WEEKLY CROP UPDATE
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Vegetable Crops

Hot Year Means More Blossom End Rot

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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 fruit, 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 leave 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.

Low pH in Plastic Mulched Beds – *Gordon Johnson, Extension Vegetable & Fruit Specialist;* gcjohn@udel.edu

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.

Disease ID for Pumpkin – *Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland*; keverts@umd.edu

I recently wrote an update article about fungicide programs for pumpkin http://agdev.anr.udel.edu/weeklycropupdate/?p=4429. However, because many fungicides are effective on some diseases, but not others, it is important to be able to identify the diseases present in a field as you design your spray program.

Foliar Diseases

The most common foliar diseases of pumpkin are powdery mildew, downy mildew, white speck (Plectosporium), gummy stem blight and anthracnose.

Powdery Mildew

Figure 1a. Powdery mildew sporulation covering leaves and defoliating pumpkin plants.

Figure 1b. Close up image of a leaf showing the "powdery" white sporulation on the upper surface of the leaf. Note that sporulation is usually seen first on the lower leaf surface. Scout a field by looking at the under surface of 45 old leaves in a field each week. Begin targeted sprays for powdery mildew when it is first observed.

White Speck (Plectosporium)

Figure 2. White speck or *Plectosporium* on the leaf causes tan spindle shaped lesions which form on the veins and result in distorted leaves. *Plectosporium* also causes lesions on the fruit (Figure 5).

Downy Mildew

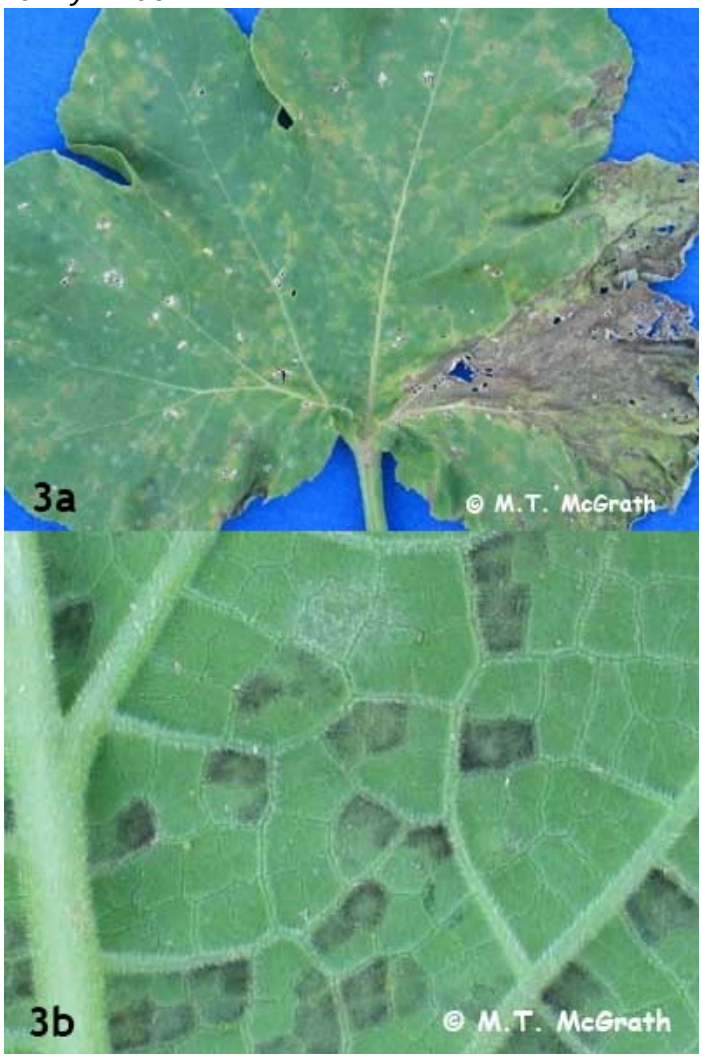

Figure 3. Downy mildew lesions are initially seen on the upper surface as angular water soaked or yellow spots (3a) that are limited by the leaf veins. The angular nature of the lesions is especially evident on the lower leaf surface where sporulation occurs (3b). Look for grey angular lesions on the under surface of leaves after dewy nights. Lesions become necrotic over time.

