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IN THIS ISSUE:

CROP CONDITIONS:

Strawberry harvest continues. Grower reports are of reduced yield and small fruit size on early varieties. Mid and later season varieties appear better. Some reports in CT of fruit damage from Long Necked Seed Bug. See: http://bugguide.net/node/view/12114 for images. Damage can resemble tarnished plant bug or like berries pictured below. Continue to watch for tarnished plant bug, two spotted spider mites, and sap beetle, especially on later ripening varieties. Consider trapping for Spotted Wing Drosophila (more on this in a special issue coming up). **Raspberries/blackberries** are in late bloom – green fruit with some beginning to color. Tarnished plant bug and mites can also be a problem now in these crops. Cane borers damage may be found on primocanes. Cut out infested canes as they appear and remove from the field. Potato leafhopper may also appear soon. Look for stunted canes (shortened internodes). **Blueberries** are coloring up and early varieties may be ready soon. Crop load looks to be very good in many locations. Some reports of excess fruit load with little or not foliage. This is considered to be a sign of possible root stress. Excessive soil moisture, insect feeding on roots, carryover drought stress from previous years have all been considered possible causes. Assess the conditions in your planting to see what might be damaging roots. Stripping some fruit from canes with few leaves will result in better chances for fruit to ripen. **Grapes** are in bloom to early fruit set. This is a critical time for disease management. Potato leaf hopper, spider mites, phylloxera, timid gallmaker are all things to watch for now. Final rounds of shoot thinning are best done now before tendrils start to wrap around stuff. Thin for good air movement and sunlight penetration into the canopy.

Long Necked Seed Bug damage in strawberries. Photo Courtesy of Mary Conklin, UConn

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately two-week period, May 17 through May 23. Soil temperature and phenological indicators were observed on or about May 23. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2012 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	2012 Growing Degree Days		Soil Temp (˚F at 4" depth)	Precipitation (1-week gain)
	1-week gain	Total accumulation for 2012		
Cape Cod	67	574	70˚	3.50"
Southeast	52	564	70˚	1.60"
East	74	591	62˚	1.90"
Metro West	63	565	60˚	1.69"
Central	71	614	n/a˚	n/a"
Pioneer Valley	64	610	64˚	2.24"
Berkshires	56	476	62˚	1.37"
Average	64	571	65˚	2.05"

(***Source***: *UMass Landscape Message #12, June 8, 2012*)

STRAWBERRY

Root Problems in Strawberries

Laura McDermott, Cornell Cooperative Extension

This year strawberry plantings have looked particularly weak after going through the winter. Perhaps this should be expected as the lack of winter snow cover left plants vulnerable to winter desiccation and cold injury. The hot dry spring also stressed plants followed by lots of cold weather to hold them back, so the fact that they are finally hitting their growth stride is quite amazing.

Some plantings however are not rebounding even with the plentiful moisture and occasional nitrogen application. These plants remain unthrifty looking, and some are even wilting. If you dig them up, look at the roots and try to determine if there is root feeding. Keep your eyes open for white grubs as these have been reported to be a problem in strawberry fields this year from Ontario to Maine. Similar plant symptoms can be the result of root weevil, and Verticillium wilt, so a root examination is important.

White grubs are immature scarab beetles and are traditional turf pests. Japanese Beetle, Asiatic beetle, European chafers and June beetles make up the white grub complex that can infest strawberry plantings. All of these beetles are largish, hard-shelled beetles which fly at night and are seldom seen on plants, but their C-shaped larvae are found in the soil and these grubs are what do the most damage. The adult beetles actively lay eggs beginning in late May through August (egg laying period depends on the species). The eggs are laid in grassy places where they hatch into larvae (white grubs) and feed on roots. Most species larvae feed in late summer and then again in the spring until the adults emerge, but June beetle larvae remain in the soil for three seasons where they feed continually on plant roots.

To control white grubs, do not follow sod or pasture crops with strawberry plantings. Use a cover crop for at least one season to break the cycle. Sites that have light soil

and are surrounded by grassy parking areas may experience the heaviest pressure. Admire- Pro can be used to control white grubs.

Verticillium Wilt is a soil borne fungal disease that like white grubs is most devastating to plants in their first year of growth. Outer leaves turn brown and eventually collapse, but inner leaves will remain green until the bitter end. The affected plants typically appear throughout the planting in a random fashion. Many weeds are host of Verticillium including nightshade, groundcherry, redroot pig-weed, lambsquarters and horsenettle making weed control critical to Verticillium management. Actinovate AG can be used as a preventative soil drench, but fumigation is the only sure way to eradicate Verticillium. Resistant varieties include Earliglow, Guardian, Allstar, Tribute and Tristar.

Root weevils including the strawberry root weevil, the black vine weevil and the rough strawberry root weevil all attack the roots or crowns of plants while in the grub stage. The larvae cause serious damage by tunneling in the roots and crowns in the spring of the year. Injured plants appear stunted; the leaves are closely bunched and are dark and blue-green. The fine roots have been destroyed, and sometimes even the hard fibrous roots have been eaten.

Heavily damaged areas in the field can be large and circular, because of the beetles' behavior of gathering in groups. Newly transplanted straw-berries are particularly susceptible to black vine weevils.

There are no resistant cultivars known. If root weevils exist, rotation away from infested area for at least 1 year will help. Setting up barriers might also be effective this limits the movement of the adult. Parasitic nematodes have been shown to be effective. Brigade is the only insecticide labeled in NYS for the control of root weevil. This should be applied at a rate of 8-32 oz/A in mid-late June.

