



Information

DEPARTMENT OF NATURAL RESOURCE SCIENCES AND LANDSCAPE ARCHITECTURE
COLLEGE PARK, MD 20742 – (301) 405-6241

Soybean and Corn Hybrid Variety Performance Under Organic and Conventional Systems

Dr. Robert Kratochvil
Extension Specialist-Grain and Oil Crops
University of Maryland

Mr. F. Ronald Mulford
Farm Manager
Lower Eastern Shore R&E Center-Poplar Hill

A research field was established at the Lower Eastern Shore Research and Education Center, Poplar Hill Facility in Wicomico County, Maryland during 2001 that allows for side-by-side evaluations of organic and conventional cropping systems. The organic plot areas within this field are managed so that all aspects of production comply with the National Organic Farming Standards. This field was used during 2005 to compare a number of select corn hybrids and soybean varieties for agronomic performance under these two systems.

Soybean Study

The soybean plots were preceded by a winter rye cover crop that was planted into corn residue following the 2004 corn harvest. On the organic plots the rye cover was killed by tilling it into the soil during early May 2005. The conventional plots also had the winter rye cover crop. These plots received a pre-emergence herbicide application that consisted of 1.5 pt A⁻¹ Dual 8E, 13 oz A⁻¹ Lorox DF, and 3 oz A⁻¹ Canopy XL. Soybean seed for the six varieties tested was organically derived seed obtained from two organic seed companies, Great Harvest Organics in Atlanta, IN and NC+ Organics in Lincoln, NE (now Blue River Organic Seed). The organic seed was planted in the conventionally managed plots. Soybean plots were planted June 13 at a seeding rate of 140,000 seeds A⁻¹ for both the organic and conventional systems. Each plot consisted of 4-20 foot rows spaced 24 inches apart that accommodated cultivation as the weed management mechanism in the organic system. Each variety was replicated 6 times in each system. Both organic and conventional systems were harvested October 31. Agronomic performance data that was collected is reported in Table 1.

Averaged over the six varieties tested, the conventionally managed system averaged 4 bu a⁻¹ more than the organically managed system, the same yield difference between these two systems that was observed during 2004. Three of the varieties produced significantly more when managed using conventional practices (Table 1). There was no instance where a variety produced more using organic management practices (Table 1). At harvest moisture content averaged 0.7% greater for the organically managed plots (Table 1). No significant maturity differences were observed between the two management systems (Table 1). For the second consecutive year, the top producing variety under both cropping systems was NC+ 3F43.

Assuming a price of \$5.25 bu⁻¹ for conventionally produced soybeans, the gross return for the conventionally produced 2005 crop would be approximately \$189 A⁻¹. The same gross return could be attained with organically produced soybeans at a price of \$5.91 bu⁻¹. Given that certified organic soybeans frequently receive premiums that are double the average price for conventionally managed soybeans, an organically managed system can prove highly profitable if the yield is only a few bushel less as has been observed in this systems comparison study during both 2004 and 2005.

Corn Study

Nine corn hybrids representing two seed companies (NC+ Organics and Doebler's Hybrids, Inc., Jersey Shore, PA) were evaluated in this component of the study. All seed used for both systems was organically derived. The seed that was planted into the conventional plots was treated with Poncho 250 prior to planting. The organic corn plot areas were planted to a winter cover crop of hairy vetch during fall 2005. The conventional plots were planted to a winter rye cover crop. Organic plots were prepared in the spring by disking the vetch twice to incorporate it into the soil during late April. The conventional plots received herbicide applications: 1) early pre-emergent—Roundup Weathermax @ 28 oz A⁻¹, Princep 4L @ 32 oz A⁻¹, and 2,4-D Ester @ 16 oz A⁻¹ (2 weeks prior to planting) and 2) pre-emergent—Roundup Weathermax @ 24 oz A⁻¹, MicroTech @ 1.5 qt A⁻¹, and Atrazine @ 15 oz A⁻¹ (just prior to planting). All corn plots were planted at a rate of 28,000 seeds A⁻¹ on April 27. Each plot consisted of 4-36 foot rows spaced 30-inches apart that accommodated cultivation as the weed management mechanism in the organic system. Each variety was replicated 3 times in each system. Fertility for the organic system consisted of one T A⁻¹ high calcium lime and 1.5 T A⁻¹ poultry litter that was applied prior to planting. It was assumed that the vetch cover crop supplied 90 lb a⁻¹ of nitrogen for the crop. The conventional plots received the same 1 T A⁻¹ high calcium lime. These plots received a pre-plant broadcast fertilizer application equivalent to 35-30-80-24 and a sidedress UAN application equivalent to 100 lb A⁻¹ N. It was assumed that these two different approaches to providing the crop's nutrients supplied equivalent amounts of nutrients. Weed management using cultivation within the organic system was very good during 2005 with relatively few weeds remaining after the final cultivation. The plots were harvested September 21. Agronomic performance data is reported in Table 2.

