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IN THIS ISSUE:

CROP CONDITIONS:

Strawberry harvest is underway. Early reports are of higher levels of leaf spot than previous years. Fruit rots are also being reported (following a stretch of wet weather). One incidence of Anthracnose fruit rot has also been reported. See more about that diesease below. Tarnished plant bug seem to be scarce this year (in strawberries at least) for an unknown reason. And no reports of last year's novelty pest, Long Necked Seed Bug, have come in so far. **Raspberry** bloom is underway. Fall raspberry new cane growth is about 24". Watch for potato leafhopper feeding on new leaves. Cane borers damage may be found on primocanes. Cut out infested canes as they appear and remove from the field. **Blueberries** are in the green fruit stage. Mummy berry infections seem to be light following the dry hot weather we had during the primary infection phase of the disease. Some reports have come in on botrytis blossom blight from infections during the wet and humid stretch that followed. Now is the time to set out monitoring traps for Blueberry Maggot. See more on this below. Crown Gall was also found in one planting of Duke blueberries. **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. **Currants and Gooseberries** are well into fruit development and may begin coloring up soon. Watch for

2013-14 New England Small Fruit Pest Management Guide is available by contacting your local Extension office or by going to the UMass Extension Bookstore at www.umassextensionbookstore.com/store.php?crn=238.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately one week period, May 30 through June 5. Soil temperature and phenological indicators were observed on or about June 5. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2013 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 2013 (2012)		
Cape Cod	127	468	72˚	2.86"
Southeast	146	484	73˚	2.00"
East	160	440	62˚	1.13"
Metro West	160	424	54˚	1.38"
Central	154	464	63˚	1.39"
Pioneer Valley	148	461	67˚	1.96"
Berkshires	131	415	62˚	1.49"
Average	145	442	67˚	1.62"

(***Source***: *UMass Landscape Message #12, June, 2013*)

STRAWBERRY

Strawberry Anthracnose

Bill Turecheck and Cathy Heidenreich – Cornell Univ.

Introduction - The term anthracnose is a general term used to describe plant diseases. Strawberry anthracnose refers to several diseases of strawberry caused by members of the same group of fungi (*Colletotrichum*), all producing similar symptoms (Table 1). These pathogens are capable of infecting fruit, buds, blossoms, petioles, runners, crowns, and foliage. Though generally thought of as southern diseases (optimal development temperature is approx. 80 degrees F), anthracnose is not limited to the south. Anthracnose crown rot (caused mainly by *C. fragariae*) is the most destructive disease of strawberry in the southeastern United States and on a global scale, anthracnose fruit rot (caused by all 3 species, but most often associated with *C. acutatum*) is a significant problem. Anthracnose fruit rot is especially severe in annual cropping systems where berries are grown on plastic-mulched raised beds. Fully open flowers and ripening fruit are very susceptible to infection. Under rainy, warm harvest season conditions the disease is able to spread very quickly and may destroy the entire crop. *C. acutatum* is considered to be most prevalent species in the Northeast.

Symptoms - Lesions first appear as small, dark spots on stolons and petioles. These enlarge to become dark, elongated, dry, sunken lesions which often girdle the stem. When petioles or runners become girdled, individual leaves or entire daughter plants may wilt and die. Petiole infections occur at the base of the petiole, causing the leaf to bend sharply at the point of attachment and hang down.

Table 1: Symptoms associated with the various *Colletotrichum* species

Symptom	*C. acutatum*	*C. dematium*	*C. fragariae*	*C. gloeosporioides*
Crown rot			X	
Fruit rot	X	X	X	X
Black leaf spot		X	X	
Irregular leaf spot	X			

Leaves: Anthracnose or black leaf spot is caused by *C. fragariae* or *C. gloeosporioides*. Lesions on leaves are small (<1/4"), round, and black (sometimes light gray) often resembling ink spots. Spots may become numerous on leaflets without causing leaf death and often appear first on expanding leaves of runner plants. While the fungi are not reported to sporulate in these leaf lesions, the presence of leaf spot may be a warning signal that abundant inoculum is present on other plant parts and fungicide applications are needed. Irregular leaf spot, caused by *C. acutatum*, has dark brown to black lesions forming on leaf margins and tips and extending along the margin and inward to the mid-rib. These lesions do not continue to develop in fully expanded leaves but infected leaves may persist on plants for 2-3 months. The fungus sporulates in these lesions and may serve as an inoculum source for flower blight and fruit rot.

