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PERFORMANCE OF SOYBEAN GENOTYPES OF MATURITY GROUP VI AND LATER MATURITIES IN PUERTO RICO

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ABSTRACT

The objective of this work was to evaluate soybean [(Glycine max (L.) Merr.)] genotypes adapted to tropical conditions for their potential commercial use in Puerto Rico. Twelve experimental lines and three cultivars of Maturity Group VI and later maturities were planted at three locations in two planting seasons during 1988 and 1989. A randomized complete block design with four replications was used at each planting. Data were collected on dates of flowering and maturity, plant height and seed yield. Significant differences in seed yield among entries were observed between years and planting dates and locations. None of the experimental lines were superior in yield to the cultivars used as checks. The importance of continued variety and experimental line evaluation for Puerto Rico is discussed.

INTRODUCTION

Soybean [Glycine max (L.) Merr.] cultivars are grown in the tropics for commercial seed production in an array of different environments (Pasaribu and McIntosh, 1985; Whigham, et al., 1978). At present, soybeans are not planted for commercial production in Puerto Rico. However, research results indicate that they could become an important cash crop in the near future (Cianzio, et al., (in press); Hartwig, 1970; Silva, et al., 1972).

Testing of soybean genotypes under local conditions is essential if farmers are to be provided with information that will help in the selection of cultivars best adapted to different locations and agronomical requirements. The objective of the work herein reported was to evaluate genotypes adapted to tropical conditions for their potential commercial use in Puerto Rico.

MATERIALS AND METHODS

Three cultivars, 'UFV-1', 'Jupiter-R', and 'Cristilina', and 12 experimental lines from the University of Florida soybean breeding program were planted in Puerto Rico during 1988 and

1989. The cultivars belong to Maturity Group (MG) VI and the experimental lines belong to MG VI and later maturities. Three locations were used in the evaluation: the Isabela farm of the Tropical Agriculture Research Station, a private farm near the Lajas Agricultural Experiment Substation of the University of Puerto Rico, and a Land Authority farm in Santa Isabel. At Isabela, the soil is a Coto clay (Tropeptic Eutrustox, clayey, kaolinitic, isohyperthermic), at Lajas, a Fraternidad soil (Udic Chromustert, clayey, montmorillonitic, isohyperthermic), and at Santa Isabel a San Anton soil (Cumulic Haplustolls fine-loamy, mixed, isohyperthermic).

Experiments were conducted in two planting seasons, January and July, and were sown during the first half of the month in both years, 1988 and 1989. A randomized complete block design with four replications at each planting season and location was used.

Plots consisted of three rows, 15 feet long (4.5 m), with a width of 32 inches (0.8 m) between rows. Seeding rate was 8 seeds/ft (0.3 m). Supplemental irrigation and standard practices of weed and insect control were used for every planting and location as needed during the growing seasons. Fertilization was applied to provide near-optimum growing conditions. Lines were planted in the soil after a commercial inoculant had been placed on the bottom of the furrow at the recommended rate. A 13-foot (4 m) central section of the middle row was harvested.

Data were collected from each plot and every planting. Date of flowering was recorded on the day when all plants in the plot had flowers at every node on the main stem. Maturity date was assigned when 95% of pods on the plants had reached their mature pod color. Plant height in cm was measured at maturity and recorded from the base to the tip of the plant. Seed yield was measured on a plot basis as g/plot and converted to kg/ha.

Standard analyses of variance were calculated for each variable in individual plantings and combined across locations and years. Least significant differences (L.S.D.) were also calcualted for the comparison among experimental lines and cultivars.

RESULTS

For all traits, there were significant differences between years and planting seasons, and among locations and entries. The two- and three-way interactions between and among these main effects were also significant.

