material can also lead to crown rots in strawberry plants. North Carolina has shown that strawberries achieve 5% bloom when they have accumulated 90 Degree Days (base 50, the same we use for corn). This refers to the Camarosa variety and may be slightly different for other varieties such as Sweet Charlie and Chandler. On Delmarva, growers can look at degree days and once it gets over 80, start looking for bloom in their crops. In Delaware, degree day calculations can be found on the DEOS weather site in the Ag/Irrigation summaries section at: http://www.deos.udel.edu/agirrigation_retrieval.html

Choose the closest site to your farm and look for the GDD column. Start in February and add up the GDD units. So far, for most of the state, we have had less than 50 GDD. We need some more warm days to get to the 80 GDD you need to see flowering. Plasticulture strawberries should have nitrogen applications prior to bloom. Base recommendations are 25 lbs/a of N at greenup and another 25 lbs/a of N 2-3 weeks later. If fertigating weekly, addition of 3-5 lbs of nitrogen per acre per week may be warranted. Nitrogen is critical prior to and during early bloom. Including potassium at a 1:1 ratio with nitrogen will often improve fruit quality (sugars).

You can monitor petiole sap N and K concentration in the field. This is based on sampling leaf petioles from the most recently expanded leaves, extracting the sap, and using portable nitrate and potassium meters. The procedure can be found at this website http://edis.ifas.ufl.edu/cv004, along with recommended levels for different growth stages. Targets initially are

- 600-800 ppm petiole sap nitrate and 3000-3500 ppm petiole sap potassium.

While this is a quick way to monitor nutrient levels, growers are also encouraged to take petiole and leaf tissue samples for laboratory analysis. To collect and submit strawberry tissue samples, follow these guidelines: Select the most recently mature, healthy, trifoliate leaves from uniform field areas and the same variety; detach the petioles from the leaves as you collect them and save each separately; include leaves and petioles from 20 to 25 plants; and then submit leaves and petioles together as one sample.

We have a lab on Delmarva that can run these tissue samples. Leaf tissue nutrient levels should be maintained as follows: N (%) 3–4, P (%) 0.2–0.4, K (%) 1.1–2.5, Ca (%) 0.5–1.5, Mg (%) 0.25–0.45. When in full bloom, petiole tissue nitrate content should be between 4000-6000 ppm and then will decrease thereafter. The recommended levels for petiole tissue nitrate from laboratory analyses can be found at this publication from North Carolina at: http://www.ncagr.gov/agronomi/pdffiles/sberrypta.pdf (our week one would be beginning bloom). Day neutral varieties that fruit into July should maintain higher levels of petiole tissue nitrate later in the season than June bearing types.

Strawberry Fruit Rots
By Cassandra Swett
Grape and Small Fruit Pathologist
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https://www.psla.umd.edu/research/research-lab-pages/swett-lab-berry-pathology

The strawberry bloom has begun and it’s time for fruit rot protection. Our two main targets for bloom time protection of strawberries are grey mold / Botrytis fruit rot (Botrytis cinerea), and, if you are growing susceptible varieties like Chandler, anthracnose fruit rot (Colletotrichum acutatum).

Most fungicides are labeled for both pathogens, but if your main target is grey mold, you need to consider that
the fungus has become resistant to several fungicides. If you use fungicides that the pathogen is resistant to, you will have no protection—it’s essentially like missing a spray. Based on the fungicide resistance tests that Guido Schnabel conducted with Botrytis from Maryland, Tospin M is ineffective and at some sites, Scala is also ineffective.

Here's a strawberry spray guide that manages fungicide resistance, when your main objective is grey mold (Botrytis) protection:

1. **Pre-bloom** (crown rot protection)
   Spray every 7-10 days
   Rotating: Captan and Thiram
   With: Rovral—this compounds can only be applied once, and only pre-bloom

2. **Early bloom** (10%) to fruit set:
   Spray every 7-10 days
   Rotating: CaptEvate, Switch, Fontelis, and Pristine
   With: Captan, Thiram
   An example: Captan+Fontelis → Switch→Captan→Pristine → Thiram → Elevate → Captan

3. **After fruit set**:
   Spray every 7-10 days
   Rotating: Captan and Thiram
   With: CaptEvate, Elevate, or Fontelis (each applied only once during this interval).

We get a lot of rain this time of year, and every time it rains the fungus has a chance to infect plants. So long as it’s raining about every week, plan to spray every 7-10 days.

**Some things to bear in mind:**
- Control is improved when you rotate between Fontelis and Switch and when you tank mix Fontelis with Captan.
- One of the compounds in Pristine is the same FRAC group as Fontelis, so don’t use these sequentially.
- Switch and Pristine are both highly effective, but are at high risk of resistance if they are used too often. Because of this, it is recommended that they are only used ONCE each year, for protection at bloom and in some guides, such as the Fungicide Resistance Management Guidelines for Vegetable Crops in the mid-Atlantic region (2015).
- Pristine is not recommended for use.

**Resources**


**Focus on Soil Health – Getting the Most from Overwintered Rapeseed Cover Crop**
By Gordon Johnson,
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Rapeseed (Brassica napus) has been planted on many acres in Delmarva as an overwintered cover crop, particularly for vegetable rotations. It has a deep root system, is good at reducing surface compaction, scavenges significant soil nitrogen, and suppresses weeds.

In addition, rapeseed is in the mustard family and produce chemicals called glucosinolates in plant tissue (roots and foliage). These glucosinolates are released from plant tissue when it is cut or chopped and then are further broken down by enzymes to form chemicals that behave like fumigants. The most common of these breakdown products are isothiocyanates. These are the same chemicals that are released from metam-sodium and metam-potassium, commonly used as chemical fumigants.

While rapeseed has shown some promise as a biofumigant, results in Delaware have been inconsistent, often with minimal benefits. It is important to note that success with biofumigant crops depends on a number of factors. The following are some suggestions to achieve the best results:
Produce as much biomass of the biofumigant rapeseed crop as possible. This requires that you have a good stand, fertility, and sufficient growing time. The more biomass that is produced and that is incorporated, the more chemical is released. However, as plants mature, the will reach a point where levels of these active chemicals will decline and you should not let the plants go past full flower.

- Plant material must be thoroughly damaged so that enzymes can convert glucosinolates into isothiocynates. This means that you need to chop the material as much as possible and work it into the soil as quickly as possible so as to not lose the active compounds to the air. A delay of several hours can cause significant reductions in biofumigant activity. The finer the chop, the more biofumigant is released. A flail mower is the best tool for achieving this.
- The chopped material should be immediately after chopping. Tillage operations should be performed immediately behind the flail mower.
- The chopped material should be incorporated as thoroughly as practical to release the biofumigant chemical throughout the root zone of the area that is to be later planted to vegetables. Poor distribution of the biofumigant crop pieces in the soil will lead to reduced effectiveness. A tractor mounted rotary tiller or power spader is the best tool for this.
- Sealing with water (irrigating) after incorporation will improve the efficacy by reducing gas loss from the decomposing rapeseed (the active fumigant released). Soil conditions should not be overly dry or excessively wet. Packing the soil will also help this sealing process.

A major limitation to the use of rapeseed as a biofumigant crop use is the fact that you cannot deliver high enough levels of the active chemicals to do a complete fumigation job and the biofumigation effectiveness is also limited by the depth of incorporation. However, you are adding organic matter and do get the benefits associated with that addition. The bottom line: the use of rapeseed as a biofumigant crop can suppress soil borne pests but should not be considered replacement for chemical fumigants, nor is it a substitute for adequate rotations. However, using rapeseed in combination with disease tolerant vegetable varieties can allow for a greater chance of success in tight rotation situations.

