

Plant Diseases

Black Shank of Tobacco

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Black shank is a widespread and destructive disease of tobacco in Tennessee. It was first identified in Robertson County in 1935 and has since spread to most tobacco-producing counties in the state. Burley, dark air-cured and dark fire-cured types of tobacco are all susceptible to black shank.

Black shank disease is caused by a soil-borne fungus, *Phytophthora parasitica f. nicotianae*. The fungus can survive in the soil for many years, even in the absence of tobacco.

Symptoms

This disease is often initially noticed in low areas or along the edges of a field. The first symptoms of black shank are usually the yellowing and wilting of a few scattered plants. Black shank can be mistaken for drowning, especially if the first plants affected are in a low area. Black shank-infected plants do not recover and soon the leaves on the entire plant wilt and turn a golden yellow.

The lower stalk and root system of infected plants are usually black. The blackened area on the stalk is often sunken and extends from several inches above the soil line to the root system. Splitting the stalks

of larger plants will often reveal a brown pith that is segmented into layers. The pith is the innermost portion of the stalk and in healthy plants is off-white, soft and not layered. However, segmenting of the stalk pith alone should not be relied on for positive identification of black shank, since this symptom does not always occur. Also, segmenting of the pith can be caused by other factors, such as lightning.

Spread

The black shank fungus can be spread in water, soil, transplants and crop residue. Rivers, creeks, ditches and ponds that receive drainage water from black shank-infested fields will become contaminated with the black shank fungus. Many cases of black shank have first appeared in fields along road ditches, creeks and rivers following their overflow. Also, extensive damage from black shank has occurred in fields receiving irrigation water from contaminated water supplies. Soil, carried on shoes and clothing of workers, on equipment and on the feet of animals, is an important means by which the fungus can spread from one field to another. The development of black shank on plants in the outside rows of fields has often



been traced to contaminated setters or cultivators used previously in infested fields. Stalks and stripping trash from infested crops can serve as a source of the black shank fungus to infest new areas. Black shank can be moved from plant beds to fields on infected transplants. Disease symptoms may not develop sufficiently in the plant bed to be noticed, so diseased plants may be used unknowingly.

Races of Black Shank Fungus

Two races of the black shank fungus are known to occur in Tennessee. These races, designated as Race 0 and Race 1, can be distinguished only by differences in their abilities to infect certain varieties of tobacco.

Both races are widely distributed in the tobacco-growing areas of Tennessee. Race 1 of the black shank fungus usually appears in fields where L8 hybrids have been grown repeatedly for several years.

The L8 hybrids are highly resistant (almost immune) to Race 0 of black shank fungus. When black shank occurs in an L8 hybrid it is probably Race 1.

Control — Non-Infested Fields

Prevention of spread — in areas where black shank is prevalent, certain management practices should be followed to prevent its spread to non-infested fields and plant beds.

1. Thoroughly clean equipment after use in infested fields and before use in non-infested fields. All soil should be washed from plows, setters, cultivators, tires, etc. A solution of one part formaldehyde in 25 parts of water (six ounces formaldehyde in one gallon of water) can be used to disinfect equipment by dipping, rinsing or spraying it. It is a good idea to plow, cultivate or set non-infested fields first if the same equipment will be used in infested fields.
2. Grow your plants on well-drained, upland soil that is disease-free. Never obtain plants from areas where black shank is known to be present. Don't locate plant beds in areas where black shank has previously occurred. When preparing and caring for plant beds, take every precaution to avoid introduction of black shank-contaminated soil. Locate tobacco beds and future tobacco fields so they do not receive water from black shank-infested fields. Don't use water — on plant beds or for transplanting — from streams that might be contaminated with the black shank fungus. Use methyl bromide at the rate of nine pounds per

100 sq. yd. bed. Apply methyl bromide in the fall to avoid delays due to cold, wet soil in the late winter.

3. Don't place stalks and sweepings from black shank-infested crops on non-infested tobacco fields. Stalks from infested fields can be placed on non-tobacco land or returned to the fields from which they were cut.
4. Avoid unnecessary trips into fields in which plants are infected with black shank, especially during wet weather. Wear overshoes, boots or disposable covers when entering fields where black shank is present. After visiting black shank-infested fields, wash overshoes or boots with water or preferably formaldehyde solution before entering other tobacco fields.

