Onion

Wednesday morning 10:00 am

Where: Grand Gallery Room B (lower level)

Summary: Onion producers will not want to miss the latest techniques to control diseases and insects, and manage nutrients. Production practices in the west and the relation between diseases and seed quality round out this session.

Recertification credits: 1 (Private, 1A, 1B)

CCA Credits: IPM(1) CM(0.5)

Moderator: Bruce Klamer, Byron Center

10:00 a.m. Introduction Onion GREEEN Grant

- Amy Irish-Brown, Michigan State Univ Extension

10:05 a.m. 2003 Onion Research Results: Disease Management

- Mary K. Hausbeck, Michigan State University

10:20 a.m. 2003 Onion Research Results: Insect Management

- Edward J. Grafius, Michigan State University

10:35 a.m. 2003 Onion Research Results: Nutrient Management

- Darryl Warncke, Michigan State University

10:50 a.m. Onion Production in Utah: Overview of Transplanted and Direct Seeded Spanish Onions and Related Research

- Dan Drost, Utah State University

11:20 a.m. Gray Mold, Black Mold and Onion Seed Quality

- Lindsey du Toit, Washington State University

2003 Onion Research Results: Disease Management

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Michigan environmental conditions were favorable for onion downy mildew in 2003. Downy mildew is caused by the fungus, *Peronospora destructor*, and is not present every year. In many years, conditions are just too warm for downy mildew to develop. Spores are easily blown long distances in moist air and can germinate and begin to grow on onion tissue within 1½ to 7 hours, even when temperatures are 50 to 54EF.

This mildew can reproduce in 11 to 15 days, providing spores for infection of nearby onion plants. The spores are short-lived and very sensitive to drying, so in dry weather, most conidia die without causing new infections. This fungus is favored by relatively cool weather, and can form spores at night temperatures from 35 to 75EF. In order to form its spores, it must have fairly high humidities for eight to nine hours during two consecutive nights (at least 60 to 90%, depending on how high the temperature), or it must have very high humidities (95% or higher), during at least eight hours of the previous night. The higher the night temperatures, the higher the humidity must be to support sporulation.

This fungus sends its spore-bearing stalks out through the leaf stomates (the breathing pores on the leaf surface). The leaf appears green and normal except for a velvet-like growth that appears purplish gray. The fungus only forms one crop of spores on any given piece of leaf tissue, and once the spores have been formed and released, the tissue collapses and dies. This is what causes the blasted appearance in a mildew-infected field.

The mildew typically begins in one area of a field and can spread to surrounding plants. If the weather turns dry after a disease outbreak, plants can produce new leaves and may recover somewhat. However, if the humidity returns, the fungus can revive and the new growth becomes diseased. Premature death of infected leaves reduces the bulb size. Problems can occur on the bulbs due to green and succulent necks which can be a target for fungal and bacterial pathogens in storage. Overwintering spores (called oospores) can form in dying onion foliage. Oospores have thick walls and a built-in food supply so they can withstand unfavorable winter temperatures and survive in the soil for up to 5 years.

Foliar fungicides can be helpful, especially when applied preventively at high rates and short intervals. Mancozeb-based fungicides can be effective and may be used in alternation with Ridomil-based fungicides (NOTE: See E-312 for formulations and rates).

A 2003 study evaluating biopesticide and fungicides for managing downy mildew was conducted at the Michigan State University Muck Soils Research Farm. Onion 'Daytona' seeds were planted on 14 May at a seed spacing of 1 inch. Rows were spaced 18 inches apart on 3-row beds centered 64 inches apart. Fungicides were applied with a CO_2 backpack sprayer equipped with three XR8003 flat fan nozzles spaced 18 inches part and calibrated to deliver 50 gal/A at a nozzle pressure of 52 psi. Eight applications were made at weekly intervals on 17, 24 and 30 Jul; 7, 14, 22 and 28 Aug; and 5 Sep. Disease was assessed using a 1-10 scale (1=no disease; 10=complete defoliation) and was evaluated on 14 and 21 Aug, and 11 Sep. Onions in the center row of each treatment bed were hand-harvested on 26 Sep, and the foliage was removed using a mechanical topper. Bulbs were graded and weights of small (<2 inch diameter), medium (2-3 inch diameter), and large (>3 inch diameter) were recorded on 9 Oct.

Disease was detected on 7 Aug and advanced slowly through mid-Aug. Disease in the untreated plots progressed rapidly during a 21-day period between 21 Aug and 11 Sep when disease levels increased from 4.0 to 8.5. There were no significant differences in disease levels among treatments on the initial evaluation date (data not presented). On the second observation date, the Bravo Weather Stik 6SC + Rovral 50WG treatment and all treatments that included Manzate 75DF provided significantly better disease control compared with the untreated. At the time of final disease evaluation, all fungicide programs that included Manzate 75DF were most effective in suppressing disease ($\leq$ 4.8) and resulted in significantly better disease control when compared with the untreated. Both the KP 481 50WG + Manzate 75DF alternated with Manzate 75DF and Ridomil Gold MZ 68WP alternated with Manzate 75DF treatments were highly effective in limiting disease to low levels (< 2.8). All treatments, including the biopesticide 710-145f 0.14% w/v, that did not include Manzate 75DF were not effective in controlling disease and were not significantly different from the untreated. When compared to the untreated, three treatments resulted in significantly higher yields and percentages of large (> 3 in.) bulbs and included KP 481 50WG + Manzate 75DF alternated with Manzate 75DF, Manzate 75DF applied alone, and Ridomil Gold MZ 68WP alternated with Manzate 75DF.