EPA Announces It Is Unlikely to Approve New Outdoor Neonicotinoid Pesticide Uses

By Joanne Whalen, DE Extension IPM Specialist jwhalen@udel.edu

As part of EPA’s ongoing effort to protect pollinators, the Agency has sent letters to registrants of neonicotinoid pesticides with outdoor uses informing them that EPA will likely not be in a position to approve most applications for new uses of these chemicals until new bee data have been submitted and pollinator risk assessments are complete. The letters reiterate that the EPA has required new bee safety studies for its ongoing registration review process for the neonicotinoid pesticides, and that the Agency must complete its new pollinator risk assessments, which are based, in part, on the new data, before it will likely be able to make regulatory decisions on imidacloprid, clothianidin, thiamethoxam, and dinotefuran that would expand the current uses of these pesticides. Affected neonicotinoid actions include:

- New Uses (including crop group expansion requests)
- Addition of New Use Patterns, such as aerial application
- Experimental Use Permits
- New Special Local Needs Registrations

This is an interim position. However, if a significant new pest issue should arise that may be uniquely addressed by one of these chemicals, EPA is prepared to consider whether an emergency use under FIFRA section 18 might be appropriate. Due to the localized nature of many emergency pest management programs, it may be possible to develop mitigation or adjust the use pattern in a manner that would minimize exposure to bees. In the event that an emergency use is requested, the Agency plans to assess such requests by relying on available information and risk mitigation strategies.

More information on EPA’s efforts to protect pollinators at: http://www2.epa.gov/pollinator-protection

Parasitoid that Attacks Brown Marmorated Stink Bug Found in the US

By Joanne Whalen, DE Extension IPM Specialist jwhalen@udel.edu

In Delaware, we continue to be a member of a multi-state/multi-regional team focusing on monitoring and management strategies for BMSB, especially in vegetables. It has recently been reported that the Asian wasp, Trissolcus japonicas, has been found in the wild in the United States. The wasp, native to the regions of Asia where the brown marmorated stink bug (BMSB) originates, is known to attack the eggs of BMSB and possibly other stink bugs. For more information on this finding please click on the following link: http://www.stopbmsb.org/stink-bug-bulletin/asiawasp-enemy-of-stink-bugs-found-in-the-united-states/
The following is a brief overview of some of the changes and updates to the Commercial Vegetable Recommendation Guide (CVRG) by the extension plant pathology team for 2015. Some additions to CVRG represent newly registered products and others were added because recent trial data indicated that they were effective. This summary is not comprehensive, please review the CVRG for additional recommendations. Also there are many other products that have been in the CVRG for many years and are still effective. Remember to follow all label safety guidelines, rates, resistance management guidelines, and tank mix incompatibilities.

Beans (snap and lima):
- Ranman and Omega are included in the CVRG for lima bean downy mildew.
  - Ranman has been added for cottony leak.
  - Quilt Xcel and Azoxystrobin are recommended for anthracnose, web blight, and common snap bean rust.
  - Azoxystrobin is recommended for root rot and Southern blight.
  - Blocker 4F is recommended for Alternaria root/stem rot.

Cucurbits (squash, muskmelon, pumpkin, watermelon, cucumber):
- Fontelis is recommended for gummy stem blight, powdery mildew, Sclerotinia stem rot.
  - Luna Experience and Proline are recommended for gummy stem blight and powdery mildew on watermelon.
  - Proline has been added to the recommendation to manage Fusarium wilt in muskmelon and watermelon.
  - Uniform is recommended for damping off on all above listed cucurbits.
  - Forum is recommended for downy mildew on pumpkin.

Tomato:
- Inspire Super is included in the recommendations for foliar pathogens (Septoria leaf spot, early blight) and fruit rots (early blight, anthracnose).
  - Inspire Super was added for control of powdery mildew.
  - Blocker 4F is now recommended for Southern blight.

Spinach:
- Pristine and Merivon are now recommended for leaf spot and anthracnose.

**Sweet corn:**
- Prosaro, and Aproach are recommended for leaf spots and blights plus rust.

**Pepper:**
- Azoxystrobin is recommended for Southern blight and damping-off.
  - Blocker 4F is recommended for Southern blight.

**Spinach:**
- Pristine and Merivon are now recommended for leaf spot and anthracnose.

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**Garlic Problems**

By Jerry Brust
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Before 2010 I think I would get one call a year from a garlic grower with a problem, now it seems I get ten times the number of calls about garlic problems. Most of the problems are from bulb mites or garlic bloat nematodes. Bulb mites are extremely tiny and are a problem of garlic and sometimes of onion that usually goes unrecognized—until too late. These pests can reduce stands, slow plant vigor, and increase post-harvest diseases by their feeding on the bulb, roots and the stem plate (fig 1). Bulb mites have a very wide host range, but cause most of their damage to onions and garlic. These mite pests prefer crawling into the crevices between the roots and stem plate where they feed.

The best way to determine whether these mites are present is to carefully dissect the region where the roots and bulb come together. The mites also could be under one or two layers of scales at the lower end of the bulb. There are usually other mites present, but with a hand lens the bulb mites usually can be identified from other mites.

The mite is bulb shaped with its legs moved forward and a bulbous rear end and many long fine hairs. The mouthparts and legs are purplish-brown while the main
body is creamy white. These mites have been described as looking like tiny pearls with legs. The mites are extremely small (from 0.02 to 0.04 inches) and usually are slow moving. They are usually found in clusters underneath scales and at the base of the roots.

It is not just the direct feeding of these mites on garlic and onions that causes problems, but also that their feeding allows pathogens to enter through the wounds they create. These wounds are very good entry points for pathogens like *Fusarium* spp., *Sclerotium cepivorum* (causes the disease white rot), and various soft-rotting bacteria. The white rot fungus does best in cool temperatures, and symptoms include white fungal growth on the stem or bulb with small, dark structures called sclerotia in the decayed tissue. Early in the growing season, bulb mites can cause poor plant stands and stunted growth as they feed on the plants. Infested plants easily can be pulled out of the soil because of the poor root growth. Later in the season, higher than normal amounts of soft rot and *Fusarium* dry rot may be seen because of the wounds caused by these mites. Bulb mites survive in the soil on organic matter left behind from the previous crop. As long as there is decaying allium vegetable matter in the soil, bulb mites can survive in the field. The best way to control bulb mites is to allow the vegetation from the previous crop to breakdown before any new crop, especially garlic or onions are planted again. These mites may also come into a clean field on infested garlic cloves. The use of clean garlic clove seed or seed that has been hot water treated will control these pests. Hot water treatment of bulbs prior to planting can reduce mite populations, but effective temperatures also reduce germination. Effective times and temperatures were 130 ° F for 10-20 min, or 140 ° F for 10-15 min. It is also possible to get good control when soaking affected cloves for 24 h in 2% soap (not detergent) and 2% mineral oil.

As soon as the HT has fresh plants in it these mites will move over to these plants and begin to feed and reproduce. These mite populations slowly build and spread throughout the HT during the season and when it gets very warm outside they can explode in numbers. Normally growers do not check their small plants for mites in March or April because it is so rare that spider mites are present, but I have seen an increasing number of HTs with two spotted spider mite problems early in the year when there should be none. These mites are either the overwintering kind or they have been brought in on the transplants; whichever is the case small tomato plants need to be inspected for mites early in the season.

