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Berry Notes

Prepared by the University of Massachusetts Fruit Team

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alert to be informed when and where captures are reported. See more on this in General Information section of this issue of *Berry Notes*.

CROP

CONDITIONS:

Strawberry renovation is complete in many areas. See more about recommended renovation practices below. Remember that prompt renovation is important for managing several strawberry pests and may help keep the build-up of Spotted Wing Drosophila down by eliminating leftover fruit. Remember to irrigate renovated fields as the new foliage begins to grow. Dayneutral strawberry harvest is beginning. See article in this issue on pest management in dayneutrals. **Raspberry** harvest is underway for summer fruiting varieties. SWD is the most critical pest at this time. Please go to the UMass Swd web page at <https://extension.umass.edu/fruitadvisor/spotted-wing-drosophila> for up-to-date information. **Blueberries** harvest is also underway with. SWD are a significant threat for this crop, too. See SWD website for recommendations for this crop. Japanese Beetle are out and may be found in high numbers in blueberries in some areas. High heat may have stressed young bushes or those with compromised root systems. Drip irrigation is important to avoid long lasting root stress. Now is a good time for leaf tissue analysis to make sure blueberries are getting the nutrition they need. See more on this topic in this issue. **Grapes** sizing up and veraison is approaching. Watch for powdery and downy mildew outbreaks and for second generation of Grape Berry Moth. More on this below. **Currants and Gooseberries** is almost done. The heat accelerated ripening and may have caused a significant amount of fruit drop unless irrigation was used to cool the crop

Spotted Wing Drosophila UPDATE: No SWD have been found in traps in MA to date. Other New England states are also reporting no captures to date. Growers can sign up for a SWD

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately 2-week period, June 26 through July 9. Soil temperature and phenological indicators were observed on or about July 9. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2014 calendar year. This information is intended for use as a guide for monitoring the developmental stages of pests in your location and planning management strategies accordingly.

Region/Location	GDD (2-Week Gain)	GDD (Total 2014 Accumulation)	Soil Temp (°F at 4" depth)	Precipitation (2-Week Gain in inches)
Cape Cod	311	1045	72	2.50
Southeast (Wareham)	285	917	75	6.80
Southeast (Hanson)	337	1084	83	3.25
East	337	1064	73	3.09
Metro West	288	917	81	2.37
Central (Boylston)	290	865	--	1.94
Pioneer Valley	342	1113	77	4.89
Berkshires	279	835	74	6.59
AVERAGE	309	980	76	3.93

n/a = information not available

(Source: *UMass Landscape Message #16, July 11, 2014*)

STRAWBERRY

Strawberry Renovation

Sonia Schloemann and A. Richard Bonanno, UMass Extension

Matted row strawberry plantings benefit from a process called 'renovation' after harvest to stimulate new growth to support next year's crop and to interrupt the build-up of certain pests and diseases mid-way through the growing season. For best results, renovation should be started immediately after the harvest is completed to knock down two-spotted mites, sap beetles and/or root weevils and to promote early runner formation. Early runner-set translates to higher yield potential the following year. Build-up of leaf spots and other foliar pathogens can be cleaned up with this process, too. Renovation should be completed by late-July in normal years. The following steps describe renovation of commercial strawberry fields. Specific rates and timing of applications can be found in the New England Small Fruit Pest Management Guide at <http://extension.umass.edu/fruitadvisor/ne-small-fruit-management-guide>

1. **Weed control:** Annual broadleaf weeds can be controlled with the 2,4-D amine formulation (Amine® 4 or Formula 40) applied immediately after final harvest. Be extremely careful to avoid drift when applying 2,4-D. Some strawberry damage is also possible if misapplied. Read and understand the label completely. If grasses are a problem, sethoxydim (Poast) will control annual and some perennial grasses. However, do not tank mix Poast and 2,4-D.

2. **Mow the old leaves off** just above the crowns 5-7 days after herbicide application. Be careful not to damage crown by mowing too low.



Mowing strawberries at renovation. Photo by Eric Hanson, Mark Longstroth and Bob Tritten

3. **Fertilize the planting.** The main goal is to deliver nitrogen at this time to help regrow the canopy. Nitrogen should be applied at 35-60 lbs/acre, depending on vigor and basic soil fertility. Split applications (one now and the rest in 4-6 weeks) are better than a single fertilizer application. This gives plants more time to take up the nutrients in the fertilizer. A leaf tissue analysis

(recommended once the canopy has regrown) is the best way to fine-tune your fertilizer program. This will tell you what the plants are actually able to take out of the soil and what nutrients are in sufficient supply or not. See Leaf Tissue Test Sampling Instructions at the UMass Soil and Tissue Testing Lab website at <http://soiltest.umass.edu/services> for more on this.

