



Black Shank of Tobacco

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IMPORTANCE

Black shank is one of the most important diseases of burley and dark tobacco in Kentucky. It tends to cause the greatest losses in fields with a history of black shank, during seasons with a wet to moderate early season followed by a dry August. Management is dependent on the successful combination of crop rotation, resistant varieties, and soil-directed fungicide applications.

SYMPTOMS

Early season symptoms typically become apparent when knee-high, established plants wilt in the heat of the day and revive overnight (FIGURE 1). Soon after, plants will become yellow (chlorotic) and may fail to recover from wilting (FIGURE 2). A dark brown, firm, somewhat constricted lesion will extend from the crown of the plant upward (FIGURE 3). Central tissue within affected plant stems may have a disked appearance when split (FIGURE 4). Spores (fungal reproductive structures) splashed from soil sometimes infect lower foliage, progressing to greasy, large, leaf lesions (FIGURE 5). Black shank often affects swaths of plants down the row and in adjacent rows (FIGURE 6), but in high-pressure fields, losses can approach 100%.



FIGURE 1. EARLY SYMPTOMS OF BLACK SHANK ON TOBACCO INCLUDE WILTING DURING THE HEAT OF THE DAY.

FIGURE 2. AS BLACK SHANK PROGRESSES, TOBACCO PLANTS YELLOW AND REMAIN WILTED.

