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Downy Mildew Update in Cucurbits

John Damicone, Extension Plant Pathologist



Downy mildew is a destructive disease of cucurbits that causes rapid vine defoliation when the fungus is present and where cool wet conditions occur. There are biotypes of the fungus that prefer certain cucurbit crops over others and this seems to differ geographically. In Oklahoma, the disease has been most severe on watermelon and cantaloupe while pumpkin and squash have been least affected. In more eastern production areas, watermelons are least affected while pumpkin, squash, and cucumber are most susceptible. In addition to variation in the crop responses, new strains have become predominant that are difficult to control with fungicides. For example, control failures where strobilurin fungicides (e.g. Reason and Cabrio) and metalaxyl (e.g. Ridomil/Bravo) have been frequent in recent years. These more aggressive strains also cannot be adequately controlled with just broad-spectrum, protectant fungicide such as chlorothalonil (Bravo) and mancozeb (Dithane).

The disease has been a sporadic problem in Oklahoma in that it does not occur every year. It is thought that because the fungus does not overwinter locally, airborne spores of the fungus move from southern production areas of Mexico and Texas, moving northward on successively planted cucurbit crops. In eastern states, the disease begins in Florida each year and moves northward. In order to track the progress of the disease each year and to warn growers on potential new outbreaks, the North American Plant Disease Forecast Center at NC State University has been monitoring known sources of downy mildew and making forecasts on disease spread into new areas (<http://www.ces.ncsu.edu/depts/pp/cucurbit/>). This effort to track cucurbit downy mildew led to the development of a network of sentinel plots across the country for the first time in 2008. Most states in the U.S. that grow cucurbits are participating. The three locations for sentinel plots in Oklahoma are in Stillwater, Lane, and Ft Cobb at the local research stations. There are seven different cucurbits planted at each site in the hopes of identifying the prevalent biotypes.

Downy mildew first appeared in commercial watermelon fields near Hydro OK and in the sentinel plots in Ft. Cobb during the first week of September. The outbreak near Hydro was more severe and advanced than in the sentinel plots in Ft. Cobb. Therefore the sentinel plots

were not very useful in predicting the outbreak in the commercial watermelon fields. The forecasted spread of downy mildew from known sources in Texas also did not provide much warning for the outbreak in Oklahoma. Apparently there are some unreported sources of downy mildew that triggered the outbreaks in Oklahoma. Downy mildew appeared about a week later in Lane and has yet to appear in Stillwater. So far we have observed downy mildew on watermelon (Fig. 1), cantaloupe (Fig. 2), the susceptible cucumber variety (Fig. 3), and on butternut squash (Figure 4).



Fig 1. Downy mildew on watermelon.



Fig 2. Downy mildew on cantaloupe.



Fig 3. Downy mildew on susceptible cucumber variety.



Fig 4. Downy mildew on butternut squash.

Table 1 shows that watermelon is most susceptible to the prevailing biotype here in Oklahoma. This differs from the east coast where watermelon is one of the last cucurbits affected. There is obviously a lot to learn yet about downy mildew outbreaks on cucurbits in the United States. In 2008, outbreaks appeared in the great lakes region (Michigan, Ontario, Ohio, and western New York and Pennsylvania) before the disease appeared in more southern states. Some suspect that infected cucurbits growing in greenhouses in the Great Lakes region may be serving as a local source of the pathogen.

We hope to learn more about local biotypes and whether or not we have the new aggressive strains. In 2007, downy mildew appeared in a fungicide trial in Stillwater and preventive applications of chlorothalonil and mancozeb, alone and in combination with other fungicides provided good disease control. The outbreak in the commercial fields in Oklahoma this year did become severe following several applications of chlorothalonil. In the eastern U.S. where the new strains are present, applications of the fungicides Previcur, Presidio, and Tanos have provided the best control when applied in combination or alternation with chlorothalonil. These and other spray programs are being tested in late-planted fungicide trial on watermelon in Stillwater.

Table 1. Date of first occurrence of downy mildew in cucurbit sentinel plots in Oklahoma in 2008.

Cucurbit host	Stillwater	Lane	Ft. Cobb
Cucumber - S*	-	-	3 Sep
Cucumber - R*	-	-	-
Cantaloupe	-	-	17 Sep
Butternut squash	-	-	17 Sep
Acorn squash	-	-	-
Pumpkin	-	-	-
Watermelon	-	11 Sep	3 Sep

* R=DM Resistant Variety; S= DM Susceptible variety.

Dr. Richard Grantham, Director, Plant Disease and Insect Diagnostic Laboratory

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