Sweet Corn

European corn borer (ECB) adult catches have remained steady in most of the state, with a slight increase in the northernmost counties. The highest catches at this time are still in Gloucester County (see ECB Map). ECB injury is common in whorl stage sweet corn at this time. 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:
- Downer 5
- Burlington 2
- Allentown 1
- Beemerville 1

Corn earworm moth (CEW) catches have not changed much from the previous week. Current catches are relatively low; with slightly higher catches in some Cumberland and Salem county traps (see CEW Map). As yet, catches from North Carolina, Virginia and Maryland are relatively low. We look for significant increases in those areas as a signal that migratory populations could reach our area with the proper atmospheric conditions. These moths remain 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
- Woodstown 2
- Belvidere 1
- Chester 1

Low pH in Plastic Mulched Beds

Hot Year Means More Blossom End Rot

Preparing Your Farm Food Safety Plan: Harmonized Audit

Weekly Weather Summary
**IPM from page 1**

### Silking Spray Schedules*

- **South** – 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.

Scattered **fall armyworm (FAW)** infestations have begun to occur throughout the state. As of this week, low level whorl stage infestations have been found as far north as Warren County. This pest favors whorl stage corn, and will even infest seedlings, causing significant injury to small plants. While scouting for ECB, note the presence of larger holes than are typically caused by ECB. These may be accompanied by large amounts of droppings in the whorl. FAW larvae are green with a pale stripe on each side when very small. As they grow, they take on a tan and brown color with a prominent upside-down “Y” on the head capsule. This pest may be difficult to control with commonly used pyrethroid insecticides. Newer materials generally provide better control. See the 2012 Commercial Vegetable Production Recommendations for newer materials useful in controlling FAW. Consider treating if 12% or more plants are infested with FAW either alone, or in combination with ECB.

**Two-spotted spider mites (TSSM)** are a common occurrence in silking sweet corn at this time. This is the result of high temperatures, infrequent rain and repeated use of synthetic pyrethroid insecticides for worm control. Look for a bronze color to older foliage. Inspect the underside of these leaves for the presence of mites. If the infestation is late in the silk stage, it may be possible to harvest without mites in the husks. However, it may be necessary to include a miticide to reduce numbers if more than a week is left between detection of the mites and harvest. It is also wise to switch chemistries for worm management during the silk stage. Newer products including the active ingredients chlorantraniliprole, spinetoram, and flubendiamide will not have the negative impact on many beneficial insects that may help keep TSSM in check.

### 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 egg masses are found in a 50 plant sample (2 leaves/plant), a foliar 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](http://www.pestmanagement.rutgers.edu/IPM/Vegetable/Pest%20Maps/maparchive.htm)) 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)**

[2012 Commercial Vegetable Production Recommendations](http://www.pestmanagement.rutgers.edu/IPM/Vegetable/Pest%20Maps/maparchive.htm) for newer materials useful in controlling BAW. **Brown Marmorated Stinkbug (BMSB)**

BMSB adult catches are rising with extreme temperatures, and falling back down to previous levels as the evenings cool. At present, only a few traps in the Burlington-Camden border area as well as Cumberland County are averaging over 5 BMSB per night (see BMSB map). Late last week, several BMSB nymph groups and egg masses were discovered in a Warren County pepper and tomato fields. Low level stinkbug injury was present, although BMSB may not have been responsible. Stinkbug feeding has the appearance of a large, diffuse blotch on pepper and tomato fruit. The blotch, called “cloudy spot”, has scalloped edges, and is pale on green fruit, but turns bright yellow as fruit ripen. BMSB has shown a preference for peppers in the past. It would be wise to intensify field scouting at this time. The bugs are difficult to detect in the field, however, and first signs of increase may appear in harvested fruit. If injury to fruit is appearing with greater frequency, consider treating for stinkbugs. For materials useful against stinkbugs, see the 2012 Commercial Vegetable Production Recommendations.

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

- Medford 10  Centerton 3  Allentown 2
- Springdale 7  Hammonton 3  Burlington 2
- Indian Mills 4  Shirley 3  Cinnaminson 2
- Green Creek 3  Snyder Farm 3  Woodstown 2

### Tomatoes

With prolonged hot, dry weather, *thrips* populations are moderate (>2/flower cluster in more than 50% of samples) 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.