Flower Parts: Flower blight may occur any time after the bud emerges from the crown. Fully open flowers are most susceptible to infection. Flower buds, sepals, pedicels, and peduncles may also become infected. Infected flowers dry quickly; dark lesions spread down the pedicel from the flower. Pedicels may be infected first; flower bud stems are girdled and buds die. Sepal infections occur as the bud is emerging from the crown. Sepals dry and turn brown; the resulting tip burn resembles that caused by excessive fertilizer. When warm, humid conditions prevail during bloom, all parts of the flower truss may dies, giving plants a blighted appearance.

Fruit: Symptoms appear as whitish, water soaked lesions up to 3 mm in diameter. As lesions develop, they turn a light tan to dark brown and eventually become sunken and black with in 2 to 3 days. After several days, lesions may be covered with pink to orange to light salmon-colored spore masses. Infected fruit eventually dry down to form hard, black, shriveled mummies. Fruit can be infected at any stage of development. Both ripe and unripe fruit can be affected. Infected seeds (achenes) turn black and are slightly sunken. These single seed infections often occur on green fruit; a typical lesion develops as the fruit ripens.

Infected fruit displaying darkening sunken lesions

Crowns: The fungus moves into the crown from petiole or stolon cankers, or may start as an infection from spores washed by rain or irrigation into the center bud. When crown tissue becomes infected, the entire plant grows normally for a while, then wilts and dies. The internal tissue of infected crowns will develop a firm, reddish brown rot (seen by slicing through the crowns). Crown tissue may be uniformly discolored or streaked with brown, and lesions may produce salmon-colored masses of spores.

Infected crown displaying reddish brown rot

Signs (visible presence of the pathogen) - Pink to orange to light salmon-colored spore masses on the surfaces of lesions form on most if not all plants parts. *C. gloeosporioides* also readily produces perithecia.

Disease cycle - Infected transplants and soil from infected transplants appear to be the primary source of inoculum in most instances, especially in annual production systems. This may be especially true for *C. fragariae*, which has a limited host range and does not survive in soil over the summer. In perennial systems, the fungi may overseason in infected plants and debris, providing inoculum for the following fruiting season. Spores (conidia) may be dispersed in the field by wind-driven rain, splashing water, insects, movement of workers, equipment or animals. Disease development and spread is minimal in most cases under cool, dry conditions. Crown infections often occur in the nursery but do not appear until after planting. The fungus continues to develop in newly planted nursery infected plants, which may suddenly die during warm weather in the fall or early spring of the following year.

Conditions favoring Infection - Anthracnose is considered to be a warm-weather disease with an optimum temperature for plant infection by *C. fragariae* between 80 and 90 °F. Therefore, the disease is generally not a problem in the Northeast unless warmer temperatures and rainfall prevail during fruit set and

harvest. *C. acutatum* fruit infections occur at 68 °F. Both fungi need nearly 100% relative humidity for spore germination and infection to occur.

Disease management - Since control is extremely difficult when favorable environmental conditions exist, measures should start at planting to reduce inoculum levels. This begins with anthracnose-free plants (Appendix of Strawberry Cultivar Disease Resistance). Use of drip irrigation and between row straw mulch will also help lessen the spread of disease within fields. Early season fruit with infections should be culled and removed from fields. Anthracnose fruit rot may be partly controlled with protective fungicide applications from flower bud emergence to harvest, however, fungicide programs have sometimes met with little to marginal success. For more information on fungicide programs see "Pest Management Guidelines for Commercial Small Fruit Production". Check product labels for timing and rates of application for products. [Ed. Note: See New England Small Fruit Management Guide]

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(***Source:*** *Cornell Coop Ext. Berry Disease of the Month, January 2012*)

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*)

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*)

Potato Leafhoppers and Berries

Kathy Demchak, Penn State University

Potato leafhoppers cause varying levels of damage to small fruit crops in different years, and this year we are seeing a fair amount of leafhopper damage to both strawberries and raspberries. In many cases where leafhopper feeding injury is severe, dry conditions cause plant growth to slow down, and damage from the leafhoppers then accrues and symptoms become more severe.

This is evidenced in the photo shown at the top, where the strawberry leaf curling is a sign of drought stress in addition to "hopperburn", the characteristic leaf yellowing and distortion that the leafhoppers cause. In some cases, people have confused the symptoms of leafhopper damage with either herbicide injury or a nutrient deficiency, rather than the real cause. Damage from potato leafhoppers can severely stunt plant growth, especially in newly-established plantings.

