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Evaluation of Soybean Varieties Resistant to Soybean Cyst Nematode

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Abstract
Use of resistant soybean varieties is a very effective strategy for managing soybean cyst nematode (SCN), and numerous SCN-resistant soybean varieties are available for Iowa soybean growers. Each year, public and private SCN-resistant soybean varieties are evaluated in SCN-infested fields in Iowa by Iowa State University personnel. The research described in this report was performed to assess the agronomic performance of SCNresistant soybean varieties and to determine the effects of the varieties on SCN numbers or population densities.

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Evaluation of Soybean Varieties Resistant to Soybean Cyst Nematode

RFR-A1141

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Introduction

Use of resistant soybean varieties is a very effective strategy for managing soybean cyst nematode (SCN), and numerous SCN-resistant soybean varieties are available for Iowa soybean growers. Each year, public and private SCN-resistant soybean varieties are evaluated in SCN-infested fields in Iowa by Iowa State University personnel. The research described in this report was performed to assess the agronomic performance of SCN-resistant soybean varieties and to determine the effects of the varieties on SCN numbers or population densities.

Materials and Methods

Plots were four 17 ft-long rows spaced 30 in. apart and were planted at 10 seeds/ft, with four replications per variety. All plots were end trimmed to a length of 14 ft on September 8. A variety was considered mature when 95 percent of the pods had turned brown. Maturity was recorded as the number of days after August 31 that a variety was considered mature. Just prior to harvest, average plant height and lodging (1 = all plants fully erect, 5 = all plants flat) were assessed in each plot. For each location, the center two rows of each four-row plot were harvested with a plot combine, total seed weight per plot and seed moisture were determined, and total plot seed weights subsequently were converted to bushels/acre. Resistant varieties and susceptible check varieties are grouped separately and are listed in the report in order of descending yield.

At the beginning of the growing season, plots were sampled for the presence of SCN. Soil samples, consisting of ten 1-in. diameter, 6- to 8-in. deep soil cores, were collected from the center 14 ft of the center two rows of each plot immediately after planting. SCN cysts were extracted from each soil sample, and SCN eggs were extracted from the cysts and counted. SCN egg population densities also were determined for each plot at the end of the growing season in an identical manner.

All varieties also were field tested for tolerance to iron deficiency chlorosis (IDC). Each variety was planted in a hill plot consisting of five seeds/hill, with two replications per variety, at two high pH field locations. Notes were taken for IDC symptoms at each location approximately four weeks after planting and again at five weeks after planting. Varieties were rated on a scale of 1 to 5 with a 1 indicating no symptoms of IDC present and a 5 indicating plant death due to IDC. The scores from each location then were averaged together and an overall rating was assigned to each variety.

Results and Discussion

The results of the experiments convincingly illustrate the benefits of utilizing SCN-resistant soybean varieties for management of this important soybean pest. Most of the soybean varieties with SCN resistance had greater yields than susceptible varieties, and end-of-season SCN population densities were significantly greater in plots where susceptible varieties were grown relative to plots planted with resistant varieties. This work was funded, in part, by soybean checkoff funds from the Iowa Soybean Association.

Table 1. Agronomic performance and SCN reproduction data of glyphosate-resistant soybean varieties.[1]

