IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 1, 2023

Assessment of Genetic Variability for Yield Contributing Traits in Maize

[a]V.P. Yadav*, [aa]R.K.Yadav, [b]Vipin Kumar, [bb]Anoop Shukla

[a]Department of Genetics and Plant Breeding, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur-208002, U.P., India.

[B]Department of Agriculture Extension Education AKS University Satna (U.P.) India

***Correspondence author e-mail:vishwanath9450@gmail.com Vk3769784@gmail.com**

ABSTRACT

In the current study, eighteen maize parents were crossed in a line x tester to measure genetic variability and selection criteria in the yield of grains and associated features throughout the period of Rabi (2020–2021). Additionally, eighteen F1, S, and F2 parents were evaluated. at C. S. Azad University of Agriculture and Technology, Kanpur, in a complete randomized block design with three replications.

Major variations were found for every attribute in the parents' analyses of variance, indicating the genetic diversity within the maize genotypes. For cob diameter (17.31 and 62.93 %) and length of cob (1.8 and 63.93 cent), the moderate PCV and GCV were noted. 8.9%) in the F1 generation. For cob dimension (18.9 and 67.42 percent) and cob length (2.69 and 13.43 cent), the F2 generation showed both a moderate PCV and GCV. For cob diameter, high heritability estimates were noted in both generation. Days to 50% tasselling, days to 50% silking, days to 75% dry husk, plant height at 50 days after sowing (cm), cob length (cm), the number of cobs per plant, and the number of grain per cob were found to have moderate heritability estimated in both the generation. These results are consistent, suggesting that the non-fixable genetic influence plays a larger role. For days to days to 75% dry husk and plant height at 50 days after sowing (cm), moderate heritability with moderate genetic progress was identified in both generations.

Key words: Genetic variability, Heritability and Genetic advance in maize

Maize (*Zea mays* L.) is Among the most significant cereal crops of India. It is a member of grass family, poaceae (gramineae) has 2n = 2x = 20 chromosomes. Maize is the third most significant cereal crop of India after rice and wheat. In India the annually Yield of cereals is around 297.02 mt from an continent of 124.30mha.with Productivity level of 2126 kg/ha, Maize contributed around 27.23mt. Productions from an continent of 10.29 m ha. with productivity level of 2830 kg/ha during 2019-20 (Agricultural statistics at a glance 2019, DAC&FW).

MATERIALS AND METHODS

The basic material in the current study consisted of eighteen varieties/ strains of maize namely, D47-1,TSK93-3, D2- 1, IB-3-1/1573/R-17, D2-2, D12, D 48, TSK-36-B, D 13, D-4-1, D36-1, D 47, D 14, D15, D 10,AUD-2, D16-1, and D2-3 were taken from the germplasm maintained at maize Section, Department of Genetics and Plant Breeding. C S Azad University of Agriculture and Technology, Kanpur. Crosses will be made by taking 18 inbred lines and 3 testers using line × tester mating design at Students educational Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Campus during *Kharif season* (2019). Total number of crosses will be 54. Mature seeds of each cross and selfed seeds of parental lines will be harvested and procured separately for development of fresh F1 and F2 source seed. Parents and F1 seed of 54 crosses well be grown in order to get fresh F1 seed and F2 source seed by selfing of F1 progenies during Rabi period 2019-20. Final trial will be carried out by taking total 131 treatments, including 21 parental lines (18 lines and 3 testes),54 F_1's 54 F_{2s} and 2 check varieties during *Rabi* period (2020-21).

Heritability:

(a) The heritability in narrow sense ($\hat{h}^2$) was calculated as indicated by **Kempthorne** and **Curnow (1961).**

$$\hat{h}^2\,(\%) = \frac{2\hat{\sigma}^2 g}{2\hat{\sigma}^2 g + \hat{\sigma}^2 s + \hat{\sigma}^2 e} \times 100$$

Where,

$\hat{\sigma}^2 g$ = Variance due to gca

$\hat{\sigma}^2 s$ = Variance due to sca

$\hat{\sigma}^2 e$ = Variance due to error

(b) Genetic advance:

It was estimatated using the following formula**:**

$$Gs = (K).\ (\sigma\ Ph).\ (\hat{h}^2)$$

where,

Gs = The expectation of genetic Progress undergoing selection

K = Selection differential (2.06), a constant at 5 per cent selection intensity

σ Ph = The phenotypic standard deviation

$\hat{h}^2$ = The estimate of heritability coefficient in narrow sense

The percentage of mean for genetic advancement was computed as follows:

$$Gs\ (\%) = \left(G_S / \overline{X}\right) x\ 100$$

Where,

Gs = Expectation of genetic advance

$\overline{X}$ = Mean of the character

Gs (%) = Genetic advance in per cent over mean of the character

Estimation of coefficient of variability:

The genotypic coefficient of variability (GCV), phenotypic coefficient of variability (PCV) and environmental coefficient of variability (ECV) were computed following **Burton and de Vane (1953)**:

$$GCV = \frac{\text{Genotypic standard deviation}}{\text{Mean}} x\ 100 \quad \text{Or} \quad \frac{\sigma_g}{\bar{x}} x\ 100$$

$$PCV = \frac{\text{Phenotypic standard deviation}}{\text{Mean}} x\ 100 \quad \text{Or} \quad \frac{\sigma_p}{\bar{x}} x\ 100$$

$$ECV = \frac{\text{Environmental standard deviation}}{\text{Mean}} x\ 100 \quad \text{Or} \quad \frac{\sigma_e}{\bar{x}} x\ 100$$

