

2005 Ohio Inoculation Study

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Eleven years of soybean inoculation evaluation consisting of 64 field trials and over 7000 research plots indicate that inoculating soybeans is a very profitable practice. The average yield increase over ten years has returned a profit of over 300 percent. For most inoculation products, a yield increase of half a bushel per acre is profitable and yield increases of 2 to 7 bu/acre have been common.

The test sites used in 2005 were well drained, had good fertility and an appropriate soil pH and the previous crop was either corn or wheat. Typically, under such ideal conditions we would not expect inoculation to increase soybean yield. The fact that yields were increased leads one to predict that even greater yield increases are likely where the soil conditions and cultural practices are less ideal. Plots were 5 feet wide and 45 feet long and included four rows spaced 12 inches apart. The soybean variety, SC9344RR was seeded at a rate of 170,000 seed per acre in this test. All test sites except for C1 were sprayed in August with insecticide to control bean leaf beetle, Japanese beetle, grass hopper and soybean aphid. The loss of leaf area had reached approximately 7 percent by the time of application. The other cultural practices for the study are described in Table 1 and rainfall, recorded in the field, is reported by month in table 2.

Table 1. 2005 Production Information

	N1	N2	C1	C2	S1	S2
	Henry Co.	Huron Co.	Mercer Co.	Delaware Co.	Preble Co.	Clinton Co.
Tillage						
Fall	None	Plow	Field Cult	None	None	None
Spring	None	None	None	None	None	None

Normal Variety Weed Control

Preemergence Canopy XL/Dual II/Roundup UltraMax
Postemergence Basagran / Flexstar / Select

Roundup Ready Variety Weed Control

Pre / Postemergence Roundup UltraMax

Soil and Crop Background

Soil Typ	Hoytville	Kibbie	Mercer	Blount	Crosby	Westland
Soil pH	6.0	5.7	6.4	6.1	6.8	6.2
Soil Test P(ppm)	98	72	40	52	78	47
Soil Test K(ppm)	299	437	221	230	298	248
Fertilizer	0-0-0	0-0-0	0-0-0	0-0-0	0-0-0	0-0-0
Previous Crop	Corn	Corn	Corn	Corn	Corn	Corn
Plant Date	5/28	5/18	5/29	5/13	5/11	5/10
Harvest Date	10/28	10/30	10/20	10/17	10/13	10/14

Table 2. 2005 Rainfall Data

	N1	N2	C1	C2	S1	S2
	Henry Co.	Huron Co.	Mercer Co.	Delaware Co.	Preble Co.	Clinton Co.
----- 2005 (Normal) -----						
May	1.6 (3.3)	1.5 (3.6)	2.0 (4.1)	1.5 (3.8)	2.6 (3.8)	3.1 (4.7)
June	1.4 (3.5)	1.0 (3.9)	2.7 (3.8)	2.8 (3.8)	1.3 (3.9)	1.7 (3.6)
July	5.7 (4.0)	3.1 (4.2)	1.6 (4.4)	1.9 (3.8)	0.7 (3.4)	2.0 (3.9)
August	1.6 (3.1)	3.6 (3.5)	3.1 (3.6)	5.2 (3.1)	4.2 (3.1)	4.6 (3.5)
September	5.2 (2.8)	3.4 (3.2)	4.1 (3.3)	3.3 (2.9)	4.8 (2.7)	1.8 (3.0)
TOTAL	1.5 (16.7)	12.6 (18.4)	13.5 (19.2)	14.7 (17.4)	13.6 (16.9)	13.2 (18.7)

Table 3. Treatment Descriptions (applications per 5 pounds of seed)