Anthracnose

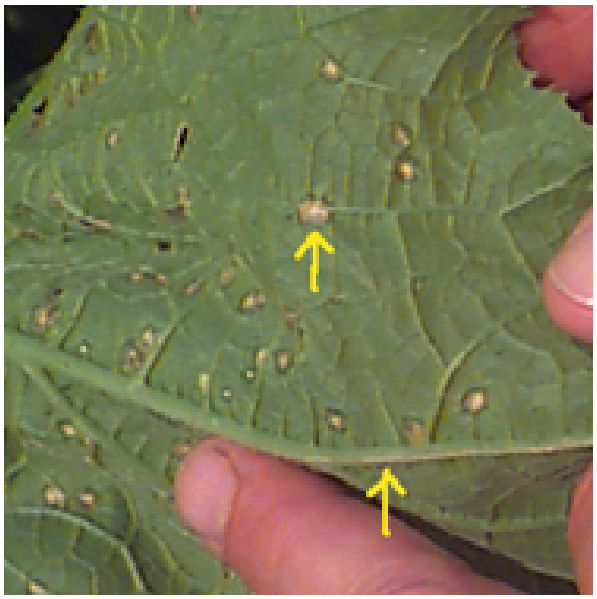

Figure 4. Anthracnose will initially be small tan lesions with darker margins (image courtesy of B. Precheur, Ohio State Univ.). They will expand as they age and damage large portions of the leaf. They may develop small holes in the leaf. Anthracnose also causes lesions on the fruit (Figure 7).

Fruit Diseases

There are several pathogens that cause fruit rot on pumpkin. To manage fruit rot the single most important practice is to follow a good fungicide management program in the field. The same fungi that cause white speck, black rot and anthracnose also cause lesions on the leaves. If the leaves are protected from disease, the fruit will be less likely to become diseased. In addition to protecting fruit from rot, a good spray program will protect "handles" from damage and will maintain foliage health and keep sunscald at a minimum.

White Speck (Plectosporium)

Figure 5. White speck (caused by *Plectosporium*, formerly *Microdochium*) causes white or tan "pimples" on the fruit.

Black Rot

Figure 6. Black rot (caused by *Didymella bryoniae* the same fungus that causes gummy stem blight on the foliage) results in large grey lesions on fruit.

Anthracnose Fruit Rot

Figure 7. Anthracnose fruit rot (caused by *Colletotrichum* spp.) appears as smaller grey lesions on fruit.

Fusarium Fruit Rot

Figure 8. Fusarium fruit rot (*Fusarium solani*) causes a relatively dry fruit rot that initially appears as small white or pink spots as in this photo. Eventually however, the lesions may become black or tan because of saprophytic growth.

Southern Blight

Figure 9. Southern blight on pumpkin fruit (*Sclerotinia rolfsii*) appears as a fan shaped white growth embedded with small round brown "seeds".

