VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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LATE BLIGHT OF TOMATO UPDATE - *(Dan Egel)* - ***The following article was written as a Vegetable Crops Hotline – BULLETIN, June 01, 2010.*** Late blight of tomato has been confirmed on tomatoes in Boone County KY located in northern KY between Indiana and Ohio. It is likely that other reports of late blight of tomato from Kentucky will be forthcoming. Recently, this disease has also been confirmed in Pennsylvania, Maryland, Louisiana and Florida. A new web page dedicated to updating late blight information can be found here <**www.ppdl.purdue.edu/PPDL/lateblight.html**>.

Tomato growers should take action to reduce the chance late blight will become a serious production issue. All growers should scout tomatoes carefully for symptoms of this disease. Transplants should be inspected for late blight before accepting shipment. Crop rotation and fall tillage should have been practiced for this 2010 crop. Volunteer tomatoes or potatoes should be rogued. Plants suspected of harboring late blight should be sent to the Plant and Pest Diagnostic Laboratory or contact your county educator or Dan Egel. One of the preventative fungicide programs described below should be put into place. The fungicide program used will depend on the value of one's crop and one's willingness to purchase specialized fungicides.

Growers who are far from the reported outbreak and/or cannot afford an expensive fungicide program should at least apply contact fungicides every 7 days or perhaps sooner. Contact fungicides such as those that contain chorothalonil (e.g., Bravo®, Echo®, Equus®) or mancozeb (e.g., Dithane®, Manzate®, Penncozeb®) will slow the rate of spread of late blight. However, these products will not be as effective as some of the specialized systemics described below.

Growers who are willing to spend more on their tomatoes may want to consider a program that includes Revus Top®. This fungicide contains 2 active ingredients and so should be effective against the common threats of early blight, Septoria leaf blight, anthracnose as well as late blight. If Revus Top® is alternated with Quadris® or Cabrio®, these products should be tank mixed with a contact fungicide. Gavel® contains a contact fungicide (mancozeb) in addition to a systemic product labeled against late blight and therefore does not need to be tank mixed with anything else.

The specialized systemic products that are the most effective against late blight include Curzate®, Gavel®, Previcur Flex®, Ranman® and Tanos® (as well as Revus Top®). With the exception of Revus Top® and Gavel® these products will have little or no activity against the common tomato disease we observe most years. Therefore these products cannot be used instead of our usual fungicide products.

Organic growers should apply a copper product on a 5-7 day schedule.

Always read the product label of any pesticide carefully before use.

The ***Midwest Vegetable Production Guide for Commercial Growers 2010 (ID-56)*** <**www.btny.purdue.edu/Pubs/ID/ID-56/**> lists these recommended products in more detail. The ***Vegetable Crops Hotline*** issue no. 512 contains more information about late blight of tomato. The ***Purdue University Bulletin BP-80-W*** <**www.extension.purdue.edu/extmedia/BP/BP-80-W.pdf**> has information and photographs of late blight.

Contact Dan Egel for more information at (812) 886-0198 or <**egel@purdue.edu**>.

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CORN EARWORMS - *(Rick Foster)* - The weekend of May 22-23 we had a pretty significant flight of corn earworm moths. As a result, I sent out a bulletin warning early sweet corn growers of the danger posed by this earlier than normal flight of moths. Subsequently, we have not caught any additional moths. It appears that the moths we caught over the weekend must have been migrants from southern regions that came north on weather fronts. While it appears that the danger of serious damage has passed, growers are still encouraged to continue

monitoring their pheromone traps. (*Editor's note: Color photographs of corn earworm larva and adults can be found on page 165 of the* ***Midwest Vegetable production Guide for Commercial Growers-ID-56*** <**www.btny.purdue.edu/Pubs/ID/ID-56/**>.)

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Late Blight of Potatoes - *(Dan Egel)* - With all the publicity that late blight of tomato has generated, it is sometimes forgotten that late blight is also a serious disease of potatoes. In fact, this is the disease responsible for the Irish Potato Famine of the 1840's.

All strains of the fungus-like organism that causes late blight are aggressive on potatoes. However, not all strains are aggressive on tomatoes. Stated another way, if the fungus-like organism causes disease on tomato, it will also cause disease on potato. In contrast, the fungus-like organism from late blight of potato may or may not cause a serious disease on tomato. Therefore, the late blight outbreak reported from northern Kentucky threatens potatoes as well as tomatoes.

