

Soybean Inoculation Trial, 2005

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A field experiment was conducted at the North Dakota State University Carrington Research Extension Center to evaluate the response of soybean to commercial inoculants and to compare this response to varying levels of soil nitrogen (N).

The trial was sown to RoundupReady soybean cultivar 'RG405RR' (Maturity Group 0.5) on 26 May at the rate of 200,000 live seeds / acre in 7" rows. A soil sample the previous fall tested 20 lbs NO₃⁻-N / acre, with adequate phosphorus. The field had a loose history of soybean production. In addition to an absolute control (no inoculum, no N fertilizer), N fertilizer treatments were included to study total N levels (soil test + fertilizer) of 50, 75, and 150 lbs N / acre without inoculation. Plots measured 10' x 25' and were arranged in a randomized complete block design with six replicates. Weeds were controlled with herbicides and hand weeding. No other pesticides were applied.

Stand establishment was poor, with only slightly more than half the target population achieved (Table 1). The poor stand was likely due to soil crusting as a result of rainfall events between planting and emergence. During the 20-day period after planting, 4.1" of rainfall fell. The lack of response to N fertilizer (especially in nodulation scores) indicates that the N was leached out of the root zone.

Table 1. Soybean performance in the inoculant evaluation trial (6 reps), NDSU Carrington, 2005.

Treatment	Company	Formulation	Plant Stand (plants/acre)	Height of Lowest Pod (cm)	Visual Nodulation (1-9) ¹	Plant Height (cm)	Grain Yield (bu/ac)	Test Weight (lbs/bu)	Seed Weight (g/250)	Oil (%)	Protein (%)
Control (20 lbs N/acre)	---	---	116,000	5.7	4.5	86.7	39.6	57.3	38.5	21.9	33.5
50 N ²	---	---	106,000	5.2	5.5	89.0	41.5	57.4	36.9	21.8	33.4
75 N ²	---	---	98,000	6.5	4.8	84.3	36.2	57.5	37.2	21.8	34.0
150 N ²	---	---	101,000	8.7	5.5	81.3	40.3	57.2	38.4	21.6	34.4
ApexExtra	Agribiotics	Liquid	102,000	8.5	5.0	83.8	36.1	57.5	38.2	21.7	33.6
BYExp05	Brett-Young Seeds	Peat	115,000	7.3	4.2	90.0	42.7	57.5	38.0	21.6	34.1
BuExp-S1	Becker Underwood	Liquid	102,000	7.8	4.7	87.0	41.4	57.2	39.2	21.9	33.3
BuExp-S2	Becker Underwood	Granular	120,000	7.5	5.0	82.7	38.6	57.3	38.2	21.9	33.5
Cell-Tech Soybean	Nitragin	Liquid	116,000	8.3	4.8	86.0	39.1	57.6	37.3	21.6	34.2
DEI Exp 1	Direct Enterprises	Liquid	107,000	7.7	4.3	92.0	42.4	57.3	37.4	21.7	33.8
DEI Exp 2	Direct Enterprises	Liquid	128,000	6.7	4.8	84.0	43.9	57.4	37.1	21.9	33.2
Dyna-Start	UAP Northern Plains	Liquid	108,000	8.0	5.2	85.0	40.9	57.4	38.7	21.8	33.7
Gusto	Direct Enterprises	Liquid	106,000	6.2	5.5	84.3	39.7	57.2	38.0	21.8	33.6
HiStick L + Subtilex	Becker Underwood	Liquid	106,000	5.3	4.5	76.7	37.9	57.5	38.0	21.6	33.9
Primo I	INTX Microbials	Liquid	107,000	7.0	4.5	86.0	37.7	57.3	38.0	21.6	33.8
N-Row	INTX Microbials	Granular	87,000	6.0	5.2	84.5	39.0	57.3	36.9	21.5	34.3
NOD+ with Extender	Becker Underwood	Liquid	102,000	6.0	4.2	74.3	36.6	57.4	38.9	21.8	33.8
Nature'sAid	INTX Microbials	Granular	109,000	8.0	5.0	85.3	37.3	57.4	38.5	22.0	33.3
Neo Liquid Soy	Millborn Seeds	Liquid	94,000	8.0	5.2	81.7	42.2	57.4	38.0	21.9	33.5
Optimize	Nitragin	Liquid	123,000	8.0	4.2	89.3	37.1	57.5	38.4	21.7	34.1
PreCoat Xtra	Becker Underwood	Liquid	119,000	6.3	4.3	80.7	38.5	57.6	38.6	21.7	34.0
Pro Liquid E	Agassiz Seed	Liquid	94,000	8.4	5.0	80.4	41.5	57.5	38.1	21.8	33.7
ProTech+Inoc.+Arise+ST1053	BioCoat Technologies	Peat	106,000	8.5	5.5	86.3	35.3	57.6	38.7	21.7	34.2
ProTech+Inoculant	BioCoat Technologies	Peat	92,000	8.3	5.0	83.3	39.8	57.4	37.4	21.9	33.3
PulseRHP	Agribiotics	Peat	113,000	6.3	4.3	78.5	39.4	57.5	38.3	21.7	34.0
Rhizo Flo	Becker Underwood	Granular	112,000	7.3	4.7	92.0	41.9	57.3	37.9	21.8	33.4
Soy Sterile	Becker Underwood	Peat	106,000	6.5	4.5	86.0	36.5	57.6	38.2	21.3	34.5
TagTeam	Philom Bios	Peat	90,000	6.3	4.8	76.3	31.9	57.2	38.7	21.8	33.7
Vault	Becker Underwood	Liquid	115,000	6.8	4.0	82.7	38.5	57.4	37.4	21.7	33.9
Mean	---	---	107,000	7.1	4.8	84.2	39.1	57.4	38.0	21.7	33.8
C.V. (%)	---	---	21.7	33.9	22.0	13.5	15.0	0.5	4.3	1.5	2.4
P-value	---	---	0.301	0.349	0.398	0.660	0.225	0.322	0.666	0.620	0.694
LSD (0.05)	---	---	NS	NS	NS	NS	NS	NS	NS	NS	NS
¹ 1 = profuse, 9 = none			² Lbs total N (soil test of 20 lbs + fertilizer) / acre (0 - 24")								

A total of 1.63" of rain fell between 4 July and 23 September. Although yields were surprisingly high with so little rainfall, no statistically significant differences ($P < 0.20$) were observed in any of the parameters measured. This lack of response is not a total surprise, given the stressful growing conditions of the 2005 season.