Vegetable Crops Hotline

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

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No. 545
September 23, 2011

<http://www.btny.purdue.edu/pubs/vegcrop>

IN THIS ISSUE

Crop rotations for Indiana Vegetables - *(Nathan Kleczewski)* - If vegetable crops are grown in the same location (field, plot, etc) season after season, pests and pathogens become problematic and plant productivity and yield declines (see Figure 1a, next page). An excellent cultural practice that you should use to minimize these issues is crop rotation. Crop rotation is when a field containing one vegetable family is replaced the subsequent year with a vegetable (or other crop) belonging to a different family. Rotated crops often outperform unrotated crops in terms of yield. Although crop rotation improves many aspects of the soil, such as plant nutrient use, nutrient availability, and organic matter, it also serves to reduce levels of pests and pathogens in the soil. This is because many pests and pathogens only consume a particular crop or related crops. When this crop is removed from a site and replaced with another, unrelated crop, the pest or pathogen loses its food source and its presence in that field typically declines (see Figure 1b, next page). Examples of some vegetables and other commonly planted crops in Indiana grouped by plant family are found in Table 1.

Crop rotation does not work for all pathogens. Some pathogens produce resilient survival structures that allow for prolonged survival in soil. Good examples of these pathogens include Sclerotinia and Fusarium, which both can survive for years in soil in the absence of an appropriate host. Other pathogens are able to infect a wide range of plants, including weeds. Examples of pathogens with wide host ranges include Verticillium and Rhizoctonia. Lastly, some pathogens do not overwinter here in Indiana because of our cold winter temperatures. Similar to some retired individuals, these organisms come in from warmer climates (e.g. Southern portions of the United States and Central America) during the spring or summer. Stem rust of wheat, sweet corn rust, and downy mildew of cucurbits are examples of these fair-weather pathogens.

Crop rotations are typically at least 4 years, but longer rotations may be required for some diseases such as Cabbage Yellows (>6 years), Root knot nematode in melons and watermelons (>6 years), Fusarium wilt of melons, watermelons, and tomato (>4 years) and Fusarium crown rot (>6 years), Southern blight (>6 years), Verticillium (>6 years), and White mold (5-6 years) of tomato. Pages 44-46 of the ID 56 provide additional information on crop rotations for specific Indiana vegetable crops **http://www.btny.purdue.edu/Pubs/ID/ID-56/**.

Vegetable crop families	
Apiaceae Carrot Celery	**Cucurbitaceae** Cucumber Melon Pumpkin Squash Watermelon
Chenopodiaceae Spinach Swiss chard Quinoa	**Fabaceae** Alfalfa Beans Clover Pea
Compositae Lettuce	**Solanaceae** Pepper Potato Tomato
Cruciferae Broccoli Brussel sprouts Cabbage Kale Kohlrabi	**Others** Corn Rye Wheat

Table 1: Here are some families of vegetables and other crops grown in Indiana. When choosing a rotation, you should try to plant crops in the same family in the same area within a year. Rotate growing areas such that the growing areas do not contain the same plant family for subsequent years. Three to four year rotations are common for many vegetable crops.

