

The University of Maryland Extension Agriculture and Natural Resources Profitability Impact Team proudly presents this bi-weekly publication for the commercial vegetable and fruit industry.

Issue #8 July 8, 2010

Casual Observations from Southern Maryland

By Ben Beale
Extension Educator & CED, Agriculture
St. Mary's County

- ✓ High heat and drought conditions remain the norm in Southern Maryland. There were some isolated showers in localized areas, but overall conditions remain very dry for vegetable and fruit growers.
- ✓ Irrigation pumps continue to run on most farms, but water sources (ponds) are beginning to dry up.
- ✓ The main harvest season began last week- watermelons, lopes, sweet corn and tomatoes are all coming off normal production fields; Yields seem to be good so far.
- ✓ Hot conditions have kept late blight in check. Disease was found on three additional farms, but damage is minimal. Growers are urged to apply preventative fungicides for late blight.

Vegetable Crop Insect Update

Joanne Whalen, Extension IPM Specialist;
jwhalen@udel.edu

July 2, 2010

Melons

Continue to scout all melons for aphids, cucumber beetles, and spider mites. As a general guideline, a treatment should be considered when you find 20-30% of the plants infested with 1-2 mites per leaf. Be sure to check all labels for rates, precautions and restrictions, especially as they apply to pollinators.

Peppers

As soon as the first flowers can be found, be sure to consider a corn borer treatment. Depending on local corn borer trap catches, sprays should be applied on a

7 to 10-day schedule once pepper fruit is ¼ – ½ inch in diameter. Be sure to check local moth catches in your area by calling the Crop Pest Hotline (in state: 1-800-345-7544; out of state: 302-831-8851) or visiting our website at:

<http://ag.udel.edu/extension/IPM/traps/latestblt.html>

You will also need to consider a treatment for pepper maggot. Be sure to watch carefully for beet armyworm larvae since they can quickly defoliate plants.

Potatoes

Continue to scout fields for Colorado potato beetle (CPB), aphids and leafhoppers. Controls will be needed for green peach aphids if you find 2 aphids per leaf during bloom and 4 aphids per leaf post bloom. This threshold increases to 10 per leaf at 2 weeks from vine death/kill. If melon aphids are found, the threshold should be reduced by half.

Snap Beans

Continue to scout for leafhopper and thrips activity in seedling stage beans. As a general guideline, once corn borer catches reach 2 per night, fresh market and processing snap beans in the bud to pin stages should be sprayed for corn borer. Sprays will be needed at the bud and pin stages on processing beans. As earworm trap catches increase, an earworm spray may also be needed at the pin stage. Additional sprays may be needed after the pin spray on processing beans. Since trap catches can change quickly, be sure to check our website for the most recent trap catches and information on how to use this data to make a treatment decision in processing snap beans after bloom:

<http://ag.udel.edu/extension/IPM/traps/latestblt.html>

and

<http://ag.udel.edu/extension/IPM/thresh/snapbeanecbthres.html>.

Once pins are present on fresh market snap beans and corn borer trap catches are above 2 per night, a 7 to 10-day schedule should be maintained for corn borer control.

Sweet Corn

Continue to sample seedling stage fields for cutworms and flea beetles. You should also sample all fields from the whorl through pre-tassel stage for corn borers and corn earworms. The first silk sprays will be needed for corn earworm as soon as ear shanks are visible. Be sure to check both blacklight and pheromone trap catches for silk spray schedules since the spray schedules can quickly change. Trap catches are generally updated on Tuesday and Friday mornings:

<http://ag.udel.edu/extension/IPM/traps/latestblt.html>
and

<http://ag.udel.edu/extension/IPM/thresh/silkspraythresh.html>

You can also call the Crop Pest Hotline (in state: 1-800-345-7544; out of state: 302-831-8851). We have found the first fall armyworm in whorl stage sweet corn. A treatment should be considered when 12-15% of the plants are infested. Since fall armyworm feeds deep in the whorls, sprays should be directed into the whorls and multiple applications are often needed to achieve control.

