Biolife 1(4):231-234
AN INTERNATIONAL QUARTERLY JOURNAL OF BIOLOGY & LIFE SCIENCES
ISSN (online): 2320-4257
www.biolifejournals.com
BIOLIFE ORIGINAL ARTICLE

GENETIC PARAMETERS OF YIELD AND YIELD COMPONENTS POOLED OVER ENVIRONMENTS IN SESAMUM (*SESAMUM INDICUM L.*)

P. Jhansi Rani[1*], P.V. Rama Kumar[2]

[1,2]Department of Genetics and Plant Breeding, ANGRAU, Agricultural College, Bapatla 522 101, Andhra Pradesh.

.

E-mail: jhansiranipuli@gmail.com

ABSTRACT

An investigation was carried out to assess the genetic parameters i.e variability, heritability and genetic advance for nine characters viz., plant height, days to 50% flowering, number of primaries, number of secondaries, number of capsules per plant, number of seeds per capsule, 1000 seed weight, oil content and seed yield plant in 10 genotypes over six environments during Kharif, 2010 and Rabi 2010-11. Significant differences were observed for all the characters among the genotypes studied for pooled analysis of six environments. The results revealed that high GCV and PCV were observed for the characters viz., seed yield per plant, number of capsules per plant, number of secondaries per plant and number of seeds per capsule in the pooled analysis of six environments studied. The characters seed yield per plant, number of secondaries, number of seeds per capsule and number of capsules per plant had shown high heritability accompanied by high genetic advance over pooled environments. The traits number of capsules per plant, number of seeds per capsule, seed yield per plant, and number of secondaries are found little influenced by environment.

Key words: Variability, heritability, genetic advance and *Sesamum indicum L*

INTRODUCTION

Sesame is one of the important oil seed crops cultivated in India and called as “Queen of oil seed crops” by virtue of its excellent quality. It is having the highest oil content (46-64%) and dietary energy (6355 Kcal/kg). Though sesamum production is high in india, its productivity is low when compared to world average. Crop improvement in sesamum has been practiced for a long time. Yet a major breakthrough could not be made in realizing high yields in sesame varieties. One of the reasons is that there is limited genetic variability in the source material, which is pre requisite for initiating any breeding programme. It is a seasonal and location bound crop hence, a particular variety does not perform uniformly in all locations and in all seasons. Information on nature and magnitude of variability present in a population due to genetic and non genetic causes is an important pre requisite for a systemic breeding programme to improve the yield potential of genotypes. Hence an attempt was made to study the amount of genetic variability present in ten genotypes of sesamum from pooled data of six environments.

MATERIALS AND METHODS

Ten genotypes of sesamum were sown on 6 sowing dates i.e., 3 sowing dates in kharif (17.07.2010, 2.08.2010 and 17.08.2010) and 3 sowing dates in rabi (2.12.2010, 17.12.2010 and

3.01.2011), thus providing 6 environments for study at Agricultural College Farm, Bapatla. The experimental material was grown in randomized block design with 3 replications of 2 m long plots of 3 rows was used with 30 × 10 cm spacing. Data were recorded on nine characters viz., plant height (cm), days to 50% flowering, number of primaries, number of secondaries, number of capsules per plant, number of seeds per capsule, 1000- seed weight(g), oil content(%) and seed yield per plant(g). The data were pooled over six environments. The mean data were statistically analyzed for studying the variability parameters viz., mean, range, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (h^2) and genetic advance (GA) as percentage of mean. Phenotypic and genotypic components of variances were worked out based on the formula given by Lush (1940). Heritability in broad sense was derived based on the formula given by Hanson et al. (1956). Genetic advance was obtained by the formula prescribed by Johnson et al. (1955).

RESULTS AND DISCUSSIONS

The analysis of variance revealed significant differences among the genotypes studied for seed yield and component characters indicating considerable amount of genetic variation in the material. The values of genotypic and phenotypic coefficients of variation, heritability in broad sense and expected genetic advance of different quantitative characters of the sesamum genotypes pooled over 6 environments are presented in Table 1.

