



# Information

DEPARTMENT OF NATURAL RESOURCE SCIENCES AND LANDSCAPE ARCHITECTURE  
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## **Soybean and Corn Hybrid Variety Performance Under Organic and Conventional Systems**

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A research field was established at the Lower Eastern Shore Research and Education Center, Poplar Hill Facility in Wicomico County, Maryland during 2001 that accommodates 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 2006 to compare a number of 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 2005 corn harvest. On the organic plots the rye cover was killed by tilling it into the soil during early May 2006. 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<sup>-1</sup> Dual 8E, 13 oz A<sup>-1</sup> Lorox DF, and 3 oz A<sup>-1</sup> Canopy XL. Soybean seed for the nine varieties tested was organically derived seed obtained from one organic seed company, Blue River Hybrids, Kelley, IA. The organic seed was also planted in the conventionally managed plots. Soybean plots were planted May 31 at a seeding rate of 140,000 seeds A<sup>-1</sup> for both the organic and conventional systems. Each plot consisted of 4-20 foot rows spaced 20 inches apart that accommodated cultivation for purposes of weed management in the organic system. Each variety was replicated 6 times in each cropping system. Both organic and conventional systems were harvested November 14. Agronomic performance data that was collected is reported in Table 1.

Averaged over the nine varieties tested, the conventionally managed system averaged slightly more than 4 bu a<sup>-1</sup> than the organically managed system. An approximate 4 bu a<sup>-1</sup> yield advantage for the conventional system, compared to the organic system, has been observed during each of the past three years. Five 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). For the other agronomic characteristics measured, test weight was superior for soybeans managed organically, while seed size was greatest for the conventional management system. Averaged over the nine varieties, protein content was better for the organic system while oil content was greater for the conventional system.

Assuming a price of \$7.50 bu<sup>-1</sup> for conventionally produced soybeans, the gross return for the conventionally produced 2006 crop would be approximately \$274.50 A<sup>-1</sup>. The same gross return could be attained with organically produced soybeans at a price of \$8.47 bu<sup>-1</sup>. 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 study during the past three years.

### **Corn Study**

Thirteen corn hybrids representing two seed companies (Blue River Hybrids and Doeblers 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 2006. 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 mid-April. The conventional plots received herbicide applications: 1) early pre-emergent—Roundup Weathermax @ 28 oz A<sup>-1</sup>, Princep 4L @ 32 oz A<sup>-1</sup>, and 2,4-D Ester @ 16 oz A<sup>-1</sup> (2 weeks prior to planting) and 2) pre-emergent—Roundup Weathermax @ 24 oz A<sup>-1</sup>, MicroTech @ 1.5 qt A<sup>-1</sup>, and Atrazine @ 15 oz A<sup>-1</sup> (just prior to planting). All corn plots were planted at a rate of 28,000 seeds A<sup>-1</sup> on April 26. Each plot consisted of 2-36 foot rows spaced 30-inches apart that accommodated cultivation as the weed management system for the organic system. Each variety was replicated 3 times in each system. Fertility for the organic system consisted of one T A<sup>-1</sup> high calcium lime and 1.5 T A<sup>-1</sup> poultry litter that was applied prior to planting. It was assumed that the vetch cover crop supplied 90 lb a<sup>-1</sup> of nitrogen for the crop. The conventional plots received the same 1 T A<sup>-1</sup> 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<sup>-1</sup> 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 2006 with relatively few weeds remaining after the final cultivation. The plots were harvested October 3. Agronomic performance data is reported in Table 2.

Averaged over the 13 hybrids tested, the conventionally managed corn produced 15 bu A<sup>-1</sup> more corn than the organically managed corn (Table 2). This was a different outcome than occurred in 2005 when the organic corn was nearly 8 bu A<sup>-1</sup> better. But, it was similar to the outcome in 2004 when conventional corn produced 25 bu A<sup>-1</sup> more. The top performing hybrid (averaged over the two systems) was Doeblers N659. This hybrid produced 10 bu A<sup>-1</sup> more than any other hybrid within the organic system. Harvest moisture content was more than 2% less for the organically managed corn. A lower harvest moisture content for organic corn was also found in 2005.

