VEGETABLE CROPS HOTLINE

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

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No. 520
April 23, 2010

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

IN THIS ISSUE

FUSARIUM DRY ROT OF POTATO - *(Dan Egel)* - Potatoes that have been kept in storage for use as seed potatoes or for future sales or use may become diseased. The most common post-harvest disease is Fusarium dry rot.

The first symptom of Fusarium dry rot is likely to be the small brown areas surrounding wounds. These areas may become sunken and wrinkled. The lesion itself may be dry and spongy in texture. However, the lesion may also become invaded by bacteria (secondary bacteria) in which case the lesion may become slimy and foul smelling. Once bacterial soft rot develops on one tuber, nearby tubers in storage may become diseased as well.

There are several species of the Fusarium fungus that can cause dry rot of potatoes. The fungi are very common in the soil. (The Fusarium fungi that cause dry rot do not cause wilt diseases.)

To manage Fusarium dry rot of potatoes, avoid wounding potatoes at harvest. Only wounded tubers can become diseased with Fusarium dry rot. Harvest potatoes when vines are completely dead to be sure that potatoes are mature. Avoid adding excess soil to harvest bins. Hold potatoes at 55-60°F and 90-95% relative humidity for 1-2 weeks at the start of storage to promote healing of any wounds. After the curing period, hold seed and fresh-market tubers at 38-40°F; french fry processing tubers at 45°F; chip processing tubers at 50-55°F. In addition, damp storage conditions favor dry rot. See the ***Midwest Vegetable Production Guide for Commercial Growers 2010 (ID-56)*** **<www.btny.purdue.edu/Pubs/ID/ID-56/>** on page 130 for fungicide information for potato dry rot.

The presence of late blight on tomato in 2009 also impacts potato storage and the use of potatoes as seed pieces. Late blight can cause a serious disease on tomatoes and potatoes (See issues 512 and 516). It is possible that the late blight fungus could overwinter on volunteer potatoes, potatoes in cull piles or potatoes used as seed pieces. My recommendation is that potatoes grown in Indiana in 2009 not be used as seed pieces. However, if growers decide to use potatoes from 2009 as seed pieces, these potatoes should be inspected closely before use to avoid re-introducing late blight to Indiana in 2010. A Purdue University extension bulletin on late blight has been published and may be found on-line here **<www.extension.purdue.edu/extmedia/BP/BP-80-W.pdf>** or can be requested by calling (812) 886-0198.

FUNGICIDES ON CUCURBITS - *(Dan Egel)* - Table 1 presented on page 2 has data from a field trial conducted last summer on muskmelon at the Southwest Purdue Ag Center. The experiment was conducted on the variety Superstar, which is susceptible to powdery mildew. The experiment was inoculated with the gummy stem blight fungus to ensure disease. Below, I will try to make a few simple points about this data.

The first item of interest is that there was plenty of gummy stem blight and powdery mildew on these experimental plants. It is important to note that any fungicide treatment significantly lowered the amount of both diseases compared with the untreated control.

Second, notice that treatment 4 which included a systemic compound (Folicur® 3.6F) offered significantly lower amounts of gummy stem blight than treatments 2 and 3 which only included contact fungicides. (Monsoon® 3.6 F and Toledo® 3.6 F have the same active ingredient as Folicur®). Systemic fungicides generally offer better control than contact fungicides for gummy stem blight.

Treatment 4 uses a contact fungicide for the first two applications. The first 2 or 3 fungicide applications are often made when disease pressure is low (because the weather is generally cooler and the amount of disease causing fungus in the field, known as inoculum, has not reached high numbers yet). In addition, contact fungicides are relatively low in cost. So the use of contact fungicides early in the season makes sense.

The first use of the systemic fungicide (Folicur® 3.6F), on the 3rd application, is made when nozzles can still be turned off between rows and money can be saved.

Contact fungicides are also used to alternate with the systemic fungicide. Both contact fungicides, Bravo® WS and Penncozeb® 75DF are in MOA group M which can be alternated with Folicur® 3.6 in MOA group 3. Other systemic fungicides that could be alternated with Folicur® include Cabrio® and Amistar®/Quadris® (group 11), Pristine® (group 7, 11) and Switch® 62.5WB (Groups 9, 12).

Generally, systemic fungicides offer better disease control of powdery mildew than contact fungicides. Treatment 4 gave lower powdery mildew numbers than either treatment 2 or 3, both of which included contact fungicides only. Systemic fungicides for powdery mildew control on muskmelon are recommended 7-14 days before first harvest. However, some systemic fungicides, such as Folicur®, are effective against both powdery mildew as well as gummy stem blight. Therefore a systemic fungicide such as Folicur® may be applied throughout the season.

Cucurbit growers in Indiana who regularly battle gummy stem blight should remember that some strains of this fungus are resistant to fungicides in MOA group 7 (e.g., Pristine®) and 11 (e.g., Cabrio®, Amistar®/Quadris®). I recommend that when any of these fungicides are used for gummy stem blight control that a contact fungicide be included in the tank mix. See Issue 516 of the ***Vegetable Crops Hotline*** for more information.

