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Berry Notes

Prepared by the University of Massachusetts Fruit Team

August 2013 Vol. 25, No. 8

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Strawberry fields remain quiet at this time of year. Dayneutral varieties are still fruiting. Some annual production fields are being planted now. Late summer and early fall is a good time to fertilize both new and established strawberry fields. Typically strawberries will need 20 – 50 pounds of nitrogen at this time of year. Amounts depend on how much was applied at renovation and the organic matter content of the soil. Evaluate established fields for the foliar diseases or other problems that could carry over to next year. Also scout fields for weed problems that can be addressed in the fall. **Highbush Blueberry** harvest is about done. A few late varieties may still be active. Survey fields for weak bushes and determine whether or not Blueberry Stunt or Scorch may be the cause. Only nonnitrogen fertilizer applications should be made this late in the season if leaf tissue tests indicate deficiency. Also, be sure to keep your blueberries watered during the coming weeks to avoid drought stress as they go into dormancy. Scout fields for weeds to prepare for late season management strategies. **Summer raspberry** harvest is done. Be on the lookout for Orange Rust on black raspberries and blackberries. **Fall raspberries** is in full swing. Botrytis fruit rot is still a threat, especially if wet weather returns. Be sure to provide irrigation (drip preferred) so the canes can size up the fruit. Also check for mites and leafhopper damage. **Grapes** are approaching harvest. Scouting for disease and insect levels and taking corrective action are still important activities now. Prepare for wine grape harvest by checking fruit ripening parameters regularly. Mite infestations can build up quickly at this time of year. Be sure to check the underside of your leaves. **Spotted Wing Drosophila**: SWD has been found in all areas of the state and should be considered a serious pest management concern for the remainder of the season. For crops where harvest is complete, be sure to clean up or incorporate any fallen fruit left on the ground that might be a place where SWD can build up. For crops that are still being harvested (late blueberries, fall raspberries, day neutral strawberries, grapes, elderberries, aronia, peaches, nectarines,) keep a tight spray rotation, harvest frequently and thoroughly, and get fruit into the cooler as quickly as possible. See extension.umass.edu/fruitadvisor/spotted-wing-drosophila for updated information as it becomes available.



ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately two week period, July 25 through August 7. Soil temperature and phenological indicators were observed on or about August 7. 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)
	2-week gain	Total accumulation for 2013		
Cape Cod	280	1,813	76°	1.75"
Southeast	n/a	1,595	68°	1.07"
East	302	1,832	76°	0.86"
Metro West	260	1,775	79°	1.68"
Central	252	1,771	60°	2.39"
Pioneer Valley	253	1,828	74°	1.06"
Berkshires	219	1,582	70°	1.32"
Average	267	1,747	70°	1.45"

(Source: UMass Landscape Message #18, Aug. 9, 2013)

STRAWBERRY

Late Season Strawberry Care – Including Foliar Disease Management

Kathy Demchack, Penn State Univ.

This is the time of year when your strawberry plants are initiating flower buds for next year’s crop. So, anything you can do take care of your plants now will help to increase next year’s yields. Failure to take care of them now could set the stage for poor yields next year. So, what do we need to do? 1) Make sure the plants have adequate water (1-2” per week). 2) Make sure the plants have sufficient nitrogen (20 to 30 pounds applied during the mid-August to mid- September time frame, or slightly more on sandy soils). If you’ve experienced a lot of rain since renovation, you may want to apply the nitrogen a bit earlier than usual, especially if plants are light green and are not growing as fast as usual. Nitrogen you applied at renovation may have been washed through the soil, especially if it was in a nitrate form. 3) Keep an eye out for foliar diseases (as you’ve probably noticed, there are a lot of them out there this year), and apply an effective fungicide for any fungal diseases. Injured leaves = less photosynthesis = less food for flower buds and healthy root growth, and a lot of inoculum overwintering can damage your plants, including fruit, next year. The trick is correctly identifying which leaf disease(s) you have, and knowing whether any the symptoms you are seeing are caused by fungus or a bacteria. Fungicides only work on diseases caused by fungi. So... here’s a description of leaf diseases I’m seeing most frequently this year, in order from most common to least common, at least for 2009.

Leaf scorch: Spots on leaves start out circular and dark red to purple. Eventually the center may turn brown, spots may coalesce, and entire leaves and become affected and die, given the whole plant a scorched appearance. Some common fungicides are effective against this disease, which can be easily confused with angular leaf spot, on which fungicides will have no effect.



Leaf scorch (left) and angular leaf spot (right) when viewed with light shining down on the leaves.