High Tunnels

By Jerry Brust

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High tunnels (HTs) are up and running now and we usually do not see many pest problems early on, but there are some potential problems that could develop later in the season that get their start now. One potential problem is when the HT was not cleaned up after the previous year’s crop was finished. Many of these are old tomato plantings, most of which had their plastic, stakes and drip-tape removed but the plants were left to rot in the HT over the winter. With as cold a winter that we have had this does not seem like too bad of an idea, but these plants more often than not harbor problems that will manifest themselves in May or June if not earlier. In about 35% of the HTs that had left the crop to rot I could find, usually at low levels, overwintering female two spotted spider mites on some of the plant material that remained green. These overwintering female mites (always female) are an orange-red (fig 1).

As soon as the HT has fresh plants in it these mites will move over to these plants and begin to feed and reproduce. These mite populations slowly build and spread throughout the HT during the season and when it gets very warm outside they can explode in numbers. Normally growers do not check their small plants for mites in March or April because it is so rare that spider mites are present, but I have seen an increasing number of HTs with two spotted spider mite problems early in the year when there should be none. These mites are either the overwintering kind or they have been brought in on the transplants; whichever is the case small tomato plants need to be inspected for mites early in the season.

The other problem I have seen in HTs is that growers do a good job of cleaning up their crop debris, but they allow winter weeds such as henbit, wild mustards and chickweed to grow either inside the HT or just outside of its edge (fig 2). My work over the years has shown that
several thrips species, and to lesser extent spider mites, can overwinter on these weeds. Chickweed was the most preferred host by thrips followed by henbit and the mustards. The thrips will feed on the succulent leaves of chickweed, which can maintain them throughout the winter in semi-protected areas (fig 3). Several different thrips species have been found on these weeds including western flower thrips (Frankliniella occidentalis). As with the plant debris from last year these winter annual weeds need to be cleaned up weeks before you plant anything into the HT. And as with mites, small plants need to be inspected for thrips.

![Close-up of chickweed leaves with thrips feeding (leaf stippling)](image)

**Label Changes for Command Herbicide**

By Mark VanGessel
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Recently the label for Command herbicide was changed, limiting use in some vegetable crops important to Delaware and the region. Under the category of succulent beans, only snap beans now are listed. Residue tolerances for lima beans have not been established, so usage for lima beans were removed from the label. This impacts the use of Command as a soil-applied herbicide for lima beans, as well as use in preceding crops. Since lima beans do not have a tolerance, there is a 16 month rotation between application and planting lima beans.

**Killing Cover Crops**

By Mark VanGessel
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It is important to be sure cover crops are dead prior to planting, since those plants still alive at planting are injured and/or larger after planting and can much more challenging to control. Furthermore, once the crop has emerged there are fewer options for killing the cover crop. The cool, overcast weather has further complicated terminating cover crops. All herbicides need actively growing plants to be effective, and the recent weather has slowed (or reduced) herbicide activity. Allow 7 to 10 days for glyphosate to achieve maximum effectiveness and scout to be sure burndown programs were successful. Tank mixes with triazine herbicides can reduce glyphosate effectiveness under poor growing conditions. On the other hand, tank mixing a triazine with paraquat can improve overall effectiveness. When tank mixing analyze each component herbicide to avoid a reduction in effectiveness.

**Focus on Soil Health: Soil Health and Vegetable Production**

By Gordon Johnson,
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With the current emphasis on soil health, the NRCS soil health initiative and the continuing interest in soil health from vegetable growers, the following is a reprint of a 2009 Weekly Crop Update article on the subject. Experienced growers and crop advisors know that one of the keys to vegetable productivity is a healthy soil. According to the Cornell Soil Health Group, “Soil health describes the capacity of a soil to be used productively without adversely affecting its future productivity, the ecosystem or the environment.” “Soil health emphasizes the integration of biological with chemical and physical measures of soil quality that affect farmers’ profits and the environment.”

From a biological standpoint, soil health relates directly to the root environment and organisms that inhabit the soil. A healthy soil for vegetables will be one that has few limits to root growth; supports high numbers of beneficial soil organisms, such as earthworms; supports a diverse microbial community with high levels of beneficial bacteria, fungi, Actinomycetes, protozoa, and nematodes and low levels of plant pathogens (such as root rot fungi, bacterial and fungal wilt organisms, soft rot bacteria, and plant parasitic nematodes). In a healthy soil, vegetable crop root systems explore a large portion of the soil volume, crops are under reduced stress, and pest problems are minimal. A healthy soil will also support mineralization of organic matter by soil microorganisms at levels appropriate to the climate. From a chemical standpoint, healthy vegetable soils will be at a proper pH (6.0-6.8 in most soils); have a high cation exchange capacity; have optimal levels of calcium, magnesium, and potassium held on exchange sites; contain optimal but not excessive levels of other mineral nutrients needed by crops, have high levels of organic matter in various levels of decomposition and high levels of stable humus; support aerobic mineralization processes; and be free of toxic minerals from natural sources (such as high free aluminum levels) or from toxic chemical contaminants.

From a physical standpoint, healthy soils will have high levels of stable aggregates in the topsoil (creating a stable granular structure); an optimal mix of pore sizes.
rotation should be planted using no-till or reduced tillage successfully in vegetables. Other field crops in the
are all examples of approaches that may be used
systems. Zone tillage, vertical tillage, and soil aeration
tools may be appropriate for other vegetable cropping
Compost, Manure, and Other Organic Matter
Additions

These are crops that are specifically used to recycle
nutrients and to add organic matter to the soil. They occupy land and time periods in the rotation when food
(vegetable), grain, and feed crops are not being grown. It is important to always have something growing on the
land, even when not in production, to maintain soil health. Including cover crops and green manures in
rotations increases crop diversity and provides the benefits associated with that diversity. For example, certain cover crops and green manure crops have been found to have benefits in reducing soil borne diseases.

Reduced Tillage

It is important to reduce the levels of tillage in soils to maintain soil health. The more that soils are tilled the
more soil aggregates are broken down and the more quickly soil organic matter is oxidized (decomposed).
Soils that are excessively tilled generally have lower organic matter levels and often have poor physical characteristics. While some vegetables and vegetable cropping systems are not well adapted to no-till planting, there have been some great successes with vegetable no-till, such as with no-till pumpkins. Reduced tillage tools may be appropriate for other vegetable cropping systems. Zone tillage, vertical tillage, and soil aeration are all examples of approaches that may be used successfully in vegetables. Other field crops in the rotation should be planted using no-till or reduced tillage tools as much as possible and attempts should be made to conserve crop residue (as long as it does not interfere with the vegetable portion of the rotation).

Success with Onions

By Gordon Johnson,
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There has been increased demand for sweet onions grown both for local sales and wholesale markets. There is also need for onions for the fresh cut (diced or sliced) market.

Success with onions starts with growing or obtaining transplants of adapted varieties. Direct seeded bulb onions do not perform well in spring plantings. Transplants are started in January in 200-288 cell flats in the greenhouse for March transplanting. Growers can also arrange to have transplant growers in the Southwest (Texas, Arizona) produce transplants and ship them to our area for spring planting. While it is too late to have plants grown for 2015, some transplant growers do produce surplus for sale. Onions also benefit greatly by being transplanted into black plastic mulch. Four foot wide plastic is laid on a raised bed such that there is a 3 foot bed top with 2 drip tapes. Four rows of onions can then be planted in the bed, with 8-10 inches between rows and 4-6 inches between transplants and a drip tape between each pair of rows.

Planting date impacts yield and bulb size, so it is very important to transplant at the right time. For sweet onions large (Jumbo) and colossal sizes greater than 3 inches in diameter have the most value. To achieve these sizes consistently, it is necessary to plant by the end of March. The later you plant in April, the lower the yields and sizes obtained.
Sweet onions have low pungency which is determined by measuring pyruvate and must have a score of 5.0 µmol/gfw or less, using a standard onion pungency test, to be marketed as a sweet onion.