4. **Subsoil:** Where tractor and picker traffic has been heavy on wet soils, compaction may be severe. Subsoiling between rows will help break up compacted layers and provide better infiltration of water. Subsoiling may be done as a later step if field conditions are unsuitable.

5. **Narrow rows and cultivate between rows:** Reduce the width of rows to 12-18 inches at the base. More berries are produced along row edges than in row middles. Wider rows lead to lower fruit production (yield and quality) and increased disease pressure. Narrow rows also give better sunlight penetration, air circulation, spray coverage, and over-all fruit quality. Use a roto-tiller, multivator or cultivator to achieve the row-narrowing. Work in the straw between the rows at this time, too. If possible, try to throw 1-inch of soil on top of the rows at this time to stimulate new root formation on established crowns and new runners.

6. **Weed control:** Pre-emergence weed control should begin immediately after the plants are mowed and the soil is tilled to narrow the crop row. The most common practice at this time is to apply half the annual rate of terbacil (Sinbar at 4 oz/acre). It is essential that the strawberry plants are mowed, even if 2,4-D was not applied, to avoid injury from Sinbar. If regrowth of the strawberry plants has started, significant damage may result. Some varieties are more sensitive to Sinbar than others. If unsure, make a test application to a small area before treating the entire planting. Sinbar should not be used on soils with less than 0.5% organic matter or on reportedly sensitive varieties. Injury is usually the result of too high a rate or overlapping of the spray pattern.

If Sinbar is not used, napropamide (Devrinol at 4 lb/acre) or DCPA (Dacthal at 8- 12 lb/acre) should be applied at

this time. Dacthal is preferred over Devrinol if the planting is weak. If Sinbar is used, napropamide (Devrinol at 4 lb/acre) should be applied 4 to 6 weeks later. This later application of Devrinol will control most winter annual weeds that begin to germinate in late August or early September. Devrinol should be applied prior to rainfall or it must be irrigated into the soil. During the summer, Poast can be used to control emerged grasses. Cultivation is also common during the summer months. Cultivations should be shallow and timely (weeds should be small) to avoid root damage to the strawberry planting. The growth of strawberry daughter plants will also limit the amount of cultivation possible especially near the crop row. Other materials that can be used at this time include Chateau and Prowl H2O. See the New England Small Fruit Pest Management Guide for specific rates and other information.

7. **Subsoiling:** Soil compaction caused by tractor and picker traffic in the field can cause soil drainage problems and interfere with good root development. Using a subsoiling blade between the rows will break up compacted layers of soil and improve water infiltration. Subsoiling is best done late in the renovation sequence to prevent interference from straw and crop residues.

8. **Irrigate:** Water is needed for both activation of herbicides and for plant growth. Don't let the plants go into stress. The planting should receive 1 to 1-1/2 inches of water per week from either rain or irrigation.

9. **Cultivate to sweep runners into the row** until plant stand is sufficient. Thereafter, or in any case after September, any runner plant not yet rooted is not likely to produce fruit next year and is essentially a weed and should be removed. Coulter wheels and/or cultivators will help remove these excess plants in the aisles.

10. **Adequate moisture and fertility during August and September** will increase fruit bud formation and improve fruit yield for the coming year. Continue irrigation through this time period and fertilize if necessary. An additional 20- 30 pounds of N per acre is suggested, depending on the vigor.

Pest Management for Day-Neutral Strawberries

David Handley, University of Maine Cooperative Extension

Most of the important pests that damage June-bearing varieties can be as much or more of a problem on day-neutral types. Because day-neutral strawberries will have buds, flowers and fruit all occurring at the same time, it is critical to pay close attention to the required number of days to harvest after a pesticide application, to be sure you can safely harvest ripe fruit while still protecting buds and blossoms. Some of the more important pests are listed

below, along with currently recommended pesticides and days to harvest as stated on current labels.

