Sclerotinia stem rot

poses a potential threat to soybean production

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Sclerotinia stem rot of soybean is caused by the fungal pathogen, *Sclerotinia sclerotiorum* (Lib.) de Bary. The pathogen was first confirmed in South Africa in 1979, however, it occurred locally long before then.

Losses can result either directly from loss of yield or indirectly from reduced grain quality. Losses due to Sclerotinia on soybean are estimated to be as high as 60% in South Africa in certain seasons and localities.

Signs and symptoms

Infections occur anytime during flowering and symptoms can be observed on leaves, pods, seeds and stems. Visual symptoms can be observed when the crop canopy between rows has closed, thus creating the ideal humid microclimate for infection and disease development. Primary symptoms include wilting and withering of leaves followed by plant death (**Photo 1**).

A closer look within the crop canopy will reveal a cottony, white mycelial mass growing on stems, leaves and/or pods (**Photo 2**). Lesions develop on the main stems and side branches, until the stem and upper plant parts eventually die. Stems appear bleached and sometimes shredded from advanced decay. Large, black sclerotia form from the white mycelium growing on plant tissues and in the stem pith (**Photo 3**).

Seeds in diseased pods are usually shrivelled and may be infected by the fungus or replaced by black sclerotia. The seed is usually contaminated with sclerotia when infected plants are harvested.

Disease epidemiology

Disease occurs primarily after the closing of the crop canopy, thus promoting cool temperatures and a humid microclimate around the stems and maintaining high soil moisture following rain or irrigation. Infection occurs either by ascospores (carpogenic) or mycelial (myceliogenic) germination. For carpogenic infection, the sclerotia germinate when there is high soil moisture and produce mushroom-like apothecia (**Photo 4**).

The apothecia release the ascospores in the air where they are carried by air currents to soybean plants. Ascospores require a film of water and a nutrient base such as dead or senescing flower tissue to germinate and grow before plant infection takes place. Infection often starts in the stem axils where senescing flower tissue have fallen or lodged.

Myceliogenic infection occurs when sclerotia germinate in the presence of exogenous nutrients and produce hyphae that invade non-living organic matter. The mycelium subsequently penetrates the host cuticle by mechanical pressure. Infection may also occur through wounds caused by insects or other injury. Soybeans are most susceptible to infection by the fungus during early reproductive growth stages, when dying flower petals remain attached to the developing pods.

A film of water on the plant surface promotes the development of lesions and increases the amount of tissue damage. Initial disease development requires lengthy periods of cloudy, humid, rainy weather. The greater the density of the plant canopy, the more favourable the environmental conditions for disease. Sclerotia will be formed as the mycelium grows in and on the plant tissue. Sclerotia can survive for a period of up to seven years in the soil, particularly in dry soil conditions.

Management

Variety selection

The most important control strategy for Sclerotinia rot of soybeans is through proper variety selection. It is advisable to choose less susceptible varieties or varieties which have shown high yield under disease pressure when planting in soils with a history of the disease.

Canopy management

Under low to moderate disease pressure, white mould increases as the row spacing is narrowed. Disease risk is reduced on 40 cm row spacing compared to 20 cm spacing. Under high disease pressure, row spacing may have no effect on disease severity. Narrow row production soybeans almost always have higher disease levels than wider rows, but narrow rows favour higher yields.

▲ **1: Soybean field infected with Sclerotinia stem rot showing typical wilting and death of leaves.** Photo: Pannar Seed

▲ **2. White, cottony mycelial growth on infected stems.** Photo: Pannar Seed