Similar symptoms from potato leafhopper damage are also often seen on raspberries (lower photo). With raspberries, damage often appears in the middle of the cane. Potato leafhoppers overwinter in southern states, and move northward as the growing season progresses; thus they are not typically present when the raspberry canes are first growing, so symptoms aren't present until the plants are one or two feet tall. Potato leafhoppers have three to four generations in Pennsylvania and are present for the remainder of the summer.

Leafhopper feeding results in a plugging of the portion of the leaves' vascular system that is used for moving

photosynthates. Thus, symptoms are similar on different types of plants–snapbeans and potatoes can be similarly affected. It should be noted however, that there are large cultivar differences in amount of damage noted, and to some extent, in details of symptoms among different crops.

Potato leafhoppers are light-green wedge-shaped insects that are about 1/8-inch long, and are found primarily on the leaf undersides. The adults fly quickly when disturbed. Nymphs cannot fly, and tend to move diagonally when disturbed. Because potato leafhoppers move in from other areas, there are no effective cultural controls for avoiding their appearance. Alfalfa is a favored host, so leafhoppers frequently move into other host crops in large numbers when alfalfa is mowed. A number of insecticides, including Provado and Assail, will provide control. For organic growers, insecticidal soap may provide some control but must be targeted against first generation nymphs.

Additional information regarding control can be found in the Mid-Atlantic Berry Guide. Penn State's Department of Entomology has a detailed factsheet on potato leafhopper life cycle and biology. (***Source**: Penn State Tree Fruit News, July 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.

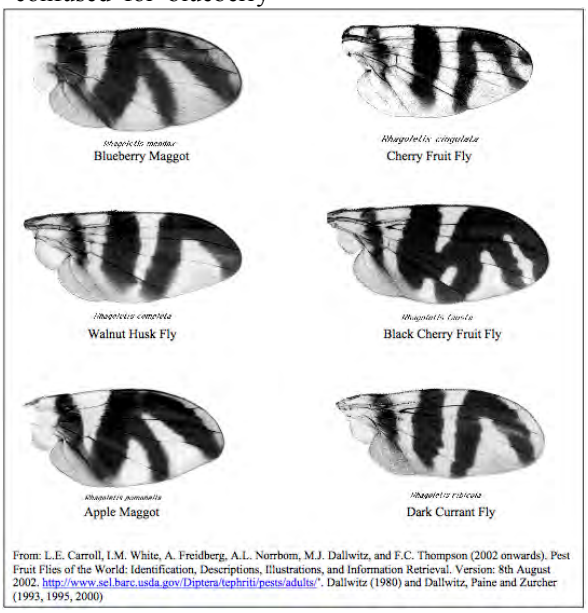
Trap Orientation and Placement - Upside down tent or "V" in top 6" of

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.

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).



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*)

Botrytis Blight of Blueberry

Bill Cline, NC State University

If there is a late freeze or even cold weather during bloom time, check the flowers and young fruit for the presence of Botrytis blight. If Botrytis is present, there will be a gray-green fuzzy growth on the plant tissues. Botrytis will usually cause losses early in the growing season, but a lot of rainy weather during the spring may also lead to Botrytis problems. It is not recommended to treat preventatively for this disease. Treat only if there is a frost that damages blooms or if there has been a significant cold spell.

There are two options for good Botrytis blight control. One is to use a fungicide with the active ingredient fenhexamid and is in the chemistry group hydroxyanilides (FRAC code 17). Another option is to use a fungicide in the multi-site mode of action chemistry group (FRAC code M). This fungicide will be most effective if applied as a preventative spray. (***Source**: Blueberry eXtension page at http://www.extension.org/pages/29284/botrytis-blight-of-blueberry*)

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

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*)

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 (TNRC), after which Michigan State University Extension has 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, oxadiazines 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 the compound 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, but their high level of toxicity to most insect pests overcomes 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. Carbamate, IGR and oxadiazine insecticides are moderately susceptible to wash-off, and vary in their toxicity to the range of relevant fruit pests. Diamide, spinosyn, avermectin and pyrethroid

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 in the plant. With neonicotinoids, 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 MSU Extension E-154 bulletin, "2013 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		
Oxadiazines	M	M/H	M	M	L	L
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	X
Belt					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.)