The management methods for late blight of tomatoes discussed in this issue also apply to potatoes. Growers who consult the ***Midwest Vegetable Production Guide for Commercial Growers 2010*** <**www.btny.purdue.edu/Pubs/ID/ID-56/**> will notice in addition to the products listed for late blight of tomato, Omega is listed for late blight control of potatoes.

Potato growers should scout for late blight symptoms (Figure 1) and consider a preventative fungicide program.

Figure 1: Lesion of late blight on a potato leaf. Potato growers should scout their fields for late blight symptoms and consider a preventive fungicide program. *(Photo by Dan Egel)*

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Performance of Preemergence Herbicides - *(Liz Maynard)* - Soil applied herbicides that kill weeds as they germinate or soon after rarely control all the weeds in a field. Cultivation, hand weeding, and postemergence herbicides are used to manage the escapes. When a soil applied herbicide has been particularly ineffective it's worthwhile to take a look at the weed species that were not controlled as well as their distribution to help determine why the herbicide was not as effective as hoped. There may be changes that could be made to improve control in the future. Here are some common reasons that weeds escape control of soil-applied herbicides.

1. Herbicide rate too low for soil type. Organic matter and/or clay reduce activity of certain soil applied herbicides. Recommended application rates take this into account. Variation in soil across the field may result in less-than-optimal rates in areas with higher organic matter or clay.
2. Herbicide not moved into the zone of weed seeds germination. Rain, irrigation, or physical incorporation is required to distribute herbicides into the soil where they will affect weed seedlings. Too little rain leaves the herbicide on the soil surface; too much can move it too deep into the soil. Likewise, if not properly done physical incorporation may leave the herbicide too close to the surface, or mix it into too large a volume of soil.
3. Cloddy soil prevents uniform distribution of herbicide in the soil. If soil is cloddy, uniform incorporation of the herbicide is difficult. Weed seeds in the middle of clods may not be exposed to high enough concentration of herbicide to kill the seedling as it emerges.
4. Herbicide is not active against particular weed species. None of the soil-applied herbicides used in vegetables are equally effective against all common weeds. A herbicide may do a great job on several species, but if it is not good on one it may appear from a distance that the herbicide didn't work at all. In the future plan in advance to include control options that are effective against that particular weed.
5. Resistant biotypes of a particular species are present in the field. There are some particular weed species with populations resistant to particular herbicide modes of action, for instance triazine-resistant lambsquarters or sulfonylurea-resistant amaranth species. I would not consider this a common or widespread problem in Indiana vegetable fields.
6. Finally, an improperly calibrated sprayer, error in calculation of proper rate or measurement of chemical, or inadequate coverage of ground with the sprayer can result in not enough herbicide applied.

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Cabbage Caterpillars - *(Rick Foster)* - Damaging populations of all three of the important species of caterpillars that attack crucifers, the diamondback moth, cabbage looper, and imported cabbageworms have been observed in the Lafayette area (Figures 1, 2, and 3 - next page). This is somewhat early for cabbage loopers to be present in numbers this high. They usually show up later since they don't overwinter this far north. However, the warm spring has caused a lot of insects

to become active earlier than normal. There are lots of insecticide choices for control of these pests. See **ID-56** (***The Midwest Vegetable Production Guide for Commercial Growers***) for details. *Bacillus thuringiensis* products are generally effective for all of these caterpillars, but are less effective against loopers. If cabbage loopers are your primarily pest species, you probably should choose a different insecticide.

Figure 1: Cabbage loopers have been observed earlier than normal in Indiana. *(Photo by John Obermeyer)*

Figure 2: Diamond back moth larvae on cabbage. *(Photo by John Obermeyer)*

Figure 3: Imported cabbage worm on cabbage. *(Photo by John Obermeyer)*

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Thoughts on Colony Collapse Disorder - *(Greg Hunt)* - The buzz about colony collapse disorder or CCD still has not died down. I still haven't seen the classic symptoms of this syndrome that was first reported in 2006 - rapid dwindling of bees in the hive with lots of brood still present, and no dead or sick bees to be seen. This has made me a skeptic about whether this is a real syndrome. But I have seen similar things - rapid dwindling over a period of weeks to a month, often with some brood disease and sometimes evidence of virus symptoms such as deformed wings. Whenever I have seen this it seems that there is almost always high levels of Varroa mites present. Varroa mites are known to transmit viruses to bees and weaken their immune responses as they suck their blood. Left unchecked, they will eventually kill your bees. These are relatively large (compared to their host) parasitic mites that came from Asian honey bees and showed up in the US twenty years ago. Ever since, our beekeeping industry has been in crisis mode and we have been losing about a third of our bees every winter. This was what the average winter loss was before CCD made the news and it is still what we were losing during the CCD period.

