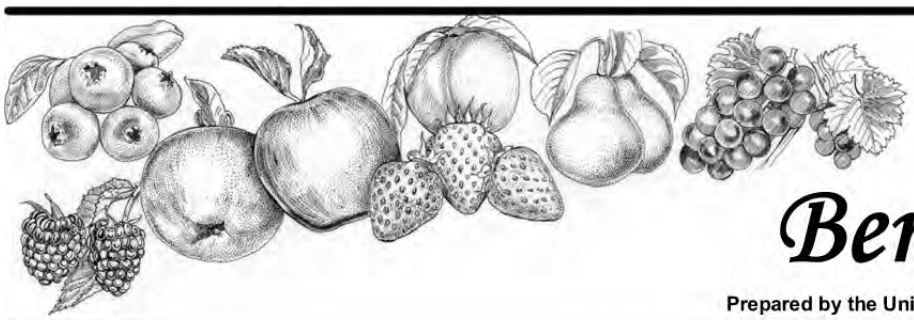

UMass Amherst EXTENSION

Berry Notes

Prepared by the University of Massachusetts Fruit Team

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www.umass.edu/fruitadvisor/berrynotes/index.html

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Current Conditions:

Strawberries Be sure to complete renovation promptly following harvest. Delaying can reduce winter hardiness by limiting time crowns have for starch storage. Remember to keep fields well irrigated after renovation to support regrowth of the canopy. Fertilization is also important for good canopy regrowth. Also watch for cyclamen mite, tow-spotted mite and potato leafhopper infestations, especially in new fields. Leaf tissue analysis should be done now to assess fertilizer program. **Raspberry** harvest continues with late season summer bearers giving way to early season fall bearers. Intermittent rain can cause increases in fruit rot during harvest. Anthracnose cane blight may be significant this year as a result of continued high temp and humidity. Watch for twospotted spider mites and potato leafhopper, especially in fall fruiting varieties. Primocanes may show flagging from infestation by cane borers. These should be cut out below any sign of tunneling. Japanese beetle feeding can be heavy on foliage and fruit. To avoid contact with pollinators, spray applications should be made in the evening with materials rated for low impact on pollinators (e.g., AzaDirect). Leaf tissue analysis should be done now to assess fertilizer program. **Blueberry** harvest also continues. Bird netting or other strategies should be well in place by now. Blueberry maggot is still active and can be monitored with sphere traps. Only low phi materials should be sprayed for BBM control at this time. Also, check new growth for aphid infestations, which can lead to virus infections. Leaf tissue analysis should be done now to assess fertilizer program. **Grapes** are at or approaching veraison. Disease management now shifts to focus on preserving good foliage through harvest. Powdery and Downy mildew are key diseases to watch for. Shoot thinning/positioning and leaf pulling improves spray coverage within the canopy. Grape Berry Moth cluster infestations can be found. Scout fields weekly and refer to NE Small Fruit Pest Mgt Guide for recommendations.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a two-week period, July 8 through July 21, 2010. Soil temperature and phenological indicators were observed on or about July 21, 2010. Accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments from the beginning of the current 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	2010 GROWING DEGREE DAYS		Soil Temp (°F at 4" depth)	Precipitation (1-Week Gain)
	2-Week Gain	*Total accumulation*		
Cape Cod	354	1,569	80˚F	1.40"
Southeast	361	1,579	88˚F	1.35"
East	360	1,712	78˚F	2.05"
Metro West	399	1,585	75˚F	1.10"
Central	346	1,560	78˚F	1.20"
Pioneer Valley	355	1,580	87˚F	1.03"
Berkshires	362	1,450	75˚F	1.10"
AVERAGE	362	1,576	80˚F	1.32"

(***Source**: UMass Extension 2010 Landscape Message #19, July 23,, 2010*) *-- = information not available*

STRAWBERRY

Cyclamen Mite Control in Renovated June Bearing Strawberries

Pam Fisher, OMAFRA

If you noticed cyclamen mite in your plantings earlier this year, now is an important window for control. As plants a start to re-grow after mowing, apply a high volume spray of Thiodan over the row (*see related article in this newsletter*), after new growth has begun but before the row is filled in with leaves. The spray is aimed to control cyclamen mite in the growing point. Use the high rate of Thiodan (or any other formulation of endosulfan). [**Ed. Note**: see below for cancelation notice for edosulfan] Cyclamen mite is causing significant problems in many strawberry fields, so take this opportunity to control it while you can. Because beneficial insects and mites play an important role in cyclamen mite control, avoid use of pyrethroid insecticides where cyclamen are a problem. (***Source**: Berry Bulletin for July 23, 2010*)

RASPBERRY

Weeds in Raspberries – *Dandelions and Quack Grass and Thistle, Oh My!*

Molly Shaw, Cornell Cooperative Extension

Weeds are the nemesis of berry growers, the pest that causes the most economic loss. If you're having trouble with them, be comforted that you're not alone. Weed control always comes up high on the list of research priorities among berry growers, and while we all wish someone would come up with a magical new way to control them, some folks do on average win the battle more often than others. A careful review of the tools and techniques currently available should prove useful.

