

**2017 Soybean Variety Trials-Yields Summary
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Site Descriptions and Research Methods

Organic Site

The Allison Organic Research Farm is located 7 miles north of Sciota, IL in southwestern Warren County. The farm has been 100% certified organic since 2009 and is currently certified by MOSA. The 2017 soybean variety trial was located in field 2B west, which is mapped as Sable silty clay loam. The trial was planted on 6/8 with a John Deere 1760, 12-row planter with a target seeding rate of 180,000/a. The planter monitor indicated that the actual planting rate was 165,000/a. The 1 row x 430' plots were arranged in a complete randomized block design with 4 replications. On 11/3, all productive plants were counted in one representative 5' section of each plot and plants per acre were extrapolated. Weed control consisted of tine weeding (6/20), row cultivation (7/17), and a small amount of hand weeding. Excellent weed control was achieved. One-row sub-plots (44' on the east side of the field) were harvested with an old Kincaid plot combine on 11/3/17. The harvest from each sub-plot was weighed and analyzed for moisture content, and yields per acre were extrapolated assuming 60 lbs per bushel at 13% moisture.

Conventional Site

The WIU Research Farm is located ~ 2 miles north of Macomb, IL in central McDonough County. The variety trial was located in block 3, which is mapped as Ipava silt loam. Two-row plots were planted on May 17th with a Kincaid JD71, 2-row plot planter at a rate of 165,000 seeds/a. The plots were arranged in a complete randomized block design with 5 replications. Weed control consisted of a standard non-GMO soybean herbicide program and manual removal of a large number of tall broadleaf weeds late in the season. Control of foxtail and other grasses was good but broadleaf weed control was very poor. Plots ranging from 10'-16' in length were harvested with an old Kincaid plot combine on 11/7. The harvest from each sub-plot was weighed and analyzed for moisture content, and yields per acre were extrapolated assuming 60 lbs per bushel at 13% moisture.

Results

Grain yields and stand counts (only at the organic site) are summarized in Table 1. Great Harvest Organics GH389N with the TerraMax PSB-ST seed treatment was the top ranked variety at the organic site (66.4 bu/a) and ranked 6th at the conventional site (49.1 bu/a). Great Harvest Organics GH350 was the top ranked variety at the conventional site (56.1 bu/a) and ranked 6th at the organic site (61.1 bu/a). Yields for the top 7 varieties at the organic site (GH389N, GH389N w/ PSB-ST, GH389N w/ 1r ST, 39C4, GH380, GH350, 31C6) were not significantly different at $\alpha = 0.05$. Yields for all varieties, except the bottom 3, at the conventional site were not significantly different at $\alpha = 0.05$.

Table 1: Performance of 12 soybean varieties at 2 sites (organic and conventional management)

Variety	Group	Company/ Source	Organic Allison Farm Planted 6/8 Yield (Bu/Acre)	Significance Groupings	Rank	Organic Allison Farm Population (Plants/Acre)	Significance Groupings	Conventional WIU Farm Planted 5/17 Yield (Bu/Acre)	Significance Groupings	Rank
GH389N w/ TerraMax PSB-ST	3.8	Great Harvest Organics	66.4	a	1	114,112	bcd	49.1	ab	6
39C4	3.9	Blue River Hybrids	65.7	a	2	129,791	ab	47.4	ab	9
GH389N	3.8	Great Harvest Organics	64.9	ab	3	121,951	abc	47.8	ab	8
GH389N w/ SoilBiotics 1r ST	3.8	Great Harvest Organics	64.1	ab	4	125,436	abc	52.6	a	3
GH380	3.8	Great Harvest Organics	61.2	abc	5	121,080	abc	52.2	a	4
GH350	3.5	Great Harvest Organics	61.1	abc	6	108,014	bcd	56.1	a	1
31C6	3.1	Blue River Hybrids	59.2	abc	7	120,209	abc	48.7	ab	7
GH330	3.3	Great Harvest Organics	58.0	bc	8	109,756	bcd	51.8	a	5
34A7	3.4	Blue River Hybrids	57.5	bc	9	146,342	a	40.2	bc	10
E3865s	3.8	Blue River Hybrids	55.6	cd	10	100,174	cd	55.0	a	2
IA 2012	2.9	Iowa State/ Bradley Farms	48.5	de	11	89,721	d	35.8	c	12
GH327	3.2	Great Harvest Organics	42.4	e	12	99,303	cd	39.2	bc	11
			LSD =7.5			LSD = 26,970		LSD =11.4		

Least Significant Difference (LSD) calculated at $\alpha = 0.05$. Soybean varieties with different letters in the significance group columns are highly likely (95% confidence) to have real, non-random differences in yield. Soybean varieties with the same letter may also have real differences in yield, but there is > 5% chance that the reported numerical differences in yield are the result of random variation. The organic site results are from 4 reps (1-4). The conventional site results are from 3 reps (2-4). Data from rep 1 was not included due to multiple extremely low outliers and rep 5 was not harvested.

