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Mean Performance and Analysis of Variance of Thirty Genotypes for Twelve Characters Studied in Maize (*Zea mays* L.)

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A B S T R A C T

The mean performance and analysis of variance (ANOVA) was studied in a set of thirty genotypes on maize (*Zea mays* L.). The experiment was conducted in a Randomized Block Design (RBD) with three replications at Genetics and Plant Breeding Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. The data were recorded on plant height (cm), days to 50% tasselling, days to 50% silking, days to 75% brown husk , ear height (cm), leaf width (cm), tassel length (cm), cob length with husk (cm), cob length without husk (cm), cob diameter (cm), 100 seed weight (g), and grain yield per plant (g). The genotype HUZM-53 produced high grain yield per plant followed by HUZM-185, V-336, HUZM-97-1-2, V-348 and HUZM-80-1. The genotype HUZM-478, HUZM-509 and CML-163 were found to be the earliest to tasseling, silking and 75 per cent brown husk. The analysis of variance of twelve characters among 30 genotypes exhibited highly significant differences for all the traits indicating presence of significant variability among 30 genotypes. The presence of variability in present investigation indicated the ample scope of selection for these traits.

Introduction

Maize is an important staple food in many parts of the world. In India maize crop stand up as the third cash crop after wheat and rice. Maize, which is the only food cereal crop that can be grown in different seasons requires moderate climate for growth. It is grown from latitude 58N to 40S, from sea level to higher than 3000 m altitude and in areas receiving yearly rainfall of 250 to 5000 mm (Downsell *et al*., 1996). India had produced only 15.5 million tonnes maize in 2015-16 *Kharif* season, down from 17.01 million tonnes a year ago, according to the farm ministry data. India's *Kharif* maize acreage was at 1.15 million hectares as of 23rd June 2016, down 12% from a year-ago level, according to data from the agriculture ministry. It is used as an important raw material in food processing, feed industry and in various other industrial applications. In the last few years, maize is increasingly being used for feed consumption. Thereby, assuming almost steady demand and reasonable price, the total maize consumption for 2016-17 for feed is likely to rise to 13000 thousand metric tonnes compared to 2015-16 estimated consumption of 12700 thousand metric tonnes. As well, based on latest market reports the poultry industry has been growing at 4-5 percent in the last few years. About 65-70% of maize produced in the country is used by the poultry, livestock, food and starch industries. Improvement in yield and quality of crop is the primary objective of a plant breeder. Selection of superior plants is the basis of crop improvement. The efficiency of selection depends on the identification of genetic variability from the phenotypic expression of the characters. Variability means difference among the individuals of a same or different species. The variability may be due to environment or genotypes or interaction of both the components.

Materials and Methods

Experimental material

The experimental materials consisted of 30 genotypes of maize which were obtained from my supervisor Prof. Rajesh Singh, Maize Breeder in Department of Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.

Experimental design

The experiment was laid out in randomized block design. The field was divided into three homogeneous replication blocks. Thirty genotypes were randomly planted in three replications. Each entry was represented by a double row of 4 m length spaced at 75cm between the rows and 20 cm between the plants within the rows. Two border rows were planted at both sides of blocks to reduce the border effects.

Preparation of land

A uniform piece of land was selected for laying out the experiment. The land was brought to the fine tilth by ploughing and harrowing.

Sowing and cultural practices

The land was prepared by ploughing followed by two cross harrowing. The basal dose of 60 kg N, 60 kg P_2O_5 and 40 kg K_2O per hectare was applied to the whole experimental area. The remaining dose of 60 kg N was applied in equal two splits at 30 and 45 days after sowing. The thinning operation was carried out 20 days after sowing. The cultural practices like plant protection and weeding were followed as and when required during the crop growth period.

Observations on following twelve characters were recorded on five randomly selected plants from each plot in each replication. These plants were tagged before tasseling. The data were recorded on plant height (cm), days to 50% tasselling, days to 50% silking, days to 75% brown husk , ear height (cm), leaf width (cm), tassel length (cm), cob length with husk (cm), cob length without husk (cm), cob diameter (cm), 100 seed weight (g), and grain yield per plant (g).

Statistical analysis

Analysis of variance (ANOVA)

The analysis of variance was done as suggested by Panse and Sukhatme (1985) in following form.

Source of variation	DF	MSS	Expected mean square
Replication	(r-1)	MSr	$\sigma^2e + t\,\sigma^2r$
Treatment	(t-1)	MSt	$\sigma^2e + r\,\sigma^2r$
Error	(r-1)(t-1)	MSe	σ^2e
Total	(rt-1)		

Where,

r = number of replication
t=number of treatments

Results and Discussion

The mean values, range, standard error and CV of the thirty genotypes for different characters are given in Table 1.