Cornell organized a series of berry webinars last winter. David Handley (University of Maine) and Rich Bonanno (University of Massachusetts) presented on cultural and chemical weed control for berries, and notes from their presentations are compiled here. The full webinar is archived on the Cornell Berry Website

(www.fruit.cornell.edu/berry.html/).

Pre-plant weed control is critical for berries because controlling weeds once plants are in is so tough, especially for those perennial weeds. And consider this: 70% of raspberry roots are in the top 8" of soil, *the same zone as grass.* Preplant weed control takes 1-3 years, more for higher weed pressure, especially perennials. Growers who prefer not to use glyphosate (round-up) on perennial weeds will also want to prep the soil a couple years in advance, since it can be tough to get rid of perennial weeds in just one year. Before you turn the soil, make note of weeds that are there. If there is a lot of quack grass, nutsedge, or wild brambles, you might even want to choose a different spot.

If you use Round-Up (or some other brand of glyphosate), fall applications work best because the plant is in "move food to my roots" mode, and the herbicide gets to the target better than in the spring, when the plant

carbohydrates are moving up from roots to new leaves. For broadleaf weeds, fall application should be before we get heavy frosts, when the plants are still actively growing. For grasses, you can go as late as Thanksgiving, just wait for a day that is 40˚ F at noon, and put the glyphosate on then.

Side note: Sparse perennial weeds can be spot-treated in the summer with glyphosate. Particularly tough weeds, woody vines, bindweed and the like, can be treated in the following manner: Mix 2 parts water with one part Roundup, dip cutting sheers in the solution, and cut the base of the weed of any actively growing plant (doesn't need to be fall). Cutting the vine and painting the stub with glyphosate doesn't work as well because the phloem of the plant is in tension, like a vacuum, and when the vine is cut that vacuum is released. If the glyphosate is present on the cutting sheers, it gets sucked down into the stem when the plant is severed. Heartless, yes, but effective.

The planting site for berries can be managed with a combination of cover crops and stale seed bed techniques. Cover crops are good as long as they are managed to deplete the weed seed bank—that would be short term cover crops with tillage in between and no weeds going to seed in the cover. An example would be spring oats followed by buckwheat (one or two rounds), followed by a winter cover crop, or even a fall brassica. Leaving a couple weeks to bare fallow between cover crops can help deplete weeds germinating by seeds, if the soil is moist enough.

If you choose to use a stale seed bed right before planting berries (a good idea), disturb the soil as shallowly as possible during the tillage, and start the stale seedbed process 6 weeks before planting the berries. If your weeds are pretty well under control and you choose to plant early in spring before it's possible to have 6 weeks of stale seed bedding, you can till just the planting strips of your overwintered cover crop such as killed cereal rye or oats. Don't simply till strips out of a lawn or old field—the grass will come back aggressively. Subsoiling in the planting strips will help with drainage if you have a hard pan (common). You can also establish your ground cover (slow growing grass) the fall before planting and kill (spray) strips for the berries. A commercial grass mix called "Orchard Vineyard Nursery mix" (OVN mix) works well, composed of slow growing fescues and rye grasses. Conservation grass mixes are too aggressive, and lawn mixes will need more mowing.

Mulch new brambles with straw or wood chips, but realized that leaving straw on the planting over winter can keep the soil too wet and cause the berries to get Phytophthora, a nasty root disease. Wood chips 4-8" thick don't hold too much moisture, pine needles are fine too. Fall leaves keep the soil too wet. Keep track of the pH under wood chip mulch, as they rot they tend to lower the soil pH.

Pre-emergent herbicides work on not-yet-germinated seeds, so they are used in the fall or in the spring before weeds emerge. Casoron is used in late fall, just before snow, when temperature is <50F. If it's too warm, it volatilizes and hurts the plants. Princep (simazine) and Sinbar have the same mode of action and work on broadleaf weeds. Princep can be used 1/2 rate the year of planting—don't use Sinbar in the planting year. Solicam, Devrinol and Surflan are all effective on grasses (ones that grow from seeds, not quack grass). Devrinol is the safest one to use on new plants. Often Princep or Sinbar is combined with one of the grass pre-emergent herbicides.

Last fall, one of the blueberry farms in the southern tier decided to try various combinations of pre-emergent herbicides and compare them. Normally Princep and Sinbar were used together in March, but pigweed wasn't well controlled. So two more treatments were added: Princep and Chateau (a pre-emergent herbicide) in the beginning of November followed by Princep and Sinbar in March, and Princep and Chateau in November with no spring application. Compared to the "normal" Princep and Sinbar in March, the addition of Chateau in the fall gave better weed control. In the treatment with no spring herbicide, sorrel was becoming a problem and will require more spot spraying than the "normal" treatment.

Kerb and Velpar are two rather new labels for blueberries which I don't have any experience with. Velpar is reputed to be pretty effective, controlling a broad range of annual and perennial broadleaf weeds. Anyone have experience with either of these that you're willing to share? Contact me at meh39@cornell.edu, 607-687-4020.

Post-emergence herbicides are pretty limited. Paraquat and Aim are contact materials—they kill green tissue that they touch, but don't move through the plant. Post, Select, and Fusilade are all grass-specific herbicides. They have no effect on berries or broad-leaf weeds because they act specifically on the growing points of grass when used in spring when grasses are <8" tall. Even quack grass is knocked back, though it eventually regrows from the roots. For herbicides that move in the plant like glyphosate and the above-mentioned grass herbicides, using less water in the application works best. For example, applying a spray using 10 gal/A water will work better than spraying on the same amount of active ingredient in 40 gal/A.