Brand	Variety	Relative maturity	Resistance	Iron chlorosis score (1-5)[5]	Maturity date	Height (in.)	Lodging (1-5)[6]	Yield (bu/acre)	Yield rank	SCN (/100cc soil)[2]	RF[3]
Pioneer	93M61	3.5	PI 88788	2.5	35	35.0	1.8	56.3	1	1,100	0.3
Lewis	302R2	3.0	PI 88788	1.9	31	32.3	1.6	51.1	2	1,725	1.1
Syngenta	S39-U2 Brand	3.9	PI 88788	1.9	36	32.3	1.8	50.9	3	525	0.1
Willcross	2350NS	3.5	PI 88788	2.3	33	35.5	2.0	50.5	4	900	0.3
ASGROW	AG3731	3.7	PI 88788	2.5	34	37.5	1.9	50.3	5	1,350	0.7
Pioneer	93Y40	3.4	PI 88788	2.0	32	31.3	1.8	50.3	5	450	0.1
Stine	3522-4	3.5	PI 88788	2.0	34	34.3	2.0	49.5	7	1,800	1.0
MERSCHMAN	WASHINGTON 1238RR	3.8	PI 88788	2.4	35	32.8	2.0	49.2	8	2,400	0.5
LATHAM	L3268R2	3.2	PI 88788	2.3	30	34.3	1.5	48.5	9	1,125	1.1
Syngenta	S35-T9 Brand	3.5	PI 88788	2.3	35	40.0	2.0	47.9	10	1,175	0.4
ASGROW	AG3432	3.4	PI 88788	2.3	34	33.8	1.9	47.9	10	3,650	1.6
Jacobsen	J819NR2	2.9	PI 88788	1.9	31	32.3	1.5	47.7	12	1,750	0.5
NuTech - G2	7342	3.4	PI 88788	2.3	35	29.5	1.6	46.9	13	1,075	0.7
Syngenta	S34-N3 Brand	3.4	PI 88788	1.7	32	33.8	1.6	46.8	14	2,400	1.2
Champion	282NR	2.8	PI 88788	1.8	29	30.5	1.5	46.7	15	1,400	0.5
Lewis	351R2	3.5	PI 88788	2.1	32	34.3	1.5	46.6	16	1,575	0.3
Kruger	K2-3402	3.4	PI 88788	2.2	32	34.3	1.8	46.5	17	1,200	0.6
FS HiSOY®	HS 34A12	3.4	PI 88788	2.2	32	31.0	1.9	46.1	18	500	0.1
LATHAM	L2711R2X	2.7	PUSCN 14	1.9	27	35.8	2.0	45.9	19	1,800	0.8
Stine	37RC82	3.7	PI 88788	2.3	33	31.3	1.6	45.8	20	1,175	0.5
LATHAM	L3385R2	3.3	PI 88788	1.9	31	32.3	1.5	45.6	21	850	0.3
Dairyland Seed	DSR-3736/R2Y	3.7	PI 88788	2.4	35	29.8	1.5	45.6	21	2,225	0.9
NuTech - G2	7290	2.9	PI 88788	1.8	30	30.0	1.6	45.6	21	2,125	1.0
Lewis	392R2	3.9	PI 88788	2.0	36	35.0	2.0	45.2	24	2,050	0.5
NuTech - G2	7332	3.3	PI 88788	2.4	32	31.5	1.5	45.2	24	2,525	0.9
Champion	29R32N	2.9	PI 88788	2.0	30	31.8	1.5	44.9	26	1,500	0.6
	Mean	3.4	-	2.2	32	32.3	1.7	45.3	-	1,797	0.8
	LSD[4] (P = 0.05)	-	-	-	-	3.5	0.3	7.7	-	NS	-
	LSD[4] (P = 0.10)	-	-	-	-	3.0	0.2	6.4	-	2,292	-
Pioneer	*93M11*	*3.1*	*None*	*1.7*	*31*	*29.3*	*1.5*	*39.1*	*51*	*19,875*	*6.0*
ASGROW	*AG3240V*	*3.2*	*None*	*2.4*	*31*	*30.0*	*1.5*	*35.5*	*52*	*13,950*	*4.5*
Syngenta	*S36-B6 Brand*	*3.6*	*None*	*2.0*	*35*	*29.8*	*1.6*	*34.0*	*53*	*13,425*	*3.9*
	Mean	3.3	-	2.0	32	29.7	1.5	36.2	-	15,750	4.8

[1]Values presented in tables are means. Varieties are listed in decreasing order of yield. Italicized entries are widely grown. SCN-susceptible varieties entered by Iowa State University for comparison purposes. Due to space constraints, only the highest yielding varieties are shown here, although the statistics are from the entire experiment. Non-glyphosate-resistant varieties were evaluated in an adjacent experiment at this same location. The complete results of both experiments are available online at www.isuscnvarietytrials.info.

[2]Final SCN egg population density (eggs/100 cc soil); there were no significant differences among initial SCN population densities; initial SCN population 2,668 eggs/100 cc soil; HG Type 0 (2.0% on PI 88788, 0.0% on Peking).

[3]Average final SCN egg population density/average initial SCN egg population density.

[4]Least significant difference: values are from Fisher's least significant difference test, NS = no significant differences among the varieties.

[5]Iron chlorosis score 1–5; 1 = no symptoms, 5 = dead plant.

[6]Lodging 1–5 score; 1 = all plants erect, 5 = all plants flat.