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Research article

GENETIC VARIABILITY STUDIES IN SESAME (*Sesamum indicum* L.)

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ABSTRACT: The evaluation of phenotypic variability, heritability and genetic advance in germplasm collections is important for both plant breeders and germplasm curators to optimize the use of the variability available. A total of 50 sesame accessions were used in this research work. Analysis of variance revealed significant difference among genotypes for all the nine characters studied. The magnitude of PCV and GCV was moderate to high for seed yield per plant, number of capsules per plant and number of branches per plant. High heritability was recorded for days to maturity, days to 50% flowering, seed yield per plant, number of capsules per plant and number of branches per plant. High heritability combined with high genetic advance was recorded for seed yield per plant, number of capsules per plant and number of branches per plant indicating that these characters are controlled by additive gene effect and phenotypic selection of these characters would be effective for further breeding purpose

Key words: Genetic variability, Heritability and Sesame

INTRODUCTION

Sesame (*Sesamum indicum* L.) is one of the world's oldest oilseed crops and is under cultivation in Asia for over 5000 years. In India, the antiquity of sesame is known from the use of its seed in religious ceremonies.The crop is highly tolerant to drought, grows well in most of the well drainedsoils and various agro climatic regions, and is well adapted to different rotations. It can set seed and yield well under fairly high temperature and can grow in stored soil moisture without rainfall and irrigation. However, continuous flooding or severe drought adversely affects the crop resulting in low yield (Mensah *et al.*, 2009). Sesame oil has highest antioxidant content and contains several fatty acids such as oleic acid (43 %), linoleic acid (35%), palmitic acid (11%) and stearic acid (7%). Though variations in climatic and edaphic conditions, according to Muhamman and Gungula (2008), affect sesame yields and performance, the major constraints identified in growing sesame in most countries are instability in yield, lack of wider adaptability, drought, non-synchronous maturity, poor stand establishment, lack of response to fertilizer application, profuse branching, lack of seed retention, low harvest index and susceptibility to insect pests and pathogens. Genetic diversity in crop plants is essential to sustain level of high productivity. Genetic variation survives for agronomically vital characters in sesame but its production is still very low in India. Traditional sesame landraces as well as related wild species are an important source of genetic diversity for breeders and form the backbone of agricultural production. The characterization and conservation of sesame germplasm are essential for both safe guarding and the future use of existing genetic resources of sesame. However, the development of improved plant cultivars is restricted mainly due to narrow genetic pool which results into limited possibility to restructure the sesame crop. The knowledge of genetic variability in germplasm will help in the selection and breeding of high yielding, good quality cultivars that will increase production. Keeping the above points in view, this study was carried out for genetic variability in 50 sesame accessions to asses the variability, heritability and genetic advance of some quantitative characters.

MATERIALS AND METHODS

In the present study fifty genotypes including two checks were sown in randomized complete block design (RBD) with two replications at Acharya N.G Ranga Agricultural University, Regional Agricultural Research Station, Jagtial during *kharif* 2009. Each genotype was raised in 4m length with spacing of 30 X 10 cm. Recommended agronomic practices were followed to raise a good crop. Observations were recorded on days to 50% flowering, days to maturity, plant height (cm), number of branches per plant, number of capsules per branch, number of seeds per capsule, capsule length, test weight and seed yield per plant. The data were recorded on five randomly selected plants in each entry in each replication.The mean values were used for analysis of variance. The coefficient of variation was calculated as per Burton (1952). Heritability in broad sense and genetic advce were calculated as per Johnson *et al.,* (1955).

RESULTS AND DISCUSSION

In the present study the analysis of variation shown highly significant differences among the genotypes for all the characters studied *viz.*, days to 50% flowering, days to maturity, plant height (cm), number of branches per plant, number of capsules per branch, number of seeds per capsule, capsule length, test weight and seed yield per plant, indicating the existence of considerable genetic variation in the experimental material. The variation of different traits under this study revealed that the Phenotypic coefficient of variation (PCV) were higher than Genotypic coefficient of variation (GCV) for all the characters studied indicating the role of environmental variance in the total variance (Table 1). The traits seed yield per plant followed by number of capsules per plant and number of branches per plant showed high PCV and GCV estimates. High coefficient of variation for number of branches per plant (Gidey *et al.*, 2013, Saha *et al.*, 2012, Sudhakar *et al.*, 2007, Solanki and Gupta, 2003) and seed yield per plant (Sumathi and Murlidharan (2010), Parameshwarappa *et al.*, 2009 and Sudhakar *et al.*, 2007) has also been reported. Hence, these characters can be relied upon and simple selection can be practiced for further improvement. Heritability in broad sense estimates were high for days to maturity, days to 50% flowering, seed yield per plant, number of capsules per plant and number of branches per plant. Genetic advance as per cent of mean (GA) is more reliable index for understanding the effectiveness of selection in improving the traits because the estimates are derived by involvement of heritability, phenotypic standard deviation and intensity of selection. Thus, genetic advance along with heritability provides clear picture regarding the effectiveness of selection for improving the plant characters. Noor *et al.*, (2004) had cautioned that high heritability per se is no index of high genetic gain hence it should be accompanied by high genetic advance. High heritability accompanied with high genetic advance recorded for seed yield per plant, number of capsules per plant and number of branches per plant indicated lesser influence of environment in expression of these characters and these characters are controlled by additive gene effect, hence, amenable for simple selection. Similar results were reported Thirumala Rao *et al.*, (2013). Moderate heritability and genetic advance was recorded for test weight and plant height. Similar results were reported by Sumathi and Murlidharan (2010), Sudhakar *et al.*, (2007).

Table.1 Estimates of variability, heritability and genetic advance in Groundnut

Character	Mean	Range	GCV (%)	PCV (%)	Heritability in Broadsence(H^2)	Genetic advance	GA as percent of mean
Days to 50% flowering	33.89	29.5-45.5	8.739	9.25	89.3	5.764	17.009
Days to maturity	87.65	75-91.5	5.015	5.188	93.4	8.753	9.987
Plant height	81.265	58-126.5	15.137	19.565	59.9	19.605	24.124
No of Branches per plant	4.604	2-9	33.839	38.563	77.0	2.816	61.17
Number of capsules per plant	49.018	14-95.5	37.119	41.024	81.9	33.914	69.186
Capsule length	2.765	2.25-3.5	8.045	12.883	39.0	0.286	10.35
No of seeds/capsule	63.62	38-90	12.852	16.405	61.4	13.196	20.742
Test weight	3.0274	1.9-4.8	15.5	21.34	52.8	0.702	23.194
Seed yield	9.119	3.1 -18.7	47.18	50.259	88.1	8.32	91.237

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