Herbicides are definitely useful in berry production, but they can't be counted on as the only technique. Their efficacy is limited, so it pays to give attention to pre-plant site prep. (***Source**: New York Berry News, Vol. 9, No. 7, July 2010*)

Fruit Rot and Cane Botrytis in Raspberry

Jay W. Pscheidt, Oregon State University

Cause: *Botrytis cinerea*, a fungus that causes blossom blight, preharvest rot, postharvest rot, and cane infections. On raspberry, it overwinters as sclerotia on canes and mycelia in dead leaves and mummified fruit. Sclerotia produce conidia in spring. A moist, humid environment is ideal for pathogen sporulation and spread. All flower parts except sepals are very susceptible. Initial infections of flowers are latent such that the fungus is dormant until fruit ripens. Fruit rot may be more prevalent in wet weather, in fields under overhead set irrigation systems, or where fruit ripens in the field for mechanical harvest. Conidia can infect mature or senescent leaves, resulting in primocane infections through petioles.

Note the concentric shades of brown on these canes and the black sclerotia.

Symptoms: Rotted fruit, usually with tufts of gray fungus growing on surface. Receptacles of picked fruit also may be colonized and become gray with fungus spores. Pale brown lesions may appear on primocane leaves in mid- to late summer. Cane infections appear as tan to brown lesions often encompassing more than one node. Cane lesions exhibit typical concentric "watermark" patterns from fall through late winter. Sclerotia may be visible on canes as shiny, black, blister-like structures.

The fruit rot and a fuzzy, gray mycelial growth develops.

Cultural control:

1. 'Munger', 'Chilliwack', 'Comox', 'Fairview', 'Meeker', and 'Nootka' have shown moderate resistance to Botrytis fruit rot. 'Chilcotin', 'Meeker', 'Nootka', and 'Willamette' have shown resistance to Botrytis cane infections.
2. Create an open plant canopy: use a double top wire training system, prune, avoid excessive nitrogen fertilization, and control weeds. These practices improve air circulation, increase light penetration, and speed drying of plant surfaces after irrigation and rain.
3. Pick fruit in the coolest part of the day. Keep harvested fruit in shade while in the field, then move to cold storage as soon as possible.
4. Control early-season primocanes.
5. Adjust irrigation to early morning just before the sun rises so plants dry quickly. Switch from overhead to drip/trickle irrigation.
6. Remove fall fruit during tying time.

Chemical control: Spray first at 5% bloom and then again 7 to 10 days later. Applications during the growing season, especially pre-harvest, aid control in wet weather. Thorough coverage and canopy penetration are essential.

1. Captan 80 WDG at 2.5 lb/A. Do not apply within 3 days of harvest. 72-hr reentry.
2. CaptEvate 68 WDG at 3.5 lb/A Do not apply more than two (2) consecutive application, within 3 days of harvest or more than 17.5 lb/A/season. 48-hr reentry.
3. Elevate 50 WDG at 1.5 lb/A. Do not use more than 6 lb/A/season. Can be used up to and including the day of harvest. 12-hr reentry.
4. Iprodione-based products plus another fungicide with a different mode of activity. Can apply the day of harvest. Note Fungal pathogens have shown resistance to iprodione when used exclusively. Tank-mix with other registered

fungicides and limit to two (2) applications per year. 24-hr reentry.

a. Iprodione 4L AG at 1 to 2 pint/A.
b. Nevado 4F at 1 to 2 pint/A.
c. Rovral 4 Flowable at 1 to 2 pint/A.

5. Pristine at 18.5 to 23 oz/A. Do not use more than 2 consecutive applications or more than 4 times/year. Can be used day of harvest. 12-hr reentry.
6. Switch 62.5 WG at 11 to 14 oz/A. May be used up to and including the day of harvest. Do not apply more than twice sequentially or use more than 56 oz/A/season. 12-hr reentry.

Notes: Other chemical(s) may be available under temporary, emergency use (section 18) or state crisis exemption labels. Double check with your local extension agent or chemical supplier.

Tests in western Washington have shown that the products Messenger and Serenade do not control this disease and are not recommended.

References:

Johnson, K.B., T.L. Sawyer, and M.L. Powelson. 1994. Frequency of benzimidazole- and dicarboximide-resistant strains of *Botrytis cinerea* in western Oregon small fruit and snap bean plantings. Plant Disease 78:572-577.

Ellis, M. A., Madden, L. V., Wright, S. R., Madden, L. V., and Wilson, L. L. 2008. Efficacy of pre-harvest fungicide applications and cold storage for post-harvest control of botrytis fruit rot (gray mold) on red raspberry. Online. Plant Health Progress doi:10.1094/PHP-2008-1015-01-RS.

