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Stem Canker of Soybean

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Stem canker has been widely recognized as an important soybean disease, but recently has been divided into northern stem canker and southern stem canker based on two causal agents. Northern stem canker was first reported in the late 1940s in Iowa, and by the 1950s, the disease had spread into the upper Midwest and Canada. Southern stem canker was reported in the south in 1973, and by 1984, had been detected in all southern states. Northern stem canker and southern stem canker are caused by *Diaporthe phaseolorum* var. *caulivora* and *Diaporthe phaseolorum* var. *meridionalis*, respectively. The northern form is the predominant type in WI. The host range of both pathogens has not been study extensively, however, over 16 weed species are known to harbor *D. phaseolorum*.

Symptoms and Losses

Initial expression of symptoms occurs during the early reproductive stages, with the development of a small, reddish-brown superficial lesion at the base of branches or petioles. The lesion is first observable in the leaf scar after the petiole has fallen. The lesion elongates and becomes dark brown or black, sunken in appearance and often girdles the stem (Fig. 1). However, in some cases, the pathogen responsible for stem canker maybe active in the plant without lesions being evident. As a result of a phytotoxin produced by the fungus, interveinal chlorosis and necrosis are expressed in the leaves and is soon followed by plant death. Above and below the canker, green tissue is present and the leaves on the dead plant wither but remain attached. A top dieback can occur and results in a characteristic shepherd's crook curling of the terminal bud. Visual symptoms of the disease may occur in the late vegetative stages, but plant mortality generally occurs in the mid to late reproductive stage.

Yield losses have been reported to be as high as 50 to 80% in naturally infested fields (Fig. 2). Yield reductions resulting from stem canker have increased dramatically over the past several years. Estimated yield losses to stem canker were 3.3 and 2.2 million bushels in 1999 and 2000, respectively.

Stem canker over winters in colonized stems and infected seed. Long distance dissemination of the pathogens is made possible by the movement of infested soybean residue and to a lesser extent by infected seed. Seed infection by northern stem canker can be as high as 10-20%.

In late winter, pycnidia (fruiting bodies) begin to develop and conidia (spores) are released beginning in late April continuing into June and serve as the primary inoculum. Splashing, blowing rain, and wind disperse spores up to 6 feet from the point source to petioles, petiole bases, stems, and leaves. The growth stage of the plant at the time of exposure to the inoculum heavily influences the incidence and severity of disease. Exposure to inoculum at V3 corresponds to the highest severity of disease. Disease severity is progressively reduced when first contact is delayed from V3 to V10 growth stages.

Secondary inoculum is released from pycnidia present in stem cankers. Conidia produced at this time could be responsible for late season infections and thereby increase the inoculum potential for the next growing season.

Environmental conditions during the vegetative stages govern disease development. Temperature greatly influences infection, with the highest levels of infection occurring when the air

temperature is between 82 and 93° F, with an optimal temperature of 83.5° F. Temperature and period of wetness are significantly related.

Rainfall during plant vegetative growth is critical for the development of stem canker epidemics. Cumulative rainfall, not the number of rainy days, is related to higher disease severity. Greater plant mortality has been observed when dry weather follows infection as compared to relatively wet conditions after infection.

Management

Stem canker is effectively managed by the combination of planting resistant cultivars and reducing crop infested on the soil surface. Deep plowing can reduce crop residue prior to planting a soybean crop.

Seed that are to be used for planting should not be harvested from fields with a history of stem canker. Fungicides applied to the seed at planting can reduce the introduction of stem canker to a field, but will not control infections in the field. Foliar fungicides can be effective when applied during vegetative stages, however, results are inconsistent, and in most cases, foliar fungicides would not be an economical management strategy.

The benefits of crop rotation to reduce stem canker have not been clearly demonstrated in production fields. Corn and small grains are not hosts of *Diaporthe phaseolorum* and rotation with these crops can reduce the risk of disease. Alfalfa, however, is a host and can increase the potential for the disease if used in a rotation with soybean. Delayed planting can reduce the incidence and severity of stem canker; however, loss of yield potential that accompanies delayed planting makes this a questionable control strategy.



Figure 1. Reddish-brown stem lesions associated with stem canker



Figure 2. A severe field infestation of soybean stem canker.

More information on soybean diseases and production can be found at:

<http://www.plantpath.wisc.edu/soyhealth>

<http://soybean.uwex.edu>

Pest Management in WI Field Crops-2006

<http://cecommerce.uwex.edu>

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