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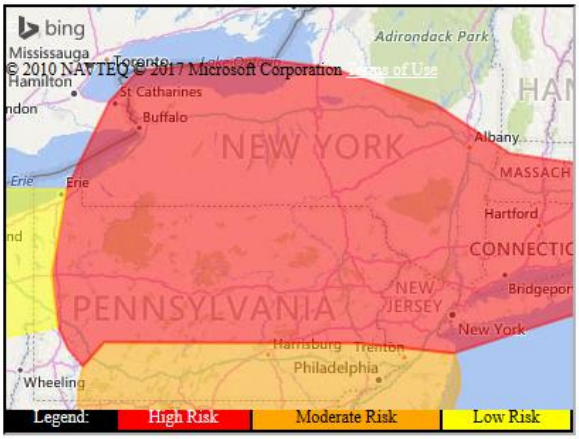
Cucurbit Downy Mildew Update

Charles Bornt–ENYCHP

Cucurbit Downy Mildew Update: As expected we found Cucurbit Downy Mildew this week in Ulster County on cucumbers and what great weather this week has been for CDM to move and establish itself! Remember that CDM likes it cool and needs moisture, usually rain or dew to help it spread. The report early this week from the CDM forecasting site is:

Overview: Epidemic spread likely in parts of the Northeast and South. Transport events encounter a variety of conditions. Toward the northern areas, more favorable weather will give way to only slightly favorable conditions on Tuesday. In the southern U.S., risks are quite elevated in portions of the deep South states and near the south-Atlantic coast, with slightly favorable to mixed conditions farther inland.

Risk prediction map for Day 1: Monday, July 24



Be sure to maintain your CDM fungicide program on a 7 day schedule. Please see the table of products on page 2 to review and refresh your memory. Several products have been added, including two new organic materials: Timorex Gold and Zonix Biofungicide. Both of these labels can be accessed by clicking on the product name.

Monday, July 24: HIGH Risk for cucurbits in central and southern MS, AL, central and southern GA, the FL panhandle, northern FL, central and eastern SC, southeast NC, northern and central PA, central and southern NY, northern NJ, Long Island, and southern New England. Moderate Risk southern PA, southern NJ, northern MD, northern DE, and central and

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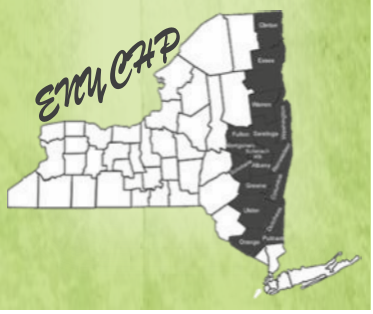

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Table 1: Fungicides labeled for Downy Mildew Control in cucurbits.

Fungicide	FRAC Code	Recommended Rate/Acre	REI	PHI	Seasonal Limits	Adjuvant Recommendations/Notes
Omega 500 F	29	0.75 – 1.0 pints	12 hours	**30 days**	9 pints/a/ season	Cantaloupe and watermelon only. **Please note the PHI!**
Ranman[1, 2]	21	2.75 fluid ounces	12 hours	0 days	6 sprays	Organosilicone or non-ionic surfactant
Zampro[1, 2]	40 + 45	14 fluid ounces	12 hours	0 days	3 sprays	
Revus[1,3]	40	8 fl ounces	12 hours	0 days	4 sprays	spreading/penetrating type adjuvant
Tanos[1, 2]	27 + 11	8 ounces	12 hours	3 days	4 sprays	
Zing!	22 + M	36 fluid ounces	12 hours	0 days	8 sprays	
Curzate[1,4]	27	3.2 ounces	12 hours	3 days	9 sprays	
Phostrol, ProPhyt, Fosphite or other phosphorus acid containing products	33	2.5-5.0 pints (vary depending on product used)	4 hours	0 days	7 sprays	
Organic fungicides labeled for Downy Mildew Control in cucurbits.						
Copper—Various formulations please see labels for more information						
Timorex Gold	NA	See label	24 hours	See comment	NA	Do not apply Timorex Gold within 48 hours of harvest
Zonix Biofungicide	NA	300-500 ppm (see label)	4 hours	0 days	NA	Use on a 5 day schedule. Can be mixed with copper.
Double Nickel 55 Biofungicide	NA	.25—3.0 lbs	4 hours	0 days	NA	Use 0.25 –1.0 lb under low disease pressure and 1.0—3.0 under higher disease pressure.
Regalia Biofungicide	NA	1—4 quarts	4 hours	0 days	NA	
Serenade ASO Bacillus subtilis str QST 713)	NA	2—6 quarts	4 hours	0 days	NA	
Actinovate AG (Streptomyces lydicus WYEC 108)	NA	3 –12 fluid ounces	1 hour or until dry	0 days	NA	