(***Source***: *OSU Online Factsheet for Plant Disease Control, Updated Jan. 2009*)

BLUEBERRY

Leaf Tissue Analysis

Gary Pavlis, Rutgers University

Readers of this newsletter are aware that fertilizer recommendations for blueberries are based on leaf analysis. We have found that there is no correlation between the soil analysis and the amount of nutrients that actually enter the blueberry plant. Soil analysis is useful to determine pH, and maintain pH in the proper range, 4.5 - 4.8. Thus leaf analysis is critical to maintain the blueberry plant in a healthy, efficient, productive condition. Now is the time to take leaf samples for analysis. Leaf tissue analysis is a way of determining the actual nutritional status of plants. It is an excellent and inexpensive way of finding out if your fertilization program is working or if changes need to be made. The analysis provides information on foliar N, P, K, Ca, Mg, Mn, Fe, Cu, B and Zn levels for the leaves sampled, a fact sheet on what the levels should be for these plant nutrients, and recommendations for corrective measures if needed. Leaf tissue analysis can help pinpoint the source of problems and determine what measures may be needed to ensure proper nutrition of the crop. Interpretation of leaf tissue analysis is most accurate when the soil pH is within the proper range for blueberries, 4.5 - 4.8.

When to Sample: Sample healthy leaves during late July or early August.

How to Sample: Collect 30-50 leaves per sample. Leaves should be from the middle shoot, not old ones/not new ones. Sample different varieties separately, if possible. Collect leaves from as many bushes as possible in the sample area. Gently wash the leaves in tap water to rinse off soil or spray residue.

Allow the leaves to air dry until they are brittle before placing into a paper bag.

The following laboratories can be considered:

[UMass Soil and Tissue Testing Lab
West Experiment Station 682 North Pleasant Street University of Massachusetts Amherst, MA 01003
Phone: (413) 545-2311 Fax: (413) 545-1931
Email: soiltest@psis.umass.edu
http://www.umass.edu/soiltest/]

[Spectrum Analytic
1087 Jamison Rd NW
Washington Court House, OH 43160-8748
1-800-321-1562
http://www.spectrumanalytic.com/]

Agri-check Inc.
P.O. Box 1350
Umatilla, OR 97882-1350
Call Lab Manager at 541-922-4894 for Fee Schedule

Midwest Laboratories Inc
13611 B Street
Omaha, NE 68144
Phone # 402-334-7770 or go on the internet at
www.midwestlabs.com

A & L Eastern Agricultural Labs, Inc.
7621 Whitepine Rd.
Richmond, VA 23237
(804) 743-9401

Agricultural Analytical Services Lab
The Pennsylvania State University
University Park, PA 16802
Phone # 814-863-0841

(***Source***: *Blueberry Bulletin, Vol.26,No.17, July 19, 2010*)

GRAPE

Summer Disease Control

Alice Wise and Wayne Wilcox, Cornell University

Berry susceptibility to new infections of black rot, downy and powdery mildew is practically non-existent. With veraison starting in early varieties, disease control is now focused on cluster rot as well as control of DM and PM on the canopy. Timely hedging of the canopy is one of the best control strategies for downy mildew as it allows leaves to dry out more quickly. Keeping downy mildew completely out of your vineyard is difficult. In the latter part of summer, warm temps accompanied by frequent morning dew help to fuel infections. A few spots do not reflect failed management, rather it reflects how challenging disease control can be. Treatment options are listed below. Downy mildew control requires a combination of canopy management, rotation of products and vigilance. Bird netting, esp over the row netting that leads to shoot crowding in the top of the canopy, complicates downy mildew control by reducing air flow and spray coverage.

· **Mancozeb** - A 66 days to harvest restriction on mancozeb products means that time of harvest must be considered. This may not be an option for earlier varieties. A protectant only.

· **Ridomil Gold/Copper** is still an option (42 day PHI). Ridomil is very effective, also resistance prone though if used prudently (not applied repeatedly to raging infections), the development of resistance is much less of a risk. Ridomil has both protectant and postinfection ability.

· **Copper** is a good protectant and can be tank mixed with sulfur. Copper can cause phyto, even with a spray lime safener, if drying conditions are poor.

· **Phosphonate** products have been widely used and effective. Many however have felt that they don't hold up under pressure. This slippage is a possible symptom of early resistance. However, with big canopies and possible compromises in coverage, don't rush to judgment on this topic. These can be tank mixed with sulfur. There have been a few reports of phyto from PA-sulfur tank mixes.

· **Captan** is a good protectant but does not offer post infection control. Should we get into extended wet conditions, captan has the advantage of providing good activity against most of the common non-Botrytis cluster rots that can occur under those conditions. Note that most labels have 48-72 hr REI's, down from 96 hrs.

· **Ziram** is another labeled protectant that offers DM control, although it is not as effective as captan.

· **Revus** is newly registered in 2009, reflecting a unique class of fungicides on grapes. It is absorbed into leaves and provides at least some post-infection activity. It did well in trials at LIHREC as well as in Wilcox's trials. It is not a miracle product however and the same warnings about resistance apply to Revus – don't apply to raging infections and rotate with different chemistry products.