Phytophthora Blight

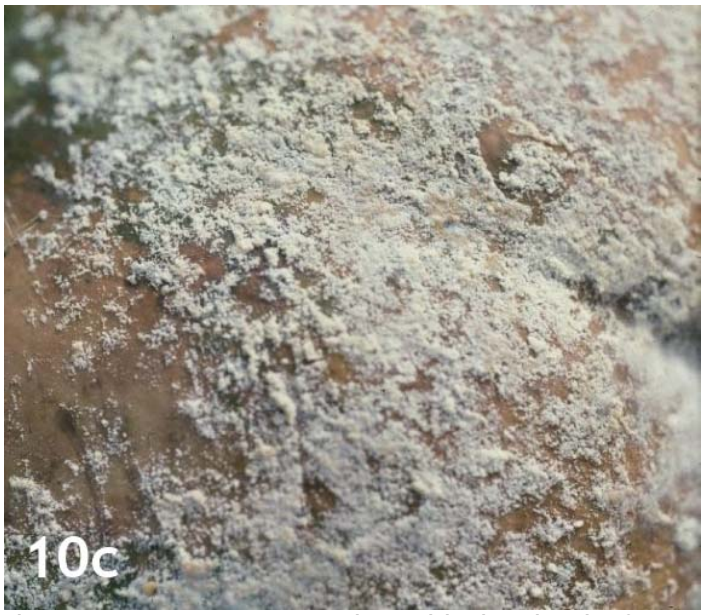

Figure 10. A young target shaped lesion (10a) of Phytophthora blight (caused by *Phytophthora capsici*). Large lesion where fruit was in contact with soil (10b). Close up image of *P. capsisi* fruit lesion with felt-like sporulation (10c).

Potato Disease Advisory #20 – July 19, 2012 - *Phillip Sylvester, Kent Co., Ag Agent*; phillip@udel.edu

Late blight Advisory
Location: Art and Keith Wicks Farm, Rt 9, Leipsic, Kent County, Delaware
Greenrow: April 20

Date	DSV	Total DSV	Accumulated P-Days	Spray Interval Recommendation
6/15-6/18	0	79	460	10-days
6/19-6/21	1	80	478	10-days
6/22-6/25	2	82	507	10-days
6/25-6/27	0	82	524	10-days
6/28-7/2	0	82	549	10-days
7/3-7/5	0	82	561	10-days
7/6-7/11	0	82	593	10-days
7/12-7/18	2	84	632	10-days

The spray interval recommendation is 10 days. The hot and dry weather we experienced earlier in the week should reduce the threat of late blight. The weather is forecast to change with lower temperatures and possible thundershowers. Maintain spray programs if the plants are still growing. There have been no reports in Delaware and no recent reports of late blight on potato in the region. Visit http://www.usablight.org/ to see where late blight has been found on potato and tomato.

Commercial fungicide recommendations can be found in the 2012 Delaware Commercial Vegetable Recommendations Guide at http://ag.udel.edu/extension/vegprogram/pdf/potatoes.pdf.

Downy Mildew Infecting Basil – *Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland*; keverts@umd.edu

Basil downy mildew has been reported in Maryland this last week in a home garden (it was previously in other mid-Atlantic states). Growers in the region should check their plants carefully for disease symptoms. Products that are labeled for Basil Downy mildew are Pro-Phyt, Fosphite, and K-Phite. These products have demonstrated some efficacy on this disease in trials. One organic option is Actinovate, which is OMRI approved.

Downy mildew infected basil: lower leaf sporulation and yellowing on the upper leaf surfaces. ➡

Agronomic Crops

Grain Marketing Highlights - *Carl German, Extension Crops Marketing Specialist*; clgerman@udel.edu

New Crop Corn Pushing Toward Historic $8.00 Mark

New crop Dec '12 corn futures may soon hit the $8.00 mark for the first time in history as the nearby Sept '12 contract did in overnight e-trade. With weekly crop conditions getting more dismal each week of the growing season, 2012 yield prospects for corn and soybeans continue to decline. On July 11 USDA estimated the U.S. corn yield at 146 bushels per acre, 20 bushels less than the June estimate. U.S. soybean production was estimated at 40.9 bushels per acre in the July report, a reduction of 3.4 bushels from June. Last week's writing alluded to the idea that these estimates were likely to be too high due to the time lag between when the data is collected and when the report is released. The point being that U.S. crop conditions have not improved since before and after the release of the report. Further, weekly U.S. crop conditions have declined for six weeks in a row as of the release of this week's report. Even if we see an improvement in crop conditions in next Monday's report the damage to the U.S. corn crop has already been done.

The 2012 drought is one of the worst the U.S. has experienced from a national perspective since the 1950s, severely impacting a good portion of the Corn Belt states. Only 31 percent of the nation's corn crop was reported as good to excellent for the week ending July 15 with 53 % reported as fair to poor. Eighteen states accounted for 92 % of the corn crop planted in 2011. National crop conditions for selected states are weighted based on 2011 planted acreage.