Spider Mites In Strawberries

Laura McDermott, Cornell University Extension

This spring two-spotted spider mites got an early start due to the hot, dry weather in April. The warmer weather this week, plus slightly drier conditions have allowed them to become a real problem in some fields. This is not a great time as picking has commenced everywhere and control products range from 0 days to harvest interval (DHI) in the case of Brigade, to 3 DHI for AgriMek and Savey. Still if the threshold of 5 mites/leaf out of 60 mature leaves has been reached, it would be better to do something now rather than wait for the population to get so big that it's much harder to control them – especially since we are rather early in the mite season.

Two spotted spider mites and eggs on strawberry leaf. Image: OMAFRA, http://www.omafra.gov.on.ca/

Two spotted spider damage. Image: OMAFRA, http://www.omafra.gov.on.ca/

A hand lens will help you scout for these pests. As you become familiar with looking for them, look for small yellow spots on the upper leaf surfaces as an indication of feeding. Brownish dry areas on the lower leaf surfaces are more characteristic of damage. The heavier the damage the more this brownish feeding injury occurs resulting in the more typical descriptor of "bronzed" leaves. Heavy feeding can result in stunted plants and sparse regrowth after renovation.

Chemical control options include Acramite, Savey, Zeal, Vendex, Portal, Brigade, Danitol, Suffoil-X and organic JMS Stylet oil. If you opt to use oil, remember not to tank mix with Captan and avoid spraying oil within 14 days of sulfur. (***Source**: Capital District Veg & Small Fruit Program Weekly Update. Vol. 4, No. 12, June 14, 2012*)

Many Options Are Available For Controlling Mites In Fruit Crops

John Wise, Rufus Isaacs and Larry Gut, Michigan State University Extension

Mites can be significant pests of fruit crops. There is an array of miticides available for control of the European red mite (ERM), two-spotted spider mite (TSSM) and rust mites (RM), such as apple and pear rust mites, pear blister mites, plum nursery mites and blueberry bud mites. But their performance characteristics are not all alike.

The following table is designed to summarize several key variables that can help you determine which miticides are optimal for your integrated pest management program.

Compound	Fruit crop	Mites	Life stage target	Seasonal timing	Residual control
Superior, Stylet Oils	all fruit crops	ERM, RM	egg/larvae	Early (pre-bloom)	2-6 weeks
Lime-Sulfur	pome, stone, blueberry	RM[3]	motiles*	Early (delayed-dormant)	2-6 weeks
Dimilin	pear	RM	motiles*	Early (pre-bloom)	2-6 weeks
Savey	pome, stone pome, stone, caneberry, strawberry	ERM TSSM	egg/larvae egg/larvae	Early*** Mid (or threshold)**	8-12 weeks 6-8 weeks
Onager	stone fruits	TSSM	egg/larvae	Mid (or threshold)**	6-8 weeks
Apollo	pome, cherry, peach	ERM TSSM	egg/larvae egg/larvae	Early*** Mid (or threshold)	8-12 weeks 6-8 weeks
Agri-Mek	pome, stone, grape, pome, stone, strawberry, grape	ERM, RM TSSM	motiles* motiles*	Early**** Mid (or threshold)	8-12 weeks 6-8 weeks
ABBA	pome, plum, grape, strawberry	ERM, RM TSSM	motiles* motiles*	Early**** Mid (or threshold)	8-12 weeks 6-8 weeks
Agri-Flex	pome, grape	ERM, RM	motiles*	Early****	8-12 weeks
Zeal	pome, stone fruits pome, stone, strawberry, grape	ERM TSSM	egg/larvae egg/larvae	Early (or threshold)** Mid (or threshold)**	8-10 weeks 6-8 weeks
Envidor	pome, plum, grape stone fruits	ERM, RM TSSM	egg, motiles* egg, motiles*	Early (or threshold)** Mid (or threshold)	8-10 weeks 6-8 weeks
Nexter	pome, stone[1], grape	ERM, RM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	6-8 weeks 6-8 weeks
Portal	pome	ERM, RM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	6-8 weeks 6-8 weeks
Kanemite	Pome pome, strawberry	ERM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	6-8 weeks 6-8 weeks
Acramite	pome, peach, plum pome, peach, plum, grape, strawberry	ERM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	6-8 weeks 6-8 weeks
Danitol	apple, grape apple, grape, strawberry	ERM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	4-6 weeks 4-6 weeks
Brigade	Pear pear, grape, strawberry, caneberry	ERM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	4-6 weeks 4-6 weeks
Hero	blueberry, caneberry, strawberry	TSSM	motiles*	Mid (or threshold)**	4-6 weeks

Oberon	strawberry	TSSM	egg, motiles*	Mid (or threshold)	4-6 weeks
Vendex	pome, stone pome, stone, grape, cane, strawberry	ERM TSSM	motiles* motiles*	Mid (or threshold)** Mid (or threshold)	4-6 weeks 4-6 weeks
Endosulfan	pome, stone, blueberry[2]	RM[3]	motiles*	Mid (or threshold)**	2-6 weeks
Sulforix	pear, blueberry	RM[3]	motiles*	Late (post-harvest)	2-6 weeks

* Motile forms include mite larvae, nymph and adult stages.
** Optimally used petal fall through August when mites reach threshold.
*** Optimally used pre-bloom through first cover.
**** Optimally used petal fall through second cover.
[1] 300 day phi for cherry
[2] post-harvest only for blueberry
[3] including pear blister mite
(***Source**: Michigan Fruit Crop Advisory, 4/24/12*)

RASPBERRIES/BLACKBERRIES

Summer Tipping Brambles

Bruce Bordelon, Purdue Univ.

