

VEGETABLE CROPS HOTLINE

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

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vegcropshotline.org

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BACTERIAL SPOT OF TOMATO AND PEPPER - (Dan Egel) - Bacterial spot may cause symptoms on all above ground portions of affected plants. On leaves, the lesions may begin as small water soaked areas and turn into brown lesions with a yellow halo (see Figures 1 and 2). Lesions on stems often lack a yellow halo. The most important lesions may be those on fruit. While the lesions are variable, on tomato fruit they are usually scabby in appearance. Lesions on peppers are often raised.



Figure 1: Bacterial spot lesions on a tomato leaf. (Photo by Dan Egel)



Figure 2: Bacterial spot lesions on a pepper leaf. (Photo by Dan Egel)

Bacterial spot on both tomato and pepper are favored by high temperatures and lots of rain. While the temperatures have been a bit cool lately, the disease may have been introduced into the field from greenhouse grown transplants. The causal bacterium survives on crop debris and may be seed borne. Volunteer tomatoes and peppers may also carry the disease.

Management guidelines for bacterial spot:

1. Fixed copper: growers with strains of the bacterial spot pathogen resistant to copper may have to increase the frequency of copper applications to overcome the level of resistance in bacteria. This is especially true during periods of warm, rainy weather.
2. The use of mancozeb products (e.g., Dithane®, Manzate®, Penncozeb®) to accompany applications of fixed copper may allow more copper to become available on the leaf surface, thus overcoming the level of copper resistance that exists. Mancozeb products are not labeled on peppers. The product Actigard® may help to lessen the symptoms of bacterial spot. Actigard® is not labeled on bell peppers. Follow the Actigard® label closely to avoid yield loss due to the application of this product.




3. Products with the active ingredient streptomycin (e.g., Agri-mycin®, Firewall®) are not affected by copper resistance. Applications of this product in the transplant greenhouse at least once will help to manage bacterial spot. Streptomycin products are not labeled for use in the field.
4. Serenade® is a biological product labeled for use on tomatoes and peppers for bacterial spot. Some research suggests that this product, used with fixed copper products, will help to manage bacterial spot. Serenade® is unaffected by copper resistance.
5. The use of a virus disease of the bacterial spot strains is another option. AgriPhage® is a product that uses a virus disease of bacteria to kill the strains that cause bacterial spot. The use of such a product requires one to send plant samples to the manufacturer so that they can customize the product for your field. Contact me for more information about AgriPhage®.
6. Some pepper cultivars have resistance to some combination of races 1 through 5 of the bacterial spot pathogen. The more races the cultivar is resistant to, the better the chance of beating bacterial spot. However, any resistance may be overcome. In 2010, bacterial spot race 6 was found on peppers in central Indiana. This race would have overcome any known resistance in commercial cultivars. While all tomato varieties are susceptible to bacterial spot, growers may notice that some varieties are more susceptible than others.
7. Always read and follow pesticide labels.

Bacterial spot is an important disease of peppers and tomatoes. Accurate diagnosis and quick action will help to manage this disease.



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Cool Season Crops Survey
What Crops Should we Study?

INDIANA VEGETABLE FARMERS:
Help us decide which crops to study.
Take the survey online: <http://bit.ly/11RZRC0>
Download the survey: <http://bit.ly/YGYX89>
Request a copy: 219-531-4200 ext. 4201

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COOL SEASON CROPS SURVEY - (*Liz Maynard*) - What cool season crops should we study? Complete a survey to let us know. The Indiana State Dept. of Agriculture, through a USDA Specialty Crops Block Grant, has funded trials to do variety screening and nutrient update research on some cool season crops, and present a workshop on cool season crops. Your responses to the survey will help determine which crops are included in the trials and covered the workshop. Access the survey by one of these methods:

- Take the survey online at purdue.qualtrics.com/SE/?SID=SV_0jRDJRxaCYO3hAh.
- Download a copy to print at ag.purdue.edu/hla/fruitveg/Documents/cool_season_crops_survey1_2013.pdf.
- Request a hard copy by calling (219) 531-4200 ext. 4201.
- If you receive a survey in the mail use it. Thank you!



HERBICIDE CARRYOVER - (*Liz Maynard*) - Crop injury from herbicide carryover is a potential problem for anyone who grows crops on herbicide-treated ground. Herbicide carryover occurs when herbicide residues remain in the soil from one cropping season to the next at a level high enough to cause symptoms or injury on sensitive crops. Herbicide residues can stunt a crop and/or reduce the stand, resulting in yield loss. In some cases, the crop may wind up with herbicide levels above the EPA tolerance for that crop, and so cannot be used as food.

This year herbicide carryover is a particular concern. The hot dry conditions of 2012 mean that carryover is more likely. Processes that decrease herbicide levels in the soil—leaching, chemical and microbial decomposition, and uptake by crops and weeds—are reduced under drought conditions.