· **Strobilurins** - Tanos is not technically a strobie but according to Wilcox has the same mode of action as Abound and Pristine. Thus it is not a suitable rotational partner for these materials. Also the Tanos label requires that it be tank mixed with a protectant fungicide. As a group, these products have provided decent control of DM but there have been failures under heavy disease pressure. In more southerly regions, resistance has been documented by researchers. (***Source**: Long Island Fruit & Vegetable Update, No. 19, July 22, 2010*)

GENERAL INFORMATION

Natural Resource Conservation Service Conservation Planning

Amanda Brown, UMass Extension and Tom Akin, NRCS

Over the next three years the UMass extension IPM program will be working with the Natural Resource Conservation Service (NRCS) to help promote the adoption of integrated pest management practices (IPM) among vegetable and fruit growers in Massachusetts. The UMass IPM Program will build upon a six-year partnership with NRCS state and district staff. Since 2004 we have worked with NRCS to develop tools and resources that make it easier for vegetable and fruit growers to use NRCS conservation programs, specifically the 595 Conservation Practice Standard (Integrated Pest Management), to implement IPM. While building upon previous work, this project will expand our collaboration into more fruit crops as well as vegetables.

Massachusetts agriculture is characterized by family owned and operated farms that produce diverse crops, almost entirely for the fresh market and usually including direct marketing to consumers. Most vegetable growers

also produce berries or tree fruit, or both; and most fruit growers produce some vegetable crops. Concentrated blocks of farms in one area are the exception; most farms are relatively isolated from other farms, surrounded by urban and suburban landscapes. Availability of private IPM consultant services is limited to a handful of consultants who cannot cover all farms or all regions; owner-operators must gather information and make decisions on crop and pest management on their own. While the proximity of non-farming neighbors provides incentive for use of lower impact pest management methods, adoption of new IPM techniques can be challenging. Each crop has unique pest management needs and decisions to make; diversity and complexity of growing operations may increase financial security but can also add stress and difficulty for management decisions and actions. Growers need support to test and become confident in new IPM techniques -- including IPM information and planning that is tailored to their operation, incentive payments, and in-field training and problem-solving in IPM.

The integrated pest management practice scenario defined by NRCS through the 595 practice, is for vegetable / small fruit operations where the application of pesticides endangers water quality as determined by the NRCS WIN-PST risk analysis tool and mitigation is required. Integrated Pest Management (IPM) principles include using pest prevention and avoidance techniques, scouting and applying suppression only when a pest population exceeds an economic threshold level, and partially substituting biological and/or low risk pesticides to reduce the application of higher risk pesticides to protect water quality and pollinators. Incentive payments can be as over $200 per acre for growers enrolled in the program that are practicing a high level of IPM. Incentive payments are designed to cover the costs of scouting materials, biological controls and the labor associated with implementing pest management practices on farm.

With funding provided through this project the UMass IPM program will co-sponsor IPM workshops for growers, NRCS staff and consultants where the development and implementation of individual applications and conservation plans can be discussed and planned for during the upcoming growing season. This season, we have met with a few growers to review current IPM practices and discuss what new strategies could be implemented. The goal is to increase IPM adoption, so if growers are already using some IPM tactics we can still look at more advanced practices which can be used such as biological control, perimeter trap cropping, disease forecasting, reduced risk products, or more preventative such as improved crop rotation or nutrient management and switching to drip irrigation to reduce disease. Ideally the UMass IPM program is aiming to train growers to use IPM on their own without relying on Extension for weekly scouting visits.

Through this project we hope to increase awareness of the 595 Practice Standard among growers including payment increases, eligibility and application requirements so that growers can take advantage of existing opportunities available to them. In turn this should increase the number of conventional or organic vegetable and fruit farms, enrolled annually in Environmental Quality Incentives Program (EQIP) contracts that include the 595 Practice Standard throughout Massachusetts achieving the ultimate goal of protecting water and soil resources, beneficial organisms and human health.

To learn more about what is involved in developing a conservation plan for your farm and the EQIP program contact the UMass Extension Vegetable or Fruit Program or your local NRCS office. Contact information for NRCS offices can be found at http://www.ma.nrcs.usda.gov/.

Controlling Japanese Beeltes in Fruit Crops

Rufus Isaacs and John Wise, Michigan State University

Japanese beetles have only one generation per year, but these beetles emerge over a long period from late June through August, and they live for over 30 days. They feed on the foliage and fruit of various fruit crops grown in Michigan, causing damage to the plant and increasing the risk of fungal diseases. Their emergence during mid-summer can also result in their presence during harvest of some fruit crops, creating a risk of contamination. They are also highly mobile insects and can fly into fields from surrounding areas. This article provides information on insecticide options based on tests over the past few years conducted at the Trevor Nichols Research Complex and at grower's farms.

A few thoughts about trapping…

Traps are sold widely for Japanese beetle monitoring and control. However, these insects are very easy to see so they can be monitored by looking directly on the crop – you will know when they are present from the feeding damage and by seeing the beetles. Traps are highly attractive and draw beetles to them over large distances, so putting a trap near your crop fields will draw beetles from the surrounding landscape. Many of the attracted female beetles do not get trapped and end up laying eggs in the soil near the trap, so this creates a hot-spot for next season. Mass trapping of beetles is also not economically feasible in commercial fruit plantings, and there is little evidence that this strategy will work to reduce beetle

populations and crop injury. The take-home message is that traps should be avoided because they will not help reduce Japanese beetle damage in fruit crops.