Cucurbit Downy Mildew Updates

Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland;
keverts@umd.edu

&

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

Kate Everts- July 2, 2010

Downy Mildew on cucumber has just been confirmed in Caroline County, MD (near Denton). Cucumber growers should scout fields and look for downy mildew symptoms. If they are unsure about symptoms, get a diagnosis. In addition, cucumber growers in the mid-shore area may want to apply a fungicide targeted for downy mildew. See the Commercial Recommendation Guide for more information. Also scout the cantaloupe crop. Cantaloupes (muskmelons) are susceptible to the same strain of downy mildew that infects cucumber.

Bob Mulrooney – July 2, 2010

There have been no more reports of northern movement of downy mildew since last week. There were new reports from Sampson county NC, GA and SC. Be sure to keep current on disease occurrences by visiting <http://cdm.ipmpipe.org/>.

We are at minimal risk at the present but keep up to date by checking the IPM PIPE website at: <http://cdm.ipmpipe.org> regularly for updates.

Downy mildew was found in New York state for the first time on cucumber in Erie and Niagara counties close to the Ontario, Canada infection site. The northern march of downy has been slowed. We have had some weather patterns coming north but the clear skies and plenty of UV radiation have probably been keeping viable spore number low. We are checking our sentinel plots weekly for downy mildew here in DE.

Viruses Found in Watermelon & Cantaloupe in Central Maryland

Jerry Brust, IPM Vegetable Specialist, University of Maryland; jbrust@umd.edu

Cucumber mosaic virus (CMV) has been found in some watermelon fields in central Maryland. CMV is not uncommon in the NE United States, but in a two-year survey of pumpkin that Kate Everts, Karen Rane, Mark VanGessel and I did in Maryland and Delaware we did not detect CMV in any pumpkin field we sampled. CMV is transmitted primarily by aphids, but also by cucumber beetles, mechanically and to a lesser extent in seed. Many species of aphid can vector the virus in a non-persistent manner – the most common species in Maryland are: Melon aphid *Aphis gossypii* and Green peach aphid *Myzus persicae*. The virus is acquired by aphids within 10 seconds after they begin to probe an infected plant. The virus can be transmitted to other plants by aphids in less than one minute. This is why insecticides do not stop initial infections. Aphids lose the ability to transmit CMV after about 2 minutes and completely lose the ability after 2 hours. There are many strains or types of CMV, some isolates can lose their transmissibility by one aphid species but retain their transmissibility with another. In one field I visited there were many early season striped cucumber beetles and I think they may have been responsible for transmitting the virus from weeds to the watermelon in this field. The virus symptoms were first seen a few weeks ago – very early in the season for us to be seeing virus symptoms in watermelon fields. Some of this may be due to early season cucumber beetles transmitting the virus and some may be due to the extreme heat and drought we are experiencing. The drought is causing weeds to wither and the aphids that are present on them are moving earlier than they normally would to greener fields—like our well cared-for cucurbit fields.

The symptoms I have seen on watermelon are rather non-descript (fig. 1) and look like they could be due to many things including herbicide injury. Leaves of new growth are crinkled and deformed with a slight yellowing to them. CMV produces a systemic infection in most host plants with the older plant tissues that developed before infection rarely being affected by the

virus. Tissues that develop after infection are affected to varying degrees. The concentration of the virus increases for several days following inoculation, and then decreases until it levels off. While there is transmission through seed in 20 host species, the most important source of virus may be weeds, which allow for overwintering of the virus. In addition to seeds CMV overwinters in many perennial weeds and some crop plants. The perennial weeds wild ground cherry, horse nettle, milkweed, ragweed, pokeweed, nightshade, and various mints can harbor the virus in their roots, and in the spring the virus migrates to new growth, which aphids then transmit to susceptible crop plants. CMV is easily transferable through sap carried on the hands, clothes and tools of people harvesting fruit, weeding or turning vines in a watermelon field.

There are some CMV resistant (tolerant) cucumber varieties available that produce a good crop, but most other cucurbits are susceptible to CMV. Using reflective mulch reduces the early season infection from aphids and gives an additional 2-4 weeks of a virus-free cucurbit field. Once the plants cover the plastic the reflective mulch ceases to be an effective deterrent. Pesticides only work to reduce the in-field spread of aphids and therefore, CMV and other viruses.