Angular leaf spot: At first, light green “windowpanes” between the veins show up on the leaf when it is held up to the light. From the top, these areas may have a blackened appearance at first. Later on, as affected areas enlarge and coalesce, the leaves may develop a reddish tinge, with leaf tissue eventually dying and turning brown. This disease (along with gray mold) was responsible for a lot of caps on the fruit turning brown or black this past spring. Fungicides don’t affect this disease, but copper can help (see cautions below). Since leaf scorch and angular leaf spot are easily confused, here are some photos to help tell the difference. These photos are of the same two leaves, held differently so sunlight either shines down on them, or through them. The primary disease affecting the leaf on the left is leaf scorch, and the one on the right, angular leaf spot. In the first one, where sunlight is shining down on the leaves, the leaves appear very similar. In the second photo, where leaves are held up so that sunlight shines through the leaf, you can see that light does not shine through the leaves with leaf scorch on the left, but the “windowpane” effect of angular leaf spot can be clearly seen in the leaf on the right. Note that in these two leaves, there is some of each disease present on each leaf, but the disease causing most of the spots is different.



Leaf scorch (left) and angular leaf spot (right) when held up to the light. The same two leaves appear in each photo.

Powdery mildew: Usually the first symptom noticed is leaf curling, where leaves fold inward along their length. There may be a purple tinge to the leaves. White powdery growth on the upper leaf surface may or may not be seen, but if you look at the leaves under magnification, as with a 16x hand lens, you may be able to see the growth of fungal mycelia on either leaf surface. On the leaf undersides, be careful not to confuse strawberry leaf hairs (they’re straighter and thicker) with the mycelia.

Phomopsis leaf blight: As lesions grow, they form a Vshape, with the wide portion of the “V” at the leaf’s edge.

Common leaf spot: I’m seeing less of this all the time - most of today’s common strawberry varieties have resistance. Spots are small (1/8 to 1/4 inch across), and develop white to gray centers, which may fall out.

Once you’ve figured out which disease(s) you have, how do you treat them? First, any cultural controls that improve air circulation will help greatly. Keep rows narrowed, and keep plantings weeded. As a general rule of thumb, Nova and Pristine work well on any of the above diseases except for angular leaf spot – just be sure to tank-mix or alternate chemistries, such as with Captan, as both are susceptible to resistance development. Captan or Captevate work quite well on leaf scorch, common leaf spot, and phomopsis leaf blight, but not powdery mildew or angular leaf spot. Copper helps with angular leaf spot, but phytotoxicity is a concern, so follow precautions on the package and discontinue use if phytotoxicity appears. For more info on these diseases and their biology, efficacy ratings, and management options, see the most recent version of the Mid-Atlantic Berry Guide [or 2013 New England Small Fruit Pest Management Guide]. (Source: *Pennsylvania Fruit Times* Vol. 28, No. 7)

RASPBERRIES/BLACKBERRIES

Management of Botrytis Gray Mold in Fall Raspberries

Annemiek Schilder, Michigan State University

Gray mold, caused by the fungus *Botrytis cinerea*, is one of the most important diseases affecting fall raspberries. Fall raspberries are usually at greater risk of infection than summer raspberries because of the prevailing weather conditions, such as lower temperatures, heavy dews and frequent precipitation. Cool, wet weather and heavy rains in the late summer and fall that keep the plants wet for extended periods are conducive to

development of the fungus and infection of the fruit. Typical symptoms include a brown discoloration of the fruit and the presence of a gray fuzzy mold, which can rapidly develop and spread to neighboring healthy berries. Symptoms tend to be more severe inside the canopy and on clusters that are closer to the ground. Even if berries look perfectly healthy at harvest, they can change to a moldy mass within 24 to 48 hours. To know how much

disease pressure you have and assess the efficacy of your spray program, pick 10 or 20 random ripe berries and place them in a covered dish on moist paper towel at room temperature. If berries stay 90 percent free of visible mold for three days, they are in good shape.

Botrytis cinerea is a ubiquitous fungus that is able to grow and sporulate profusely on dead organic matter. It overwinters in old infected canes and plant debris. The spores are airborne and can travel long distances on the wind. When the spores land on plant surfaces, they germinate and can invade the plant tissues directly or through wounds. Overripe berries and bruised berries are particularly susceptible to infection. Latent flower infections, even though they do occur, are not as important in raspberries as they are in strawberries.



Cultural methods are very important for control of Botrytis gray mold. Choosing a site with good air flow can reduce humidity in the canopy considerably. Low density plantings, narrow rows and trellising can also reduce a buildup of humidity. Good weed control and moderate fertilizer use to avoid lush growth are also important. Selecting a resistant cultivar or, at the minimum, avoiding highly susceptible cultivars will help to reduce the need for control measures. During picking, avoid handling infected berries, since spores can be transferred on hands to healthy berries. Timely harvesting

and rapid post-harvest cooling can also help to reduce losses to Botrytis gray mold.