With recent hail events occurring around the state, growers should be alert to the increased chance of bacterial infections in tomatoes. Hail creates numerous wounds on plants, providing easy access for cells of bacterial leaf spot (BLS) and related pathogens. It is wise to apply a copper product to affected plantings as soon as conditions permit. Watch plants for signs BLS, including dark lesions on all foliage (even the youngest leaves) and fruit. Consult the 2012 Commercial Vegetable Production Recommendations for anti-bacterial materials and application schedules.

**Pumpkins and Winter Squash**

Pumpkins and winter squash vines are running at this time, although most do not have much fruit yet. Fields with enlarging fruit are now developing powdery mildew (PM) infections 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 of Tuesday morning, the older cucumber variety ‘Straight 8’ showed beginning signs of a DM infection. Symptoms include pale areas, sharply bordered by leaf veins on the upper leaf surface. Below these areas (lower leaf surface), dark spores are produced. Without control, particularly if conditions are moist, the lesions will coalesce, resulting in total defoliation of the plants in a period of several days. Within the sentinel plot, more modern cucumber varieties as well as pumpkin, winter squashes, muskmelon and watermelon plants were uninfected. This indicates a strain of DM that is affecting cucumbers with no resistance to the pathogen. For more information on the regional presence of DM as well as comprehensive, weekly forecasts, see the following website: [http://cdm.ipmpipe.org](http://cdm.ipmpipe.org).
Each year we see problems with vegetable crops related to low pH in plastic mulched beds. A common scenario is a field with sandy soil (loamy sand, sandy loam) that has not been limed in the last 2 years. The starting pH of beds in this situation will usually be 5.5-6.0. Granular or liquid nitrogen fertilizers applied prior to or at bed formation and nitrogen fertilizers applied through the drip irrigation system during fertigation will commonly consist of ammonium sulfate, urea, ammonium nitrate or UAN (urea-ammonium nitrate) solutions. All of these fertilizers are acidifying because the ammonium which they contain (urea releases ammonium nitrogen as it reacts with the soil). Ammonium will convert to nitrate in the soil, a process called nitrification, and will release hydrogen (H+) ions, thus dropping the pH. As a result, pH in the plastic mulched beds gets progressively lower throughout the growing season. Beds with a starting pH of 5.5 can drop down into the 4s. The largest drops in pH will be in the wetted area around the drip emitter and drier areas of the bed will have a higher pH.

As pH drops, availability of magnesium and calcium declines while manganese availability increases, often to toxic levels. Below pH of 5.2, the chemistry of the soil changes and aluminum is released into the soil solution at increasing levels, further acidifying the soil. This free aluminum also is very harmful to plant roots because aluminum interferes with calcium, can bind with phosphorus, and can interfere with cell expansion at root tips, effectively stopping root tip development. Most of the active mineral nutrient uptake occurs in the region just behind the root tips. Without further root tip growth, nutrient uptake will become limited. Effective rooting volume is also reduced, thus placing the plant under additional stress. In severe cases, plants can die.

Managing plastic mulched bed pH starts with making sure that fields are limed the fall before beds are to be made. Spring applications can also be made to the area but full lime reaction should not be expected. Manage fertilizer programs so that large pH drops do not occur. This means switching some or all of the nitrogen program to nitrate sources – calcium nitrate and potassium nitrate would be examples.

If marginal pHs are encountered after plastic is laid (below 5.8), consideration should be given to eliminating ammonium or urea containing fertilizers and switching to calcium nitrate and potassium nitrate sources for fertigation. Both these fertilizers cause a basic reaction in soils because plant roots excrete hydroxides and carbonates as they take up the nitrate. There are few other materials that can be used to raise the soil pH through the drip system once plastic is laid. One option is potassium carbonate which is alkaline and thus will raise the pH. It is fully soluble and can be made in liquid forms. Liquid lime products with ultrafine ground limestone can also go through a drip system; however, getting enough material into the soil to affect the pH will be difficult and expensive and agitation of supply tanks will be necessary.
Hot Year Means More Blossom End Rot

Gordon Johnson, Extension Vegetable & Fruit Specialist, University of Delaware Cooperative Extension