Control — Infested fields

Crop Rotation

Crop rotation is essential in controlling black shank. The black shank fungus can reproduce and reach high levels even when resistant varieties are grown.

Once a soil becomes heavily infested with black shank, even the most resistant varieties may be damaged.

Rotating black shank-infested fields with sod crops, such as fescue, will help prevent the movement of contaminated soil to non-infested fields on tillage equipment. The longer an infested field is planted to a crop other than tobacco, the lower the black shank fungus population will become. A minimum three-year rotation is recommended for fields infested with black shank. Rotation should be practiced even when resistant varieties are grown.

Resistant Varieties

Burley Tobacco — Tobacco breeders have developed burley tobacco varieties with resistance to black shank. These varieties were developed using two sources of resistance. Varieties developed from one of these sources of resistance usually have resistance to both races of the black shank fungus. The levels of resistance in the currently recommended varieties are shown in Table 1.

The second source of black shank resistance is derived from a breeding line designated as L8. Burley tobacco hybrids, such as MS KY 14xL8 and MS Burley 21xL8, which use L8 as a source of resistance, have high resistance to Race 0 but are susceptible to Race 1 of the black shank fungus. Burley varieties

with L8-type resistance have been widely grown in Tennessee because of their yields and high level (10 rating on a scale of 0 – 10, with 10 being most resistant) of resistance to Race 0 black shank fungus.

Unfortunately, Race 1 of the black shank fungus has become widespread in recent years. Many growers suffered severe losses when they unknowingly grew L8 hybrids in fields infested with Race 1 black shank fungus. L8 hybrids are not recommended for fields infested with black shank.

Dark Tobacco — Black shank is a major threat to dark tobacco because no varieties have a high level of resistance, and many varieties are very susceptible. Table 1 shows the resistance ratings for some commonly grown dark varieties.

Chemical Control

Ridomil Gold® is a systemic fungicide that can be used to supplement crop rotation and resistant varieties in controlling black shank. The chances of realizing economic returns from the use of Ridomil are greatest if it is used in conjunction with varieties that have at least a 4 resistance or higher rating to both Race 0 and Race 1. Ridomil should not be used for black shank control on highly susceptible burley (varieties with a resistance rating of 0 – 2) or dark-type varieties. The chances of obtaining economic returns are also better in fields heavily infested with black shank.

Use Ridomil Gold® at 1 qt/acre, applied broadcast with a minimum of 20 gallons of water per acre and incorporated into the top 2 – 4 inches of soil.

For prolonged control of black shank (especially in fields that have had heavy black shank infections in the past), the following is recommended: Apply Ridomil Gold® at 1 pt/acre just prior to transplanting, followed by second application at 1 pt/acre at the first cultivation, followed by a third application of 1 pt/acre at lay-by or the last cultivation. Position the nozzles so the spray is deposited under the plants and is covered with soil by the cultivator. The label allows these supplemental applications only if 1 pt/acre was used at transplanting.

No-till tobacco

Apply Ridomil Gold® to the field before transplanting for control of black shank and Ridomil-sensitive strains of blue mold on all types of tobacco. Apply ½ – 1 pt/treated acre as a preplant, broadcast or banded soil application. A supplemental lay-by application may be made 30 – 35 days after planting at 1 pt/acre. Do not make the lay-by application if more than 1 pt/acre of Ridomil Gold® was applied at transplanting or if no Ridomil was applied at transplanting.



Figure 1. A wilted shank-infected plant between two healthy plants. The wilted plant will usually turn yellow.

