Soybean response to rhizobia bacteria seed inoculation methods, Carrington, 2018.

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A field trial was conducted at the Carrington REC with support from the ND Soybean Council to examine the response of soybean to various rhizobia bacteria seed inoculation methods, including double inoculation. In addition, sampling and tests to determine soil rhizobia bacteria and plant tissue ureide-N levels were conducted to add to a database to predict yield response to seed inoculation. Experimental design was a randomized complete block with four replications. Previous crop in 2017 was flax and soybean was last grown in 2014. Spring soil test indicated 67 lb nitrate N/acre, 18 ppm P (Olsen), 230 ppm K, 3.4% organic matter, 6.4 and 5.3 and 7.4 pH (0-6" and 6-24" soil depth, respectively), and 0.22 and 0.35 mmho/cm soluble salts (0-6" and 6-24" soil depth). Soil rhizobia bacteria count was 263 per gram soil, indicating that response to inoculation was unlikely (threshold = 100 per gram). Liquid inoculant was Dyna-Start Rhizobia Liquid at 1.16 cwt/A. Granular inoculant was Cell-Tech at 3.1 lb/A (low) and 12.2 lb/A (high). Proseed '30-20 RR2Y' was seeded in 7-inch rows on May 23. Plant samples were taken for ureide-N analysis at the R3-4 stage on July 25. Seed was harvested with a plot combine on September 11.

Plant development, stand, and nodule number were statistically similar among treatments (Table). Ureide-N levels were similar among treatments, and the untreated check averaged above 1500 ppm, which suggests N fixation was adequate without seed inoculation. Seed yield, test weight, seed count, and seed oil and protein content were statistically similar among treatments, including double inoculation.

Table.													
	Treatment	Plant						Seed					
		Application			Nodules								
	Inoculant	method/		Stand	(June		Maturity	Ureide-		Test	Number		
Number	formulation	timing	Emerge	(June 12)	18)	Flower	(R8)	N	Yield	weight	/lb	Oil	Protein
			Jday	plt/A	no./plt	Jday		ppm	bu/A	lb/bu		%	%
•									•	•			
1	untreated check	Х	151	155,570	8	185	246	2683	41.9	55.9	3551	18.8	35.9
2	liquid	seed	152	143,713	9	185	246	2477	46.5	56.3	3587	19.2	35.2
3	granular	seed	152	145,136	9	185	246	2409	49.4	56.0	3493	19.4	35.0
	liquid plus granular	seed and in-											
4	(low rate)	furrow	152	149,879	7	185	246	2663	45.3	56.5	3549	19.2	35.4
	liquid plus granular	seed and in-											
5	(high rate)	furrow	151	166,479	10	185	246	2921	44.1	56.3	3602	19.0	35.5
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mean			151	152,092	8	185	246	2630	45.4	56.2	3557	19.1	35.4
CV (%)			0.3	13.9	23.7	0.2	0.0	15.6	8.5	0.8	2.8	2.0	1.9
LSD (0.05)			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS