

# Corn Variety Performance Trials for Ohio Organic Farms

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## Objective

Grain crops grown organically often are raised in conditions unlike that experienced in university and commercial variety performance trials. The objective of this trial was to determine if varieties suited to high input conditions are the same as those suited to low input conditions.

## Background

**Table 1. Certified Organic Farms Participating in Statewide Performance Trials, Row Widths, Planting Dates, and Harvest Dates for the Corn Test Plots**

Farm #	Region	County	Nearest Town	Farm	Row Width (in.)	Planting Date	Harvest Date
1	NW	Defiance	Mark Center	Joe Hammond	30	May 9	November 4
2	NC	Sandusky	Clyde	Jeff Dean	22	May 20	November 13
3	NC	Medina	Litchfield	Gary Mennell	30	June 3	December 4
4	NE	Wayne	Wooster	Art Riggerbach	30	May 16	November 30
5	C	Delaware	Delaware	Stratford Center	30	May 12	December 10
6	C	Knox	Centerburg	Stuart Veatch	30	May 14	November 15
7	C	Knox	Mt. Vernon	Rex Spray	30	May 16	November 2
8	W	Darke	Union City	Dan Young	30	May 14	November 20
9	WC	Logan	DeGraff	David Bell	30	May 17	November 22
10	S	Ross	Greenfield	Charlie Eselgroth	30	May 16	November 21

**Table 1. Certified Organic Farms Participating in Statewide Performance Trials, Row Widths, Planting Dates, and Harvest Dates for the Corn Test Plots**

Farm #	Soil Type	Ph	P (ppm)	K (ppm)	Ca (ppm)	Mg (ppm)	OM (%)	Nitrate (ppm)
1	Nappanee silt loam	7.6	11	117	3750	753	3.3	7.1
2	Hoytville clay loam	6.4	18	108	1820	299	3.7	9.9
3	Mahoning silt loam	NA	NA	NA	NA	NA	NA	NA
4	Hoytville silt loam	7.2	56	120	1880	221	3.5	13

5	Blount silt loam	6.2	8	79	1670	282	3.1	17.1
6	Bennington silt loam	5.6	12	70	1130	251	2.7	12.3
7	Chili & Bogart silt loams	5.6	31	112	950	163	2.9	12.8
8	Miamian & Crosby silt loams	6.2	36	156	1760	433	3.1	26.3
9	Miamian silt loam	6.8	38	107	1600	415	3.1	13.3
10	Miamian silt loam	6.5	21	86	1690	305	3.1	14.4

NA= not available.

The corn varieties evaluated for the project included the following:

AgriGold A6447; yellow food grade with pink cob and 109-day maturity

Baldrige 611; a corn silage variety with yellow and white kernels and 112-day maturity

Bird ND-70; a nutrient dense corn, yellow grain, red cob with a 111-day maturity

Cash RS (OP); an open-pollinated variety, yellow grain, red cob with a 113-day maturity

Doebler 636XY; yellow grain with pink cob and 109-day maturity

French's 440; yellow grain with red cob and 108-day maturity

NC+Organics 4880; yellow grain with white cob and 110-day maturity

Pioneer 34K77; yellow food grade with white cob and 107-day maturity

Schlessman 550; 3-way cross, yellow grain with variable cob color and 108-day maturity

Steyer Seed 2340; yellow grain with red cob and 106-day maturity

White Cap (OP); an open-pollinated variety, yellow grain, white or pink cob, 85-day maturity

Yoders 510; yellow corn, white cob with 108-day maturity

## Methods

The study was conducted as a randomized complete block design using the 10 farms as blocks or replicates. Twelve varieties were selected by producers at a planning session to prepare for the study. These varieties included food-grade and feed-grade corn. Two open-pollinated varieties were added to the selections to respond to inquiries regarding their performance in Ohio. The varieties were randomized at each farm (one replication per location) in field length strips averaging nearly 1,200 feet in length with widths varying from 10 to 60 feet (4 rows to 24 rows), but averaging 24 feet. Farmers were instructed to use planting rates they normally use with the only seeding rate recommendations being for Baldrige 611 and Cash RS. Providers of the seed for those two varieties recommended rates should be kept close to 20,000 seeds per acre.