I have also seen virus symptoms in cantaloupe recently. Leaves are mottled and puckered (figure 2), and symptomatic tissue tested positive in a generic potyvirus test. Initial tests for the common potyviruses Watermelon Mosaic Virus, Zucchini Yellow Mosaic Virus and Papaya Ringspot Virus were negative for these cantaloupe leaves. Additional tests are being performed to try to identify which specific potyvirus is affecting the cantaloupe.

Other Watermelon & Cantaloupe Problems

In addition to the virus problems, I have seen, especially in the last two weeks, a great increase of necrotic spot appearing on the crown leaves of watermelon plants (fig. 3). This is being caused by a combination of air pollution problems-hot humid air not moving much and the fact that the plant takes nutrients from the crown leaves when there is a heavy demand from the growing fruit. This results in the crown leaves turning brown and eventually breaking down. In cantaloupe I have seen some leaf marginal chlorosis (yellowing of leaf margins) of some leaves. This is often caused by salt deposits (from foliar nutrient or pesticide sprays) that accumulate around leaf margins, which have a toxic effect on the gas exchange pores (hydathodes) located at leaf tips. This is commonly seen under high temperature and humidity.



Fig. 1 New growth on watermelon with CMV symptoms



Fig. 2 Cantaloupe with potyvirus symptoms



Fig.3 Necrotic spots on watermelon crown leaf



Fig. 4 Marginal chlorosis of cantaloupe leaf

Vegetable Disease Update

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

July 2, 2010

Bacterial Wilt

Bacterial wilt on slicing cucumbers was diagnosed this week. Symptoms on this planting were random wilting of several runners on 20% of the plants. Sticky strands of bacterial ooze can be seen when the cut ends of the wilted runners are touched together then slowly drawn apart. Striped and spotted cucumber beetles carry the bacteria on their mouthparts and inoculate them when they feed on the succulent stems early in the season. Bacterial wilt is not seed borne and does not persist in the soil more than 2-3 months. It is thought that the bacteria acquire the bacteria from infected weed or volunteer cucurbit hosts. Cucumber beetle control is the primary control method.



Strands of bacterial ooze from touching cut ends of infected runner and pulling them apart slowly

Potato and Tomato Late Blight Webinar for Home Gardeners

Rutgers, Penn State and Cornell University vegetable plant pathologists will be holding a [Webinar on Potato and Tomato Late Blight](#) for home gardeners on July 13, 2010 at 6:30 PM. You are encouraged to participate in this timely topic. The linked announcement has all the information to enroll. It will be a good review for commercial producers as well.

Pythium Blight or Cottony Leak on Snap Beans

Pythium blight or cottony leak on snap beans was diagnosed early this week. This disease likes the hot, humid conditions that we had before this recent break in the weather. When we go back to the humid weather again with scattered showers and irrigation this disease can be a threat. Look for the cottony white

growth in the lower canopy and on pods close to the ground. There is a 24c registration for Ridomil Gold Copper (2 lbs/A) for prevention of Pythium blight in DE, MD and VA. Several applications may be necessary if favorable weather persists.

Cucurbit Powdery Mildew

Powdery mildew on cucurbits has been reported in New Jersey. Delaware growers should be scouting and begin applying fungicides for powdery mildew once 1 old leaf in 45 has been found with powdery mildew. See the article titled [Powdery Mildew on Cucurbits](#) in [WCU 18:15](#) for suggested fungicides.

Pepper Anthracnose

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

Symptoms of pepper anthracnose on fruit 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 fungicides before symptoms appear, especially in fields or areas of the 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 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.



Anthracnose on bell pepper fruit

Early Blight on Potato & Tomato

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

On both potato and tomato early blight produces large brown areas on the leaf, usually with a concentric ring pattern. On potato early blight usually begins after flowering on susceptible varieties, especially once potatoes or tomatoes begin to senesce. The disease is favored by high humidity and periods of leaf wetness. Optimal temperatures for infection range from 75-80°F.

