

Evaluation of Soybean Varieties for Certified Organic Production—Neely-Kinyon Trial, 2003

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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 2003 organic soybean variety trial included the following: IA3011, IA3021, IA3022, Pioneer 9305, Schillinger 240F.Y, and Schillinger 290F.HP. Plots measuring 20 × 40 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 28, 2003, at a rate of 200,000 seeds/acre. Weed control was established through the following procedures: rotary hoe on June 6, 9, and 12; and cultivation on June 23, July 2, and July 14. Plant stands were counted on June 19, 2003. Bean leaf beetle sampling occurred on July 19, by sweeping across plants 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 9. 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 19, stands in the Schillinger 290F.HP plots were significantly greater than in the IA3011 and IA3022 plots (Table 1). Grass weeds were significantly greater in IA3022 plots compared with all other varieties, but there was no significant difference in broadleaf weed number (Table 1). Yields in the IA varieties (IA3011, IA3021, and IA3022) were significantly greater than the Schillinger 290F.HP variety, averaging 36 bushels/acre. Bean leaf beetle populations were reduced in 2003, and on July 19, no beetles were found in IA3022, compared with an average of 2 beetles per 8 sweeps in the other varieties (Table 2). There was a trend toward lower seed staining in the Schillinger varieties, but because of low bean leaf beetle populations and low seed staining (average of 2.5%), there was no significant difference between varieties in overall seed staining in 2003 (Table 2).

Grain quality varied among varieties, with the highest protein level in the Schillinger290F.HPvariety, averaging 42%, the highest level of any soybean at the Neely-Kinyon Farm in 2003 (Table 3). Oil content in the IA3021 variety (19%) was significantly greater than the other varieties. Overall, the organic soybean varieties performed well at the N-K Farm in 2003, despite the decrease in yield due to drought conditions in August and September.

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Table 1. Soybean populations and yield, 2003.

Variety	Soybean plants/acre	Weeds/m ²		Yield (bu/acre)
		Grasses	Broadleaves	
IA3011	71,222a	3.0b	105.9	34.48ab
IA3021	123,750bcd	1.0b	68.3	34.17ab
IA3022	113,375b	12.0a	113.9	37.79a
Pioneer 9305	117,750bcd	4.0b	109.9	30.79bc
Schillinger 240F.Y	120,750bcd	2.6b	106.6	32.71b
Schillinger 290F.HP	130,250d	4.3b	87.9	27.30c
LSD (0.05)	14,333	6.42	NS	4.79

Table 2. Bean leaf beetle populations and percentage of stained soybeans, 2003.

Variety	Bean leaf beetles/8 sweeps	Stained soybeans (%)
IA3011	0.25ab	3.1
IA3021	0.50ab	2.7
IA3022	0.00b	2.1
Pioneer 9305	0.25ab	2.8
Schillinger 240F.Y	1.00a	2.0
Schillinger 290F.HP	0.25ab	2.0
LSD (0.05)	0.80	NS

Table 3. Grain quality, organic soybean variety trial, 2003.

Variety	Protein	Oil	Fiber	Carbohydrates	Moisture
IA3011	38.60b	18.64ab	4.45c	20.31d	10.16a
IA3021	37.65cd	19.00a	4.50c	20.85c	10.18a
IA3022	38.14bc	18.40b	4.53bc	20.94c	9.88ab
Pioneer 9305	36.60f	18.53b	4.68a	22.20a	8.48c
Schillinger 240F.Y	37.28de	18.33b	4.60ab	21.80b	9.85b
Schillinger 290F.HP	41.80a	16.68c	4.33d	19.20e	9.83b
LSD (0.05)	0.65	0.43	0.08	0.33	0.30