PSB-ST is a bacterial consortium containing a unique, non-plant specific, blend of microbes capable of providing a kick start to improve the availability and efficiency of use of phosphorous in the soil. By acidifying the soil solution, particles that hold phosphorus, release the phosphorus post planting. PSB-ST can provide an early benefit to corn, soybeans and wheat by supporting the release of bound phosphorous.

Organic 1r - Seed Treatment is a non-polymer liquid product that is applied to seeds up to 5 months pre-plant. It can be applied to all seeds, and is compatible with most other seed treatments. The treatment contains 12% humic acid content derived from Leonardite. It is designed to improve the beginning stages of plant life which may result in the opportunity of better plant health and improved yields.

Discussion

Despite serious variation in monthly precipitation during the 2017 growing season (very dry in June, unusually wet in July and very dry in August and September), the overall weather was favorable for high soybean yields at both locations. Higher yields were produced at the organic site from 9 of the 12 varieties/treatments. In addition, average yield across all plots was 10.7 bu/a higher at the organic site, despite being planted 22 days later. Much higher weed pressure is likely the primary reason for the lower yields at the conventional site. At both locations, variation in yield between the highest and lowest performing varieties/treatments was significant (>20 bu/a).

Great Harvest Organics' GH389N variety, has been a strong and consistent performer in our plots since 2014. It is a tall bushy variety that competes well with weeds. The Great Harvest Organics website lists it as having high yield potential across all soil types and excellent stress tolerance. In 2017, GH389N was planted as part of 3 treatments at both the organic and conventional sites: 1) control/without any seed treatment, 2) treated with TerraMax PSB-ST biological seed treatment, 3) treated with SoilBiotics Organic 1r - Seed Treatment. All 3 treatments performed well (top 4) at the organic site with the TerraMax treatment being the highest ranked treatment at 66.4 bu/a, which is 1.5 bu/a greater than the control (but less than 7.5 bu/a, the calculated least significant difference at $\alpha = 0.05$). This group of treatments did not perform as well at the conventional site, however the SoilBiotics treatment ranked 3rd at 52.6 bu/a, which is 4.8 bu/a greater than the control (but less than 11.4 bu/a, the calculated least significant difference at $\alpha = 0.05$). Averaged across both sites, the TerraMax PSB-ST treatment out yielded the control by 1.4 bu/a and the SoilBiotics Organic 1r - Seed Treatment out yielded the control by 2.0 bu/a. The additional revenue generated from the extra bushels exceed the cost of the seed treatments.

Historically, BRH 34A7 has been a very consistent top yielding variety at both sites, but in 2017 it ranked 9th at the organic site (57.5 bu/a) and 10th at the conventional site (40.2 bu/a). Interestingly, it did have the highest stand of all treatments (146,342 beans/a) at the organic site. It is a tall leafy variety that competes well against weeds and usually is a good fit with organic no-till production. We have used BRH 34A7 in organic no-till plots since 2009, and it averaged slightly over 70 bu/a in our no-till experiment in 2016. One weakness of this variety is its relatively low resistance to soybean cyst nematodes. Variety 34A7 is scored 2 out of 5 (5 being the best score) for nematode resistance on the Blue River Hybrids website and nematode damage to this variety was observed at the organic site in one field during 2011. It is unlikely that the lower yields in 2017 were related to nematode damage.

Overall, the 3 food grade varieties (E3865s, IA 2012, and GH 327) did not perform well at either of the sites and all 3 were the lowest yielding at the organic site. The highest yielding food grade variety at both sites was Blue River Hybrids' E3865s, which yielded 55.6 bu/a (rank 10) at the organic site and 55.0 bu/a (rank 2) at the conventional site. Compared to the highest yielding feed grade variety, the yield deficit was 10.8 bu/a and 1.1 bu/a, respectfully.

Conclusion

Averaged across all plots, soybean yield was 58.7 bu/a at the organic site and 48.0 bu/a for the conventional site. High broadleaf weed pressure at the conventional site certainly contributed to the 10.7 bu/a yield difference, but higher organic matter/healthier soil at the organic farm may have provided a more favorable seed fill environment during unusually dry conditions in August and September.

Both of the seed treatments had higher numerical soybean yields than the control, but the differences were not statistically significant when analyzed with $\alpha = 0.05$. The costs of both treatments are low enough that additional testing and evaluation on commercial farms is probably warranted.

Prices for food grade soybeans are consistently higher than feed grade prices, but food grade soybean varieties typically produce lower yields than feed grade varieties. One needs to do the math to understand if the food grade premium is enough to offset the lower yields that they could encounter. In our experience, the food grade premiums usually have not been enough to offset the likely yield drag and extra risk associated with producing food grade beans. However, a high yielding food grade soybean such as E3865s is well worth considering growing for the food grade market.