Soybean Project Report, 2007

TITLE: New Soybean Inoculants for Alabama

INVESTIGATORS:
Dennis Delaney and Yucheng Feng
Extension Specialist and Associate Professor, respectively
Dept. of Agronomy & Soils, Auburn University

OBJECTIVES:
Effective infection of soybean roots by rhizobia bacteria (*Bradyrhizobium japonicum)* is critical for nitrogen fixation and high yields of soybeans without the addition of expensive nitrogen fertilizer. Several new rhizobia inoculants have been introduced into the marketplace in recent years, along with claims that they are more effective than existing strains or surviving native soil rhizobia.

The objective of this study was to evaluate several new commercial formulations of rhizobia inoculants under Alabama growing conditions with typical producer practices.

RESULTS:
Three experiments were conducted at three Experiment Stations locations with and without a recent history of soybean production. Fields at EV Smith Field Crops Unit (EVS) and Sand Mountain REC (SMS) did not have soybeans planted in the last 5 years, while a field at Plant Breeding Unit (PBU) had soybeans within the last 2 years. Experiments at EVS and PBU were irrigated; however, extremely hot and dry weather still caused stress conditions.

Soybean seed were inoculated less than 24 hours before planting with several commercial inoculants according to manufacturers' recommendations. Formulations included traditional peat-based, sterile-peat based and liquids. The cone planters used were sterilized between treatments with alcohol and allowed to dry before the next treatment was planted. A growth promoting solution "Accele-gro", recently marketed in the state, was included as a seed treatment, and was also foliar applied twice at EVS and PBU per directions.

The number of viable rhizobia in each inoculant was determined by plate counts using Mannitol-Yeast extract-Congo red agar media. The numbers of viable rhizobia in all inoculants were at least 2 orders of magnitude (100X) lower than those indicated on the inoculant labels. However, samples were taken from packages stored at room temperature until the last trial was treated. This could indicate lower survival during shipment and storage, or the need for extreme care of opened packages of inoculant products before use.

Five plants per plot from border rows were dug approximately 6 weeks post-plant to determine nodule counts (Table 1). There were no differences in height, color or other growth parameters noted. There were no significant differences for nodule count or yield between any of the treatments, even at locations where there was not a recent history of soybean production in the trial fields (EVS and SMS).

Nodule counts averaged across inoculated treatments (EVS = 29.6, PBU = 29.0, SMS = 39.2) were numerically higher at each location than for Untreated Checks, but were highly variable and did not result in higher yields.

Table 1. Nodule Counts and Yield for Soybeans Inoculated with *Bradyrhizobium japonicum* at Planting at Three Locations in Alabama, 2007

	Nodules / plant			Yield (bu/A)		
Treatment	**EVS**	**PBU**	**SMS**	**EVS**	**PBU**	**SMS**
Untreated Check	26.0 a	20.9 a	30.2 a	49.3 a	47.8 a	32.9 a
Optimize with LCO	28.4 a	28.4 a	38.2 a	45.0 a	47.1 a	34.3 a
Cell-Tech	30.0 a	30.0 a	40.9 a	48.3 a	51.5 a	32.6 a
Nitra-Stick-S	27.2 a	27.2 a	37.5 a	49.0 a	51.3 a	34.5 a
Urbana Soy	25.6 a	25.6 a	39.1 a	48.3 a	42.7 a	33.7 a
Vault	27.6 a	27.6 a	48.0 a	46.7 a	44.1 a	34.5 a
Rhizo-Stick	31.1 a	29.3 a	25.6 a	47.9 a	43.8 a	33.2 a
NOD+	32.9 a	32.9 a	35.4 a	49.8 a	43.4 a	33.0 a
Magnify LST	29.7 a	25.8 a	48.1 a	53.2 a	46.3 a	32.5 a
Accele-Gro M + Rhizo-Stick	34.0 a	34.0 a	39.9 a	49.9 a	50.6 a	34.4 a
CV (%)	22.53	26.47	39.69	8.08	11.02	7.58

Means followed by same letter do not significantly differ *(P=.10, Duncan's New MRT)*