RESULTS AND CONVERSATION

For every investigated variable, analysis of variance revealed significant differences across genotypes (Table 1). The results show that the experimental genotype offered enough genetic diversity for every attribute that was assessed. In the F1 and F2 generations, respectively, the general mean range was from 1.90 to 356.7 and 1.85 to 365.1) (Table -1). Days to 50% silking (52.00) and days to 50% tasseling (51.2) are the general means in the F1 and F2 generation. (127) (128), days to 75 % dry husk (1.90) and (1.80), plant height at 50 days after sowing (189.5) and (191), cob diameter (19.69) and cob length (20.62) (365) and (375), number grains per cob (61.2) and (62.12),grain yield per plant(29.9) and (28.3), no. of leaves at 50 days after sowing (83.2) and (82) , Cob weight (16) and (14), shelling percentage(39.2) and (38.3) ,tryptophan content (26.1) and (25), 100-kernal weight (4.88) and (4.44) and numbers of cobs/plant (8.3) and (7.2).

For every character, the estimates of the phenotypic coefficients of variations (PCV) in the F1 and F2 generations were greater than the genotypic coefficients of variations (GCV). For cob diameter, high heritability estimates were noted for both generations. Days to 50% silking, days to 50% tasseling, and days to 50% tasseling all had moderate heritability estimates. days to 75 % dry husk, plant height at 50 days after sowing (cm), the diameter of the cob (cm), how many cobs are on each plant, and how many grains are on each cob in both generation. This suggested that the genetic effect that is unfixable plays a larger significance. estimates of moderate heritability were additionally published by Kanagarasu et al. Viola et al. (2003) reported moderate heritability with low to medium genetic progress as a percentage of mean for the total number of cobs per plant, cob height, and height of the plant, and the number of seed rows per cob. (2013) heritability suggests that selection may be effective for these. Genetic advancement in percent of mean varied from 0.25 to 62.93) in F1 generations and from 0.29 to 67.48 in F2 generations in order to determine the relative quality of various traits. Characters like days to 50% silking, days to 50% tasseling, A moderate level of genetic advance was demonstrated by 75% dry husk, plant height at 50 days after sowing (cm), cob length (cm), cob diameter, number of cob per plant, and number of grains per cob .

CONCLUSION

For both generations, the cob diameter showed substantial heritability values. so that result of this study cob diameter could be used as a selection criterion because of its highly effects on F1 and F2 generations of all other characters. These findings concur, suggesting that the non-fixable genetic influence plays a larger role.

REFFERENCE

Anonymous, (2019).Agriculture – Statistical year book India (Ministry of statistics and programme implementation),mospi.nic.in/statistical-year-book- India/2019.

Bisen,N.; Rahangdale,C.P.; and Sahu,R.P;(2018). Genetic variability and correlation studies of yield and yield component in hybrid maize varieties in (*Zea mays L.*) in the kymore plateau and satpura hill region of MP. *IJAEB:* **11**(1):71-77.

Burton,G.W.;(1952).Quantitative inheritance in grasses. Sixth International Grassland Congress Proceedings, the state of Pennsylvania College, USA, 23 August 1952. 277-283.

Dar,Z.A.; Lone, A.A.; and Alie ,B.A.; (2018).Combining capacity analysis for yield and characteristics that contribute to yield in popcorn(*Zea mays L.)* under temprate conditions.*JPP,***7**(1),361-366.

1. Kanagarasu, S., Ganesan, K. N., Kannan, S., and Nallathambi, G. (2013). Genetic variability and association study analysis for maize (Zea mays L.) single cross hybrids' yield and its constituent parts. Plant Breeding Electronic Journal; 4(4): 1319–1324.

Kempthorne, O. 1957. An overview of genetic statistics. New York, John Wiley and Sons, Inc. London: Chapman and Hall Limi. USDA,(2019)NationalAgriculturalstatisticsService.

Table. Estimation of heritability and expected genetic advance for 14 characters in 18 x 3 Line x Tester cross in Maize (*Zea mays L.*)

Characters	Mean performance			Heritability		Genetic advance		Expected genetic advance in % of mean	
	Parent	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
Days until 50% tasseling	53.8	51.2	52.0	0.632	0.697	3.934	3.924	7.616	7.497
Days until 50% silking	130.0	127.5	128.9	0.872	0.866	6.342	6.723	4.956	5.206
Plant height at 50 DAS (cm)	190.5	189.5	191.0	0.970	0.950	14.927	16.111	8.397	8.438
No. of leaves at 50 DAS	82.1	83.1	82.0	0.953	0.920	8.401	9.26	18.131	11.286
Days to 75% dry husk	1.90	1.90	1.85	0.946	0.848	0.254	0.296	13.377	14.918
Number of cobs/plant	7.88	8.37	7.80	0.386	0.503	1.045	1.207	12.631	14.452
Cob length(cm)	20.61	20.99	19.98	0.839	0.772	1.881	2.699	8.992	13.433
Cob diameter (cm)	356.7	365.1	355.3	0.903	0.917	62.933	67.429	45.31	41.966
Cob weight (g)	14.6	16.3	14.8	0.627	0.685	1.266	1.431	7.835	9.06
Number of grains/cob	62.03	61.71	62.28	0.829	0.802	4.846	4.69	7.846	7.537
100-Kernal weight (g)	4.776	4.870	4.486	0.972	0.917	1.497	1.729	30.854	38.099
Grain yield /plant (g)	28.40	29.90	28.71	0.673	0.718	3.268	4.077	11.032	14.228
Shelling percentage	39.02	39.14	38.55	0.890	0.835	1.838	2.284	4.697	5.912
Tryptophan content (%)	26.59	26.80	25.07	0.245	0.127	1.355	1.916	5.063	7.559

*, ** Significant at 5% and 1%, respectively