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Plant Pathology Fact Sheet

Managing Target Spot and Rhizoctonia Damping-Off in the Float System

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IMPORTANCE

Damping-off and target spot occur each year in Kentucky. They can cause significant levels of damage to tobacco seedlings if cloudy, rainy conditions prevail. Once considered minor problems in float beds, both diseases have increased steadily in importance in recent years. Sound management practices and early recognition of these diseases are keys to preventing serious losses during the transplant production cycle.

DAMPING-OFF

Cause

The float-system is an ideal location for *Rhizoctonia solani*, the causal agent of damping-off. Two strains of *R. solani* can be found in the float system – one of which causes only damping-off; another which can cause both damping-off and target spot.

Symptoms

Damping-off usually occurs early in the development of the tobacco seedling and first appears as a water-soaked lesion at the base of the plant. Later, the lesion will take on a sunken, brown appearance and will eventually girdle the plant. Girdled seedlings collapse and eventually die (FIGURE 1). In many cases, the entire stem of affected plants will be discolored and decay spreads into the leaves (FIGURE 2). Leaves in contact with the surface of Styrofoam trays or peat-based media can become infected and will first develop water-soaked lesions that enlarge over time, often

FIGURE 1. EARLY SYMPTOMS OF RHIZOCTONIA DAMPING-OFF ON TOBACCO SEEDLINGS.

FIGURE 2. STEM AND LEAF ROT OF TOBACCO SEEDLINGS CAUSED BY *RHIZOCTONIA SOLANI*.

spreading to the stems on young seedlings (FIGURE 3). Seedlings with mild infections of *R. solani* that are later transplanted may succumb to soreshin in the field; they may also be more susceptible to black shank and Fusarium wilt.

Disease Development

A common inhabitant of agricultural soils, *R. solani* can survive on organic matter and will colonize growth media used in tobacco transplant production. Primary infections occur when actively growing hyphae (fungal threads) come in contact with roots or stems. Hyphae then form infection cushions that produce enzymes which, in turn, degrade plant tissues. Infections can spread from plant to plant, and organic matter (plant debris) can serve as a bridge between infected and healthy seedlings. Survival structures called sclerotia are formed after the food source has been exhausted. High humidity and float-bed temperatures above 68° F are optimal for growth of *R. solani*.

Infested soil or Styrofoam trays are the most common sources of *R. solani* in transplant production. Dormant hyphae associated with organic debris and sclerotia are the principal resting structures of *R. solani.* These can be found easily on the surfaces of infested trays and in cracks and crevices in older Styrofoam trays. Infested trays thus become a source of inoculum in subsequent years if they are not sanitized properly or replaced.

Management

- **Good sanitation** is the best way to manage Rhizoctonia damping-off in the float system. The first step is to limit the amount of fungal inoculum in the transplant system. New trays will all but eliminate the risk of carrying over inoculum from previous transplant cycles, but this option can be expensive and may create issues with disposal of old trays. Used trays should be sanitized properly to reduce carryover of inoculum. Refer to the *Kentucky-Tennessee Tobacco Production Guide* (ID-160) for more information.

FIGURE 3. LEAF INFECTION CAUSED BY *RHIZOCTONIA SOLANI*.

- **Proper ventilation**, which minimizes leaf and stem wetness, along with **maintenance of fertility,** are important considerations as well.

- **Properly-timed fungicide applications** can be effective for managing target spot. We obtain reasonable suppression with the mancozeb-based fungicides Dithane DF, Manzate Pro-Stick, and Penncozeb. These products are applied at a rate of 1/2 pound per 100 gallons of finished spray solution (or 1 level teaspoon per gallon) once plants have reached the size of a dime. Use 3 to 5 gallons of the fungicide solution per 1,000

square feet, applied as a fine spray (to ensure good coverage) on younger plants; increase spray volume to 6 to 12 gallons on older plants. Begin applications before symptoms develop, or at the latest, immediately after the first symptoms are observed. Continue sprays on a 5 to 7 day schedule until plants are ready to go to the field.

Target Spot

Cause

Target spot is caused by the sexual stage of *Rhizoctonia solani,* known as *Thanatephorus cucumeris*.

Symptoms and Signs

Target spot begins in localized areas, or foci, and commonly occurs after the plant canopy has fully formed. Small, water-soaked lesions appear on leaves and will expand rapidly during periods of warm temperatures (greater than 75° F) and high humidity. Lesions normally have a transparent-light green appearance (Figure 4) and may be surrounded by a chlorotic (yellow) halo.

Figure 3. Early-phase lesions of target spot on tobacco transplants.

Expanded lesions have a characteristic 'bullseye' appearance (Figure 5). Dead leaves will turn brown and adhere to the float tray. Web-like strands (mycelia) of fungal growth may be present on leaves, stems, and growth media when humidity is high. The target spot pathogen will damp-off younger transplants as well. Seedlings with target spot that are transplanted can contribute to epidemics in the field later in the season.

Figure 5. Expanded target spot lesions showing typical 'bullseye' pattern.

Disease Development

Inoculum carried over in infested trays is the most common way for the *T. cucumeris* to enter the float system, although inoculum may move in on air currents from sources outside the transplant facility. Basidospores generated by *T. cucumeris* are released under favorable conditions and contribute to spread of the disease within the float system.

Management

- **Sanitation** and **good growing practices** are the best defense against target spot. Research suggests that plants that are nitrogen-deficient show increased susceptibility to target spot. Severe outbreaks of target spot have occurred in cases where nitrogen has dropped below 50 parts per million (ppm), a common scenario in outdoor float beds that have received significant rainfall resulting in dilution of fertilizer levels. Maintaining nitrogen within the recommended range of 75 to125 ppm will help suppress, but not eliminate, this disease.

- Mancozeb **fungicides**, as described for damping-off, should be applied when

conditions favor disease. These products are the only labeled options for managing Rhizoctonia diseases of tobacco seedlings, and work reasonably well when used in conjunction with sound management practices.

A better option for target spot in the float bed is Quadris fungicide, which received a "Special Local Need" or "24 (c)" label for control of target spot in float beds through December 31, 2012. Under the provisions of this label, growers will be able to make ONE application of Quadris at a rate of 6 fluid ounces per acre, which is the equivalent of 0.14 fluid ounces (4 cc, or roughly 1 teaspoon) of product per 1,000 square feet of float bed (approximately 400 trays) applied in a recommended volume of 5 gallons. This should be adequate to get good leaf coverage and rundown of fungicide solution onto stems.

For best control we recommend making the Quadris application before symptoms are seen (or at the very latest, when they first appear) and at a time when the plants would be the most susceptible to target spot. To get ahead of the disease, a good strategy would be to apply Quadris after the first or second clipping. After making the Quadris treatment, producers should switch back to mancozeb until plants are set in the field. It is also important to note that the float-bed application counts towards the seasonal limit for Quadris in the field. Following the manufacturer's use guidelines for Quadris is critical to staying in compliance with the label, and to minimizing the risk of the target spot pathogen developing resistance to this important fungicide.

Additional Resources

The following University of Kentucky publications are available at County Extension offices, as well as on the Internet.

- Fungicide Guide for Burley and Dark Tobacco, PPFS-AG-T-08
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/ppfsagt8.pdf

- Kentucky-Tennessee Tobacco Production Guide, ID-160 (*1 MB file*)
http://www.ca.uky.edu/agc/pubs/id/id160/id160.pdf

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