Plant height (cm)

The genotype CML-161 (74.63 cm) was found dwarf, while HUZM-185 (163.92 cm) was found tall. The observed mean value was 134.09 ± 3.98 and C.V. was 5.15%.

Days to 50% tasseling

The days to 50% tasseling ranged from 42.67 (HUZM-478) to 57.33 (HUZM-53) and overall mean performance was 51.86 ± 2.24 whereas, the C.V. was 7.49%.

Days to 50% silking

The days to 50% silking range was from 48.33 (HUZM-478) to 64.33 (HUZM-53) and with mean value being 58.43 ± 2.37 while, C.V. was 7.00%.

Days to 75% brown husk

The days to 75% brown husk ranged from 76.00 (HUZM-478) to 97.33 (HUZM-53) whereas, overall mean value was 88.88 ± 2.39 and C.V. was 4.66%.

Ear height (cm)

The ear height was varied from 30.01 cm (CML-169) to 64.70 cm (HUZM-185) and overall means value was found 51.98 ± 1.98 and C.V. was 6.60%.

Leaf width (cm)

The leaf width range of means was from 6.48 cm (CML-161) to 11.08 cm (HKI-162). The value of grand mean was found 8.56 ± 0.20 and C.V. was 4.03%.

Tassel length (cm)

For the tassel length mean varied from 24.27 cm (CML-163) to 37.14 cm (HKI-287), whereas, grand mean was found 30.94 ± 1.52 and C.V. was 8.51%.

Cob length with husk (cm)

For this trait, the mean value was varying from 18.41 cm (HUZM-88) to 30.91 cm (HUZM-185). The value of overall mean was found to be 25.72 ± 1.35 and C.V. was 9.11%.

Cob length without husk (cm)

For this trait, the mean value was varying from 12.43 cm (HUZM-88) to 21.17 cm (HUZM-185). The value of overall mean was found to be 17.44 ± 2.66 and C.V. was 9.05%.

Cob diameter (cm)

For this trait, the mean value was varying from 3.78 cm (HUZM-536) to 5.78 cm (HUZM-211-1). The value of overall mean was found to be 4.38 ± 0.23 and C.V. was 9.09%.

100 seed weight (g)

100-seed weight ranged from 15.39g (HUZM-88) to 20.5g (HUZM-185). The value of grand mean was found 17.35 ± 0.41 and C.V. was 4.06%.

Table.1 Mean performance of thirty genotypes for twelve characters studied in maize