Spotted wing drosophila (*Drosophila suzukii*) is a new pest which is likely to be a concern for day-neutral strawberries, fall raspberries and blueberries. This is a small fruit fly, similar to the type that hover around the over-ripe bananas in your kitchen. However, this species will lay its eggs on fruit before it ripens, resulting in fruit that is contaminated with small white maggots just as it is

ready to pick. As a result, the fruit quickly rots and has no shelf life. This insect recently came into the U.S. from northern Asia, and infested Maine berry crops last year. It can complete a generation in under two weeks, with each adult female laying hundreds of eggs. Therefore, millions of flies can be present soon after the introduction of just a few into a field. This makes them very difficult to control, and frequently repeated insecticide sprays (3 to 5 times per week) may be needed to prevent infestations once the insect is present in a field. Spotted winged drosophila can successfully overwinter here, although it may not build up to damaging levels until late in the summer. We have set out monitoring traps for spotted winged drosophila in fruit plantings around the state to determine the activity of this pest in Maine. However, these traps are unlikely to provide early warning, i.e. when we find them in a trap they are probably already established in the field. We will be alerting growers when we find them in Maine. We have found a few spotted wing drosophila in Maine this season, but not yet in damaging numbers. Products that provide good control of drosophila on strawberries include Delegate®, Brigade®, Danitol®, and malathion. Keeping fields clean of over-ripe and rotten fruit can also help reduce the incidence of this insect. For information on identifying spotted wing drosophila and making your own monitoring traps, visit the Michigan State University's Spotted Wing Drosophila website at: <http://www.ipm.msu.edu/swd.htm>.

Tarnished plant bug: This is one of the most prevalent and persistent pests of day-neutral strawberries, as summer flowering coincides with peak populations of this insect. Adult and nymph stages feed on the flowers and developing fruit, causing them to have seedy ends and other malformations. Regular insecticide applications are often required to keep the damage in check. Scout the flower clusters for adults and nymphs often to determine if controls are necessary. Insecticide products for tarnished plant bug include:

Tarnished Plant Bug	
Product	Days to Harvest
Brigade®	0
Pyganic®	0
Assail®	1
Dibrom®	1
Rimon®	1
malathion	3
Thionex®	4

Two-spotted spider mites: Mites can become a problem during the summer when the growing conditions are warm and dry. In addition to infesting the leaves, mites

can move onto the fruit, reducing marketability. Plants that are drought-stressed, over fertilized with nitrogen, or prone to dust covering, e.g. growing beside a dirt road, are especially prone to mite infestation. Predatory mites can be an effective means to control spider mites and keep them in check over the season. Releases should only be made when spider mites are present in the field to provide the predators with a source of food. Most of the products labeled for controlling spider mites will also kill predatory mites, so do not use these products after predators have been released. Scout for mites often during the season by examining the undersides of the leaves. Control is warranted if more the 25% of leaves examined have mites.

Two-Spotted Spider Mites	
Product	Days to Harvest
Brigade®	0
Zeal®	1
Vendex®	1
Acramite®	1
Danitol®	2
Agri-Mek®	2
Oberon®	3
Savey®	3
Kelthane®	3

Potato leafhoppers, sap beetles, thrips and spittlebugs may also become problems on day-neutral strawberries, but are less frequently observed than tarnished plant bug and spider mites. Recommendations for these insects can be found in the current edition of the New England Small Fruit Management Guide.

Foliar and fruit diseases also need to be managed on day-neutral strawberries, and should be controlled in much the same way as they are for June-bearing varieties. Most of the fungicide products labeled to control gray mold, powdery mildew, leaf spot and leaf scorch have either zero or one day to harvest, so protecting blossoms at the same time as fruit is near harvest should not be a problem; but be sure to check labels carefully and schedule your sprays and harvests accordingly. Anthracnose fruit rot can be especially troublesome for day-neutral strawberries, because it grows well under warm conditions and spreads by splashing water, which is encouraged on plastic mulch. Fungicides registered for control of anthracnose include Cabrio®, Abound®, Pristine® and Switch®, all of which have zero days to harvest restriction. (*Source: UMaine Strawberry IPM News, No. 7. July 16, 2013*)

RASPBERRIES/BLACKBERRIES

Potato Leaf Hopper in Brambles

Sonia Schloemann, UMass Extension

ID/Life Cycle:



Leafhoppers are small, green, bullet-shaped insects which take flight quickly if disturbed. The nymphs are lighter colored and do not fly. They are easily identified by their habit of moving sideways when

disturbed. Potato leafhoppers don't overwinter in New England but are blown up every year from the south on storm fronts. There are multiple generations every year.

Damage:



The potato leafhopper feeds on the underside of leaves leaving small chlorotic areas and causing a downward cupping of the leaves. Most feeding is the upper, more succulent leaves on primocanes and often causes a

stunting of those canes.