[1] Should mix with a protectant partner such as chlorothalonil.
[2] Also labeled for Phytophthora blight.
[3] Not recommended for cucumber as it has demonstrated reduced efficacy – therefore recommended for pumpkins, squash and gourds.
[4] Has a short residual of 3 days so it needs to either be tank mixed with another systemic plus protectant or another application of a different material should be made 3 – 5 days later. Reports also indicate less effective under hot conditions (80^{O}F). Does have some curative action so best used when CDM is first detected.
None of the above fungicides will control Powdery Mildew.

Stink Bugs Damaging Tomatoes

Teresa Rusinek, ENYCHP

This past week I observed tomato plantings with stink bugs and damage. Check your fields; you don't want to be surprised by the damage when you go to pick fruit. Tomatoes are not the only crops they go after: beans and peppers, especially Jalapeno are some other stink bug favorites. Stink bug populations and damage is often higher in weedy fields and field edges. Stink bugs happily feed on weeds until the weeds get old and dry, then they'll move into cultivated crops. On tomato, I've seen feeding damage on both ripe and green fruit. The damage appears as a pin prick surrounded by a cloudy irregularly shaped spot. Spots may coalesce when feeding is heavy. Spots tend to be yellowish to green on ripe fruit and whitish on green fruit. Below the surface, the flesh of the tomato will turn whitish and have a spongy texture. The stink bug damages the fruit when it inserts its needlelike proboscis into the fruit to feed on the sap. The feeding may also introduce pathogens into the fruit that can cause decay. We have several types of stink bugs in New York. The Brown Marmorated stink bug has gotten a lot of press in the past few years because it an invasive, originally from Asia, but we also have green and brown stink bugs. A number of pyrethriod insecticides are labeled for control, but be aware of toxicity to bees. Organic controls for stink bugs are limited to labeled Neem and Pyrethrum products. Keeping weeds around fields mowed will help discourage stink bugs. Scout along field edges and wooded edges for first signs of damage. For more info and management recommendations see the Cornell Veg Management Guidelines.

Top: Yellow cloudy spots caused by Stink bug feeding. **Bottom:** Brown Marmorated Stink Bug Nymphs (immatures) Feeding on Jalapeno. Photos: T.Rusinek

Bacterial Spot on Pepper

Crystal Stewart and Teresa Rusinek, ENYCHP

We are seeing fairly severe bacterial spot on peppers this year, and the hot and stormy weather that we are currently experiencing will certainly contribute to further spread. This is the same disease that affects tomatoes and can be treated in the same way—copper treatments to kill bacteria which land on unaffected tissue, not handling plants when they are wet, and working with infected varieties *after* working with clean plants. Bacterial diseases can come in on seed and then spread to uninfected plants in the greenhouse and through handling any time during the season. In the field, bacterial diseases often spread from one plant to another by splashing rain and wind. If you are staking your peppers, you can also bring in bacterial diseases from last year on infected wood, so make sure you are sanitizing your stakes for all crops. If you have bacterial diseases on your peppers, you can slow the spread on the plant and between plants with copper sprays. Copper is a protectant, so will need to be sprayed whenever plants are at risk. Generally this means spraying between each rain. Some studies show that resistance inducing Fungicides, also know as "plant activators," such as Actigard (not allowed in organic production) or LifeGard (OMRI approved) are effective in reducing occurrence and severity of bacterial infection. They need to be applied preventatively on a precise schedule and rate. Symptoms on the leaves and fruits can be found below. Even when fruit are quite small, tiny, dark raised lesions can begin to appear. Fruit with these lesions will continue to deteriorate, culminating in scabby bumps and often secondary soft rots.