Tipping of primocanes is an important management practice for summer bearing blackberries and black raspberries. Tipping the new primocanes causes lateral branching and most of the fruit production next year will be from buds on those lateral branches rather than buds off the main cane. Tipping also helps increase the diameter and strengthen the main cane. Height to tip is relative to vigor. Vigorous thornless blackberries can be tipped at 40-48 inches for best results. Black raspberries should be tipped no higher than 36-40 inches to help develop a stout cane capable of supporting itself. Ideally primocanes should be tipped as they reach the appropriate height with minimal tissue removed. Just pinch or break the tip off. However, if some canes have escaped notice and are taller than desired, it's still preferable to tip at the appropriate height, even if that means removing a foot or more of cane Tipping red raspberries a recent study suggest that tipping primocane fruiting blackberries can increase yields. (***Source**: Facts for Fancy Fruit, Vol. 12, No. 5. May 29, 2012*)

Cornell Releases Two New Raspberry Varieties

Amanda Garris

freelance writer in Geneva, N.Y. Article reprinted from Chronicle Online: http://www.news.cornell.edu/.

With its two newest raspberry releases, Big Red is going gold and crimson. Double Gold and Crimson Night offer small-scale growers and home gardeners showy, flavorful raspberries on vigorous, disease-resistant plants.

"Both varieties have attracted a lot of interest from small-scale growers because they are looking for varieties with intense flavor and a different look from the supermarket varieties," said Courtney Weber, Cornell small fruits breeder and associate professor of horticulture. "If consumers get a taste of these, they will buy them."

Double Gold produces a deeply blushed, golden champagne-colored fruit with a distinctive conical shape, earning the "double" in its name for its two harvests per season. The first year of planting, the initial crop is produced in the fall on the tips of that year's canes, and a second crop is produced farther down the same canes the following summer. According to Weber, none of the golden raspberries already on the market combine excellent flavor, peachy blush color, a conical shape and the ability to bear two crops per season.

"I have been told by sellers at farmers markets that having several colors on your display is a good way to draw in customers and distinguish you from other sellers," said Weber. "I'm hoping Double Gold will fit that niche."

In Weber's taste tests, Double Gold has been a favorite. The release is targeted to u-pick growers, farm stands and home gardeners because the fruit is too delicate for long-distance shipping. Although the fruit is tender, the plants that bear them are tough.

"Over eight years of testing, it has been consistently vigorous and disease-resistant," said Weber. "Specifically, we have observed it to be resistant to Phytophthora root rot as well as most of the common leaf diseases."

Double Gold bears deeply blushed, golden champagne-colored fruit in two crops per season. *(Photo courtesy Courtney Weber)*

Crimson Night produces heavy crops of shiny, dark fruit. *(Photo courtesy Courtney Weber)*

Crimson Night caught Weber's eye among thousands of raspberry selections in summer 2003 for its heavy fall crop and dark, shiny fruit. Grown in a commercial high tunnel system that offers protection from the elements, it is vigorous and productive. Grown outdoors without protection, Crimson Night is more compact, making the dark purple canes a particularly attractive ornamental for container gardening or a backyard raspberry plot.

"The berries are medium large with excellent flavor," said Weber. "Although the color is considered too dark for wholesale markets, the shiny, conical fruit are very attractive in a container at a farm stand."

According to Jessica Lyga, plant varieties and germplasm licensing associate for the Cornell Center for Technology Enterprise and Commercialization, both varieties have been licensed to North American Plants, LLC., a propagator that sells to nurseries and growers across the United States. Small quantities will be available late this summer, and North American Plants expects to have enough plants to meet the anticipated demand of each variety by the spring of 2013. Plant patents will be filed later this year.

Double Gold and Crimson Night are the fourth and fifth new berry varieties introduced by Weber in the past year. Recent releases include Purple Wonder, the darkest strawberry variety available; the Herriot strawberry, a high-yielding midseason variety; and the Crimson Giantraspberry, suitable for high tunnel cropping systems with a November harvest. Weber hopes to maintain a steady pace with selections this summer.

"For 2012 there will be approximately 20,000 raspberry seedlings under evaluation, and we will plant about 7,500 more," he said. "We'll also be adding 2,500 more strawberries to the 2,000 already under evaluation."

Interested growers can learn more about new Cornell berry varieties at a strawberry field day in mid-June and two raspberry open house events in July and September. (***Source***: *New York Berry News, Vol. 11, No. 5, May 25, 2012*)

BLUEBERRY

Blueberry Maggot

Cesar Rodrigues-Saona, Dean Polk, Gene Rizio, Rutgers University

The first trap capture was seen late last week on Thursday and Friday. The initial trap capture was in an Elliott field which bordered the woods, and had a history of high populations. However scattered trap captures were also noted in fields which have had very little history of trap captures. This starts the clock for those growers on a calendar based spray program if exporting fruit to Canada. The first insecticides must be applied within 10 days of first being notified (already done by NJDA on Friday), and again every 7-10 days through the Canadian shipping season. For the trap based program, growers need only to pay attention to traps placed in specific production areas, and treat on a schedule based on those trap catch dates. For this system, the first insecticide is applied within 5 days of the trap capture and again 7-10 days after that. If another fly is captured in the same production area after those sprays are applied, then the treatment cycle starts over again.

