

VEGETABLE CROPS HOTLINE

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

Liz Maynard, Editor
600 Vale Park Road
Valparaiso, IN 46383
(219) 531-4200
emaynard@purdue.edu



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WHITE MOLD OF TOMATO FRUIT - (Dan Egel, egel@purdue.edu, 812-886-0198) - Perhaps the most common symptom of white mold of tomato is the light brown area on the lower stem (see Figure 1). This brown area is essentially dead and will result in the wilt and death of the tomato plant above that point. Either on the outside of this dead area or inside the stem, dark, irregularly shaped fungal bodies can usually be found. These fungal bodies (known as sclerotia) are diagnostic of white mold.

Recently, I found tomato fruit with symptoms of white mold. Note in Figure 2 that the top of the tomato fruit is rotten and a white mold is growing around the top (calyx). The portion of the white mold closest to the viewer seems to be growing over a dark area-this area is the sclerotia mentioned above. While the fruit rot symptom is a bit unusual, perhaps the cool, moist weather in much of Indiana last week is responsible.

The fungal spores responsible for white mold are released early in the spring from a very small mushroom (smaller than a dime). The spores will enter a plant where tissue is dead or senescent, such as old flower petals. Fortunately, white mold, once established, will not spread from tomato to tomato plant. However, growers may observe more symptoms as earlier infections develop.

White mold is one of the diseases that I observe more in greenhouses (or high tunnels) than in the field. The reason for this is that greenhouses tend to increase the relative humidity necessary for disease establishment.

One of the key management methods of white mold is suggested by the paragraph above. Anything that can be done to minimize relative humidity and leaf moisture

will help reduce the severity of white mold. Therefore, vent the greenhouse in the evening (if possible) and space the tomato plants far enough apart to allow air circulation. A good rule of thumb is to leave 5 feet between rows and 2 feet between plants. However, a study at the Southwest Purdue Agriculture Center is examining plant populations of determinate tomatoes in a high tunnel-we should have more answers in the fall.

A biological control is available for white mold. The product, known as Contans®, has an active ingredient that is a fungus that parasitizes the white mold fungus. Contans® must be plowed into the soil months before planting. For more information, read the label and/or see the *Midwest Vegetable Production Guide for Commercial Growers 2014*, also known as the ID-56 mwvegguide.org. A version of this article originally published at the VeggieDiseases blog <http://veggiediseaseblog.org>.



Figure 1. Light brown necrotic area caused by white mold on tomato. Note dark, irregular fungal structure (sclerotia). This symptom is typical of white mold on tomato. (Photo by Dan Egel)



Figure 2. White mold on tomato fruit is not as common as the stem symptom. White mold has caused the fruit to be rotten and a white mold to grow around the stem area (calyx). Note that the white mold around the calyx is beginning to look dark due to the development of a sclerotium. (Photo by Dan Egel)



PHYSIOLOGICAL LEAF ROLL OF TOMATO - (Dan Egel, egel@purdue.edu, 812-886-0198 and Liz Maynard, emaynard@purdue.edu, 219-531-4200) - The two tomato plants shown in Figure 3 are both healthy. However, to some observers, the leaf roll of the tomato plant on the left might seem to indicate a problem. Leaf roll can be caused by stresses such as heat and drought, diseases such as leaf curl viruses, or conditions that promote starch accumulation in the leaves, such as pruning. Rolling of this last type is termed 'physiological leaf roll.'

Physiological leaf roll commonly occurs after pruning off suckers. It begins on lower leaves and moves up the plant. Rolling tends to be more severe on heavily-pruned plants. The rolled leaves usually remain rolled, but new leaves may grow normally and so the plants often look better with time. The explanation seems to be that when growing conditions are good and there aren't enough growing points or developing fruit on the tomato plant to make use of all the sugars produced by photosynthesis, starch builds up in the leaves and this causes leaves to roll. Physiological leaf roll rarely results in yield loss and usually does not indicate an important problem. However, if the rolling is so severe that fruit is not protected by leaves, fruit quality may be reduced.

Look again at tomato plants in the photo. The two tomato plants shown here are actually two different varieties. The tomato plant on the left, 'Mountain Spring', almost always shows some leaf roll. In fact, 'Mountain Spring' is genetically more likely to show leaf roll than the plant on the right, 'Red Deuce'. Yet, there is no indication that there is anything wrong with the 'Mountain Spring' plant—it just shows more leaf roll. There are other varieties that tend to show leaf roll as well.

