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Variability Analysis for Various Quantitative Traits in Maize (*Zea mays* L.) Hybrids

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A B S T R A C T

The experiment was conducted at Agricultural and Horticultural Research Station, Kathal agere during *kharif* 2018. Estimation of variability parameters like environmental variability, Genotypic variability, Genotypic coefficient of variability, Phenotypic variability, Phenotypic Coefficient of Variability, Heritability (h^2), Genetic advancement at 5%, Genetic advancement as % of mean 5% and General mean. In the present study twenty seven diverse hybrids were grown in RCBD design with three replications during *Kharif* 2018 to study the genetic parameters viz. ANOVA, GCV, PCV, h2 and Genetic Advance (GA). The results indicates that ANOVA for all the characters viz. cob weight, shelling %, moisture %, initial plants and, final plant stand, cob count, days to 50% pollen shed, days to 50% silking, days to70% dry husk, plant height, ear height are highly significant while grain yield showed significant values. The high GCV and PCV values were observed for grain yield, cob weight while moderate GCV and PCV values were shown by moisture %, days to 70% dry husk and cob count. High heritability coupled with high expected genetic advance in percent of mean was observed for grain yield, cob count, days to 70% dry husk, plant height and ear height. Conclusively PCV was higher GCV indicates that environmental role in the expression of these traits.

Introduction

Maize (*Zea mays* L.) is the third most important cereal crop after rice and wheat. Maize has myriad of uses in food, feed and industrial segment. Globally 67 per cent of maize is used for livestock feed, 25 per cent for human consumption, 14% for starch products, 1% each for beverages and seed and rest for industrial purposes. Genetic EEC - 2015 - 278 variability is of greatest interest to the plant breeder as it plays a vital role in framing successful breeding programme. Heritability of a metric character is a parameter of particular significance as it measures the degree of resemblance between the parents and off-springs. The knowledge of heritability enables the plant breeder to decide the course of selection procedure to be followed under a given situation (Li and Yang, 1985). Genetic advance aids in exercising the necessary selection pressure. Keeping in view

the importance of these aspects a study was conducted to know variability, heritability and genetic advance in twenty seven in breds of maize which will help to ascertain the real potential value of the genotypes.

Materials and Methods

The experimental materials consisted of twenty seven inbred lines of maize obtained from All India Coordinated maize research centre, Regional station, Hyderabad. Twenty seven genotypes were sown during *kharif*, 2018 in Randomized Block Design with three replications. Each entry was sown as four rows of 4 meter length with row-to-row and plant-to-plant distance of 75cm and 30cm respectively. All the agronomic practices along with prophylactic plant protection measures were followed so as to raise a good crop. Observations were recorded on five randomly selected plants for Plant height (cm), Plant stand, Moisture (Per cent), Ear height(Cm), Cob Weight. (Kg), Number of Cobs. However, observations for the characters namely days to 50 per cent tasseling, days to 50percent silking, days to maturity were recorded on plot basis. Analysis of variance was computed based on Randomized Block Design for each of the character separately as per standard statistical procedure given by (Panse and Sukhatme, 1978). Heritability (h^2) in the broad sense was calculated according to the formula given by (Allard, 1960) for all characters. Phenotypic and genotypic coefficients of variation (PCV and GCV) were computed according to(Burton,1952). For statistical analysis, Windostat Version 9.1 software package was used.

Results and Discussion

Analysis of variance for the experiment involving a set of 27 hybrid lines of maize for six quantitative traits revealed highly significant mean sum of squares for all the characters indicating greater diversity among the genotypes. The results of significant mean sum of squares due to genotypes for all the traits studied were reported by (Manjunatha *et al.*, 2018, Rafiq *et al*., 2010; Reddy *et al.*, 2013; Nagabhushan *et al.*, 2011; Suresh *et al.*, 2012). The results pertaining to genetic parameters viz., phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), broad sense heritability (h) and genetic advance as percent of mean(GAM) for all the six characters are furnished in Table 1. The Highest magnitude of both PCV (12.87%) and GCV (42.5%) were observed forcob weight followed by ear height (4.3%- 12.63%) suggesting that these characters were under the influence of genetic control. Similar reports were earlier given by (Akbar *et al*., 2008; Reddy *et al.*, 2013) for cob weight and ear height. The characters plant height (9.3%-7.33%), plant stand (3.5%-7.08)were recorded for moderate magnitudes of both PCV and GCV, respectively. Similar results were reported by (Krishnam Raju, 2001) for days to 50% tasseling indicating the predominance of non-additive gene action. The phenotypic coefficient of variation was higher than genotypic coefficient of variation (GCV) for all the characters under study but the GCV was greater than the variation produced by the environment for all the characters. The results are in agreement with the findings of (Srivas and Singh, 2004; Abirami *et al.*, 2005; Mustafa *et al.*, 2014).

Heritability estimates were high for all the traits under study except cob weight which recorded moderate estimate of heritability. This suggested the greater effectiveness of selection and improvement to be expected for these characters in future breeding programme as the genetic variance is mostly due to the additive gene action. The results are in consonance with the reports given by (Natraj *et al.*, 2014) for cob weight, ear height, plant height.

Table.1 Variability parameters for various quantitative traits of maize inbreeds

Variability parameters	Plant height(cm)	Plant stand	Moisture (Per cent)	Ear height (Cm)	Cob Weight (Kg)	Cobs (Number)
Environmental variability	383.23	16.5	0.87	164.6	53953.9	16.53
Genotypic variability	6.11	5.34	0.138	22.23	49.51	5.35
GCV	0.93	3.5	2.055	4.36	12.87	3.50
Phenotypic variability	377.12	21.8	0.73	186.9	54003.4	21.88
PCV	7.33	7.08	4.74	12.63	425.15	7.08
Heritability	42.00	44.00	48.00	61.00	51.00	25.00
Genetic advancement @5%	0.65	2.35	0.33	3.35	0.439	2.35
Genetic advancement as % of mean 5%	0.24	3.56	1.83	4.3	0.562	4.57
General mean	264.9	66.06	18.07	108.23	54.66	66.06

Higher genetic advance was found for plant height (65.00%) followed by ear height (61.86%),plant height (6.5 %), cob weight (43.9%), number of cobs per plant (23.5%) and plant stand (23.5%). Similar results for high genetic advance for grain yield per plant were earlier reported by (Arun Kumar Singh *et al.* 2018; Suresh *et al.,* 2012; Kanagarasu *et al.,* 2013; Bekele *et al.,* 2014). High heritability coupled with high genetic advance was observed for grain yield per plant, ear height and plant height and ear length. It indicates the role of additive gene action in controlling the traits; hence pedigree method of breeding will be a rewarding one to improve the traits under investigation. Similar results were reported by (Kabdal *et al.,* 2003) for grain yield, plant height, ear height and ear length. For grain yield per plant and number of kernelsper row (Hepziba *et al.,* 2013).

In conclusion, high estimates of PCV and GCV were recorded for grain yield per plant and ear height which provides considerable variability and offers scope for genetic improvement through selection. Further high heritability coupled with high genetic advance were observed for grain yield per plant, ear height, plant height, number of kernels per row, 100 – seed weight and ear length Indicate the role of additive gene action in controlling the traits, hence pedigree method of breeding will be a rewarding one to improve the traits under investigation.

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