UMass Extension
CENTER FOR AGRICULTURE
Berry Notes
Prepared by the University of Massachusetts Fruit Team

# Massachusetts IPM Berry Blast 6/7/11

**IN THIS BLAST:**



## STRAWBERRY

**Angular Leaf Spot:** Some of the photos didn't come through in the last issue of IPM Berry Blast for the article by Kathy Demchak from Penn State Univ. For a complete version of the article with all the photos, go to http://extension.psu.edu/vegetable-fruit/newsletter/june-2011-the-vegetable-small-fruit-gazette-1.

**Two-Spotted Spider Mite**: Two-spotted spider mites are tiny arthropods that live on the underside of strawberry leaves. Females are slightly larger than males and both have two dark patches (spots) on their backs. They are best viewed with a hand lens as they are difficult to see with the naked eye and form colonies as the numbers build up. (Photo credit: Pam Fisher, Ontario Crop IPM)

They overwinter in cracks and crevices on the strawberry crowns or in the surrounding duff around the plants. There are many generations per year. Both adult and immature mites feed on plant sap and have a wide host range, feeding on many species of plants.

**Damage**: Under heavy infestations, mite feeding destroys leaf chlorophyll and causes leaves to have yellowish or whitish speckles, then an overall bronze color. Leaves will be covered in a fine webbing. Yield reductions may occur from repeated heavy infestations. The most serious reductions in yield may result from early season feeding, so scouting for overwintered mites in early May is especially important.

**Management**

***Monitoring:*** Mites should be monitored weekly by sampling the field in 5 to 10 locations. Five to 10 leaves should be sampled at each location for a total of 60 leaves. Examine the underside of the leaves for the presence or absence of TSSM. Record the information on a fi eld map so that "hot spots" can be identifi ed and treated. The actio threshold is when 25% (i.e., 15 leaves) or more of a 60 leaf sample is infested. When sampling a field, presence of predators as well as pest mites should be noted.

**Control strategies**

*Cultural/Biological:*

- Release natural enemies, such as *Neoseiulus fallacis*, when threshold levels are reached. Follow-up releases may be needed to achieve sustained suppression.
- Preserve natural enemies whenever possible by selecting spray materials that are less toxic to beneficials.
- Be sure to keep the field irrigated during periods of active growth to avoid stress on the plants.
- Prompt renovation when harvest is complete can interrupt the build-up of mite populations.

*Chemical:*

- Apply recommended miticides when threshold levels are reached.
- If repeat applications are needed, rotate miticides from different IRAC groups to reduce the chance of resistance development in the pest.
- DO NOT APPLY MITICIDES DURING BLOOM.

| Conventional (PHI) | Organic (PHI) | Cultural Practices |
|---|---|---|
| Acramite 50WS (1)<br>*Agri-Mek 0.15EC (3)<br>*Brigade WSB (0)<br>*Danitol 2.4EC (2)<br>Kanemite 15SC (1)<br>Oberon 2SC (3)<br>Portal (1)<br>Savey 50DF (3)<br>Vendex 50WP (1)<br>Zeal 2-3 oz (1) | Azahar (0)<br>AzaMax (0)<br>JMS Stylet Oil (0)<br>Trilogy (Neem) (0)<br>Predatory mite release (0) | • avoid excess nitrogen<br>• avoid drought stress<br>• renovate asap after harvest |

*Read labels thoroughly for application rates and restrictions (REI, PHI, etc.)*

** Restricted use material*

**BLUEBERRY**

**Blueberry Maggot Fly** (*for more IPM information see http://www.blueberries.msu.edu/bbmaggot.html*)
Rufus Isaacs, Entomology and John Wise, MSU Trevor Nichols Research Complex

The blueberry maggot goes through one generation per year, overwintering as a pupa below the soil surface. Most pupae emerge one year after going into the soil, though depending on climatic conditions, a small proportion will remain as pupae through another year or two before emerging. Adult emergence typically begins in mid- to late June with adult fl ight continuing through August**First adult emergence can be predicted by using a growing degree day (GDD) model, because adult fly emergence should begin at 750 GDD base 50.** Actual emergence can be delayed if the soils are dry, as pupae usually respond more readily to a moist environment. Thus, initial adult emergence often follows a rainfall event in late June and in July. After emergence, female fl ies require approximately seven to 10 days to become sexually mature and mate, at which point they will begin laying eggs. Eggs are oviposited under the skin of ripening blueberries with a single egg deposited per fruit. Eggs hatch in about five days, at which point the maggot begins feeding, completing their development within a single berry. Upon maturity, the maggot drops to the ground, burrowing up to several inches into the soil before pupating. In Michigan's climate, these pupae will not emerge until at least the following growing season.