Several fungicides are labeled for control of Botrytis in raspberries. Sprays close to harvest help to reduce postharvest rots. **Switch** (cyprodinil + fludioxonil) is a reduced-risk fungicide with excellent systemic and protectant activity against gray mold. It has a zero-day pre-harvest interval (PHI). Another good option is **Elevate** (fenhexamid), which is a reduced-risk, locally systemic fungicide with a zero-day PHI. Since these fungicides are in different chemical classes, they can be alternated for fungicide resistance management. My recommendation is to save Switch and Elevate for critical

sprays, e.g., during wet periods and for sprays closer to harvest. Other fungicides that may be used in the spray program are **Pristine** (pyraclostrobin + boscalid: zero-day PHI), **Captevate** (captan + fenhexamid: three-day PHI), **Captan** (captan: three-day PHI), **Rovral** (iprodione: zero-day PHI) and **Nova** (myclobutanil: zero-day PHI). To improve the efficacy of Rovral, an adjuvant should be added. Pristine and Nova also provide excellent control of late leaf rust, which sometimes infects the leaves and fruit of fall raspberries. (*Source: Michigan Fruit Crop Advisory Team Alert: Vol. 24, No. 16, August 25, 2009*)

Blackberry Disorders that Affect Fruit Quality

Kathy Demchak, Penn State University

Whitening of drupelets on the fruit, mainly on the upper surface of the fruit and on the side of the row which receives the most sun, is as you can guess, due to sun exposure. This problem is also frequently seen on red raspberries (example below) and may occur on both crops at the same time. It can occur whether temperatures are high or not and is often more noticeable following a



period of very clear days. There is no cure, and the problem clears up once weather conditions change.

Drupelet reddening, often only apparent after the fruit has been refrigerated, is

thought to be related to the fruit basically getting

"cooked" when it is on the plant close to harvest time. Apache seems to be especially prone to showing this symptom.

With both of the above physiological problems, drupelets remain full-sized and plump.

Insect feeding, such as from stinkbugs, damages drupelets and may cause their color to lighten. The damaged drupelets occur in a random pattern on the fruit, depending on where the insect stopped to feed, and often eventually collapse.



Anthracnose causes fruit to turn brown and possibly seedy in severe

cases, and some or all drupelets on a berry may be affected. If you suspect anthracnose on the fruit, also check the canes for anthracnose lesions and the leaves for spots – if you find numerous lesions, this is a clue that the fruit problem is caused by anthracnose. In severe cases, the cane lesions can cause cane death. If anthracnose lesions are present, fruiting canes should be pruned to the ground right after harvest, pruning stubs should be removed during dormant pruning, and fungicides (see the [Mid-Atlantic Berry Guide](#) [or New England Small Fruit Management Guide] for materials and timing) applied.

Other issues that affect water translocation can also cause fruit to dry up, including winter injury, mechanical damage, and other cane diseases such as *Gnomonia* stem canker which may essentially girdle the canes. If the fruit is drying up, the problem may actually be much lower on the plant. Finally, spotted wing drosophila egg-laying can damage drupelets and cause them to quickly collapse. Spotted wing drosophila numbers are on the rise, and blackberries are among their favorite foods, so be on the lookout. (*Source: Penn State Fruit Times, July 26, 2013*)

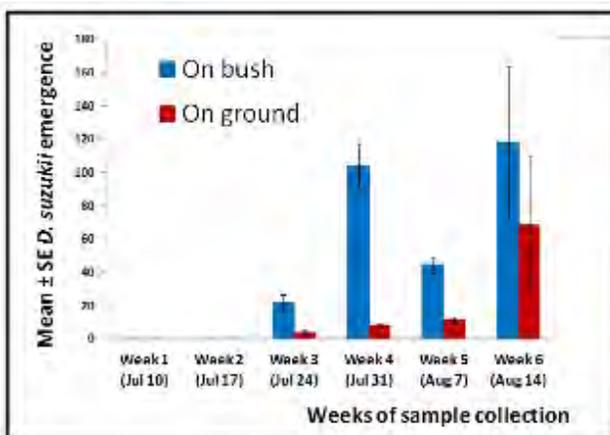
BLUEBERRY

What should I do About the Fallen Blueberries?

Cesar Rodriguez-Saona, Rutgers University

We know that not all fields are being harvested and growers are asking what to do about the blueberries remaining in these fields. Growers are concerned that these berries can become a source for spotted wing drosophila (SWD) oviposition, and thus possibly create a greater problem the following year. Firstly, I need to indicate that we do not know whether this statement is true, i.e., whether fruit remaining in fields will increase the likelihood of higher SWD populations the following year. It is clear that we need to know more about the overwintering biology, behavior, and survival of this fly in our region. One thing that we do know, based on studies we conducted last year, is that SWD will readily oviposit on fallen berries. Our data show that as the season progresses and the number of berries in bushes decreases and the number of berries on the ground increases, there is a likely shift in SWD preference towards those berries on the ground (see graph).