If you are dealing with bacterial issues this year, it is important to start thinking about how to avoid a problem in the future. If growing your own transplants, change seed source or plan to treat seed with hot water, and sterilize every surface of the greenhouse prior to the next season. Do not reuse trays. Note which varieties have

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Left: Bacterial spot lesions on the lower leaves of peppers **Right:** Raised bacterial lesions on pepper fruit.

bacterial issues this year. Different varieties of peppers are more or less susceptible to bacterial spot, though all infected plants seem to end up with lesions on the fruit which render them unmarketable. Either change transplant sources if purchasing plants or talk to your source to make sure they use good sanitation practices and clean seed. A minimum of a two year rotation away from pepper and tomato is recommended.

Tomato Hornworms are Here! (Check your Peppers Too)

Amy Ivy, ENYCHP

Tomato hornworms are usually not considered an economically important pest in field tomatoes, but they certainly thrive and cause damage in high tunnels. For something so large, they sure are hard to find and their damage seems to appear overnight. One day your plants look fine and pest free, but the next day several leaves can be devoured down to the mid-rib and/or unripe tomato fruit can be chewed. Under the protection of a high tunnel without predators other than humans, hornworms can wreak considerable havoc in no time.

They can feed on any member of the nightshade family, but tomatoes are their favorite. We are doing a trial on cherry tomatoes and peppers in the Cornell Willsboro Research Farm tunnel this year and I can say first hand that hornworms like peppers too. As I mentioned, they can be hard to find even when you're looking right where the damage occurred. The first clue is their droppings. They are black or dark green and about the size of peppercorns. If they are shiny, the culprit is close by. If they are dry and crumbling, the hornworm has probably moved on. Once you find some droppings, look at the undersides of leaves just above. Hornworms prefer the newer growth and they are usually lying on the underside or back of the leaf, right along the main vein or leaf petiole. They are very good at 'hiding in plain sight.'

There may not be too many, so a thorough job of hand-picking can be enough to reduce the damage. We found over twenty in the research tunnel in one morning which is more than we can tolerate. If you decide you need to spray there are a few options for high tunnels. Conventional growers can use Baythroid (0D PHI) or Lannate (1D PHI). Organic options include Entrust and labeled Bt formulations, although Bt is only effective on the young caterpillars.

Onion Update

Ethan Grundberg, ENYCHP

As the early transplanted onion varieties near maturity on the black dirt, here are some observations from the growing season so far.

Seeders: Early transplanted onions grown from plants shipped in from the South are showing higher-than-average number of bolted onions. Bolting in onions is triggered by low temperatures following a period of high temperatures. So, given how hot it was in the south when plants were being grown this winter followed by the extended cold wet weather this spring in New York, it created the perfect environmental conditions for bolting. Bolted onions will not store well, so should be either field cut and sold first or culled before harvest.

Tip burn on field with severe pink root. Stemphylium leaf blight is also appearing on dead leaf tissue.

Tip Burn: Tip burn, or tip dieback, can be caused by a number of different factors. The fields where tip burn is most severe this year seem to be those with the most severe presence of pink root (*Phoma terrestris*), especially where infected plants were used. Since pink root affects the ability of the plant to take up water and nutrients, the tip burn is more a symptom of nutrient and water deficiency rather than the pink root itself. Tip dieback can be caused by insufficient uptake of calcium, boron, and/or molybdenum. Many growers are successfully using foliar calcium fertilizers early in the season to try to reduce later season tip burn; however, this strategy is ineffective once symptoms have already developed. Just like with blossom end rot in tomatoes and tip burn in lettuce, what shows up on a soil test for calcium and other nutrients may not reflect what is actually being taken up by the plant. The best way to get a sense of what, if any, micronutrient foliar fertilizer should be used is by submitting tissue samples for analysis during the growing season. In general, though, avoid using foliar fertilizers with high nitrogen content once onions are close to lodging.