Life Cycle. There is one generation per growing season. The blueberry maggot overwinters in the soil below blueberry bushes enclosed in a brown puparium buried one to two inches deep in the soil. Pupae lay dormant until environmental conditions become suitable to emerge as adults (early through mid-June). Peak emergence and

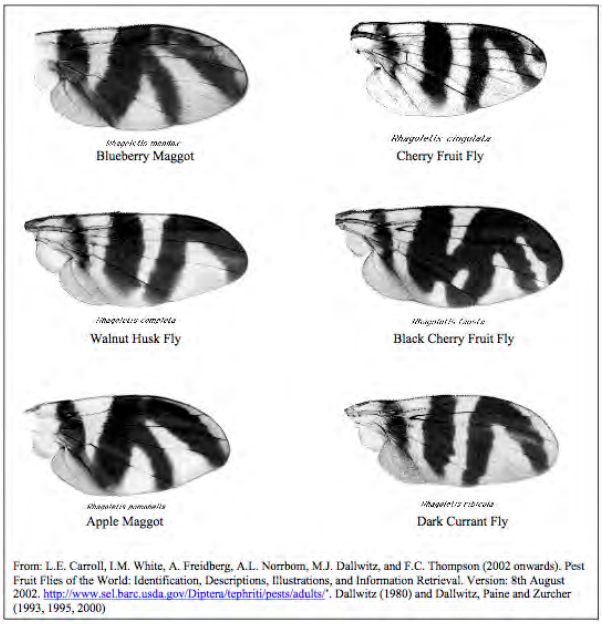
migration from wild hosts continues from mid-July through mid-August. Female blueberry maggot flies do not begin laying eggs until 10 days after emergence, typically corresponding to when the blueberry fruit turns blue. Adult females live for about 30 days, feeding on nectar, dew, and honeydew. Female flies lay one egg per berry under the fruit skin, which hatches in five to seven days. Maggots feed for about three weeks inside ripening and harvested fruit. The full- grown larva is about 7/16 to 1⁄2 inch long and white. The body is tapered, with an indistinguishable head at the narrow end.

As the larvae mature, infested fruit become soft and watery, and drop to the ground. The cycle is perpetuated for the following year as larvae then pupate in the soil under the bushes from which they have dropped. Pupae may remain in the soil for up to 2 to 3 years.

Trap Orientation and Placement - Upside down tent or "V" in top 6" of

Monitoring and Management. Determining the onset of adult fly activity is essential to the control of blueberry maggot as protective sprays must be applied in the 7 to 10 day period before oviposition begins. Regular monitoring of blueberry maggot emergence is done with yellow baited sticky traps. A trap and lure system has been developed that increases blueberry fly capture. Pherocon AM yellow sticky boards baited with ammonium acetate work effectively in monitoring blueberry maggot flies. Traps should be hung in a "V" orientation within the top 6-8" of the bush canopy, not above it, with the yellow surface facing down (see Picture). Sometimes this means cutting away a little foliage so it doesn't stick to the trap. If the trap is hung above the foliage then fewer to no maggot flies will be caught. The traps should ideally remain open at a 90o angle. As the trap gets wet, it looses form and gets heavier. Use of a # 14 or 12 wire in place of the plastic coated wires that come with the traps will help maintain proper orientation and shape. Traps should be placed at least a week before first flies are expected to emerge (early June). Traps should also be changed every 2 weeks, since the ammonium acetate will volatilize off the traps. Place traps on field borders near wooded areas, with a few traps in the field interior.

Adult identification. Proper identification of the blueberry maggot flies is important. There are several flies that resemble and may be confused for blueberry maggot adults. The blueberry maggot adults are identifiable by the characteristic solid "W" or "M" shape mark on their wings. In most cases, this looks identical to apple maggot but assume that if it is in a commercial blueberry field, then it is blueberry maggot. See illustrations from Carroll et al below (2002).



From: L.E. Carroll, I.M. White, A. Freidberg, A.L. Norrbom, M.J. Dallwitz, and F.C. Thompson (2002 onwards). Pest Fruit Flies of the World: Identification, Descriptions, Illustrations, and Information Retrieval. Version: 8th August 2002. http://www.sel.barc.usda.gov/Diptera/tephriti/pests/adults/". Dallwitz (1980) and Dallwitz, Paine and Zurcher (1993, 1995, 2000)

Blueberry Maggot Insecticide Options				
Material	Rate/A	REI	PHI	Rating
Diazinon 50W	1 lb	5 days	7 days	G
Guthion 50W	1 lb	7 days	7 days	E
Imidan 70WSB	1.33 lb	24 hr	3 days	E
Lannate 90SP	1 lb	48 hr	3 days	G
Malathion 8	1.5 pt	12 hr	1 day	G
Sevin 80WSP /4F	1.5 lb / 3 pt	12 hr	7 days	G
Asana XL	8 oz	12 hr	14 days	G
Danitol	10 2/3 – 16 oz	24 hr	3 days	G
Hero	4 – 10.3 oz	12 hr	1 day	G
Provado 1.6F	6–8 oz	12 hr	3 days	G
Actara	4 oz	12 hr	3 days	G
Assail 30SG	4.5 – 5.3 oz	12 hr	1 day	E
Rimon	20-30 fl oz	12 hr	8 days	G
Delegate	6 oz	4 hr	3 days	suppression
Surround	25 lb	4 hr	day of harvest	suppression
Entrust	2 oz	4 hr	3 days	suppression
GF120	20 oz	4 hr	day of harvest	F

E=excellent, G=good, F=fair, suppression=suppression only
Lannate is not labeled in Canada and should be minimized if exporting berries.
Assail, Provado, Actara, Rimon, and SpinTor are reduced-risk/OP replacement products.
Surround, Entrust, and GF120 are organically-approved insecticides.
Diazinon may be applied only once as an in-season foliar spray.

(***Source**: Blueberry Bulletin, Vol. 28, No. 12. June 11, 2012*)

GRAPE

Potato Leafhopper in Grapes

Alice Wise, Cornel Univ.

Potato Leafhopper: Potato leafhopper (PL) nymphs are pale yellow-green and walk sideways like a crab. The more slender lime green adults may also be present. This insect does not overwinter on LI, but rides warm air masses from the south May-June. The constant migration means all stages may be present at any one time in early summer and repeat invasions may occur. Thus PL infestations may be short-lived or may persist well into August.

