Effect of Soil-Test Phosphorus and Phosphorus Fertilization on the Severity of Soybean Sudden Death Syndrome

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Sudden death syndrome (SDS) of soybean [Glycine max (L.) Merr.], caused by Fusarium virguliforme, can cause significant yield loss in soybean (Scherm et al., 1998) and has been associated with wet soils. Management practices to reduce yield losses have been to select tolerant varieties that are resistant to soybean cyst nematode (SCN), to alleviate soil compaction, and to delay planting to avoid wet soils. While these practices can reduce yield loss due to SDS, significant losses can still occur.

Since 1983, a long-term fertilizer application experiment has been conducted on a Eudora silt loam soil at the Kansas River Valley Experiment Field, near Topeka, KS as an annual corn-soybean rotation. Fertilizer treatments were applied biannually only before corn in a factorial complete block design with rates of N, P, and K in four replications. The total rainfall from April to September 2014 was 19.2 inches, and the study area received 6.7 inches of supplemental irrigation during the same period.

Asgrow 3833 soybeans were seeded 21 May 2014 at 140,000 seeds acre⁻¹. June rainfall (7.05 inches) was significantly more than the 30-yr average (3.81 inches). Foliar symptoms of SDS were observed in the study at the R5 growth stage. Foliar symptom severity and normalized difference vegetation index (NDVI) were recorded 28 Aug. 2014. Foliar symptom severity was rated as the percentage leaf area with symptoms. NDVI readings taken with a GreenSeeker meter model 505 handheld (Trimble Navigation) from the middle two rows of each plot. The uppermost trifoliate leaflets were collected at R6 and analyzed for total P. Soybean plant height was measured at maturity to the highest node having seed-bearing pods. Soil cores collected from each plot at the 0–12-inch sampling depth before planting were analyzed for soil-test P by the Mehlich-3 method. The two middle rows were combine-harvested. Grain weight and moisture were collected, and yield was expressed at 13% grain moisture. Population densities (expressed as colony-forming units, CFUs) of F. virguliforme were measured from...