School of Agriculture-Western Illinois University

SoilBiotics X-Cell ST (Seed Treatment) Plots

By Dr. Joel Gruver and Andrew Clayton

Introduction:

X-Cell ST is an organically approved liquid seed treatment derived from mined humates that was developed by SoilBiotics. According to SoilBiotics, X-Cell ST and other X-Cell technology products contain "humic, fulvic, and ulmic acids" and "increase seed germination, seedling vigor, and crop yield". Additional information about SoilBiotics products, including OMRI labels, is available on the company's website: http://www.soilbiotics.com/

In this 2012 study, X-Cell ST was used to treat Blue River Hybrids 35C2 soybean seeds prior to planting. The plots were located at the Western Illinois University conventional main farm in McDonough County, IL. The only parameter measured was crop yield.

Methods:

The soybean seeds were hand treated at 2 rates of the X-Cell ST product (5 and 8 oz per 100 lbs of seed) uniformly applied one day prior to planting and allowed to dry before packaging into small plot envelopes. The soybean variety used in this study, Blue River Hybrids 35C2, is non-GMO and the seed had not received any other seed treatments.

Soybeans were planted on 5/25 in block 13 of the WIU main farm at a rate of 160,000 plants/a with a 2 x 30" row plot planter. Each plot was 2 rows x 20' and replicated 5 times. Control plots consisted of the same soybean variety without any product. See (Plots with Yields: Map 1) for clarification regarding placement of plots and controls.

Excellent weed control was achieved with a conventional herbicide program (Canopy XL & Touchdown 5 days after planting, Select Max ~ 1 month after planting) and some hand pulling of broadleaf weeds.

Representative sections of each plot (2 rows x ~ 15') (actual length was carefully measured) were harvested on 10/26 by a custom harvesting service using a plot combine. The seed weights used for calculating yields were obtained with the onboard plot combine scale.

Results:

As shown in Table 1, the plots receiving the high rate of X-Cell ST (8 oz/100 wt) outyielded the control plots in the southwest section of the experimental site by 3.2 bu/a, but yielded 6.7 bu/a less than the northeast control plots. The low rate of X-Cell ST was not significantly different than the southwest controls at any of the alpha levels analyzed, (0.05 - 0.15). With alpha set at 0.05, the northeast control section was the only treatment significantly different than the other treatments. The numerical difference between the 2 control sections was 9.9 bu/a (table 1).

Table 1: Soybean Yields of X-Cell ST Treated and Control Plots

Site	Treatment (5 reps each)	Grain Yield (Bu/A)	Grain Yield (Bu/A)
WIU conventional	Control* (northeast section)	65.7[a]	65.7[a]
WIU conventional	8 oz product/100 wt	59.0[b]	59.0[b]
WIU conventional	5 oz product/100 wt	58.1[b]	58.1[bc]
WIU conventional	Control (southwest section)	55.8[b]	55.8[c]
		LSD (alpha 0.05) = 4.1	LSD (alpha 0.15) = 2.9

LSD = Least Significant Difference

Different (superscript) letters associated with yields in the table indicate significant differences among treatments.

*This control appeared to be in a location of the field favorable for higher yields.

Discussion:

This study was conducted during one of the worst droughts in recorded history, but the soybeans were still able to yield remarkably well. Moisture stress was evident across all the plots in July, but timely rain in late August appears to have allowed a good crop to mature. Foliar health was excellent across all plots.

Plot yields for the experimental site were evaluated with respect to spatial arrangement and linear zones were identified that had large yield differences. Post harvest soil probing revealed that higher yielding zones had greater soil density at ~ 9" than the lower yielding zones. The higher yielding northeast control section happened to lie within a zone with higher soil density and yield. Map 1 at the bottom of this report illustrates these yield patterns. Historical wheel traffic may have contributed to this anomaly. Compaction is normally not thought to be yield enhancing, but there is some evidence that moderate compaction can enhance yields during drought conditions.

If the northeast control plots had anomalous soil conditions more favorable than the other plots, then it is probably most meaningful to only interpret treatment effects with respect to the southwest control plots. The treatments compared to these controls grown under similar soil conditions indicate a significant yield improvement of 3.2 bu/a at the rate of 8 oz/100 wt. The lower rate product yield was numerically higher but not significant at any of the alpha levels tested.