PL injects a toxin when feeding, causing chlorosis (yellowing) and even browning of the leaf edge. Leaves are often cupped, especially on shoot terminals which can also be stunted. It is notoriously difficult to scout for PL due to the extremely high mobility of this pest. Many managers visually estimate damage and do an informal "trellis shake" to help gauge the severity of infestation. In apples, a threshold of 1 nymph per leaf is used, out of 50 - 100 leaves counted per orchard block. Mature vines can tolerate some injury as damaged terminals are often hedged off. Moderate to severe injury on both terminals and laterals however may be detrimental to vine health, though overall vine health and the severity/length of the infestation are factors. The need for control of grape berry moth and Japanese beetle may help decide the timing and frequency of treatment. Intervention for baby vines or otherwise compromised vines (ex: drought stressed vines) might be sooner vs. mature, healthy vines. Options for treatment are below. Note that products with the a.i. Imidacloprid should be used judiciously and only as necessary as this compound is a groundwater concern.

· **Assail** is a reduced risk neonicotinoid labeled for 2 app's, adjuvant recommended.

· **Avaunt**, reduced risk, labeled for leafhopper suppression only.

· **Baythroid**, restricted use, labeled for control of grape leafhopper. Broad spectrum activity means it is likely hard on beneficials.

· **Brigade**, **Brigadier** – both labeled for grape leafhopper, both restricted use, both have the pyrethroid bifenthrin, the latter also has Imidacloprid, the ai found in Provado.

· **Danitol** and **Lannate**, restricted-use and toxic to predator mites, although Danitol is also a miticide. No more than two applications of Danitol/season are recommended due to concerns about the development of resistant PL and ERM populations, although more are allowed on the label depending on rate. Lannate has a 7 day reentry interval. Note that new labels of Lannate do not have grapes on the label; existing supplies with the old label may still be used.

· **Imidan** is labeled for grape leafhoppers. Field experience with Imidan indicates that it will knock back PL also however the period of residual control is usually no more than a week. Imidan is no longer restricted use but it has a 14 day reentry.

· **Leverage**, restricted use, labeled for control of leafhoppers, broad spectrum activity suggests it is likely hard on beneficials. Imidacloprid is a component of Leverage.

· **Provado**, another neonicotinoid with the a.i. Imidacloprid, is now restricted use. Pasada is the name of a generic version of Provado. Research in grapes by entomologist Greg Loeb suggests that a half rate is as effective as a full rate.

· **Sevin** is linked anecdotally to flare ups of European red mites in vineyards. Advantage to Sevin is that it is also effective against beetles and berry moth.

· **Azadiractin** materials primarily act as insect growth regulators that function as contact materials and work through ingestion. In a trial at LIHREC in 2004, Aza-Direct did not work as well as Danitol or Assail with moderate PL pressure. The primary use is against nymphs, they disrupt the molting process. Thus, their best fit is early in the infestation cycle and not when the population is skewed toward adults. Both Aza-Direct and Neemix are OMRI approved.

· **Pyrethrin** based products – Many such as Pyganic are OMRI approved. Experience with these products in other commodities suggests that they are broad spectrum, will offer a quick knock down but will have a short period of residual control, reportedly as little as 3 days. These are probably more effective when applied in the earlier stages of an infestation.

· **Oils and soaps**. Though labeled for leafhoppers, JMS Stylet Oil typically is not used specifically for PL control. It likely will knock back but not control moderate to heavy infestations (comment based on intuition, not field or research experience). Grower experience with soaps against PL has been disappointing. See labels for cautions on use in temps >85F and for compatibility issues.

References: Greg Loeb, Grape insect and mite pests – 2012 field season. This overview is located on our web page at <http://ccesuffolk.org/viticulture> in the Current Events section. (***Source**: Long Island Fruit & Vegetable Update, No. 10. June 7, 2012*)

Developing Grape Clusters Are Very Susceptible To Fungal Diseases And Need To Be Protected

Annemiek Schilder, Michigan State University Extension

Young fruit clusters are highly susceptible to all major diseases, including downy mildew, powdery mildew, black rot, Phomopsis and anthracnose. If prolonged cool, wet weather prevails during bloom, Botrytis can also gain a foothold in clusters of susceptible varieties by promoting fungal growth on senescent flower parts. However, with continued dry, warm conditions, it is unlikely that bloom will be an important time for Botrytis infection. Black rot and Phomopsis lesions have been seen in the last couple of weeks and indicate that the pathogens are active. Grape anthracnose symptoms are also visible on shoots, leaves and cluster stems of susceptible varieties. The first powdery mildew colonies have been seen on unsprayed Chardonnay vines in Clarksville, Mich. Powdery mildew has also been spotted near Traverse City, Mich., but this report is still being confirmed. Downy mildew so far has only been seen in low-lying wild grapes, which often show symptoms at least a week before cultivated grapes. However, it has been relatively dry, so downy mildew development may be a bit late this year. Careful scouting is advised on a weekly basis.

It is possible to have powdery mildew fruit infection without seeing any foliar infections, so protect the fruit of susceptible cultivars even if no powdery mildew has been seen on the leaves. Often, downy mildew infections of flower clusters in cv. Chancellor are seen before leaf infections as well. In 2009, we first observed downy mildew in Chancellor in Fennville, Mich., during the first week of June and in 2010 during the second week of June. Growers are strongly advised to protect flower and fruit clusters from infection by all these pathogens using effective fungicides. The risk of infection is especially high if we have multiple rain events and moderate to high temperatures.