So, what can growers do to protect these berries from SWD? After harvest, we do not recommend use of insecticides in these fields. There are a couple of important reasons for this; first, it is expensive and we feel this is a waste of money because we do not know if applying insecticides after harvest has any benefits, and second, overuse of insecticides will increase the likelihood of resistant SWD populations. Alternatively, disking the row middles to bury infested berries may provide protection against SWD. Our research has shown that burying the fallen berries 5-10 cm (or 2-4 inches) below ground will likely decrease SWD emergence by 70-100%. Therefore, adoption of cultural control such as disking might be the most sustainable method to reduce SWD populations in blueberry fields that still have berries after harvest. For this, we suggest blowing the berries from the bushes, crowns, and tops of the rows into the row middles, and then disking these areas to bury the berries.



Our research shows that SWD emergence from berries on the ground increases as the season progresses (red bars).

[**Editor’s Note:** For growers with sod row middles, cultivating will not be practical. However, raking or blowing fallen fruit out from under the bushes may still be beneficial, especially if the fruit can then be crushed by driving over the ‘windrow’ with a garden tractor or mower. Each grower will have to assess the practicality of this step. In any case, do not allow grass or weeds to grow up within the crop row as this creates an even more hospitable environment for SWD to reproduce. Keep weeds and grass mowed within and between rows.]

(*Source: The Berry Bulletin, Vol. 24, No. 16, July 29, 2013*)

Evaluating Grape Samples for Ripeness

Joe Fiola, University of Maryland

It is critical to properly monitor and assess the fruit characteristics and maturity to make the appropriate management, harvesting, and winemaking decisions to produce the best quality grapes and wine possible. The last “Timely Viticulture” described how to take a proper sample that best represents the actual ripeness stage of the variety in that vineyard. The next step is set the priorities that will optimize fruit quality and give you the opportunity to make the best possible wine and then evaluate your sample based on that criterion.



- The critical principals here are that high quality wine is the confluence of fruit derived flavor and aroma components and for red grapes also the reduction of immature tannins.
 - These do not necessarily correspond to “desired” sugar and acid ranges.
 - The highest priority needs to be the quality and quantity of varietal aroma/flavor in the fruit.
 - Simply stated, to obtain a desired characteristic aroma or flavor in the wine, it must be present in the grapes at the time of harvest!
 - By regular, continuous sampling you will learn through experience the succession of aromas, flavors and textures that each variety goes through.
 - Depending on the degree of ripeness red grape characteristics can range from green and herbaceous to fruity and “jammy.”
 - Therefore the individual sampling must be diligent to monitor for that aroma and/or flavor in the sample.
 - The next highest priority, especially for red wines, is the texture of the grape tannins in skin and the seed.
 - These quality and quantity of the tannins determine the structure, body, astringency, bitterness, dryness, and color intensity of the wine. Mature tannins are critical to the production of quality red wines.
- The degree of ripeness and polymerization of the tannins will determine the astringency and mouth feel of your wine.
 - *This can range from the undesirable, hard and coarse tannins of immature grapes, through to the desirable, “supple and silky” profile of mature grapes.*
 - Procedure:
 - Select a few random grapes and place them in your mouth. DO NOT look at the cluster when you are choosing the grapes because you will tend to pick more ripened berries.
 - Without macerating the skins, gently press the juice out of the berries and assess the juice for sweetness (front of tongue) and acid (back sides of your tongue). With experience (and comparison against numbers from lab samples) you will be able to reasonably guesstimate the Brix and TA level of the grapes.
 - Next gently separate the seeds from the skins and “spit” into your hand. The color of the seeds gives you a clue to the level of ripeness. Green seeds are immature, green to tan and tan to brown seeds are maturing, and brown seeds are mature. Ripe seed tannins are desirable as they are less easily extracted and more supple on the palette.
 - Finally macerate the remaining skins and press them in your cheeks to assess the ripeness of the skin tannins. You will be able to “feel” the astringency (pucker) of the skins. The less intense the astringency the more ripe the grapes.
 - *A good way to practice is to first sample an early grape variety such as Merlot and then immediately go to a later variety such as Cab Sauvignon, and you will feel the difference in the acidity, astringency and ripeness.*
 - Of course, other factors must still be considered, such as the total acidity and pH
 - Generally you would like to harvest white grapes in the 3.2-3.4 pH range and reds in the 3.4-3.5 range, as long as the varietal character is appropriate as described above. Remember the enologist can do a good job adjusting acidity but it is almost impossible to increase variety character in the wine.
 - Brix or sugar level is good to follow on a “relative” scale but levels can greatly vary from vintage to vintage.

- In some years the grapes will be ripe and have great varietal character at 20 Brix and another year they may still not have ripe varietal character at 23 Brix.
- Disease/Rot - Monitor to see if the grapes are deteriorating do to fruit rots or berry softening.
- Look at the short and long range forecast.

