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Selection indicies for nodulation, yield and quality attributes in exotic and indigenous germplasm of soybean under rainfed enviroment

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ABSTRACT

Selection indices were computed on the basis of linear combination of 40 soybean germplasm based on nodulation, yield and quality traits during 2007-08 and 2008-09 under rainfed condition. The range for selection indices was from 6.34 to 19.43, 3.15 to 15.18 and 3.08 to 17.68 during first, second year and in pooled analysis respectively. The result revealed that gene stock TGX1025-2F, BR35, AGS153B, BP1159, BR-15-126-3-13 and TGX802-IIIE exhibited high index value for nodulation, yield and quality traits. EC333939, AGS153B, TGX802-IIIE, TGX 1025-2F, EC 34501 and BP1159 recorded highest per se performance for seed yield per plant. An overall observation of selection criteria (both varietal indices and *per se* performance basis) TGX 1025F recorded the highest estimate value followed by AGS 153B, TGX802-IIIE, BP1159. Thus, these gene stock is valuable source for new variety released as well as selecting diverse parents for use in hybridization programme.

Key words: Indices, Indigenous, Rainfed, Soybean.

Soybean improvement programme mainly aim for development of high yielding varieties with stable performance on various ecological situation (karnwal *et al*, 2009). Selection for desirable plants is one of the most important research aspects for the genetic improvement and exploitation of yield in soybean. For this purpose existence of genetic variability on the basis of selection index and per se performance is an essential research prospective for overall quantitative and qualitative traits improvement in soybean. Selection index determines the genetic merit of particular genotype based on linear combination of various characters, thus it helps in discriminating the desirable genotypes from the same or diferent sources of population, which was the demand of today's breeding programme under rainfed condition. Thus a present attempt was therefore made on the basis of phenotypic and genotypic merit performance in soybean under rainfed condition.

The field experiment was conducted during *kharif* 2007 and 2008 at AICRP on Soybean Farm, R.A.K College of Agriculture, Sehore (M.P.) in complete randomized block design with three replication under rainfed condition. Each genotype was grown in 2 rows plot of 3 m length with the spacing of 30 cm and 10 cm between and within the rows, respectively. Recommended package of practices were adopted for good crop growth and development. A basal dose of 20kgN+60kgP_2O_5+10 kg K_2O was applied uniformly over the soil at the time of sowing. A random selection of five plants in each plot was made and the observation were recorded on each selected plant. The mean values of each character under study were computed on the basis of five plants for each genotype in each replication. The observations recorded on six nodulation traits, eleven yield traits and two consumer quality traits of soybean as described below:

(A.) Nodulation observation on 30 and 45 DAS: Number of nodules per plant, fresh weight of nodules per plant, dry weight of nodules per plant

(B.) Yield trait: Days to flowering, plant height, branches per plant, days to maturity, number of pods per plant, seeds per pod, seeds per plant, biological yield, seed yield, harvest index,100 seed weight

(C.) Quality traits: Oil content, protein content

The mean values of each character were taken for statistical analysis. The genotypic and phenotypic variances and covariance obtained from the analysis of variance and covariance were utilized for calculating discriminant function coefficients using all the nodulation, yield and quality attributing characters according to Smith (1936), Singh and Choudhary (1979) and Baker (1986). On the basis of these selection criteria.(both varietal indices and *per se* performance for seed yield)the genotypes were arranged in the order of merit to select the best 10% genotypes for further breeding.

Varietal indices and per se performance for seed yield were computed for six nodulation traits, eleven yield determining traits and two quality traits (Table 1).Selection indices varied from 6.34 to 19.43, 3.15 to 15.18 and 3.08 to

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Table 1: Selection indices for seed yield and seed yield *per se* in soybean.