Thrips: The cooler wet weather has meant lower thrips populations for most growers. There were some hot spots around the valley, especially last week during the hot weather that coincided with some small grain and hay harvest, but most scouted fields have been under the 1 thrips per leaf action threshold. Since Movento does not control adult thrips, it is not advisable for use this late in the season. A few growers are experimenting with Minecto Pro (IRAC groups 28 + 6) this year both on the black dirt and on the Elba Muck. Field experiences seem to be confirming what Dr. Brian Nault has found in his trials; Minecto Pro has similar knock down ability to Radiant along with 10-14 day systemic residual activity for nymphs. However, it is important to note that Minecto Pro contains the same active ingredients as Agri-Mek (abamectin) and Exirel (cyantraniliprole), so growers must make sure to avoid exceeding maximum annual application rates of those active ingredients.

Pink root on seeded onions

Foliar Diseases: Stemphylium leaf blight (SLB) continues to be the most widespread foliar disease on onions in Orange County. The fungal disease takes advantage of physical wounds in onion leaves (caused by thrips feeding, hail and rain damage, herbicide injury, and/or tip burn), then spreads across the leaf surface. As mentioned in earlier newsletters, FRAC groups 3 and 7 have demonstrated best efficacy at managing SLB in Christy Hoepting's field trials. Botrytis leaf blight has been severe in some fields, but growers have been mostly successful at keeping it in check with early

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applications of Bravo (FRAC group M5) followed by Rovral (FRAC group E3) in tank mixes and/or rotated with Luna Tranquility (FRAC groups 7+9). For the full list of fungicide field trial results from the Elba Muck, see the 2017 Cornell Onion Fungicide "Cheat Sheet" at https://rvpadmin.cce.cornell.edu/uploads/doc_583.pdf. Since most of the most effective fungicides for managing SLB have labeled rotation restrictions, it is worth spending the time to map out your spray sequence for the remainder of the season to make sure you always have a FRAC group 3 or 7 active ingredient in the tank for SLB control.

Bacterial Bulb Rot: I have seen very few foliar signs of bacterial bulb rot in the field, but there is still plenty of time for infection to occur. As mentioned in a previous newsletter, Crop Production Services is now carrying the 12.5% SURCHLOR sodium hypochlorite (pool chlorine) formulation with a FIFRA 24(c) Special Local Needs label for managing bacterial decay of onions. We are, however, still conducting field trials with grower-participants to better understand tank compatibility and pH effects on tank mixes when using sodium hypochlorite. Other options for managing bacteria on onions include labeled copper formulations and OxiDate 2.0. Some growers in the region are trialing PERpose Plus (Hydrogen Peroxide) in place of OxiDate for managing bacterial pathogens on a number of crops. PERpose Plus does NOT contain peroxyacetic acid; some studies have shown that there is less risk of foliar burn from repeated applications compared to products that combine hydrogen peroxide with the peroycacetic acid.

Bacterial bulb rot in seeded onion

Follow-up to Fertigating Vegetables

Charles Bornt, ENYCHP

Last week we gave you some complicated math to determine the correct amount of fertilizer to be applying to your vegetables through the drip system or what is commonly referred to as "fertigation". After reading that, many of you might have been wondering how do I know I need to fertigate my vegetables and after thinking about it, I had a couple thoughts.