Blossom end rot (BER) is showing up again this year in peppers and tomatoes. BER is a disorder where developing fruits do not have enough calcium for cell walls, cells do not form properly, and the fruit tissue at the blossom end collapses, turning dark in color. Calcium moves through cation exchange with water movement in the soil, so the end of the fruit will be the last to accumulate calcium. Larger fruits and longer fruits are most susceptible. With fruits, the rapid cell division phase occurs early in the development of the fruit and if calcium accumulation in the fruit is inadequate during this period, BER may occur. While it may not be noticed until the fruit expands, the deficiency has already occurred and cells have already been negatively affected. We most commonly see signs of blossom end rot on fruits many days after the calcium deficiency has occurred.

Understanding blossom end rot also requires an understanding of how calcium moves from the soil into and through the plant. Calcium moves from the soil exchange sites into soil water and to plant roots by diffusion and mass flow. At plant roots, the calcium moves into the xylem (water conducting vessels), mostly from the area right behind root tips. In the xylem, calcium moves with the transpirational flow, the movement of water from roots, up the xylem, and out the leaf through stomata. Calcium is taken up by the plant as a divalent cation, which means it has a charge of +2. It is attracted to negatively charged areas on the wall of the xylem, and for calcium to move, it must be exchanged off the xylem wall by other positively charged cations such as magnesium (Mg++), potassium (K+), ammonium (NH4+), or additional calcium cations (Ca++). This cation exchange of calcium in the xylem requires continuous movement of water into and up through the plant. It also requires a continuous supply of calcium from the soil.

In general, most soils have sufficient calcium to support proper plant growth. While proper liming will insure there is adequate calcium, it is not the lack of calcium in the soil that causes blossom end rot in most cases. It is the inadequate movement of calcium into plants that is the common culprit. Anything that impacts root activity or effectiveness will limit calcium uptake. This would include dry soils, saturated soils (low oxygen limits root function), compaction, root pathogens, or root insect damage. In hot weather on black plastic mulch, roots can also be affected by high bed temperatures. Low pH can also be a contributing factor. Calcium availability decreases as pH drops, and below a pH of 5.2 free aluminum is released, directly interfering with calcium uptake. Again, proper liming will insure that this does not occur. Applying additional calcium as a soil amendment, above what is needed by normal liming, will not reduce blossom end rot.

In the plant, there is a “competition” for calcium by various plant parts that require calcium such as newly forming leaves and newly forming fruits. Those areas that transpire the most will receive more calcium. In general, fruits have much lower transpiration than leaves. In hot weather, transpiration increases through the leaves and fruits receive lower amounts of calcium. High humidity will reduce calcium movement into the fruit even more. Tissue tests will often show adequate levels of calcium in leaf samples; however, fruits may not be receiving adequate calcium. In addition, in hot weather, there is an increased risk of interruptions in water uptake, evidenced by plant wilting, when transpirational demand exceeds water uptake. When plants wilt, calcium uptake will be severely restricted. Therefore, excess heat and interruptions in the supply of water (inadequate irrigation and/or rainfall) will have a large impact on the potential for blossom end rot to occur. Proper irrigation is therefore critical to manage blossom end rot.

As a positive cation, there is “competition” for uptake of calcium with other positive cations. Therefore, if potassium, ammonium, or magnesium levels are too high in relation to calcium, they can reduce calcium uptake. To manage this, do not over-fertilize with potassium or magnesium and replace ammonium or urea sources of nitrogen with nitrate sources.

Applying additional soluble calcium through irrigation, especially drip systems, can reduce blossom end rot to some degree if applied prior to and through heat events and if irrigation is applied evenly in adequate amounts. Foliar applications are much less effective because fruits do not absorb much calcium, especially once a waxy layer has developed, and calcium will not move from leaves into the fruit (there is little or no phloem transport).

In conclusion, the keys to controlling blossom end rot are making sure roots are actively growing and root systems are not compromised, soil pH is in the proper range, and irrigation is supplied in an even manner so that calcium uptake is not interrupted. Supplemental calcium fertilization will only marginally reduce blossom end rot if water is not managed properly.

