



Massachusetts IPM Berry Blast 5/18/11

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Tarnished Plant Bug

STRAWBERRY (for IPM info see <http://www.omafra.gov.on.ca/IPM/english/strawberries/insects/tarnished-plant-bug.html>)



This pest causes “cat faced” or “button berries” in strawberries and misshapen fruit in raspberries. Tarnished plant bug adults and nymphs cause damage to the fruit but nymphs are more abundant so are of greater concern. Nymphs are yellow/tan to light green, have long antennae, look a bit like aphids but unlike aphids they move very fast when disturbed. (TPB on green strawberry fruit. photo credit – David Handley, Univ of Maine)

Scouting for nymphs in strawberry by striking the plant over a white colored dish or piece of paper as this will knock the nymphs free from plants. Immature TPB (nymphs) are sampled by shaking flower trusses over a flat white surface. Thirty flower clusters should be sampled evenly from across the field (typically 6 clusters at 5 locations & 5 clusters at 6 locations). If 4 or more flower clusters are infested with nymphs (regardless of how many) a spray is recommended. A follow-up spray application may be made after bloom if TPB are still present in high numbers (check harvest interval before selecting material).

RASPBERRY

Controlling weeds in and around the planting may reduce populations of this insect, but insecticide sprays may be necessary, applied prebloom and repeated after petal fall. If mowing around fields, do so after insecticides have been applied (to control migrating insects). Avoid planting alfalfa (which attracts high populations of TPB) near raspberries. [White sticky traps](#) are available for monitoring tarnished plant bug adults. These traps are used as an indication of when plant bugs begin their activity in the spring and a relative indication of their abundance, not as an indication of when to control this insect. Immature TPB (nymphs) are sampled by shaking flower trusses over a flat white surface. Thirty flower clusters should be sampled evenly from across the field (typically 6 clusters at 5 locations or 5 clusters at 6 locations). If 4 or more flower clusters are infested with nymphs (regardless of how many) a spray is recommended. A follow-up spray application may be made after bloom if TPB are still present in high numbers (check harvest interval before selecting material).

If the threshold is exceeded, consider treating with one of the labeled materials below. DO NOT SPRAY INSECTICIDES DURING BLOOM.

Conventional	Organic (OMRI listed)	Cultural Practices
Actara 25WDG (full label on raspberry, suppression only on strawberry) Assail SG (full label on strawberry and	Aza-Direct Azahar AzaMax	<ul style="list-style-type: none"> control weeds in and near berry planting don't mow alfalfa near berry planting when berries

raspberry) *Brigade WSB (for strawberries only, but labeled on raspberry for other pests) *Danitol EC (for strawberries only, but labeled on raspberry for other pests) Dibrom 8EC (for strawberries only) Malathion 57 EC (for strawberries only, but labeled on raspberry for other pests) Pyrenone Crop Spray 0.5 EC (full label on strawberry and raspberry)	Pyganic 1.4 ECII Pyganic 5.0 ECII	are in bloom or shortly after <ul style="list-style-type: none"> possible use of trap crop (e.g., winter canola) to draw plant bug out of berry crop (still under study) some cultivars less susceptible than others (e.g., 'Honeyoye')
Read labels thoroughly for application rates and restrictions (REI, PHI, etc.) * Restricted use material		

Strawberry Bud Weevil – Clipper

STRAWBERRY (for IPM info see <http://www.omafra.gov.on.ca/IPM/english/strawberries/insects/strawberry-clipper-weevil.html>)



In the pre-bloom to early bloom period the clipper is one of the main insect pests in strawberries. The females lay an egg in an unopened flower bud and then clip the stem of the bud causing it to flop over or fall off. Only unopened flower buds are affected. Some strawberry varieties (e.g., Jewel and Seneca), can tolerate a fair amount of bud loss from clipper, causing the remaining fruit to size up more (like thinning peaches). However in high numbers, it can be a problem in any variety. Clipper tends to be a more severe problem along borders of plantings, near woods, hedgerows or stonewalls. (*Clipper on strawberry buds. photo credit – David Handley, Univ of Maine*)

Scout for clipper by counting the number of damaged flower trusses per meter (yd) of row in several locations in the field. Treat for clipper when you find an average of more than 3 highly damaged flower trusses per meter of row. If the threshold is exceeded, consider treating with one of the labeled materials below. You may be able to treat only border rows near woods, hedgerows or stonewalls.

