

# VEGETABLE CROPS HOTLINE

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

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vegcropshotline.org

No. 565  
April 18, 2013

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**PITH NECROSIS VS BACTERIAL CANKER: A TALE OF TWO TOMATO DISEASES** - (Dan Egel and Scott Monroe) - We recently observed a tomato sample with tomato pith necrosis. Since this disease can be confused with bacterial canker, this article is a comparison of the two diseases.

**Introduction:** Tomato pith necrosis is not common in Indiana. It is usually reported only once or twice during a season. Almost always, pith necrosis is observed in a greenhouse or high tunnel situation. Pith necrosis rarely causes significant losses.

Bacterial canker is relatively common in Indiana. It may occur in field, greenhouse or high tunnel situations. Bacterial canker is one of the most serious of the tomato diseases that occur in Indiana.

**Symptoms:** Tomato pith necrosis causes vines to assume a twisted appearance. Stems may also turn dark (see Figure 1). If the stems are cut open, the inside may be rotten, giving the disease its name. Usually only a few plants in a greenhouse become symptomatic; often plants seem to 'grow out of' the disease symptoms.

The first symptom of bacterial canker is often the brown and yellow edges (marginal necrosis and chlorosis) observed on leaves (see Figure 2). This symptom is sometimes known as 'firing'. Use a knife to cut open the lower stem of a tomato plant affected by bacterial canker; the interior is often discolored brown. Fruit occasionally have a symptom known as a bird's eye lesion. Bacterial canker symptoms can be very severe, in some cases resulting in complete loss of yield.

**Biology:** Low night temperatures, high nitrogen levels and high humidity favor tomato pith necrosis. It is not clear how the causal bacterium survives or enters the tomato plant.

The bacterium that causes bacterial canker may be seed-borne or may survive in crop debris. Temperatures of 75 to 90°F favor the disease; wet, rainy conditions help bacterial canker to become established. Once inside the plant, the bacteria may become systemic so that the disease may spread within a plant without additional moisture.

**Management:** To manage tomato pith necrosis, avoid low night temperatures and excessive nitrogen levels; reduce high humidity in the greenhouse or high tunnel.

Whenever possible, avoid planting seed that is contaminated with the bacterium that causes bacterial canker. Inspect transplants for symptoms of disease before planting. Applications of a copper or streptomycin product in the transplant greenhouse may reduce disease severity. Be sure to check the label for greenhouse use, re-entry interval, etc. However, once the bacteria become systemic, these products will not be useful. Crop rotation and sanitation will help reduce the disease problem.

For more information, consult the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) available in hard copy from the Education Store [the-education-store.com](http://the-education-store.com) (\$10) or online at [mwveguide.org](http://mwveguide.org). See the article about disease management in greenhouses and high tunnels in Issue No. 564 of the *Vegetable Crops Hotline*. Always check the pesticide label prior to use.



**Figure 1:** Tomato pith necrosis may cause the stems of affected plants to turn a dark color. (Photo by Dan Egel)



**Figure 2:** Bacterial canker of tomato often causes the leaves of affected plant to become yellow and brown around the edges. (Photo by Dan Egel)



**HOOSIER HARVEST MARKET FOOD HUB SETS MEETING FOR FARMERS - (Roy Ballard)** - The Hoosier Harvest Market Inc., formerly known as the Central Indiana Food Hub, will have a meeting April 23 in Greenfield for farmers interested in becoming vendors in the on-line market for their products. The meeting will be held from 7 to 9 P.M. EDT at the Hancock County Purdue Extension office, 802 N. Apple St., just north of the county fairgrounds.

The Hoosier Harvest Market is a system that coordinates, through online marketing, the weekly sale and collection of local farm products for delivery to customer delivery points across the region. The Hoosier Harvest Market is organized with both the farmer and the consumer in mind as a means of conveniently connecting the Indiana shopper with the very best that Indiana farmers can produce. All products that you might expect to see at a traditional farmers market will be included in the offerings of the Hoosier Harvest Market.

Because of the approaching growing season, farmers interested in selling through the market this year should attend the meeting to learn more about the logistics of the market and what they can expect if they participate. Farmers will receive an information packet and a member agreement for their consideration and

will have the opportunity to ask questions and voice any concerns.

Like other food hubs, Hoosier Harvest Market seeks to increase consumer access to fresh and healthy locally produced foods, including those in underserved areas, while at the same time provide wider access to institutional and retail markets for small to mid-sized producers.

The market will provide another access point for shoppers who want to support local farmers and buy the freshest local products from farmers they know and trust. Many of these shoppers are currently limited to the traditional outlets such as roadside markets and community farmers' markets.