Broad-spectrum options

The carbamates Sevin and Lannate provide control of beetles present during the application. They are also stomach poisons, so if beetles eat treated foliage they will also receive a higher dose. The mode-of-activity of these compounds can be a good fit 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 three or seven day pre-harvest interval (PHI) depending on the crop, and Lannate ranges from three to 14 days. The organophosphates Guthion and Imidan (buffer Imidan to pH 6.0 in the spray tank) both provide excellent lethal activity on adult beetles, although it can take a few days for their effects on Japanese beetles to be seen as the beetles take up the insecticide. If considering Guthion, beware of the 2010 restrictions on the total amount of this insecticide allowed this season as part of the EPA phaseout – see the label for details. These organophosphates provide 10 to 14 days of activity, with three to 21 day PHI, depending on the crop. The pyrethroids Danitol, Asana, Brigade, Baythroid, Mustang Max, Warrior, and Capture give instant knockdown and mortality of adult beetles, with seven to 10 days of activity. Beetles that do not receive a lethal dose of pyrethroid may also be repelled from treated fields, providing an additional mode for reducing infestation of crops at harvest. PHI's for pyrethroid insecticides vary from one to 14 days and can be different in different crops, so check the label before use or consult the table at the back of the 2010 edition of the *MSU Fruit Management Guide* to compare PHI's.

Reduced-risk insecticides

The labeling of the neonicotinoids Provado, Actara, Assail, Scorpion, Belay, and Clutch for use in some fruit crops provides selective options for Japanese beetle management. These insecticides provide two to five days of lethal activity from the surface residues before being absorbed into the foliage. Thereafter, beetles must eat treated foliage to get a dose of the insecticide. Once inside the foliage, these locally-systemic insecticides are rainfast and provide antifeedant and knockdown activity, but with much less direct mortality from the residues. These neonicotinoids will also provide some control aphids and leafhoppers. The rate of these insecticides allowed in different crops will have a large impact on their effectiveness, and growers should consider the higher end of the rate range to achieve some lasting control of Japanese beetles. Most labels will provide guidance on the rate that is appropriate for control of this pest. Avaunt is now labeled for use in grapes with Japanese beetle, grape berry moth and leafhoppers (suppression only) on the label. Premixed insecticides such as Voliam Flexi and Leverage contain one or more active ingredients targeting moth pests and one that is active on Japanese beetles. It is prudent to examine the rates of each active ingredient in these pre-mixes to determine whether a pre-mix is right for your insect pest control needs.

Short PHI and organic options

For growers looking for beetle control immediately before harvest or in organically grown fruit crops, some selective insecticides with zero 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 zero day PHI and pyrethrum (Pyganic) has a 12-hour 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 one to two 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-hour 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.

A final option for protection against Japanese beetle is SURROUND WP, a white clay material applied to create a white coating on the surface of foliage and fruit to provide protection against insects. When applied to provide a good coating (typically requiring two or more applications), SURROUND has performed very well against Japanese beetle in trials conducted in blueberry and grape. If considering this approach to Japanese beetle control, be aware that the white coating on the fruit may require some removal after harvest to make the fruit marketable. This may be challenging for some types of fruit. For example, in blueberries the white residue was removed well from the surface during processing but deposits in the calyx cup were not removed even after running berries through a typical wet processing line with food grade detergents.

Soil-applied insecticides

Japanese beetles typically lay their eggs in moist grassy areas, and many fruit farms have a large amount of this highly suitable habitat. An additional approach to reducing the impact of Japanese beetles in a farm is to reduce the overall population by targeting the grub stage of this pest 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 in late June/early July reduced the abundance of beetles on bushes for the first few weeks of their flight period in the next growing season. 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 surrounded by infested grassy areas. However, as part of an overall IPM program to minimize

the impact of Japanese beetle, this approach can help reduce the number of beetles growers must control. Platinum is another soil-applied insecticide that can be used for this grub control strategy. (***Source**: Michigan Fruit Crop Advisory Team Alert, June 22, 2010*)

Understanding Pre-mix Pesticide Seasonal AI Restrictions

John Wise, Nikki Rothwell, Erin Lizotte, Michigan State University

There are many new pesticide pre-mixes, both insecticides and fungicides, on the market this season. These products offer growers convenience with this multi-pack combination, but they also come with some complexities. Many of these pre-mix products are combinations of active ingredients that growers are already using in their orchards rather than distinctly new active ingredients. Therefore, growers need to keep in mind two criteria when using these products: 1) know the amount of each active ingredient in the blend to be able to properly manage for insect and disease control as well as to minimize resistance issues, and 2) be aware of the total amount of active ingredient allowed per season, whether they are used in a pre-mix or alone. In the first instance, growers should know the recommended rate to control a particular insect of disease and will need to make sure the rate of the pre-mix will provide an adequate amount of each active ingredient (AI) for a particular application. Secondly, the pre-mixes may be a blend of chemical classes growers are already using, and as usual, pesticide rotation is critical to minimize pesticide resistance. For the total amounts per season, growers should make sure they know the active ingredients and use the total AI per season rather than totals by product name. For example, Voliam flexi is a combination of chlorantraniliprole (same AI as Altacor) and thiamethoxam (same AI as Actara), and in stone fruit, the total amount of product for Actara (thiamethoxam) is 11oz. If a grower makes two full applications of Actara (thiamethoxam) for plum curculio at the high rate, 5.5oz, then he/she cannot apply Voliam flexi during that season or the total amount of Actara (thiamethoxam) will be over the allotted AI per season. Therefore, growers need to look at the active ingredients and amounts in the pre-mixes, particularly if he/she has applied one of the active ingredients in a prior spray. We have tried to summarize these pre-mixes for insecticides, their active ingredients, and the total amount of product allotted per season in the tables below.