Average seed yield differed considerably among the three locations (Table 1). The overall yields at Lajas and Isabela averaged over the 15 genotypes tested were more than double

that at Santa Isabel. Differences among locations were also observed for the other traits recorded. In general, the environment at Santa Isabel seemed to be the least favorable for soybean production. Rain distribution was irregular compared to the average conditions generally prevailing at the site. A drought occurred during both years that also affected the availability of water for irrigation.

Table 1. Average number of days to flowering, to maturity, and to harvest, plant height, and seed yield per location of three cultivars and 12 experimental lines of soybean grown in two planting seasons during two years at three locations in Puerto Rico.

	Lajas	Isabela	Santa Isabel
Days to flowering	57	52	48
Days to maturity	124	115	100
Days to harvest	135	127	113
Plant height (cm)	67	60	37
Seed yield (kg/ha)	1,575	1,437	538

Differences in averages were observed for the other traits during years and planting seasons and the interaction between these two factors was due in part to different climatic conditions (Table 2). Rainfall distribution was variable and inconsistent at all locations during the testing. In general, plants required more days to flower and were taller in the July plantings than in those of January. Variation in photoperiod duration between the two planting seasons may partially explain the differences observed for these traits. Plantings were exposed to longer days in July than in January. Soybeans are photoperiod sensitive and are classified as long-night species (Allard and Garner, 1940). When the plants are exposed to longer days, flowering is delayed.

There were significant differences among the 15 genotypes for all traits measured (Table 3). A wide range in yield was observed. Mean seed yield of lines varied from 954 to 1552 kg/ha. The three cultivars had yields that were higher to the experimental lines. However, the line F82-7614, had yield that was similar to the cultivar 'Jupiter-R' and 'UFV-1'. The line was three days later in maturity than 'UFV-1' and six days earlier than 'Jupiter-R'.

Table 2. Average number of days to flowering, to maturity, and to harvest, plant height, and seed yield per year and season of three cultivars and 12 experimental lines of soybean grown in two planting seasons during two years at three locations in Puerto Rico.

	1988		1989	
	January	July	January	July
Days to flowering	48	54	52	56
Days to maturity	100	120	116	117
Days to harvest	117	129	127	127
Plant height (cm)	42	62	50	64
Seed yield (kg/ha)	967	1,567	1220	975

Table 3. Average number of days to flowering, to maturity, and to harvest, plant height, and seed yield of individual cultivars and experimental lines of soybean grown in two planting seasons during two years at three locations in Puerto Rico.

Genotypes	Number of days to:			Plant height	Seed yield
	Flowering	Maturity	Harvest		
	----------days---------			--cm--	--kg/ha--
'UFV-1'	46	100	116	41	1404
'Jupiter-R'	54	109	123	61	1303
'Cristilina'	51	115	128	56	1552
F79-6429	45	107	120	38	1216
F82-7137	58	120	131	61	1077
F82-7145	61	122	132	62	993
F82-7614	48	103	116	41	1344
F83-1415	56	122	133	70	1225
F83-5463	48	116	127	44	1219
F83-5545	60	123	132	65	1176
F84-5114	42	99	111	43	1005
F84-5944	43	98	111	44	1059
F85-2276	81	123	134	66	1013
F85-4085	58	121	132	62	1167
F85-7356	52	118	131	61	954
LSD (0.05)	1	3	2	3	141

CONCLUSIONS

The experimental material did not outyielded the cultivars used as checks. If, in the near future, interest is developed in

planting soybeans as a commercial crop in Puerto Rico, the cultivars evaluated in these tests would provide adequate yields. Seed of these cultivars could be readily supplied to farmers for commercial plantings. However, the results of the evaluations conducted over years, locations and planting seasons indicate the importance of extensive testing before any material is made available to farmers for commercial production. Variations observed in yield and other agronomic traits indicate the need for continued variety testing service if soybeans become a crop of economic importance in Puerto Rico. These evaluations will help in the identification of superior genetic material for release as cultivars and for use in breeding programs to develop improved genotypes.

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