In general, intermediate day sweet Spanish onion types are best adapted for our area; however, some long day varieties also can be grown successfully. The standard yellow sweet onion variety has been ‘Candy’. Other recommended yellow varieties are Spanish Medallion, Expression, and Exacta. Some yellow varieties for trial include Cimarron, Great Western, Salute, and Avalon. White onion varieties recommended include Super Star and Mt. Whitney. Recommended red varieties are Red Sky and Red Wing.

It is important that once transplanted, onion growth is not interrupted. Steady, frequent applications of irrigation water are necessary because onions have small root systems. If beds are allowed to dry out at any time, yields will be reduced. Fertility varies with grower and field but in general 50 lbs. of N/acre is applied preplant along with P and K based on a soil test. An additional 25-50 lbs. N/acre is applied through drip before bulbing starts.

Success with Establishing Blueberries

By Gordon Johnson,
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There has been continued interest in blueberry production on Delmarva. With that in mind, the following is information on how to succeed with establishing blueberries in most Delmarva soils that have been previously used as crop fields.

Blueberries can be a very profitable crop, especially for growers who direct market their crop. As a perennial shrub-like crop, they will take 5 or more years to come into full production but can then be productive for decades. It is critical, therefore, to make sure that plants get off to the right start. Blueberries have exacting soil modification requirements that must be addressed before planting. They are native to areas with acid soils that have high organic matter on the surface but sand below. In natural blueberry habitat water is relatively close to the surface however, blueberries do not tolerate waterlogged soils.

It will take 1-3 years of site preparation before planting blueberries for most Delmarva soils. During that time you will lower the pH, increase organic matter, modify the field to improve drainage and lay out systems for drip irrigation.

The first step in successful establishment is to take a soil sample and pay particular attention to what the soil pH is. If the field has variable soil types, divide it into zones and sample each zone separately.

Blueberries require acid soils with a pH in the 4.5-4.8 range. All of our cultivated soils have higher pHs higher than this with many above 6.0; therefore soils must be acidified. The material commonly used to acidify soils is elemental sulfur. However, sulfur must be converted by microorganisms to release the acidity so it only reacts when soils are warm. Plan 1-2 years ahead of planting to provide enough time to acidify the soils to the target pH range of 4.5-4.8. On a sandy loam soil, about 1000 lbs of sulfur per acre is recommended. For other soil types more or less sulfur will be needed. Contact your county Extension office for recommended rates for the soils on your farm. You should not plant until the soil has been acidified.

In addition, prior to planting, add phosphorus and potassium so that soil levels are in the high range. Use potassium sulfate as the potassium source, not potassium chloride.

Increase organic matter in the field prior to planting. This can be accomplished by planting multiple green manure crops before the pH has dropped too low for them to grow (year 1). Sorghum sudangrass hybrids can be used in the summer and rye in the winter.

For soils very low in organic matter, additional amendments may be necessary. Use only materials that will not increase the pH. It is best to modify the entire planting strip before planting. Apply 2-4 inches of organic materials such as composted sawdust or pine bark fines and work them into the soil in a 3-6 foot strip where the blueberries are to be planted. Do not use most commercial composts as they are usually high in pH.

Modify the site as needed to provide good drainage. Make sure that water drains away from the planting site and does not collect. It may be necessary to make low, wide ridges to improve drainage and move excess water away from plants. However, avoid planting in sites that are poorly drained or that have high water tables in the winter.

Blueberries do best in moist (not wet) soil conditions. Make sure that there is adequate water for the crop. This may require a dedicated well. You will need to install water distribution systems, ideally below ground. Install mains and sub-mains that will supply the water to
drip lines in the planting area. Contact an irrigation company for assistance in designing, laying out, and installing the system. Install drip irrigation lines to provide irrigation water to the crop before you plant. Drip tubing should be thick walled for long term use. Two lines, one on either side of the planting row, are recommended. Drip lines should be placed at a shallow depth prior to laying mulch.

Work with nurseries, ideally 2 years ahead of planting, to decide on what varieties to order. Plants can be ordered as potted plants or rooted liners. Larger plants establish more quickly but also cost more. When choosing varieties consider your intended market. Large fruited varieties may be more desirable for pick-your-own operations and flavor is important if you intend to direct market. Also, select a set of varieties that will mature over the time period during which you would like to be marketing blueberries. Blueberry season in Delaware can extend from the second week of June to mid-August with the use of early, mid-season and late maturing varieties. Variety recommendations can be found in the Mid-Atlantic Berry Guide: http://pubs.cas.psu.edu/freepubs/MAberryGuide.htm.

The University of Delaware has been doing variety evaluations over the last 4 years. Contact Emmalea Ernest emmalea@udel.edu for variety reports. Organic matter additions are also needed in the planting hole. Just prior to planting, dig planting holes for the blueberry plants about 1–1.5 feet deep and wide. Reserve this soil and mix one gallon of peat with the backfill soil for each plant during planting. Peat should be wetted prior to mixing with the backfill. You may also use other materials such as composted saw dust, bark fines, or other partially rotted materials as long as they are acid (have low pHs). Do not use manures, high pH composts, or spent mushroom soil. One gallon of peat has been proven to be the ideal planting hole amendment. More than 1 gallon did not improve blueberry growth in Delaware trials.

Handle plants with care at planting so as to do minimum damage to roots. Blueberry roots are very fragile.

Mulch immediately after planting with a 4 inch layer of organic material. Common materials are aged sawdust or bark mulch. Waste hay or straw are also effective mulches. Mulch is critical to protect the shallow roots and suppress weeds. It also provides additional organic matter as it decomposes. Reapply mulch as necessary, usually annually.

Water plants to settle into the ground and irrigate frequently during the rooting-in period. Irrigate frequently throughout the establishment year but make sure the soil does not stay overly saturated.
half of the trees having Cripps Pink for a scion and the other half having Brookfield Gala for the scion.

Growers/nurseries buy liners directly out of TC for peaches and cherries but not for apples. By observing the growth rate and structure, overall size and yield, we want to begin to determine if the TC process is detrimental to apple production or cultural practices in the orchard. Much of the work that has been done with these rootstocks and the Tall Spindle system has been done in other parts of the country. Maryland growers have had to extrapolate from that information; given the variation in climates, we are not certain how closely recommendations from states like New York or Michigan can be followed here. We plan to: evaluate High Density systems for western/central MD; collect data on new dwarfing disease tolerant rootstocks; help to determine the appropriateness of this High Density system for hot humid conditions of the mid-Atlantic region; and gain a better understanding of the growth habit of TC trees in comparison to those produced in traditional stool beds.

Data has been collected on height, trunk diameter, survivability, fruit quality (which includes color, soluble solids, firmness, and starch), fruit size, yield per tree, and tree efficiency (fresh weight of fruit/cross sectional area) for four seasons. To this point as we finish the 5th leaf on this planting there has been very little difference between the trees. The 202TC trees certainly broke out of the blocks fast and initially made a larger more robust tree in comparison to stool bed 202 trees but, over the last two years, it is difficult to see a great difference between any of the trees and statistically there are no differences between the treatments.

As far as survivability, we have lost a number of trees. All tree losses were due to breaking at the graft union. Most of the losses were early on but G-935 continues to break and has been the rootstock that has lost the most trees. We have also put in Day break Fuji on M-9 for BMSB work and it has had no tree loss at all and appears to be yielding well after its third leaf.