Control of early blight begins with crop rotation then protectant fungicides, such as chlorothalonil or mancozeb, should be applied every 7 to 10 days, depending on the weather. Once flowering occurs on potato a systemic fungicide is recommended for several sprays, especially if a susceptible variety is grown or early blight is found in the field. Systemic fungicides recommended for early blight control on potato include: Endura, Gem, Headline, Quadris, Reason, Revus Top, and Tanos. As always, follow pesticide labels for rates and usage. Revus Top and Tanos will also offer suppression of late blight. See the Potato Disease Advisory for P-day accumulations to predict early blight appearance. The same fungicide list applies for tomato, just substitute Cabrio for Headline. Alternate the protectant fungicide with the systemic fungicide combined with a protectant as per label instructions.



Early blight on potato



Early blight on tomato

Watermelon Gummy Stem Blight Fungicide Programs in 2010

Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland;
keverts@umd.edu

Our weather has **not** been highly conducive to gummy stem blight or anthracnose in the last two weeks. Therefore, under low disease pressure a good strategy is to apply Bravo on a 7-day schedule.

Alternatively, our trials over many years have demonstrated that under low disease pressure the spray intervals can be lengthened. Following the weather forecaster 'MELCAST' at:

<http://mdvegdisese.umd.edu/forecasting/index.cfm>

Use this site to determine the safe interval that can be used without the likelihood of risking disease increases.

There are several fungicides available for gummy stem blight management. Although several products are available, the usefulness of some of these products is limited by resistance development in the pathogen. On Delmarva we have confirmed the presence of resistance in *Didymella bryoniae*, the pathogen, to fungicides in the FRAC code group 11 (strobilurins, including Quadris and Cabrio) and FRAC code 3 (demethylation inhibitors or DMIs, including Topsin M). Resistance to Pristine exists in Georgia, and therefore Pristine is not recommended in that state. We have not yet detected resistance to Pristine here. However many of our transplants are grown in the south and it would not be surprising to find that resistance has been introduced here.

The following are fungicide programs that performed well in trials in Maryland and other areas in the southeast US in 2009:

- Switch 14 fl oz/A (1 day PHI; FRAC codes 9 and 12) alternated with Bravo
- Folicur 8 fl oz/A (7 day PHI; FRAC code 3) alternated with Bravo
- Inspire Super at 20 oz/A (7 day PHI) alternated with Bravo (Inspire Super is a new product that has two active ingredients. Although one component is in the FRAC code 3 group – Inspire Super performed very well in 2009.)
- Pristine 12.5–18.5 oz/A (0 day PHI; FRAC codes 11 and 7) alternated with Bravo (Pristine continues to perform very well in my trials -it usually ranks at the top, although it is not always significantly better than other products. However, because it performs very poorly in Georgia trials and because of the potential for resistance development, use caution and monitor disease levels carefully, if you choose to use Pristine.)

Watermelon is susceptible to other diseases as well. Scout for downy mildew, Phytophthora fruit rot and powdery mildew. The presence of these diseases will require additional fungicide applications with products with different modes of action.

Powdery Mildew Control on Cucurbits

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

Continue to scout cucurbits for powdery mildew. Symptoms typically begin on older, lower leaves and can spread rapidly under dry, humid conditions. Control of powdery mildew begins with regular scouting for symptoms and weekly fungicide applications. Begin a fungicide program when one lesion is found on the underside of 45 leaves. For control of cucurbit powdery mildew in:



Pumpkin and Winter Squash:

Alternate:

Rally (myclobutanil, 3) at 5.0 oz 40WSP/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Procure (triflumizole, 3) at 4.0 to 8.0 oz 50WS/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Folicur (tebuconazole, 3) at 4.0 to 6.0 fl. oz 3.6F/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

With one of the following:

Micronized Wettable Sulfur (M2) at 4.0 lb 80W/A (Sulfur may injure plants especially at high temperatures. Certain varieties can be more sensitive. Consult label for precautions.)

or

chlorothalonil *plus* Pristine (pyraclostrobin + boscalid, 11 + 7) at 12.5 to 18.5 oz 38WG/A

or

Quintec (quinoxifen, 13) at 6.0 oz 2.08F/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

When Powdery mildew has become well-established in the mid- to late part of the season, only apply protectant fungicides such as chlorothalonil or sulfur.