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

(***Source**: Michigan Fruit Crop Advisory, June 3, 2013*)

UPCOMING MEETINGS:

June 8, 2013 - *Massachusetts Cultivated Blueberry Grower's Association Summer Meeting*, 11:30 - 2:30ish. Akin Bak Farm, 360West Central St., Franklin MA. $10. Preregistration required by contacting Pat Concree at theblueberryfarm@comcast.net.

June 11, 2013 – *UMass Extension Fruit Team Twilight Meeting*, 5:30 PM at Tougas Family Farm, 246 Ball St., Northoboro, MA. Pesticide re-certification credit(s) will be offered. A light meal will be served. Special guest: Win Cowgill, Rutgers Extension. Topics to be covered may include: tunnel sprayer; apple tree hedging; a review of chemical thinning in 2013; rescue thinning opportunity; enhancing return bloom; and current season's crop load management on young and older trees. Orchard tour will include fruiting wall apple, older tall spindle apple, quad-v peaches, and a young cherry planting. Plan on a 3-4 hour meeting! Contact Jon Clements for more information at jon.clements@umass.edu or see http://extension.umass.edu/fruitadvisor/events/fruit-twilight-meeting-1.

July 10, 2013 – *Massachusetts Fruit Growers' Association Meeting*. 10AM – 2:30PM. Honey Pot Hill Orchards, 138 Sudbury Rd. Stow, MA. Two hours of pesticide-license-recertification credit will be offered for the day. Cost of registration for the meeting is **$30 per MFGA Member and $35 for non-members**, which includes lunch. Please return the bottom of this announcement, along with the appropriate payment by **July 5** to assure the availability of the lunch. You can alternatively register online with a credit card at: http://www.massfruitgrowers.org/. Mail along with a check for the appropriate amount (made out to MFGA) to: Doreen York, 201 Natural Resources Road, 210 Bowditch Hall, University of Massachusetts, Amherst, MA 01003-9294.

June 11, 2013 – *Invasive Plant Certification: Part B – Developing and Invasive Plant Management Program*. 9AM – 3PM. Doubletree Hotel, 11 Beaver St. Milford Massachusetts 01757. For more information see http://ag.umass.edu/events/invasive-plant-certification-part-b-developing-invasive-plant-management-program or contact Ellen Weeks at eweeks@umext.umass.edu

June 12, 2013 - *Tree Fruit Twilight Meeting*. 5:30-7:30pm**.** Join us for this Summer Tree Fruit Growers' Twilight Meeting. This meeting will include a tour of the orchard, IPM considerations, diseases effecting apple production, orchard weed control, and apple pest management and production options and strategy basics to plan for the rest of the growing season.The following speakers will be presenting:Cheryl Smith • UNH CE, Extension Specialist-Plant HealthAlan Eaton • UNH CE, Extension Fruit Entomology Specialist and Extension I.P.M. CoordinatorBill Lord • UNH CE Fruit Specialist, EmeritiSeth Wilner • UNH CE Extension Field Specialist- Sullivan CountyGeorge Hamilton • UNH CE Extension Field Specialist- Hillsborough County. Riverview Farm, River Road. Plainfield NH. For more information see: http://extension.unh.edu/events/index.cfm?e=app.event&event_id=27446

July 10, 2013 - *Sprayer Calibration*, 5:30-7:30pm Tree Fruit Twilight Meeting. 1-4pm Apple Hill Farm, Concord NH. PLEASE NOTE: *registration required for this meeting (call 603-641-6060). For more information see: http://extension.unh.edu/events/index.cfm?e=app.event&event_id=27448*

July 17, 2013 - *Vegetable and Berry Twilight Meeting* 5-7pm.. Fallow management and tunnel selection on an organic farm. Blue Ox Farm, Enfield NH. *In cooperation with the NH Veg & Berry Growers' Assoc*.

July 22, 2013 - *Vegetable and Berry Twilight Meeting* 5-7pm.. LaValley Farms, Allenstown NH. *In cooperation with the NH Veg & Berry Growers' Assoc*.

Aug 7, 2013 - *Seed Production Workshop*. 6-8pm. Sanborn Mills Farm, Loudon NH. *In cooperation with NOFA-NH*.

Aug 28, 2013 - *Twilight Meeting and Research Field Day* 5-7pm.. UNH Woodman Farm, Durham NH. *In cooperation with the NH Vegetable & Berry Growers' Association*.

Sept 4, 2013 - *Vegetable and Berry Twilight Meeting*. 5-7pm. Tomato and Brussels Sprouts Variety Trial, Disease management focus. Carroll County Farm, Ossipee NH.
