Stability of Some Promising Vegetable Soybean Genotypes in Karnataka State of India

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Introduction and methods

Vegetable soybean (Glycine max (L.) Merrill) is defined as those which are harvested between R_6 and R_7 growth stages while the pod is still green and full. It is rich in protein, fat, vitamins A, C and E and its characteristic flavour is widely appreciated. A wide range of vegetable soybean varieties have been cultivated in Japan, Korea and Taiwan. Further there is an increased consumption of vegetable soybean from 4700 t in 1984 to 14,000 t in 1989 and forecasted likely demand for vegetable soybeans in neighbouring countries (Shanmugasundaram, 1991).

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 realised to identify vegetable types. This becomes all the more important considering the general malnutrition problem in the country. Keeping this in view an initiation has been made at the University of Agricultural Sciences (UAS),Dharwad, India to breed vegetable soybean types.

Based on the evaluation of available germplasm at UAS, Dharwad, ten most suitable genotypes for vegetable purpose were identified based on green seed coat and larger seed size. It was intended not only to study and confirm the potentiality but also to assess their stability in respect of productivity and important component traits. Therefore an experiment was conducted at the main research station, UAS, Dharwad from 1998 to 2000 during *Kharif* season in a randomised block design with three replications . Each variety was sown in eight rows of 5 m long spaced 30 cm, apart. Observations were recorded on pod yield, days to maturity , plant height, number of pods and 100 seed weight. The data was subjected to stability analysis following Eberhart and Russel (1966).

Results

In breeding vegetable soybeans, the importance of understanding GxE interactions and the need to identify widely adapted types has been very well highlighted (Shanmugasundaram, 1991). In a country like India, where no systematic work has been done, there is more need to take up such studies and hence the present investigation was carried out. The pooled analysis of variance (Table-1) indicated significant genotypic differences in respect of all the characters except pod yield. The variation due to environments was also significant for days to maturity , plant height and 100 seed weight indicating their sensitivity to variation in environment. Contrary to this pod yield and its most important component trait, number of pods per plant appeared to be less affected by change in the environment. It is interesting to note that the pod yield and two of its important component traits, pods per plant and 100 seed weight showed a major proportion of non-linear GxE variation which suggested the unpredictable behaviour of the genotypes studied across the environments (Saikia *et al*., 1994,Basavaraja *et al*.,1998). However days to maturity, plant height showed significant linear component of G xE interaction.

The stability parameters shown in Table-2, support the conclusions made on the basis of information in Table-1 .For 100 seed weight, pods per plant and pod yield, the deviation from regression values were significant for most of the genotypes similar report was made by Weaver *et al*.(1983). For pod yield Seminol, Cockerstaurt and EC- 175329 were promising as they showed consistent high mean pod yield across the environments with non-significant bi values indicating their wide adaptability. For vegetable soybeans, seed weight is one of the major considerations . However in the present study, we could not find a genotype showing stable performance across the environments for seed weight. But among the genotypes studied, Alankar deserves some mention, which was the only genotype to show non- significant deviation from the regression coefficient indicating stability . However, it was found to be better adapted for poor environments. An overview of the stability parameters over characters studied bring out the importance of Seminol and EC- 175329 which are not only high yielders but are also early with optimum plant height.

Conclusions

Based on the studies conducted, we feel that there is an urgent need to augment the available collections with us by adding the known vegetable soybean genotypes reported from elsewhere particularly AVRDC, Taiwan.The work has been only initiated and it is felt that the detailed investigation on other important relevant aspects *viz*., nutritional quality, resistance to biotic and abiotic stresses are warranted.

References

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Table1. Pooled analysis of variance for different characters in vegetable soybean genotypes

Source	d.f.	Mean sum of square				
		Days to maturity	Plant height	Pods /plant	100 seed wt	Pod yield
Genotypes (G)	9	37.43**	617.80**	48.91**	37.03**	231785.33
Environments (E)	2	3.03*	823.16**	5.91	46.91**	4149792.20
Genotypes x Envi.(GxE)	18	5.86	604.44	8.15	1.15	1199930.40
Envi.+(GxE)	20	5.57	136.72	7.92	5.72	1494916.60
Envi.(Linear)	1	6.05*	1646.32**	11.82	93.84**	8299599.40*
GxE(Linear)	9	10.63**	115.33**	3.11	1.80*	1309661.40
Pooled deviation	10	0.97	5.01	11.86**	0.44**	981178.06**
Pooled error	54	1.99	12.44	1.96	9.95	185020.35

* Significant at P=0.05, ** Significant at P=0.01

Table 2. Estimates of stability parameters for pod yield and yield contributing traits in vegetable soybean genotypes.

Genotypes	Days to maturity			Plant height(cm)			Pods / plant			100 seed weight(gm)			Pod yield(kg/ha)		
	$\bar{x}$	bi	S^2di	$\bar{x}$	bi	S^2di	$\bar{x}$	bi	S^2di	$\bar{x}$	bi	S^2di	$\bar{x}$	bi	S^2di
Alankar	89	4.28**	-0.59	32	-0.07**	-2.98	26.19	-1.62	9.61**	40.20	0.33**	0.02	4159	1.67	1064673.88*
Cockerstaurt	93	-2.70	1.82	56	1.74**	17.03*	29.76	2.78	20.57**	42.60	1.89**	1.31**	4233	1.33	696005.12
Seminol	91	8.92**	1.50	59	1.32	5.01	34.80	0.60	36.65**	32.95	0.98	0.21*	4317	0.13	109561.02
EC-175322	89	3.95*	-0.54	31	-0.56	0.35	27.63	2.02	9.12*	42.77	0.75	0.71**	3526	-1.60	2748161.50**
EC-175324	96	2.61	-0.56	66	2.15**	-3.56	39.99	0.56	4.94**	27.50	1.40	0.20*	3572	1.62	380875.06
EC-175329	88	0.51	-0.30	55	1.42*	-3.06	32.77	3.08	24.84**	37.00	0.72	0.30**	4005	0.28	829.85
EC-175330	87	-2.36	1.59	63	1.61**	-4.15	31.22	2.76	5.11**	38.15	1.31	0.15*	3851	0.12	-4909.86
GP-15	97	1.01	-0.62	33	0.89	-0.66	28.82	-0.12	0.91	43.38	0.78	0.13*	3684	1.66	258797.02
GP-1055	94	-5.79*	1.35	33	0.57*	-4.10	29.16	0.82	-0.61	53.55	0.80	0.51**	3718	2.21	1233942.38*
KB-19	92	-0.42	-0.55	40	0.92	4.70	28.94	-0.88	0.99	57.00	1.03	0.57**	3953	2.59	2707110.00**

* Significant at P=0.05, ** Significant at P=0.01