Finally, more information on the subject of cucurbit fungicides can be found in the ***Midwest Vegetable Production Guide for Commercial Growers 2010 (ID-56)*** <**www.btny.purdue.edu/Pubs/ID/ID-56/**>. In particular, Table 25 on page 47 lists fungicides and their MOA codes. Page 72 of the ID-56 starts the alphabetical listing of disease and treatments of cucurbits. Several extension bulletins are listed on this website <**www.ag.purdue.edu/btny/Extension/Pages/VegetablePathology.aspx**>. If you don't have access to the Internet, call Dan Egel at (812) 886-0198.

Table 1: The management of gummy stem blight and powdery mildew of muskmelon with fungicides. The higher the number observed under the disease severity (AUDPC) column, the more disease existed in the field. Treatments with the same letter beside the number are not statistically different.

Treatment number	Treatment, rate/A	Application Sequence	Disease Severity (AUDPC[z])	
			Gummy stem blight	Powdery mildew
1	Untreated check		813.4 a[x]	1125.7 a
2	Penncozeb® 75DF, 3 lbs	1st-7th	531.7 b	274.2 bc
3	Bravo® WS, 3 pt	1st-7th	468.1 b	355.6 b
4	Bravo® WS, 3 pt Folicure® 3.6F, 8 fl oz Penncozeb® 75DF, 3 lbs	1st, 2nd, 4th 3rd, 5th, 7th 6th	190.2 c	115.0 cd

[z] AUDPC stands for Area Under the Diseae Progress Curve. The higher the number observed in this column, the more disease existed in the field.
[x] Treatments with the same letter in common are not significantly different.

Keeping an Eye on the Weather - (*Liz Maynard*) - It has been a warm spring and we are not even in to May. Good weather records are useful for a variety of reasons. Temperature records are useful in scheduling multiple plantings or predicting harvest, as described in *Vegetable Crops Hotline* Issue 421 <**www.btny.purdue.edu/pubs/vegcrop/VCH2003/VCH421.pdf**>. This article will introduce two sources for Indiana records that may be helpful additions to your weather record toolbox.

The Indiana Crop Progress and Condition Report is published by the Indiana Office of the National Agricultural Statistics Service of USDA. Each week during the growing season, the report summarizes temperatures, rainfall, growing degree-days, and soil moisture across the state by region. The difference from 30-year normals for growing degree-days, precipitation and temperature are also provided. The number of days suitable for fieldwork and an estimate of crop progress for major agronomic crops are also reported. Text and audio versions of the report are available at <**www.nass.usda.gov/Statistics_by_State/Indiana/Publications/Crop_Progress_&_Condition/index.asp**>. Electronic and print subscriptions are available.

The Indiana State Climate Office at <**iclimate.org**> has a wealth of information, including maps of temperature and precipitation, climate information, weather summaries. For daily weather records the access to data from automated and cooperative weather stations around the state is useful. To find these from the home page, choose the link 'Data Request' and then the link to 'Automated 'Request'. The time period and type of report can then be selected.

Automated stations collect data on wind speed and gusts, precipitation, solar radiation, air and soil temperature, and evapotranspiration. Data can be retrieved as a daily summary (Figure 1), or for each hour or half-hour. Currently there are reports from five automated stations located at Purdue Ag Centers around the state.

There are many more cooperative stations around the state (Figure 2). Data available from cooperative stations varies: some report just precipitation, others include air temperature and growing degree-days and heat units, and a few also report soil temperature and evapotranspiration. Data may be viewed in summary formats or as daily observations. 30-years normals by day, month and year are also available for cooperative stations.

With the weather warm and dry there may not be time to check these resources out right now. If that's the case, file this article away for a day when you have time. The records will be there when you need them.

Observations for Station ID:PPAC for the period: 4/15/2010 to 4/22/

Date	PACId	Wind Speed (mph)	Wind Speed Sigma (mph)	Wind Direction (degree)	Wind Direction Sigma (degree)	Wind Gust (mph)	Wind Gust Time (time)	Precipitation (inch)
04/15/2010	PPAC	7	6	127	25	17	08:55	0.01
04/16/2010	PPAC	8	8	230	20	35	14:44	0.01
04/17/2010	PPAC	9	6	310	48	28	17:58	0.10
04/18/2010	PPAC	8	7	335	25	31	09:41	0.00
04/19/2010	PPAC	8	7	344	21	24	11:18	0.00
04/20/2010	PPAC	5	4	5	32	29	14:21	0.00
04/21/2010	PPAC	4	2	351	34	20	13:29	0.00
04/22/2010	PPAC	6	5	335	31	18	11:46	0.00

Figure 1: A portion of the automated weather station data available from <**iclimate.org**>. This data is from the Pinney-Purdue Agriculture Center (PPAC). Data is also available from Davis, Northeast, Southeast and Southwest Purdue Agriculture Centers.

