Preparing Your Farm Food Safety Plan
Part 12: Storage and Transportation
Meredith Melendez, Mercer County Senior Program Coordinator and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

Part 12 of your farm food safety plan addresses the storage and transportation of produce. Topics in this section should focus on containers and pallets, pest control, storage/temperature control, loading and transportation of the product.

Keep in mind that not all areas of the audit will apply to your farm based on your production practices. Those areas not applicable would be marked not applicable by the auditor. Areas that do apply but you are deficient in would result in a reduction of audit points. A minimum of 80% must be achieved in each section to pass the final audit. Conducting a self audit is the best way to determine deficiencies and changes that will need to be made to your farm infrastructure and/or production practices.

The following statements and procedures considered to include in your storage and transportation section:
✔ Packing containers that are not in use are protected from contamination
✔ Pallets and storage containers are inspected prior to use to ensure that no foreign materials contaminate the product
✔ Storage areas are inspected, cleaned and sanitized at the beginning of the packing season, and kept clean throughout the season
✔ The exterior and interior of the buildings are checked for cracks and needed repairs prior to the harvest season
✔ Non-food grade supplies (lubricants, paints, etc.) are stored separately from production areas
✔ All refrigeration equipment is serviced annually
✔ The food safety supervisor inspects the refrigeration equipment monthly
✔ Cold storage area temperatures are taken daily and recorded in a log
✔ Thermometers are checked for accuracy prior to the harvest season
✔ Water used in the refrigeration units is potable
✔ If ice is manufactured off site reports are available from the manufacturer
✔ If ice is manufactured on site the ice machine is sanitized prior to the harvest season

Anthony Rappa of Swedesboro examines his sales slips for truck load of produce sold at Swedesboro Auction, 1944. Source: NJ State Archives

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A pest/rodent control program is in place for the storage areas
Equipment used for storage and loading of product is kept clean
Trailers used to store and transport the product are checked for any disagreeable odors, soil, and contaminants prior to their use
If trucks/trailers are refrigerated the temperature is checked and recorded on the manifest prior to its loading
Indicate how product is packed prior to loading (for example: palleted with glue strips on top of each carton, hand stacked, and wrapped with plastic) to secure the product during transport
Indicate that there are procedures for disposal of spilled product, waste water spillage, pest control, worker health and traceability in the packing-house section of the farm food safety plan

This is the twelfth article in a series dedicated to preparing a farm food safety plan. For previous articles refer to earlier editions of the Plant and Pest Advisory, or visit the Rutgers Vegetable Crops blog at: http://jerseyvegcropsagupdates.blogspot.com Remember you may not need a third party audit; it depends on who is purchasing your produce. However, everyone should have a food safety plan. For more information on Farm Food Safety visit: http://njveg.rutgers.edu/html/mf-food-safety.html

Next week: Harmonized Audit

IPM Update
Kristian Holmstrom, Research Project Coordinator II, Vegetable IPM Program

Sweet Corn

European corn borer (ECB) adult catches have begun to increase again in some parts of the state. This is an indication that the second flight is starting. The most consistent catches at this time are in Salem and Cumberland counties, although low level catches are also being recorded in Morris and Burlington counties (see ECB Map). Plants are largely free of ECB injury at this time, but the situation will change within 2 weeks, as eggs are laid and larvae begin to feed. Consider treating if 12% or more plants exhibit the characteristic “shot-hole” type feeding on leaves and/or droppings or ECB larvae in emerging tassels. Remember to make a full-tassel application to control ECB larvae as they leave the tassel and travel down the stalk to re-enter the plant near the ear shank. This last application is often critical to controlling ear infestations from ECB. Consider weekly applications through the silk stage unless local corn earworm catches dictate a tighter schedule. This will help prevent ear infestations resulting from eggs laid on or near the developing ear.

The highest nightly ECB catches for the previous week are as follows:
Shirley 3 Green Creek 2 Eldora 1
Burlington 2 Shiloh 2 Long Valley 1
Chester 2 Allentown 1 Morristown 1
Denville 2 Downer 1 Oldwick 1

Corn earworm moth (CEW) catches are highly variable at this time. From lower Burlington County south, there are higher numbers, with particular hot-spots in Salem and Cumberland counties (see CEW Map). Pheromone catches near the Camden/Atlantic County border, as well as Salem and Cumberland counties have increased significantly over the past week as well. These moths are a threat to the sweet corn plantings now in the silk stage. As silks begin to appear, pay close attention to CEW catches in local blacklight traps, and treat silking plantings accordingly. Begin silk spray schedules as close to first silk as possible.

