

COMPARATIVE PERFORMANCE OF SOYBEAN VARIETIES*

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Soybean is considered to be an important source of edible plant protein and vegetable oil in many countries, especially as it contains about 40 percent protein and 20 per cent oil. Though it had been accepted for large scale cultivation in many countries and though attempts were made to introduce this crop into India since long, its cultivation had not so far been taken up on a large scale in India. The main reasons for the poor acceptance of soybean as a commercially important crop in this country are considered to be the poor consumer acceptability of the crop produce and the non-availability of suitable varieties and production technology. With the primary objective of selecting varieties suitable for South India, a large germplasm material of over 1000 types was screened at IARI Sub-centre, Coimbatore and these studies revealed that several varieties would come up well in south Indian condition and about 25 varieties were found the most promising. The initial screening trial with these varieties conducted at the College of Horticulture, indicated wide differences in the performance of these soybean varieties. With a view to study the performance of the initially screened superior varieties, the present investigation was taken up.

Materials and Methods

Field experiments were conducted during the south west monsoon seasons of 1980 and 1984 at the farm attached to the College of Horticulture, Vellanikkara. The soil of the experimental area was deep, well-drained sandy clay loam containing 0.05 per cent nitrogen, 2.0 ppm available phosphorous (Bray I) and 140 ppm available potassium (neutral normal ammonium acetate) with a pH of 4.6. Treatments consisted of the following 13 varieties during 1980.

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|--------------------|-------------|
| 1 EC 39821 | 8 Monetta |
| 2 EC 14437 | 9 Bragg |
| 3 EC 26691 | 10 EC 39824 |
| 4 Improved Pelican | 11 Davis |
| 5 EC92814 | 12 JN 2750 |
| 6 Ankur | 13 EC 63298 |
| 7 PLSO 18 | |

One more variety, EC 2586 was included in the trial during 1984. The experiments were laid out in randomised block design with three replications. Each experimental plot consisted of three raised beds of 4.5 m x 1 m, seeds sown at a spacing of 45 cm x 5 cm. Each bed had a total of 200 plants, the total number of

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plants per plot thus being 600. Fertilisers at the rate of 20:80:80 kg/ha of N, P₂O₅ and K₂O were applied basally through ammonium sulphate, superphosphate and muriate of potash respectively. Sowing dates were 10th June, 1980 and 13th June, 1984. Hand weeding and earthing up were done one month after sowing. The crops were harvested 125 and 120 days after sowing during the first and second seasons.

Detailed growth observations on plant height, number of branches, number of nodules, number of effective nodules, weight of nodules, total phytomass production, leaf area index and net assimilation rate were recorded during 1980. These were not recorded during 1984. Observations on yield attributes recorded during 1980 included number of bearing nodes per plant, number of pods per bearing node, number of seeds per pod, test weight, shelling percentage and number of pods per plant. Only observations on test weight and total number of pods per plant were recorded during 1984. The weight of sun dried seeds harvested from net plot was reckoned as seed yield during both the seasons.

Results and Discussion

Among growth characters recorded during 1980, there was no significant difference among the varieties except in the case of leaf area index recorded on the 90th day after sowing. Even in this case, there was lack of statistically significant difference at the earlier and later stages of growth. The data on growth characters are, therefore, not presented.

Among the primary yield contributing characters, viz., number of bearing nodes per plant, number of pods per bearing node, number of seeds per pod and 1000 seed weight there was significant varietal differences in the case of number of pods per bearing node during the first year (Table 1). The varieties that recorded higher number of pods per bearing node were Bragg (3.68), Improved Pelican (2.90) EC 39824 (2.67), EC 26691 (2.50), Monetta (2.45) and EC 92814 (2.44). During 1984, differences in 1000 seed weight were also significant, the varieties EC 39821 (114.3 g), Ankur (98.3 g), PLSO 18 (97.3 g), EC 14437 (96.0 g), EC 39824 (95.7 g) and Bragg (95.0 g) recording the highest 1000 seed weight values. The range of varietal mean values in 1000 seed weight were from 83 g in EC 63298 to 114.3 g in EC 39821. Among the ancillary yield components, shelling percentage, number of pods per plant and weight of pods per plant, significant differences were noted only in the case of shelling percentage during 1980. The values ranged from 57.7 per cent in EC 14437 to 65.97 per cent in Davis. The varieties with higher shelling percentage values were Davis (65.97), Ankur (64.1), EC 39821 (62.8), EC 39824 (62.1) and EC 92814 (61.9).