- If it looks good and the grapes have the ability to ripen further, then there may be a benefit to letting them hang a bit longer.

- If the tropical storm is on the way.....

- When grapes are close to optimal ripeness, it is more desirable to harvest before a significant rainfall than to wait until after the rain and allow them to build up the sugar again afterwards. (*Source: Univ. of Maryland Timely Viticulture Series; Pre Harvest*)

Foliar Testing for Assessing Vineyard Nutrition

Diane Brown, Michigan State University Extension

There is a poor relationship between soil and plant nutrient levels. In general, foliar analysis is more reliable than a soil test for judging the nutrient status of the vine. The best option is to test both the soil and the petioles and compare results to determine not only the nutrient levels in the soil, but how they are being utilized by the vines. Petiole testing can actually save growers money by allowing the application of fertilizers according to how

they are utilized by the plant, instead of according to levels present in the soil.

We will soon be at veraison, which is considered to be the most accurate time of year for assessing grapevine nutrient status. Detailed information classifying the element levels in grape petioles (deficient, below normal, normal, above normal and excessive) can be found in Table 1 below.

Table 1. Specific element recommendations for grapes from petioles.

Element*	Deficient	Below normal	normal	Above normal	Excessive
Nitrogen %	0.3-0.7	0.7-0.9	0.9-1.3	1.4-2.0	2.1+
Phosphorus %	0.12	0.13-0.15	0.16-0.29	0.30-0.50	0.51+
Potassium%	0.5-1.0	1.1-1.4	1.5-2.5	2.6-4.5	4.6+
Calcium %	0.5-0.8	0.8-1.1	1.2-1.8	1.9-3.0	3.1+
Magnesium %	0.14	0.15-0.25	0.26-0.45	0.46-0.80	0.81+
Manganese (ppm)	10-24	25-30	31-150	150-700	700+
Iron (ppm)	10-20	21-30	31-50	51-200	200+
Boron (ppm)	14-19	20-25	25-50	51-100	100+
Copper (ppm)	0-2	3-4	5-15	15-30	31+
Zinc (ppm)	0-15	16-29	30-50	51-80	80+

**Values may differ among species for optimal growth. Values from leaves will vary significantly. For petioles taken between July 15th to August 15th. Source: Fertilizing Fruit Crops, Ohio State University Extension; bulletin 458*

The [University of Minnesota](#) (UMN) has a good factsheet on how to do petiole sampling in vineyards as well. Here are some suggestions from both Cornell and UMN on how to do it right. Tissue analysis should begin once the vine starts producing (usually the third year) and be repeated yearly until the yields stabilize and fertilizer needs are determined. Mature vines can be sampled every 2 to 3 years. A single sample should represent no more than 5 acres. Make note of previous cropping levels.

For samples collected at veraison, select petioles from the most recently developed mature leaf.

For each sample, use 25-50 typical vines.

Be consistent. For routine sampling, collect samples at the same growth stage each year- either bloom or early veraison.

Vines should be of the same age, variety and rootstock, growing on a relatively uniform soil of the same fertility. If these conditions are not met, divide the vineyard into uniform blocks and sample separately.

Monitor the same areas in specific vineyards or blocks each year. Flag specific rows within a block and revisit them yearly.

Collect 60 to 100 petioles from 2 to 3 leaves on the vine. Don't pick more than one leaf per shoot. Keep the petiole-discard the leaf blade.

Don't collect leaves for sampling if they have disease, insect or mechanical damage.

[Cornell University](#) has a short YouTube video about how to collect petiole samples from vineyards and prepare

them for the testing lab. [View the video](http://www.youtube.com/watch?v=5gAp9gw14rs) on YouTube at <http://www.youtube.com/watch?v=5gAp9gw14rs>.

Here are some of the recommendations from the video: Detach each petiole from the leaf blade immediately after picking and place in a paper bag. Label each sample and keep your own record of the following: varieties sampled; vineyard block where the samples are collected; sampling date; and conditions of vineyard. Before sending samples in for testing, allow them to dry at room temperature in a well-ventilated place until they are crisp. The petioles can be washed to remove spray residue and dust if they are dirty. Dip them in a weak detergent solution (2-3 cups of

deionized water with a couple of drops of Tide, etc.) for one minute or less, then rinse with clean water one minute or less. Blot dry with paper towels or a clean dish towel and place them loosely in a paper bag to dry.

References:

[Petiole Analysis as a Guide to Grape Vineyard Fertilization](#) Dr. Carl Rosen, Professor, Department of Soil, Water and Climate, University of Minnesota.

[Lake Erie Regional Grape Program, Vine Nutrition and Soils.](#)

(Source: Michigan Fruit Crop Advisory, Aug. 13, 2013)

GENERAL INFORMATION

Food Safety Modernization Act – Comment Period Extended Until Nov. 15!