The highest nightly CEW catches for the previous week are as follows:
Centerton 5 Downer 2 Hammonton 1
Woodstown 5 Indian Mills 2 Medford 1
Cedarville 3 Shiloh 2 Pedricktown 1
Jones Island 3 Tabernacle 2 Shirley 1

Silking Spray Schedules*:
South – 3-4 days
Central – 5-6 days
North – 6-7 days

* Note: These are general recommendations. Local trap catches may indicate some variation in the frequency of insecticide applications to silking corn.

Peppers

With the beginning of the second ECB flight, it is a good idea to scout fields at least weekly for the presence of ECB eggs. If 2 or more eggmasses are found in a 50 plant sample (2 leaves/plant), a foliar

See IPM on page 3
insecticide application should be considered. Generally, where blacklight trap catches average one or more ECB per night (shaded and crosshatched areas on the map, and blue and green areas on the web version, found at: http://www.pestmanagement.rutgers.edu/IPM/Vegetable/Pest%20Maps/maparchive.htm) and fruit are greater than ½” in diameter, insecticides are warranted. See the 2012 Commercial Vegetable Production Recommendations for materials useful in controlling ECB. Beet armyworm (BAW) larval populations have been found on various crops in southern NJ. This pest is typically a threat to peppers, and as new plantings become established, growers should be on the alert for this pest. BAW larvae feed on leaves near the growing points on plants. This feeding can result in significant defoliation and ultimately fruit damage, as the larvae begin to feed there as they grow. BAW is another of our southern invaders that has shown up much earlier than expected. Like FAW, BAW can be difficult to control with older materials. See the 2012 Commercial Vegetable Production Recommendations for newer materials useful in controlling BAW.

Brown Marmorated Stinkbug (BMSB)

BMSB adult catches are still low in most blacklight traps, although numbers have been increasing gradually over the past two weeks or so. At present, the only trap averaging more than 5 BMSB/night is near Shirley in Cumberland County (see BMSB map). BMSB has shown a preference for peppers in the past. Growers should pay close attention to activity from local traps to determine when to initiate field monitoring of this pest.

The highest nightly BMSB catches for the previous week are as follows:

Shirley     15   Jones Island  4   Indian Mills  3
Denville   5     Morristown  4   Oldwick   3
Green Creek 5     Flanders   3   Shiloh    3
Hamonton  4     Folsom     3   Oxford    3

Tomatoes

With prolonged hot, dry weather, thrips have begun to increase in a number of scouted tomato fields. Flower thrips may be found by tapping upper level fresh flower clusters over an index card. This should be done at least once a week. If there is a sharp increase in the number of flower clusters having thrips, consider an insecticide to suppress their numbers. These insects can cause a golden colored “fleck” to the surface of fruit. This injury is largely cosmetic, but can result in unmarketable fruit. Generally, if thrips are found in less than 50% of flower clusters, the threat is low. However, if multiple thrips are found in more than half of the samples, and numbers have increased, an insecticide may be warranted. See the 2012 Commercial Vegetable Production Recommendations for newer materials useful in controlling flower thrips.

Pumpkins and Winter Squash

Pumpkins and winter squash vines are running at this time, although most do not have much fruit yet. As fruit develop and begin to enlarge, powdery mildew (PM) will appear on older leaves. It is possible to begin a protectant fungicide program for PM when the disease first appears, without sacrificing quality or yield. It is imperative, however, to scout for PM lesions. If the disease is caught too late, some loss of quality may result. Check 5 consecutive plants each in 10 random locations. Check two older leaves per plant (top and bottom) for the presence of PM lesions. These will initially be about the size of a dime, and are white, and granular in appearance. When 2 lesions are found per 50 plants, consider beginning the protectant fungicide rotation. See the 2012 Commercial Vegetable Production Recommendations for newer materials useful in managing PM.