Although 2015 will be the final season for collection of all the data, the planting will remain and be managed so further observations can be made regarding this rootstock and the planting is being expanded to include G-41, G-214, G-202, G-11, G-222, Bud 9, M-9 337, and G-935, planted at both 6’x12’ and 3’x12’ on our four wire 9’ trellis system. I also have some dormant bud (sleeping eye) Pink lady and Granny smith on G-969 donated by Bill Mackintosh, from his nursery in Virginia that we transplanted last fall. They will be cut off above the bud graft in the spring and other than some limb removal and suckering during their 1st growing season there are few differences in management. They will be managed as both trellis trees and free standing.

I am very excited this season to have actually accomplished renovation pruning. Above you can see it does really work and we are now finishing our fifth leaf and will begin doing a lot more of this type of pruning as we work on our Maryland Modified Tall Spindle System. B. Butler.
MDA ANNOUNCES NEW SPECIALTY CROP GRANT PROGRAM
Application Deadline is May 8

The Maryland Department of Agriculture (MDA) today announced a competitive grant program to fund projects that solely enhances the competitiveness of specialty crops. The Specialty Crop Block Grant Program was established by the 2014 Farm Bill. MDA will administer funds totaling approximately $340,000. Of this amount, Food Safety, Market Enhancement and Pest Management will be a priority for projects with a minimum level of $15,000. MDA intends to fund projects that can produce the highest degree of measurable benefits to Maryland specialty crop producers in relation to each dollar spent and need to have the support from specialty crop producers. Grants will be reimbursement grants.

Specialty crops are defined by the U.S. Department of Agriculture as fruits, vegetables, tree nuts, dried fruits, horticulture, and nursery crops. MDA is seeking applications from eligible non-profit organizations, government entities, for-profit and organizations for projects that aim to promote or enhance the production of and access to Maryland specialty crops. Applicants must reside or their business or educational affiliation must be in Maryland. Potential applicants are encouraged to call Karen Fedor at 410-841-5773 to discuss proposals.

Electronic grant applications must be submitted by 4:00 p.m. on May 8, 2015. Paper applications must be postmarked by May 8, 2015.

For questions about the grant application or to download the application, contact Karen Fedor at Karen.fedor@maryland.gov or 410-841-5773.

WANTED: STINK BUGS

University of Maryland Researchers Seeking Thousands of Live Stink Bugs
By Sara Gavin
Communications Coordinator
University of Maryland

Brown Marmorated Stink Bug Image Credit: Edwin Remsberg

As the weather turns warmer, stink bugs stowed away for the winter in houses and buildings will start to seep out of cracks and crevices much to the dismay of residents all over the region. Before simply getting rid of the pests, however, scientists at the University of Maryland are urging people to collect them and donate them to research.

Galen Dively, Ph.D., an Extension specialist in integrated pest management and entomology professor at the university, says his lab collected roughly 13,000 stink bugs last fall, most of which died due to a suspected virus that causes colony collapse.

“We really need bugs,” says Dively, who heads up a team of graduate students all dedicated to studying the invasive Brown Marmorated Stink Bug (BMSB) and figuring out how to eradicate it. “If you have a large stink bug population in
your home or office or school, our lab would really appreciate you capturing the little critters.”

Dively suggests collecting the bugs in household items like plastic food containers or old coffee cans, throwing a piece of apple inside for food and poking holes in the lid. However, he cautions not to throw the bugs together inside confined spaces like Ziplock bags as the pests will “stink” each other to death. Dively and his colleagues are offering to come pick up collections of at least 50 stink bugs or more. Contact the researcher at: galen@umd.edu (link sends e-mail) or 202-812-9828.

The BMSB was accidentally imported from Asia to North America in the late 1990s and with few known natural enemies in this country, quickly became a nuisance inside homes, office buildings and warehouses. Although the insect doesn’t bite humans, it lays hundreds of eggs during its lifetime and is particularly dangerous to farmers because of the fact that it will feed on almost anything.

While the BMSB is known as more of a nuisance in the summer and fall months, Dively says it only takes a couple of warm days to coax them out of their winter hiding spots. Dively and his research team are currently studying some of the BMSB’s natural predators – parasitic wasps who feed on the bug’s eggs – and testing the effectiveness and safety of various spray treatments.

The Maryland Rural Enterprise Development Center (MREDC) Announces the addition of three online resources:

1. **Food Processing-Cottage Food Industry-Business Law and Labeling & Packaging.** A “cottage food product” is a nonhazardous food that is sold at a farmer’s market or public event. The Department of Health and Mental Hygiene (DHMH) must adopt specified regulations to carry out Cottage Law. Get all the resources and facts about the law, labeling and packaging at this new resource on MREDC at: [https://www.extension.umd.edu/mredc/specialty-modules/cottage-food-business-law-md](https://www.extension.umd.edu/mredc/specialty-modules/cottage-food-business-law-md)

   Two enterprises trending in Maryland and beyond are honey bee enterprises and hops production. Varying circumstances make for great growth potential of these enterprises in Maryland!

2. **Honey Bee Enterprise Resource Page at:** [https://www.extension.umd.edu/mredc/specialty-modules/honey-bee-enterprise](https://www.extension.umd.edu/mredc/specialty-modules/honey-bee-enterprise)

3. **Hop Production Resource Page at:** [https://www.extension.umd.edu/mredc/specialty-modules/hop-production](https://www.extension.umd.edu/mredc/specialty-modules/hop-production)

By Ginger S. Myers
Marketing Specialist, University of Maryland Extension
Director, Maryland Rural Enterprise Development Center

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**University of Maryland and Penn State Extension to Offer Food Business Risk Management Class**

Because consumers have grown more concerned about how their food was grown and processed, every food business owner (and every farmer who is selling products directly to the public) needs to understand the ways that he or she can lessen the liability associated with placing food products in the marketplace.

To respond to this need, Penn State Extension, in collaboration with the Maryland Rural Enterprise Development Center and University of Maryland Extension, is offering a one-day class, *Managing Risk for Food Businesses*, at the Maryland Agriculture Resource Center, 1114 Shawan Road, Cockeysville, Maryland 21030, on Tuesday, May 12th. The primary instructor will be Winfred McGee, Penn State Business Management Educator. The session will run from 9:15 a.m. to 3:30 p.m., and will combine educational presentations, discussions with...
successful food entrepreneurs, and a highly interactive learning environment, to address the following topics:

- **Good Agricultural Practices (GAP)/ Good Handling Practices** - general procedures that producers and packers of farm-fresh products should follow to ensure food safety of their product—especially for products sold to large, national customers.
- **Hazard Analysis Critical Control Point (HACCP) Planning** - Steps or procedures to eliminate or reduce hazards associated with food production - learning what the producer or his/her co-packer should monitor for food safety.
- **Liability Insurance** - The amount of coverage that is warranted and what purpose it will serve in protecting farm assets—learning from the experiences of those well and poorly insure captured in case studies.
- **Allergen Warnings** - Complying with FDA regulations that food labels must state clearly if food products contain any ingredients that contain protein derived from the eight major allergenic foods.
- **Pro-active Recall Processes** - Coding batches and keeping accurate records so that the entire product line need not be recalled in an emergency.

Registration for Managing Risk for Food Businesses, is $40.00 (includes lunch and all handouts,) payable by credit card or personal check. Please register by going to: [http://managingriskforfoodbusinesses.eventbrite.com](http://managingriskforfoodbusinesses.eventbrite.com)

Funding for this project was provided by the Northeast Center for Risk Management Education, the USDA National Institute of Food and Agriculture, and North East Sustainable Agriculture Research and Education. The Pennsylvania State University is an equal opportunity employer.