First of all, with all the rain this year I suspect that some of the fertility that was put down pre-plant has probably either leached (nitrogen and potassium in particular) or is moved far enough in the soil profile that the roots haven't gotten down to it yet. However, if you're using plastic mulches, the good news is that the likelihood of fertilizer leaching under the plastic is pretty slim. Second, one thing that I have been trying to get more growers to do during the growing season to help make fertility decisions is taking a foliar sample and sending it to a reputable lab. These results are helpful in taking a "snapshot" at that particular time to see what is happening. It's another tool to use and should be done on a routine basis. For most crops, there are established levels of key nutrients that are required for optimum productivity and these foliar tests can give you an idea if your plants are sufficient or lacking fertility. With that said, there are many factors that can influence the nutrient levels in your plants such as the stage of the plant (vegetative vs. fruiting), to much or too little rain, poor growing conditions because of weeds or pest pressure or even just sampling too late in the day! Again, these tests offer a quick snapshot in time of the nutrient levels in your plants.

Two of the most commonly tested nutrients are nitrogen and potassium. Nitrogen is responsible for plant growth and potassium is mostly associated with plant growth, but also flavor and storability or shelf life of vegetables. Table B11 below comes from the 2016-2017 Mid-Atlantic Commercial Vegetable Production Recommendations (http://extension.udel.edu/ag/vegetable-fruit-resources/commercial-vegetable-production-recommendations/) and is a great resource to use if you are doing or considering doing foliar sampling. As stated above, nitrogen and potassium are the two most commonly tested nutrients, but foliar samples are also great for helping to diagnose micronutrient issues like manganese or boron deficiencies (or sometimes toxicities). Most labs will provide you with recommendations, but if they don't this table can give you an idea of where your crop is nutrient level wise depending on the growth stage of the plant. One lab that I use frequently is Waters Agricultural Laboratories, Inc. They also have similar tables on their website (https://watersag.com/service/plant-analysis/), but more importantly they have the sampling protocol for various vegetables as well as the submission forms etc. Each crop has different parts that they want collected in order to give you an accurate result. The table below from Waters Ag Lab gives you the sampling protocol for

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many of the common vegetables that they run routine tests for.

If you decide that foliar sampling is something you should do, I would recommend that you spend a couple minutes looking at the Waters Ag. Lab website to make sure you understand the protocol for sampling. Here are some things to know when sampling:

1. Do not sample in the heat of the day or right after a rain or irrigation period. Getting your samples taken early in the morning is best.
2. Do not place samples in plastic bags! Use paper or bags provided to you by the lab you choose.
3. Do not sample plants that have pest damage such as disease or insect injury as these samples will give you an incomplete analysis.

Some labs will also recommend that you also take a soil sample from within the crops that you are sampling. Again, I find this pretty useful as you can compare what's in the soil and what's in the plant. Sometimes we can see deficiency symptoms of a nutrient in a plant, but the soil tests say there is plenty there. This can help us identify another cause why the nutrient is not being absorbed by the plant. It could be that another nutrient in excess is tying the one showing the deficiency symptom or the pH is out of whack etc.

If you have questions, comments or concerns about foliar sampling, don't hesitate to reach out to me or your local ENYCHP educator!

Table 2: Plant sampling chart for various vegetable crops. (Source: Waters Agricultural Laboratories, Inc.

