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Influence of Spacing on the Yield and Yield Components of Soybean (*Glycine max* (L.) Merrill.)

BY

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ABSTRACT

Spacing trials with soybean showed that (i) the yield levels were significantly influenced by the spacing of plants (ii) closer spacings produced taller plants, (iii) wider spacings increased the number of branches and pods as well as pod and grain yield per plant (iv) the total grain yield per unit area was increased under closer spacing due to the rise in plant population and (v) a very close spacing of 30 cm between rows and 5 cm between plants within the row was found to be the optimum for realising the maximum grain yield per unit area.

INTRODUCTION

The introduction of soybean in Tamil Nadu would provide a new and rich source of protein in the diet of the people, since it has a protein content of about 42 per cent and an oil content of 21 per cent. The trials conducted at Coimbatore indicated that an economic soybean selection E. C. 39821 has a good scope for large scale cultivation in this State. Soybean is known to be responsive to spacing but specific information on the responsiveness of this particular variety is lacking. Hence, an experiment to assess the effect of different inter-row and intra-row spacings on the yield and other important characters of soybean E.C. 39821 was conducted during 1970 and 1971 at the Pulses Unit, Department of Agricultural Botany, Tamil Nadu Agricultural University, Coimbatore and the results are reported in this paper.

MATERIALS AND METHODS

The trials were conducted under irrigation in a split plot design with three inter row spacings viz., 30, 45 and 60 cm as main-plot treatments and four intra-row spacings viz., 5, 10, 15 and 20 cm as sub-plot treatments replicated three times. The soil was red loam with a pH of 8.1, low in N and K and very low in P. The plot size was 3.6 M long and 1.8 M broad and all the plots were uniformly fertilized at the rate of 50 kg N, 100 kg

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P_2O_5 and 25 Kg K_2O per hectare as basal dressing. Seeds of soybean E.C. 39821 duly inoculated with the appropriate *Rhizobium* were dibbled 2.5 cm deep, according to the spacings of the treatments. Irrigation, hoeing and plant protection operations were done uniformly to all the treatments. On

TABLE 1. Effect of spacing on the yield and yield components of soybean

Treatment	Height of plant (cm)			Number of branches per plant			Number of pods per plant		
	1970	1971	Mean	1970	1971	Mean	1970	1971	Mean
Inter row spacing									
30 cm	51.1	52.0	51.6	2.4	2 5	2.5	42.8	39.0	40.9
45 ,,	47.7	47.9	47.8	3.7	3.8	3.7	58.7	44.8	51.8
60 ,,	43.9	44.2	44.1	3.9	3.8	3.9	60.9	48.9	54.7
'F' Test	**	**	**	**	**	**	**	**	**
S. E.	0.81	1.02	0.65	0.14	0.19	0.11	3.5[illegible]	1.13	1.8[illegible]
C. D.	3.18	3.99	2.14	0.55	0.75	0.36	13.8[illegible]	4.44	6.0[illegible]
Intra row spacing									
5 cm	54.9	58.0	56.4	2.0	2.0	2.0	36.9	29.6	33.3
10 ,,	51.0	50.1	50.5	2.9	3.1	3.0	50.9	36.9	43.9
15 ,,	43.8	43.6	43.7	3.8	3.8	3.8	62.0	52.1	57.1
20 ,,	40.7	40.5	40.6	4.6	4.7	4.7	66.1	58.5	62.3
'F' Test	**	**	**	**	**	**	**	**	**
S. E.	1.22	1.04	0.80	0.21	0.14	0.12	3.6[illegible]	2.65	2.3[illegible]
C. D.	3.62	3.09	2.10	0.62	0.42	0.37	10.8[illegible]	7.88	6.4[illegible]
Main plot × sub plot interaction									
'F' Test	N. S.	N.S.	N. S.	N. S.	N.S.	**	N.S.	N.S.	N.S

Table 1 [continued]