In general, aim to protect the clusters from the major diseases from immediate pre-bloom until four to five weeks after bloom. As the berries develop, they become naturally resistant to black rot, downy mildew and powdery mildew and the need for protection diminishes after the susceptible period ends. This happens quite rapidly for downy mildew (two to three weeks after bloom), whereas for powdery mildew it is about four weeks after bloom. Concord grapes become resistant to black rot at four to five weeks after bloom, but some wine

grape varieties may remain susceptible to black rot for up to eight weeks post bloom. However, be aware that the cluster stem (rachis) and berry stems can remain susceptible longer than the berries in most cases. The only disease to which berries remain susceptible throughout their development is Phomopsis, but the risk of infection diminishes after bunch closure because inoculum levels drop off then. Botrytis is just the opposite in that berries actually become more susceptible as they get closer to harvest, especially in tight-clustered varieties.

Powdery mildew

Sterol inhibitor (e.g., Elite, Rally, Procure, etc.) and strobilurin (e.g., Sovran, Flint, Abound, Pristine) fungicides have the ability to cure early infections, but will not eliminate colonies that are already established. JMS Stylet Oil and potassium bicarbonate fungicides (Kaligreen, Armicarb, MilStop) can be used to eradicate visible powdery mildew colonies. If you use eradicants, make sure that coverage is thorough (use sufficient spray volume), as only those colonies contacted by the fungicide will be killed. Since strobilurin-resistant powdery mildew isolates have been found in Michigan (mostly in MSU experimental vineyards and wine grape vineyards with a history of strobilurin use) and we have circumstantial evidence for sterol inhibitor (SI) resistance, we recommend adding a protectant fungicide like Sulfur or Ziram to the tank-mix when using either type of fungicide. Sulfur is the most cost-effective option for non-sulfur sensitive grape cultivars.

Over the past two years, we have noticed that Ziram as a tank-mix partner did improve control of powdery mildew in a spray program on the research stations where we have strobilurin resistance. Also, alternate fungicides with different modes of action, for example Sulfur, Quintec, Vivando, Luna Experience, Endura, Serenade, Sonata or Regalia. Revus Top is a new fungicide for powdery and downy mildew and black rot control in grapes. However, the ingredient that is active against powdery mildew is difenoconazole, which belongs to the sterol inhibitor class. This fungicide is phytotoxic on Concord and Noiret grapes, so do not use on these cultivars. Inspire Super also contains difenoconazole. Luna Experience is a new fungicide for control of powdery mildew, black rot, Phomopsis and anthracnose.

Downy mildew

For most varieties, foliar infections are the main phase to be concerned about. However, the downy mildew pathogen can also infect clusters. Cultivar Chancellor is the poster child for downy mildew cluster infection. Both the rachis and berries can be destroyed. If active infections are found, use fungicides with post-infection activity at the highest labeled rate. For downy mildew, Ridomil Gold (MZ or Copper) are the strongest fungicides, followed by phosphorous acid fungicides like Phostrol and ProPhyt. When using phosphorous acids, applying a "booster spray" five days after the first spray will enhance the curative effect. Strobilurin fungicides have limited post-infection activity and should preferentially be used in a preventive mode.

Newer fungicides for downy mildew control are Presidio, Revus and Revus Top (don't apply Revus Top to Concord or Noiret vines due to risk of phytotoxicity), Gavel (contains mancozeb), Forum, Reason, Ranman and Tanos. While some of these new fungicides have post-infection (curative) activity, they are best applied on a preventative basis. They are good for integration into a fungicide resistance management program as many of them represent new and different chemistries.

Black rot

Black rot lesions have been seen on grape leaves in various locations and range from 1 to 5 mm in size. They can be recognized by the tiny, black pimples (pycnidia) in a ring along the inner edge of the lesion. Temperatures in the high 70s and low 80s are perfect for black rot. At these temperatures, only six to seven hours of wetness are needed for infection, so a nightly dew period may be sufficient for infection.

Black rot is a tricky disease because infections can remain latent (invisible) for a long period of time, so you won't know the berries are infected until is it too late to do anything about it. However, one can scout for the small, roundish leaf spots – a lot of black rot leaf lesions indicate high disease pressure from ascospore inoculum and will also contribute conidia for fruit infections. Conidia produced in leaf spots are rainsplashed, whereas the old fruit mummies produce airborne ascospores. In a field with a history of black rot, old fruit cluster remnants left hanging in the trellis are major contributors to infection. Fruit infections can take place anytime from bloom onwards, but only become apparent between bunch closure and veraison. Black rot is relatively easy to control in the period from immediate pre-bloom through early fruit development.

The approach to black rot control now focuses primarily on protecting the clusters from infection. EBDC sprays applied earlier in the season for Phomopsis will also control black rot leaf infections, and therefore no sprays are recommended specifically for black rot on the foliage

early in the season. In five years of trials in New York, good black rot control was achieved with one immediate pre-bloom and one to two post-bloom fungicide sprays. A second post-bloom application is strongly advised if black rot has been a problem in the vineyard the previous year, and should be considered prudent if wet weather is anticipated. During three years of fungicide trials in a 'Concord' vineyard in Fennville, Mich., just two post-bloom applications of SI fungicides (Rally, Elite) provided very good control under high black rot pressure.

Sterol inhibitor fungicides (e.g., Rally, Elite) continue to provide outstanding control of black rot and provide several days of post-infection activity. Currently, there are various "generic" tebuconazole products on the market, like Orius and Tebuzol, that may be more cost-effective. The difenoconazole ingredient in Revus Top and Inspire Super is similar to Rally and Elite when it comes to black rot control. When using SI fungicides on a post-infection schedule, use the highest label rates because post-infection activity is strongly rate dependent, particularly when extended "kickback" activity is required. The strobilurin fungicides (Abound, Flint, Sovran, Pristine) and Luna Experience are also excellent against black rot, but provide only limited post-infection activity. Flint, Pristine, Inspire Super and Revus Top should **not be used on Concord grapes** because of potential phytotoxicity.

