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Heritability and Genetic Advance Studied for Yield Characters in Some Advance Lines of Soybean [*Glycine max* (l.) Merrill].

B.J.RAULJI, P.B. PATEL, M.M. PANDYA, P.B.TRIVEDI AND P.R.RATHVA

Department of Genetics&Plant Breeding,N. M. College of Agricultural, Navsari Agricultural University, Navsari (Gujarat)-396 450
email : pandyamihir2828@gmail.com

ABSTRACT

A set of 66 advance lines of soybean [*Glycine max* (L.) Merrill] grown in a Randomized Block Design with three replication during the *Kharif* - 2012 at Pulse Research Station, N. M. College of Agriculture, Navsari Agricultural University, Navsari. High heritability estimates were obtained for all the characters studied except seed yield per plant and protein content whereas high heritability with high genetic advance was observed in number of pods per plant indicating that these characters were less influenced by environment and direct selection for these characters would be effective for further improvement in yield level.

Key words *Heritability, Genetic Advance and soybean*

Soybean is nature's most precious gift and on account of its three dimensional utility as pulse, oil seed and vegetable has vital importance of its own as a cash crop of large number of people in the different states of India. Soybean seeds contain an average of 21 per cent oil and 40 per cent protein. It yields more usable protein per hectare than any other cultivated crop. Due to its multifaceted advantages, soybean has progressed by leaps and bounds as an oil seed crops and contributes a major part of the total supply of the world vegetable oil. Because of all these benefits it is often designated as 'GOLDEN BEAN' and has become the miracle crop of the twentieth century. A successful breeding programme for yield improvement through phenotypic selection is mainly dependent on the nature and magnitude of variation in the available material and part played by the environment in the expression of the plant characters i.e. phenotype. This required the partitioning of the overall variability into its heritable and non-heritable components with the help of suitable genetic parameters such as heritability and genetic advance.

MATERIALS AND METHODS

The experimental material for present investigation comprised of Sixty six genotypes of [*Glycine max* (L.) Merrill] obtained from Niger Research Station, Navsari Agricultural University, Navsari were grown in a randomized block design during the *kharif,* season 2012 at Pulses Research Station, Navsari Agricultural University, Navsari. Five plants were randomly selected in each entry in each replication for recording observation on growth, yield and phonological characters. The seeds were sown at 45×15cm spacing. Heritability is the heritable portion of the phenotypic variance. In broad sense, it was calculated by using the formula proposed by Allard, 1960. Heritability percentage was categorized as demonstrated by Robinson, *et al.,* 1949. The expected genetic advance in terms of per cent of mean was calculated by the formula suggested by Johnson, *et al.,* 1955.

RESULTS AND DISCUSSION

In crop improvement, only the genotypic component of variation is important since only that component is heritable and transmitted to next generation. Heritability indicates the effectiveness with which selection of genotypes would be based on phenotypic performance.The broad sense heritability ranged from 52.50 (seed yield per plant) to 93.38 (number of seeds per pod). High heritability estimates were observed for all the characters studied.

The results obtained were in conformity with those obtained by Harer and Deshmukh, 1992 and Agrawal, *et al.,* 2001 for plant height, pods per plant, branches per plant and seed yield per plant, Jagtap and Mehetre, 1994 for plant height, pods per plant, seed yield per plant and branches per plant, Shrivastava and Shukla, 1998 for days to maturity, plant height and pods per plant, Dhillon, *et al.,* 2005 for protein content, pods per plant and 100-seed weight and Ramana, *et al.,* 2000 for pod length, Malik, *et al.,* 2006 for 100-grain weight, days to maturity, plant height and protein content, Ramteke, *et al*., 2010 for days to maturity, days to 50 % flowering, plant height, oil content and protein content. Aditya, *et al*., 2011 for number of pods per plant, Okonkwo and Idahosa, 2013 for 50 per cent flowering, days to maturity, pod length, seeds per pod, 100-seed weight and grain yield.

High heritability for all the characters studied indicated the preponderance of additive gene effects. Therefore, further improvement through individual plant selection on the basis of these traits would be possible.Shift in gene frequency towards superior side under selection pressure is termed as genetic advance and is generally expressed as per cent of mean. Johnson, *et al*. (1955) stated that in predicting the resultant effect of selection, the

Table I . Heritability, genetic advance and genetic advance as per cent of mean for 12 characters in 66 genotypes in soybean.

Sr. No.	Characters	Heritability (broad sense %)	Genetic advance	Genetic advance (% of mean)
1.	Days to 50 % flowering	81.66	8.70	15.15
2.	Days to maturity	72.81	11.62	10.84
3.	Plant height (cm)	89.77	31.35	48.35
4.	No of branches per plant	62.43	63.72	18.62
5.	No of pods per plant	91..37	16.41	55.93
6.	No of seeds per pod	93.38	1.15	44.50
7.	Pod length (cm)	72.54	0.46	12.02
8.	Yield per meter raw length (g)	62.83	25.14	21.80
9.	Seed yield per plant (g)	52.50	1.65	20.02
10.	100 -seed weight (g)	89.70	6.07	38.26
11.	Protein content (%)	57.43	2.94	7.59
12.	Oil content (%)	91.09	2.88	15.87

genetic advance should be considered along with the estimates of heritability. However, high genetic gain along with high heritability showed most effective condition for selection.

In the present study the high heritability coupled with high genetic advance was observed for plant height, number of pods per plant, number of seeds per pod, yield per meter raw length, seed yield per plant and 100-seed weight. It indicated that this character is governed by additive gene action. Similar results were also reported by Jagtap and Mehetre, 1994, Ramana, *et al.,* 2000, Agrawal, *et al.,* 2001 for number of pods per plant, Aditya, *et al.,* 2011 for number of pods per plant, dry matter weight per plant, plant height and seed yield per plant. Okonkwo and Idahosa, 2013 for days to flowering and seed weight. Thus results indicated the substantial contribution of additive genetic variance in the expression of this character and could be improved through individual plant selection.

Days to 50 per cent flowering, days to maturity, number of branches per plant, pod length and oil content showed high heritability coupled with moderate genetic advance as per cent of mean. This is in accordance with the earlier findings by Jagtap and Mehetre, 1994 for branches per plant, Dhillon, *et al*., 2005 for days to 50 per cent flowering, plant height and protein content, Aditya, *et al*., 2011 for seed yield per plant, Okonkwo and Idahosa, 2013 for days to maturity. High heritability conjugated with moderate genetic advance as per cent of mean indicated that the genotypes under study have moderate genetic potential.

The result revealed high heritability coupled with low genetic advance for protein content. Similar result was obtained by Dhillon, *et al.,* 2005 for days to maturity, Aditya, *et al*., 2011 for days to 50 per cent flowering, number of branches per plant, 100-seed weight, Okonkwo and Idahosa, 2013 for seed per pod and 100-seed weight. This indicated that selection would be ineffective for this character for further improvement.

The result of present investigation showed that seed yield per plant had high heritability with high genetic advance. Such result is in conformity with Harer and Deshmukh, 1992 and Agrawal, *et al.,* 2001 for seeds per pod and Dhillon, *et al.,* 2005 for 100-seed weight.

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