Farmers who sell through the Hoosier Harvest Market will be able to provide their inventory and prices online weekly. Shoppers, including consumers buying for their families and perhaps restaurants seeking locally grown products for their menus, will be able to shop among all of the listed farmers for an array of products. Shoppers will pay for the products online.

At the end of each marketing cycle, farmers who sold products will deliver them to an aggregation point near Greenfield where the products will be sorted into customer market baskets and delivered to their selected drop-off points.

For more information or to register for the meeting, producers can contact their county Extension educator or Roy Ballard at (317) 462-1113 or by email at [rballard@purdue.edu](mailto:rballard@purdue.edu).

Farmers and growers who are unable to attend the meeting but want to learn more about the Hoosier Harvest Market can get information on the market's website at [www.hoosierharvestmarket.com](http://www.hoosierharvestmarket.com) or look for updates on the Hoosier Harvest Market Facebook page.

Shoppers who would like to receive information about the opportunity to buy products through the market can inquire by email at [info@hoosierharvestmarket.com](mailto:info@hoosierharvestmarket.com).

Hoosier Harvest Market is funded in part through a USDA Specialty Crop Block Grant administered through the Indiana State Department of Agriculture.

**NEW THRESHOLD FOR CORN EARWORMS IN EARLY SEASON SWEET CORN - (Rick Foster)** - For several decades, we have used an economic threshold of 10 corn earworm moths caught in a pheromone trap per night to determine if an insecticide spray was needed on sweet corn (see Figure 3). In other words, whenever the corn is in a stage that is vulnerable to earworms (green silks present), a spray is economically justified if we were catching 10 or more moths (see Figure 4). This threshold has worked quite well, eliminating unnecessary sprays while still allowing production of worm-free sweet corn. However, some recent research that we have conducted along with Dr. Rick Weinzierl from the University of Illinois

has caused us to reconsider how we decide whether to treat early season sweet corn.

During most of the growing season here in the Midwest, earworm moths have lots of corn to choose from as a site to lay their eggs. Our sweet corn is kind of an island in the middle of an ocean of field corn. As a result, the eggs are diluted among all the corn that's out there. However, in early spring when we are pushing to get the earliest sweet corn harvest that we can, our sweet corn will start silking often long before the neighboring field corn. Therefore, most of the moths are attracted to our sweet corn and most of the eggs are concentrated there. So, it doesn't take as many moths flying around to supply enough eggs to damage the sweet corn.

For sweet corn that is silking earlier than any of the neighboring field corn, I recommend that you treat if you are catching any corn earworm moths in your pheromone trap. Spray as long as the corn has green silks present, with intervals of 2 to 5 days between sprays depending on temperature (more frequent sprays when it is hot) and on moth catches (5 days if you are catching 1-2 moths per night, 2 days if you are catching more than 100 per night).

Once the field corn in your vicinity starts to silk, you can revert to the old threshold of 10 moths per night. A reasonable question would be, what about very late sweet corn, after the field corn has all dried down. You might expect this would create a situation similar to early spring where egg laying would be concentrated in the nice, green sweet corn fields. However, we have not seen this as a problem in our research. Also, corn earworm trap catches at that point in the season are usually well above the 10 moths per night level so we would be spraying a lot anyway.

We will be conducting research this summer to test this new threshold so we will keep you posted as to what we find.



**Figure 3:** Sweet corn grower Chuck Mohler discusses the wire mesh trap he uses for corn earworm moths with Purdue entomologist Rick Foster. Inset shows moths in upper part of trap. (Photo by E. Maynard)



**Figure 4:** Corn earworms lay eggs on fresh corn silks. It is important to protect sweet corn when corn earworm moths and fresh silks are present. (Photo by E. Maynard)



#### **PHEROMONES AND PHEROMONE TRAPS - (Rick Foster)**

- One way insects communicate with individuals of the same species is with pheromones. Pheromones are volatile chemicals released by an insect that usually can be detected only by individuals of the same species.

There are a number of different types of pheromones, but the most common type is the sex pheromone. Usually the females will emit a tiny amount of a chemical that attracts the male to her and increases the likelihood of mating. Because the chemical is volatile, air currents carry it. The male detects the pheromone in the air with receptors on his antennae. He then flies upwind to find the source of the pheromone, a prospective mate.

The chemical compositions of pheromones for a number of pest species have been identified and synthetic copies can be produced in the laboratory. Synthetic pheromones can be used in conjunction with traps to catch male insects.

Listed below are some, but certainly not all, of the suppliers of pheromones and traps.

