Soybean Response to Crop Rotation, Carrington, 2005

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A field study was initiated in 2002 at the NDSU Carrington Research Extension Center to examine the performance of continuously-grown soybean compared to soybean grown on the previous year's wheat ground. In 2005, 'RG200RR' soybean was direct-planted with standing stubble in a dryland, loam soil at 200,000 pure live seeds/acre in 7-inch rows on May 18 with previous crop history of four years of soybean or alternating wheat and soybean (wheat in 2004). Also, soybean performance was compared between inoculated ('Implant+') and non-inoculated seed, and seed treatment ('ApronMax') versus untreated seed. Experimental design was a randomized complete block with a split-split plot arrangement and four replications. The continuous soybean ground had a nitrate-N level at the 0-2 ft depth of 99lb/acre, 37 ppm P, 3.4% organic matter and 7.0 pH. The alternating soybean and wheat ground had a nitrate-N level at the 0-2 ft depth of 41lb/acre, 46 ppm P, 3.5% organic matter and 7.3 pH. The trial was harvested with a plot combine on September 20.

Unifoliate leaf disease was higher with continuous soybean compared to soybean on wheat ground but average root disease lesions were similar between rotations (Table 1). Soybean on wheat ground generally did not provide a seed yield or quality advantage compared to continuous soybean. Generally, similar seed yield and quality occurred with seed inoculation compared to the untreated check. Plant density was higher with seed treatment but seed yield and quality were similar compared to the untreated check. Inoculating seed in continuous soybean or alternating soybean/wheat rotation had a similar yield compared to non-inoculated seed (Table 2). Plant stand and seed yield were greater with seed treatment in alternating soybean/wheat rotation compared to untreated seed.

Table 1. Soybean response to crop rotation, Carrington, 2005 (main factors).																
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	Plant		First	Plant	Plant	Average	Average	Unifoliate	Grain	Test	250			Seed	Seed	Seed
	emergence	Plants/A	flower	maturity	height	root length	root lesion	leaf severity	yield	weight	KWT	Oil	Protein	germ	fungi	bacteria
Treatment	(Jday)	(x1000)	(Jday)	(Jday)	(inch)	(mm)	(mm)	(%)	(bu/A)	(lb/bu)	(gram)	(%)	(%)	(%)	0-5	0-5
Rotation																
soy/soy	151	2340	183	242	30.5	127	29	23	47.6	58.3	37.0	19.9	36.1	98.1	2.2	1
soy/wht	152	2344.0	183	24	27.9	117	24	8	44.0	58.5	36.2	20.3	34.8	96.3	2.1	1
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	12	2.6	NS	0.27	0.1	0.4	NS	NS	NS
Seed inoculation																
inoculated	152	2410	183	242	28.9	122	24	16	45.7	58.6	36.7	20.1	35.6	96.6	2	1
untreated check	152	2274	183	242	29.5	122	28	16	45.9	58.3	36.5	20.1	35.3	97.8	2.2	1
LSD 0.05	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.2	NS	NS	NS
Seed treatment																
treated	152	2424	183	242	29.8	127	27	17	46.4	58.4	37.3	19.9	36.2	97.5	2.1	1
untreated check	152	2260	183	242	28.6	118	26	15	45.2	58.5	36.7	19.9	36.0	98.6	2.3	1
LSD 0.05	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2. Soybean response to crop rotation, Carrington, 2005 (interactions).																
							Disease									
	Plant		First	Plant	Plant	Average root	Average	Unifoliate leaf	Grain	Test				Seed	Seed	Seed
	emergence	Plants/A	flower	maturity	height	length	root lesion	severity	yield	weight	250 KWT	Oil	Protein	germ	fungi	bacteria
Treatment	(Jdav)	(x1000)	(Jdav)	(Iday)	(inch)	(mm)	(mm)	(%)	(bu/A)	(lb/bu)	(gram)	(%)	(%)	(%)	0-5	0-5
RotxInoc	(***))	((0000)	(****))	(()	()	(10)	(===,)	(,)	(9)	(,=)	(,,,)	(, =)		
sov/sov inoc	151	2333	183	242	30.3	128	27	23	47.0	58.5	37.3	19.9	36.2	97.5	2	1
sov/sov UC	151	2347	183	242	30.8	127	31	23	48.1	58.2	36.7	19.9	36	98.8	2	1
sov/wht inoc	152	2486	183	242	27.6	117	22	9	44.5	58.6	36.1	20.3	35	95.6	2	1
sov/wht UC	152	2201	183	242	28.3	117	25	10	43.6	58.5	36.3	20.3	34.6	96.9	2	1
LSD 0.05	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
RotxTreat																
soy/soy treat	151	2358	183	242	31.2	135	29	25	47.2	58.2	37.1	20.0	36.1	97.5	2	1
soy/soy UC	151	2322	183	242	29.9	120	28	21	47.9	58.4	36.9	19.8	36.1	98.6	2	1
soy/wht treat	152	2490	183	242	28.4	119	25	9	45.5	58.5	36.0	20.3	34.8	96.9	2	1
soy/wht UC	152	2198	183	242	27.4	115	23	10	42.5	58.5	36.3	20.3	34.8	95.6	2	1
LSD 0.05	NS	*	NS	NS	NS	NS	NS	NS	1.7	NS	NS	0.1	NS	NS	NS	NS
InocxTreat																
inoc treat	152	2433	183	242	29.5	129	25	16	46.3	58.7	37.2	20.2	35.7	97.5	2	1
inoc UC	152	2386	183	242	28.3	116	24	15	45.2	58.5	36.2	20.0	35.5	95.6	2	1
UC treat	152	2415	183	242	30.1	125	29	17	46.5	58.1	36.0	20.2	35.2	96.9	2	1
UC UC	152	2134	183	242	28.9	119	27	16	45.2	58.5	37.0	20.0	35.4	98.8	2	1
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.3	0.9	NS	NS	NS	NS	NS
mean	152	2342	183	242	29.2	122	26	16	45.8	58.4	36.6	20.1	35.4	97.0	2.1	0.9
C.V.%	0.1	8.1	0.1	0.2	6.3	10.8	15.2	33.4	3.4	0.5	2.2	0.6	0.8	4.3	23.8	49.0