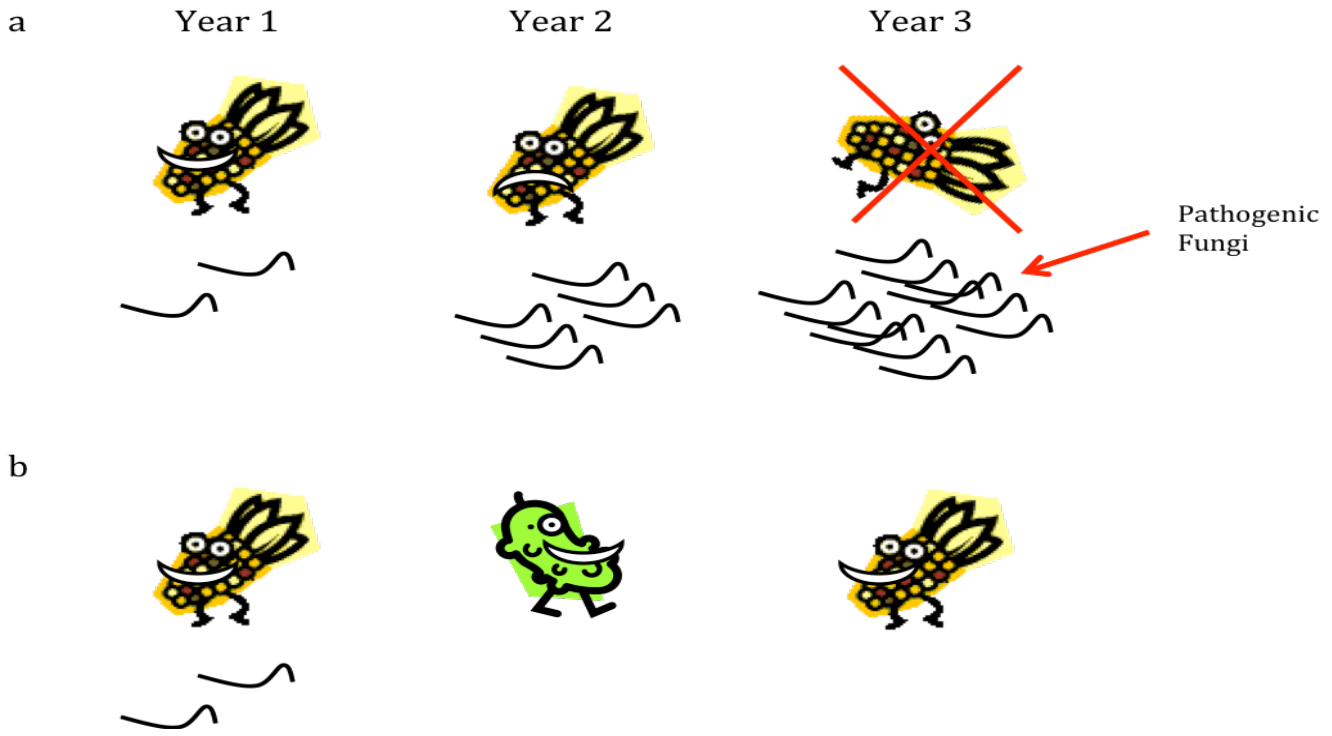

Figure 1 a-b: A simplified, diagrammatic example of how crop rotation can control soil borne diseases of vegetable crops. a) When corn is grown in a field, a farmer may experience some issues with pathogenic fungi. These fungi may be present at low levels, so as to not cause any noticeable effect on crop health or yield. However, if corn is planted in the same field for consecutive years, the population of fungi increases to a point where disease and crop losses are large by year 3. b) Pathogen cycles can be broken by crop rotation. This particular pathogenic fungus is not able to survive in soils without corn. As a result, when cucumber is planted in rotation with corn, there are no issues with this pathogen in year 3. In this example I chose corn and cucumber simple because both clip arts featured these crops as friendly, walking characters. Specific examples of recommended rotations can be found in table 22 (page 44-45) of the ID-56.

Production Guide Preview - *(Dan Egel)* - I have been spending the last several days going through the *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) chapter by chapter. The new edition of the ID-56 will be updated with new products, pests, and other details. The completed guide will be available the first week of January 2012. Below, find a preview of two items that will be found in the ID-56 for 2012.

Early blight fungicide resistance: Strains of the fungus that cause early blight in tomatoes and potatoes in Indiana have been observed to have resistance to group 11 fungicides (see Figure 2, next page). These fungicides include the products Cabrio® (technical name pyraclostrobin) and Quadris® (azoxystrobin). It is unknown at this point how common resistance is in Indiana. Growers who want to continue to use group 11 products may want to tank mix these products with other fungicides of a different group number that are labeled for early blight. For example, Quadris® could be tank mixed with contact fungicides such as chlorothalnil products (e.g., Bravo®, Echo®, Equus®) or a mancozeb product (e.g., Dithane®, Manzate®, Penncozeb®). Pre-mixes of products such as Quadris Top® (contains azoxystrobin, group 11, plus difenconazole, group 3) or Quadris Opti® (contains azoystrobin, group 11, plus chlorothalonil, group M) could also be used. At the very least, growers should alternate group 11 fungicides with fungicides of a different mode of action, such as the contact fungicides mentioned above or systemic fungicides such as Endura® (group 7) or Inspire Super® (group 3 and 9). Fungicide resistance in the early blight of tomato/potato system will be noted in the 2012 ID-56.

