

## Effects of Potassium Fertilization of Soybean Grain Yield and Disease Incidence in Iowa

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This project was conducted from 2005 until 2008 at five Iowa locations (20 site-years) to assess the effects of K fertilization and tillage on soybean grain yield and incidence of leaf/stem diseases. Rates of 0, 35, 70, and 140 lb K<sub>2</sub>O/A were broadcast at four locations, and the lowest three K rates were broadcast or deep-banded at the other location. Soybean was grown in rotation with corn, and treatments were evaluated each year. Soybean varieties varied across trials and were planted using a 30-in. row spacing.

There was a large grain yield response to K in low-testing soils (< 131 ppm K, 6-in. depth), a small response in soils testing optimum (131 to 170 ppm K, for which only maintenance is recommended), and no response in high-testing soils. Tillage did not affect grain yield or yield response to K fertilization. Potassium deficiency symptoms were obvious on low-testing plots of several site-years. Asian Soybean Rust was not detected at any site. There was light to moderate incidence of Brown Leaf Spot and Bacterial Blight in most locations and years, and less frequent incidence of *Cercospora* Leaf Spot, Frogeye Leaf Spot, and Powdery Mildew. Tillage sometimes influenced disease incidence, but effects were inconsistent across diseases, locations, and years and are not discussed in this summary.

In 2005 disease incidence was low, and K fertilization reduced incidence of Bacterial Blight and Brown Spot at one location, mainly with no-tillage. In 2006, K fertilization significantly reduced diseases at two locations (mainly with no-tillage) and had smaller effects at two other locations. Effects were more consistent on Brown Leaf Spot than on *Cercospora* Leaf Spot, Frogeye Leaf Spot, and Powdery Mildew. In 2007, K fertilization again reduced incidence of most of these diseases at three locations where disease incidence was observed. Results for 2008 showed small or no disease pressure, although K fertilization again reduced disease incidence or severity at three locations. Data from all site-years indicated that K fertilizer rates that increased soil-test K above optimum levels did not result in additional reduction in disease incidence. The study showed that adequate K fertilization increased soybean grain yield in soils testing less than about 170 ppm K and that often (but not always) the magnitude of the yield response is increased by reduced incidence of leaf/stem diseases.