



Managing Rhizoctonia Damping-off & Target Spot in the Float System

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IMPORTANCE

Damping-off and target spot occur each year in tobacco transplant crops in Kentucky. These diseases can cause significant levels of damage to tobacco seedlings. Once considered minor problems in float beds, both 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

Symptoms

Damping-off occurs early in the development of tobacco seedlings and first appears as water-soaked lesions at the base of plant stems. Later, lesions take on a dry, sunken, brown appearance and may girdle the plant. Girdled seedlings collapse and eventually die (FIGURE 1). For young seedlings, the entire stem of affected plants will be discolored, and leaves become yellow (chlorotic) and decay (FIGURE 2). Leaves in contact with the surfaces of trays or peat-based media can also become infected. Water-soaked lesions on these leaves enlarge over time, often spreading to stems of young seedlings (FIGURE 3). Mildly infected seedlings that are later transplanted may decline due to sore shin (a disease that results in stem lesions and girdling in the field), and may also be more susceptible to black shank and Fusarium wilt.

Cause & Disease Development

Rhizoctonia damping-off is caused by the soilborne fungal pathogen, *Rhizoctonia solani*. Two strains of *R. solani* can be found in float systems – one that causes only damping-off and another that can cause both damping-off and target spot. Fungal structures of *R. solani* may be found in the surface layers of growing media or in poorly sanitized trays, which makes infection of the lower stem more common than root rots.

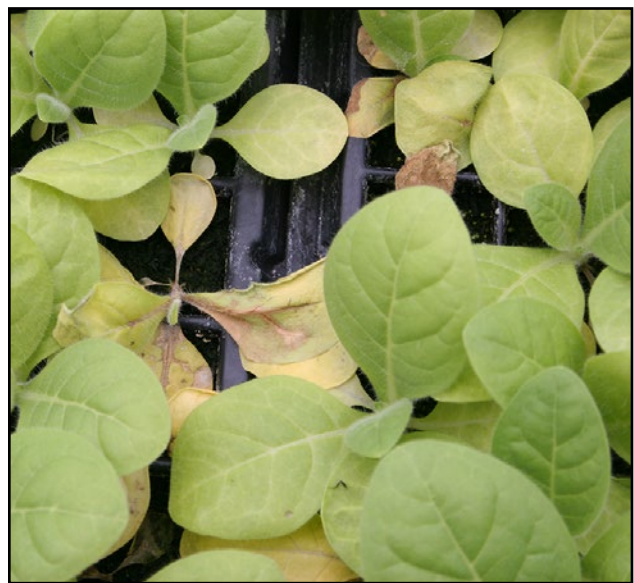


FIGURE 1. EARLY SYMPTOMS OF RHIZOCTONIA DAMPING-OFF ON TOBACCO SEEDLINGS.



FIGURE 2. STEM AND LEAF ROT OF TOBACCO SEEDLINGS CAUSED BY *R. SOLANI*. **FIGURE 3.** LEAF INFECTION CAUSED BY *R. SOLANI*.

A common inhabitant of agricultural soils, *R. solani* can survive on organic matter and will colonize growth media used in tobacco transplant production. The abundance of water and humidity in the float system makes it an ideal location for disease development. Primary infections occur when actively growing fungal threads (hyphae threads) come in contact with roots or stems. Hyphae form infection structures that produce enzymes, which in turn degrade plant tissues. The disease can spread from plant to plant, and organic matter (plant debris) can serve as a bridge between infected and healthy seedlings.

Overwintering survival structures called sclerotia are formed after plant tissues die; these resemble mouse droppings. High humidity, in association with cloudy and rainy conditions, and float-bed temperatures above 68°F are optimal for growth of *R. solani*.

Infested soil or unclean 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 this fungus. These may be observed in and on infested trays, particularly those that are breaking down. Unclean and older trays are a source of disease-causing inoculum in subsequent years.

Management

Sanitation

Good sanitation is the best way to manage Rhizoctonia damping-off in float systems and prevent sore shin in fields. Limiting the amount of initial fungal inoculum is the most important step to managing disease. New trays can 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. Reused trays, no older than 3 to 5 years, should be sanitized properly to reduce carryover of inoculum. Refer to the *Burley and Dark Tobacco Production Guide* (ID-160) for more information. Once float bays have been relined, avoid the introduction of soil or media until bays are filled with water.