If the threshold is exceeded, consider treating with one of the labeled materials below. **DO NOT SPRAY INSECTICIDES DURING BLOOM.**

Conventional	Organic (OMRI listed)	Cultural Practices
*Brigade WSB *Danitol EC *Lorsban 4E	Aza-Direct Azahar AzaMax Pyganic 1.4 ECII Pyganic 5.0 ECII	<ul style="list-style-type: none"> avoid planting near hedgerows, stone walls, woods avoid planting strawberries and raspberries near each other (alternate hosts) some varieties less susceptible to yield reduction (e.g., late flowering varieties less susceptible) rotate out of strawberries for 3–5 years before replanting in same field
Read labels thoroughly for application rates and restrictions (REI, PHI, etc.)		

Two-spotted Spider Mite

STRAWBERRY (for IPM info see <http://www.omafra.gov.on.ca/IPM/english/strawberries/insects/two-spotted-spider-mite.html>)

Two-spotted spider mite can be a problem in plantings starting early and throughout the growing season. This is a tiny arthropod that lives on the underside of leaves and damages the plant by sucking out chlorophyll from the leaves. When allowed to grow to large numbers, tssm feeding weakens the plants and makes them more susceptible to stress and infection by other pathogens. You may see areas of the field with whitish or yellowish stippling on leaves

Mites should be monitored weekly by sampling the field in 5 to 10 locations. Five to ten 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 field map so that “hot spots” can be identified and treated. A miticide application is recommended if 25% (i.e., 15 leaves) or more of a 60 leaf sample is infested with TSSM.

RASPBERRY

Mites should be monitored weekly by sampling the field in 5 to 10 locations. Five to ten leaves should be sampled at each location for a total of 60 leaves. Sample leaves should be fully expanded leaves from the floricanes (not primocanes). Examine the underside of the leaves for the presence or absence of TSSM. Record the information on a field map so that “hot

spots” can be identified and treated. A miticide application is recommended if 25% (i.e., 15 leaves) or more of a 60 leaf sample is infested with TSSM.

Natural predators exist which feed on two-spotted spider mites. One such predator, also a mite (*Neoseiulus fallacis*), is native to the northeast and often maintains TSSM populations at non-damaging levels. Another is *Phytoseiulus persimillis*. Both are commercially available for release to control TSSM. Beneficial mites must be introduced before large populations of mites develop, but after insecticides for tarnished plant bug have been applied.

If the threshold is exceeded, consider releasing predators or treating with one of the labeled materials below. DO NOT SPRAY MITICIDES DURING BLOOM.

Conventional	Organic (OMRI listed)	Cultural Practices
Acramite 50WS Agri-mek .15EC (strawberry only) *Brigade WSB *Danitol 2.4 EC Kanemite 15SC (strawberry only) Oberon 2SC (strawberry only) Portal (strawberry only) Savey 50DF *Vendex 4L Zeal WP (strawberry only)	Azahar AzaMax JMS Stylet Oil Trilogy	<ul style="list-style-type: none"> • avoid excess nitrogen fertilization • renovation in strawberries helps suppress tssm • Release of predatory mites at recommended rates (will vary – consult supplier)
<i>Danitol and Brigade are hard on predatory mites</i>		
<i>Read labels thoroughly for application rates and restrictions (REI, PHI, etc.)</i>		

Botrytis Gray Mold

STRAWBERRY (for IPM info see <http://www.omafra.gov.on.ca/IPM/english/strawberries/diseases-and-disorders/botrytis.html>)

Symptoms of gray mold include light brown areas on fruit; a powdery gray growth produced on rotted fruit and leaf tissue; and whole rotted berries that retain their general shape but become tough and dry.