Yield of seed showed significant differences during 1980 with Bragg recording the highest yield of 2319 kg/ha. The yield of this variety was at statistical parity with all the varieties except EC 92814, EC 14437 and PLSO 18. The overall

Table 1

Performance of 14 soybean varieties for yield and its components

Varieties	No. of bearing nodes/plant 1980	No. of pods/bearing node 1980	No. of seeds/pod 1980	Shelling percentage 1980	1000 seed weight (g)		No. of pods/plant		Weight of pods/plant (g) 1980
					1980	1984	1980	1934	
1 E C 39821	19.20	2.36	1.78	62.78	86.67	114.33	46.33	50.11	10.85
2 E C 14437	18.27	1.90	1.75	57.73	79.96	96.00	35.06	51.67	7.17
3 E C 26691	24.20	2.50	1.71	58.92	85.40	89.00	60.73	69.33	13.10
4 Imp. Pelican	20.27	2.90	1.62	58.51	87.21	95.00	58.90	52.78	12.93
5 E C 92814	18.53	2.44	1.88	61.88	89.59	94.00	44.67	55.11	10.66
6 Ankur	17.60	1.85	1.71	64.06	84.84	98.33	33.73	57.00	7.00
7 PLSO 18	15.60	1.99	1.94	58.17	83.90	97.33	30.87	55.55	7.90
8 Monetta	20.47	2.45	1.82	61.79	84.05	93.00	49.87	52.77	11.23
9 Bragg	19.00	3.68	1.77	61.69	84.36	95.00	68.47	56.00	14.56
10 E C 39824	19.40	2.67	1.65	62.05	82.71	95.66	51.33	56.22	11.00
11 Davis	18.67	1.96	1.83	65.97	89.23	89.66	36.80	44.33	9.38
12 J N 2750	25.47	2.30	1.67	61.63	86.07	84.33	60.73	53.78	14.10
13 E C 63298	16.93	2.35	1.87	61.23	83.60	83.00	39.73	53.55	8.81
14 E C 2586	—	—	—	—	—	87.66	—	54.77	—
F test	NS	Sig	NS	Sig	NS	Sig	NS	NS	NS
SEm±	3.344	0.287	0.105	1.413	0.207	4.450	9.910	8.330	2.291
CD (0,05)	—	0.838	—	4.123	—	12.960	—	—	—

Table 2

Seed yield, stover yield, protein content and oil content of 14 soybean varieties

Varieties	Seed yield(kg/ha)		Stover yield	Protein content	Oil content
	1980	1984	(kg/ha) 1980	(per cent) 1980	(per cent) 1980
1 E C 39821	2072.57	1627.18	2974.20	31.64	15.79
2 E C 14437	1412.22	1743.21	2095.03	30.60	18.45
3 E C 26691	2244.67	2283.95	3217.37	29.72	14.09
4 Imp. Pilican	2080.52	2071.60	3616.45	31.44	21.09
5 E C 92814	1833.14	1738.27	2543.97	31.55	21.22
6 Ankur	1915.45	1827.16	2674.91	30.40	21.30
7 PLSO 18	1338.02	1856.79	2250.69	32.25	17.77
8 Monetta	2121.21	1977.78	2731.03	36.00	16.44
9 Bragg	2319.49	2200.00	3477.93	35.69	18.49
10 EC 39824	2080.06	1646.91	3329.61	32.25	20.31
11 Davis	1922.93	1432.10	2731.62	31.98	20.59
12 J N 2750	2222.22	1651.85	3497.96	34.70	18.86
13 E C 63298	2169.85	1832.10	2974.20	30.99	15.10
14 E C 2586	—	1743.21	—	—	—
F test	Sig	N.S.	Sig	Sig	Sig
SE m	147.480	196.450	183.640	0.789	1.057
C, D. (0.05)	430.470	-0.838	535.228	2.305	3.087

