

Evaluation of Organic Soybean Varieties Southeast Research Farm, 2019

Kathleen Delate, professor
Daniel Korhonen, undergraduate research asst.
Departments of Horticulture and Agronomy
Myron Rees, farm superintendent
Cody Schneider, ag specialist

Materials and Methods

According to the USDA National Organic Program, certified organic farmers must source organic seed (seed from organically raised crops). The organic seed industry is currently growing in Iowa and the Midwest, and with this growth, organic growers are looking for University-based recommendations on organic varieties to use in Iowa. The Organic Agriculture Program at Iowa State University has been using organic seed at the Southeast Research Farm for eighteen years with excellent results.

There were four soybean varieties selected for the 2019 organic variety trial. These included the following varieties: Viking 0.2188AT12N and Viking 0.2518N (Albert Lea Seed, Albert Lea, MN), Blue River 30C8 and Blue River 34A7 (Blue River Hybrids, Ames, IA). Plots measuring 20 x 380 ft. were laid out in a randomized complete block design with four replications of each variety. The field was chisel-plowed on May 15 and prepared with a soil finisher on April 25, June 9 and June 12 for planting. Soybeans were planted at a 1.25–inch depth at 140,000 seeds/acre on June 13. Weed management included rotary hoeing on June 25, July 1 and July 3, and row cultivation on July 5, 11, 22 and 30. Soybeans were harvested with a combine on October 28.

Plant populations were determined in three randomly selected areas in each replication of each variety on July 2, 2019. Grass and broadleaf weed populations were also counted

in square-meter quadrats in three randomly selected areas in each replication of each variety on July 2. Harvest samples (200 g) were collected from each plot for grain quality analysis, which was conducted at the ISU Grain Quality Laboratory, Ames, IA.

Results and Discussion

Despite the extreme weather in 2019, organic soybean performance was excellent in southeast Iowa. Plant stands suffered some in 2019, possibly from wet weather and rotary hoeing damage, with differences observed between varieties (Table 1). Plant populations were greater in BR 30C8, at 125,667 plants/acre, and in Viking 0.2188AT12N, at 128,833 plants/acre, compared to an average of 87,500 plants/acre in the other two varieties. Weed management also suffered in 2019, but weed populations were equivalent across varieties. Broadleaf weeds averaged 5 weeds/m² across all varieties, while grass weeds averaged 4 weeds/m² (Table 1).

Organic soybean yields were excellent in 2019, averaging 61 bu/acre. There were greater yields in the BR 30C8, at 64 bu/acre, and in the organic Viking 0.2518N, at 63 bu/acre, with lowest yields in the Viking 0.2188AT12N, at 57 bu/acre (Table 2). The BR 34A7 yielded 60.2 bu/acre, which was similar to the highest yielding varieties (Table 2). The percentage of stained soybeans was 4.4% across all varieties, a relatively low level, compared to other sites in Iowa (Table 2).

Moisture content at harvest averaged 13.2% across all varieties (Table 3). The Blue River 30C8 had lower moisture levels at 12.8%. Protein levels in the organic hybrids averaged 34.7% across all varieties (Table 3). Oil

content averaged 19.4% across all varieties.
Carbohydrate content averaged 21.5%.

These results show great promise for organic hybrid seed, which is gaining in popularity for organic production in Iowa. New ISU organic soybean breeding lines will be tested in future years to determine if yields are equivalent to commercial organic varieties.

Acknowledgments

We would like to thank Chad Hesseltine, Bob Turnbull, Henry Franzen, Ben Heller, Megan Moore, Lauren Bilek and Theo Nguyen for their help in production, data collection and analytical aspects of this project. We also thank Albert Lea Seed and Blue River Hybrids for their seed support.

Table 1. Soybean plant and weed populations in the Organic Soybean Variety trial, Crawfordsville, IA, 7/02/2019.

Variety	Plant population (plants/acre)	Grass weeds (plants/m ²)	Broadleaf weeds (plants/m ²)
Blue River 30C8	125,667a	5.38	2.69
Blue River 34A7	72,833c	2.69	3.59
Viking 0.2188AT12N	102,167b	1.79	4.48
Viking 0.2518N	128,833a	4.48	7.18
LSD _{0.05}	17,125	NS ^y	NS ^y
p value ($\alpha=0.05$)	<0.0001	0.8491	0.1962

^yMeans followed by the same letter down the column are not significantly different at $P \leq 0.05$ or not significant (NS) (Fisher's Protected LSD Test).

Table 2: Soybean yield and stained soybeans in the Organic Soybean Variety trial, Crawfordsville, IA, 2019.

Variety	Yield (bu/ac)	Stained soybeans (%)
Viking 0.2188AT12N	57.24b ^y	4.85
Viking 0.2518N	62.59a	4.33
Blue River 34A7	60.20ab	5.83
Blue River 30C8	63.56a	3.98
LSD _{0.05}	3.73	---
P-value ($\alpha = 0.05$)	0.0138	---

^yMeans followed by the same letter down the column are not significantly different at $P \leq 0.05$ or not significant (NS) (Fisher's Protected LSD Test).

Table 3. Grain quality in the Organic Soybean Variety trial, Crawfordsville, IA, 2019.

Variety	Moisture (%)	Protein (%)	Oil (%)	Carbohydrates (%)
Viking 0.2188AT12N	13.7	34.5	19.0	21.3
Viking 0.2518N	13.0	35.0	19.1	21.2
Blue River 34A7	13.3	34.7	19.4	21.5
Blue River 30C8	12.8	34.7	19.9	21.9