Lisa McKeag, UMass Extension

In January 2011, the Food Safety Modernization Act (FSMA), a sweeping piece of legislation meant to regulate our agricultural production system to prevent produce-borne contamination was signed into law. The law gives the Food and Drug Administration (FDA) authority to enforce the law’s proposed rules. The Produce Safety Rule applies to farms where produce is grown; the Preventative Control Rule applies to facilities where this food is processed.

The FDA is inviting the public to comment on these proposed rules through November 15. It is essential to the health of the New England agricultural economy that those who will be affected by this new legislation become familiar with how these rules will impact them, and tell the FDA their stories. An overview of the proposed rules, as prepared by the New England Farmers Union, is provided in the table (see below).

The New England Farmers Union has a number of concerns about how the requirements of the law, though nobly aimed at ensuring consumer safety, might be unnecessarily difficult and costly to comply with and unfairly burdensome to the smaller-scale operations that now thrive in this region.

There are many ambiguities within the law as it is written, some with respect to defining ownership that could affect farm cooperatives or shared storage facilities. Certain record keeping, water testing, and compost handling and application requirements seem onerous.

Please visit the NE Farmers Union’s website at <http://www.newenglandfarmersunion.org/food-safety-modernization-act/> to learn more about how FMSA will impact New England’s agricultural businesses. This site provides overviews of both the Produce Safety and Preventative Controls rules. You will also find many suggestions for comments that need to be addressed to the FDA, as well as how to submit your comments electronically or by mail. Consider how these concerns might affect you, and provide your feedback to the FDA during the open comment period.

	Produce Safety Rule: Reduce risk of microbial contamination in raw produce	Preventive Controls Rule: Reduce microbial contamination from food processing
What the rule applies to:	This rule applies to farms that grow, harvest, pack or hold produce that is generally consumed raw. The rules do not apply to produce rarely consumed raw (potatoes, pumpkins, sweet corn), and it does not apply to produce that is grown for personal or on-farm consumption.	This rule applies to facilities that manufacture, process, pack, or hold human food, and to operations that buy and resell products grown on other farms. Will apply to farms that peel, chop, or combine ingredients, and those that buy and resell products from another farm.
What the rule requires:	Farms must comply with minimum standards related to the use of agricultural irrigation and wash water; biological soil amendments; worker training and health and hygiene; field intrusion by domesticated and wild animals; equipment, tools and buildings; and staff.	Facilities must register with the federal government and are required to write and implement a food safety plan that identifies hazards, preventive controls, and monitoring procedures. Operations must comply with current Good Manufacturing Practices.
Who is exempt from the rule:	<ul style="list-style-type: none"> Farms that sell less than \$25,000 of food per year (all food sold for human or animal consumption) are exempt. Farms that sell less than \$500,000 of food per year (all food sold for human or animal consumption) and that also have over half of their sales direct to “qualified end users” have a qualified exemption. Qualified end users are consumers, restaurants and grocery stores within 275 miles of the farm. 	<ul style="list-style-type: none"> Farms that only grow, wash and trim off outer leaves, and sell only their own products are exempt. Farms that have total food sales* of less than \$500,000 and who sell directly to consumers, restaurants and grocery stores within 275 miles of the farm, must be in compliance with local and state food safety regulations or use preventive controls. These farms must notify their customers. Certain very small business and low-risk activities are also exempt.

For the full text of the law, fact sheets, and more information visit the US Food and Drug Administration’s FSMA website at <http://www.fda.gov/Food/GuidanceRegulation/FSMA/default.htm>.

And to get it from the horse's mouth, attend the upcoming listening session in Hadley, where representatives of the FDA will be present to answer your questions and get your feedback. It will take place at Plainville Farm, 135 Mount Warner Rd., Hadley, MA on Thursday, August 22 from 1:00 to 2:30 pm. There will also be sessions on Aug. 19 at the Augusta, Maine State Armory from 9:30 am to 12:30 pm and in Hanover, NH on Aug. 20 in the Alumni Hall Auditorium at the Hopkins Center at Dartmouth College from 9:30 am to 12:30 pm. (Source: *UMass Vegetable Notes*. Vol 25, No. 17. Aug. 15, 2013 with source material from *New England Farmers Union*).

Late Summer Cover Crops

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adapted from work by R. Hazzard & F. Mangan, UMass; Vern Grubinger, UVM and Thomas Bjorkman, CU. Resources: *Managing Cover Crops Profitably*, 3rd edition, published by Sustainable Agriculture Network; *New England Vegetable Management Guide* (www.nevegetable.org).

A well-established late season cover crop increases organic matter, improves soil structure, scavenges remaining nutrients, chokes out weeds, and prevents soil erosion. Grains and grasses can provide all of these functions and legumes can add additional nitrogen. Each has strengths and weaknesses. Below is a list of several good choices, depending on your specific goals and field conditions.