Treatment	Pod yield per plant (mg)			Grain yield per plant (mg)			Grain yield per plot (g)		
	1970	1971	Mean	1970	1971	Mean	1970	1971	Mean
Inter row spacing									
30 cm	152.5	123.7	138.1	99.1	77.8	88.5	827.3	671.1	749.2
45 ,,	221.8	141.4	181.6	145.7	87.0	116.4	722.3	519.5	620.9
60 ,,	230.9	173.7	202.2	172.4	98.6	135.5	536.6	505.9	521.2
'F' Test	NS	**	**	**	**	**	NS	NS	
S. E.	19.4	3.70	9.91	8.00	3.30	4.33	75.10	60.86	48.7
C. D.		14.52	32.31	32.40	12.94	14.11	...	...	...
Intra row spacing									
5 cm	128.2	98.0	108.1	77.8	58.0	67.9	870.2	686.8	778.
10 ,,	184.7	120.9	152.8	128.7	74.7	101.7	804.4	613.0	708.7
15 ,,	232.6	174.1	203.3	168.1	101.2	134.7	582.9	590.8	576.9
20 ,,	261.4	192.1	226.7	181.7	117.3	149.5	524.0	372.4	448.2
'F' Test	**	**	**	**	**	**	**	**	**
S. E.	14.27	8.50	8.23	7.07	5.50	4.46	53.30	58.20	38.30
C. D.	43.39	25.25	23.87	21.01	16.25	12.85	143.42	172.90	110.00
Main plot × sub plot interaction									
'F' Test	NS	NS	NS	**	NS	**	NS	NS	NS

** Significant at one per cent level
* Significant at five per cent level
N. S Not Significant

maturity, five plants from each plot were picked up at random and studied for the important quantitative characters.

RESULTS AND DISCUSSION

It may be seen that with closer inter and intra-row spacings, the plants

are taller than those under wider spacings (Table 1). The treatment effect was significant in both the years and also in the pooled analysis. However, there was no interaction between inter and intra-row spacings. Singh (1969) has also reported a similar increases of plant height with closer spacings. Wider spacings produced significantly more branches per plant in both the years as well as in the pooled analysis. There was no interaction between the main and sub plot treatments in both the years. However, the effects of interaction were found to be significant in the pooled analysis (Table 2). The finding that wider the spacing, higher is the number of branches per plant is in agreement with the results reported by Singh (1969)

TABLE 2. Interaction between inter - row and intra - row spacings in respect of number of branches per plant

Inter row spacings in cm	Intra - row spacings in cm			
	5	10	15	20
30	0.82	2.15	3.45	3.48
45	2.25	3.43	4.15	5.01
60	2.97	3.32	3.80	5.37

	Between intra - row spacings at any one level of inter - row spacings	Between inter - row spacings at any one level of intra - row spacings
S. E.	0.22	0.31
C. D.	0.64	0.64

Under wider spacings the individual plants produced more number of pods. The treatment effect was significant in both the years and in the pooled analysis as well. Suput *et al.* ('967) and Singh (1969) have also reported similar findings. An increase in pod yield per plant was observed with every increase in the spacing. The treatment effect was significant in both the years and in the pooled analysis for intra-row spacings. The treatment effect of inter-row spacings was significant in 1971 and in the pooled analysis. With an increase in the spacing, there was also a corresponding increase in the grain yield per plant, the difference being statistically significant in both the years as well as in the pooled analysis. The interaction differences between the inter and intra-row spacings were significant in one season (1970) only and in the pooled analysis (Table 3)

In contrast to the trend of response noticed in respect of the other characters, the total grain yield per plot registered an increase under closer spacings in both the years. The closest spacing of 30 × 5 cm has recorded the maximum grain yield per plot. The treatment effect was significant for intra-row spacing only during 1970 and 1971 and for both inter and intra-row spacings in the pooled analysis. Even though the grain yield per individual plant gets reduced under closer spacings, the large increase of plant population brought about by

TABLE 3. : Interaction between inter - row spacings and intra - row spacings in respect of grain yield per plant

Inter - row spacings in mc	Intera - row spacings in cm			
	5	10	15	20
30	53.9	74.8	113.9	111.2
45	64.8	93.7	132.3	175.0
60	85.3	136.6	157.8	162.3

	Between intra-row spacings at any one level of inter-row spacings	Between inter-row spacings at any one levels of intra-row spacings
S E.	7.75	11.30
C.D.	22.2	22.90

such closer spacings has contributed for the increased grain yield per unit area. This finding is also in agreement with the results reported by Suput *et al.* (1968), Verma *et al.* (1971) and Donouan *et al.* (1963).

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