Summer Squash and Cucumber:

Alternate:

Rally (myclobutanil, 3) at 5.0 oz 40WSP/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Procure (triflumizole, 3) at 4.0 to 8.0 oz 50WS/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Folicur (tebuconazole, 3) at 4.0 to 6.0 fl. oz 3.6F/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

With a tank mix containing:

chlorothalonil *plus* Pristine (pyraclostrobin + boscalid, 11 + 7) at 12.5 to 18.5 oz 38WG/A

Muskmelon and Watermelon:

Alternate:

Rally (myclobutanil, 3) at 5.0 oz 40WSP/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Procure (triflumizole, 3) at 4.0 to 8.0 oz 50WS/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

Folicur (tebuconazole, 3) at 4.0 to 6.0 fl. oz 3.6F/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

With a tank mix containing:

Quintec (quinoxifen, 13) at 6.0 oz 2.08F/A *plus* chlorothalonil at 2.0 to 3.0 pt 6F/A

or

chlorothalonil *plus* Pristine (pyraclostrobin + boscalid, 11 + 7) at 12.5 to 18.5 oz 38WG/A

For more information on control of powdery mildew of cucurbits please see the [2010 Delaware Commercial Vegetable Production Recommendations Guide](#).

Blossom End Rot in Tomatoes

Jerry Brust, IPM Vegetable Specialist, University of Maryland; jbrust@umd.edu

This is just a quick reminder that we are in very dry conditions right now and tomato plants are putting on large fruit at the same time they are flowering profusely. Everyone knows that blossom end rot is caused by too little calcium in the fruit while it is developing, usually from the time of flowering until it is the size of a quarter. Most of the blossom end rot I have seen in tomato is due to too little water supplied to tomatoes during dry, very hot periods like we are having now. Some varieties are much more sensitive to dry conditions and will show severe blossom end rot symptoms while other varieties do not. Your tomato plants are going to need more water than you may be used to giving them over the next few weeks if conditions remain hot and dry.



Blossom end rot on tomato fruit

Tomato Pith Necrosis Found in Maryland

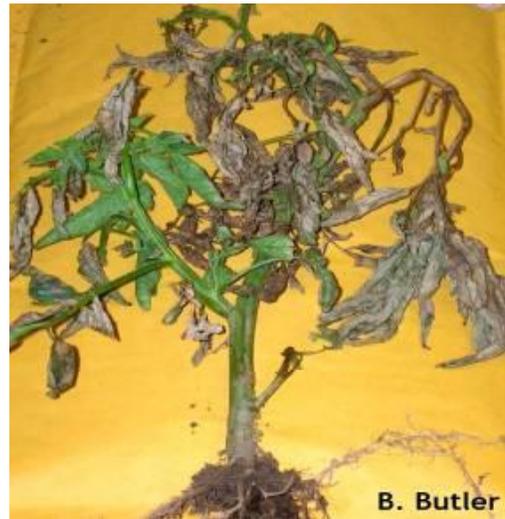
Jerry Brust, IPM Vegetable Specialist, University of Maryland; jbrust@umd.edu

&

Karen Rane, Director
UMD Plant Diagnostic Laboratory

In the last few days we have received tomato samples that have the same unusual disease called Tomato pith necrosis. Tomato pith necrosis is caused by the soilborne bacterium *Pseudomonas corrugata*. Pith necrosis has occurred infrequently in Maryland over the past few decades. The disease usually is found in early planted tomatoes when night temperatures are cool, but the humidity is high, and plants are growing too rapidly **because of excessive nitrogen** application. Once night temperatures warm up, the plants usually outgrow the problem. We have had an early spring, which has allowed many growers to plant their crops 2-3 weeks earlier than normal. We then had cool nights in May and at times high humidity. In the field, diseased plants occur randomly with initial symptoms often being seen as the first fruit clusters reach the mature green stage. Symptoms include chlorosis (yellowing) of young leaves and shoots, followed by wilting of the infected shoots in the upper part of the plant canopy (Fig. 1). This wilting is usually associated with internal necrosis at the base of the stem. Black streaking may be apparent on the surface of the main stem, which often splits (Fig. 2). When the stem is cut open along its length, the pith will be discolored and may have hollow areas (Fig. 3). There is often prolific growth of adventitious roots in the stems with discolored pith, and the stems may appear swollen.

