

A3231

Strawberry disorder: Black root rot

P. S. McMANUS

Black root rot is one of the most common problems affecting strawberries in commercial plantings and in the home garden. Black root rot is often referred to as a disease complex, because many different factors—both living and nonliving—interact to cause roots to become dark and stunted. Black root rot is more common in areas where strawberries have been planted for several years, but symptoms also can occur in newer plantings.

Symptoms

Black root rot usually becomes apparent during the first fruiting year. Aboveground symptoms often are noted first in low areas or places where soil is especially wet, heavy, and/or compacted. Plants show poor runner growth, have small berries, and in general are stunted and lack vigor. Under drought stress, affected plants may collapse and die. More commonly, affected plants survive but remain stunted and produce a poor crop. The aboveground symptoms of black root rot are similar to symptoms of other root diseases. Therefore, the roots themselves should also be examined to diagnose this disease.

The best time to observe roots for symptoms of black root rot is at about the time that fruit begin to color. In early spring and late summer strawberry roots are normally dark, so these are not good times to try to diagnose black root rot. Declining plants, and healthy plants for comparison, should be dug (not pulled)

from the ground, so that the roots remain intact. On healthy plants, roots are fleshy and white and have numerous small, lateral (feeder) roots. Older roots may appear dark on the outside but are yellow to white inside. On plants with black root rot, there are irregular dark patches on the surface of the white, fleshy roots. Initially the affected roots are white inside, but in later stages, the entire root becomes blackened throughout. In advanced stages, the rotted roots break and decay, making the root mass significantly smaller than in a healthy plant (see photo).

Causes

Several biological and environmental factors have been implicated in causing black root rot. The most likely biological factors in heavier soils are common soilborne fungi such as *Rhizoctonia*, *Pythium*, and *Fusarium*. However, these fungi also are found in soil surrounding healthy plants, so the fungi alone are probably not enough to cause black root rot. In lighter, sandier soils the root lesion nematode, *Pratylenchus penetrans*, may feed on roots and make them more susceptible to fungi. Environmental factors that contribute to black root rot include winter injury, soil compaction, and poor drainage.



Roots infected with black root rot (left) are small, decayed, and blackened. Compare to healthy root mass at right.

Other stresses such as fertilizer burn, herbicide injury, and salt may also play a role.

Prevention and control

The factors involved in black root rot vary among locations, which makes it impossible to prescribe a single, simple treatment that will work everywhere. In general, chemical control has not been effective. Soil fumigation will reduce nematode and fungal populations, but after the first year these organisms seem to rebound to their previous levels.

Careful site selection and soil preparation before planting are key in managing black root rot. Choose a site where strawberries or other fruits or vegetables have not been grown for at least 3 years. Avoid low-lying areas and poorly drained soils. If this is not possible, then plant into raised beds to improve drainage and reduce

soil compaction around roots. The texture of heavy soils can be improved by incorporating organic matter such as straw. Ideally, the site should be planted with a cover crop for at least 1 year prior to planting strawberries, to build up organic matter in the soil. Suitable cover crops include annual ryegrass, sudangrass, and sorghum/sudan. Legumes are not a good choice because they are hosts for some of the fungi involved in black root rot.

There are no varieties of strawberry that are resistant to black root rot. However, some varieties are relatively tolerant of winter injury and therefore may be less susceptible to infection by fungi. Varieties that have performed well in Wisconsin include Annapolis, Cavendish, Glooscap, Sparkle, and Winona. Varieties that are more susceptible to winter injury and therefore possibly to black root rot include Earliglow, Jewel, and Kent.

After planting, maintain plant vigor through fertilization (based on tissue tests) and adequate but not excessive irrigation. Mulch plants with straw in late fall to prevent winter injury. Heavy, wet soils are especially prone to heaving during winter, which can injure roots and predispose plants to black root rot.

Additional information

For more information on related topics, see the following publications available from your county Extension office:

Growing Strawberries in Wisconsin (A1597)

Fertilizing Small Fruits in the Home Garden (A2307)

Home Fruit Cultivars for Southern Wisconsin (A2582)

Home Fruit Cultivars for Northern Wisconsin (A2488)

Strawberry Pest Management for Home Gardeners (A2127)



©2004 University of Wisconsin-System Board of Regents and University of Wisconsin-Extension, Cooperative Extension

Authors: P.S. McManus is associate professor of plant pathology, College of Agricultural and Life Sciences, University of Wisconsin-Madison and University of Wisconsin-Extension, Cooperative Extension. Produced by Cooperative Extension Publications, University of Wisconsin-Extension.

University of Wisconsin-Extension, Cooperative Extension, in cooperation with the U.S. Department of Agriculture and Wisconsin counties, publishes this information to further the purpose of the May 8 and June 30, 1914 Acts of Congress; and provides equal opportunities and affirmative action in employment and programming. If you need this material in an alternative format, contact the Office of Equal Opportunity and Diversity Programs or call Cooperative Extension Publications at 608-262-8076.

This publication is available from your Wisconsin county Extension office or from Cooperative Extension Publications. To order, call toll free 877-947-7827 (WIS-PUBS) or visit our web site at cecommerce.uwex.edu.