Vegetable Crops Hotline

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

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IN THIS ISSUE

Fusarium wilt of watermelon - *(Dan Egel, Shubin K. Saha, Nathan Kleczewski)* - This disease was observed on seedless watermelon seedlings in transplant trays. Symptomatic seedlings were scattered randomly throughout transplant trays. The lower portion of the stem below the seed leaves (hypocotyl) was often darkened and necrotic (see Figure 1). The vascular tissue of the inside of the stem was discolored. The leaves of affected seedlings were often wilted and necrotic as a result of the infection (see Figure 2).

Fusarium wilt is a regular visitor to commercial watermelon fields in Indiana. In 2005 and 2006, several instances of Fusarium wilt were reported on watermelon transplants still in trays. The most likely cause of such instances of Fusarium wilt is seedborne transmission. However, we have also been able to show that the use of contaminated transplant trays can cause Fusuarium wilt to appear the next time the trays are used.

Watermelon transplants should be carefully inspected for symptoms of Fusarium wilt. Symptomatic seedlings should not be planted; such seedlings will introduce the Fusarium wilt fungus into your field. Even apparently healthy seedlings may also become diseased after planting. New transplant trays should be used each year or the trays should be carefully cleaned and sanitized. Greenhouse sanitation is critical to avoid reoccurrence of Fusarium wilt.

The field phase of Fusarium wilt of watermelon has been discussed in issue number 531 of the *Vegetable Crops Hotline* **http://www.btny.purdue.edu/pubs/vegcrop/VCH2010/VCH531.pdf** and in BP-141 **http://www.extension.purdue.edu/extmedia/bp/bp-141-w.pdf**.In brief, management options include long crop rotations and partial resistance of cultivars. Evaluation of host resistance in watermelon cultivars is tested each year at the Southwest Purdue Agricultural Center. The results of these tests are shared at the winter technical meeting of the Southern Indiana Melon and Vegetable Association, the *Midwest Vegetable Variety Report* **http://www.hort.purdue.edu/fruitveg/reports.shtml** and the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) **http://www.btny.purdue.edu/Pubs/ID/ID-56/**.

Figure 1: Recently observed watermelon seedlings affected by Fusarium wilt had stems (hypocotyls) that were dark, necrotic and withered. *(Photo by Shubin Saha)*

Figure 2: Watermelon seedlings with Fusarium wilt may have true leaves that are wilted and necrotic. *(Photo by Shubin Saha)*

Chilling Temperatures in May - *(Liz Maynard)* - Early plantings of warm season crops face the risk of chilling temperatures and this season has been no exception. The table below shows the number of hours below 50°F and 45°F from May 1 - 25 at three Purdue Ag Centers. In all locations, the first and third weeks of May had longer periods of chilling than the second and fourth weeks of the month. Northwest Indiana, represented by Pinney-Purdue, had the most chilling, with the temperature below 50°F for more than half the time during the third week of May. The 'normal' amount of chilling below 50°F at Pinney-Purdue (based on 30-year normal daily high and low temperatures) would be 48, 29, 10 and 0 hours for weeks 1, 2, 3 and 4 in May, respectively.

Chilling injury occurs on susceptible crops below temperatures of 45° to 50°F. Muskmelon, watermelon, squash, cucumber, pumpkin, okra, basil, eggplant, and pepper are most susceptible. Snap bean, tomato and sweet corn can also be injured. Chilling injury is cumulative: the lower the temperature and the longer the exposure, the greater the injury. Symptoms include wilting, water-soaked spots on leaves, and slowed growth for a time even after conditions improve. Chilled plants are also more likely to be injured by herbicides that have a narrow margin of crop safety.

Once chilling injury has occurred in the field there is no curative treatment. The crop should be managed to minimize further stresses.

A number of practices are commonly used to reduce the likelihood of chilling injury in field plantings. Dark plastic mulch can warm not only the soil and but also the air near the soil. Row covers also provide protection. Varieties more tolerant to chilling are available for some crops (e.g. cucumbers). Seedlings hardened at temperatures slightly above chilling before transplanting to the field should have better chilling-tolerance. Although not a common practice in Indiana, grafting onto cold-tolerant rootstocks can increase chilling tolerance in cucurbits.

Published research trials report that a variety of compounds including abscisic acid, hydrogen peroxide, cytokinins, and salicylic acid can increase chilling tolerance of vegetable plants under experimental conditions. Practical applications of these findings haven't been developed for this region.