There is not much that can be done for control of pith necrosis. The best practice is prevention by avoiding the use **of excessive amounts of nitrogen** in tomato, especially early in the season when nights are still cool. Using plant activators such as acibenzolar-S-methyl (Actigard) have resulted in 55% disease reductions, but applications must be started before symptoms appear. There is some evidence that the pathogen may be seedborne, but more research is needed on the epidemiology and management of this disease.



B. Butler
Figure 1. Whole plant symptoms of tomato pith necrosis



K. Rane
Figure 2. Splitting of the main stem and darkened pith caused by tomato pith necrosis



K. Rane
Figure 3. Discolored pith and prolific adventitious root growth cause by tomato pith necrosis

Watch for Phytophthora Fruit Rot on Cucurbits

Bob Mulrooney, Extension Plant Pathologist,
University of Delaware bobmul@udel.edu

Be on the lookout for Phytophthora fruit rot on cucurbits, especially watermelon. After last seasons' losses from Phytophthora fruit rot due to the excessive rainfall in 2009, growers should be thinking about the possibility of fruit rot this season. We are at risk for Phytophthora blight if the scattered thunder storms, along with the frog-strangling rains that we can get.

Phytophthora blight is a tough disease to control, but if you have cucurbits in fields that had fruit rot last season you are at very high risk if the soil stays saturated even for a few hours. This is a fungus that moves in water and the spores will move where water goes. (Spores will not move more than a few feet in the air.) Some additional cultural controls would be rotation (5 years or more) for watermelons, sub-soiling between the rows before they close to help water drain faster and to keep the fruit out of standing water.

Fungicides will only suppress the disease and those that have the best activity are the following: Presidio, Revus, Ranman plus a surfactant (see label), Forum, Gavel and Tanos. Depending on the test, the season, and the location, the efficacy of these fungicides varies. However, proper application of these products will result in better yields than in untreated fields. Remember that Revus and Forum are Group 40 fungicides and have the same mode of action, so they should not be applied in succession. All of these fungicides, except Ranman, should be tank mixed with fixed copper if the label allows. **Fixed copper is not compatible with Ranman plus the surfactant. Good coverage of fruit is very important.**

On pickling cucumbers, fruit rot fungicides should be applied soon after flowering when the fruit are one inch long and repeated once they are three inches long for the best results. Data from Michigan State indicate that Presidio, Revus, Gavel, Forum (Acrobat), and Ranman provide suppression of fruit rot. Remember that Revus and Forum are Group 40 fungicides and have the same mode of action, so they should not be applied in succession.

Magnesium Deficiencies in Vegetables

Gordon Johnson, Extension Vegetable & Fruit Specialist; gcjohn@udel.edu

I have recently looked at a field of pickling cucumbers with areas that showed symptoms of magnesium deficiency. Magnesium (Mg) is considered a secondary macroelement and is essential for plant growth. It is a component of chlorophyll, the green pigment that captures light energy in photosynthesis. The chlorophyll molecule has a porphyrin ring with a magnesium atom at the center. Therefore, deficiencies of magnesium will result in reduced chlorophyll production and yellowing of plants.

In most vegetable crops, magnesium deficiency commonly first appears as yellow or white areas between the veins of older leaves. As the deficiency progresses, the yellowed areas may turn into dead spots. Older leaves in plants may also have a purple or bronze appearance and leaf tips and margins may brown and die. The plants may be stunted and have an overall yellow appearance. Symptoms are most severe on older leaves because magnesium is a mobile element in plants and will be scavenged from older leaves and transported to new growth.