By Ginger S. Myers
Marketing Specialist, University of Maryland Extension Director, Maryland Rural Enterprise Development Center

**EPA Approvals of Maryland's Requests of Section 18**

EPA recently approved Maryland’s request to re-certify a Section 18 for bifenthrin to control Brown marmorated stink bugs on apples, peaches and nectarines. For full details go to: [https://extension.umd.edu/sites/default/files/docs/Bifenthrin%20BMBS%20Inform%20Packet.pdf](https://extension.umd.edu/sites/default/files/docs/Bifenthrin%20BMBS%20Inform%20Packet.pdf)

EPA request for a specific exemption under Section 18 of FIFRA, to allow use of HopGuard®II to control varroa mites in honey bee colonies. For full details go to: [https://extension.umd.edu/sites/default/files/docs/2015%20Section%20Potassium%20Salt.pdf](https://extension.umd.edu/sites/default/files/docs/2015%20Section%20Potassium%20Salt.pdf)

See the Attachments!

1) 2015 Multi-Fruit Spray Guide.
2) Section 18 for Brown Marmorated Stink Bug (BMSB) Management on Apples, Peaches and Nectarines

**Vegetable & Fruit News**

A timely publication for the commercial vegetable and fruit industry available electronically in 2015 from April through October on the following dates: April 16; May 14; June 11; July 9; August 13; September 10; and October 22.

Published by the University of Maryland Extension Focus Teams 1) Agriculture and Food Systems; and 2) Environment and Natural Resources.

Submit Articles to:
Editor,
R. David Myers, Extension Educator
Agriculture and Natural Resources
97 Dairy Lane
Gambrills, MD 21054
410 222-3906
myersrd@umd.edu

Article submission deadlines for 2015 at 4:30 p.m. on: April 15; May 13; June 10; July 8; August 12; September 9; and October 21.

The University of Maryland Extension programs are open to any person and will not discriminate against anyone because of race, age, sex, color, sexual orientation, physical or mental disability, religion, ancestry, national origin, marital status, genetic information, political affiliation, and gender identity or expression.

Note: Registered Trade Mark® Products, Manufacturers, or Companies mentioned within this newsletter are not to be considered as sole endorsements. The information has been provided for educational purposes only.
Spray Program for Multi-Small Fruit Plantings

Many local farms are composed of multi-small fruit combinations producing for fresh market blackberries, raspberries, blueberries, strawberries and grapes. Aggressive fruit spray programs are required to achieve high quality fruit. These multi-small fruit plantings create many spray management challenges for the achievement of good pest control in accordance to label guidelines.

Therefore, the following multi-small fruit spray program for the control of major small fruit pests and diseases may offer some assistance:

Labeled as noted in 2015 for All Small Fruit – Strawberries, Blackberries, Raspberries, Blueberries, and Grapes.

**FUNGICIDES: [FRAC]** | **RATE** | **NOTES**
--- | --- | ---
Lime Sulfur [M2] | 10.0 gals | Dormant Fall Sanitizer
JMS® Style Oil [NC] | 1.0 gal | Apply Temp 35°-85°F
Kocide® DF [M1] | 2.0 lbs | Other Fixed Coppers
Captan® 50W [M4] | 2.0 lbs | General Protectant
Ziram® 76DF [M3] | 5.0 lbs | General Protectant
(Smart for Strawberry use Thiram®)
Sulfur 95W [M2] | 3.0 lbs | General Protectant

**INSECTICIDES: [IRAC]** | **RATE** | **NOTES**
--- | --- | ---
Provard® Admire® [4A] or Actara® [4A] | 4.0 ozs | SWD, Grubs, Aphids, Hoppers, Curculio & Whitefly
Brigade® WB [3] | 12.0 ozs | BMSB, SWD, Clipper Beetle, Plant Bug, Mites & Root Weevil
Malathion® [1B] | 2.0 pts | SWD, Scale, Fruit Moths & Whitefly
Sevin® 50W [1A] | 4.0 lbs | SWD, Japanese Beetles, Hornets & Sap Bees

*Rate for 50-100gal Acre Concentrate Spray
**Be sure to follow all labels closely for PHI and REI!

**Multi-Small Fruit Spray Calendar**

March 5 - Spring Dormant Spray
JMS® Style Oil 1.0 gal (Scales & Mites)

April 10 - Early Strawberry Bloom
Captan® 50W 2.0 lbs
Thiram® 75WDG 5.0 lbs (Strawberry Only)

April 15 - Strawberry Bloom/ Blueberry Early Bloom
Captan® 50W 2.0 lbs
Ziram® 76DF 5.0 lbs (except Strawberry)
Brigade® WB 12.0 ozs (Clipper Beetle, 0-3-day PHI)

April 25 - Strawberry Full bloom/Blueberry Mid-Bloom/ Grape Bud Break
Captan® 50W 2.0 lbs
Pristine® 14.5 ozs
Brigade® WB 12.0 ozs (Clipper Beetle, 0-3-day PHI)

May 5 - Strawberry 1st Cover & Early Harvest Spray/ Blueberry Full Bloom/Grape & Bramble Shoot Growth
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Elevate 4.15 lbs (0-day PHI)
Provard® 45.4 ozs (Curculio & Aphids; 7-Day PHI)

May 15 - Strawberry 2nd Cover & Harvest Spray/ Blueberry 1st Cover/Grape Bloom Spray/Bramble Cane Development
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Switch® 11.0 ozs (0-day PHI)
Malathion® 2.0 pts (Curculio, Scale & Fruit Moths; 0-3-day PHI)

June 1 - Strawberry 3rd Cover & Harvest Spray/Blueberry 2nd cover/Grape 1st Cover/Bramble Bloom
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Pristine® 14.5 ozs (0-day PHI)
Malathion® 2.0 pts (Curculio, Scale & Fruit Moths; 0-3-day PHI)

June 15 - Strawberry 4th Cover & Harvest Spray/Blueberry 3rd Cover & Early Harvest/ Bramble 1st Cover/ Grape 2nd Cover
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Elevate 4.15 lbs (0-day PHI)
Sevin® 50W 4.0 lbs (Sap Beetle, 3-Day PHI)

July 1 - Strawberry Renovation/Blueberry 4th Cover & Harvest/ Bramble 2nd Cover & Early Harvest/ Grape 3rd Cover
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Pristine® 14.5 ozs (0-day PHI)
Rally 40 W 4.0 ozs (Except Blueberry, 0-day PHI)
Brigade® WB 12.0 ozs (0-3-day PHI)

July 15 - Strawberry Post Harvest/ Blueberry 5th Cover & Harvest/ Bramble 3rd Cover & Harvest/ Grape 4th Cover & Veraison
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Switch® 11.0 ozs (0-day PHI)
Sulfur 95W 3.0 lbs (0-day PHI)
or Captan® 95W 2.0 lbs (0-day PHI)
or Kocide 6 DF 2.0 lbs (0-day PHI)
Malathion® 2.0 pts (0-3-day PHI)

August 1 - Strawberry Post Harvest/ Blueberry 6th Cover & Harvest/ Bramble 4th Cover & Harvest/ Grape 4th Cover & Early Harvest
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Pristine® 14.5 ozs (0-day PHI)
Sevin® 50W 4.0 lbs (Japanese Beetle, 3-Day PHI)

August 15 - Strawberry, Blueberry & Bramble Post Harvest/ Grape 4th Cover & Harvest
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Elevate 4.15 lbs (0-day PHI)
Phostro® 4.0 pts (0-day PHI)
Sevin® 50W 4.0 lbs (Hornets – 3-Day PHI for All Fruit)

September 1 - Strawberry Post Harvest/ Grape 5th Cover & Harvest
Captan® 50W 2.0 lbs (0-3 Day PHI & 4-Day REI)
Phostro® 4.0 pts (0-day PHI)
Sevin® 50W 4.0 lbs (Hornets – 3-Day PHI for All Fruit)