Producers were asked to record the date for each variety when half the plants had achieved the R1 growth stage (first leaf unfolded after emerging). Soil samples were taken approximately three to four weeks after planting, corresponding to what would be the time of sampling for sidedress nitrogen recommendations in conventional fields. Early season stand and height data were the averages of five replicates per variety per farm taken at soil sampling time.

The entire plot area was harvested at Farm No. 2, 3, 6, 7, 8, and 9 to reduce operator inconvenience. Farm No. 1 harvested the west three rows of six-row strips; Farm No. 10

harvested the center four rows of six-row strips. Farms No. 4 and 5 harvested ears of corn by hand using 40-row-feet and 80-row-feet samples respectively. All other data, other than yield, grain moisture, and test weight, were taken from the center two rows of each variety strip plot.

## Results

All but one of the fields sampled showed low levels of nitrate-nitrogen in the soil. These fields, had they been conventional fields, would have had nitrogen fertilizer applied to achieve optimum corn yields (e.g., Iowa recommendations would suggest additional N for nitrate levels below 21 ppm.). Farms No. 5 and 6 were below optimum P and K levels. Farm No. 1 was below optimum P and Farm No. 10 was below optimum K.

**Table 3. Early Season Growth and Development.**

Variety	Emergence <sup>1</sup> (%)	Days to Emergence <sup>2</sup>	Height 3-4 weeks after planting (in.)	Growth Rate - Emergence to 25th Day <sup>2</sup> (in/day)
Agrigold A6447	92.5 ab	9.1 a	6.8 cde	0.36 cd
French's 440	91.6 abc	9.9 bc	8.0 a	0.44 a
Doebler 636XY	92.2 ab	9.5 ab	7.4 abc	0.41 abc
NC+ Organics 4880	94.5 ab	10.1 bcd	6.5 de	0.37 bcd
Pioneer 34K77	91.7 abc	9.5 ab	6.9 bcd	0.37 bcd
Steyer 2340	84.4 cd	9.8 abc	7.6 ab	0.42 ab
Bird ND-70	89.3 bcd	9.8 abc	7.2 bcd	0.41 abc
Yoders 510	76.2 e	11.3 e	5.4 f	0.34 d
Baldrige 611	97.7 a	10.8 de	6.6 de	0.41 abc
Schlessman 550	84.3 cd	9.8 abc	6.2 e	0.37 bcd
White Cap (OP)	83.6 de	9.6 ab	6.9 bcd	0.37 bcd
Cash RS (OP)	91.2 abcd	10.4 cd	7.2 bcd	0.42 abc
Average all varieties	89.2	9.9	6.9	0.39
LSD (0.05)	7.6	0.7	0.75	0.055
CV %	9.6	7.5	11.9	14.5

<sup>1</sup> Planting rates across farms averaged 23,726 seeds per acre except White Cap at 22,692 seeds per acre and Baldrige and Cash RS both at 21,742 seeds per acre.

<sup>2</sup> Emergence date for each variety not collected at two farms.

Means followed by the same letter are not significantly different from each other.

