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Variability Studies on Yield and Yield Contributing Characters in Maize (*Zea mays* L.)

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ABSTRACT

The experiment was conducted with an objective to know the variability, heritability and genetic advance of 67 maize genotypes (fifty hybrids, fifteen parents and two checks) for the characters *viz.,* days to 50 % tasseling, days to 50 % silking, plant height (cm), ear height (cm), kernel rows per ear, number of kernels per row, ear length (cm), 100-seed weight (g) and grain yield per plant (g). Analysis of variance revealed significant amount of variability for all the characters studied. High PCV and moderate GCV were recorded for grain yield per plant and high heritability combined with high genetic advance as per cent of mean was shown by the characters *viz.,* ear height, 100-seed weight and grain yield per plant indicating the predominance of additive gene action in the inheritance of these traits.

Key words: *Genetic advance, Heritability, Maize, Variability.*

Maize (*Zea mays* L.) is one of the most important cereal crops after wheat and rice which contributes to the food security in most of the developing countries. In India, maize is cultivated over an area of 9.3 million hectares with a production and productivity of 21.07 million tonnes and 2557 kg ha^{-1}, respectively (Directorate of Economics and Statistics, Department of Agriculture, 2015).

The amount of variability present in the population is a prerequisite for selecting desirable genotypes, hence critical analysis of the genetic variability parameters *viz.,* genotypic coefficient of variation and phenotypic coefficient of variation is essential. Along with variability, the estimates of heritability help the plant breeder in determining the character for which selection would be rewarding. The major function of heritability estimates is to provide information on transmission of characters from the parents to the progeny. Heritability estimates along with genetic advance are normally more helpful in predicting the genetic gain under selection than heritability estimates alone. Thus the present study was conducted to know the Variability parameters for yield and yield contributing traits in maize.

MATERIAL AND METHODS

Evaluation of 50 hybrids generated from crossing ten lines and five testers in line x tester fashion along with fifteen parents and two checks (DHK-13-PHM-4 and DHK-15-HM-8) following Randomized Block Design with two replications was carried out at Agricultural College Farm, Bapatla during *rabi* 2015-16. All the 67 genotypes were grown in three rows of 3 m length with 60 x 20 cm spacing. Standard agronomic practices were followed to maintain optimum plant population. Data was recorded on nine quantitative characters *viz.,* days to 50% tasseling, days to 50% silking, plant height, ear height, kernel rows per ear, number of kernels per row, ear length, 100-seed weight and grain yield per plant and subjected to statistical analysis on genetic parameters such as phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) using the formulae given by Burton (1952), heritability in broad sense was calculated using the formula given by Hanson *et al.* (1956) and genetic advance as per cent of mean was estimated by formula suggested by Johnson *et al*. (1955).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters studied indicating a high degree of variability in the material. The genotypic coefficient of variance (GCV) values were close to phenotypic coefficient of variance (PCV) which indicated less influence of environment on expression of these traits (Table 1).

Table 1. Estimates of variability, heritability and genetic advance as per cent of mean for grain yield and yield component in maize (*Zea mays* L.).

S. No.	Character	Mean	Range		Coefficient of variation		Heritability (broad sense)	Genetic advance as per cent of mean
			Minimum	Maximum	PCV (%)	GCV (%)		
1.	Days to 50% teasseling	52.41	48.00	58.00	4.96	4.76	92.00	9.40
2.	Days to 50% silking	55.23	50.00	60.00	5.45	5.26	93.20	10.46
3.	Plant height (cm)	214.04	130.10	252.20	11.43	8.36	53.50	12.67
4.	Ear height (cm)	85.11	46.50	113.00	15.85	13.83	76.00	24.83
5.	Kernel rows per ear	13.64	10.00	15.60	7.86	5.86	55.70	9.00
6.	Number of kernels per row	29.93	11.90	37.60	15.12	12.08	63.80	19.87
7.	Ear length	15.25	7.90	18.80	12.57	9.88	61.80	16.01
8.	100-seed weight (g)	27.78	15.64	39.39	14.63	14.09	92.80	27.97
9.	Grain yield per plant (g)	110.63	25.50	158.50	20.85	19.65	88.90	38.18

PCV = Phenotypic coefficient of variation GCV = Genotypic coefficient of variation

High PCV and moderate GCV were recorded for grain yield per plant while low PCV and GCV were recorded for days to 50% tasseling, days to 50% silking and kernel rows per ear. Similar result was also reported by Bharathiveeramani *et al.* (2012). Moderate PCV and GCV were recorded for ear height, number of kernels per row and 100-seed weight. Moderate PCV and low GCV were recorded for plant height and ear length, similar results for plant height and ear length was also reported earlier by Kumar and Satyanarayana (2001). Thus, the study indicates that there is considerable amount of variability for majority of the characters studied.

Heritability estimates were high for days to 50% tasseling, days to 50% silking, ear height, number of kernels per row, ear length, 100-seed weight and grain yield per plant. Similar result was also obtained by Nataraj *et al.* (2014), while plant height and kernel rows per ear recorded moderate heritability. The maximum value for heritability was recorded by the trait days to 50 % flowering (93.20 %) and minimum was recorded by plant height (53.50 %).

Heritability estimates along with genetic advance are more helpful in predicting the genetic gain under selection than heritability estimates alone. Heritability and genetic advance as per cent of mean were high for the characters *viz.,* 100-seed weight, grain yield per plant and ear height indicating that these characters were less influenced by environment and governed by additive gene action which may be exploited through breeding methods involving simple selection. This result was in agreement with the findings of Azam *et al.* (2014).

High heritability coupled with moderate genetic advance as per cent of mean was observed for days to 50% silking, number of kernels per row and ear length. High heritability coupled with low genetic advance as per cent of mean was observed for the character, days to 50% tasseling, while moderate heritability coupled with moderate genetic advance as per cent of mean was observed for plant height and moderate heritability coupled low genetic advance as per cent of mean was observed for kernels rows per ear, indicating the role of both additive and non-additive gene actions in the inheritance of these traits and can be improved by population improvement methods.

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