Management:

Monitoring: Scouting is especially important in new raspberry/blackberry plantings and on primocane fruiting varieties. Scout by brushing the leaves with the hand and looking for small adult leafhoppers flying off. Examine the underside of injured leaves to see if nymphs are present. There are no thresholds established for potato leafhoppers. Consider control if there are one or two nymphs per leaf and leaf curl is evident.

Control strategies:

See [New England Small Fruit Management Guide](#) for more information on recommended materials and rates

Cultural/Biological: Follow recommended practices in table below.

Chemical:

- Apply recommended insecticides when large populations of nymphs are noted on the leaves or symptoms become apparent.
- If repeat applications are needed, rotate insecticides from different IRAC groups to reduce the chance of resistance development in the pest.

Conventional(PHI)	Organic OMRI listed (PHI)	Cultural Practices
Assail 30SG (1) Actara 25WDG (3) Admire Pro (3) Malathion 57EC (1) Malathion 8F (1) Sevin XLR Plus (7)	Aza-Direct (0) AzaGuard (0) Neemix (0) Safer Brand #567 (0)	Avoid proximity to alfalfa plantings, which provide a major source of potato leafhopper population build-up.

*= Restricted Use Material -- Read labels thoroughly for application rates and restrictions (REI, PHI, etc.)

BLUEBERRY

Controlling Japanese Beetles in Blueberries

Rufus Isaacs, Michigan State University

Japanese beetles can feed on the foliage and fruit of blueberries, causing damage to the plant and increasing the risk of fungal diseases. Their emergence during mid-summer can also create a risk of contamination of harvested berries. Japanese beetles are highly mobile insects and can fly into fields from surrounding areas.

This article provides information on management options based on research conducted over the past few years at the Trevor Nichols Research Complex and at grower's farms.

Scouting. Weekly scouting for beetles should be done through July and August to identify field with, and

without, beetle pressure. This can help ensure that management is targeted to the most important areas, and it will help with planning pest management activities around harvest activities. Regular field scouting can also detect the distribution of beetles in a field. If scouting indicates that the field only has beetles on the perimeter, as is often the case, a border application can be sufficient to gain control and allow harvest of beetle-free fruit. Grassy adjacent areas are often a source of beetles, so be on the lookout for this pest in fields near pastures, golf courses, urban areas, etc. Since the beetles are good flyers, this also applies to areas that might be across a road or hedgerow.

Field management. Clean cultivation is a highly effective method to reduce the suitability of fields for Japanese beetles, because the female beetles search out moist grassy areas to lay their eggs. Grassy perimeters may still be attractive and harbor beetle grubs, but there are approaches to making these areas less suitable for larval survival (see last section below). For many farms, clean cultivation may not be a suitable system due to potential problems with dust or mud, so growers have implemented a mixed system that has bare ground when beetles are flying in July and August, followed by a fall seeding of winter rye to provide soil structure during winter and spring. This is then mowed and tilled in the spring before beetle activity. Such a system is an effective approach to minimizing the suitability of fields for this pest.

Weeds can be a big draw for this beetle, so make sure fields do not have sassafras, Virginia creeper, raspberry or blackberry, or any other attractive weeds growing in them. These plants are much more attractive than blueberry plants, and once beetles find them and start feeding, this will attract more beetles to the field.

In small plantings, beetles can be removed by hand and put into soapy water to help reduce the population. Use of monitoring traps in crop fields is not recommended since these traps will draw beetles from the surrounding landscape into the field, creating hot-spots around the trap where the beetles feed, mate, and lay eggs.

Broad-spectrum insecticide options. The organophosphate **Imidan** (buffer to pH 6.0) provides excellent activity on adult beetles, providing 7-10 days of activity, with a 3 day PHI.

The pyrethroid **Asana** has been labeled for a few years in blueberry and this provides high mortality and some repellency of Japanese beetles. However, this insecticide also has a 14 day PHI making it of less use as harvest

approaches. Blueberries also have label for **Mustang Max** (4 oz per acre) and **Danitol** (10-16 oz per acre) which are also pyrethroids. These have shorter pre-harvest intervals (Mustang = 1 day, Danitol = 3 days) and can be applied aerially and by ground. These products are also highly effective against Japanese beetles.

The carbamates **Sevin** and **Lannate** provide immediate kill of beetles present during the spray. They are also stomach poisons, so if beetles eat treated foliage they will also receive a higher dose. This can be a good property for control of Japanese beetles since they eat so much that a strong dose of insecticide is taken up. Lannate has a short residual activity of a few days, whereas Sevin provides a week or more of protection. Sevin has a 7 day PHI in blueberries which has reduced its usefulness near harvest.