Vegetable Crops

CROP	GROWTH STAGE	PLANT PART TO SAMPLE
Beans	Seedling stage	All of the above ground portion
	Prior to or during initial Flowering	Youngest fully mature leaves at the top of plant
Cucumbers & melons	Vegetative	All of the above ground portion
	Before fruit set	mature leave near base of the main stem
Carrots	Seedling	All of the above ground portion
	Vegetative	1st mature leaves from center of whorl
Head Crops (Cabbage, Cauliflower Broccoli)	Before heading	1st mature leaves from center of whorl
Eggplant	Prior to full bloom	Youngest fully mature leaf on the main stem
Leaf Crops (collards, turnips, kale, mustard)	mid growth	Youngest mature leaf
Onions, garlic, shallots	vegetative	All of the above ground portion
	prior to bulb enlargement	Center mature leaves
Peas	Seedling stage	All of the above ground portion
	Prior to or during initial Flowering	Youngest fully mature leaves at the top of plant
Peppers	Vegetative to fruit set	Youngest fully mature leaves at the top of plant
Potato	Seedling stage	All of the above ground portion
	Before or during full bloom	3re to 6th leaf from the growing tip
Pumpkin, Squash	Vegetative – fruit set	Youngest mature leaf
Radish	Seedling	All of the above ground portion
	Vegetative	1st mature leaves from center of whorl
Sweet Corn	Seeding Stage-(V1-V6)	All of the above ground portion
	Prior to tasselling-(V7-VT)	The fully developed leaf below whorl
	Tasseling to silking-(above R1)	The leaf at the ear node (below of above)
Tomato	Seedling Stages	All of the above ground portion
	Prior or at fruiting	3rd or 4th leaf from growing tip
Tomato (Greenhouse)	Early Flowering	Leaf tip
	1st to 6th cluster	Terminal leaf/leaflet at the most recent fruiting cluster

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Table B11. Sufficiency levels for petiole sap concentrations in vegetable crops.

Crop	Stage of Growth	Fresh Petiole Sap Concentration (ppm)	
		K	NO_3-N conc.
Cucumber	First blossom Fruits three inches First harvest	N/A	800 to 1000 600 to 800 400 to 600
Broccoli	Six-leaf stage Just prior to harvest At first harvest	N/A	800 to 1000 500 to 800 300 to 500
Eggplant	First fruit (two-inches long) First harvest Mid harvest	4500 to 5000 4000 to 5000 3500 to 4000	1200 to 1600 1000 to 1200 800 to 600
Muskmelon (Cantaloupe)	First blossom Fruits 2 inches First harvest	4000 to 5000 3500 to 4000 3000 to 3500	1000 to 1200 800 to 1000 700 to 800
Pepper	First flower buds First open flowers Fruits half-grown First harvest Second harvest	3200 to 3500 3000 to 3200 3000 to 3200 2400 to 3000 2000 to 2400	1400 to 1600 1400 to 1600 1200 to 1400 800 to 1000 500 to 800
Potato	Plants 8 inches tall First open flowers 50% flowers open 100% flowers open Tops falling over	4500 to 5000 4500 to 5000 4000 to 4500 3500 to 4000 2500 to 3000	1200 to 1400 1000 to 1400 1000 to 1200 900 to 1200 600 to 900
Squash	First blossom First harvest	N/A	900 to 1000 800 to 900
Tomato (Field)	First buds First open flowers Fruits one-inch diameter Fruits two-inch diameter First harvest Second harvest	3500 to 4000 3500 to 4000 3000 to 3500 3000 to 3500 2500 to 3000 2000 to 2500	1000 to 1200 600 to 800 400 to 600 400 to 600 300 to 400 200 to 400
Watermelon	Vines 6-inches in length Fruits 2-inches in length Fruits one-half mature At first harvest	4000 to 5000 4000 to 5000 3500 to 4000 3000 to 3500	1200 to 1500 1000 to 1200 800 to 1000 600 to 800

Which Vegetables are the Most Profitable to Grow?

Calculating Contribution Margin

Elizabeth Higgins, ENYCHP

Most farmers understand the concept of profit and loss – if your expenses are less than your revenue, then you are making a profit. If your expenses are more than your revenue you are taking a loss. Easy-peasy.

A more complicated question is *WHICH* of the vegetables that I grow will contribute the most to my farm's profitability? It is important to note that the profitability question includes BOTH income AND expenses. Sometimes it is easy to be seduced by a crop that sells for a high price when we haven't seen the cost side of the equation. This is where the concept of ***contribution margin*** comes in. The contribution margin is the amount that income increases for each unit of an item sold. The higher the contribution margin, the more profitable growing another unit the crop.

