

Short Communication

Evaluation of vegetable soybean genotypes for plant growth and seed quality traits

RS Nayana* and B Fakrudin

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Vegetable soybean [*Glycine max* (L.) Merrill, 2n=40] are those which are harvested between R6 and R7 growth stages (approximately 80 % maturity) at which pods are fully formed and still green. It belongs to the family fabaceae and is harvested at the immature R6 stage when the green seeds are fully expanded (Fehr and Caviness 1977). Vegetable soybeans are characterized by large pods (having 2-3 seeds) which are bolder in size (200-250 mg/100 g fresh seed weight) besides seed being green, soft and sweet in taste. These are rich in protein, fat, phosphorus, calcium, iron, thiamin, riboflavin, vitamin E and isoflavones. Protein deficiency in the daily diet of human being probably the predisposing factors for many of the disease. It is exemplified by the recent survey reports that, in India, 50-60 % of the children below the age of five and 51 % of the pregnant and lactating mothers are affected by protein deficiency. The protein in-take in the daily diet has reduced from 60 gm/day in 1950s to 31 gm/day in the present days. The protein based production of food in country is becoming less and the possible avenues of getting rich source of protein have to be investigated. In this context vegetable soybean is emerging as a potential protein rich vegetable which a common man can use in his routine diet. As far as India is concerned, soybean is mainly cultivated as an oilseed crop. However, considering its nutritive value as vegetable crop, it is now being realized to identify vegetable types. Asian Vegetable Research and Development Center (AVRDC), Taiwan is one of the principle repositories of germplasm resources vegetable soybean. In India, University of Agricultural Sciences, Bangalore has received vegetable soybean genotype Karune which is a low trypsin inhibitor and has high nutritive value. The variation in plant growth and seed quality parameters among the vegetable soybean genotypes is needed to be investigated. Thus, the objective of this experiment was therefore to study the genotypic variation for traits in vegetable soybean.

The study was comprised of 11 vegetable soybean genotypes including already released cultivar (Karune, AGS-432 and AGS-433) from AICRP on soybean, University of Agricultural Sciences, Bangalore. These genotypes are screened as vegetable types from 219 soybean accessions using already released vegetable soybean types as check (IC-501164, EC-95286, IC-25763, EC-110318, IC-501197, GC-9901-35, EC-242072 and EC-103153) at College of Horticulture, Bangalore. Each genotype was grown with a spacing of 30 × 10 cm under Augmented Block Design at College of Horticulture, Bangalore during *kharif*, 2014-15. Standard agronomic practices were followed for raising the crop. Data on plant height (cm), number of branches per plant, number of clusters per plant, number of pods per cluster, number of seeds per pod, pod length (cm), pod width (cm), seed length (cm) and seed width (cm) were collected from five randomly selected plants from each plot and the average value was considered per plant basis, whereas data on days to 50 per cent flowering, days to R6 stage, days to maturity and 100-seed weight were recorded on plot basis. The data collected were analyzed statistically as described by Sundarraj et al. (1972).

The growth parameters are generally influenced by several biotic, abiotic and agronomic management practices beside genetic makeup of variety. Similarly, vegetable soybean genotypes also widely differ in their growth and maturity habits. In the present study, genotype differences with respect to field performance have been noticed in vegetable soybean. Significant variations were observed for plant growth parameters (Table 1). The plant height varied from 18.60 cm (AGS-433) to 22.90 cm (AGS-432). Variation for plant height in soybean was also reported by Rasaily *et al.* (1986). Among the genotypes the highest number of clusters per plant was noticed in IC-501164 and EC-103153 (14.00) and low in AGS-433 (9.00). The days to 50 % flowering is under genetic control and influenced by the environment prevailing during crop growth period. EC-95286 took significantly minimum days (38.00) for 50 % flowering compared to EC-103153 which was found

Department of Biotechnology and Crop Improvement, College of Horticulture, UHS Campus, Bengaluru, Karnataka

*Corresponding author, Email: nayanars.158@gmail.com

Table 1: Mean attributes of plant growth parameters for vegetable soybean accessions during *khharif*, 2014-15 at Bangalore