Economics of the product at the higher rate (8oz/100 wt) show a net profit with the yield boost of 3.2 bu/a (table 2). Economics for the lower rate (5 oz/100 wt) were not calculated due to the statistics not indicating a significant yield difference. Keep in mind that Table 2 presents an organic production scenario, even though this study was conducted under conventional management.

Table 2: Net profit increase of X-Cell ST product at higher rate of 8 oz/100 wt of seed

Soybean market type	Market price of soybeans	Seeding rate/ (lbs/a)	Cost of 1 gal of X-Cell ST	Cost of X-Cell ST per acre	Gross revenue increase @ 3.2 bu/a yield boost	Net profit increase*
conventional	$14/bu	160k/a (50 lbs/a)	$250	$7.82	$44.80	$37/a
organic	$28/bu	175k/a (54.7 lbs/a)	$250	$8.55	$89.60	$81/a

*Net profit increase will be slightly lower if application cost of treating the seed is considered.

With alpha set at 0.15, statistically significant results indicate that there is an 85% chance that a treatment significantly improved yield and a 15% chance the yield improved because of random events.

Conclusion:

Spatial biases complicated the interpretation of this study's results. We attempted to identify and isolate the biases but additional study with the same treatments as well as a conventional seed treatment would probably be informative. X-Cell ST boosted soybean yield above what we deemed to be the most comparable set of control plots, so there is some evidence that the treatment can contribute to a profitable net return. Additional study with complete plot randomization and more normal weather conditions is needed to recommend X-Cell ST without reservations.

Plots with Yields: Map 1

2012 WIU Farm: Map of X-Cell ST Plots with Soybean Yields

⬆ North

Border	Border	Border	Border	Border	Border	Border	Border	Border
Border	Border	Border	Border	Border	Border	Border	Border	Border
Border	TH1 68.9 bu/a	Border	C-TH1 55.0 bu/a	C-X10 72.3 bu/a	Border	X10 58.5 bu/a	Border	Border
Border	TH2 63.4 bu/a	Border	C-TH2 60.6 bu/a	C-X9 65.0 bu/a	Border	X9 54.9 bu/a	Border	Border
Border	TH3 71.6 bu/a	Border	C-T3H 57.7 bu/a	C-X8 62.6 bu/a	Border	X8 55.6 bu/a	Border	Border
Border	TH4 66.7 bu/a	Border	C-TH4 58.5 bu/a	C-X7 63.4 bu/a	Border	X7 54.8 bu/a	Border	Border
Border	TH5 72.4 bu/a	Border	C-TH5 62.2 bu/a	C-X6 65.3 bu/a	Border	X6 58.5 bu/a	Border	Border
Border	X1 63.0 bu/a	Border	C-X1 57.0 bu/a	C-TH10 61.6 bu/a	Border	TH10 53.7 bu/a	Border	Border
Border	X2 63.0 bu/a	Border	C-X2 55.1 bu/a	C-TH9 60.0 bu/a	Border	TH9 53.4 bu/a	Border	Border
Border	X3 59.3 bu/a	Border	C-X3 54.7 bu/a	C-TH8 54.9 bu/a	Border	TH8 52.4 bu/a	Border	Border
Border	X4 59.4 bu/a	Border	C-X4 58.5 bu/a	C-TH7 61.3 bu/a	Border	TH7 54.4 bu/a	Border	Border
Border	X5 58.5 bu/a	Border	C-X5 53.9 bu/a	C-TH6 47.2 bu/a	Border	TH6 58.2 bu/a	Border	Border
Border	Border	Border	Border	Border	Border	Border	Border	Border
Border	Border	Border	Border	Border	Border	Border	Border	Border

West (left side) — East (right side)

⬇ South

Border and all plots = Blue River Hybrids 35C2, except underlined borders = LVF 3507

Each cell represents a 2 row plot for about 20' and were reduced in length when alleys were cut.

X= X-Cell ST liquid humic acid seed treatment (Odd numbers = 5oz/100 wt rate; even numbers = 8 oz/100 wt rate)
C-X= Control for X-Cell ST

TH= Biological treatment from another company
C-TH= Control for TH