Selective insecticides. The labeling of **Provado**, **Actara**, and **Assail** for use in blueberries after bloom provides selective options for Japanese beetle management. These provide 2-3 days of lethal activity from the surface residues before the residue is absorbed into the foliage.

Thereafter, beetles must eat treated foliage to get a dose of the insecticide. Once inside the foliage, these neonicotinoid insecticides are rainfast and provide significant sub-lethal effects of repellency and knockdown activity, but with much less direct mortality from the residues. All three of these insecticides will also provide excellent control of aphids and leafhoppers, especially if the spray is applied to the whole bush. Assail has a 1 day PHI, while Provado and Actara have a 3 day PHI in blueberries.



Fig 5. Adult Japanese beetle; Photo: P. Jenkins.

Short PHI and organic insecticide options. For growers looking for beetle control immediately before harvest or in organically grown fruit crops, some selective insecticides with 0 day PHI's can provide a tool to repel beetles and help achieve beetle-free fruit during harvest. Compounds containing neem (Azadirect, Neemix etc.) have a 0 day PHI and pyrethrum (Pyganic) has a 12 h PHI. These compounds are labeled for organic use, and have a short but effective impact on adult Japanese beetles, with some mortality, some knockdown off the crop, and some repellent activity. Typically there is only 1-2 days of activity against beetles because the residues do not remain active for long. The non-organic form of Pyganic, called Evergreen, also has a 12 h PHI, and is much more effective against Japanese beetle than Pyganic due to the addition of a chemical that inhibits the beetle's ability to break down the insecticide.

Soil-applied insecticides. Japanese beetles typically lay their eggs in moist grassy areas and many fruit farms have

a large amount of this suitable habitat. An additional approach to managing Japanese beetle populations is to target the grub stage of this pest in these areas to reduce the abundance of beetles in the following year. If the location of high grub densities near fruit fields is known, these areas could be treated with a soil insecticide to get maximum return on this treatment. Our experience in Michigan blueberry fields has been that application of Admire (16 oz/acre) to grassy field perimeters, applied in late June, reduced the abundance of beetles on nearby

bushes in the following year. This effect only lasted for the first few weeks of their flight period, however. After that, beetles flying into the area from outside swamped out this effect, so there is only a short-lived benefit from targeting the grubs in fields that are surrounded by infested grassy areas. This approach is expected to work best in isolated farms with minimal immigration of beetles from surrounding areas. (*Source: Michigan Blueberry Newsletter, Volume 4, Issue 12, June 22, 2010*)

GRAPE

Grape Berry Moth

Alice Wise and Greg Loeb, Cornell Univ.

According to the GBM model on NEWA <www.newa.cornell.edu>, we have passed the 811-900 GDD benchmark for treatment. The model says that egg laying continues. The next treatment threshold is 1620. While it is helpful to have this threshold, scouting is still essential particularly for vulnerable areas. Remember it is 1620 GDD from biofix – this is calculated by the GBM model on the website. The exact date for biofix on Long Island is somewhat of a toss-up. The model uses a default of May 31. That is supposedly the date of 50% bloom of wild riparia. However, several observations of wild vine bloom were noted this year and in both cases, it occurred after vinifera bloom. Bloom of riparia rootstock at LIHREC occurred in early June. We will have to contemplate determination of biofix over the winter.

A list of GBM materials follows. Contact materials include Danitol, Sevin, Baythroid etc. Ingestion materials are Dipel, Delegate, Entrust and Avaunt though this also has some contact activity. Members of the LI Sustainable Winegrowing group should check the guidelines to ensure compliance when making decisions about GBM sprays. Spray coverage is critically important for control of GBM whether applying a material that works via ingestion or by contact. Leaf pulling of the cluster zone will help with penetration.

In addition to Loeb's annual insect write-up (2014 version on our website), the 2014 NY & PA Pest Management Guidelines for Grapes has good information on efficacy and use of materials. Unfortunately, this is no longer available online. To verify pesticide registration or get a NY approved pesticide label, go to the Cornell PIMS website - <<http://pims.psur.cornell.edu/>>.

- **Avaunt** – A reduced risk material, provides some leafhopper suppression, limited to 2 app's, adjuvant recommended. Two + 's out of three in the Guidelines. Should be easy on beneficials.
- **Baythroid** – Restricted use, contact activity reiterates the need for good penetration, minimum of 50 GPA water required. Will be hard on beneficials.