November 25 Fall Dormant
Lime Sulfur 10.0 gals
Kocide DF 2.0 lbs (0-day PHI)

**HERBICIDES: [HRAC]** | **RATE** | **NOTES**
--- | --- | ---
Gramoxone® [22] | 1.0 qts | Burndown, Directed Spray
Roundup® [9] | 1.0 qts | Burndown, Shielded & Directed Spray
Devrinol® 50 DF [15] | 4.0 lbs | Spring/Summer 35-Day PHI
Prinect® 4L [5] | 1.0 qts | Spring Dormant, Avoid High pH Soils
Solvam® [12] | 2.5 lbs | Spring/Fall Dormant, 1-yr Established
(Except estragon)
Aim® [14] or Shark® [14] | 2.0 ozs | Directed Spray to Weeds, 3-day PHI
Venue® [14] (Grapes only) | 2.0 ozs | Directed Spray, 0-day PHI
Chateau® [14] | 12.0 ozs | After Harvest to Spring Bud Swell
Surflan® [3] | 2.0 qts | Spring/ Summer, Provi 60-day PHI
(Except estragon)
Poast® [1] | 1.5 pts | Summer Grasses, Variable PHI
Sinsar® [5] | 4.0 ozs | Fall Dormant, 1-yr Established

*Lowest Use Rate Recommended Initially

**Organic Approach Substitutions:**

**Conventional Product** | **Organic Certified Product (OMRI)**
--- | ---
Captan® | Surround® or Sulfur or Lime Sulfur
Rally® | Kalgreen (Powdery Mildew Eradicant)
Listed Insecticides | Neem® or Pyriac® or Entrust® or Dipel®
Gramoxone® or Roundup® | Avenger®, Burnout® or Scythe® (no OMRI label)

* Important Note: The calendar spray dates given are an average estimate for Anne Arundel and Prince George’s County small fruit production, and may vary by location in Southern Maryland. Be sure to adjust your spray schedule application dates accordingly. The above recommendations closely reflect the current spray program utilized at the University of Maryland Research and Education Center, Upper Marlboro Facility for its research fruit plots. Remember to always “Read the Label”.

R. David Myers
Extension Agent, Agriculture
myersrd@umd.edu
**Spray Program for Multi-Tree Fruit Orchards**

Many local orchards are composed of multi-fruit combinations producing for fresh market apples, peaches, pears, plums, nectarines, and cherries. Aggressive fruit tree spray programs are required to achieve high quality fruit. These multi-fruit orchards create many spray management challenges for the achievement of good pest control in accordance to label guidelines.

Therefore, the following multi-fruit orchard spray program for the control of major tree fruit pests and diseases may offer some assistance: **Labeled as noted in 2015 for All Tree Fruit – Pomes: Apples & Pears Stones: Peaches, Plums, Nectarines, and Cherries.**

### INSECTICIDES: [IRAC]

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Imidan</strong></td>
<td>70W [1A]</td>
<td>2.0 lbs  Captan, SWD, Scale &amp; Fruit Moths</td>
</tr>
<tr>
<td><strong>Warrior</strong></td>
<td>3</td>
<td>4.0 ozs  Borers, Captan, SWD, BSBM</td>
</tr>
<tr>
<td><strong>Tombstone</strong></td>
<td>3</td>
<td>2.0 ozs  &amp; Fruit Moths</td>
</tr>
<tr>
<td><strong>Actara</strong></td>
<td>4A</td>
<td>4.5 ozs  Aphids &amp; Curculio</td>
</tr>
<tr>
<td><strong>Lorsban</strong></td>
<td>4E [1B]</td>
<td>1.5 qts  Dormant &amp; Trunk Borer</td>
</tr>
<tr>
<td><strong>Acramite</strong></td>
<td>50WS [25]</td>
<td>1.0 lbs  Mites Only</td>
</tr>
<tr>
<td><strong>Sevin</strong></td>
<td>50A [1A]</td>
<td>4.0 lbs  SWD, Japanese Beetles, Hornets &amp; Sap Beetles</td>
</tr>
</tbody>
</table>

*Rate for 50-100gal Acre Concentrate Spray

** Be sure to follow all labels closely for PHI and REI!

**Multi-Fruit Spray Calendar**

<table>
<thead>
<tr>
<th>Date</th>
<th>Spray Program</th>
<th>Insecticide</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 15</td>
<td>Dormant Spray</td>
<td>Imidan, War</td>
</tr>
<tr>
<td>April 5</td>
<td>Peach Bloom</td>
<td>Apple Tight Cluster</td>
</tr>
<tr>
<td>April 15</td>
<td>Peach Fall</td>
<td>Apple Bloom</td>
</tr>
<tr>
<td>April 25</td>
<td>Peach Shuck Split</td>
<td>Apple Petal Fall</td>
</tr>
<tr>
<td>May 5</td>
<td>1st Cover Spray</td>
<td>Captain, Cap</td>
</tr>
<tr>
<td>May 15</td>
<td>2nd Cover Spray</td>
<td>Captain, Cap</td>
</tr>
</tbody>
</table>

### HERBICIDES: [HRAC]

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gramoxone</strong></td>
<td>[22]</td>
<td>1.0 qts  Burnbird, Directed Spray</td>
</tr>
<tr>
<td><strong>Roundup</strong></td>
<td>[9]</td>
<td>1.0 qts  Burnbird, Shielded &amp; Directed Spray</td>
</tr>
<tr>
<td><strong>Devrinol</strong></td>
<td>50DF [15]</td>
<td>4.0 lbs  Spring/Summer 35-day PHI</td>
</tr>
<tr>
<td><strong>Primpol</strong></td>
<td>4L [5]</td>
<td>1.0 qts  Spring Dormant, Avoid High pH Soils</td>
</tr>
<tr>
<td><strong>Solfac</strong></td>
<td>[12]</td>
<td>2.5 lbs  Spring/Fall Dormant, 1yr Established</td>
</tr>
<tr>
<td><strong>Goal or Galigan</strong></td>
<td>[14]</td>
<td>2.0 pts  After Harvest to Spring Bud Splendor</td>
</tr>
<tr>
<td><strong>Chateau</strong></td>
<td>[14]</td>
<td>12.0 ozs  After Harvest to Spring Bud Splendor</td>
</tr>
<tr>
<td>**Axia or Shark or Venom [14]</td>
<td>2.0 ozs  Directed Spray, 0-3-day PHI</td>
<td></td>
</tr>
<tr>
<td><strong>Matrix</strong></td>
<td>[2]</td>
<td>4.0 ozs  Late Spring, 1yr Established</td>
</tr>
<tr>
<td><strong>Prowl</strong></td>
<td>[3] or Surfyan [3]</td>
<td>2.0 qts  Summer, Prowl 60-day PHI</td>
</tr>
<tr>
<td><strong>Post</strong></td>
<td>[1]</td>
<td>1.5 pts  Summer Grasses, Variable PHI</td>
</tr>
<tr>
<td><strong>Karmex</strong></td>
<td>[7] or Diuron [7]</td>
<td>1.6 qts  Spring/Fall Dormant, 3yr Established</td>
</tr>
</tbody>
</table>

*Lowest Use Rate Recommended Initially

### Organic Approach Substitutions:

<table>
<thead>
<tr>
<th>Conventional Product</th>
<th>Organic Certified Product (OMRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain &amp; Topsis- M</td>
<td>Surround or Sulfur or Lime Sulfur</td>
</tr>
<tr>
<td>Rally</td>
<td>Kalgreen (Powdered Mildew Eradicant)</td>
</tr>
<tr>
<td>Listed Insecticides</td>
<td>Neem or Pyganic or Entrust (Stone Fruts Only)</td>
</tr>
<tr>
<td>Agrimycin</td>
<td>Agrimycin or Fixed Copper (Apples &amp; Pears Except During Bloom)</td>
</tr>
</tbody>
</table>

* Important Note: The calendar spray dates given are an average estimate for Anne Arundel and Prince George’s County Orchards, and may vary by location in Southern Maryland. Be sure to adjust your spray schedule accordingly. The above recommendations very closely reflect the current spray program utilized at the University of Maryland Research and Education Center, Upper Marlboro Facility for its research orchards. Remember to always "Read the Label"

R. David Myers  
Extension Agent, Agriculture  
myersrd@umd.edu
MEMORANDUM

TO: Agricultural Extension Agents and Interested Parties

FROM: Dennis Howard, Chief, Pesticide Regulation Section

SUBJECT: Section 18 Approval for the use of Bifenthrin (Bifenture EC, Bifenture 10DF and Brigade WSB), to control Brown marmorated stink bugs on apples, peaches and nectarines.