Table 1. Pome fruit uses

Compound trade name	Active ingredients (AI)	Labeled rate / acre*	Total product (lbs AI) per season
Altacor 35WG	chlorantraniliprole	2.5 – 4.5 oz	9 oz (0.2 lb AI)
Actara 25WDG	thiamethoxam	4.5 - 5.5 oz	16.5 oz (0.25 lb AI)
Voliam flexi 40WDG (pre-mix ratio 1 : 1)	chlorantraniliprole thiamethoxam	4.0 – 7.0 oz	16 oz (0.2 lb AI ctpr, 0.25 lb AI thiamethoxam)
Provado 1.6F	imidacloprid	8.0 oz	40 oz (0.5 lb AI)
Baythroid 2E	cyfluthrin	2.4 – 2.8 oz	2.8 oz (0.044 lb AI)
Leverage 2.7F (pre-mix ratio 1.6 : 1.1)	imidacloprid cyfluthrin	3.6 – 5.1	5.1 oz (.044 lb AI cyfluthrin, 0.064 lb AI imidacloprid)
Belt 4SC	flubendiamide	3.0 – 5.0 oz	15 oz (0.468 lb AI)
**Centuar 70WSB	buprofezin	34.5 oz	34.5 oz (1.5 lb AI)
Tourismo 3.5F (pre-mix ratio 1 : 2)	flubendiamide	15 – 17 oz	46 oz (0.42 lb AI flubendiamide, 0.84 lb AI buprofezin)

* Rate ranges for key direct pests. ** Centuar rate for pears is 46 oz/acre (2 lb AI)

Examples of in-season applications that meet total AI limits for pome fruits.

Voliam flexi

If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 applications of Altacor 35WG at the 3 oz/acre rate.

If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 or more applications of Actara 25WDG up to an additional 12.5 oz/acre.

Leverage

Growers can make 1 application of Leverage or 1 application of either Baythroid 2E or Baythroid XL per season.

If growers make 1 application of Leverage (5.1 oz/acre), then they can still make 4 applications of Provado 1.6F at a 8 oz/acre rate.

Tourismo

Growers can make 1 application of Tourismo 3.5F or 1 application of Centuar per season.

If growers make 1 application of Tourismo 3.5F (15 oz/acre), then they can still make 2 applications of Belt 4SC at a 5 oz/acre rate

Table 2. Stone fruit uses

Compound trade name	Active ingredients (AI)	Labeled rate / acre*	Total AI per season
Altacor 35WG	chlorantraniliprole	3.0 – 4.5 oz	9 oz (0.2 lb AI)
Actara 25WDG	thiamethoxam	4.5 - 5.5 oz	11.0 oz (0.172 lb AI)
Voliam flexi 40WDG (pre-mix ratio 1 : 1)	chlorantraniliprole thiamethoxam	4.0 – 7.0 oz	14 oz (0.2 lb AI ctpr, 0.172 lb AI thiamethoxam)
Provado 1.6F	imidacloprid	6.0 – 8.0 oz	24 oz (0.3 lb AI)
Baythroid 2E	cyfluthrin	2.4 – 2.8 oz	5.6 oz (0.088 lb AI)
Leverage 2.7F (pre-mix ratio 1.6 : 1.1)	imidacloprid cyfluthrin	4.4 – 5.1	10.2 oz (0.044 lb AI cyfluthrin, 0.13 lb AI imidacloprid)
Belt 4SC	flubendiamide	3.0 – 4.0 oz	12 oz (0.375 lb AI)
**Centuar 70WSB	buprofezin	34.5 – 46.0 oz	69.0 oz (3.0 lb AI)
Tourismo 3.5F (pre-mix ratio 1 : 2)	flubendiamide	10 – 14 oz	37 oz (0.34 lb AI flubendiamide, 0.67 lb AI buprofezin)

- Rate ranges for key direct pests. ** Centuar labeled for peaches only.

Examples of in-season applications that meet total AI limits for stone fruits.

Voliam flexi

If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 applications of Altacor 35WG at a 3 oz/acre rate.

If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 1 or more applications of Actara 25WDG up to an additional 7.0oz/acre per season.

Leverage

If growers make 1 application of Leverage 2.7F, then they can still make 1 application of either Baythroid 2E or Baythroid XL.

If growers make 1 application of Leverage 2.7F (5.1 oz/acre rate), then they can still make 2 applications of Provado 1.6F at a 8 oz/acre rate.

Tourismo

If growers make 1 application of Tourismo, then they can still make 1 application of Centuar.

If growers make 1 application of Tourismo 3.5F (14 oz/acre rate), then they can still make 2 applications of Belt 4SC at a 3 oz/acre rate.