Market Strategy

The current situation consists of extreme market volatility. Extreme volatile markets add risks to using different marketing alternatives whether they are futures, options on futures, and/or cash markets. The added risks that are associated to the market greatly limits the opportunities to get any marketing done, although not necessarily impossible. Grain buyers are generally willing to work with producers to make any remaining old crop 2011 sales, 2012 new crop sales, and in some cases initial sales for the 2013 crop. Most grain marketers know what they can or cannot do in regard to making sales decisions. Meaning the individual producer usually knows the alternatives that they prefer to apply to making sales taking the current situation into account. In this kind of market all grain sellers should proceed with caution. Things are changing by the hour in the current market environment.

Currently, there is no carry in the corn, soybean, and SRW wheat markets. This means that the market wants to buy your grain now instead of later. Additionally, new crop corn, and soybean prices are making new life-of-contract highs almost daily. Both are strong indicators to be getting that portion of your crop that you know you are going to have at harvest sold with forward cash contracts and taking spot sales on any remaining old crop sales.

Drought markets are dictated by short crops. Short crops have long tails. This means that prices peak early to curtail demand, possibly before harvest and then tail off for a long period of time. The price peak curtails demand which is currently happening. USDA took 1.055 billion bushels out of projected U.S. corn use for the current marketing year from the June to July 11 supply/demand reports. They also increased beginning stocks by 50 million bushels from June to July. The tail off in price for a long period of time is the market looking to find the equilibrium price that will, hopefully, restore demand. Historically, no two drought markets have peaked at the same time. However, they have generally peaked anywhere from just prior to harvest, during harvest, or even into January. Remember, this year is different in that this drought is thought to be having a bigger impact on a larger portion of crop production areas than previous droughts. U.S. ending stocks for corn and soybeans are expected to drop to extremely low levels. That is why demand has to be rationed. Besides rationing demand, corn imports will be increased. It is rumored that freightliners of corn are now being lined up to

bring corn into the Wilmington, NC port from South America.

This market will turn. No one knows just when that will happen. New crop corn prices attempted to make the historic $8.00 mark this morning but have now backed off at mid-day somewhat. If it is thought that demand needs to be rationed more prices will move higher from current levels. Once that task gets accomplished then the price will turn. The weather also weighs into this because it takes significantly less rain to turn the market than to grow the crop. It is important to focus on getting new crop sales done before the market turns. Currently, in e-trade Dec '12 corn futures are trading at $7.81; Nov '12 soybeans at $16.42; and Sep '12 SRW wheat is at $9.18 per bushel.

For technical assistance in making grain marketing decisions contact Carl L. German, Extension Crops Marketing Specialist.

Announcements

2012 Summer Turf & Nursery Expo
Thursday, August 16 8:15 a.m.-3:35 p.m.
Carvel Research and Education Center
16483 County Seat Hwy
Georgetown, DE 19947

Talk & Workshop Topics

- Transportation Regulations, Laws & Safety
- Pest & Beneficial Insect Walk
- Soil Health
- Intermediate Wall, Paver (Raised Patio) Construction
- Business Planning
- Safe Tree Removal
- Proper Pruning Techniques
- CNP Plant ID Challenge & Their Potential Pests

Pesticide and Nutrient Management credits awarded for some talks/workshops. More information and registration form available online:
http://www.dnlaonline.org/pdf/programs/Summer%20Expo/2012_Summer_Turf_Expo_RegisBrochure1.pdf

Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of July 12 to July 18, 2012

Readings Taken from Midnight to Midnight

Rainfall:

0.03 inch: July 14

Air Temperature:

Highs ranged from 97.3°F on July 18 to 83°F on July 12.

Lows ranged from 76°F on July 18 to 63°F on July 13.

Soil Temperature:

83.7°F average

Additional Delaware weather data is available at http://www.deos.udel.edu/monthly_retrieval.html and http://www.rec.udel.edu/TopLevel/Weather.htm

Weekly Crop Update is compiled and edited by Emmalea Ernest, Extension Associate – Vegetable Crops