- **Bt's** – Biological materials Biobit and Dipel, based on *Bacillus thuringiensis* (sp). These are OMRI listed insecticides, effective if applied to young larvae, best used in back to back applications per flight (generation) in targeted cluster zone sprays. See label for rates, timing, compatibility issues. Easy on beneficials. A spreader sticker may help with rain fastness.
- **Danitol** – Restricted use, effective, concerns about resistance remain. Will be hard on beneficials.
- **Brigade** – Restricted use, effective, broad-spectrum so will be hard on beneficials.
- **Delegate** – A next generation material related to Spintor for GBM and thrips. Delegate is thought to have a longer period of residual control than Spintor. Once dry, Delegate is relatively easy on beneficials, although when wet, can be toxic to some beneficial arthropods. This EPA designated reduced risk product has a 4 hr REI. Delegate is a bit more expensive than other products.
- **Imidan** – No longer restricted use but the 14 day restricted entry interval makes this a difficult choice.
- **Leverage** – A restricted use material that is a combination of the neonicotinoid imidacloprid and a pyrethroid cyfluthrin (same a.i. as Baythroid). Leafhopper control provided, likely hard on beneficials. A non-ionic surfactant is recommended. See comments below on imidacloprid.
- **Brigadier** – Restricted use. Combines the neonicotinoid imidacloprid with the pyrethroid bifenthrin (same as Brigade). The pyrethroid gives broad-spectrum activity but will be hard on beneficials. The imidacloprid is particularly effective against leafhoppers. However, imidacloprid is a groundwater concern so use of products with this active ingredient should be done thoughtfully and sparingly.
- **Sevin** - There are many Sevin labels, thus make sure grapes are listed. Can be hard on beneficials, has been linked anecdotally to flare ups of European red mite in local vineyards. Note that new labels for Sevin have

increased reentry intervals (from 12 hours to 2 days for most activities).

• **Entrust** (OMRI-approved) - Two back to back app's per generation recommended due to rapid breakdown of the active ingredient and because larvae are targeted. Both

products should be easy on beneficial insects. See write up on Delegate. (**Source:** *Long Island Fruit & Vegetable Update, No. 15, July 10, 2014*)

GENERAL INFORMATION

Spotted Wing Drosophila Alert System: how to sign up

Sonia Schloemann, UMass Extension



Spotted Wing Drosophila (SWD) have not yet been reported in traps or fruit in Massachusetts, but we are approaching the

time when they are likely to be found. This email is being sent to let you know about a new pest alert service being made available this year with the help of the Massachusetts Dept. of Ag Services. Alerts for Brown Marmorated Stink Bug (BMSB) are also being offered.

To sign up for SWD and BMSB text alerts, go to: <https://extension.umass.edu/fruitadvisor/alert-signup>

Once you fill out the form and submit it, the system will send you a confirmation email to which you will need to reply to confirm that you do, in fact, want to sign up for this service. Cancellation information will also be included in the email. You can cancel at any time. The system will not collect or provide your email or cell phone number to any other entity.

You can sign up for either or both pests. Please indicate if you would like to receive weekly email updates, text alerts (only for urgent events) and provide your email address and/or cell phone number accordingly. Be aware that texting charges may apply, but texts will only go out for very urgent notifications. If you have any questions, please contact either Sonia Schloemann (sgs@umext.umass.edu) or Arthur Tuttle (aft@umass.edu).

In addition and new this year, there will be a mapping feature to the SWD and BMSB pages which will show updated information on where these pests are being found and relative abundance. The map for SWD can be found at <https://extension.umass.edu/fruitadvisor/invasives/map/spotted-wing-drosophila>. This does not replace the need to trap and/or monitor on your own farm, but will give you an idea of if and where things are happening near you. There is also a blog feature that will be updated regularly. It can be found at <https://extension.umass.edu/fruitadvisor/spotted-wing-drosophila-2014>.

Small Fruit Leaf Tissue Analysis

Sonia Schloemann, UMass Extension

Leaf tissue testing is an excellent way to monitor plant nutrient levels. With perennial fruit crops, leaf analysis is better than soil tests for determining an optimal fertilization program. While soil tests reveal the quantity of certain nutrients in the soil, leaf analysis shows exactly what the plant has taken up. However, soil tests are necessary for determining soil pH (and lime or sulfur recommendations) and soil organic matter content (SOM). If nutritional problems are suspected in a given planting, it's a good idea to take both leaf and soil tests.