Table 3. Grape uses

Compound trade name	Active ingredients (AI)	Labeled rate / acre*	Total product (lbs AI) per season
Altacor 35WG	chlorantraniliprole	2.5 – 4.5 oz	9 oz (0.2 lb AI)
Actara 25WDG	thiamethoxam	1.5 - 3.5 oz	7.0 oz (0.109 lb AI)
Voliam flexi 40WDG (pre-mix ratio 1 : 1)	chlorantraniliprole thiamethoxam	4.5 oz	9.0 oz (0.2 lb AI ctpr, 0.109 lb AI thiamethoxam)
Provado 1.6F	imidacloprid	3.0 - 4.0 oz	8.0 oz (0.1 lb AI)
Baythroid 2E	cyfluthrin	2.4 – 3.2 oz	12.8 oz (0.2 lb AI)
Leverage 2.7F (pre-mix ratio 1.6 : 1.1)	imidacloprid cyfluthrin	5.0 – 8.0 oz	8.0 oz (0.07 lb AI cyfluthrin, 0.1 lb AI imidacloprid)
Belt 4SC	flubendiamide	3.0 – 4.0 oz	12 oz (0.375 lb AI)
Tourismo 3.5F (pre-mix ratio 1 : 2)	flubendiamide	10 - 14 oz	37 oz (0.34 lb AI flubendiamide, 0.67 lb AI buprofezin)

Examples of in-season applications that meet total AI limits for grapes.

Voliam flexi

If growers make 1 application of Voliam flexi 40WDG (4.5 oz/acre), then they can still make 1 or more applications of Altacor 35WG up to an additional 4.5 oz/acre.

If growers make 1 application of Voliam flexi 40WDG (4.5 oz/acre), then they can still make 1 or more applications of Actara 25WDG up to an additional 3.5 oz/acre.

Leverage

Growers can make 1 application of Leverage 2.7F (5.0 oz/acre), then they can still make 2 or more applications of either Baythroid 2E or Baythroid XL, up to an additional 10.2 oz/acre.

If growers make 1 application of Leverage 2.7F (5.0 oz/acre), then they can still make 1 application of Provado 1.6F at a 3 oz/acre.

Tourismo

If growers make 1 application of Tourismo 3.5F (14 oz/acre), then they can still make 2 applications of Belt 4SC at a 4 oz/acre. (***Source****: Michigan Fruit Crop Advisory Team Alert, June 16, 2009*)

ENDOSULFAN – Termination of use

Kathy Demchak, The Pennsylvania State University

Due to concerns about agricultural worker and environmental safety, EPA is in the process of terminating endosulfan (previously sold as Thiodan and more recently as Thionex) insecticide use. Endosulfan, unfortunately, not only can affect the people working with the pesticide and immediate area, but also tends to bioaccumulate (i.e., it can be passed on and accumulate in the food chain), and can be found at great distances from the point of application. Details behind the decision can be found on the Web at

http://www.epa.gov/pesticides/reregistration/endosulfan/endosulfan-cancl-fs.html.

Endosulfan is classified as restricted use, and within the small fruit "world", re-entry intervals are already quite long (5 days for strawberries and 9 days for blueberries). So, uses are already somewhat limited. However, one gap in pest control may be in materials available for cyclamen mite control on strawberries, where endosulfan is applied after harvest. Various groups with interests in agricultural crop protection will be working to ensure that other safer options are in place for important uses before endosulfan usage is completely discontinued. For the time being, existing stocks can be used. *(Source: The Pennsylvania State University Vegetable and Small Fruit Gazette, Vol. 14, No. 7, July 2010.)*

UPCOMING MEETINGS:

July 29, 2010. *2010 Cornell Fruit Field Day,* Geneva, NY. Save the date! Program details and registration information forthcoming.

August 11, 2010. *UMass Extension Vegetable , Field and Energy Crops Field Day.* UMass Agronomy Farm, 89-91 River Rd., South Deerfield MA. 12:30-8:00. Concurrent tours starting at 12:30, 2:30 and 6:00. Over 30 Presentations on Current Research! Five different tours will be offered: 1. Cropping Systems and Livestock, 2. New Crops and Cropping Systems, 3. Zone Tillage & Soil Amendments for Vegetables and Grain, 4. Energy and Rotation Crops , 5. Vegetable Medley For more information go to www.umassvegetable.org or contact Ruth Hazzard (rhazzard@umext.umass.edu) or Masoud Hashemi (masoud@psis.umass.edu).

August 17 & 18 2010. *NASGA Summer Tour in Montreal.* For complete information on this excellent tour and about joining the North American Strawberry Growers Association, go to http://www.nasga.org/.

August 19-21, 2010. *North American Fruit Explorers.* Best Western Motel/Conference Center, Lafayette, IN. To view the program and registration form, check: http://web.extension.illinois.edu/edwardsvillecenter/foodcrophort3031.html. For additional details or questions: contact Ed Fackler at cefackler@gmail.com or 812-366-3181.

Sept 14, 2010. *High Tunnel Construction with Ed Person, Ledgewood Farm Greenhouse Frames*. Edgewater Farm, Plainfield NH. 5 pm. For info, call 802-257-7967 or email vernon.grubinger@uvm.edu.

Sept 22, 2010. *GAPs on a Wholesale/Retail Vegetable Farm*. Paul Mazza's Fruits and Vegetables, Essex VT. 5 pm. For info, call 802-257-7967 or email vernon.grubinger@uvm.edu.

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