Genotypes	Selection indices for seed yield			Seed yield *per se*			Genotypes	Selection indices for seed yield			Seed yield *per se*		
	I Year	II Year	Pooled	I Year	II Year	Pooled		I Year	II Year	Pooled	I Year	II Year	Pooled
JS117	14.41	8.65	13.93	11.96	9.94	10.95	TGX816-30D	8.54	3.15	3.08	5.03	3.05	4.04
EC291401	11.18	8.16	11.22	7.35	8.31	7.83	TGX854-77D	10.09	4.72	7.69	7.12	4.17	5.64
BB24-94	11.91	7.27	10.33	11.76	10.02	10.89	EC93406	11.69	5.81	6.55	7.35	6.12	6.74
RPSP780	10.75	6.53	8.87	7.35	7.15	7.25	GC12	7.29	3.99	4.05	4.03	3.68	3.86
EC274684	11.95	7.35	11.60	9.03	9.19	9.11	EC389165A	13.98	9.03	11.16	9.85	9.03	9.44
TGX1025-2F	18.36	13.19	17.68	14.02	14.63	14.33	TGX824-33D	8.33	4.53	5.45	6.03	5.39	5.71
EC333939	19.43	12.22	14.94	16.90	14.02	15.46	EC39511	13.07	8.73	9.72	9.28	9.66	9.47
PI165947	14.10	9.64	10.92	13.11	13.25	13.18	BB1294	13.74	10.07	10.49	11.01	11.15	11.08
B352	12.53	11.38	12.57	8.18	11.91	10.05	SC16A	16.64	15.18	14.72	10.51	16.20	13.36
TGX825-3FF	14.20	11.84	13.61	12.06	15.06	13.56	EC333899	10.27	6.98	6.84	5.37	5.63	5.50
EC241412	10.59	7.68	8.75	8.75	8.05	8.40	EC350668	9.55	5.95	6.75	4.77	4.73	4.75
EC333924	10.02	7.03	9.11	7.34	7.76	7.55	EC333893	6.34	3.21	3.37	3.59	3.75	3.67
PX5(4)	11.21	6.17	9.77	7.66	7.02	7.34	TGX302A-12E	11.55	7.29	9.31	8.69	8.67	8.68
BR15-126-3-13	15.64	12.09	15.33	10.17	11.16	10.66	EC333861	14.30	8.65	11.18	10.13	10.79	10.46
CHARLES	15.44	11.14	13.39	13.77	14.44	14.11	EC251762B	7.39	4.17	4.70	4.57	4.85	4.71
BR10	12.21	8.27	9.35	8.18	8.86	8.52	BP1159	17.86	13.51	15.43	15.48	12.81	14.15
PI103419	9.08	4.14	4.66	4.62	3.97	4.29	TGX9964-F6(B)	14.07	8.47	10.22	9.75	9.28	9.52
EC34501	17.98	14.09	14.14	14.14	14.30	14.22	EC242104	8.45	4.19	6.54	4.54	3.70	4.12
AGS153B	18.50	12.84	15.43	15.12	14.06	14.59	TGX802-IIIE	16.60	12.55	15.32	14.16	14.80	14.48
TGX328-019D	11.58	5.94	7.07	7.71	5.91	6.81	BR35	16.43	11.95	15.54	12.69	12.00	12.35

17.68 during first, second year and in pooled analysis respectively. Genotype EC 333939, AGS153B, TGX1025-2F, EC 34501, BP 1159, SC16A and TGX802-IIIE exhibited highest values for selection during first year. SC 16A followed by EC 34501, BP 1159, TGX1025-2F, AGS 153B, TGX802-IIIE and EC 333939 were selected. As per categoring the genotypes on both year pooled performance TGX1025-2F, BR35, AGS153B, BP1159, BR-15-126-3-13 and TGX802-IIIE were selected. Among them, TGX1025-2F, AGS153B and TGX802-IIIE and BP1159 recorded high selection index for nodulation, yield and quality traits. Top six genotypes based on per se performance viz. EC333939, AGS 153B, TGX802IIIE, TGX1025-2F, EC34501 and BP1159 were selected. Among them, TGX 1025F, AGS 153B, TGX802-IIIE, BP1159 exhibited better performance for both genotypically and phenotypically thus appeared promising genotypes for cultivation under rainfed environment or to use as a donor for further breeding programme. This finding is in accordance with Singh and Khan (2003),Singh *et al.*(2007), Sisodia and Yasin(2009), Sisodia(2009), Menezes *et al*.(2014). It is therefore, suggested that above gene stock can be effectively used in breeding programme for improvement in seed yield of soybean varieties under rainfed cultivation.

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