Hours of Chilling Temperatures May 1 - 25, 2011 at three Purdue Ag Centers (PACs).*

	Hours Below	
	50°F	45°F
Davis PAC (Randolph County)		
May 1-7	66	34
May 8-13	5	0
May 14-20	54	20
May 21-25	0	0
Pinney PAC (Porter/Laporte Counties)		
May 1-7	65	34
May 8-13	10	0
May 14-20	98	26
May 21-25	4	0
Southwest PAC (Knox County)		
May 1-7	55	22
May 8-13	0	0
May 14-20	21	0
May 21-25	0	0

*Based on temperatures reported by Purdue Automated Weather Stations, accessed at **http://iclimate.org/data_archive_v3.asp?rdatatype=ph**, on 5/25/2011.

Bacterial canker of tomato - *(Dan Egel)* - This disease was observed on tomatoes grown in a greenhouse for production. The affected plants were wilted, had leaves with necrotic margins and had internal discoloration of the stem area (see Figures 3 & 4).

Figure 3: Marginal necrosis is a common symptom of bacterial canker of tomato. *(Photo by Dan Egel)*

Figure 4: The vascular tissue of tomatoes affected with bacterial canker often turns brown. *(Photo by Dan Egel)*

The bacterium that causes canker can survive in crop debris and seed. In our laboratory, we were able to detect the canker bacterium on wooden stakes. The disease can be spread by water, pruning and equipment.

Sanitation is key to avoiding bacterial canker of tomato. Transplant trays, wooden stakes and pruning equipment all needs to be carefully cleaned and sanitized. Seed should be tested for the presence of the bacterium; transplants should be inspected for the disease. Crop rotation is important in reducing the amount of inoculum in crop residue. Fixed copper products can help lessen the spread of the disease among seedlings and young plants. However, once the bacterium become systemic in the tomato plant, copper applications will not help control the disease.

Hail Damage - (This article is modified from one written by Sarah E. Hulick and Steve Reiners, Department of Horticulture Science, Cornell University, NYSAES. Liz Maynard also contributed to this article.)

Scattered hail damage has been reported across much of Indiana in the last few days. The good news is that relatively cool temperatures followed the hail, reducing stress on plants. Disease control is absolutely essential. Surviving plants will also benefit from a sidedressing of nitrogen about a week after the damage occurred. The following is a summary of all the information we could find relating to hail and vegetable recovery.

Bell Peppers: A study was conducted in North Carolina to determine the impact of hail on the incidence of bacterial spot. The hailstorm occurred 38 days after transplanting when the plants were still young and recovery was possible. Researchers found that a copper plus maneb spray program helped suppress bacterial spot and induce recovery of a young pepper crop from hail damage. Damage from a hailstorm increases a plants susceptibility to pathogens immensely. Prior to the hailstorm, 53% of unsprayed plants and 13% of weekly and bi-weekly sprayed plants showed symptoms of bacterial spot. After the hail damage all plants showed disease. In unsprayed plots, the combination of hail and early Bacterial spot caused a 6-fold reduction in yield. In sprayed plots the reduction in yield was only 2-fold. In a jalapeno pepper trial at Pinney-Purdue a few years ago, many of the plants had the main stem broken by hail. Yields from plants with broken stems were about 72% of the yield from plants with undamaged stems.

Tomatoes: Direct damage to fruit can make fruit unmarketable and open fruit up to secondary pathogens. It is best to remove all damaged fruit as keeping unmarketable fruit on the vine wastes the plant's resources. If plant damage is mostly defoliation with some broken stems, recovery can occur. This is especially true for large, indeterminate plants. Harvest will be delayed significantly as it takes about 40-50 days from flowering to ripe fruit. Growers may want to invest in floating row covers to protect the later fruit from an early frost in the fall.

Melons and other vine crops: Defoliation has the greatest negative impact on marketable yield when it occurs just before the canopy covers all bare ground on the plots, or approximately 30-40 days before first harvest. Defoliation decreases the fruit soluble solids concentration (see Figure 5), which can make the melons less flavorful. Muskmelons and watermelons have the ability to fully recover from defoliating hail damage if it occurs early in the season, (especially during fast vegetative growth stage) and if the growing season is long enough (see Figure 6, next page). Defoliation causes fruit exposure to the sun, sunscalds and premature ripening. All vine crops have some capacity to compensate for lost leaf area if it happens before vegetative growth slows.