Gray mold is a serious problem because it often attacks other living plant parts in addition to developing and harvested fruit. The fungus overwinters in living plant tissue and proliferates in the spring as leaves die. Favored by cool, wet weather, the fungus establishes itself on dead or aging leaves, moving to healthy tissue as more and more spores are produced. Petals and other parts of older flowers are likely to be attacked first. These infections may destroy developing fruit immediately or become dormant until the fruit begins to ripen. Secondary infections may occur when spores that cling to ripening fruit germinate in moist packaging conditions after the fruit is harvested, causing uncontrollable storage rots.

It is important to maintain proper spacing between plants and also narrow plant rows to allow good air circulation. This will promote rapid drying of foliage, blossoms, and fruit during periods of high humidity, rain, irrigation, or dew and lessen the chance of Botrytis spores germinating on plant surfaces. Beds that become too crowded are likely to promote Botrytis fruit rot. Heavy nitrogen applications, particularly early spring applications, also promote Botrytis development.

RASPBERRY

To prevent fruit rot from becoming a major problem, encourage air circulation and rapid drying of the plants and fruit by maintaining narrow plant rows, and proper cane thinning. Infections can occur as early as bloom, so preventative fungicide sprays should be applied beginning at that time, and followed-up with additional sprays when wet weather is predicted. Harvest fruit regularly. Do not allow overripe or rotten fruit to remain on the plants.

If Botrytis is a chronic serious problem or in years with a lot of rainfall during bloom, fungicides should be applied during the bloom period.

Conventional	Organic (OMRI listed)	Cultural Practices
Elevate 50WDG CaptEva 68WDG Captan 50WP Pristine WG Rovral Scala SC (strawberry only) Switch	Actinovate AG (best applied with a spreader/sticker) JMS Stylet Oil Oxidate	<ul style="list-style-type: none"> • managing weeds • promote good air circulation/drying conditions by maintaining narrow rows with good spacing between rows • avoid excess nitrogen • avoid applying nitrogen before renovation

- avoid allowing overripe fruit to remain in field

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

BLUEBERRY

Cranberry Fruitworm (for more IPM information see <http://www.blueberries.msu.edu/fruitworm.htm>)

Feeding can significantly lower marketable yield of the crop. Adult moths lay eggs in the calyx cup (blossom end) of green fruit. Larvae hatch, enter the fruit, consume the flesh and move to another fruit. Larvae will infest from 3–6 berries, filling them with brown frass, and webbing them together with silk. *(Cranberry fruitworm frass on fruit cluster. photo credit – Rufus Isaacs, Michigan State)*



Adult moths (males) can be monitored with pheromone traps. This allows growers to establish when moths begin their flight and also their relative abundance. It also allows growers to estimate when egg laying is likely to begin and time spray applications. A degree-day model being tested in Michigan indicates 80 to 100 GDD (base 50° F) after first significant trap capture of male moths is an appropriate time to initiate the first treatment. This timing is approximately correct for both cherry and cranberry fruitworm species.

Another method is scouting for [eggs](#), which provides a biofix for egg hatch timing. Scouting for eggs should start at early fruit set and when traps have caught some moths. Look for eggs (using a hand lens) on fruit that is waist to shoulder high off the ground. They tend to be laid clustered together within a few bushes.

Conventional	Organic (OMRI listed)	Cultural Practices
*Asana XL Avaunt Assail 70WP *Brigade WSB Confirm 2F *Danitol 2.4 Delegate WG Esteem 35WP <i>(supplemental label)</i> *Imidan 70W *Lannate 90 Malathion 5EC *Mustang Pyrenone Crop Spray Sevin XLR Spintor 2SC	Dipel DF Entrust Naturalyte	<ul style="list-style-type: none"> • avoid planting near cranberries • remove and destroy infested clusters as they appear