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 \$4.00 bu<sup>-1</sup>, the gross return for corn produced under that system during 2006 would be approximately \$508 A<sup>-1</sup>. A price of \$4.53 bu<sup>-1</sup> would have grossed the same amount for organically produced corn. 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 relatively 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
Blue River Hybrids	27087 Timber Road Kelley, IA 50134 800 370-7979

**Table 1. Performance of soybean varieties grown under organic and conventional management at Lower Eastern Shore Research & Education Center - Poplar Hill during 2006.**

Variety	Yield Bu A <sup>-1</sup>		Harvest Moisture %		Test Weight Lb bu <sup>-1</sup>		Seed Size Number lb <sup>-1</sup>		Protein %		Oil Content %		Quality Score 1-5	
	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.	Conv.	Org.
Blue River 34A7	39.7 a <sup>2</sup>	33.9 b	14.9	15.2	52	52.8 <sup>3</sup>	3480	3174	39.7	40.3	21	21	2.7	2.7
Blue River 32A7	42.7 a	36.4 b	14.6	14.8	53.3	53.6	3579	3393	40.1	40.6	22.7	20.4	3.3	2.7
Blue River 2FN93	33.0 a	32.1 a	13.7	14.2	48.9	49.7*	4702*	4227	42.9	42.6	20.5	20.7	3.7	4.3
Blue River 37Y7	40.8 a	36.0 b	14.8	14.2	52.3	52.9*	2909	3047	40.2	40.8	20.6	20.5	3	3.3
Blue River 30YP5	20.8 a	23.4 a	14.9	14.9	50.7	51.3*	3458*	2886	43.4	42.9	20.2	20.1	3	3
Blue River 43A7	47.5 a	39.8 b	14.3	14.5	53.4	53.8*	3675*	3341	40.5	40.7	20.3	20.3	1.3	1.3
Blue River 39A7	41.0 a	37.3 a	15.1	15	53.3	54.1*	3748*	3441	38.6	38.8	21.3	21.2	2	2
Blue River 3F43	36.9 a	29.8 b	14.7	14.3	51.9	52.6*	4252*	3918	41.5	41.8	20.4	20.1	3.7	3.7
Blue River 28YP5	26.8 a	23.3 a	14	14.3	52.8*	52.4	3975	3710	44	46	19.1	18.7	3.5	3.7
<b>Average<sup>1</sup></b>	<b>36.6*</b>	<b>32.4</b>	<b>14.5</b>	<b>14.6</b>	<b>52.1</b>	<b>52.6*</b>	<b>3753*</b>	<b>3459</b>	<b>41.2</b>	<b>41.6</b>	<b>20.7</b>	<b>20.3</b>	<b>2.9</b>	<b>3.0</b>

<sup>1</sup>An \* (asterisk) following either the conventional or organic treatment average for an agronomic characteristic indicates that the difference between the two systems for that characteristic is significant  $p < \text{or} = 0.10$ .

<sup>2</sup>A variety that has its conventional and organic yields followed by the same letter is not different for those two systems at  $p < \text{or} = 0.10$ .

<sup>3</sup>An \* (asterisk) in either the conventional or organic column for an agronomic characteristic for a variety indicates that a significant difference for that characteristic exists between the two cropping treatments at  $p < \text{or} = 0.10$ .

**Table 2. Performance of corn hybrids grown under organic and conventional management at Lower Eastern Shore Research & Education Center - Poplar Hill during 2006.**

Hybrid	Yield Bu A <sup>-1</sup> @ 15.5%		Harvest Moisture %		Test Weight Lb Bu <sup>-1</sup>	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Doeblers N676	127 a	108 a	21.5	20.4	54.3	54.4
Doeblers N659	135 a	139 a	22	18.3	52.2	53.3
Doeblers N509	120 a	109 a	18.8	16.9	55.2	56.6
Doeblers N531	104 a	121 a	20.7	17.7	53.5	55.4
Doeblers N640	123 a	91 b	20.8	20.5	54.8	53.5
Blue River 72H54	136 a	102 b	23	18.4	51.4	54
Blue River 68F32	123 a	110 a	20.8	17.4	53.2	56.3
Blue River 67M07	135 a	104 b	22.6	18.9	52.8	55.7
Blue River 69K34	142 a	108 b	21.5	20.6	52.1	52.9
Blue River 63H07	122 a	107 a	20.6	18.6	52	53.3
Blue River 55R32	123 a	118 a	21.4	18.1	52.7	54.4
Blue River 61R34	132 a	108 a	21.7	19.4	53.1	54.6
Blue River 66P32	135 a	129 a	20.4	20.3	54.3	54.5
<b>Average</b>	<b>127 a<sup>2</sup></b>	<b>112 b</b>	<b>21.2</b>	<b>18.9</b>	<b>53.2</b>	<b>54.5</b>

<sup>1</sup>A corn hybrid that has its conventional and organic yields followed by the same letter is not different for those two systems at  $p < \text{or} = 0.10$ .  $\text{LSD}_{0.10} = 29$  bu/acre.