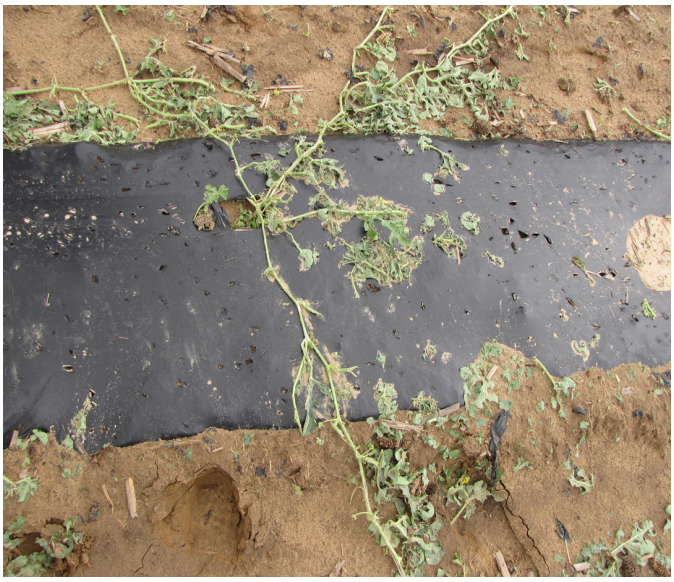

Figure 5: Severe hail can damage foliage, reducing the soluble solids in watermelon. *(Photo by Dan Egel)*

Figure 6: Vine crops, such as watermelon, have the capacity to recover from early season hail damage if the main stem is not damaged. It is often best to wait a few days to assess the impact of hail damage. *(Photo by Dan Egel)*

Sweet Corn: In a variety trial hit by hail, sweet corn was at the tasseling stage and suffered shredded leaves. Total yields were reduced by 57% compared to the prior 3-year average. Sweet corn at the 12-18 inch stage experienced the same hail and yields were reduced 42 % compared to the 3-year average.

In a trial conducted in Delaware, all hail treatments reduced the percentage of marketable ears of sweet corn, except for the light application in the 13th leaf stage (early vegetative) in 1991. In 1992, additional treatments consisting of clipping all leaves were conducted. Clipping leaves at the early silking stage reduced marketable ears, indicating the loss of foliage adversely affected the growth of the ear. Clipping leaves just prior to harvest reduced the yield of Jubilee, but not Silver Queen.

Onions: Defoliation has the greatest impact on total marketable yield and yield of individual market classes when it occurs near the onset of bulbing. The greatest effect the hail damage inflicts on onions is the market class distribution. Jumbos (>3.25") decrease in number and the medium and prepack size distribution increases. Yields of the larger marketable class decrease to a greater extent than the total marketable yield. In a study conducted in Colorado a 67% defoliation at 14,18, 42,and 56 days before maturity caused a 10%, 52%, 63%, and 51% decrease respectably in jumbo yields. A 33% plant defoliation on the same dates resulted in a 15%, 21%, 17%, and 24% reduction in Jumbo class yields. The medium class makes up for these decreases by increasing in number. Defoliation can delay crop maturity and makes onions more susceptible to disease infection.

Cauliflower: Damage done before budding does not significantly affect the budding process. Later defoliation tends to change the color of the cauliflower heads from white or ivory to a yellowish-white. The yellowing is more pronounced the greater the defoliation and the later the stage at which defoliation occurs. In plants in which the stems get bent back, the heads can be elongated and in some cases deformed. Defects: sunburn, frost damage, warts, and attack by slugs and snails are more frequent in plants with greater defoliation and/or later in the season. Most importantly, defoliation at later stages is going to have a greater adverse effect on number and mass of heads than defoliation at earlier stages. The greatest mass lost from hail damage will occur when heads are between 2-3.8 cm.

Soybeans: We could not find any studies on snap beans but in this Oregon soybean study, 80% defoliation on plants with substantial stem breakage, 5 weeks after planting resulted in a 40% reduction in yield. Plants grew back, but not to full stature.

Update to the *Midwest Vegetable Production Guide for Commercial Growers* 2011 (ID-56) - In the sweet corn weed section (page 155), herbicide treatments were updated with a comment to emphasize that Poast® should only be applied to Poast® tolerant sweet corn varieties **http://www.btny.purdue.edu/Pubs/ID/ID-56/sweetCorn.pdf**.

Food safety information - North Carolina State University has posted food safety information about beans, leafy greens, sprouts, tomatoes and general vegetable production at the Fresh Produce Safety Portal **http://ncsu.edu/enterprises/ncfreshproducesafety/?page_id=2529** . Information included in this website includes Good Agricultural Practices and Commodity Specific Safety Guidelines for select vegetables. If you do not have access to the Internet, call (812) 886-0198 for assistance.