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Soybean Yield Response to Rhizobium Inoculation on Converted Grass Pasture

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Abstract
Much of the soybean plant's nitrogen requirement is supplied through nitrogen fixation when atmospheric nitrogen is converted into a usable form for the plant. Nitrogen fixation is critical for producing higher yield in soybean. For nitrogen fixation to occur, nitrogen-fixing bacteria (genus Rhizobium) need to be present in the soil. If soils do not already contain a high population of Rhizobium, these bacteria can be added either as a liquid or granular peat inoculant, or as a peat-based powder. The different forms can be seed applied or used in-furrow.

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Introduction

Much of the soybean plant's nitrogen requirement is supplied through nitrogen fixation when atmospheric nitrogen is converted into a usable form for the plant. Nitrogen fixation is critical for producing higher yield in soybean. For nitrogen fixation to occur, nitrogen-fixing bacteria (genus *Rhizobium)* need to be present in the soil. If soils do not already contain a high population of *Rhizobium*, these bacteria can be added either as a liquid or granular peat inoculant, or as a peat-based powder. The different forms can be seed applied or used in-furrow.

The ISU Western Research and Demonstration Farm identified a field that had been in pasture since 1995, but is now being returned to crop production. This time period likely reduced the population of soil borne *Rhizobium*. Two soybean *Rhizobium* inoculants were compared with an inoculant free check in this field in 2011.

Materials and Methods

Three treatments with four replications were compared in this study. Layout design was a randomized complete block design. Soybean seeds were either untreated or inoculated with *Rhizobium* products Magnify LST or BioBoost Plus. Both products were seed applied. The Magnify LST seed treatment rate was 2 oz. per 50 lb of seed. BioBoost Plus was applied to the soybean seed at 3.5 oz. per 50 lb of seed. Both were planted shortly after inoculant was applied. All treatments were no-till planted on May 6. Plots were 8 rows wide with 30-in. row spacing and lengths of plots ranged from 750 to 791 ft. All seeds were treated with Innovate, a fungicide plus insecticide seed treatment. The 17-80-80 fertilizer was spread on March 28. Glyphosate was applied at 40 oz. per acre on June 4. Prior to planting, the sod was killed with herbicides the previous fall. Soybeans were harvested on October 9 and yields were measured with a weigh wagon. Yield results can be found in Table 1.

Results and Discussion

Yield results in Table 1 show that the use of soybean inoculants with *Rhizobium* increased harvested soybean yield on this site that had been out of soybean production for many years. Both *Rhizobium* products increased yield equally. Both were significantly better than the check treatment without *Rhizobium* inoculated seed.

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Table 1. Rhizobium inoculant effects on soybean planted in converted grass pasture.

Treatment	Spring soybean stand count	Yield (bushels/acre)	Yield significance
Control	128,333	54.6	
BioBoost Plus	129,083	59.1	**
Magnify LST	138,667	59.2	**

** = statistical difference at P≤0.05.
LSD (least significant difference) = 1.5 bushels/acre at P≤0.05.