Averaged over the nine hybrids tested, the organically managed corn produced nearly 8 bu A⁻¹ more corn. There were two hybrids (NC+ 69R36 and Doebler's N509) that produced significantly more corn under the organically managed system than they did under conventional management (Table 2). NC+ 67M07 was the highest yielding hybrid for both systems (Table 2). The conventional system had approximately 2000 more plants A⁻¹ at harvest (averaged over the nine hybrids) (Table 2) indicating that system likely provided a seedling emergence and survival advantage. Harvest moisture content was 0.8% less for the organically managed corn. For all but one hybrid (NC+ 4771), there were no differences in lodging between the two systems (Table 2).

Profitability for both organically and conventionally produced corn is dependent upon market price for the commodity and input costs. Assuming a market price for conventional corn of \$2.25 bu⁻¹, the gross return for corn produced under that system during 2005 would be approximately \$356 A⁻¹. Since average yield for the organically produced corn was 8 bu A⁻¹ greater and since certified organic corn can receive a premium that can be nearly double the price of conventional corn, it is easy to see the profit potential that can be attained with an organic corn system when weed control is good and other stresses are minimal.

Acknowledgments:

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Seed Companies and Addresses

Company	Address
Doebler’s Hybrids, Inc.	202 Tiadaghton Avenue Jersey Shore, PA 17740 (570) 753-3210
NC+ Organics (Blue River Organic Seed as of summer 2005)	Box 327 Seward, NE 68434 (800) 370-7979
Great Harvest Organics	6803 East 276 th Street Atlanta, IN 46031 (317) 984-6685

Table 1. Performance of soybean varieties grown under organic and conventional management at Lower Eastern Shore Research & Education Center - Poplar Hill during 2005.

Variety	Yield Bu a ⁻¹		Harvest Moisture %		Maturity 100% Leaf Drop	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Great Harvest 292	35 a ¹	27 b	12.1	12.5	Sept. 24	Sept. 23
Great Harvest 397	35 a	34 a	11.7	12.6	Sept. 24	Sept. 25
NC+ 3F43	44 a	36 b	11.8	12.8	Sept. 24	Sept. 24
NC+ 25YP6	30 a	31 a	11.8	12.6	Sept. 22	Sept. 22
NC+ 36YP6	35 a	36 a	11.5	11.3	Sept. 26	Sept. 26
NC+ 41YP5	36 a	32 b	11.6	13.1	Sept. 28	Sept. 28
Mean	36 a	32 b	11.8	12.5	Sept. 25	Sept. 25
LSD _{0.10}	4.0		0.9		NS	

¹A variety that has its conventional and organic yields followed by the same letter is not significantly different for those two systems at p< or =0.10.

Table 2. Yield of corn hybrids grown under organic and conventional management at Lower Eastern Shore Research & Education Center - Poplar Hill during 2005.

Hybrid	Yield Bu A ⁻¹ @ 15.5%		Harvest Population Plants A ⁻¹		Harvest Moisture %		Lodging %		Test Weight Lb Bu ⁻¹	
	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.
NC+ 4771	155 a ¹	174 a	24845	22587	16.2	15.8	17	6	55.9	53.8
NC+ 67M07	185 a	179 a	24361	25813	20.0	18.5	10	6	53.2	53.3
NC+ 68F32	164 a	155 a	23877	21914	17.3	17.3	4	7	53.4	55.5
NC+ 69R36	145 b	169 a	23877	20812	19.6	19.2	4	8	53.2	55.9
NC+ 72H54	157 a	174 a	23071	18392	19.5	18.8	6	1	52.3	52.0
Doebler N509	127 b	162 a	21619	18553	16.8	14.8	2	1	53.8	54.4
Doebler N640	146 a	147 a	22587	18069	17.6	17.0	8	5	54.8	54.8
Doebler N659	166 a	163 a	20489	21457	20.1	18.9	7	4	49.4	50.3
Doebler N676	180 a	171 a	25329	24523	19.7	19.4	4	5	54.1	54.3
Mean	158 a	166 a	23340 a	21350 b	18.5 a	17.7 a	7 a	5 a	53.4 a	53.8 a
LSD _{0.10}	20.5		730		NS		7.7		NS	

¹A corn hybrid that has its conventional and organic yields followed by the same letter is not different for those two systems at p< or =0.10.