Ventilation

Proper ventilation, which minimizes leaf and stem wetness, will reduce plant-to-plant spread. Maintenance of moderate fertility is also recommended to minimize transplant stress, which may make transplants more susceptible to *R. solani*.

Chemical

Fungicide applications, while effective for target spot, are not recommended in Kentucky to manage the spread of damping-off and sore shin.



FIGURE 4

FIGURE 4. SMALL, WATER-SOAKED LESIONS OF TARGET SPOT ON TOBACCO TRANSPLANTS.



FIGURE 5

FIGURE 5. EXPANDED TARGET SPOT LESIONS SHOWING TYPICAL 'BULLSEYE' PATTERN.

TARGET SPOT

Symptoms

Target spot begins in localized areas of the float bed 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 (FIGURES 4 & 5). Lesions normally have a transparent-light green appearance and may be surrounded by a yellow (chlorotic) halo. Dying leaves turn brown and may adhere to the float tray. Seedlings with target spot that are transplanted can contribute to epidemics in the field later in the season.

Cause & Disease Development

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

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

Management

Growing Practices

As with *Rhizoctonia* damping-off, good growing practices are an important defense against target spot. Proper ventilation to reduce humidity can help to lower disease severity. Nitrogen-deficient plants have been shown to be more susceptible 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 diluted fertilizer levels from frequent rain. When additional water is added to greenhouse float bays, fertilizer levels may also be diluted. Maintaining nitrogen within the recommended range of 75 to 125 ppm will help suppress, but not eliminate, this disease.

Sanitation

Similar to damping-off, sanitation is very important for disease management in greenhouse float

bed systems. Keep beds free of all plants that are not tobacco. Areas inside and directly outside greenhouse walls should be frequently mowed or maintained weed-free. This facilitates better air flow and reduces the possibility of *T. cucumeris* spores (produced in association with weedy areas) being blown into houses.

T. cucumeris can remain associated with clippings and organic matter, and can cause new infections on nearby plants. Therefore, clippings should be collected and disposed of at least 100 yards from the facility, or destroyed. Mowers should be cleaned frequently in a space far from production areas.

Chemical

Reasonable suppression can be obtained with the mancozeb-based fungicide Manzate Pro-Stick, which has a 24(c) Special Local Needs label for use in Kentucky. This product is applied at a rate of 0.5 pounds per 100 gallons of finished spray solution (or 1 level teaspoon per gallon). Use 3 to 4 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 gallons on older plants. Begin applications before symptoms develop, as early as dime-size plants, and certainly while tray walls are still visible overhead. Continue sprays on a 7-day schedule until transplants are set. The risk of fungal pathogens developing resistance to mancozeb is very low. Efficacy of this application is reliant on the spray reaching all leaf surfaces since mancozeb has no systemic activity.

Another option is an azoxystrobin fungicide labeled for greenhouse use on tobacco. At the time of publication, these were Quadris, Aframe, and AZteroid. Under the label provisions, growers may make ONE application of one of these fungicides. The rate of Quadris, for example, on greenhouse tobacco transplants is 4 cc, or approximately 1 teaspoon, of product per 1,000 square feet of float bed, applied in a 5-gallon volume. This should be adequate to achieve good leaf coverage.

Azoxystrobin is most effective when applied before symptoms develop. This single azoxystrobin application is recommended the day after the first or second clipping, after plants have thoroughly dried and the clipping wounds have begun to “heal.” After the azoxystrobin application, producers should apply mancozeb at least once before setting plants in the field. If target spot pressure is severe, weekly sprays will be needed to manage the disease. The azoxystrobin application to transplants counts towards the season-long crop limit for azoxystrobin applications, so purchasers of plants should retain a record of the transplant producer’s spray practices. Following the manufacturer’s use guidelines for azoxystrobin is critical to staying in compliance with fungicide labels and minimizes 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
- Burley and Dark Tobacco Production Guide (ID-160)
<http://www.ca.uky.edu/agc/pubs/id/id160/id160.pdf>

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