In Delaware, magnesium deficiencies are most commonly found in sandy, acid soils with a pH below 5.4. Therefore, magnesium deficiencies are commonly not field wide, but will be in areas of a field with depressed pH such as "sand hills" that have been excessively leached. Often, a whole field's pH will be in an acceptable range so it is critical to check the soil pH in affected areas. Tissue tests should be considered to confirm the magnesium deficiency.

Excessive levels of potassium can also induce magnesium deficiency where available magnesium levels are low to moderate to begin with.

Commonly, magnesium is applied to soils with dolomitic limestone (Hi-Mag lime). Sulfate of potash and magnesia (K-Mag, Sul-Po-Mag) is a naturally mined mineral deposit that can also be applied to add magnesium to soils. Other magnesium sources include magnesium sulfate (same as Epsom Salts), magnesium oxide (basic slag), and magnesium chloride.

To correct a deficiency in growing vegetables, soluble magnesium sources should be used. Foliar applications are effective but must be applied in a dilute solution to avoid salt injury. Spray 20 lbs of a soluble magnesium source (20 lbs of magnesium sulfate for example) in 100 gallons of water per acre (10 lbs in 50 gallons or 5 lbs in 25 gallons). Dry broadcasts of 15-25 lbs of actual magnesium per acre, irrigated in, or fertigation with similar amounts from

soluble sources will also be effective. Sidedress applications may also be effective at 15-20 lbs of actual magnesium per acre. For drip irrigated vegetables, soluble magnesium fertilizers can be applied through the drip system.

Magnesium deficiencies corrected early enough in the growing season will often result in little yield loss. However, it is critical to target affected fields with corrective liming for future crops in the rotation. Variable rate liming may be considered and is recommended where there is excessive variability in pH in a field.

If pH is below 5.2 and vegetables are still small, dolomitic limestone may be broadcast over the top and cultivated in to correct pH related problems. This should be coupled with a foliar magnesium application to more quickly address the magnesium deficiency.

In vine crops, low pH may also be a causal factor for manganese toxicities and you may see both magnesium deficiency and manganese toxicity in the same field. Manganese toxicity symptoms in melons will initially show up as small yellow spots on upper leaf surfaces. On lower leaf surfaces you will see dead spots with water soaked rings around these dead spots. As the deficiency worsens, these leaf areas will turn brown and die. In watermelons, manganese toxicity will show up as black speckling on the lower leaf surfaces and extensive vein browning. However, manganese toxicity is not common in watermelon. For a review of manganese toxicity in cantaloupes refer to an article by Jerry Brust in the WCU archives [Volume 14, Issue 15, July 7, 2006](#).

Insecticide Update: Endosulfan (Thionex)

Joanne Whalen, Extension IPM Specialist;
jwhalen@udel.edu

This news release was received as an EPA Pesticide Program Update from EPA's Office of Pesticide Programs on June 10, 2010.

"EPA Moves to Terminate All Uses of Insecticide Endosulfan to Protect Health of Farmworkers and Wildlife.

"The U.S. Environmental Protection Agency (EPA) is taking action to end all uses of the insecticide endosulfan in the United States. Endosulfan, which is used on vegetables, fruits, and cotton, can pose unacceptable neurological and reproductive risks to farmworkers and wildlife and can persist in the environment.

"New data generated in response to the agency's 2002 decision have shown that risks faced by workers are greater than previously known. EPA also finds that there are risks above the agency's level of concern to



aquatic and terrestrial wildlife, as well as to birds and mammals that consume aquatic prey which have ingested endosulfan. Farmworkers can be exposed to endosulfan through inhalation and contact with the skin. Endosulfan is used on a very small percentage of the U.S. food supply and does not present a risk to human health from dietary exposure.

"Makhteshim Agan of North America, the manufacturer of endosulfan, is in discussions with EPA to voluntarily terminate all endosulfan uses. EPA is currently working out the details of the decision that will eliminate all endosulfan uses, while incorporating consideration of the needs for growers to timely move to lower-risk pest control practices.

"Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), EPA must consider endosulfan's risks and benefits. While EPA implemented various restrictions in a 2002 re-registration decision, EPA's phaseout is based on new data and scientific peer review, which have improved EPA's assessment of the ecological and worker risks from endosulfan. EPA's 2010 revised ecological risk assessment reflects a comprehensive review of all available exposure and ecological effects information for endosulfan, including independent external peer-reviewed recommendations made by the endosulfan Scientific Advisory Panel.

"Endosulfan, an organochlorine insecticide first registered in the 1950s, also is used on ornamental shrubs, trees, and herbaceous plants. It has no residential uses."

For more information, you can go to the following link: <http://www.epa.gov/pesticides/reregistration/endosulfan/endosulfan-cancl-fs.html>

Fertigating Drip Irrigated Vegetables

Gordon Johnson, Extension Vegetable & Fruit Specialist; gjohn@udel.edu

Fertigation is the term used when soluble fertilizer sources are delivered through the irrigation system to crops. Drip irrigation is an ideal means to fertigate and to deliver mineral nutrients to vegetables during the growing season. Nutrients are carried with the irrigation water right to the root zone where they can be efficiently taken up by vegetable plants.

There are several strategies for fertigating vegetable plants. One strategy is to split fertigation so that crop nutrient needs, after preplant fertilizers are accounted for, are delivered in 4-5 applications just prior to critical growth stages. For example, for fruiting vegetables, the first fertilizer application through the drip system would be done after planting when plants

have become established, the next prior to rapid vegetative growth, the next at flowering or early fruit formation, and the last during fruit expansion. For crops that have long fruiting and harvest periods, an additional application would be made after first harvest to encourage continued production.

Other strategies use weekly applications or applications of fertilizers through the drip system every time the crop is irrigated. In these systems, smaller amounts of fertilizers are applied each time and rates are increased as plants get larger. This requires a somewhat higher level of management.

For general vegetable fertigation through the drip, a 1-1-1 N-P₂O₅-K₂O ratio soluble fertilizer (such as 20-20-20) is recommended. Where phosphorus (P) levels are very high, lower P ratios are appropriate (such as a 21-5-20). In some vegetables, only nitrogen (N) sources will be needed if soil fertility (P and K) are high. Soluble potassium nitrate and calcium nitrate are often used in combination in crops such as tomatoes and plasticulture strawberries to provide N, K (potassium), and Ca (Calcium).

Fully soluble fertilizers must be used for fertigation. Those in dry form must be mixed with water until they fully dissolve to create a concentrated stock solution. Those already in liquid form should be checked to make sure there has been no salting out of nutrients during storage – if salting out has occurred, you will need to make sure the fertilizer re-dissolves by agitation prior to use. It is important to know how much fertilizer is contained in these liquid stock solutions to match to injection rates.

A good quality fertilizer injector matched to the flow rate of your drip system is important to deliver the fertilizer the length of each bed uniformly in the field. Run the drip system to fill the drip tubes and come to steady pressure, start injecting, and then continue injecting using an injection rate that matches the irrigation period. You may then run the irrigation for a short period after fertigation to flush the lines. It is important not to over-irrigate as nutrients may be moved out of the root zone (especially N). Fertigation rates should be based on a mulched acre – that is only the amount of ground covered by plastic mulch.

For more information on fertigation go to our Commercial Vegetable Production Recommendation guide at:
<http://ag.udel.edu/extension/vegprogram/pdf/CIrrigation.pdf> starting on page C-5.

Vegetable & Fruit Headline News

A bi-weekly publication for the commercial vegetable and fruit industry available electronically in 2010 from March through September on the following dates: March 18; April 1 & 15; May 6 & 20; June 3 & 17; July 8 & 22; August 5 & 19; September 2 & 16.

**Published by the University of Maryland
Extension Agriculture and Natural Resources
Profitability Impact Team**

Submit Articles to:

Editor,
R. David Myers, Extension Educator
Agriculture and Natural Resources
7320 Ritchie Highway, Suite 210
Glen Burnie, MD 21061
410 222-6759
myersrd@umd.edu



Article submission deadlines for 2010: March 17 & 31; April 14; May 5 & 19; June 2 & 16; July 7 & 21; August 4 & 18; September 1 & 15.