**Alpha Scents, Inc.**, 1089 Willamette Falls Drive, West Linn, OR 97068; 503-342-8611; [www.alphascents.com](http://www.alphascents.com)

**Gempler's**, P. O. Box 270, 100 Countryside Dr., Belleville, WI 53508; 800-382-8473; [www.gemplers.com](http://www.gemplers.com)

**Great Lakes IPM**, 10220 Church Rd., NE, Vestaburg, MI 48891; 517-268-5693; [www.greatlakesipm.com](http://www.greatlakesipm.com)

**Insects Limited Inc.**, 16950 Westfield Park Rd., Westfield, IN 46074-9374; 317-896-9300; [www.insectslimited.com](http://www.insectslimited.com)

**Pacific Biocontrol Corporation**, 620 E. Bird Lane, Litchfield Park, AZ 85340; 623-935-0512 or 800-999-8805; [www.pacificbiocontrol.com](http://www.pacificbiocontrol.com)

**Scentry Biologicals Inc.**, 610 Central Ave., Billings, MT 59102; 800-735-5323; [www.scentry.com](http://www.scentry.com)

**Trece Incorporated**, P. O. Box 129. Adair, OK 74330; 866-785-1313; [www.trece.com](http://www.trece.com)

You can buy most pheromone traps from these suppliers, but for corn earworm/tomato fruitworm, I recommend that you use the wire mesh trap which is available from:

**Bob Poppe's Service**, 25738 N. 3200 Road, Lexington, IL 61753; 309-723-3201.

The wire traps catch more moths and last longer than the nylon traps.

To get the most from your pheromone traps, they must be used properly:

- Place the traps and the pheromones out before you would normally expect the insect pest to be active. That way you can monitor the adult activity, which will warn you that damage from the larvae may be coming soon. Corn earworm pheromone traps should go out about June 1.
- Be careful how you store pheromones. Ideally, they should be frozen until ready for use. At the very least, they should be refrigerated. If you keep them on the dashboard of your truck, they won't work well when you place them in the trap.
- When handling pheromone lures, do not touch them with your hands. Use a pair of forceps or wear latex gloves. This is especially important when you are using pheromones for more than one pest. Contamination of a lure with another pheromone will likely reduce the effectiveness.
- Lures usually should be changed every 3 to 4 weeks, although this will vary for individual lures.
- Check traps regularly, at least weekly. Daily would be better.



**GETTING THE MOST FROM THE PURDUE PLANT & PEST DIAGNOSTIC LAB** The Purdue Plant and Pest Diagnostic Lab provides diagnostic and identification services. Follow these guidelines for submitting samples.

#### **TOP TEN TIPS FOR COLLECTING A GOOD VEGETABLE SAMPLE:**

1. **Time is money:** Don't wait until the problem is widespread to send a sample. Many diseases and insects are easily controlled if caught early.

2. **Dead plants tell no tales:** Plants that are totally dead, dry or rotten are useless for diagnosis. Collect declining but not completely dead material.

3. **What's bugging you?** Collect several examples of insects for ID, just in case some get damaged in shipping or if both males and females are needed. Many can be shipped in vials with 70% alcohol. More details at: [www.ppd.purdue.edu/PPDL/physical.html](http://www.ppd.purdue.edu/PPDL/physical.html)

4. **More is better:** The main concern may be overlooked if you send only one plant, one insect or a single fruit. Send plenty of material. Make sure samples are representative of what you are seeing. Digital images can help too! They're essential to show patterns of injury in the greenhouse or field.

5. **Get to the root of the problem:** Many above-ground symptoms are related to the roots and soil. From the greenhouse submit entire pots and plug trays or sections of trays with at least 5-10 cells with plugs for a more accurate diagnosis (see Figures 5 and 6). From the field, dig plants rather than pulling them up to keep roots intact. Keep the soil separate from the foliage to prevent contamination and rotting (see Figure 7). Put the rooted end and media into a plastic bag, and seal the bag with a twist tie at the soil line. Do not seal the foliage inside the plastic bag. Wrap the sample in newspaper to prevent additional drying out of foliage.

6. **A place for everything:** If soil gets on the leaves during shipment it can mask symptoms or even create a "disease" that wasn't there at shipment. Contain soil around roots in a plastic bag that is then attached to the base of the main stem or secure roots and soil in aluminum foil. Wrap bagged sample in newspaper and then place the sample in a perforated plastic bag to keep the sample from drying out but to allow venting of moisture. DO NOT add any water before packaging.

7. **Details...details:** The more you tell the diagnostic lab about the situation the better. Please give complete information; including name of plant, location, percent affected, symptoms of concern, distribution, soil type and drainage, and fertilizers or pesticides used recently. For Plant ID or Weed ID please give full details requested on form.

8. **Fresher is better:** Mail or deliver samples as soon as you can. Store samples in a cooler on hot days until you can deliver or ship them. Avoid mailing samples on Fridays since most plants will start to rot after being in transit over a weekend. A next day delivery service is needed for urgent samples or those that may rot quickly in shipment.

9. **Fragile, handle with care:** Use crush proof boxes with crumpled newspaper for padding. Insect vials

must be padded to prevent breakage in shipment (see Figure 8).