Phomopsis

Cane and leaf lesions have been showing up in fairly high numbers in susceptible varieties. Each rainfall event will lead to spore dispersal and can also lead to successful infection if the tissue remains wet for a sufficient amount of time. The optimum temperature for infection is 59 to 68 degrees Fahrenheit, at which time about six to 10 hours of wetness are needed for infection. The longer the tissue stays wet, the more severe the symptoms will be. At this time, we should be concerned with preventing Phomopsis infection of the rachis and fruit, especially in mechanically pruned vineyards and vineyards with a history of the disease. Rachis infections are most closely correlated with yield losses due to berry drop at harvest in Niagara vines, whereas fruit infections are more of a problem in wine grapes.

If at this time you find a lot of lesions on the leaves and canes, infection pressure will be high for the fruit also. It is not too late to apply fungicides for cluster protection from Phomopsis. Sterol inhibitors, overall, do not have good efficacy against Phomopsis, although fungicides containing difenoconazole (Revus, Revus Top, Inspire Super) are among the more effective. The best fungicides for control of Phomopsis during and after bloom are Abound and Pristine (do not use Pristine on Concord grapes). Phosphorous acid fungicides such as ProPhyt and Phostrol are also good and cost-effective alternatives. These are systemic and will likely provide some kickback activity.

In trials done in Michigan, ProPhyt provided very good control of Phomopsis when sprayed on a 14-day schedule. Tighten the schedule and increase the rate if disease pressure is high. Luna Experience is also quite effective. Ziram is a moderate to good protectant against Phomopsis and can be a tank-mix partner with any of the phosphorous acid fungicides. EBDC fungicides and Captan are good protectants, but cannot be applied after bloom has started in grapes grown for the National Grape Cooperative (these fungicides are suspected carcinogens). EBDC's have a 66-day pre-harvest interval. (***Source**: Michigan Fruit Crop Advisory, June 12, 2012*)

GENERAL INFORMATION

Rainfast Characteristics of Insecticides on Fruit Crops

John Wise, Michigan State University Extension

The rainfall events experienced in Michigan have prompted questions about the relative "rainfastness" of the insecticides used in fruit production. In 2006, AgBioResearch provided funds to purchase and install a state-of-the-art rainfall simulation chamber at the MSU Trevor Nichols Research Center, after which we have conducted trials (with generous funding support from Michigan fruit commodity groups) on fruit crops for a range of insecticides.

There are several critical factors that influence impact of precipitation on a pesticide's performance. First is the plant penetrative characteristic of the various compounds. Some pesticide chemistries, like organophosphates, have limited penetrative potential in plant tissue, and thus are considered primarily as surface materials. Some compounds such as carbamates and pyrethroids penetrate plant cuticles, providing some resistance to wash-off. Many newer compounds such as spinosyns, diamides, avermectins and Insect Growth Regulators (IGR) readily penetrate plant cuticles and have translaminar movement in leaf tissue. Others, like the neonicotinoid insecticides, are systemic and can have translaminar, as well as acropetal, movement in

the plant's vascular system. Penetration of plant tissue is generally expected to enhance rainfastness of pesticides.

The second factor is the inherent toxicity of an insecticide to the target pest and the persistence of activity in the environment. In some cases, a compound may be highly susceptible to wash-off, but its persistence and inherent toxicity to the target pest compensates for the loss of residue, thus delaying the need for immediate re-application.

The third factor is the amount of precipitation. In general, organophosphate insecticides have the highest susceptibility to wash-off from precipitation, although their toxicity level to most insect pests can often overcome the necessity for an immediate re-application. Neonicotinoid insecticides are moderately susceptible to wash-off, with residues that have moved systemically into plant tissue being highly rainfast, and surface residues less so. Pyrethroid and carbamate insecticides are moderately susceptible to wash-off and vary in their toxicity to the range of relevant fruit pests. Diamide, spinosyn, avermectin and IGR insecticides have proven to be moderate to highly rainfast on most fruit crops.

For most insecticides, a drying time of two to six hours is sufficient to "set" the compound on the plant. With neonicotinoid, for which plant penetration is important, drying time can significantly influence rainfastness. For neonicotinoids, up to 24 hours is needed for optimal plant penetration, thus the time proximity of precipitation after application should be considered carefully. Spray adjuvants, materials intended to aid the retention, penetration or spread on the plant can also improve the performance of insecticides.

Based on the results from the current studies, the following charts have been developed to serve as a guide for general rainfastness characteristics and re-application recommendations for certain insect pests (also printed in the E-154 *2012 Michigan Fruit Management Guide*). Note that these recommendations should not supersede insecticide label restrictions or farm-level knowledge based on site-specific pest scouting, but rather are meant to compliment a comprehensive pest management decision-making process.

Rainfastness rating chart: General characteristics for insecticide chemical classes.

Insecticide Class	Rainfastness ≤ 0.5 inch		Rainfastness ≤ 1.0 inch		Rainfastness ≤ 2.0 inch	
	Fruit	Leaves	Fruit	Leaves	Fruit	Leaves
Organophosphates	L	M	L	M	L	L
Pyrethroids	M	M/H	L	M	L	L
Carbamates	M	M	L	M	L	L
IGRs	M	H	M	M		
Neonicotinoids	M,S	H,S	L,S	L,S	L,S	L,S
Spinosyns	H	H	H	M	M	L
Diamides	H	H	H	M	M	L
Avermectins	M,S	H,S	L,S	M,S	L	L

* H – highly rainfast (≤ 30% residue wash-off), M – moderately rainfast (≤ 50% residue wash-off), L – low rainfast (≤70% residue wash-off), S-systemic residues remain within plant tissue

Apple insecticide precipitation wash-off re-application decision chart: Expected codling moth control in apples, based on each compound's inherent toxicity to codling moth larvae, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1.0 inch		Rainfall = 2.0 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Guthion				X	X	X
Imidan		X		X	X	X
Asana		X	X	X	X	X
Calypso			X	X	X	X
Assail			X	X	X	X
Proclaim		X		X	X	X
Rimon			X	X	X	X
Delegate					X	X
Altacor						X
Belt						X

*Number of days after insecticide application that the precipitation event occurred.
X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.
(An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.)