Another calcium disorder that is found in peppers is called “stip”. These spots on peppers occur later in the year, commonly in the late summer or fall, during cool, humid conditions. Under these conditions, calcium movement into the fruit is uneven, leading to localized collapse of cells, causing the spotting. Again, making sure adequate calcium is moving in the plant is critical to control stip. 

❏
Preparing Your Farm
Food Safety Plan
Harmonized Audit –
Field Operations and Harvesting
Harmonized Food Safety Standard
Meredith Melendez, Mercer County Senior Program Coordinator and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

As we explained last week the harmonized audit is an attempt to combine several audits from different auditing companies and will be put into effect by the USDA next year. The harmonized audit has more emphasis on risk assessment at all levels of the operation. This emphasis includes: additional questions, increased documentation and recordkeeping, corrective action procedures and a clear written recall program. In addition to these changes the operation will need to: review their food safety plan annually, conduct an annual self-audit, conduct a pre-plant assessment around production fields to determine potential animal intrusion, assess the water system, document water system preventative control procedures, document monitoring procedures and document corrective measures. The next several articles will detail the changes to the regular USDA audit for the harmonized audit.

GENERAL QUESTIONS:
Management Responsibility
● A written food safety policy shall outline a commitment to food safety in general terms. How is this plan implemented and how is it communicated to employees. This policy shall be signed by senior management.
● Twenty four hour contact information shall be available for the individuals that have responsibility and authority for food safety on the farm in case of a food safety emergency.
● There shall be a disciplinary policy for food safety violations that establishes corrective actions for personnel who violate established food safety policies or procedures.

Food Safety Plan
● The food safety plan shall address potential physical, chemical, and biological hazards and hazard control procedures, including monitoring, verification and recordkeeping, for the following areas: water, soil amendments, field sanitation, production environment, and worker practices.
● The operation shall be responsible for reviewing their food safety plan at least annually, documenting the review procedure and revising the plan as necessary. Updated or revised date shall be indicated.

Documentation and Recordkeeping
● Documentation shall be retained for a minimum period of two years, or as required by prevailing regulation.

Worker Education and Training
● The individual designated for food safety responsibilities demonstrates knowledge of food safety principals. Food safety designate has completed at least one formal food safety course/workshop or by job experience.

Microbiological Sampling and Testing (note this is not required)
● Where microbiological analysis is required in the food safety plan, testing shall be performed by a GLP laboratory using validated methods.
● Where microbiological analysis is required in the food safety plan, samples shall be in accordance with an established sampling procedure.
● Tests, their results and actions taken must be documented.
● All required testing shall include test procedures and actions to be taken based on the results.

Traceability
● Records that enable reconciliation of product delivered to recipients (one step forward) shall be maintained except for direct to consumer sales.
● A traceback and trace forward exercise shall achieve accurate traceability within 4 hours.

Corrective Actions
● The operation shall have documented corrective action procedures. The responsibility, methods, and timelines to address Corrective Actions shall be documented and implemented.

Self-Audits
● The operation shall have documented self-audit procedures. ☐
Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged slightly above normal, averging 74 degrees north, 76 degrees central and 78 degrees south. Extremes were 102 degrees at Downstown and Hammonton on the 19th, and 58 degrees at Charlotteburg and Freehold on the 22nd. Weekly rainfall averaged 2.51 inches north, 0.90 inches central, and 1.17 inches south. The heaviest 24 hour total reported was 2.20 inches at Newton on the 18th to 19th. Estimated soil moisture, in percent of field capacity, this past week averaged 87 percent north, 70 percent central, and 60 percent south. Four inch soil temperatures averaged 76 degrees north, 77 degrees central and 78 degrees south.

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*PRECIPITATION TOTALS AT NEWTON SEEM MUCH TOO HIGH OVER THE PAST FEW WEEKS, THERE MAY BE A PROBLEM WITH THE AUTOMATIC RAIN GAUGE.

WES KLINE -- GDD BASE 40 PINEY HOLLOW
LAST WEEK 260 (Ending 7/16/12)
THIS WEEK 266 (Ending 7/23/12)
TOTAL UNITS BASE 40 FOR FEBRUARY=55
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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is responsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.

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For back issues of the Plant & Pest Advisory: www.rce.rutgers.edu/pubs/plantandpestadvisory

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