

Safflower

Pythium Root Rot

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Identification and Life Cycle

Pythium root rot and wilt is caused by various fungus-like pathogens in the genus *Pythium*. The diseases are favored by high soil moisture and moderate to high temperature. Varietal susceptibility will also influence disease development. Pathogen survival and inoculum buildup are favored by soils with high organic matter and poor drainage. Susceptibility can be increased if roots are damaged during cultivation or by other soil-related problems, such as nematode feeding. The fungus can be transported within and between fields by contaminated irrigation water. Occurrence is also favored by improper crop rotation. The pathogen survives pathogenically on weeds and in the soil as dormant oospores.

Plant Response and Damage

Pythium species may infect planted seeds prior to germination, germinating seedlings, young plants, or older plants during blossoming and pod formation. It is one of the pathogens capable of causing seed decay and seedling death. Initial root rot symptoms appear as elongated water-soaked areas on the hypocotyl and roots, within one to three weeks after planting. The pathogen will extensively prune roots, reduce overall plant growth, and destroy much of the hypocotyl and main root system. The water-soaked region may extend several inches above the soil line, with little, if any, visible evidence of the fungus. The water-soaked area eventually dries out, becomes somewhat sunken, and tan to brown in color. Plants then wilt and die. Disease development later in the season results when pods in contact with the soil become infected. These pods exhibit a watery soft rot, or a mass of white fungal growth, but black sclerotia do not form as with white mold.

Management Approaches

Biological Control

T-22 Planter Box (*Trichoderma harzianum* strain KRL-AG2) and Kodiak (*Bacillus subtilis* GBO3) are registered, but the efficacy of these biological control agents in the High Plains region are not known.

Cultural Control

Plant high quality seed in warm, well-prepared seedbeds under conditions favorable to rapid seedling emergence; shallow planting can encourage rapid emergence. Avoid excess irrigation and poor drainage. Planting into raised beds can help avoid water-logging and promote more rapid germination. Crop rotation with non-hosts (i.e., small grains) may provide some reduction in damping-off, but *Pythium* pathogens have very broad host ranges and can attack most plants. Conventional tillage tends to reduce damping-off as compared to minimum or no-till operations. *Pythium* root rot is not a problem on safflower grown without irrigation.

Chemical Control

Seed treatments provide some disease suppression, but are most effective when combined with sound cultural practices.

Product List for Pythium Root Rot:

Pesticide	Rate per 100 lb seed	Application Frequency (days)	Remarks
Captan			
Captan 75	6-9 oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp.
Captan 30-DD	1.25 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp.
Captan 400	1-2 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp.
Captan 400-C	1-2 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp.
Carboxin and Carboxin + Thiram			
Vitavax 34	2 fl oz	Seed treatment	Suppression of <i>Rhizoctonia</i>
Vitavax 200	4 fl oz	Seed treatment	Broad spectrum
EBDC—several formulations available, but not all are listed			
Dithane M45	2 oz	Seed treatment	Broad spectrum
Fludioxonil			
Maxim 4FS	0.08-0.16 fl oz	Seed treatment	Suppression of <i>Fusarium</i> and <i>Rhizoctonia</i> spp.
Thiram			
42-S Thiram	8 fl oz	Seed treatment	Broad spectrum

Thiram 50WP	8 oz	Seed treatment	Broad spectrum
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