

Cotton Disease and Nematode Management

Cotton sales are important to the economies of many nations, including the United States. Sales can help balance trade with cotton-buying countries.

Problems such as diseases can interfere with cotton production and can therefore upset the producing countries' economies. The situation is the same in Missouri. Although the effects of cotton diseases on the Missouri economy are not as dramatic as in some other states, crop damage due to severe disease can seriously affect an individual producer's profit. Fortunately, most cotton diseases can be managed.

To manage disease and nematode problems, an accurate diagnosis is essential. This guide should help producers to identify problems caused by cotton diseases and nematodes and to decide which management strategies to use.

Whenever possible, consult an extension specialist at the University of Missouri Delta Research Center, a county MU Extension center, or the MU Plant Diagnostic Laboratory at 23 Mumford Hall, Columbia, MO 65211 (phone: 573-882-3019).

Management methods

There are several strategies for managing cotton disease and nematode problems in cotton. The three most important are to rotate crops, plant resistant varieties, and plant in warm, well-drained soil. An integrated approach that uses all of these methods usually is the most effective and profitable.

Improved varieties immune to all or most cotton diseases do not exist. However, newer cotton varieties often have improved levels of resistance to Fusarium

wilt. Farmers should choose varieties based on MU yield trials in their area and resistance to locally significant diseases (see results of variety trials online at aes.missouri.edu/delta/cotton/trials/index.stm).

Rotating cotton with corn or certain soybean varieties will help manage several cotton diseases.

Certain growth regulators cause the plant to grow more open, which increases air movement, reduces canopy humidity and thus reduces boll rot. Boll rot is most prevalent during warm, humid, rainy weather, especially when insect feeding injures bolls. To avoid boll rot, plants should be protected from insects and managed to avoid rank growth, which can increase humidity in the canopy.

Seed treatments and fungicides applied to the soil at planting can be very helpful in managing cotton seedling disease. Most cotton seed sold commercially is treated with a fungicide, but more fungicide may be applied.

Table 1 provides a brief description of the major diseases and nematodes found in Missouri cotton. It also provides management strategies to follow when they occur.

Authors

Allen Wrather, Professor of Plant Pathology, Division of Plant Sciences, Delta Center, Portageville

Laura Sweets, Extension Associate Professor, Plant Pathology, Division of Plant Sciences

Table 1. Cotton disease and nematode management strategies.

Disease and cause	Symptoms	Chemical control	Alternative control and remarks
Seedling disease			
Rhizoctonia, Fusarium and Pythium spp.	Slow emergence, thin stands, lesions on stems at soil line, dry or soft rot of roots, lodged seedlings	Apply fungicides into the furrow at planting and apply extra fungicide treatment if planting early or into clay soil.	Plant only high-quality (80 percent + germination) fungicide-treated seed. Plant in warm, well-drained soil. Avoid crop stress due to a lack of fertilizer, excess water or excess herbicides. Plant on raised beds.

Disease and cause	Symptoms	Chemical control	Alternative control and remarks
Boll rots			
	Small brown to black lesions on bolls expand and the entire boll eventually may become blackened and dry.	Apply Quadris or Headline.	Prolonged periods of high humidity or water on the boll surface is necessary for infection. Rank growth promotes boll rot. Avoid practices that result in a rank, dense canopy. Use a growth regulator to reduce plant height.
Bacterial blight			
<i>Xanthomonas campestris</i> pv. <i>malvacearum</i>	Small, light green, angular lesions on leaves, which turn dark brown. Large numbers of lesions may darken large areas of a leaf. Infected leaves defoliate prematurely. Symptoms rarely occur on bolls or stems in southeast Missouri.	None	Most varieties have some resistance. Crop rotation will control this problem.
Leaf spots			
<i>Alternaria macrospora</i>	Small, brown, circular lesions on leaves enlarging to 0.4 inch, and old lesions have gray centers, which may fall out. Other <i>Alternaria</i> species cause small purple spots to develop on dying leaves.	Apply Headline.	These leaf spot diseases are of minor importance in Missouri and specific controls are not recommended. They appear more frequently on stressed plants.
<i>Cercospora gossypina</i>	Small purple lesions on leaves expand to light brown lesions surrounded by narrow purple margin. These old lesions may be 0.7 inch in diameter.	Apply Headline.	Same as for <i>Alternaria macrospora</i> .
<i>Ascochyta gossypii</i>	Small (2 mm) brown lesions on leaves that enlarge into irregular dead areas surrounded by a dark brown border. Lesion centers may crack and fall out.	Apply Headline.	Same as for <i>Alternaria macrospora</i> .
Fusarium wilt			
<i>Fusarium oxysporum</i> f. sp. <i>vasinfectum</i>	Symptoms usually appear first on oldest leaves at bloom. Areas of leaf margin wilt, then turn yellow. The entire leaf eventually may wilt and turn yellow. Leaves defoliate prematurely. In cross-section, a brown layer of tissue appears just below the bark of the lower stem. Bolls may open prematurely. These symptoms are difficult to distinguish from <i>Verticillium</i> wilt.	None	Most varieties are somewhat resistant. Maintain soil pH at 6.0 to 6.5, and use recommended rates of fertilizers.
Verticillium wilt			
<i>Verticillium dahliae</i>	Irregular yellow areas appear between veins and on margins of oldest leaves first. Centers of yellowed areas may turn brown. Defoliation is slow. Plants are usually stunted, and vascular discoloration occurs. Bolls may open prematurely.	None	Plant tolerant varieties, maintain soil pH 6.0 to 6.5, and use recommended rates of nitrogen and potash.
Root-knot nematode			
<i>Meloidogyne incognita</i>	Aboveground symptoms depend on the level of infestation. At high levels, plants may be stunted, yellowing and unthrifty in appearance. Plants may wilt in the heat of the day and recover at night. Yields are reduced. Symptoms may be confused with mineral deficiency, drought, herbicide injury or other soil-borne diseases. Symptoms occur in oval patches or spaced erratically through the field. Roots have small to large galls and may be excessively branched. Roots usually are discolored.	Use Aeris or Avicta seed treatments, treat the soil with Telone before planting, or apply Temik in furrow at planting. Telone II (52 to 106 ounces per 1000 foot row). Do not plant for 1 to 2 weeks. Vapam (75 to 100 gallons per acre = 1.5 to 2 pints per 100 square feet). Do not plant for 2 to 3 weeks. Temik 15G (3.5 to 10 pounds per acre = 4.5 to 12 ounces per 1000 foot row)	There are no effective management tools other than use of nematicides.
Reniform nematode			
<i>Rotylenchulus reniformis</i>	Light green color appears by the third or fourth leaf stage. Leaf margins may become purple. Other aboveground symptoms same as root knot.	Same as for root-knot nematodes.	No resistant cotton varieties. Same as for root-knot nematodes.
Lance nematode			
<i>Hoplolaimus galeatus</i>	Aboveground symptoms same as root-knot. Plant may defoliate following drought. Small, brownish yellow lesions on roots.	Same as for root-knot nematodes.	No resistant cotton varieties. Same as for root-knot nematodes.