Organic Corn Hybrid Trial, Iowa, 2007

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Introduction

With demand for organic corn increasing, variety selection is a key step in successful organic corn production. In 2007, research on growing pure stands or mixing organic corn hybrids was initiated in a joint project with Ohio State University and the University of Wisconsin with the overall goal of identifying organic corn varieties best suited for organic grain production in three distinct production regions of the Corn Belt. Activities focused on two objectives: 1) evaluate the agronomic performance and grain quality of organic certified varieties in pure stands, and 2) investigate potential benefits of mixing corn varieties to enhance grain yield and quality. Results of recent studies in South Dakota and Minnesota indicate that farmers can improve grain yield and protein content of corn without additional inputs by mixing varieties of different parentage and similar flowering date in the same field. Studies with various cereals have shown that varietal blends can enhance yield stability and help minimize yield losses from various foliar diseases.

Materials and Methods

Three treatments, replicated four times in a completely randomized design, consisted of two single varieties of organic hybrid corn seed (Blue River 66P32 and BR 71R52) and one mixture of the two varieties. Seed was planted on May 17, 2007, at 32,000 seeds/acre into a certified organic field at the Neely-Kinyon Farm in Greenfield, Iowa, that had received an application of hoophouse swine compost at 8 tons/acre on April 5, 2007. Corn plant population data were taken on June 6, 2007. Weeds were maintained with one rotary hoeing on May 31 and two cultivations on June 15 and 21. Weed ratings were taken on July 5 and September 26 by estimating the percent of cover provided by the corn plants versus the weeds. Corn borer evidence and presence data were taken on 12 corn plants from each treatment on July 5.

Ear and plant height data were taken on September 26. Corn stalk samples were taken on September 26 and brought to the Iowa State University Soils & Plant Analysis Laboratory for nitrate analysis. Ears were collected from the field on September 26 and data pertaining to ear length, ear diameter, ear weight, grain weight, tip damage, fungi presence, and earworm damage were taken the following week. Plots were harvested with a combine on October 29, 2007. Grain quality was determined by the ISU Grain Quality Analysis Lab, Ames, Iowa.

Results and Discussion

In 2007, there were no significant differences in plant populations among treatments (Table 1), averaging 23,833 plants/acre. Yields also were not significantly different among treatments, averaging 167 bu/acre (Table 1). The hybrid mix, while not statistically lower than the pure stands, averaged 146 bu/acre, compared to an average of 177 bu/acre between the two pure stands. Plant height, averaging 256 cm, was significantly greater in BR 66P32 compared to the average 245-cm height in the other treatments (Table 1). The height of the corn ear was similar between BR 66P32 and BR 71R52 (Table 1). In 2007, weed management was excellent in the organic corn trial. In the July 5 weed ratings, the hybrid mix appeared to have slightly higher weeds than the pure stands, averaging 10% weed coverage to the 2% of the pure stands (Table 2). In September, the highest weed rating was in the BR 71R52 plots, which

averaged only 8% weed coverage (Table 2). Corn borer larvae were not detected, but the hybrid mix plants showed evidence of corn borer damage in 8% of surveyed plants (Table 2).

Ear length averaged 22 cm, with ear width 17 cm, and no significant differences among the three treatments (Table 3). Average ear weight was 362 g/ear with grain weight 287 g/ear, and no significant differences among the three treatments (Table 3). Some ear tip damage (from insects/disease/mold), averaging 3 cm in length, was visible at harvest (Table 3). Of those ears exhibiting damage, 75% appeared to be of fungal origin in BR 66P32, 25% in BR 71R52, and no fungal damage detected in the hybrid mix ears. Earworm damage, however, was noted in 75% of hybrid mix ears, in 25% of BR 66P32 ears, and in 50% of BR 71R52 ears (Table 3). Moisture at harvest averaged 18% (Table 4) with no differences among treatments. Protein levels in harvested grain were greater at 8.2% in BR 66P32 compared to an average of 7.2% in the other two treatments (Table 4). Oil content averaged 3.8% and starch 61%, with no significant differences among the three treatments (Table 4). Overall, organic corn yields and grain quality were excellent at the Neely-Kinyon Farm. This trial will be repeated in 2008.

Acknowledgments

We would like to thank the USDA-SARE Program and Peter Thomison of Ohio State University for initiating and supporting this project. We also thank the Leopold Center for Sustainable Agriculture, the Wallace Foundation and the Practical Farmers of Iowa for their input and support. Thanks also go to Greg Lilly, Mark Rosmann, Kelly Bevins, Chelsea Jensen, Ximena Cibils, Francisco Rosas and Francisco Viteri; and to Maury Johnson of Blue River Hybrids for supporting us in this study.

Table 1. Corn stands and yields, Neely-Kinyon trial, 2007.

Treatment	Corn stands (plants/acre)	Ear height (cm)	Plant height (cm)	Corn stalk nitrates (ppm)	Corn yield (bu/acre)
66P32 & 71R52	22,917	101.42b	245.00b	983.63a	146.43
66P32	24,583	111.25a	255.75a	55.88b	179.49
71R52	24,000	104.75ab	245.42b	678.75ab	174.62
LSD (0.05)	NS	7.45	8.23	669.47	N/A

Table 2. Corn pest data, Neely-Kinyon trial, 2007.

Treatment	Weed rating July 5, 2007		Weed rating September 26, 2007		Corn borer %	Corn borer %
	Weeds	Corn	Weeds	Corn	Evidence	Presence
66P32 & 71R52	9.76a	91.08b	2.75b	97.25a	8.33	0.00
66P32	2.36b	97.64a	3.42b	96.58a	0.00	0.00
71R52	1.28b	98.72a	7.67a	92.33b	0.00	0.00
LSD (0.05)	4.00	3.73	3.62	3.62	NS	NS

Table 3. Post-harvest corn ear data, Neely-Kinyon trial, 2007.

Treatment	Ear length (cm)	Ear diameter (cm)	Ear wt with ear (g)	Grain weight (g/ear)	Tip damage length (cm)	Fungi presence (%)	Earworm damage (%)
66P32 & 71R52	21.88	17.25	343.68	259.00	2.98	0.0	75.0
66P32	23.18	17.40	395.73	320.70	3.03	75.0	25.0
71R52	22.60	17.30	347.50	280.45	2.95	25.0	50.0
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS

Table 4. Corn grain quality, Neely-Kinyon trial, 2007.

Treatment	Moisture %	Protein %	Oil %	Density %	Starch %
66P32 & 71R52	18.33	7.33b	3.78	1.28	61.05
66P32	17.40	8.20a	3.80	1.31	60.35
71R52	17.95	7.20b	3.70	1.28	61.30
LSD (0.05)	NS	0.59	NS	NS	NS