The genotypic and phenotypic coefficients of variation were highest for seed yield per plant (14.58, 24.92) followed by number of secondaries (11.09, 17.70), number of capsules per plant (8.85, 17.07), number of seeds per capsule (8.30, 13.18) and number of primaries (6.99, 14.88).

In the present study analysis of variance indicated significant differences among the genotypes studied for all the characters over pooled data. The phenotypic coefficients of variation of all characters, generally were higher than the genotypic coefficients of variation, might be due to higher degree of interactions of the genotypes with the environment.

The phenotypic coefficients of variation ranged from 5.48% for oil content to 24.92% for seed yield per plant and the genotypic coefficients of variation ranged from 3.69% for oil content to 14.58% for seed yield per plant over pooled environments.

Wide differences between genotypic and phenotypic coefficients of variation estimates were found for seed yield per plant, number of capsules per plant, number of primaries and number of secondaries. Similar results of variation were observed for seed yeild per plant by Ved Narain et al.(2004), Singh (2005) and Raghuwanshi (2005); for number of primaries by Sudhakar et al. (2007) and for number of secondaries by Govindarasu et al. (1990).

Though coefficients of variation indicate the amount of genetic variation, it is difficult to ascertain the amount of heritable variation. High heritability values have been found to be useful in selection of superior types on the basis of phenotypic performance and low heritability values suggest that characters are highly influenced by environment.

Oil content exhibited maximum heritability (45%) followed by days to 50% flowering (41%), number of seeds per capsule (40%), number of secondaries (39%), plant height (37%) and seed yield per plant (34%). Heritability (broad sense) estimates ranged from 22% for number of primaries to 45% for oil content. High Heritability values were observed for for oil content by Babu et al. (2005) and for seed yield per plant by Kandaswamy et al. (1990) and Janardhanam and Subhash Chandra Bose (1991).

The genetic advance as percentage of mean was highest for seed yield per plant (17.58) followed by number of secondaries (14.32), number of seeds per capsule (10.76) and number of capsules per plant (9.46). The genetic advance

Table-1: Estimation of Genetic Parameters for 9 yield and yield attributing characters over 6 environments in Sesamum

Genetic parameters	Plant height	Days to 50% flowering	No of primaries	No of secondaries	No of capsules /plant	No of seeds/ capsule	1000 seed weight	Oil content	Seed yield/ plant
Average	85.92	41.22	3.62	2.95	40.54	59.67	2.88	46.86	7.26
C.D (at 5%)	5.03	1.36	0.31	0.27	3.9	4.02	0.13	1.25	0.97
GCV (%)	6.85	4.19	6.99	11.09	8.85	8.30	5.08	3.69	14.58
PCV (%)	11.23	6.54	14.88	17.70	17.07	13.18	8.76	5.48	24.92
h^2(b)	0.37	0.41	0.22	0.39	0.27	0.4	0.33	0.45	0.34
G.A as % of mean	8.62	5.52	6.75	14.31	9.45	10.76	6.06	5.12	17.58
C.V (%)	8.9	5.02	13.14	13.8	14.6	10.24	7.14	4.05	20.20

as percentage of mean ranged from 5.12 for oil content to 17.58 for seed yield per plant. Maximum genetic advance for seed yield per plant in sesamum was reported by Solanki and Deepak Gupta (2000), Ved Narain et al. (2004), Babu et al. (2005), Gawali et al. (2007); Sudhakar et al. (2007); P K Singh et al (2013) and Ajaysingh et al, (2013).

High heritability coupled with genetic advance is of more value than the former alone in predicting the effect of selection. If the heritability was mainly due to additive and non-additive gene effects the expected genetic gain would be low and if there are additive gene effects only a high genetic advance may be expected (Panse, 1957).