Leaf analysis is helpful for detecting nutrient deficiencies (especially of minor nutrients) before they

effect plant health or yield. The best tissue analysis for berry crops comes from green, healthy, whole leaves (except for grapes). Do not submit plant tissue that has disease, leaf burn, insect or hail damage. Keep the material in a cool place (insulated chest) or refrigerate before mailing. Record all foliar sprays in case the results are influenced by nutrient or pesticide applications.

A minimum of 50 leaves from raspberries or strawberries, and 80 to 100 leaves from blueberries should be selected for each analysis. Do not mix leaves from fields with different soil types or management

histories. Do not combine leaves from healthy plants with plants that are not growing well.

Strawberry: Strawberry samples should be taken from the first fully-expanded leaves after renovation, about July 15 to August 15.

Raspberry: Raspberry samples should be leaves from non-fruiting canes taken between August 1 and 20.

Blueberry: Blueberry samples should be leaves taken during the first week of harvest, from July 15 to August 15.

Grape: Grape samples should be taken either at bloom or veraison (berry coloring). Bloom samples should be taken from leaves opposite first fruit cluster on a shoot. Veraison samples should be taken from the furthest fully expanded leaf on a current season's shoot. Unlike other berry crops, grape tissue testing is done on just the leaf petioles, so the leaf blades can be discarded.

Place samples in sealed paper bags, clearly labeled with field names. Below is a list of labs that perform leaf tissue analysis:

MASSACHUSETTS

Soil & Plant Tissue Testing Laboratory - West Experiment Station/UMass Amherst MA 01003 Telephone: 413-545-2311 <http://soiltest.umass.edu/>

NEW HAMPSHIRE

University of NH Analytical Services Lab - Spaulding Hall, Room G28A, 38 Academic Way Durham NH 03824 (603)862-3200 <http://extension.unh.edu/agric/agpds/soiltest.htm>

PRIVATE

Brookside Laboratories - 308 South Main St. New Knoxville, OH 45871 Telephone: 419-753-2448 <http://blinc.com>

Spectrum Analytic - 1087 Jamison Rd. Washington Court House, OH 43160 Telephone: 800-321-1562 <http://www.spectrumanalytic.com/>

Measuring Pesticides for Backpack Sprayers

Ruth Hazzard and Katie Campbell-Nelson, UMass Extension

Growers with diverse crops and small plantings often need to be able to apply pesticide to beds or plots of several hundred square feet. It can be difficult to figure out how to calibrate a backpack sprayer for spraying a small area. Some labels give rates for backpack sprayers (i.e. amount per gallon of water), but most only provide rates per acre (i.e. amount per land area treated). Rates may have to be calculated by converting from the rate per acre (per 43,560 sq ft) to rates for a few hundred square feet. Careful division gives you the amount you need. However, it is also critical to properly calibrate your sprayer by determining how much water you use to cover a given area. For some products, spraying small areas may mean that you need to measure extremely small amounts. Some labels provide conversions of volume to weight, but many do not. For example, if you are using spinosad (Entrust formulation, a dry powder) you may need to weigh product in grams. If a gram scale is unavailable, then it is possible to measure Entrust by volume. Based on repeated samples, we found that, on average, the volume was 1.7 gm per teaspoon (shaved level and tamped slightly) of Entrust powder. One ounce (dry weight) equals 28.45 grams.

Liquid measured in (fluid) ounces is already a volume so it is easier to measure. One fluid ounce equals 29.6 milliliters (mL). Some pesticides call for very low rates per acre and may need to be measured in mL when treating small areas. Neonicotinoid insecticides are an

example. An inexpensive measuring device for mL can be found in the children's medicine section of drug stores. Even if you are using pesticide products that are relatively safe, always store in a safe place, handle carefully, follow the directions on the label, and use the required protective gear for mixing, spraying, and cleaning your sprayer. Mix in a designated area that is away from workers and the public. Only mix the amount of product that you are going to use for a given application. Never store mixed pesticides in a backpack sprayer or any other vessel, and never store any pesticides in anything other than the original labeled container. When calibrating and using your sprayer, be consistent. The amount of spray you apply to an area will depend on four variables: your walking speed, the pressure you select, your spray swath width, and the nozzle tip you've chosen. If you change any one of these, you change the amount of spray you apply.

Walking speed. This constant walking speed should be one that you can comfortably maintain over the entire time you intend to spray. It also must be the same speed at which you calibrate the sprayer. If you double your walking speed while maintaining pressure and swath width, you'll apply half as much spray. You would then require twice as much pesticide per gallon (that is, a greater concentration) to apply the same amount of pesticide per acre.