range in grain yield was from 1338 kg/ha in PLSO 18 to 2319 kg/ha in Bragg. As the mean yields of a large number of varieties were at par during this season, an attempt was made to select a few, whose yields exceeded the critical level of discrimination. Such a selection showed the superiority of the varieties, Bragg, EC 26691, JN 2750, EC 63298 and Monetta. To estimate the genetic potential of these varieties, a selection index based on number of pods per bearing node and number of bearing nodes per plant was calculated and based on this selection index the varieties were ranked. Among the varieties that were selected as superior based on mean yield, the three varieties, Bragg, JN 2750 and EC 26691 ranked first, second and third respectively in selection index. These three varieties may, therefore, be considered as most superior among the 13 varieties tested. Superiority of the variety Bragg for seed yield had earlier been reported by Saxena and Pandey (1971) among the 16 varieties tested and Agarwal and Narang (1975) among three varieties tried. Premsekhar (1973) observed JN 2750 to be the highest yielder among 36 varieties. The results during the second season in 1984, however, showed lack of statistically significant differences between varieties. A comparison based on the mean yields would indicate superiority of Bragg and EC 26691, these two being the highest yielders. The performances of JN 2750 which was adjudged as the second best in the trial of the first season was one of the poorest. It is to be concluded from these available data that the varieties Bragg and EC 26691 are the most adapted varieties both in terms of general yielding ability and consistency in performance.

The protein and oil contents of seeds showed significant differences during 1980 (Table 2). The highest protein content of 36 per cent was noted in Monetta. Of the three superior varieties, Bragg and JN 2750 recorded relatively high protein contents of seeds and the respective values were 35.7 and 34.7 percent. The protein content of EC 26691 was comparatively low (29.7%). If protein content of seeds also is taken as a criterion, a further superiority of Bragg would thus become apparent.

The content of oil in seeds in the varieties tested ranged from 14.1 to 21.3 per cent during 1980. In general, percentages of oil in the seeds of superior varieties were comparatively low.

Summary

Experiments were conducted at the College of Horticulture, Vellanikkara during the south west monsoon seasons of 1980 and 1984 10 select soybean varieties suitable for the agro-climatic conditions of Kerala. These were laid out in randomised block design with 13 varieties during 1980 and 14 during 1984. The results of the study indicated that the varieties Bragg and EC 26691 may be adjudged as the most promising based on yield performance and consistency in yield over seasons. A further superiority of the variety, Bragg is to be recognised if protein content of seeds also is taken as a criterion.

സംഗ്രഹം

കേരളത്തിലെ മണ്ണിനും കാലാവസ്ഥയ്ക്കും അനുയോജ്യമായ സോയാബീൻ ഇനങ്ങൾ തിരഞ്ഞെടുക്കാൻ വേണ്ടി വെള്ളാനിക്കര ഫോർട്ടിക്കൽ കോളേജിൽ 1980ലും 1984ലും ലഭ്യമായ 14 ഇനങ്ങൾ പരീക്ഷണാർത്ഥം കൃഷിചെയ്യുകയുണ്ടായി. ഇവയിൽ ബ്രോഗ്, ഇ. സി. 26691 എന്നീ ഇനങ്ങൾ ഏറ്റവും നല്ല വിളവു നൽകുന്നതായി കണ്ടു. വിത്തിലെ മാംസ്യംശം കൂടി കണക്കിലെടുത്താൽ ബ്രോഗ് എന്ന ഇനമായിരിക്കും ഏറ്റവും അനുയോജ്യമായത്.

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