

# Evaluation of Soybean Varieties for Certified Organic Production—Neely-Kinyon Trial, 2005

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## Introduction

Bean leaf beetles have continued to be a problem for organic tofu soybean producers throughout the Midwest because of the resulting seed staining, which can downgrade the quality of the soybeans at market. Beginning in 2000, we have evaluated soybean varieties at the Neely-Kinyon Farm in Greenfield, Iowa, for yield and seed staining under organic production methods.

## Materials and Methods

Varieties selected for the 2005 organic soybean variety trial included the following: IA3017, NC+2FN93, NC+3F43, Schillinger XP304, Schillinger 240F.Y, MRK0431CTB, and Pioneer 9305. Plots measuring 20 × 100 feet were laid out in a completely randomized block design with four replications of each variety. Soybeans were planted at a depth of 2 inches on May 27, 2005, at a rate of 205,000 seeds/acre. Weed control was established through the following procedures: rotary hoeing on June 15 and June 22; cultivation on June 17 and July 1; and walking plots on August 2. Plant stands were counted on June 17 and June 20. Insect sampling with an emphasis on bean leaf beetles occurred on June 17 and July 13, by sweeping across plants 20 times in each plot with a 15-in. diameter sweep net. Insects were placed in Zip-lock bags and transported in coolers to Iowa State University. Insects were frozen until enumeration in the laboratory. Soybeans were harvested on October 11. The percentage of stained soybeans was determined by counting

the number of stained soybeans in a 200-gram sample that was randomly collected from the harvest of each plot.

## Results and Discussion

On June 17 and June 20, stands in the Schillinger XP304 were significantly higher than any of the other varieties. Pioneer 9305 exhibited the next highest stand count, followed by NC+3F43, NC+2FN93, IA3017, MRK0431, and Schillinger 240F.Y (Table 1). There were no significant differences among varieties in grass and broadleaf weeds on June 27 (Table 1). Yields were excellent in 2005, ranging from 50.66 to 60.10 bu/acre. Pioneer 9305 yielded the highest and was significantly higher than all of the rest of the varieties. There were no significant differences in yield among all other varieties (Table 1). Bean leaf beetle populations were very limited with no significant differences among varieties on June 17 and July 13, ranging from 0 to 10 beetles per 20 sweeps (Table 2). Soybean aphids were not evident on any of the sampling dates. Seed staining was reduced in 2005, with NC+2FN93, NC+3F43, Schillinger XP304, Schillinger 240F.Y, MRK0431CTB, and Pioneer 9305 having less than 1.3% stained seeds (Table 2). IA3017 was included in the trial as an oil crop (low linolenic fatty acids) and was therefore excluded from the staining analysis (seeds are crushed into oil, where seed coat color is not an issue). Schillinger XP304 and Schillinger 240F.Y had significantly greater protein levels compared to other varieties at 37.38% and 36.93%, respectively (Table 3). This trend was followed by IA3017, NC+2FN93, and NC+3F43, which had significantly greater protein than MRK0431 and Pioneer 9305 (Table 3). Oil content in Pioneer 9305 (19.65%) was significantly greater than the other varieties (Table 3). MRK0431 and

IA3017 had the greatest fiber content, and MRK0431 had the greatest carbohydrate content (Table 3).

Pioneer Hi-Bred, Mark Seeds, Innovative Growers, and NC+ Organics for their support and seed trade. Appreciation is expressed to Charles Hurburgh and Glen Rippke of the ISU Grain Quality Lab for grain analysis.

### Acknowledgments

We would like to thank the Leopold Center for Sustainable Agriculture, Schillinger Seeds,

**Table 1. Soybean populations, weeds, and yields, 2005.**

Variety	Soybean plants/acre	Weeds/m <sup>2</sup> June 27, 2005		Yield (bu/acre)
		Grasses	Broadleaves	
IA3017	122,500cd	0.33	0.67	50.66b
NC+2FN93	132,333bc	0.08	2.33	54.50b
NC+3F43	134,000bc	0.00	3.50	54.97b
Schillinger XP304	165,667a	0.08	2.33	54.34b
Schillinger 240F.Y	102,083e	0.00	4.17	54.07b
MRK0431CTB	113,083de	0.08	3.67	53.67b
Pioneer 9305	136,000b	0.00	0.58	60.10a
LSD (0.05)	12.59	NS	NS	4.19

**Table 2. Bean leaf beetle, soybean aphid, beneficial insect populations and percentage of stained soybeans.**

Variety	Insect populations/ 20 sweeps						Stained soybeans (%)
	Beneficial insects	Pest insects	Bean leaf beetles	Beneficial insects	Pest insects	Bean leaf beetles	
IA3017	0.17	0.08	0.08	1.50	6.00	1.50	N/A
NC+2FN93	0.00	0.00	0.00	1.00	10.00	1.50	1.31
NC+3F43	0.08	0.00	0.00	1.25	7.75	3.50	1.17
Schillinger XP304	0.00	0.00	0.00	1.50	6.50	1.25	1.16
Schillinger 240F.Y	0.00	0.00	0.00	1.75	6.75	3.75	1.24
MRK0431CTB	0.00	0.08	0.08	3.00	6.00	1.50	1.32
Pioneer 9305	0.08	0.00	0.00	3.00	3.25	1.75	1.38
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS

**Table 3. Grain quality, organic soybean variety trial, 2005.**

Variety	Grain Quality (%)				
	Protein	Oil	Fiber	Carbohydrates	Moisture
IA3017	35.43b	18.70c	4.93a	22.95b	12.13b
NC+2FN93	35.30b	19.08b	4.75bc	22.88b	11.58a
NC+3F43	35.05b	19.13b	4.75bc	23.08b	12.58c
Schillinger XP304	37.38a	17.60d	4.70c	22.35c	12.58c
Schillinger 240F.Y	36.93a	18.38c	4.60d	22.10c	12.83cd
MRK0431CTB	33.83c	19.27b	4.90a	24.00a	13.10d
Pioneer 9305	34.38c	19.65a	4.78b	23.20b	12.15b
LSD (0.05)	0.65	0.34	0.06	0.37	0.42