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

Mummyberry



Mummyberry is a disease caused by a fungus which attacks new growth, foliage and fruit. It has a [complex life cycle](#) with two distinct phases, the shoot strike phase and the blossom blight phase. Disrupting the shoot strike phase is the goal, so that little or no flower/fruit infections can take place. *(Mummyberry shoot blight. photo credit – Annemiek Schilder, Michigan State)*

Decision to spray is largely based on field history. If mummyberry has been a problem in the previous year, cultural practices to suppress it are recommended. Fungicide applications should be made early, at green tip where field history indicates the need. Scout field for shoot strikes to determine if a follow up spray is needed to control the second phase of the disease. Frost events during bloom can increase the severity of infections, so good protection prior to a cold night is recommended, or a systemic material after a cold night can help clean up recent infections.

Varieties showing some resistance to mummyberry include 'Jersey', 'Elliott', 'Bluejay', 'Duke', 'Stanley', 'Darrow', 'Burlington', 'Collins', 'Darrow', 'Rubel', 'Bluetta', and 'Dixi'. Varieties that appear to be more susceptible to mummyberry include 'Earliblue', 'Blueray', 'Bluehaven', 'Bluegold', 'Northblue', 'Sierra', 'Harrison', 'Coville', 'Rancocas', 'Weymouth', 'Berkeley', 'Bluecrop', and 'Herbert'.

Conventional	Organic (OMRI listed)	Cultural Practices
Abound Bravo Indar 2F Orbit Pristine PropiMax EC Switch	Actinovate-AG Serenade ASO Serenade MAX	<ul style="list-style-type: none"> • plant resistant varieties when possible • rake up and remove/destroy fallen mummies before spring • apply organic mulch over any fallen mummies to create a physical barrier for spore release in spring • plant and prune for good air circulation and drying conditions to reduce moisture in the canopy

Read labels thoroughly for application rates and restrictions (REL, PHL, etc.)

Botrytis Blossom Blight

Caused by the fungus *Botrytis cinerea*. The fungus survives the winter on dead twigs and in soil organic matter. It is present every year, but only causes severe damage during cool, wet periods several days in duration, like has been common this year. The most critical period for infection is during bloom. Disease is most severe where excessive nitrogen has been used, where air circulation is poor, or where frost has injured blossoms. Rotted berries typically have a gray cast of the mycelium and spore-bearing structures present which gives the disease its name.

Conventional	Organic (OMRI listed)	Cultural Practices
Elevate Switch Captan 50WP Rovral 50WP Ziram 76DF CaptEvote 68WDG Pristine WG	Actinovate AG Milstop OxiDate Serenade Max	<ul style="list-style-type: none"> • avoid excess nitrogen fertilizer • plant and prune for good air circulation and drying conditions to reduce moisture in the canopy • avoid having overripe fruit present in the planting • remove and destroy infected fruit to reduce overwintering inoculum

Read labels thoroughly for application rates and restrictions (REL, PHL, etc.)

Anthracnose

Another fungal pathogen that can infect the fruit and is favored by cool wet weather. Primary infections take place during bloom and are latent until fruit begins to ripen. Secondary infections can spread quickly and are favored by hot humid weather. Infected fruit often exhibit a soft, sunken area near the calyx-end of the fruit. Spores spread to "good" fruit during and after harvest, causing significant post-harvest losses. 'Bluecrop', 'Bluetta', 'Chanticleer' and 'Spartan' are particularly susceptible to the disease. Varieties in which the fruit hangs ripe for a long time on the bush prior to disease, although 'Elliot' appears to have good resistance.

Conventional	Organic (OMRI listed)	Cultural Practices
Abound Bravo Ultrex Cabrio Omega Pristine Switch Ziram	Actinovate AG Serenade Max Trilogy	<ul style="list-style-type: none"> • plant resistant varieties when possible • plant and prune for good air circulation and drying conditions to reduce moisture in the canopy • avoid excess nitrogen fertilization • avoid having overripe fruit present in the planting • remove and destroy infected fruit to reduce overwintering inoculum

Read labels thoroughly for application rates and restrictions (REL, PHL, etc.)