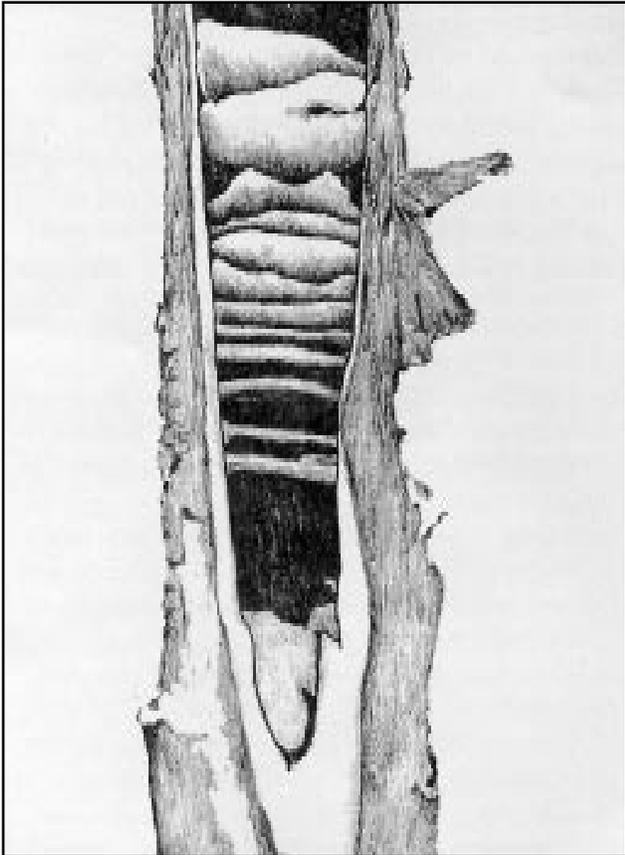


Figure 2. Typical segmenting of pith in stalk of black shank-infected plant.



Figure 3. Black, deteriorated lower stalk of black shank-infected plant.

Table 1. Disease-resistance rating for tobacco varieties.

BURLEY TOBACCO

Variety	Yield Potential ¹	Black Shank		Black Root Rot	Wildfire	Tobacco Mosaic Virus (TMV)	Tobacco Vein Mottling Virus (TVMV)	Tobacco Etch Virus (TEV)
		Race 0	Race 1					
Black Shank-Susceptible								
MS KY 14XL8	7	10	0	Medium	High	High	None	None
NC 3	7	2	2	High	High	High	High	Medium
N 126	8	0	0	Medium	High	High	None	None
R 7-12	8	0	0	High	High	High	None	None
NC BH 129	7	1	1	High	High	High	None	None
HB 04P	9	0	0	High	High	High	None	None
NC 2000**	2	0	0	Low	High	High	None	None
Black Shank-Resistant								
TN 86 LC	7	4	4	High	High	None	High	Medium
TN 90 LC	5	4	4	High	High	High	High	Medium
TN 97 LC	6	5	5	High	High	High	High	Medium
KT 204 LC	9	7	7	High	High	High	High	Medium

DARK TOBACCO

Variety	Black Shank		Black Root Rot	Fusarium Wilt	Tobacco Mosaic Virus	Wildfire
	Race 0	Race 1				
N.L. Madole	None	None	None	None	None	None
T.R. Madole	None	None	None	None	None	None
Little Crittenden	None	None	None	None	None	None
DF 911	None	None	High	None	High	High
KY 160	None	None	None	None	High	None
KY 171	None	None	High	Moderate	High	None
VA 309	Moderate	Low	Low	?	None	?
VA 359	Low	Low	Low	?	None	?
TN D950	Moderate	Moderate	High	None	High	High
KT D4 LC	Moderate	Moderate	None	?	None	None

¹Scale of 1 - 10, with 10 being the greatest potential yield.

²Scale of 0 - 10, with 10 being the greatest resistance.

Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

Disclaimer Statement

Pesticides recommended in this publication were registered for the prescribed use when printed. Pesticide registrations are continuously being reviewed. Should registration of a recommended pesticide be cancelled, it would no longer be recommended by the University of Tennessee.

Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others which may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product.

A UT Extension Reminder —

Safe Handling of Insecticides

Home gardeners can control insect pests with reasonable safety by observing these safety rules:

- Keep insecticides in the original, labeled container.
- Keep insecticides in a locked storage container.
- Read the label each time you use the insecticide.
- Measure the amount to be mixed carefully.
- Do not exceed the recommended rate of application.
- Handle the insecticide carefully when mixing to avoid splashing of liquid concentrates and billowing of dusts and powders.
- Wear protective clothing and other personal protective equipment as dictated by the label.
- To protect yourself when mixing insecticides, it is suggested that protective clothing and equipment, such as chemical-resistant gloves, a long-sleeved shirt, long pants and protective eyewear, be worn.
- Wash all insecticides off the skin immediately, using plenty of soap and water.
- Avoid breathing the spray mist or vapor.
- Always mix insecticides outdoors near a source of water.
- Clean up any spilled materials to prevent children from entering a heavily contaminated area.
- Apply insecticides to only those plants listed on the label.
- Observe the time intervals between the last application and harvest.

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