To avoid problems with carryover, know what herbicides have been applied to a field in the past four years, when they were applied, and at what rates. Find out whether those herbicides might carryover and cause injury.

Information about how long after herbicide application sensitive crops may be planted is included on the herbicide label in the section about rotational crop restrictions. For example, the label for Optill® herbicide states that following application of Optill® at 2 oz. per acre, “edible beans” (snap beans) may be planted after 4 months, lettuce and sweet corn after 18 months, and potatoes after 26 months. Crops not specifically mentioned, including most vegetable crops, may not be planted until 40 months have elapsed, and a field bioassay has been performed to check for damaging residues.

Table 24 in the 2013 *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) mwvegguide.org summarizes rotation restrictions for many herbicides used on soybeans and field corn. However, if a herbicide is not listed there, don't assume that it has no restrictions. Check the herbicide label.

If a herbicide has rotation restrictions, find out under what particular conditions carryover is more likely. For example, atrazine and sulfonyleurea herbicides have more carryover at high pH. This information may be on the herbicide label. The resource listed at the end of this article provides this information for many herbicide active ingredients.

If the planned planting date for a sensitive crop is on the borderline, if conditions are right for high carryover, or if the label requires it, perform a field bioassay.

A field bioassay is a practical test to determine whether herbicide levels are high enough to injure a sensitive crop. For spring-planted crops the bioassay should be performed in the spring. A summary of the procedure is provided here, but for detailed instructions, see "Herbicide Persistence and How to Test for Residues in Soils" in the *Illinois Agricultural Pest Management Handbook*, available at www.ipm.uiuc.edu/pubs/iapmh/13chapter.pdf. Contact me if you have questions about the process.

To conduct a field bioassay, collect several soil samples from the field in question and place them in separate pots. Fill other pots with similar soil known to be free of herbicide residue. Plant seeds of sensitive crops and/or indicator species the soil. Place pots in a warm, well-lit area with good growing conditions, and keep soil sufficiently moist for seeds to germinate, emerge, and grow. After a few weeks, compare emergence and growth in soil with and without possible herbicide residue. Poor emergence, stunting, deformities, and chlorosis can all indicate injurious levels of herbicide. If a properly done field bioassay shows no sign of a problem, chances are that crop injury won't occur. A field bioassay can't provide a 100% guarantee that no injury will occur, however.

Don't use a herbicide-treated field for a sensitive crop unless the required rotational interval has passed, and, if a field bioassay was performed, no injury was seen. When making plans for the future, identify vegetable-friendly herbicide programs for your crop rotations. Discuss herbicides with landlords in advance of making commitments to rent a field. Vegetable crops are too valuable to risk crop injury from herbicide carryover.

Resources: Colquhoun, J. 2006. Herbicide Persistence and Carryover. A3819. Univ. of Wisconsin Extension, Madison. learningstore.uwex.edu/Herbicide-Persistence-and-Carryover-P166.aspx



POSTHARVEST CARE OF EARLY SEASON VEGETABLES - (Liz Maynard) - The first crops of the season are on the way to market or will be soon: asparagus, rhubarb, and greens. It's a good time to review the postharvest environmental conditions that will keep the produce at its best quality.

Asparagus is one of the most perishable of vegetables. Picked as a rapidly growing shoot, it remains very much alive until it is eaten. Quality deteriorates rapidly due to respiration, lignification, and water loss. The keys to maintaining quality are low temperatures and high relative humidity. Low temperatures slow the rate of respiration. Lignification, which causes toughening, occurs rapidly above 59°F but is greatly reduced at low temperatures. Ideally, asparagus is cooled to 32-35.6°F right after harvest and kept at that temperature until sold. Relative humidity during storage should be 95- 99%. Absorbent, water-soaked pads can be used to maintain high humidity in the storage container. Exposure to ethylene increases lignification and so asparagus should be kept away from fruit and vegetables that produce ethylene as well as other possible sources. Spears will grow after they are cut if not kept cold. If they are stored in a horizontal position, the growth will cause tips to bend upwards. Store spears upright to avoid this problem.

Rhubarb should be cooled after harvest and stored under conditions similar to asparagus: 32°F and 95-100% relative humidity. Reduce splitting of petioles by leaving small portions of the leaf blade attached to the petiole.

Greens for cooking or salad, including spinach, kale, mustard, lettuce, arugula, and many others, should also be cooled soon after harvest and kept at 32°F and 98-100% relative humidity. Keep them away from sources of ethylene because it will cause yellowing of green leaves and russet spotting of lettuce. Handle greens with care to prevent bruising. Bruised tissue produces ethylene and also is more susceptible to infection by bacteria that cause postharvest soft rots.

