

Have you ever wondered if it is important to use soybean inoculant when soybeans haven't been planted in a field for several years, or if an inoculant wasn't used when it should have been used, will an emergency application of nitrogen compensate for the lack of inoculant?

A recent study was established at three Kansas locations to help address the first part of that question. One study was established at the North Central and Irrigation Experiment Farm near Scandia under irrigated conditions on a Crete silt loam soil; the second study was a dryland site in Geary County on a Muir silty clay loam; and the third study was a dryland site at the North Agronomy Farm, Manhattan on a Wymore silty clay loam. Soybeans had been grown within two years on the Geary County site, but soybeans not been grown at the Scandia site in more than nine years and it had been five years since soybeans were grown at the Manhattan site. Six to 13 different inoculant treatments, including a no-inoculant check, were used depending on location. (Remember, soybean inoculant contains the bacterium, *Bradyrhizobium*, that "fixes" nitrogen which is utilized by the plants.)

Average yields for all treatments for the Scandia, Geary County, and Manhattan sites were 67, 55, and 24 bushels per acre, respectively. The Manhattan site received hail damage which reduced yields. The no-inoculant check yields were 50, 55, and 24 bushels per acre, respectively. There was a 17 bushels per acre advantage for the inoculant treatments over the no-inoculant check at the Scandia site where soybeans had not been grown in more than nine years. At the other two locations which had been planted to soybeans within the past five years, there was no yield difference between the inoculant treatments and the no-inoculant check.

Results from a three-year soybean inoculation-nitrogen study conducted at the Northwest Research-Extension Center at Colby in the early 1980s on a field that had never been planted to soybeans answers the second part of the question. This study contained four inoculant-nitrogen treatment combinations and they were: no-inoculated-0 nitrogen, no-inoculated-60 lbs nitrogen per acre, inoculated-0 nitrogen, and inoculated-60 lbs nitrogen per acre. The three-year average yields were 39, 44, 45, and 47 bushels per acre, respectively. Thus, there was a 6 bushels per acre advantage by using an inoculant where soybeans had never been planted. Also, the application of 60 pounds nitrogen per acre when the soybeans were not inoculated compensated for the lack of inoculant.

What's the bottom line?

Without the bacteria, *Bradyrhizobium* that "fixes" nitrogen, soybean yields can be dramatically reduced. It is very important the inoculant that contains *Bradyrhizobium* be used, especially in fields where soybeans have never been planted or have not been planted in the past several years. There are some situations when seed should be inoculated even when soybeans have been previously planted. Those situations include when the field has been flooded, when the soil pH is very low, or if the soil is sandy with low organic matter. Based on these data, if a farmer did not use an inoculant when one should have been used, added nitrogen fertilizer could eliminate most of the yield loss. This should be considered an emergency solution because the cost of the nitrogen fertilizer is considerably more expensive than the cost of the inoculant.

For more details about this research see:

Field Research 2002. Report of Progress 893. P. 90-91. K-State Research and Extension.
Report of Agricultural Research 1984. Report of Progress 454. P. 62. K-State Res. and Ext.

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