

## Evaluation of Organic Corn Varieties

### RFR-A1897

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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 17 years with excellent results.

### Materials and Methods

There were four corn varieties selected for the 2018 organic variety trial. These included the following varieties: Viking 0.68-06 and 0.74-10GS (Albert Lea Seed, Albert Lea, MN), BR57A30 and BR51T59 (Blue River Hybrids, Ames, IA). Plots measuring 20 ft x 380 ft were arranged in a randomized complete block design with four replications of each variety. Turkey manure (5 tons/ac; 3-2-1.5 N-P-K) was spread on the field November 7, 2017, and plowed under with the 2017 red clover cover crop April 13, 2018. The field was field-cultivated May 22 and 23 to prepare for planting. Corn was planted at a 2-in. depth at 35,600 seeds/acre May 23. Weed management included rotary hoeing May 30 and June 5, and row cultivation June 7, 13, and 18. Corn was harvested November 13, 2018.

Plant populations were determined in three randomly selected areas in each replication of each variety June 18, 2018. Grass and broadleaf weed populations also were counted in square-meter quadrats in three randomly selected areas in each replication of each variety June 18. 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 2018, organic corn performance was excellent in southeast Iowa. Plant stands were excellent in 2018, averaging 30,479 plants/acre in the hybrid corn varieties, with no difference between varieties (Table 1). Weed management was excellent in 2018. Weed populations were equivalent across varieties. Broadleaf weeds averaged 1.5 weeds/m<sup>2</sup> across all varieties, while grass weeds averaged <1 weeds/m<sup>2</sup> (Table 1).

Organic hybrid corn yields were excellent in 2018. There were greater yields in the organic Blue River 57A30, at 186 bushels/acre, compared with an average of 170 bushels/acre for all other varieties (Table 2). The Viking 0.68-06 yielded 173 bushels/acre, which was numerically greater than the other two varieties, which yielded an average of 168 bushels/acre (Table 2).

Moisture content averaged 17.2 percent across all varieties. The Viking 0.74-10GS corn had significantly higher moisture levels at 18.2 percent, while the BR51T59 was significantly lower at 16.3 percent (Table 3). Protein levels in the organic hybrids averaged 7.4 percent across all varieties, with no differences among varieties (Table 3). Oil content averaged 4.2 percent, with

significantly greater levels (4.5 and 4.4%) in BR57A30 and Viking 0.68-06, respectively. Starch content averaged 73.4 percent, with significantly higher levels (74.1 and 73.9%) in BR 51T59 and Viking 0.74-10GS varieties, respectively.

These results show great promise for organic hybrid seed, which is gaining in popularity for organic production in Iowa. New ISU/USDA organic corn breeding lines, however, will require additional years of testing and selection before being equivalent to commercial organic varieties.

### Acknowledgements

Thanks to the Leopold Center for Sustainable Agriculture for their support of this project. Thanks also to Chad Hesselstine, Rachel Tan, Bob Turnbull, Shawn Wu, and Daniel Korhonen, 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. Corn and weed populations in the organic field corn variety trial, Southeast Research Farm, 6/18/18.**

Variety	Plant populations (plants/acre)	Grass weed populations (weeds/m <sup>2</sup> )	Broadleaf weed populations (weeds/m <sup>2</sup> )
Blue River 57A30	31,083	0.17	1.08
Viking 0.68-06	29,833	0.08	1.58
Blue River 51T59	30,250	0.08	1.17
Viking 0.74-10GS	30,750	0.17	2.08
LSD <sub>0.05</sub>	NS <sup>x</sup>	NS	NS
P value ( $\alpha = 0.05$ )	0.6251	0.9157	0.5672

<sup>x</sup>Means 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. Organic hybrid field corn variety yields, Southeast Research Farm, 2018.**

Variety	Bu/acre
Blue River 57A30	186.21a <sup>x</sup>
Viking 0.68-06	172.92b
Blue River 51T59	168.29b
Viking 0.74-10GS	167.83b
LSD <sub>(0.05)</sub>	12.17
P-Value ( $\alpha = 0.05$ )	0.0213

<sup>x</sup>Means 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 hybrid field corn varieties, Southeast Research Farm, 2018.**

Variety	Moisture (%)	Protein (%)	Oil (%)	Starch (%)	Density (g/cc)	Ethanol yield (gal/bu)
Blue River 57A30	17.25b <sup>x</sup>	7.725	4.45a	72.50b	1.23b	2.82b
Viking 0.68-06	17.28b	7.325	4.40a	72.95b	1.23b	2.84ab
Blue River 51T59	16.25c	7.150	4.08b	74.10a	1.26a	2.87a
Viking 0.74-10GS	18.18a	7.525	4.00b	73.88a	1.26a	2.86a
LSD <sub>0.05</sub>	0.3544	NS	0.2167	0.7716	0.0211	0.0331
P value ( $\alpha = 0.05$ )	<0.0001	0.3769	0.0012	0.0020	0.0118	0.0301

<sup>x</sup>Means 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).