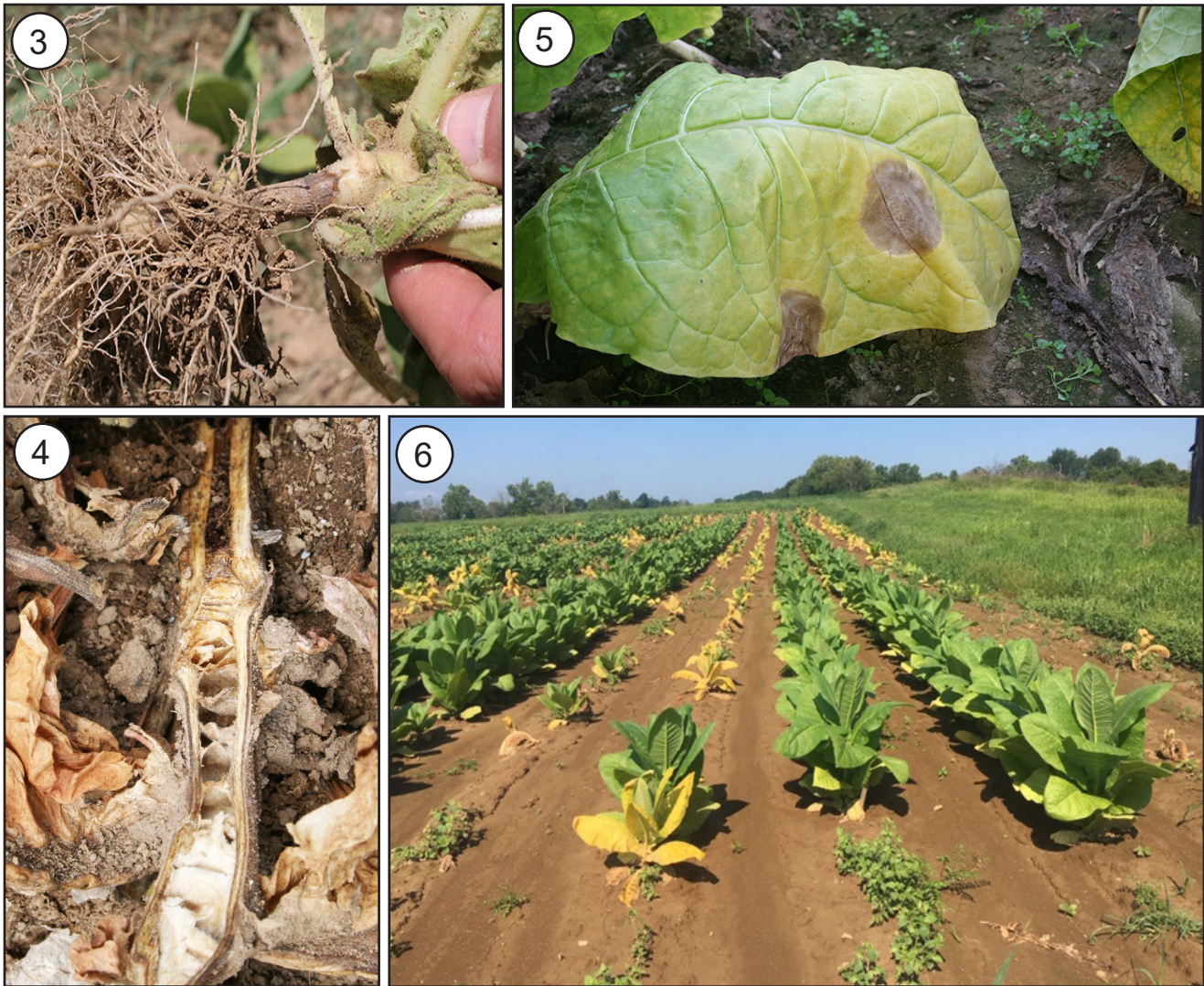


FIGURE 3. TOBACCO AFFECTED BY BLACK SHANK HAS A DARK BROWN, FIRM, SOMEWHAT CONSTRICTED LESION EXTENDING FROM THE CROWN UPWARD. **FIGURE 4.** WHEN AN INFECTED TOBACCO STEM IS SPLIT OPEN, DISKING OF THE PITH MAY BE OBSERVED. **FIGURE 5.** GREASY, LARGE LESIONS MAY BE PRESENT ON LOWER TOBACCO LEAVES WHEN THE BLACK SHANK PATHOGEN IS SPLASHED FROM SOIL. **FIGURE 6.** BLACK SHANK MAY AFFECT TOBACCO PLANTS WITHIN THE SAME ROW OR IN ADJACENT ROWS.

CAUSE & DISEASE DEVELOPMENT

Phytophthora nicotianae, an oomycete (or water mold) pathogen, causes black shank in all types of tobacco. *P. nicotianae* generally can infect many different plants, but the sub-types (races) that affect tobacco are specialized to only this crop (Mammella et al. 2013). Two races of the black shank pathogen are prevalent in Kentucky, race 0 and race 1.

P. nicotianae overwinters on-site in soil or with crop debris as hardy spores (primarily chlamydo spores, but oospores may also be present). Primary infection sites for *P. nicotianae* are fine root tips and minor root wounds resulting from growth through soil as well as cultivation damage. The pathogen colonizes tobacco roots and progresses up the stem of susceptible varieties, disrupting water movement to aboveground plant parts.

DISEASE MANAGEMENT

Black shank can be well-managed even in high-pressure fields by combining crop rotation, resistant varieties, and soil-directed fungicide applications.

Crop Rotation

Since the races of the black shank pathogen prevalent in Kentucky are tobacco-specific, planting tobacco only every third or fourth year reduces the amount of overwintering *P. nicotianae* available to infect the tobacco. Corn, small grains, rye, wheat, or other cover crops are good rotational choices.

Resistant Varieties

Any field with a chance of having black shank pressure should be planted with a variety with at least moderate resistance to both races 0 and 1. For a number of years, burley variety 14xL8LC was planted widely in fields with black shank due to its nearly-complete resistance to race 0. However, race 1 is now broadly distributed across the state. A number of contemporary burley varieties have

high resistance to both races, but only moderate resistance to race 1 is available in dark tobacco cultivars. See the *Burley and Dark Tobacco Production Guide* (ID-160) for specific guidance on black shank variety selection.

Soil-Directed Fungicide Applications

Soil-directed fungicides are a critical component of black shank management. At a minimum, transplant water-administered fungicides (either Orondis Gold with Ridomil Gold SL, or Ridomil Gold SL) are recommended for any field with a possibility of black shank. In high-pressure fields, up to two post-transplant fungicide applications may be applied toward tobacco stems, then cultivated into soil. Post-transplant fungicide options, applied at first cultivation and/or layby, are Orondis Gold 200 (if not used at transplant), Ridomil Gold SL, or Presidio. Fungicide applications typically conclude before significant plant loss becomes apparent. Read and follow all fungicide product labels.

ADDITIONAL RESOURCES

- Burley and Dark Tobacco Production Guide (ID-160)
<http://www2.ca.uky.edu/agcomm/pubs/id/id160/id160.pdf>
- Gallup, C.A., M.J. Sullivan, and H.D. Shew. 2006. Black Shank of Tobacco. The Plant Health Instructor. DOI: 10.1094/PHI-I-2006-0717-01
<https://www.apsnet.org/edcenter/disandpath/oomycete/pdlessons/Pages/BlackShank.aspx>
- Mamella, M. A., Martin, F. N., Cacciola, S. O., Coffey, M. D., Faedda, R., and Schena, L. 2013. Analyses of the population structure in a global collection of *Phytophthora nicotianae* isolates inferred from mitochondrial and nuclear DNA sequences. *Phytopathology* 103: 610-622.
<https://doi.org/10.1094/PHYTO-10-12-0263-R>

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