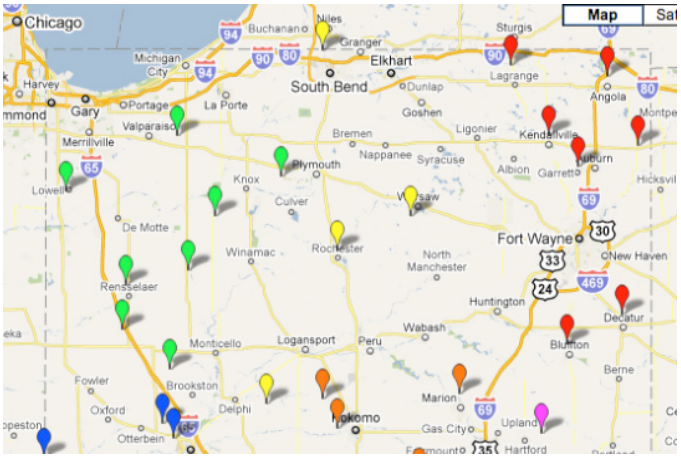

Figure 2: A portion of the map of Indiana showing just the cooperative stations in the northern section of the state.

Temperature in the Greenhouse - *(Liz Maynard)* - Keeping temperatures within the desired range is important for successful transplant production. Temperatures that are too low can lead to slow germination, increased root disease, and slow growth. Temperatures that are too high can lead to spindly plants (see 'Leggy Transplants' article this issue of the ***Vegetable Crops Hotline***) or faster growth than desired. This article addresses two important components of temperature management.

The placement and housing of thermostats that control heaters, fans, and vents determine what temperature is maintained in the greenhouse. Ideally the temperature sensed by thermostats should be the same as experienced by the seedlings growing in the greenhouse. This requires that thermostats be placed near center of the greenhouse at the same height as the seedlings. A thermostat that is exposed to direct sun can heat up and register a temperature higher than the surrounding air. To avoid this, place thermostats in a shaded area, or better yet, enclose them in a light-colored case with a fan that will pull air from outside the case over the thermostat (Figure 1).

Figure 1. Example of thermostats in a box with a fan. Box will be painted white.

A second component of temperature management is periodically checking the temperature. Max-min thermometers are useful for keeping a record of the extremes. Thermometers should be placed near plants and out of direct sun. Temperatures vary in different areas of the greenhouse, so consider having several thermometers. One might keep a chart nearby to record temperature data.

For more information on heating and cooling greenhouses, see articles by J. Bartok from Univ. of Massachusetts on "Selecting and Maintaining Thermostats" and "Greenhouse Ventilation", available at <**www.umass.edu/umext/floriculture/fact_sheets/greenhouse_management.html**>.

Leggy Transplants - *(Dan Egel & Liz Maynard)* - Transplants that are too tall and tend to fall over are often referred to as spindly, shanky or leggy. Such transplants may have low survival rates in the field. Several factors may cause leggy transplants. Many vegetable crops will require relatively warm conditions for germination. This is especially true of seedless watermelon. Seeds of seedless watermelon should be kept at 85 to 95 degrees Fahrenheit for at least 48 hours. (More information on germination of seedless watermelon can be found here: <**www.ces.purdue.edu/extmedia/BP/BP-62.pdf**>). If transplants are kept warm too long, the additional warmth may lead to an increase in seedling height.

Spindly transplants may also be produced under low light conditions. Greenhouse structures that let inadequate light in and cloudy weather could be the culprits. Over watering may lead to spindly plants. Avoid over watering seedlings during cloudy weather.

Temperature may also cause transplants to be elongated. Hot days and cold nights favor leggy transplants. If night temperatures are equal to or higher than day temperatures, stem elongation will be reduced. It may be sufficient to lower the greenhouse temperatures for a two-hour period starting at dawn.

Over fertilization can also lead to spindly transplants. In particular, high levels of phosphorus may cause taller plants. If high P might be a problem, experiment with a fertilizer containing a lower percentage of phosphorus - for instance, try 21-5-20 rather than 20-20-20. It is important to provide adequate P, but not too much: under fertilization with P will produce short plants, but yields will also suffer.

Figure 1: Gummy stem blight has been observed on watermelon transplants in southwestern Indiana. The water-soaking of the stem area around the seed leaves is typical of this disease. *(Photo by Dan Egel)*

Figure 2: The woody appearing stem on the muskmelon shown above is generally observed after the water-soaked stem shown in figure 1. *(Photo by Dan Egel)*

Handbook on Cooperative Marketing - *(Announcement)* - On Monday, April 5, the Sustainable Agriculture Research and Education Program (SARE) <**http://sare.org**> released a handbook on cooperative marketing for community supported agriculture farms (CSAs). The 130-page manual gives concrete details on strategies for forming and maintaining a multifarm CSA, including advice on staffing, volunteer boards, distribution, and legal topics.

Local Harvest: A Multifarm CSA Handbook is available for download as a free PDF <**http://sare.org/publications/csa/csa.pdf**> or you can order a print copy from the SARE website <**http://sare.org/publications/csa.htm**>.

This guide is one of the many publications available from SARE Outreach <**http://sare.org/publications/index.htm**> which features research, practical guides, and other tools related to sustainable production systems and marketing practices.