Grape insecticide precipitation wash-off re-application decision chart: Expected Japanese beetle control in juice grapes, based on each compound's inherent toxicity to Japanese beetle adults, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1.0 inch		Rainfall = 2.0 inches	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Imidan			X	X	X	X
Sevin				X	X	X
Brigade				X	X	X
Actara		X		X	X	X
Avaunt		X		X	X	X

Number of days after insecticide application that the precipitation event occurred.
X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.
(An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.)

Blueberry insecticide precipitation wash-off re-application decision chart: Expected cranberry fruitworm control in blueberries, based on each compound's inherent toxicity to cranberry fruitworm larvae, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1.0 inch		Rainfall = 2.0 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Guthion		X	X	X	X	X
Asana		X	X	X	X	X
Intrepid		X	X	X	X	X
Assail		X		X	X	X
Delegate		X		X	X	X

*Number of days after insecticide application that the precipitation event occurred.
X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.
(An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.)

Blueberry insecticide precipitation wash-off re-application decision chart: Expected Japanese beetle control in blueberries, based on each compound's inherent toxicity to Japanese beetle adults, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1.0 inch		Rainfall = 2.0 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Imidan	X	X	X	X	X	X
Mustang Max		X		X	X	X
Sevin		X	X	X	X	X
Provado		X	X	X	X	X

* Number of days after insecticide application that the precipitation event occurred.
X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.
(An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.)

Insecticide persistence, plant penetration and rainfastness rating

Compound Class	Persistence (residual on plant)	Plant Penetration Characteristics	Rainfast Rating
Organophosphates	Medium - Long	Surface	Low
Carbamates	Short	Cuticle Penetration	Moderate

Pyrethroids	Short	Cuticle Penetration	Moderate
Neonicotinoids	Medium	Translaminar & Acropetal	Moderate
Avermectins	Medium	Translaminar	Moderate
IGRs	Medium - Long	Translaminar	Moderate - High
Spinosyns	Short - Medium	Translaminar	Moderate - High
Diamides	Medium - Long	Translaminar	Moderate - High

(***Source**: Michigan Fruit Crop Advisory, June 12, 2012*)

UPCOMING MEETINGS:

June 20, 2012 – *UConn Extension Fruit Twilight Meeting*, Rogers Orchard, Long Bottom Rd., Southington, CT. 5-9pm For more information contact Mary Conklin at mary.concklin@uconn.edu.

June 23, 2012 – *Massachusetts Cultivated Blueberry Grower's Association Summer Meeting*. Fox Hill Farm 755 Pleasant St. Paxton, MA 0151212:00pm picnic lunch (pyo), 1:00 program starts. Featured Speaker: Rich Cowles, CT Ag Experiment Station on Spotted Wing Drosophila and other Blueberry Pests. For more information contact Elisabeth Patt at eap1226@verizon.net.

June 26, 2012 – *UMass Fruit and Vegetable team Twilight Meeting*, Wards Berry Farm,

June 26, 2012 – *UNH Small Fruit Twilight Meeting*, Butternut Farm, Quincy Rd. Runmery, NH. 6:00-8:00pm. For more information see: http://extension.unh.edu/Counties/Grafton/Docs/SmFruit26.pdf.

June 26, 2012 – *Year Round Production at Pleasant Valley Farm*, Argyle NY. 3:00-6:00. Please register by calling Stephanie Backer-Bertsch at NOFA-NY at 585-271-1979 x 509, or by registering online at http://www.tinyurl.com/nofanyevents. Registration is FREE for NOFA-NY members and $15/ non-members. For more information see: http://www.nofany.org/events/field-days/season-extension-food-safety-year-round-production-pleasant-valley-farm

June 27, 2012 – *UNH Veggies & Berries Twilight Meeting*, Meadow's MirthFarm, 61A Stratham Heights Rd., Stratham, NH. Part 1: 5-6:15; Part 2: 6:15-7:30. For more information see: http://extension.unh.edu/Counties/Rockingham/Docs/VegAndB.pdf

July 10, 2012 - *UNH Veggies & Berry Twilight Meeting*. Surowiec Farm, 53 Perley Hill Rd., Sanbornton, NH. For more information see: http://extension.unh.edu/Agric/Docs/SurowiecFlier_71012.pdf.

July 17, 2012 - *Specialty Small Fruit Production and Processing at Cherry Hill Farm*. For more information see http://www.uvm.edu/vtvegandberry/meetings/meetlist.html .

July 18, 2012 – *Organic Weed Management at Hurricane Flats*. S. Royalton VT. For more information see http://www.uvm.edu/vtvegandberry/meetings/meetlist.html .

August 7, 2012 – *Pollinator Conservation Short Course*. Randolph Center VT. For more information see http://www.uvm.edu/vtvegandberry/meetings/meetlist.html .

August 10-12, 2012 – NOFA Summer Conference. UMass, Amherst, MA. For more information and registration see: http://www.nofasummerconference.org/

If you know of an event that would be suitable for this list, please forward to sgs@umext.umass.edu

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