**Table 4. Agronomic Performance of Corn at Harvest.**

Variety	Yield <sup>1</sup> (bu/A)	Harvest Population <sup>2</sup> (plants/A)	% of Seeding Rate <sup>2</sup>	Harvest Moisture (%)	Test Weight (lbs/bu)
Agrigold A6447	124.6 a	22,511 a	93.6 a	21.9 d	54.72 c
French's 440	118.8 ab	21,372 a	88.7 ab	19.6 ab	53.99 cde
Doebler 636XY	114.9 ab	21,657 a	89.8 a	20.0 b	52.64 fg
NC+Organics 4880	114.6 ab	21,056 ab	87.5 abc	20.7 bcd	53.40 ef
Pioneer 34K77	112.3 ab	21,407 a	88.8 ab	19.9 b	56.03 a
Steyer 2340	107.6 bc	21,093 ab	87.7 abc	20.2 bc	53.59 def
Bird ND-70	95.8 cd	21,852 a	91.1 a	19.2 ab	55.95 ab
Yoders 510	86.0 d	18,817 cd	78.3 d	21.5 cd	53.25 ef
Baldrige 611	61.2 e	19,718 bc	90.3 a	21.8 d	54.69 cd
Schlessman 550	59.9 e	19,533 bcd	81.0 d	19.8 b	54.84 bc
White Cap (OP)	49.4 ef	18,746 cd	81.8 cd	18.3 a	54.76 c
Cash RS (OP)	39.9 f	18,088 d	83.0 bcd	23.4 e	51.76 g
LSD(0.05)	15.2	1,570	6.4	1.5	1.13
CV%	18.3	8.2	7.8	8.3	2.3

<sup>1</sup> Yields adjusted to 15.0% grain moisture.

<sup>2</sup> Data missing from one farm.

Means followed by the same letter are not significantly different.

## Summary and Notes

Excessive rain in the northern areas of the state, particularly in the central and eastern sections, delayed planting for participating producers. Originally, plans were to have 14 certified organic farms participate in the trial; however, only 11 farms were able to plant corn successfully. The excessive moisture also hindered weed control after planting. The very wet conditions in June resulted in one less rotary hoe or cultivation pass than the producers normally plan. Not all the varieties in one planted field flowered normally, and the field was chopped for silage.

Organic grain producers regard early plant vigor as an important characteristic of varieties for their weed management programs. Normally, planting is done later than conventional farms to mechanically control early occurring weeds. Once the corn emerges, fast growth is desirable to compensate for late planting and to provide a canopy over weeds that emerge after planting. Of the varieties tested in this trial, the Agrigold hybrid was the quickest to emerge at 9.1 days after planting. This was not significantly different from the Bird, Doebler, Pioneer, Schlessman,

Steyer, and White Cap varieties. Of this early emerging group, Bird, Doebler, and Steyer had the greatest growth rate. French's was significantly taller at three to four weeks after planting than any other variety with the exception of Doebler and Steyer.

Organic producers have a difficult time attaining seed that is not commercially treated. For this trial, all of the varieties were treated, except for the two open-pollinated and Yoders. (Permission was attained from the International Office of the Organic Crop Improvement Association so that the certification status of participating producers would not be jeopardized by the use of chemically treated seed.) Interestingly, Yoders had an emergence of only about 80% of the seeding rate (Table 4), which was significantly lower than all other varieties with the exception of White Cap (OP). The Yoders and Baldrige varieties were significantly slower than all other varieties in number of days to emergence after planting. The other untreated variety, Cash RS, was in the mid-range of performance in regards to emergence.

Agrigold A6447 yielded significantly better than all the other varieties with the exception of French's 440, Doebler 636XY, NC+Organics 4880, and Pioneer 34K77. One drawback to the Agrigold A6447, however, was its tendency to be among the varieties that remain high in harvest moisture. The Agrigold variety's harvest moisture was significantly greater than three of the varieties that were equivalent in yield. Grain-drying costs are a significant management factor for certified organic producers. The open pollinated varieties used in this trial performed poorly, largely due to excessive lodging, stalk breakage, and barren plants relative to the other varieties. At several farm sites, the two open-pollinated lines were already lodging severely by silk time. The open pollinated varieties consistently yielded less than half of the yields obtained by the better performing hybrids.

In general, the varieties were grown under typical organic farm conditions with moderate weed pressure and marginally low soil fertility. The results are only for one season. This trial will be repeated next year to further confirm the performance of promising varieties.

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