There were some pretty heavy winter die-offs (up to 50%) of bees in Indiana this last year, a situation that was coupled with poor fall honey flows from the flowers and high mite levels. A recent paper in the online journal PLOS One looked at colonies showing CCD symptoms and healthy colonies. After looking at pesticides and pathogens in these hives, the only common thread in all this was that healthy hives had higher levels of the miticides that are used to kill Varroa mites in the wax combs. The authors suggested that maybe Varroa mites are a factor in this syndrome. The most recent surveys of factors associated with winter losses of bee hives in the US, Canada and Europe, all found that the presence of Varroa mites in the fall was the most significant risk factor in winter die-offs. Our bees are weakened at times by new systemic pesticides and the stresses of poor nutrition or transportation on trucks over long distances. These could be contributing factors in the bee losses. But in my opinion, we cannot conclude that CCD is anything new. Maybe CCD = Varroa + virus. It should be noted just for historical accuracy that there have also been mysterious bee declines prior to the arrival of the mites. Sometimes bee colonies dwindled for mysterious reasons and the term "disappearing disease" was coined. Here is a quote from the report of the Secretary of Agriculture from 1869: "During the past season a disease suddenly appeared in Indiana, Kentucky and Tennessee, sweeping away whole apiaries. So quiet were its operations that the beekeepers became aware of its existence only by the disappearance of their bees. The hives were left, in most cases, full of honey, but with no brood and little pollen; the whole appearance of the hive causing the casual observer to suppose that the bees had emigrated."

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Powdery Mildew of Muskmelon - *(Dan Egel)* - The keys to managing powdery mildew of muskmelon have been host resistance and the application of systemic fungicides in a timely manner (Figure 1). Observations

Figure 1: Powdery mildew on a muskmelon leaf. Note that symptoms have accumulated in an area of the leaf that is shaded and remains more humid. *(Photo by Dan Egel)*

suggest that a new race of the powdery mildew fungus has overcome host resistance. Therefore, application of systemic fungicides for powdery mildew is critical. Work conducted at SWPAC suggests that the following fungicides should be used to manage this important disease. Fungicides omitted from this list are not recommend.

- Quintec® is labeled on muskmelon and watermelon and has been very effective in my tests. This product is not systemic, but can relocate on leave surfaces via a vapor phase. However, since it is not systemic, it will not enter the leaf and have any effect on existing infections. Therefore, be sure to apply Quintec® before powdery mildew is observed and/or mix Quintec® with a systemic fungicide labeled below. Quintec® is a Group 13 fungicide and should not be applied in sequential applications (see the label).
- Procure® and Rally® (formerly Nova®) are Group 3 fungicides and have been effective in my tests. They are both systemic. Again, do not apply these fungicides in sequence. These fungicides are labeled for pumpkins.
- Folicur®/Monsoon® is now labeled for muskmelon, watermelon and pumpkin. It is a Group 3 fungicide. This product has performed very well in my tests. Note this product is labeled for gummy stem bight as well.
- Inspire Super® is labeled and should be effective against powdery mildew. I will perform tests this year. For more information about this product and anthracnose and gummy stem blight, see issue 522.
- The fungicide Pristine® has active ingredients in Group 7 and Group 11. The Group 7 portion of the fungicide is moderately effective against powdery mildew and can be used in alternation or mixed with the fungicides above. Note that the fungus that causes gummy stem blight of muskmelon and watermelon has been observed to be resistant to Pristine in parts of Indiana.
- Organic growers do not have systemic products certified for their production. However, copper products may have some effectiveness against powdery mildew. Oxidate® may also help to manage this disease. A biological product that may have effectiveness is Serenade®. It is critical with all these products to obtain excellent coverage.

Apply fungicides 10 to 14 days before first harvest of muskmelon. Watermelon has not been affected by powdery mildew. Notify me if you see symptoms on watermelon (Figure 2). I would continue to purchase muskmelon hybrids with resistance to powdery mildew. The ***Midwest Vegetable Production Guide for Commercial Growers for 2010*** has additional information <**www.btny.purdue.edu/Pubs/ID/ID-56/**>. Always read the fungicide label carefully before application.

Figure 2: Powdery mildew on watermelon leaves tends to show up as round, chlorotic areas. *(Photo by Dan Egel)*