Treat.	Company	Treatment Description
1	UTC	ApronMaxxRFC at labeled rate
2	Humart	Inoculant FX
3	BeckerUnderwood	Vault @ 7.25ml/5# 3-5dpp *9.8ml extender, 1.4ml Integra.,
4	BeckerUnderwood	BUEXP-S1 @ 7.25ml/# 3-5dpp , 9.8ml extender, + Integral.
5	BeckerUnderwood	NOD+ w/ Extender @ 7.25ml/5# 3-5dpp , 7ml extender.
6	BeckerUnderwood	HiStick L @ 6.3 ml + Subtilex @ 0.091g
7	BeckerUnderwood	HiStick N/T @ 4 g
8	Philom Bios	Tag Team @ 6.6 gm
9	Agribiotics	APEX extra @ 6.25 ml
10	Agribiotics	Pulse R HP Mix10.5 gm
11	ABM	ABM 2003 Liquid @ 6.2
12	ABM	Exp 3-strain @ 1.15 g
13	ABM	Rhizoshield @ 2.3 g
14	Brett-Young Seeds	SoyExcel @ 10.2 g
15	Nitragin	Optimize @ 6.3 ml
16	Nitragin	Optimize @6.3 ml 30dpp
17	UAP-Loveland	Dyna-Start @ 6 ml
18	UAP-Loveland	Dyna-Start @ 6 ml + LI 6140 @ 5 oz
19	Clint Johnson	NeoLiquid Soy @ 6.25 ml

* indicates treatment application 3-5 days before planting.

Table 4. Yield data in Bushels per Acre

Treatment	N1	N2	C1	C2	S1	S2	MEAN
1	49.3	52.5	45.1	51.0	63.7	69.6	55.2
2	54.4	54.0	42.8	55.3	67.4	69.5	57.2
3	56.4	50.1	44.0	50.2	69.4	71.4	56.9
4	53.1	51.8	45.4	50.9	63.9	70.9	56.0
5	59.3	53.5	45.4	54.5	68.2	70.5	58.6
6	51.5	53.5	42.3	50.7	65.8	70.5	55.7
7	52.9	51.6	45.6	51.4	64.2	69.0	55.8
8	54.2	51.4	42.2	50.8	69.4	70.6	56.4
9	56.8	51.5	44.3	50.6	66.5	68.7	56.4
10	54.1	55.6	48.6	54.7	68.5	68.9	58.4
11	58.5	52.4	47.0	51.6	67.5	70.0	57.8
12	53.7	55.1	43.6	53.1	68.3	72.6	57.7
13	55.0	46.9	43.0	53.6	70.3	71.6	56.7
14	50.8	57.2	46.1	55.1	63.9	70.6	57.3
15	57.3	50.7	45.4	56.6	68.1	68.7	57.8
16	55.2	50.9	44.4	54.3	66.9	69.0	56.8
17	55.8	52.8	42.9	52.2	64.3	70.6	56.4
18	55.3	51.5	42.9	53.7	66.9	70.0	56.7
19	55.8	52.0	44.1	53.8	68.4	72.1	57.7
Max	59.3	57.2	48.6	56.6	70.3	72.6	58.6
Mean	54.7	52.4	44.5	52.9	66.9	70.2	56.9
Min	49.3	46.9	42.2	50.6	63.7	68.7	55.2
LSD 0.3	2.5	2.1	2.1	1.9	2.2	1.4	0.9

Observations & Conclusions:

The amount of rainfall received at the two test sites was only 68 to 93 percent of normal (table 2). In June, all test sites received an intense rain that resulted in the low organic matter soils at C1 and C2 to seal over which interfered with water intake and air exchange during the remainder of the growing season. Due to the adverse growing environment, topography, and variation in soil organic matter content at C1 and C2, "plot-to-plot" variation in plant size and productivity was greater than normal, and likely reduced the magnitude of treatment effects, ie, in a less stressful environment we would likely see an increased range of treatment effects. This problem was greater at the C1 due to tillage in the fall of 2004. For all sites, plants from some treatments were inspected in July and the number of nodules was generally greater than normal with the vast majority being active. Nodule size also seemed to be larger than normal.

When averaged over all six test sites, all treatments but two produced a statistically significant yield increase. Dry soil conditions following planting probably interfered with the survival of the bacteria of most of the treatments leading to smaller than normal yield increases.