Grasses can return a significant portion of organic matter and other nutrients to the soil if planted after removal of a seasonal crop and given enough time to mature. Kill grasses before maturity in the spring or mix with a legume to reduce the C:N ratio and supply more nitrogen for the following year's crop.

Winter or Cereal Rye (*Secale cereale*) is the most common cover crop used by growers in Massachusetts. It is inexpensive, easy to get and to establish, and can be seeded until 2 weeks before a killing frost. However, it is best planted before September 15th in order to recover the available N from soil and to produce enough canopy to protect soil from erosion and outcompete weeds. It consistently overwinters here and will continue to grow in the spring, producing up to 7,000 lbs/A of biomass contributing to soil organic matter. It should be seeded with a legume to keep the C:N ratio low making more N available in the spring. Some growers are hesitant to use this cover crop because of the longer decomposition rate and allelopathy against spring seeded crops. *Seeding rate: 90-120 lbs/A broadcast; 60-120 lbs/A drilled; 50-60 lbs/A mixed with a legume.

Annual or Italian Ryegrass (*Lolium multiflorum*) and Perennial Ryegrass (*Lolium perenne*) are used by some growers because of the dense root system that outcompetes weeds and protects against erosion. Annual ryegrass can tolerate some flooding while perennial ryegrass is more cold hardy. Both are shade tolerant. These cover crops should be planted at least 40 days before the fall frost date. The seed is small

and light, so specialized equipment will be needed if seeding a large area. Seeding rate: 20-30 lbs/A broadcast; 10-20 lbs/A drilled; 8-15 lbs/A mixed with a legume.

Oats (*Avena sativa*) can be seeded in the late summer, will come up quickly, and are best planted before September 15th similar to winter rye. Unlike winter rye, oats will winterkill in Massachusetts, making for simpler field preparation in the spring, however, with less organic matter contribution. To maximize nitrogen carry-over to the following crop, mix with a legume that will overwinter such as hairy vetch. Seeding rate: 110 – 140 lbs/A broadcast; 80-110 lbs/A drilled; 60-90 lbs/A mixed with a legume.

Winter Wheat (*Triticum aestivum*) is increasingly being used as a cereal grain and as a cover crop. It is winter hardy, but does not grow as tall or mature as quickly as rye so there is no rush to kill it in early spring and risk compacting wet soils. Wheat is excellent for erosion control, scavenging N, P and K, building soil organic matter and improving tilth. Plant it in late summer to early fall; before September 15th. Best growth will be in well-drained soils with moderate fertility. Rye is a better choice on wet soils. Wheat works well as a nurse crop for legumes such as hairy vetch or clover. Seeding rate: 90-160 lbs/A broadcast; 60-120 lbs/A drilled; 60-90 lbs/A mixed with a legume.

Legumes are a good choice if you are interested in adding nitrogen to the soil, however, it is important to inoculate seed before planting with the appropriate root nodulating bacteria that will fix nitrogen from the air. Some growers use coca cola or sugar water to help the inoculum stick to the seed and plant while still wet to keep the bacteria alive. Bacterial inoculants are specific to certain legumes and therefore must be used with the correct plant groups in order to establish. Inoculum groups are: 1) red and white clovers, 2) crimson and berseem clovers, 3) alfalfa and sweet clover, 4) pea, vetch and lentils, 5) annual medics, 6) cowpea and

lespedeza. If well managed, legume cover crops can provide as much as 100 to 150 lbs nitrogen per acre to the following crop.

Hairy Vetch (*Vicia villosa*) usually benefits from being grown with a nurse crop such as rye, oats or wheat to help reduce matting during spring and to keep weeds down. Both the vetch and the grain can be mixed together in the seed drill. In the spring, vetch is incorporated at early bloom, typically in late May. With a good flail mower, vetch can be used in a deep zone tillage system without matting and tangling in the equipment. Seeding Rate: 25-40 lbs/A broadcast; 15-40 lbs/A drilled, 15-20 lbs/A mixed with a grass.

Red Clover (*Trifolium pratense*) is a short-lived perennial that is somewhat tolerant of soil acidity or poor drainage. Mammoth red clover produces more biomass for plow-down than medium red clover, but does not regrow as well after mowing. Mammoth will often establish better than medium in dry or acid soils. Sow in early spring or late summer. Red Clover can be undersown in mid-summer into corn or winter squash before it vines and other crops if soil moisture is plentiful. Seeding rate: 10-15 lbs/A broadcast; 6-15 lbs/A drilled; 6-10 lbs/A mixed with a grass.