The U.S. Environmental Protection Agency has recently approved the Maryland Department of Agriculture’s request for a specific exemption under Section 18 of FIFRA. This exemption allows the use of 3 products (Bifenture EC, Bifenture 10DF and Brigade WSB) to control Brown marmorated stink bugs on apples, peaches and nectarines. This specific exemption expires October 15, 2015.

Under this specific exemption, Brigade WSB (10% bifenthrin), EPA Registration No. 279-3108, manufactured by FMC Corporation; Bifenture EC (25% bifenthrin), EPA Registration No. 70506-277; and Bifenture 10 DF (10% bifenthrin), EPA Registration No. 70506-57, both manufactured by United Phosphorus, Inc., may be applied to apples, peaches and nectarines.

Applications must be made post-bloom, by ground only, at a rate of 0.08 to 0.2 lb. active ingredient bifenthrin (a.i.) per acre; no more than 0.5 lb a.i. per acre may be applied per year; multiple applications may be made at a minimum of 30 day intervals; a restricted entry interval (REI) of 12 hours and pre-harvest interval (PH) of 14 days must be observed.

All applicable direction, restrictions, and precautions on the EPA - registered product labels, as well as those outlined on the section 18 use directions must be followed. To help minimize exposure to pollinators, the following statement on the application time must be observed: “Do not apply this product until after petal fall.”

To mitigate risks of aquatic organisms, Section 3 product label requirements must be strictly followed. For ground applications (the only method allowed under this exemption) a 10 ft vegetative buffer strip, or a 25 ft buffer zone is required between the site of application and adjacent bodies of water. Recommendation on the section 3 product labels regarding droplet size, wind direction and speed, temperature inversions, and other factors affecting off-site drift or runoff of bifenthrin must also be carefully followed.
Please Note: *This pesticide is extremely toxic to fish and aquatic invertebrates. Use with care when applying in areas adjacent to any body of water. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not make applications when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment was waters.*

*This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area.*

*The Use of bifenthrin is prohibited in areas that may result in exposure of endangered species to bifenthrin. Prior to use in a particular county contact the local extension service or Department of Natural Resources for procedures to protect endangered species.*

The Maryland Department of Agriculture’s Pesticide Regulation Section shall be immediately informed of any adverse effects resulting from the use of this pesticide in connection with this exemption.

Your help in dissemination this information is greatly appreciated.

DWH: dh  
cc: Bifenthrin Section 18 File
For distribution and use only in Maryland under an emergency exemption authorized under Section 18 of FIFRA

All applicable directions, restrictions, and precautions on the EPA registered product labels as well as those on these directions for use must be followed. These directions for use must be in the possession of the user at the time of pesticide application.

Products:  
Bifenture® EC Agricultural Insecticide (EPA Reg. No. 70506-57)  
Bifenture® 10DF Insecticide/Miticide (EPA Reg. No. 70506-227)

Firm Name: United Phosphorus, Inc.  
630 Freedom Business Center, Suite 402  
King of Prussia, PA 19406

Crop/Site/Commodity: Apples, Peaches, Nectarines  
File Symbol: 15-MD-02, 15-MD-03, 15-MD-04  
Target Pest/Problem: Brown Marmorated Stink Bug (Halyomorpha halys)

Dosage:  
Apply 5.12 – 12.8 fl ozs (0.08-0.20 lbs ai) per acre of Bifenture EC Agricultural Insecticide (EPA Reg. No. 70506-57), OR

Apply 12.8 – 32.0 ozs (0.08-0.20 lbs ai) per acre of Bifenture 10DF Insecticide/Miticide (EPA Reg. No. 70506-227)

Use higher rates under heavy insect pressure.

Dilution Rate:  
By Ground: Apply as a dilute spray (minimum of 200 gallons of finished spray per acre) or concentrate (minimum of 50 gallons of finished spray per acre). For best control, thorough coverage is necessary.

Frequency/Timing of Applications:  
Applications should be applied when populations reach locally determined economic thresholds. Consult the cooperative extension service, professional consultants or other qualified authorities to determine appropriate threshold levels for treatment in your area.

Do not apply more than 32 fl ozs (0.50 lbs ai) of Bifenture EC Agricultural Insecticide or 80 ozs (0.50 lbs ai) of Bifenture 10DF Insecticide/Miticide per acre per season.

Apply as necessary to maintain control using a minimum of 30-day spray intervals. Do not apply this product until after petal fall. Do not graze livestock in treated orchards or cut treated cover crops for feed.

Restricted Entry Interval (REI): 12 hours

Pre-Harvest Interval (PHI): 14 days

Restricted Use Pesticide: When used in Maryland, applications can only be made by certified applicators or by persons under their direct supervision and only for those uses covered by the certified applicators certification.

This exemption is effective April 6, 2015 through October 15, 2015.
RESTRICTED USE PESTICIDE
Toxic to fish and aquatic organisms.
For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator’s certificate

Section 18 EXEMPTION
FOR DISTRIBUTION AND USE ONLY IN MARYLAND
EPA File Symbols:
15-MD-____
15-MD-____
15-MD-____

EMERGENCY CALLS: 800-331-3148

ALL APPLICABLE DIRECTIONS, RESTRICTIONS, AND PRECAUTIONS ON THE REGISTERED PRODUCT LABEL FOR BRIGADE WSB (EPA REG. NO. 279-3108) ARE TO BE FOLLOWED

THESE DIRECTIONS FOR USE MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF PESTICIDE APPLICATION.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Pest Controlled</th>
<th>Rate of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples, Peaches, Nectarines</td>
<td>Brown Marmorated Stinkbug</td>
<td>12.8 - 32 oz/A (0.08 - 0.2 lb ai/acre)</td>
</tr>
</tbody>
</table>

Directions for Use: Application must be made post-bloom, by ground only as a dilute (minimum 200 gallons of finished spray per acre) or concentrate (minimum 50 gallons of finished spray per acre) in sufficient water to provide thorough coverage. Do not apply this product until after petal fall.

Restrictions: Do not apply more than 32 oz/acre (0.2 lb ai/acre) per application. Do not apply more than 72 oz/A (0.5 lb ai/acre) per year. Do not make applications less than 30 days apart. Do not graze livestock in treated areas. Do not apply within 14 days of harvest. Do not allow entry into treated areas for 12 hours following application.

Any adverse effects resulting from the use of Brigade WSB under this emergency exemption must be immediately reported to the Maryland Department of Agriculture.

FMC Corporation
Agricultural Products Group
1735 Market Street
Philadelphia, PA 19103

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