10. **It's not always what you know, it's who you know.** Indiana has a strong Cooperative Extension Service. See [www.ces.purdue.edu/counties.htm](http://www.ces.purdue.edu/counties.htm)

Forms and how to submit samples: [www.ppdل.purdue.edu/PPDL/](http://www.ppdل.purdue.edu/PPDL/)

**Plant & Pest Diagnostic Lab**  
Purdue University, LSPS Room 101  
915 W. State Street  
West Lafayette, IN 47907-2054

**General Information:**

765-494-7071

Tom Creswell, Lab Director

Gail Ruhl, Senior Plant Disease Diagnostician

Ania Meier, PPDL Secretary

Hours: 8–12 A.M. and 1–5 P.M. Monday–Friday

**Sample (Digital and Physical) Processing Fees:**

- \$22 out-of-state
- \$11 Indiana samples
- Include check or request invoice

**Digital Image Samples:** There is no additional charge for physical samples sent with images. Complete client information is required for ALL samples, including digital images. Upload up to ten images at: [www.ppdل.purdue.edu/PPDL/digital.html](http://www.ppdل.purdue.edu/PPDL/digital.html)



**Figure 5:** Entire pot submitted to diagnostic lab.



PPDL/Purdue Univ.

**Figure 6:** Plug flat wrapped and ready for shipment to diagnostic lab.



**Figure 7:** Media and roots on left are properly secured for shipment.



PPDL/Purdue

**Figure 8:** Use styrofoam, packing peanuts, or crumpled newspaper inside a crush proof box to protect the sample during shipment.



**DIG A LITTLE, LEARN A LOT!** - (*Becky Fletcher, NRCS*) - As temperatures go UP and the weather begins to feel more Spring-like, it is the perfect time to focus your attention by looking DOWN at the ground. It's time to investigate your SOIL. The newest trend for production agriculture - and conservation farmers - is using cover crops. The new emphasis is to improve the health of their soil.

"It doesn't matter what kind of landowner you are, a small farmer, large farmer, organic grower or even homeowners and gardeners. You can easily examine your soils. Take a quick look and you can learn a lot," says Indiana's Soil Health Specialist Barry Fisher.

The Natural Resources Conservation Service (NRCS) is the federal agency created to protect our nation's natural resources. NRCS' recent push is to "Unlock the Secrets of the Soil." According to Acting State Conservationist Roger Kult, "We are blessed with productive soils in Indiana. NRCS helps people sustain healthy soils and improve the health of soils that need help."

To investigate your soils level of health, you'll need a few simple tools: a garden spade or shovel, your nose, your eyes, and your hands.

**LOOK** - Look for plant residue on the soil surface and a living canopy or cover. The soil structure should look like chocolate cake with air holes permeating throughout. You should see organic matter and live roots that extend way down. And of course, you should see earthworms—our wonderful soil engineers!

**SMELL** - Healthy soil should have the aroma of geosmin, which is a byproduct of soil microbes called actinomycetes. Geosmin has a sweet, earthy aroma like nothing else.

**TOUCH** - Soil should be loose and crumble easily. In healthy soil, roots can grow straight and deep, allowing plants to reach nutrients and water they need to produce the food we love to eat.

Why should we care about soil health? Fisher explains that healthy soil is important for agriculture and our state's ability to feed the nation, but it actually has a direct impact on many larger issues that affect life as we know it.

Soil health can improve and regulate water, sustain plant and animal life, filter potential pollutants, cycle nutrients, and support building and structures. Healthy soils hold more water, which can reduce flooding and help with drought. Healthy soils also resist runoff and erosion, they suppress weeds and pests naturally, and sustain our precious natural resources.

Simply put, healthy soils are productive soils and they are important to every one of us. So once the ground thaws a bit, grab a spade and dig a little. You can learn a lot! Visit [www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/).



#### UPCOMING EVENTS

#### **Produce Safety Alliance Q & A Sessions with the FDA about Proposed Produce Rule.**

April 22: Soil Amendments

May 3: Domestic & Wild Animals

May 6: Growing, Harvesting, Packing, & Holding Activities

May 8: Equipment, Tools, Buildings, & Sanitation

May 10: Health, Hygiene, & Training of Workers

May 13: Recordkeeping, Compliance, & Enforcement

All sessions run from 11 A.M. to 12 P.M., EDT. To participate, dial in 5 minutes before the call begins. Dial toll-free: 866-906-9888. Enter passcode: 8140591.

All sessions will be recorded and made available at [producesafetyalliance.cornell.edu](http://producesafetyalliance.cornell.edu). For more information see the Produce Safety Alliance site or contact Gretchen Wall at 607-255-6806 or [glw53@cornell.edu](mailto:glw53@cornell.edu).

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