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RHIZOCTONIA SOLANI MANAGEMENT - WHITE PAPER BY IVORYCHEM

Collar rot of bean / Damping-off and root rot of bean / Pod rot of bean / Web-blight of plants
(Mainly Rice & Beans)

Solution: TERMINATOR 72 WP & TERMINATOR 50 SC

[Disease Life Cycle](#)

[Management](#)

TAXONOMY

Rhizoctonia solani frequently exists as thread-like growth on plants or in culture. Asexual spores are not produced and thus the fungus was placed in a taxonomic group with sterile mycelia only (fungal threads). Infrequently, sexual spores are observed on diseased plants. Characteristics of these spores and the structures which produce them belong to *Thanatephorus cucumeris*, a basidiomycete. This fungus is a distant relative of the common edible mushroom, *Agaricus*. In the past, *Pellicularia filamentosa* and *Corticium solani* were names used for this fungus.

HOST

Many plants besides bean (*Phaseolus vulgaris*) are attacked by this pathogen. These include alfalfa, peanut, soybean, lima bean, cucumber, papaya, eggplant, corn and many more. Farr *et al.* lists over 500 hosts in the United States alone.

DISTRIBUTION

Common on all islands in the Caribbean, Hawaii and throughout the world.

SYMPTOMS

On bean, germinating seeds and seedlings are attacked by this pathogen. Reddish spots, which can be sunken, expand to kill the plants. Reddish-brown to brown collar rots are common on young plants. These rots inhibit normal growth and cause stunting or plants with poor vigor. Callus formation and thickening of the collar area also occurs. Root rots form at any time. Extensive root rots cause plants to decline and yields are reduced.



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Pod rots are brown to greenish-brown, mostly circular, and sunken. In temperate areas such as the U.S. mainland, a rapid blight also occurs over portions of the plant during periods of high moisture. Leaves and pods are covered with fungal threads known as web blights.

BIOLOGY

Rhizoctonia solani produces thread-like growth called hypha (plural, hyphae); large masses of hyphae are referred to as mycelium. The hyphae of *Rhizoctonia solani* have the following characteristics: 1) some shade of brown; 2) a special type of cross wall within the hyphae, called a dolipore septum; 3) each cell is multinucleate (has many nuclei) rather than binucleate; 4) branches that are produced at right angles; 5) no asexual spores are formed by the mycelium.

In general, the growth rate of *Rhizoctonia solani* is very rapid and a typical isolate can grow across a 90 mm Petri plate in three days. Small, oval cells produced in branched chains or clusters are formed. These are called monilioid cells and have slightly thicker walls than the mycelium. Large aggregates of these cells are called sclerotia which are black to brown and 3 to 5 mm long.

The hyphae of *Rhizoctonia solani* have many nuclei (commonly 4 to 8) per cell. This distinguishes it from similar fungi that have only 2 nuclei per cell. Those fungi with hyphal characteristics similar to *Rhizoctonia solani*, but with only 2 nuclei per cell, are called binucleate types and are generally non-pathogenic. These *Rhizoctonia solani*-like fungi are saprophytic, do not cause disease, and feed on dead organic matter.

Following invasion of the host by *Rhizoctonia solani*, sexual spores are formed on specialized structures called basidia. Four spores are produced on each basidium. Basidia are formed when the environment is moist and sufficient growth of the fungus has occurred. Basidiospores are wind-dispersed and germinate with moisture. Each basidiospore has a single nucleus. The hyphae produced by germinating spores will fuse (anastomose), forming new hyphae with a mixture of different types of nuclei.

Observations of basidiospores on diseased host tissue is not common. Several methods have been developed to produce basidiospores in pure culture but it remains difficult.

In recent years, the recognition of different anastomosis groups has helped to elucidate the complexity of this large fungal group. Having no asexual spores and only the few morphological characteristics to define "*Rhizoctonia solani* isolates", many fungi were placed into this species. However, it is now recognized that *Rhizoctonia solani* has multinucleate cells and other related fungi (with 2 nuclei per cell), the binucleates, do not belong in that species. Further, when isolates are paired, only related mycelium will fuse and thus anastomosis groups have been defined by a set of tester isolates. A set for *Rhizoctonia solani* isolates and another set for binucleate *Rhizoctonia solani*-like fungi are also available.

EPIDEMIOLOGY



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This pathogen survives in soil within diseased host material or as sclerotia. It can persist in soil for years, especially since so many plants are hosts. When bean seeds are planted into infested soil, the fungus attacks the young radicle or hypocotyl of the emerging seedling. In moist environments, seedlings are rotted and killed while surviving seedlings have root or collar rots. Rots develop on pods formed close to the ground. Innoculum splashes on these pods and circular rots are caused by the pathogen. Sclerotia form in diseased host tissue and remain viable in soil.

The pathogen is transported in infested soil or through movement of diseased plants or bean pods. Potential for seed-borne inoculum also exists.

Although basidiospores are wind-borne, their role in initiating disease has not been considered important except for foliar diseases (web blight) in high humidity.

MANAGEMENT

1. Obtain high quality seeds from your closest IvorySeeds Distributor and avoid seeds that may be contaminated with the pathogen. In fields known to have *Rhizoctonia solani*, prepare planting areas to increase drainage and prevent water accumulation. Set plants with adequate spacing to avoid crowding and formation of high humidity in the foliage.
2. Addition of compost and organic fertilizers can decrease disease levels. Fungicides such as methyl thiophanate, PCNB (pentachloronitrobenzene) and Chlorothalonil **TERMINATOR** are also effective. Consult label directions and carefully follow instructions for application.

Removing the debris after harvest will reduce the amount of inoculum in the soil. In some cases, alternation with a non-susceptible crop also reduces inoculum level.