Contribution margin is calculated by the **total revenues – total variable costs**. Sometimes contribution margin is called *net returns over variable costs*. Variable costs are the costs that change based on the number of items that are produced. For example, in growing cucumbers, seeds would be a variable cost, because you plant more seeds to get more plants. Rent for the field would be a fixed cost, because you pay the rent regardless of whether any cucumbers are planted, and the rent doesn't change as

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Contribution Margins of Three Different Crops

Crop	Cucumbers/acre	Broccoli	Snap Beans/acre
Total Revenue	8550	7425	2800
Total Variable Cost	6086	6157	995
Contribution Margin	**2464**	**1268**	**1805**

the number of cucumbers planted goes up and down.

In the example in the table above, although broccoli revenue per acre is 2.6 times greater than snap beans, the contribution margin of snap beans is 1.4 times greater than broccoli. Every acre planted to snap beans instead of broccoli would be likely to generate $500 more an acre. If fixed costs are the same for both crops, selecting snap beans over broccoli is likely to be the more profitable option.

Contribution margin is also important for calculating your break-even point (price or quantity). The break-even point formula is **(Contribution margin per unit * Quantity of units sold) - Fixed costs = $0 (income).** Assuming that the fixed cost per acre for Green Beans is $300. The break-even number of green bean acres to plant is:

1805 x – 300 = 0 1805 x = 300

x = 300 / 1805 **x = .16 acres**

Food Safety in the Packing House

Erik Shellenberg–ENYCHP

GAPS – Good Agricultural Practices are any practices that reduce the risk of contamination of fresh produce with microbiological, chemical, or physical contaminants. The USDA offers two types of voluntary audits called Standard GAP (or GHP/GAP), and the more intensive Harmonized GAP. There are many other third party audits such as SQF, Primus, BRC, and Global GAP, offered by companies that have their own grading systems. Wholesale produce buyers may require suppliers to pass one or more of these audits to fulfill their own internal requirements.

FSMA – The Food Safety Modernization Act is a piece of legislation written and regulated by the FDA. The Produce Rule, which is part of FSMA, regulates food safety in fresh produce for the first time in America. Compliance requirements with the Rule depend on a farm's gross income level. Farms grossing over $500,000 for a three year average must comply with the Rule by January 26, 2018. Farms grossing between $250,000 and $500,000 have an additional year, and the $25,000-$250,000 have two additional years to comply. Farms under $25,000 are not covered by the rule. All farms have an additional two years from their compliance date to comply with the water testing requirements. All farms covered by the rule MUST attend a one day FSMA-certified food safety training, where all other questions about compliance requirements are answered.

So, you may be thinking about food safety because of GAPS or because of FSMA, or just because you want to mitigate your risk in general.

Worker Training: Workers should be trained on general hygiene. They should wash hands before work, after eating, drinking or smoking, using the rest room, or compromising the sanitary nature of their hands. Workers should wear clean clothes and they should keep a look out for any indicators of contamination in the produce, packing house, or packaging materials. Workers should have designated areas to store personal effects, take breaks and eat lunch. They may drink water while working, but never use glass containers.

Packing equipment: Packing equipment should be kept clean on a schedule. If water is involved, food contacted surfaces should be sterilized daily at the end of use. Food grade lubricants should be used in packing equipment.

Packing materials: All packing materials should be stored in dry and secure locations. They should be kept on pallets off the ground. In general, new materials should be used to prevent contamination from other products. When re-using, the use of a plastic liner in a box can adequately prevent the produce from contacting a potentially unsanitary surface. Reusable plastic containers should be cleaned between use and sanitized several times in a season of use. Materials should be stored 12'' away from the wall to minimize pest habitat.

Wooden surfaces: Wooden surfaces in packing equipment, sorting tables, walls, and floors are acceptable to use, but it should be understood that they can't be sterilized and should be kept dry and clean.

Cleaning and Sanitizing: Remember, you can't sanitize a dirty surface. At the end of every day, there should be a cleaning protocol that workers go through to ensure the entire area is clean, and that all food contact surfaces that can be sanitized are sanitized.