Monitoring adult blueberry maggot flight is the foundation of an effective protection program for blueberries against this pest. Initial adult emergence is best monitored using yellow sticky boards baited with ammonium acetate (or ammonium carbonate) as a food attractant, because newly emerged females are actively feeding during this pre-oviposition period. These traps should be placed on a stake or hung on an upper branch of a blueberry bush in a perimeter row (south facing side of bushes) with enough foliage cleared from around the trap so leaves don't stick to it. Hang traps with the colored side down in a V-orientation (see photo). Traps should be deployed before first anticipated flight (late June), since most flies are expected to be immigrating from wild or non-sprayed hosts outside the commercial planting. If a resident fly population is suspected from previous infestation, a trap placed inside the fi eld is a good idea to detect internal infestations.**Traps optimally should be checked twice weekly starting at 700 GDD base 50 until the first fly is caught, triggering fruit protection activities.**

After the pre-oviposition period is complete, female flies will begin actively searching for fruit to lay eggs in, and there is a trap available that mimics the visual stimulus of a fruit. A green sphere trap, baited with synthetic fruit volatile lure can be used to monitor fly activity in fields. Again, these traps should be placed in perimeter rows of the field unless

there is evidence of a resident population far in the interior.

Control of blueberry maggot has been achieved for many years using broad spectrum insecticides. These kill the adult fly on contact and prevent the insect surviving to the point of being able to lay eggs into the fruit. The organophosphates ~~Guthion,~~ Malathion and Imidan are highly active on blueberry maggot with the latter two products having shorter pre-harvest intervals and potential for use closer to harvest. Carbamates, such as Sevin and Lannate, and the pyrethroids Asana, Mustang Max, and Danitol are also active on adult fruit flies. As a general rule, our trials in fruit crops against maggot flies have shown lower activity from the pyrethroid chemical class than from the organophosphates.

There are several newer insecticide products that include blueberry maggot on their labels. These include the neonicotinoids Provado and Assail that are also active on Japanese beetle and aphids. Small plot trials of these products have shown that they protect fruit from maggot infestation, and in large-scale trials over four years in Michigan blueberry farms, we found no blueberry maggot infestation in fields treated with Provado during July and early August. The spinosyn-containing compounds Delegate, SpinTor (non-organic formulation) and Entrust (organic formulation) are highly active on blueberry maggot adults when ingested. In field trials with high pest pressure and two week application intervals their performance has been rated as good (see table). Performance would be expected to be higher in fields with lower pressure and with less time between applications.

GF-120 NF Fruit Fly Bait (spinosad) is registered for control of the blueberry maggot and is listed by the Organic Materials Review Institute (OMRI) for use in organic production. Because the primary route of entry into the insect is through ingestion, applying this product during the fruit fly pre-oviposition period is important for optimal performance. GF120 must be applied with specialized equipment, and is designed for low-volume application by air. Field efficacy data is encouraging, but it is sensitive to wash-off. We have limited experience with this novel formulation in large-scale trials in Michigan.

The use of Surround WP for fruit fly control is based on creating a protective barrier between the plant and the pest that 1) reduces host recognition of the pest, and 2) prevents adult oviposition (i.e. egg laying). Because it is not toxic to adult flies like conventional insecticides, complete coverage of the plant is critical. Multiple applications are typically needed to attain initial coverage; further sprays may be necessary to respond to wash-off from rain or excessive wind. Field trials indicate that when adequate coverage is maintained that excellent fruit protection can be achieved, although the white residue makes this not suitable for fruit destined for the fresh market.

**Table 1. Blueberry maggot pesticide use and spray timing.**

| Compound trade name | Chemical class | Optimal spray timing for blueberry maggot | Residual activity | Effectiveness rating** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| ~~Guthion,~~ Imidan | Organophosphates | Within 7 days of the first fly being captured | 14+ days | E |
| Malathion | Organophosphates | Within 7 days of the first fly being captured | 5-7 days | G |
| Lannate, Sevin | Carbamates | Within 7 days of the first fly being captured | 5-7 days | G |
| Asana, Danitol, Mustang Max | Pyrethroid | Within 7 days of the first fly being captured | 7-10 days | G |
| Delegate, Entrust*, SpinTor,GF120NF* | Spinosyns | Immediately after the first fly has been captured | 7-10 days | F-G |
| Provado, Assail | Neonicotinoid | Within 7 days of the first fly being captured | 10-14 days | G-E |
| Surround WP* | Particle Film Protectant | Multiple applications before fly emergence | As long as thorough coverage of the canopy is maintained | G |

* OMRI approved for organic production
** Effectiveness rating of insecticides Fruit Management Guide; E – excellent, G – good, F – fair.
(***Source**: MSU Fruit Crop Advisory Team Alert, June 08, 2010*)

*Where brand names for chemicals are used, it is for the reader's information. No endorsement is implied, nor is discrimination intended against products with similar ingredients. Please consult pesticide product labels for rates, application instructions and safety precautions. Users of these products assume all associated risks.*

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