

**2019 Soybean Variety Trials-Yields Summary
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Conventional Farm Site Description and Research Methods

In 2019, a soybean variety trial consisting of 14 certified organic varieties, sourced from 3 companies, was conducted in block 14 (mapped as Greenbush silt loam) of 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 and 2019.

Four-row plots were planted on 6/18 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 5 replications. Weed control consisted of a standard non-GMO soybean herbicide program and some weeds were manually removed late in the season.

The 2019 season was extremely wet in May and June but the mid-June planting date and site's gentle slope (2-5%) helped reduce ponding issues on all but rep 5 (the flattest part of the experimental site). Rep 5 was negatively affected by both ponding and animal damage.

The middle 2 rows of the 4-row plots (47'- 48' in length) were harvested with a Gleaner Model K plot combine on 12/12. Yields were not recorded for rep 5 due to excessive weather and animal related damage. Rep 5 was closest to a small section of timber and was the flattest and most prone to flooding.

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 51.7 to 62.8 bu/a. The least significant difference was large (6.4 bu/a) leading to only 4 significance groups (see table 1).

The top yielding variety in the trial was Blue River Organic Seed (BROS) 34A7, which yielded 62.8 bu/a (see table 1). The 34A7 variety has been one of the best yielding varieties in our studies since 2006 (14 years), with the exception of 3 years, when it yielded poorly. One weakness of this variety is its relatively low resistance to soybean cyst nematodes, which needs to be considered for field placement. Additionally, 34A7 has also proven to do very well in our organic no-till trials and competes well with weeds. The BROS website indicates that the 34A7 variety also has

excellent heat and drought stress tolerance, which likely contributes to its strong performance in organic no-till systems where the cover crop may have used a significant amount of soil moisture.

The 2nd top yielding variety in the trial was Great Harvest Organics (GHO) 401GH, which yielded 62.2 bu/a (see table 1).

We should note that 350GH variety had several of the top yielding plots but also had one low yielding plot (14 bu/a lower than the next lowest 350GH plot). If this plot were removed from the variety average the yield for 350GH would be 64.0 bu/a, which would make it the top yielding variety in the study.

The top yielding food-grade variety (6th in overall rank) was BROS 389.F.Y, which yielded 58.7 bu/a. The 2nd highest yielding food-grade variety (9th in overall rank) was IA 3051, which yielded 56.0 bu/a (see table 1). It is a public variety offered by Clarkson Grain.

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 the food-grade prices offered should be significantly higher than what is offered for feed-grade varieties.

For example, if you grow a feed-grade variety and it yields 60 bu/a, with a market price of \$19/bu, your gross revenue would be \$1,140/a; but if you grow a lower yielding food-grade soybean that yields 50 bu/ac, with a market price of \$22.50/bu, your gross revenue would be only \$1,125/ac. In that example, choosing the higher yielding feed-grade soybean would likely be the more economical choice. In past trials, it has been common to have feed-grade varieties yield at least 10 bu/a more than food-grade varieties. However, if you use yield data for the example from our 2019 top yielding feed-grade and food-grade varieties you will get a different outcome. The average yield for feed-grade variety 34A7 was 62.8 bu/a. With a market price of \$19/bu your gross revenue would be \$1,193/ac. The average yield for food-grade variety 389F.Y was 58.7 bu/a. With a market price of \$22.50/bu, your gross revenue would be \$ 1,321/ac. In this example, choosing the lower yielding food-grade soybean would be the more economical choice, assuming no significant additional costs incurred when producing the food-grade variety.

A lodging score of 0-5, (0 = no lodging to 5 = severe lodging within the plot), was assigned to each variety on 12/9. Varieties 291GH, 30C8, 350GH, and 380GH had no lodging, while the rest had only mild lodging. The 2 highest lodging scores were 1.5 and 1.0, which were assigned to 39C4 and 389F.Y respectively. The lodging score of 1.5 was statistically significantly higher than 9 of the 14 varieties even though it was mild. The LSD ($\alpha = 0.05$) was 0.87.

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

Variety	Group	Company/ Source	Traits	Conventional WIU Farm Planted 6/18 Yield (bu/a)	Significance Groupings	Rank
34A7	3.4	Blue River Organic Seed	Feed Grade	62.8	A	1
401GH	4.0	Great Harvest Organics	Feed Grade	62.2	Ab	2
350GH	3.5	Great Harvest Organics	Feed Grade	60.1	Abc	3
35DC2	3.5	Blue River Organic Seed	Feed Grade	60.1	Abc	4
e3776	3.7	Blue River Organic Seed	Feed/Protein	58.7	Abc	5
389F.Y	3.8	Blue River Organic Seed	Food Grade	58.7	Abc	6
291GH	2.9	Great Harvest Organics	Feed Grade	57.6	abcd	7
330GH	3.3	Great Harvest Organics	Feed Grade	57.1	abcd	8
IA3051	3.0	Clarkson Grain	Food Grade	56.0	Bcd	9
e3865s	3.8	Blue River Organic Seed	Food Grade	55.8	Bcd	10
30C8	3.0	Blue River Organic Seed	Feed Grade	55.4	Cd	11
380GH	3.8	Great Harvest Organics	Feed Grade	54.3	Cd	12
39C4	3.9	Blue River Organic Seed	Feed Grade	54.1	Cd	13
e3782	3.7	Clarkson Grain	Food Grade	51.7	D	14
				LSD = 6.4 ($\alpha = 0.1$)		

Least Significant Difference (LSD) calculated at $\alpha = 0.1$. Soybean varieties with different letters in the significance group columns are highly likely (90% 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 90% chance that the reported numerical differences in yield are the result of random variation.

Conclusion

Fourteen organic soybean varieties were compared under conventional management. Considering that the plots were planted late (June 18), experienced unusually wet conditions for most of the growing season and were also harvested late (December 12), all varieties in the trial appear to have good yield potential. It should be noted that different rankings of these 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.