Which plant will end up yielding more? These

plants are part of an experiment in the high tunnels at the Southwest Purdue Agriculture Center in Vincennes, IN. One of the questions we hope to answer is which variety yields more in a high tunnel. Stay tuned for more information. A version of this article was originally published at the VeggieDiseases blog <http://veggiediseasesblog.org>.



Figure 3. Tomato varieties differ in susceptibility to physiological leaf roll, as observed here for 'Mountain Spring' (left), which shows leaf rolling on most of the plant, and 'Red Deuce' (right), with just a few rolled leaves at bottom of the plant. (Photo by Dan Egel).



CATFACING IN TOMATO FRUIT - (Liz Maynard, emaynard@purdue.edu, 219-531-4200) - Catfaced tomato fruit are usually large, often misshapen, and with scars at blossom end that may extend up the side of the tomato (see Figure 4). Sometimes it appears that two tomatoes have grown together into one. USDA grade standards allow a little catfacing in No. 1 and No. 2 grades, but large, rough, or deep scars, or wide or deep channels aren't permitted. Fruit of some heirloom tomato varieties are frequently catfaced, and unless very severe, it may not affect marketability.

Often catfacing is not noticed until harvest, or at least until tomatoes are a few inches across. However, the first signs of catfacing can be observed when a tomato flower opens, or even before. The disorder results from disruptions to normal development of the flower well before it blooms. Flowers that produce markedly catfaced fruit have more than the typical 5 or 6 petals, and the ovary at the base of the flower is larger than normal and may be deformed (see Figures 5, 6 and 7).

Cool temperatures are one condition that can disrupt flower development. Temperatures of 62°F/50°F several weeks before flowers open can lead to increased catfacing in varieties prone to the problem. In Indiana, this is probably the cause of much of the catfacing we see. This year we have certainly had temperatures in this

range that would affect tomatoes in high tunnels or the field. Exposure to growth regulator-type herbicides can also disrupt flower development and lead to catfaced tomatoes. In my experience, if herbicide exposure is enough to cause deformed fruit, leaf symptoms are quite apparent shortly after the exposure.

There's no way to 'reverse' catfacing on a particular fruit once the flower development has been disrupted. Usually the condition that led to catfacing moderates (e.g. it warms up) and later-forming flowers develop normally. In production systems where tomatoes are intensively managed, flower clusters are sometimes pruned to remove unwanted buds, flowers, or very small fruit. In such systems, flowers or small fruit that are severely catfaced and won't be marketable can be removed during regular cluster pruning.



Figure 4. 'Brandywine' tomatoes with varying degrees of catfacing. (Photo by Liz Maynard)



Figure 5. This flower from the heirloom variety 'Cherokee Purple' has many more than 5 petals, indicating it will produce a large and probably catfaced fruit. (Photo by Liz Maynard)



Figure 6. This flower from 'Mountain Fresh' has 9 petals, indicating it will most likely produce a catfaced fruit. (Photo by Liz Maynard)



Figure 7. Petals have been removed from tomato flowers in the second and fourth row from the top of this photo. Tomato flowers in the top two rows have many petals and/or large ovaries, signs that fruit would be catfaced. Tomato flowers in rows 3 and 4 have the normal number of petals and normal-sized ovaries, and should produce normal fruit. (Photo by Liz Maynard)



CHANGES TO VEGETABLE PLANTING RULES FOR PRODUCERS IN USDA ARC AND PLC PROGRAMS - (Liz Maynard, emaynard@purdue.edu, 219-531-4200) - On May 19 the Indiana office of USDA's Farm Service Agency (FSA) announced new rules for vegetables and fruit that affect producers who plan to participate in the Agriculture Risk Coverage (ARC) or Price Loss Coverage (PLC) programs. Key points are provided here; for the complete press release visit www.fsa.usda.gov and follow links to the Indiana office and then to

news releases.