Storage at or near 32°F may not be practical for all operations. When stored at higher temperatures these vegetables won't last as long, but if kept cool they will remain in good shape long enough to be successfully marketed.

Recommended storage conditions for more vegetable crops are listed in Table 13. Postharvest Handling and Storage Life of Fresh Vegetables, *Midwest Vegetable Production Guide for Commercial Growers*, mwvegguide.org.

For additional information, see the Postharvest section of Purdue's Fruit and Vegetable Connection at ag.purdue.edu/hla/fruitveg/Pages/harvest.aspx



SEED AND ROOT MAGGOTS - (*Rick Foster*) - Three species of seed and root maggots attack vegetables in Indiana. The seedcorn maggot feeds on seeds and seedlings of sweet corn, cucurbits, lima and snap beans, peas, and other crops. Cabbage maggots can cause serious damage to transplants of cabbage, broccoli, cauliflower, and Brussels sprouts and make the fleshy roots of radishes, turnips, and rutabagas unmarketable. Onion maggots are pests of seedling onions, developing bulbs and onions intended for storage.

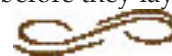
Due to the cool, wet spring, we have seen some serious damage from seedcorn maggots on melon. Seedcorn maggot flies emerge in April and May and lay eggs preferentially in areas with decaying organic matter. Fields that are heavily manured or planted to a cover crop are more likely to have seedcorn maggot injury. Maggots burrow into the seed and feed within, often destroying the germ. The seeds fail to germinate and plants do not emerge from the soil, leaving gaps in the stand. When infested seeds germinate, the seedlings are weak and may die. Maggots also will feed within the stems of transplants.

Any condition that delays germination may increase damage from this pest. Damage can be reduced by planting into a well-prepared seedbed, sufficiently late to get rapid germination. The slower the rate of growth, the greater the likelihood of seedcorn maggot injury. For any type of early season transplant, soil temperatures should reach at least 70° F or more for 4-5 days in a row to avoid maggot injury. Anything that raises soil temperature (black or clear plastic mulch) will increase soil warming and decrease the possibility of seedcorn maggot injury. Once damage is observed, the only management strategy available is the decision to replant or not. If you decide to replant, be sure to use treated seed. When resetting transplants be sure to wait 5 days from the first evidence of wilted plants before you reset. Unfortunately, we don't have any insecticides that can be applied at planting time that will provide good control of seedcorn maggots. Admire Pro® and Platinum®, which both provide several weeks of excellent systemic control of striped cucumber beetles when applied at planting, are not labeled for seedcorn maggots and the control is marginal at best. Capture LFR® is labeled for control of wireworms, grubs, and other soil insects on cucurbits but not for seedcorn maggots. I have one year of data with Capture® that showed fairly promising results, but more data are needed.

Cabbage maggots lay white eggs at the base of newly set plants. Larvae from this first generation tunnel in the roots of small plants, causing the plants to appear sickly, off color or stunted, and may cause them to die. Control of first generation maggots can be achieved using soil insecticides such as Capture LFR®, Lorsban® or diazinon at planting or transplanting. For short season crops such as radishes and turnips, long-residual insecticides cannot be used.

Onion maggots attack the underground portions of the onion plants and cause plants to wilt and die. Seeded onions are more susceptible than transplanted onions. Do not overseed to compensate for losses to onion maggots. The flies do not space their eggs evenly, so you may end up with smaller bulbs because the plant spacing is too close.

Removing cull onions after harvest and planting as far as possible from fields planted to onion the previous year can reduce damage. Soil drenches of Lorsban® (dry bulb only) or diazinon at planting will effectively control first generation maggots and provide some control of the second generation. As the onions begin to mature, they become physically resistant to attack from onion maggots, unless they have been injured in some way. Be careful during field operations not to damage the growing plants in any way. A nick in an onion bulb allows the maggots to enter and begin feeding. Also, the flies are attracted to the damaged onions to lay eggs. Reducing the amount of physical damage to the onions at harvest as much as possible will also reduce the amount of injury from the third generation. Do not apply foliar sprays to kill flies before they lay eggs.



NRCS WATERSHED PROGRAM DEADLINE JUNE 21 - (*Liz Maynard*) - Indiana NRCS has funds from the National Water Quality Initiative to support practices that will improve water quality in selected watersheds. The deadline to sign up this year is June 21. Watersheds eligible for this funding include Silver Creek in portions of Fulton, Kosciusko, Miami, and Wabash counties; Ell Creek in Dubois County; and Eagle Creek in portions of Boone, Hendricks, and Marion counties. Practices may include nutrient management, cover crops, filter strips, conservation cropping systems, and more. For more information, check with your local NRCS office www.in.nrcs.usda.gov/contact/directory/field_offices.html, and read the April 30 NRCS press release www.in.nrcs.usda.gov/news/Impove_waterbodies.html.

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