A sentinel plot containing susceptible and resistant cucumber varieties, as well as muskmelons, watermelons, acorn and butternut squash and pumpkins has been established at the Snyder Research and Extension Farm in Hunterdon County. This purpose of this plot is to detect the presence of downy mildew (DM) in northern NJ. As yet, the plot is unaffected by DM. Any occurrence will be reported in this newsletter and will also generate an alert to all subscribers. For more information on the regional presence of DM as well as comprehensive, weekly forecasts, see the following website: http://cdm.ipmpipe.org.

See Pest Distribution Maps on page 4
Vegetable Disease Update

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

✔ Pepper – Anthracnose - Symptoms of fruit infection include sunken, circular spots which develop blackish-tan to orange concentric rings as lesions develop. Lesions on stems and leaves appear as grayish-brown spots with dark margins and can easily be overlooked. Control of Anthracnose begins scouting on a regular basis and applying preventative fungicide applications before symptoms appear, especially in fields or areas of farm where you have had anthracnose problems in the past. Beginning at flowering and as small fruit begin to set, alternate chlorothalonil (M5) at 1.5 pt 6F/A or Manzate Pro-Stick at 1.6 to 3.2 lb 75DF/A with one of the following FRAC code 11 fungicides: azoxystrobin (Quadris at 6.0 to 15.5 fl oz 2.08F/A) or Cabrio (pyraclostrobin) 20EG. After harvesting, pepper fields should be disced and plowed under thoroughly to bury crop debris.

✔ Bell Pepper - Bacterial leaf spot - Heavy rain and winds have caused bacterial problems in peppers and tomatoes to increase. Remember, the best method for reducing the chances of getting BLS are to plant those bell pepper cultivars which carry resistance genes for the disease. If symptoms of BLS start to develop, apply fixed copper at labeled rates to weekly fungicide program. A Section 2ee for the use of Quintec (quinoxyfen, 13) at 6.0 fl oz 2.08F/A to help suppress BLS has been granted for NJ.

✔ Tomato – Bacterial spot, speck and canker – After transplanting, apply Actigard at 0.33 oz 50WG/A (see label for use), or fixed copper (M1) at 1 lb a.i./A plus a mancozeb (Dithane, Manzate, Penncozeb, M3) at 1.5 lb 75DF or OLF, or ManKocide (M1 + M3) at 2.5 to 5.0 lb 61WP/A on a 7 day schedule.
Disease Briefs
Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

● Basil - Downy mildew - Basil downy mildew was confirmed on June 28 in Morris County. This is almost a month sooner than last year. Control of basil downy mildew begins with regular scouting, recognizing symptoms and weekly protectant fungicide applications. Now that Downy mildew has been detected in the state all basil growers should scout on a daily basis and should add a labeled downy mildew specific fungicide to their weekly fungicide program. Phosphite fungicides (FRAC code 33) have shown the best efficacy in trials at RAREC. Both ProPhyt and K-Phite have downy mildew labels under herbs. Actinovate (OMRI-approved) is also labeled for downy mildew control. Please remember, all abandoned basil fields should be sprayed with gramoxone or worked under immediately after last harvest to kill the foliage! Abandoned fields left unattended after use will only serve as a source of inoculum for other fields.

● Cucurbit downy mildew has already been reported on cucumber in New Jersey. Please see the 2012 Commercial Vegetable Recommendations Guide for specific fungicide recommendations. To track the progress of cucurbit downy mildew please visit North Carolina State University’s Cucurbit Downy Mildew Forecasting Center at http://www.ces.ncsu.edu/depts/pp/cucurbit.

● Cucurbit powdery mildew has been found in New Jersey. Cucurbit growers should adjust fungicide programs accordingly.

● Peppers - Sunscald - The recent storms have caused pepper plants in some fields to lay over exposing fruit to direct sunlight leading to sunscald injury. In some cases, over 50% of harvestable fruit were lost. Staking, and/or re-staking and tying plants that have fallen over to get the plants back in the upright position and increasing N fertility to help promote foliage growth should be considered. Shading products, such as Surround (95% Kaolin), which help protect fruit from direct sunlight should also be considered.