High heritability together with high genetic advance was observed for seed yield per plant, number of primaries , number of secondaries and plant height and number of seeds per capsule. This indicates that selection would be effective for these traits as these are less prone to environmental fluctuations. Apparently number of capsules per plant, number of seeds per capsule, seed yield per plant, number of primaries and number of secondaries are the characters found least susceptible to environmental fluctuations, hence more stable over environments and highly responsive to selection.

REFERENCES

1. **Ajay Singh, J. P. Shahi and D. M. Langade.** 2013. Appraisal Of Heterosis For Yield And Yield Attributing Components In Maize (Zea mays L.). Biolife. 1(3):-123-129**.**
2. **Babu, D.R., Kumar, P.V.R. and Rani, C.V.D. 2005.** Genetic variability, heritability and genetic advance of seed yield and its components in sesame (Sesamum indicum L.). Research on Crops, **6** (2) : 307 - 308.
3. **Gawali, C.W., Bhoite, K.D., Pardeshi, S.R., Mhaske, B.M. and Wagh, M.P. 2007.** Study of genetic variability and correlation studies in sesame (Sesamum indicum L.). Agricultural Science Digest, **27** (4) : 282-284.
4. **Govindarasu, R., Rathinam, M. and Sivasubramanian, P. 1990.** Genetic Variability in sesame (Sesamum indicum L.). Madras Agricultural Journal, **78** (1-3): 450-452.
5. **Hanson, C.H., Robinson, H.F. and Comstock, R. E .1956 .** Biometrical studies of yield in segregating populations of Korean lespedza. Agronomy Journal, **48**(6) : 268-272.
6. **Janardhanam, V. and Subbash Chandra Bose .1991.** Variability, heritability estimates and genetic advance in sesamum (Sesamum indicum L.). The Andhra Agricultural Journal, **38** (4) : 359-361.

7. **Johnson, H.W., Robinson, H.F. and Comstock ,R.E .1955.** Estimates of genetic and environmental variability in soybeans. Agronomy Journal, **47** : 314-318.
8. **Kandaswamy, M., Sundaram, M K., Sridharan ,C .S. D. and Rangaswamy, S. R. D. 1990.** Genetic variability in sesamum. Madras Agricultural Journal, **77** (9 - 12) : 395-398.
9. **Lush, J. L. 1940.** Intra-sire correlation on regression off-spring on dams as a method of estimating heritability of characters. Proceedings of American Society of Animal Production, **33**: 292-301.
10. **Panse, V.G .1957.** Genetics of quantitative characters in relation to plant breeding. Indian Journal of Genetics, **17**: 318-328.
11. **P. K. Singh, Nitish Singh, A. K. Singh, J. P. Shahi and M. Rao,** 2013. Heterosis In Relation To Combining Ability In Quality Protein Maize (Zea Mays L.). Biolife. 1(2):-65-69.
12. **Raghuwanshi, K.M.S .2005.** Study of genetic variability in sesame (Sesamum indicum L.). Journal of Maharashtra Agricultural Universities, **30** (3): 264 – 265.
13. **Singh, S.B .2005.** Genetic variability and relative contribution of component characters of yield of sesamum. Farm Science Journal, **14** (1): 1-3.
14. **Solanki, Z.S. and Deepak Gupta. 2000.** Correlation and path analysis for oil yield in sesamum (Sesamum indicum L.). Journal of Oilseeds Research, **17**(1): 51-54.
15. **Sudhakar, N., Sridevi, O. and Salimath, P.M. 2007.** Variability and character association analysis in sesame (Sesamum indicum L.) Journal of Oilseeds Research, **24** (1) : 56-58.
16. **Ved Narain., Gupta, R .R. and Singh, P.K .2004.** Genetic variability and character association in sesame (Sesamum indicum L.). Farm Science Journal, **13** (2) : 130-132.

DOI: https://dx.doi.org/10.5281/zenodo.7193677
Received: 11 October 2013;
Accepted; 29 November 2013;
Available online : 5 December 2013