

2003

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Recommended Citation

Delate, Kathleen; Friedrich, Heather; and Burcham, Robert, "Evaluation of Soybean Varieties for Certified Organic Production--Neely-Kinyon Trial, 2002" (2003). *Iowa State Research Farm Progress Reports*. 1436.

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Abstract

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 evaluated soybean varieties at the Neely-Kinyon Farm in Greenfield, Iowa, for yields and percentage staining under organic production methods.

Keywords

Horticulture, Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences | Horticulture

Evaluation of Soybean Varieties for Certified Organic Production □ Neely-Kinyon Trial, 2002

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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 evaluated soybean varieties at the Neely-Kinyon Farm in Greenfield, Iowa, for yields and percentage staining under organic production methods.

Materials and Methods

Varieties selected for the 2002 organic soybean variety trial included the following: IA3006, IA3012, Pioneer 9305, Schillinger 240F.Y, Schillinger 290F.HP, and Vinton 81. Plots measuring 20 □ 80 feet were laid out in a completely randomized block design. Soybeans were planted at a depth of 2 inches on May 30, 2002, at a rate of 220,000 seeds/acre. Weed control was established through the following procedures: June 14, cultivation; June 17, rotary hoe and walking; July 1, cultivation; and July 22, walking. Plant stands were counted on June 19. Bean leaf beetle sampling occurred on July 29, by sweeping across plants in each plot with a 15-in.-diameter sweep net. Insects were placed in plastic bags and transported in coolers to Iowa State University. Insects were frozen until they were counted in the laboratory. Soybeans were harvested on October 19, 2002. 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

Despite the preference for Vinton soybeans by Japanese organic tofu manufacturers, Vinton 81 soybeans have numerous problems in southwest Iowa. There was a significantly lower plant population in Vinton 81 compared with all other varieties (Table 1). The highest plant population was obtained with the Schillinger 290F.HP variety (Table 1). The highest yield was obtained with P9305 (50 bushels/acre), with the lowest yielding variety being Vinton 81 (33 bushels/acre). Iowa State varieties were equal to the Schillinger varieties, averaging 42–45 bushels/acre. There were no significant differences in bean leaf beetle populations among varieties, but a significantly lower percentage of stained soybeans were found in Schillinger 240F.Y compared with all other varieties (Table 2). The Schillinger 290F.HP soybeans contained the highest level of protein (43%), followed by IA3006 (38%) and Schillinger 240F.Y (37.5%) (Table 3). We will continue to evaluate in 2003 the effects of genotype (through variety trials) and environment (through organic treatment trials) in mitigating the bean leaf beetle problem in the Midwest. Producing organic soybeans of higher quality than the Vinton 81s will help gain acceptance from Japanese tofu manufacturers.

Acknowledgments

We would like to thank the Leopold Center for Sustainable Agriculture, the Wallace Foundation, Noreen Wantate, Andrea McKern, Jorge Alvaro, Katie Schroeder and Wade Boehm for their support and help on production and analytical aspects of this project. We also thank Heartland Organic Marketing Cooperative, Schillinger Seeds, Pioneer Hi-Bred, and NC+ Organics for their support and seed trade. Appreciation is expressed to Charles Hurburgh and the ISU Grain Quality Lab for grain analysis.

Table 1. Soybean populations and yield, 2002.

Variety	Soybean plants/acre	Yield (bu/acre)
Pioneer 9305	161,417 ± 2,653 b	50.04 ± 1.06 e
Vinton 81	129,333 ± 2,991 a	33.93 ± 0.79 a
IA3006	168,167 ± 6,357 b	42.78 ± 1.69 c
IA3012	162,500 ± 5,308 b	47.89 ± 0.99 de
Schillinger 240F.Y	164,250 ± 4,747 b	45.27 ± 0.65 cd
Schillinger 290F.HP	178,500 ± 6,117 c	39.39 ± 0.42 b
LSD 0.05	13,857	3.02

Table 2. Bean leaf beetle populations and percentages of stained soybeans, 2002.

Variety	Bean leaf beetles/20 sweeps	Stained soybeans (%)
Pioneer 9305	31.75 ± 4.61	7.13 ± 1.10 b
Vinton 81	19.50 ± 1.85	8.88 ± 0.59 b
IA3006	32.00 ± 3.11	8.05 ± 0.88 b
IA3012	34.00 ± 6.52	7.53 ± 0.76 b
Schillinger 240F.Y	32.00 ± 7.71	2.90 ± 0.14 a
Schillinger 290F.HP	27.50 ± 2.25	8.93 ± 0.53 b
LSD 0.05	NSD	2.17

Table 3. Grain quality, organic soybean variety trial, 2002.

Variety	Protein	Oil	Fiber	Carbohydrates	Moisture
P9305	36.13 b	19.08 c	4.4 c	22.4 c	13.6 a
Vinton 81	36.43 b	18.78 c	4.43 cd	22.38 c	14.43 d
IA3006	38.47 d	17.68 b	4.11 a	21.74 b	13.61 ab
IA3012	34.58 a	19.75 d	4.48 d	23.2 d	13.88 b
Schillinger 240F.Y	37.54 c	17.94 b	4.35 c	22.18 bc	14.14 c
Schillinger 290F.HP	43.4 e	15.5 a	4.25 b	18.85 a	13.38 a
LSD 0.05	0.75	0.45	0.08	0.45	0.26