Pressure. If you change the pressure while you spray, you change output. Increased pressure results in higher

output; the exact relationship depends on your nozzle type.

Nozzle tip selection. The proper tip will depend on the situation. Tips are available that cover a wide range of output volumes, spray widths, and pressures. Most backpack sprayers come with a single flat fan nozzle, but a cone tip may be more appropriate for covering foliage.

Swath width/nozzle height. Tips are designed for use within certain heights and pressures. Within these ranges, some tips deliver narrow bands; others, like flooding tips, provide swath widths up to 7 feet. The wider each swath width, the less time the operator spends walking up and down fields. The height at which you hold the spray tip above the target influences the swath width. Spraying as close to the target as is practical minimizes drift and operator contact.

First, check your sprayer coverage and operation. Select the spray tip or boom setup that provides the desired coverage. Add water, and spray the ground or dry pavement as if you were spraying your field. Check the spray pattern for uniformity (and proper spray pattern overlap if you're using a boom). You can also check it over the crop to see if you are getting good coverage. Adjust nozzle spacing and/or height until you achieve the desired pattern. Be certain you're getting uniform coverage before you proceed! Check fittings and hoses for leaks. Below are examples of two different ways to calibrate and mix backpack sprayers.

Method 1. Concentration: Using the Labeled Rate per Gallon for a Backpack Sprayer.

Some pesticide labels provide a rate of product to use per gallon, or concentration, for backpack sprayers. If this is given, add that amount of pesticide to each gallon of water. Spray to cover the crop foliage, but not to runoff on the ground. Mix the amount you need to cover your crop area.

The following rates for two commonly used organic insecticides are listed on the product label:

Product	Amount per gallon	Amount per 3 gal (for 1000 sq ft)	Rate per acre
Entrust	0.43g =0.015 dry oz	1.3 gm =0.046 dry oz = 3/4 tsp	2 oz

Surround WP	1 1/2 - 3 cups	4.5 - 9 cups	50 lb
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For Entrust, do not use more than 3 gallons of water per 1,000 sq ft.

Method 2. Match the amount of pesticide to the amount of water needed to spray the crop area.

1. Calculate what portion of an acre is being sprayed. Determine sq ft of area to be sprayed (multiply bed or canopy width by row length by number of rows). Calculate how much of an acre this is (this may be a small fraction of an acre):

Acres to be sprayed = number of ft² to spray / 43,560 ft² per acre

2. Calculate how much pesticide to use. Multiply the rate per acre for the crop and pest (from the label) times the proportion of an acre to be sprayed.

Amount of pesticide needed = amount per acre X proportion of acre to be sprayed

3. Measure water needed per sq ft of crop. Add a known amount of water (eg 1 or 2 gallons) to the tank. Spray the water as if you were actually spraying your field. Remember, you must maintain constant pressure, constant walking speed, and consistent nozzle height and boom setup or wand motion to achieve the coverage you need. This amount will change with different crops and size of crop canopy. When the water is gone, stop and mark the spot. Measure the area you sprayed and calculate the square feet (length of swath x width). Calculate how many gallons needed per sq ft.:

Gallon per ft² = number of gallons used/ number of ft² sprayed

4. Determine total water needed:

Gallons of water needed = gal./ft² X number of sq ft to be sprayed.

5. Mix the required amount of pesticide in the required amount of water. It is best to add half the water, add the pesticide, agitate, then add the remaining water. Spray, using the walking speed, pressure, nozzle and boom setup or wand motion that you used for calibrating. (Source: UMass Vegetable Notes, Vol. 24, No. 13, July 18, 2013)

UPCOMING MEETINGS:

July 9, 2014 – *Annual Summer Meeting of the Massachusetts Fruit Growers' Association*. 10am – 3pm, UMass Cold Spring Orchard, 391 Sabin St., Belchertown MA. Details will be available soon at <http://extension.umass.edu/fruitadvisor/>.

July 29, 2014 – *UMass AG Field Day*, Crop and Animal Research Farm, North River Rd. South Deerfield MA. 10:00am – 4:00pm. For more information and directions go to: <http://ag.umass.edu/events/umass-agricultural-field-day> . 0.5 pesticide recertification credits and 5.5 CEUs for Certified Crop Advisors will be available.

August 20-21, 2014 – *NASGA Summer Tour*, Abbotsford, British Columbia, Canada. For more information or to register, go to: <http://www.nasga.org>.

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