

## Evaluation of Organic Soybean Varieties

### RFR-A1990

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### Introduction

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 18 years with excellent results.

### Materials and Methods

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 April 15 and prepared for planting with a soil finisher April 25, June 9, and June 12. Soybean was planted at a 1.25-in. depth at 140,000 seeds/acre June 13. Weed management included rotary hoeing June 25, July 1, and July 3, and row cultivation July 5, 11, 22, and 30.

Soybean was harvested with a combine October 28.

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

### 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 with 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/m<sup>2</sup> across all varieties, while grass weeds averaged 4 weeds/m<sup>2</sup> (Table 1).

Organic soybean yields were excellent in 2019, averaging 61 bushels/acre. There were greater yields in the BR 30C8, at 64 bushels/acre, and in the organic Viking 0.2518N, at 63 bushels/acre, with lowest yields in the Viking 0.2188AT12N, at 57 bushels/acre (Table 2). The BR 34A7 yielded 60.2 bushels/acre, which was similar to the highest yielding varieties

(Table 2). The percentage of stained soybean was 4.4 percent across all varieties, a relatively low level, compared with other sites in Iowa (Table 2).

Moisture content at harvest averaged 13.2 percent across all varieties (Table 3). The Blue River 30C8 had lower moisture levels at 12.8 percent. Protein levels in the organic hybrids averaged 34.7 percent across all varieties (Table 3). Oil content averaged 19.4 percent across all varieties. Carbohydrate content averaged 21.5 percent.

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

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**Table 1. Soybean plant and weed populations in the organic soybean variety trial, ISU Southeast Research Farm, Crawfordsville, IA, 7/02/2019.**

Variety	Plant population (plants/ac)	Grass weeds (plants/m <sup>2</sup> )	Broadleaf weeds (plants/m <sup>2</sup> )
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 <sub>0.05</sub>	17,125	NS <sup>y</sup>	NS <sup>y</sup>
P value ( $\alpha = 0.05$ )	<0.0001	0.8491	0.1962

<sup>y</sup>Means followed by the same letter in a 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 soybean in the organic soybean variety trial, ISU Southeast Research Farm, Crawfordsville, IA.**

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

<sup>y</sup>Means followed by the same letter in a 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, ISU Southeast Research Farm, Crawfordsville, IA.**

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