Water: All post-harvest water should be of potable quality. The water should be from a well or municipal source, and should be tested yearly. When using water for washing, there is single pass water, dunk tank water, and recirculation systems. Single pass water, such as spray tables or spray washer lines, do not require sanitizer in the water. Dunk tank and recirculation water require the use of sanitizers to prevent cross-contamination. This does NOT sanitize the vegetables or fruits themselves, but it prevents contaminants from getting into the water. There are many sanitizers available including bleach, Sanidate 5.0, Tsunami, and others. Always use them in accordance with the label, and in addition the pH and sanitizer levels should be monitored to ensure efficacy. There should be adequate drainage so that there is no standing water in the packing house. If there is no drainage, there must be a plan in place to ensure that standing water does not remain for long periods of time. Listeria can thrive in any standing water, even at refrigerator temperatures.

Rest rooms: These facilities should be cleaned on a regular basis. Paper towels, soap, and cleaning products should always be well stocked. Signage reminding workers that handwashing is required should be installed. There should be a plan in place to deal with backups and sewage overflow.

Pest management: Rodents, birds, and other pests in the packing house can contaminate produce. There should be traps placed to control rodent populations. Never use poison in packing houses. Birds should be kept from the packing area. Make sure they can't nest or roost above any part of the operation.

Lights: Lights should always have covers so that if they are broken, the glass shards will not land on packing material, equipment, or product.

Coolers and product storage areas: Coolers should be monitored to ensure that they are at the proper temperatures. Condensation can carry contamination, so it should be minimized. Condensation dripping on produce must be prevented with drip trays and piping around condensers. Product should be kept off the ground, and 12'' away from the wall. Coolers and storage areas should have regular clean-out schedules, and should be monitored for pests.

Culls: Any product that comes in contact with the floor should be thrown in the cull pile. Culls should be removed from the facility daily and dealt with in a manner that will not cause any contamination to enter the packing house. If you are in accordance with all of the above, you will be in good shape for a GAPS audit and for compliance with FSMA.

If you have further questions about either GAPS or FSMA or a specific issue in your packing house please contact our food safety specialist:

Erik Schellenberg
845-344-1234

New Product for Organic Growers: Timorex Gold

There is a "new" biological fungicide stemming from very old botanical wisdom available to organic growers (if certified organic, please ask your certifier about this product, as it is not yet OMRI listed). Timorex Gold is made from tea tree oil, and is labeled for prevention and control of a variety of fungi ranging from downy and powdery mildew to early blight and cercospora. Notably, it's also labeled for bacterial diseases. We don't have much independent trial information to reference on this product yet, but Dr. Meg McGrath noted that research coming out of Florida indicated better cucurbit downy mildew control than with any other biological product. Research provided by the company shows Timorex to yield comparable control to many conventional products in controlling both fungi and bacteria, though we will want to see independent work demonstrating this as well.

Tea tree oil is a cell membrane disruptor which targets fungi and leaves plant and animal/insect cells intact. It is a part of FRAC group 7 and can be alternated with or mixed with copper fungicides as part of a resistance management plan. As with most biologicals, it is recommended that the product be applied prior to infection, not as a curative spray.

Right now Timorex is only available through Crop Production Services, which will make it hard for some growers to get ahold of. The cost per application ranges from around $40 to $10 an acre, depending on the rate, so this will be a spray reserved primarily for high-value crops. All that said, we're looking forward to seeing how it performs in New York. *Crystal Stewart, ENYCP*

Corn Trap Counts 7/18– 7/25

County	CEW	ECB-Z	ECB-E	FAW	WBC
Orange	12	0	0	56	18
N. Dutchess	1	1	NA	0	0
Columbia	6	0	0	0	30
Greene	3	0	0	0	8
Albany	2	0	2	0	2
Schoharie	0	3	0	8	6
Fulton	0	0	0	0	0
Saratoga	0	0	2	1	3
S. Washington	1	0	1	2	11
N. Rensselaer	2	0	0	0	7
S. Clinton	0	0	0	0	2
C. Clinton	0	0	0	0	0

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