Dec 1st, 12:00 AM

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Each year, soybean growers lose at least 14 percent (approximately $175,000,000 in Indiana) of their crop to disease. Root rots disease caused by particular species of *Fusarium, Phytophthora, Rhizoctonia, Phialophora,* and *Macrophomina* account for a significant portion of this annual yield loss and substantially increase yield losses above 14 percent in specific production areas in the Midwest. Yield losses due to diseases like Fusarium root rot, Phytophthora root rot, Rhizoctonia root rot, Brown stem rot, and Charcoal root rot caused by species of the fungi mentioned above have been recognized for a number of years and most soybean producers are somewhat familiar with disease symptoms associated with each disease. However, root rot damage and losses due to Sudden Death Syndrome, a relatively new soybean disease are not as well documented.

Sudden death syndrome (SDS) caused by a specific strain of Fusarium solani has been documented in the Midwest only during the past six to eight years. During this period of time , it has caused substantial yield losses for several Midwest soybean producers. This form of Fusarium root rot is commonly associated with extensive dying of foliage tissue during the pod development growth stages. It reduces seed yield and quality regularly in many soybean fields and when severe it can reduce yield in a particular field by as much as 50 percent. This unique soybean disease has occurred most frequently in high yield potential environments and caused greatest losses in areas of soybean fields where plants were most productive. The pattern of SDS occurrence in Arkansas, Mississippi, Tennessee, Missouri, Kentucky, Illinois, and Indiana prior to 1993 suggested this particular strain of Fusarium root rot caused severe damage primarily in river flood plain fields. But, with awareness of increased disease development in the Midwest and especially in 1993 SDS has become a major concern to soybean producers throughout the Midwest soybean production area.

During 1993, SDS was as severe in central and northwest Indiana as observed in southwestern Indiana (river flood plain fields) in previous years. The pattern of SDS occurrence appeared to follow the same pattern as the rainstorms during July and early August. Symptoms of SDS commonly first appear 10-14 days after heavy rains that saturate soils.

Foliage symptoms of SDS due to the Fusarium root rot first appear as yellow, interveinal blotches. These blotches rapidly increase in size and interveinal tissues become necrotic. The leaf veins are the last to become necrotic. Petioles and stems of affected plants remain green until considerable leaf tissue has died. As symptoms progress, leaf blades drop from the petioles, leaving erect, barren, somewhat green petioles attached to stems. Interveinal necrosis progresses faster on the upper than the lower leaves, the upper leaves are usually the first to defoliate. Leaf symptoms alone are not diagnostic for SDS, since a similar leaf death may be experienced with brown stem rot. The root and lower stem tissues must be closely examined for diagnosis of SDS. The foliar symptoms of SDS may easily be confused with the foliar

symptoms produced by brown stem rot. However, with brown stem rot, affected plants show some signs of wilting, and pith tissues of lower stems are reddish-brown to dark brown while the cortical and vascular tissues of the tap root and lower stem are normal in color. In the late stages of brown stem rot, the cortical and vascular tissues of the tap root and lower stem may become lightly discolored.

When initial foliar symptoms appear, the roots of SDS affected plants appear almost normal on the surface. But internally, a reddish-brown discoloration develops near the central core of the tap root and radiates outward and upward. The discoloration of the internal tap root tissues away from the central core become a streaky to uniform, light brown to light gray color. This discoloration spreads into the cortical tissues of the lower stem as the disease progresses. Pith tissues in the stem remain a normal white to green color which aids in the differentiation of SDS from brown stem rot. Root systems are often badly deteriorated.

Yield reduction due to SDS is dependent upon cultivar, weather conditions, time of disease onset, and severity of disease within a field which is strongly influenced by management practices that modify or alter soybean plant health (i.e. planting date, rotation, tillage, herbicide injury, and interaction with other soybean pathogens). All of these factors can significantly contribute to SDS yield losses. Yield losses due to SDS are a major concern to the soybean industry since the disease regularly causes premature plant death, pod abortion, lack of pod fill and low test weight.

In summary, SDS is caused by a soil borne fungus, Fusarium solani form A (the "blue" strain). The pathogen regularly infects secondary root of the soybean plant, but extensive taproot colonization appears to occur primarily if high soil moisture occurs during early reproductive growth stages of soybeans. Toxins produced by the fungus that are translocated to the leaf tissues are responsible for the diagnostic leaf symptoms. Plant health and especially root health appears to influence SDS development. Other fungal pathogens and soybean pests that reduce plant health regularly contribute to yield losses associated with SDS. When SDS was initially described, it occured primarily in areas where the soybean cyst nematode (SCN) is a major concern. Root damage by the nematode does enhance SDS severity, but the presence of the nematode is not required for SDS to occur. In addition, soybeans with SDS symptoms may be infected with other fungal disease pathogens. Laboratory isolation studies have detected both the fungus that causes SDS (Fusarium solani race A) and either Phytophthora sljae or the Phytophthora megasperma type fungus. Symptoms expressed by doubly infected plants are similar to those described above, but often have some variations.

Disease symptoms and seed yield data for several currently grown Public and Private soybean varieties as well as exotic soybean germplasm sources evaluated in SDS field nurseries in Indiana will be discussed and emphasized with selected photographs.

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