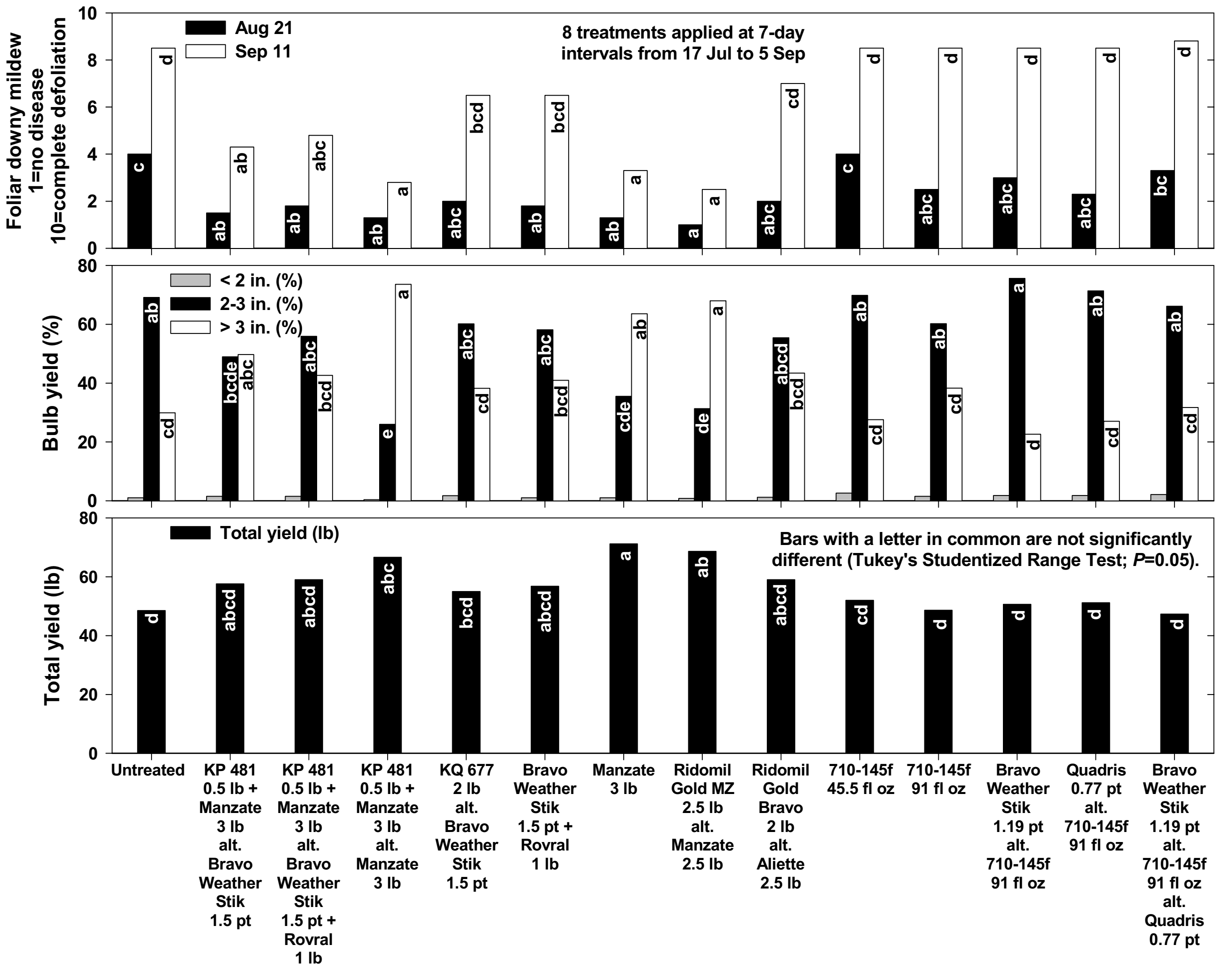

Figure 1. Effectiveness of registered and unregistered fungicides in controlling onion downy mildew.

Table 1. Products used in onion downy mildew fungicide trial.

Product	Active ingredient	Company
710-145f 0.14% w/v	*Bacillus licheniformis* SB3086	Novozymes Biologicals, Inc.
Aliette 80WDG	fosetyl-al	Bayer CropScience
Bravo Weather Stik 6SC	chlorothalonil	Syngenta Crop Protection, Inc.
KP 481 50WG	famoxate + cymoxanil	E.I. du Pont de Nemours and Company
KQ 677 68.75WG	famoxate + mancozeb	E.I. du Pont de Nemours and Company
Manzate 75DF	mancozeb	Griffin LLC
Quadris 2.08F	azoxystrobin	Syngenta Crop Protection, Inc.
Ridomil Gold MZ 68WP	mefenoxam + mancozeb	Syngenta Crop Protection, Inc.
Ridomil Gold Bravo 76.5WP	mefenoxam + chlorothalonil	Syngenta Crop Protection, Inc.
Rovral 50WG	iprodione	Bayer CropScience

Manzate 75WG 3 lb/A **Untreated**

Figure 2. Downy mildew on onion – fungicide trial results