

2020 Soybean Variety Trials-Yields Summary
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Conventional Farm Site Description and Research Methods

In 2020, a soybean variety trial consisting of 14 certified organic varieties, sourced from 3 companies, was conducted in block 2 (mapped as Osco silt loam, 2-5% slope) at the WIU Research Farm. The farm is located ~ 2 miles north of Macomb, IL in central McDonough County. In previous years, the trial was replicated at the WIU Allison organic research farm but only the conventional site was planted in 2018, 2019 and 2020.

Four-row wide plots were planted on 6/12 with a John Deere 4-row plot planter at a target rate of 160,000 seeds/a. The plots were arranged in a complete randomized block design with 4 replications. Weed control consisted of a standard non-GMO soybean herbicide program and some weeds were manually removed late in the season.

In addition to evaluating differences in variety yields, 2 of the varieties received a pelletized gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) product from Calcium Products (<https://www.calciumproducts.com/>) called mini SO4. The product was applied in-furrow metered through insecticide boxes (set for maximum rate) at an approximate rate of 20-25 lbs of product/acre.

The middle 2 rows of the 4-row plots (33'-38' in length) were harvested with a Gleaner Model K plot combine on 11/5/20.

The soybeans harvested from each sub-plot were weighed and analyzed for moisture content, and yields (bu/a) were calculated assuming 60 lbs per bushel at 13% moisture.

Results & Discussion

The mean yields of the 14 varieties ranged from 54.0 to 63.2 bu/a. With $\alpha = 0.05$, the least significant difference was 5.9 bu/a (see table 1).

The top yielding variety in the trial was Great Harvest Organics (GHO) 350GH, which yielded 63.2 bu/a (see table 1). 350GH also yielded well at the conventional site in 2017 (56.1 bu/a; ranked #1) and 2019 (60.1 bu/a; ranked #3). According to Great Harvest Organics, 350GH has excellent yield potential, a very good disease package and is versatile, allowing for flexible placement across soil types.

The 2nd overall top yielding variety in the trial was Blue River Organic Seed (BROS) 30C8, which yielded 61.8 bu/a (see table 1). According to Blue River Organic Seed, this variety has very good resistance to soybean cyst nematode and excellent standability.

The top yielding food-grade variety (7th in overall rank) was GHO 291GH, which yielded 57.6 bu/a. The 2nd highest yielding food-grade variety (8th in overall rank) was IA 3051, which yielded 56.9 bu/a (see table 1). It is a public variety and is offered by Clarkson Grain.

The gypsum product (mini SO4) had mixed results. The 350GH control plots (w/o gypsum) averaged 2.1 bu/a higher than the 350GH gypsum plots. In contrast, the 389F.Y gypsum plots averaged 1.5 bu/a higher than the 389F.Y control plots (w/o gypsum). In both cases, the yield differences were not statistically significant @ $\alpha = 0.05$. One interesting effect across both varieties, is that the gypsum treated plots had less variation in yield. This effect was particularly noticeable for the 389F.Y food-grade variety. To quantify yield variability, we calculated the difference between individual plot yields and average yields for the rep including the plot and then calculated the standard deviation of these differences generating a metric that ranged from 0.84 bu/a to 5.17 bu/a. The 389F.Y gypsum plots had the lowest value (0.84 bu/a) whereas the 389F.Y control plots (w/o gypsum) had one of the highest values (3.97 bu/a). Low yield variability is valuable because it reduces uncertainty and thus simplifies grain handling and marketing.

When deciding on growing a feed-grade vs a food-grade soybean variety it is important to understand that food-grade varieties typically come with additional risks, such as lower yields and strict quality requirements. To compensate for those risks, prices offered for food-grade soybeans should be significantly higher than prices offered for feed-grade varieties.

For example, if you grow a feed-grade variety that yields 60 bu/a and sells for \$18.50/bu, your gross revenue is \$1,110/a; whereas if you grow a food-grade variety that yields 50 bu/a and sells for \$21.50/bu, your gross revenue is slightly less at \$1,075/ac. In that example, choosing the higher yielding feed-grade variety would be the more profitable option. However, if you use yield data from our 2020 top yielding feed-grade and food-grade varieties the outcome is different. The average yield for feed-grade variety 350GH was 63.2 bu/a. With a market price of \$18.50/bu, your gross revenue would be \$1,169/a. The top 2 food-grade varieties 291GH and IA3051 yielded 57.6 and 56.9 bu/a, respectively. With a market price of \$21.50/bu, your gross revenue would be \$1,238 and \$1,223/ac, respectively. In this example, growing a relatively high yielding food-grade soybean is the more profitable option by approximately \$54-\$59/a, assuming no significant elevator dockages or significant additional costs incurred when producing the food-grade variety.

Conclusion

Fourteen organic soybean varieties were compared under conventional management. Considering that the plots were planted late (June 12), all varieties in the trial appear to have good yield potential. Future trials using the gypsum product (mini or standard SO4) broadcasted at recommended rates of 150 lbs/a prior to planting may produce more favorable results than did the low in-furrow rates.

It should be noted that different rankings of these 14 varieties might occur if they were grown at the organic farm, where reliance on mechanical methods and plant competition for weed control rather than a herbicide program might give more advantage to tall leafy varieties. For this reason, some soybeans are more suited for organic production than others.

Table 1: Performance of 14 Soybean Varieties (4 reps)

Variety	Group	Company/ Source	Traits	Conventional WIU Farm Planted 6/12 Yield (bu/a)	Significance Groupings	R a n k
350GH	3.5	Great Harvest Organics	Feed Grade	63.2	a	1
30C8	3.0	Blue River Organic Seed	Feed Grade	61.8	ab	2
350GH (w/gypsum)	3.5	Great Harvest Organics	Feed Grade	61.1	abc	3
32DC8	3.2	Blue River Organic Seed	Feed Grade	61.0	abc	4
320GH	3.2	Great Harvest Organics	Feed Grade	59.4	abcd	5
390GH	3.9	Great Harvest Organics	Feed Grade	59.2	abcd	6
291GH	2.9	Great Harvest Organics	Food Grade	57.6	abcd	7
IA3051	3.0	Clarkson Grain	Food Grade	56.9	bcd	8
e3776	3.7	Blue River Organic Seed	Feed/Protein	56.6	bcd	9
e3782	3.7	Clarkson Grain	Food Grade	56.6	bcd	10
34A7	3.4	Blue River Organic Seed	Feed Grade	56.1	bcd	11
389F.Y (w/gypsum)	3.8	Blue River Organic Seed	Food Grade	55.5	cd	12
e3865s	3.8	Blue River Organic Seed	Food Grade	54.2	d	13
389F.Y	3.8	Blue River Organic Seed	Food Grade	54.0	d	14
				LSD = 5.9 ($\alpha = 0.05$)		

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 a 95% chance that the reported numerical differences in yield are the result of random variation.