For the most up-to-date information fast, please sign up for the Jersey Vegetable Crop Ag Updates at: http://jerseyvegcropsagupdates.blogspot.com
Here’s What’s Happening at NJ IR-4
Cesar Rodriguez-Saona, Ph.D., Specialist in Blueberry/Cranberry Entomology

The IR-4 Project is “a cooperative program of the USDA and the SAES, with the principle goal of developing data to support and to expedite regulatory clearances of newer, reduced risk pest control products for specialty crop growers.” More information on the IR-4 Project can be found at http://ir4.rutgers.edu. As the IR-4 liaison for the state of New Jersey, my main responsibility is to represent the pesticide needs of minor crops in New Jersey at the IR-4 Food Use Workshop meeting.

This year, the IR-4 Food Use Workshop will take place on Tues.-Wed., Sept. 11-12, at the St. Louis Union Station Marriott, downtown St. Louis, MO. New projects must be submitted no later than August 15. These projects will be discussed at the workshop in September. If you would like to submit a project, visit the IR-4 website listed above and click on “Submit a Request”. Nominations for projects can be done August 17-30. I will represent New Jersey grower needs at this workshop. Please let me know if you are submitting a request, and whether you plan to attend the meeting. That way I will be aware of all the projects being submitted and attendees from New Jersey, and thus be better prepared to support your requests.

Please feel free to contact me if you have any questions at 609-726-1590 x 4412, or e-mail me at crodri-guez@aesop.rutgers.edu.

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Fruit Loads in Vine Crops
Gordon Johnson, Extension Vegetable & Fruit Specialist

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Early watermelons are sizing now, later plantings are setting fruit, pickle harvest is underway, and pumpkin planting is finishing up. A common question from growers and crop consultants is how many fruit should a plant carry and what will affect fruit set and fruit “carry” in vine crops.

For watermelons, a healthy, vigorous plant may set 3-7 fruits initially. However, for mid-size and larger watermelons, the plant will only carry 2-4 fruit at any time. Smaller fruited varieties have more fruits per plant but essentially the same amount of pounds as larger types. This is the carrying capacity of the plant and is directly related to the quantity of photosynthates being produced by the plant, mostly in the leaves. Any additional fruits, even if initially set, will be aborted. Once the first fruit ripens and is harvested, additional sets can be carried. To carry the maximum amount of fruit, it is necessary to maintain high plant vigor and good foliage health. This requires paying close attention to irrigation and fertility programs; having excellent disease, insect, and mite control; and having good pollinator activity during pollination and fruit set. If average fruit carry is less than 2 per plant in watermelons, that is a sign that the plants have reduced vigor and are under stress. Repeated fruit set depends on maintaining vine health through the season.

Another factor to consider is where fruit set is occurring. Crown sets are desired in watermelons, especially in early plantings. Crown sets are those that occur on nodes closest to the base of the plant, within the first 8 nodes. Having good crown sets requires that plants have good early growth so that adequate leaf area is produced that can support early set fruit as well as proper pollination (sufficient bees). Lack of crown set is a sign of poor early growth, early plant stress, or of problems with pollination.

With pumpkins the carrying capacity is similar; however, because pumpkins are not repeat harvested as are watermelons, harvest is limited to those fruits set initially. Medium sized Jack-o-lantern types will carry 1-2 fruits, larger types closer to 1. All others will be aborted. Smaller types will carry more depending upon their size in pounds (for example a variety with 5 lb. average will carry 4-7 fruits). Maximum carrying capacity in pumpkins is largely affected by variety (varieties with some heat tolerance will carry more fruits in our climate) and foliage health. Excess nitrogen fertilization will often delay fruit set in pumpkins.

In gynoecious cucumbers grown for once over pickle harvesting, there will be two fruits set on adjacent nodes that are ready for harvest at any one time. These will be set on nodes 2-6 commonly. The pollinizers that make up a small percentage of the population will set pickles every fifth node generally and therefore only one fruit will be ready for harvest. Yield reductions in gynoecious pickling cucumbers occur when there is a loss of set so that fruits are not on adjacent nodes. Parthenocarpic pickle varieties that set fruit without pollination will commonly have 4-6 pickles on 3-5 adjacent ready for harvest at any one time. This allows them to be planted at much lower densities.