White Clover (*Trifolium repens*) is a low-growing perennial, tolerant of shade, moisture and slightly acid soil. Ladino types are taller and live longer than the Dutch or New Zealand types. The clovers do not compete well with weeds unless mowed to improve lateral growth and establishment. Thus, they are suitable for use in mowed walkways or alleys. Seed tends to be expensive, although stands can last for many years, especially if mowed or grazed, since the laterally- growing stolons continue to root. Seeding rate: 7-14 lbs/A broadcast; 10-12 lbs/acre drilled; 2-6 lbs/A in a mix.

Sweet clover (*Melilotus officinalis*) is a biennial crop, except for the annual types called Hubam. It is deep-rooted and adapted to a wide range of soils and thus is a good soil-improving crop, as a provider of free N and “biological subsoiling”. Yellow Sweet clover is earlier maturing and somewhat less productive than white Sweet clover. Sow before August 30th for best results. Heavy growth is produced in spring after overwintering. The tall, lush growth may be difficult to incorporate without proper equipment. This should be done in latespring, or by mid-summer at flowering since growth will cease after that. Seeding rate: 20-30 lbs/A broadcast; 10-20 lbs/A drilled; 6-10 lbs/A in a mix.

Other species may be used as cover crops in disease management or in the case of the forage radish, for improving water drainage and soil structure.

Radish (*Raphanus sativus*), known as Daikon, tillage, forage or oilseed are also appropriate biological subsoilers, often producing 8-14 inch tap roots. With its deep roots, this crop can recover N, P, S, Ca and B for the following season, but must be planted into a crop early in the spring or else these nutrients are lost through fast decomposition and the deep root holes. This cover crop can be planted 4-10 weeks before a killing frost and typically winterkills in December or January. It can be used as animal forage. Seeding rate: 10-13 lbs/A broadcast; 7-10lbs/A drilled.

Brown Mustard (*Brassica juncea*) found in many of the ‘Caliente’ seed mixes is a biofumigant planted to combat root knot nematode and a variety of soil-borne fungal pathogens. It is also allelopathic against weeds. Do not plant this cover crop in rotation with any brassica crops. If allowed to flower, this crop is highly attractive to honey bees. Plant this in late August through September. Other brassica cover crops include Rapeseed or Canola and Turnips, which are often used as livestock forage. Mustards should not be planted following any brassica crops since they are in the same family. Seeding rate: 10-15lbs/A broadcast; 5-12 lbs/A drilled.

Keep in mind it is always best to plant a cover crop as leaving a field bare over winter is very damaging to soil structure, increasing erosion and reducing long term fertility. Though it may take several growing seasons or a lifetime to perfect the art of cover cropping, your soil will thank you.

Cover Crop Resources:

- 1) [A Comprehensive Guide to Cover Crop Species used in the Northeast United States.](http://www.plant-materials.nrcs.usda.gov/pubs/nypmcpu10645.pdf) <http://www.plant-materials.nrcs.usda.gov/pubs/nypmcpu10645.pdf> prepared by: Shawna Clark.
- 2) [Managing Cover Crops Profitably:](http://www.soilandhealth.org/03sov/0302hsted/covercropsbook.pdf) <http://www.soilandhealth.org/03sov/0302hsted/covercropsbook.pdf> 3rd ed. Published by the Sustainable Agriculture Network, Beltsville, MD.
- 3) [Cover Crop Plant Guides prepared for the USDA by: NRCS, RMA and FSA.](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantanimals/plants/projects/%3Fcid%3Dstelprdb1077238/) <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantanimals/plants/projects/%3Fcid%3Dstelprdb1077238/>

* Note: seeding rate recommendations may vary with regional differences.

(Source: UMass Veg Notes, Vol. 24, No. 16. August 8, 2013)

UPCOMING MEETINGS:

Aug. 22, 2013 – *Food Safety Modernization Act Listening Session*. 1:00-2:30PM. Plainville Farm, 135 Mt. Warner Rd. Hadley, MA. FDA has scheduled several listening sessions to hear directly from New England farmers about the potential impacts of the proposed regulation on the farms and farm families in the region. Background on the law and proposed regulations can be found at <http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm247546.htm>.

These regulations could have a major impact on the growing success of agriculture in Massachusetts. Please consider sharing your thoughts with FDA.

Written comments on the proposed regulations are due November 15, 2013. Please check out the MA Farm Bureau web site www.mfbf.net for details on major issues, sample comments, and how to submit your comments to FDA.



Aug. 22-23, 2013 – *New Grower/New Winery Workshop*. NY State Ag Experiment Station, 630 W. North St., Geneva, NY. For more information or to register, go to <http://nysaes-bookstore.myshopify.com/collections/nysaes-meetings/products/new-grower-winery-workshop>.

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*. See <http://extension.unh.edu/events/files/B5529313-97BC-074B-A29466DB96DE5E82.pdf> for more information.

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

December 17-19, 2013 – *New England Vegetable & Fruit Conference*. Radisson Hotel, 700 Elm St., Manchester NH. Registration is not available yet, but mark your calendars and look for more information soon.

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