Bacterial spot and copper resistance: Tomato and pepper growers who have heard me give extension talks or have been readers of this newsletter may know that strains of the bacterium that causes bacterial spot of tomato and pepper have been observed in Indiana that have resistance to copper (see Figure 3, next page). This will be noted officially in the upcoming 2012 ID-56. In addition, the use of Tanos® fungicide has been added to this section as a possible management tool for the suppression of copper resistant strains of bacterial spot as well as bacterial speck and bacterial canker strains. Tanos® should be tank mixed with a mancozeb product and a fixed copper product. Other products that may be used to manage copper resistant bacterial spot strains include Actigard®, Serenade Max® and, in the greenhouse, Agri-mycin 17®.

The *Midwest Vegetable Production Guide for Commercial Growers* 2012 will be available at several Purdue University extension meetings such as the **Indiana Horticultural Congress January 17-19** in Indianapolis (contact Tammy Goodale at 765-494-1296) and the **Illiana Vegetable Growers School, January 5** in Schererville (contact Liz Maynard at 219-531-4200). The Guide will also be available online at **http://www.btny.purdue.edu/Pubs/ID/ID-56/**. Growers who have questions, comments or suggestions for the ID-56 should contact Dan Egel at (812) 886-0198 or **egel@purdue.edu**.

Figure 2: Early blight of tomato causes round necrotic lesions, often with a concentric ring pattern. This disease may cause lower leaves of the tomato plant to turn brown and die. Although early blight was not a serious disease in the 2011 season, it has been reported that some strains of the fungus that causes early blight are resistant to group 11 fungicides. This issue will be appear in the 2012 *Midwest Vegetable Production Guide for Commercial Growers* (ID-56) now being updated (see accompanying article) *(Photo by Dan Egel)*.

Figure 3: Bacterial spot of tomato can result in large lesions on the tomato fruit as shown here as well as lesions on the foliage (not shown). Resistance of some bacterial spot strains to copper and possible treatments to manage this problem will be discussed in the *Midwest Vegetable Production Guide for Commercial Growers* 2012 (see accompanying article). *(Photo by Dan Egel)*

Drought record for U.S. set in July - *(This article is written by Steve Smith of the University of Nebraska-Lincoln.)* - The percent of contiguous U.S. land area experiencing exceptional drought in July reached the highest levels in the history of the U.S. Drought Monitor, said an official at the National Drought Mitigation Center at the University of Nebraska-Lincoln.

Nearly 12 percent of the contiguous United States fell into the "exceptional" classification during the month, peaking at 11.96 percent on July 12. That level of exceptional drought had never before been seen in the monitor's 12-year history, said Brian Fuchs, UNL assistant geoscientist and climatologist at the NDMC.

Eighteen percent of the country is classified as under either extreme or exceptional drought, Fuchs said. Much of it remains contained in the south, particularly Texas, where the entire state is experiencing drought.

Other states include: * New Mexico (100% abnormally dry or in drought) * Louisiana (100% abnormally dry or in drought) * Oklahoma (100% abnormally dry or in drought) * South Carolina (97% abnormally dry or in drought) * Georgia (95% abnormally dry or in drought) * Arkansas (96% abnormally dry or in drought) * Florida (89% abnormally dry or in drought)

To examine current and archived national, regional and state-by-state drought maps and conditions, go to **http://droughtmonitor.unl.edu/**.

Madison County Growers Council Educational Tour - The tour will be held at Smith Family Farms, Pendleton, IN on October 6th, at 6 p.m. The focus of this tour will be the Smith's pumpkin production and agricultural education business. Liz Maynard, Commercial Vegetable Specialist, Purdue University, will focus on effective pumpkin production in Indiana and Roy Ballard, Extension Educator, Hancock County will share some information on SARE grants and agri-tourism in Indiana. Neal and Jennifer Smith of Smith Family Farms will lead a tour of the operation and share background information about the farm. **This is free and open to the public.** Please email John Orick at **orick@purdue.edu** or call 765-641-9514 to reserve a spot for this program!

Next Hotline in November - The next issue of the *Vegetable Crops Hotline* will be in November. The first *Vegetable Crops Hotline* for the 2012 growing season will be in February. To receive the 2012 Hotline issues by mail, the fee will be $15 and can be mailed to Sara Hoke at the address above. Please make your checks payable to **Purdue University**.