Genotypes	Days to 50% flowering	Branches per plant	Clusters per plant	Plant height (cm)	Days to R6 stage	Days to maturity
IC-501164	40.00	6.00	14.00	20.50	66.00	101.00
EC-95286	38.00	6.00	13.00	19.80	71.00	100.00
IC-25763	40.00	5.00	12.00	19.50	68.00	100.00
EC-110318	40.00	6.00	13.00	20.10	68.00	101.00
IC-501197	41.00	5.00	12.00	19.80	72.00	104.00
GC-9901-35	40.00	5.00	13.00	19.00	69.00	100.00
EC-242072	41.00	6.00	13.00	19.10	72.00	104.00
EC-103153	42.00	6.00	14.00	20.10	72.00	102.00
Karune	39.00	5.00	11.00	18.90	62.00	97.00
AGS-432	39.00	5.00	12.00	22.90	65.00	98.00
AGS-433	39.00	5.00	9.00	18.60	69.00	100.00
Mean	39.90	5.45	12.36	19.84	68.54	100.63
SEm±	0.34	0.15	0.43	0.35	0.97	0.65
CV	2.84	9.57	11.59	5.90	4.72	2.14

Table 2: Mean attributes of pod and seed parameters for vegetable soybean accessions during *khharif* 2014-15 at Bangalore

Genotypes	Pods per cluster	Pod length (cm)	Pod width (cm)	Seeds per pod	Seed length (cm)	Seed width (cm)
IC-501164	2.00	4.80	0.73	2.00	1.30	0.94
EC-95286	3.00	4.90	0.76	3.00	1.20	0.94
IC-25763	3.00	5.30	0.96	3.00	1.60	0.88
EC-110318	3.00	5.50	1.06	3.00	1.60	0.92
IC-501197	3.00	5.10	0.83	2.00	1.30	0.96
GC-9901-35	3.00	4.00	0.86	2.00	1.30	0.94
EC-242072	3.00	4.40	0.86	3.00	1.20	0.80
EC-103153	3.00	5.20	0.93	3.00	1.60	0.94
Karune	3.00	4.50	0.90	3.00	2.10	1.00
AGS-432	2.00	5.00	0.86	2.00	1.20	1.00
AGS-433	2.00	5.40	1.30	2.00	1.50	0.92
Mean	2.72	4.91	0.91	2.54	1.44	0.93
SEm±	0.14	0.13	0.04	0.15	0.08	0.01
CV	17.12	9.39	17.17	20.51	18.91	5.95

late (42.00). Similar reports on varietal variation on days to 50 % flowering were made by Basavaraja *et al.* (2005). The vegetable soybean usually has the green seed coat at maturity and it is harvested between R6 and R7 growth stages as a plump green color pod just prior to yellowing. Among the genotypes, Karune took minimum days (62.00) to pick it for vegetable purpose as compare to other genotypes. The variations among the vegetable soybean genotypes for growth, seed yield and quality characteristics were also reported by Dhananjaya *et al.* (2012).

The study revealed significant differences between the genotypes for pod and seed parameters (Table 2). The highest pod length was recorded in EC-110318 (5.80 cm) and pod width in AGS-433 (1.30 cm). The highest seed length (2.10 cm) and seed width (1.00 cm) was observed in Karune. The highest 100-dry seed weight was recorded in AGS-433 (31.50 g), which is characterized by bold seeds as compared to other genotypes. The variation in seed parameters in different genotypes may be due to variation in duration and response of genotypes to different environmental conditions. Similar results were reported by Dhananjaya *et al.* (2012) in vegetable soybean. Thus, the present study revealed that the genotypes which are having

different genetic potentials will influence plant growth, yield and seed quality. This is mainly due to the response of genotypes to different growing conditions and also variation in duration of the genotypes.

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References

- Basavaraja GT, Naidu GK and Salimath PM (2005) Evaluation of vegetable soybean genotypes for yield and component traits. *Karnataka J Agric Sci* 18(1): 27-31.
- Dhananjaya BC, Channakeshava, Chandramohan S and Mallikarjuna MG (2012) Genotypic variation in plant growth, seed yield and seed quality of vegetable soybean. *Envt Ecol* 30: 1576-1579.
- Fehr WR and Caviness E (1977) Stages of soybean development. *Spec Rep 80 Iowa Agric Home Econ Exp Stn Iowa State Univ America*.
- Rasaily SK, Desai ND and Kukudia MU (1986) Genetic variability in soybean [*Glycine max* (L.) Merrill]. *J Gujarat Agric Uni Res* 11: 57-60.
- Sundarraj N, Nagaraju S, Venkataram MN and Jagannath MK (1972) Design and analysis of field experiments. *Uni Agric Sci Bangalore (India)*, pp 141-167.