When fruits or vegetables are planted on payment acres of a farm, an acre-for-acre payment reduction applies. Fruits or vegetables planted on acres that are not considered payment acres will not result in a payment reduction. Farms not enrolled in ARC/PLC this year may plant unlimited fruits or vegetables and eligibility for future years is not affected. Planting and harvesting fruits and vegetables on ARC/PLC acreage is subject to the acre-for-acre payment reduction when those crops are planted on either more than 15 percent of the base acres of a farm enrolled in ARC using the county coverage or PLC, or more than 35 percent of the base acres of a farm enrolled in ARC using the individual coverage. Fruits and vegetables planted in a double-cropping practice will not cause a payment reduction if the farm is in a double-cropping region as designated by the USDA's Commodity Credit Corporation.

For more information on these rules, visit www.fsa.usda.gov or contact your local USDA Service Center.



MICROBIAL WATER QUALITY FOR PRODUCE SAFETY - (Manpreet Singh, manpreet@purdue.edu, 765-494-0823) - Safety of fruits and vegetables in current times is ever so important with the ongoing changes and anticipation of the proposed implementation of produce safety rules as part of the Food Safety Modernization Act (FSMA). One of the key components of ensuring safe production practices to eliminate potential food safety hazards is the quality of water used for irrigation and in packinghouses. Surface water quality by no means is the sole factor, however, in coordination with several other factors such as employee training, good hygiene practices and other good agricultural practices (GAPs), the food safety hazards can be markedly reduced.

Typically, ground water is not considered as a source of contamination, however, if ground water tests positive for contaminants (biological), there could be a bigger issue at hand. Oftentimes, surface water quality is taken for granted, which means testing for water quality is probably overlooked leading to increased risks of cross contamination that can lead to food safety hazards.

Given the criticality of food safety and the potential for surface water to act as a conduit for carrying biological contaminants (bacteria specifically) and fecal shedding of bacteria of pathogenic nature by livestock in close proximity to farms, knowing water quality is ever so important.

Suslow (2009) and Pachepsky et al (2011) have suggested in their studies, that the frequency of testing irrigation water quality for indicator organisms is inconsistent

without any standard protocols. At a minimum we recommend that water sources be tested prior to use, regularly during use, and whenever conditions suggest that a test is warranted (e.g. after heavy rains). The state and nationwide land-grant university extension systems are a good resource to seek information regarding water testing and parameters that need to be monitored to prevent cross-contamination of fresh produce.

With summer in full swing and farmers markets finally gaining momentum, knowing your water quality is a critical aspect of food safety not only in the peak season but year round. Refer to the previous issue (no. 582) of this *Vegetable Crops Hotline* newsletter for information on where to get water tested for microbial quality.

References: Pachepsky, Y.A. and D.R. Shelton. 2011. *Escherichia coli* and Fecal Coliforms in Freshwater and Estuarine Sediments. *Critical Reviews in Environmental Science and Technology* 41: 1067–1110.

Suslow, T. V. 2009. Safety Project Issue Brief: Standards for Irrigation and Foliar Contact Water. Produce Safety Project. Retrieved May 27, 2014, from

http://www.pewhealth.org/uploadedFiles/PHG/Content_Level_Pages/Issue_Briefs/PSP_Water-Suslow-1.pdf

Editors note: Dr. Manpreet Singh is Associate Professor and Extension Food Safety Specialist in the Dept. of Food Science at Purdue. He arrived at Purdue about a year ago, and since then has been involved with several food safety extension programs such as the Retail Food Safety (ServSafe) training and New Entrepreneurs program, in addition to assisting the processing industry in the state with HACCP and other food safety programs. Welcome, Manpreet!





Bringing in the Harvest: Preparing for the 2014 Melon Season

Indiana Cantaloupe and Watermelon Growers continue to face many challenges as they prepare for the 2014 harvest. The need for a safe harvest makes packinghouse preparation a critical item.

These workshops will show growers how to better prepare their packinghouses for the upcoming harvest, as well as update them on current regulatory and other food safety issues.

Workshops are confirmed at the following locations:

June 9, 2014
Kamman's Farms
4683 South State Rd. 135
Vallonia, IN 47281
8:00 am – 12:00 pm (EDT)

June 13, 2014
Oaktown Produce Depot
13990 N. Old Hwy 41
Oaktown, IN 47561
8:00 am – 12:00 pm (EDT)

***** No high heels. Closed-toe shoes and long pants required at all locations!!!**

If you need a reasonable accommodation to participate in this program, prior to the meeting, contact Scott Monroe at (812) 886-0198 or (888) EXT-INFO.

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