Sr No	Genotypes	PH	DTT	DTS	DBH	EH	LW	TL	CLWH	CLWOH	CD	100 SW	GY
1	CML-163	84.57	50.00	54.67	84.67	33.48	7.02	24.27	26.19	17.68	4.11	16.13	72.23
2	CML-169	77.33	51.00	56.67	86.00	30.01	7.18	31.73	25.14	16.32	3.86	18.12	82.33
3	DMR-QPM-58	126.18	54.00	59.00	87.67	47.79	8.03	32.18	24.89	16.74	4.48	17.05	82.42
4	CML-141	89.21	50.67	57.33	87.33	36.26	6.74	30.74	26.59	18.80	4.25	17.71	81.47
5	CML-161	74.63	50.67	60.00	90.33	30.46	6.48	27.54	24.87	17.00	4.71	16.95	81.91
6	HKI-162	137.79	55.00	61.33	91.00	57.01	11.08	31.03	26.22	17.99	4.05	17.08	87.45
7	HKI-164-4-(1-3)-2	103.55	51.33	59.67	88.33	43.18	8.67	32.88	25.06	17.02	4.27	18.04	83.30
8	HUZM-53	162.40	57.33	64.33	97.33	62.95	8.62	29.39	25.82	17.90	4.36	15.41	100.73
9	HUZM-88	155.10	52.00	58.33	88.33	60.21	8.56	29.52	18.41	12.43	4.47	15.39	70.33
10	HUZM-97-1-2	83.40	52.67	59.67	90.00	31.46	9.32	33.49	23.53	16.20	4.32	17.06	90.41
11	HKI-193-1	146.02	52.67	61.00	91.00	53.82	8.04	30.05	26.02	18.33	4.30	18.11	86.33
12	HKI-287	143.94	53.00	61.33	92.00	52.45	8.60	37.14	26.02	16.73	4.34	17.43	88.23
13	HKI-586	142.20	52.67	57.67	89.00	53.02	9.35	29.16	23.69	15.51	4.32	17.55	84.58
14	HUZM-152	124.81	51.33	56.67	87.33	52.43	8.71	29.22	25.53	17.30	4.65	18.02	88.12
15	HUZM-185	163.92	52.67	61.00	91.67	64.70	9.25	30.81	30.91	21.17	4.51	20.50	96.22
16	HUZM-211-1	155.19	51.00	58.67	89.00	63.43	8.60	29.99	26.58	16.90	5.78	16.88	87.88
17	V-25	151.12	52.67	59.67	89.67	60.49	8.62	30.18	26.25	16.96	4.29	16.75	88.12
18	V-335	114.86	53.33	59.00	89.67	43.10	8.65	32.29	25.98	17.70	4.46	17.76	87.49
19	V-336	107.36	53.33	59.00	89.33	43.43	8.61	29.15	24.41	16.32	4.39	17.19	91.78
20	HUZM-242	155.00	50.67	56.00	87.00	60.56	8.20	32.90	26.19	18.19	4.25	17.90	87.07
21	HUZM-478	151.57	42.67	48.33	76.00	59.38	8.56	33.71	25.80	16.31	4.20	18.22	87.49
22	HUZM-509	149.91	45.67	52.00	83.33	56.96	8.99	28.62	25.72	17.43	4.42	17.34	85.07
23	HUZM-536	143.16	50.33	56.67	88.33	50.37	8.88	30.87	26.09	17.80	3.78	16.47	84.05
24	HUZM-1105	159.95	53.00	57.67	91.00	59.66	8.92	31.07	26.07	17.16	4.35	17.18	87.31
25	V-348	156.25	53.33	60.00	91.67	59.88	8.90	33.62	26.22	18.20	4.43	17.85	88.91
26	V-351	156.49	51.67	57.00	86.33	62.49	8.73	32.02	25.42	17.71	4.72	17.14	88.43
27	HUZM-80-1	148.70	53.33	60.33	91.00	57.02	8.86	31.25	27.67	19.51	4.33	17.16	88.57
28	HKI-1105	156.11	51.33	58.33	89.67	58.68	9.01	31.25	27.01	18.84	4.41	17.11	87.12
29	HKI-323	148.16	54.00	61.00	91.00	57.02	8.89	31.25	26.15	17.95	4.29	17.96	85.68
30	HUZM-60	153.89	52.33	60.67	91.33	57.60	8.76	31.26	27.02	19.10	4.33	17.17	87.55
	Mean	134.09	51.86	58.43	88.88	51.98	8.56	30.94	25.72	17.44	4.38	17.35	86.29
	Range Lowest	74.63	42.67	48.33	76.00	30.01	6.48	24.27	18.41	12.43	3.78	15.39	70.33
	Range Highest	163.92	57.33	64.33	97.33	64.70	11.08	37.14	30.91	21.17	5.78	20.50	100.73
	S.E.	3.98	2.24	2.37	2.39	1.98	0.20	1.52	1.35	2.66	0.23	0.41	3.62
	C.V.	5.15	7.49	7.00	4.66	6.60	4.03	8.51	9.11	9.05	9.09	4.06	7.26

Table.2 Analysis of Variance (ANOVA) for twelve traits in thirty maize genotypes

Source of variation	DF	Mean sum of squares											
		PH	DTT	DTS	DBH	EH	LW	TL	CLWH	CLWOH	CD	100 SW	GY
Replication	2	194.49	11.54	13.30	14.21	18.03	0.33	13.61	7.36	0.06	0.49	1.16	61.71
Treatment	29	2396.89**	20.59**	27.70**	38.33**	341.58**	2.24**	15.74**	10.75**	6.62**	0.33**	2.60**	2.60**
Error	58	47.62	15.08	16.76	17.13	11.78	0.12	6.93	5.49	2.49	0.16	0.49	0.49

**and* Significant at 1% and 5% level of significance, respectively. Where, PH (cm) = plant height, DTT (50%) = days to 50% tasseling, DTS(50%) = days to 50% silking, DBH(75%) =days to 75% brown husk, EH(cm) = ear height, LW(cm) = leaf width, TL(cm)= Tassel Length CLWH(cm) = cob length with husk, CLWOH(cm) =cob length without husk, CD(cm) = cob diameter, 100 SW(g) =100 seed weight, GY = grain yield per plant.

Grain yield per plant (g)

The grain yield per plant was found lowest for HUZM-88 (70.33g) and highest for genotype HUZM-53 (100.73g) with 86.29 ± 3.62 g being the mean value and C.V. was 7.26% for this character.

Analysis of variance

The analysis of variance for the design of an experiment (Table-2) indicated the existence of significant variability among the 30 genotypes of maize for all the characters under study. The presence of large amount of variability is due to diverse source of the material as well as environmental influence, which pre-dominantly governed the phenotype.

The variability was highly significant for all the traits of the genotypes. Thus, the presence of variability in present investigation indicated the ample scope of selection for these traits. Similar trends of high significant difference among the different genotypes were observed by Parimala *et al*., 2011, Pinnisch *et al*., 2012 and Patil *et al*., 2016 in maize and Jakhar et al., 2016 in chickpea in previous studies.

References

Downsell, C.R., Paliwal, R.L., Cantrell, R.P. 1996. Maize in the third world. West view press, pp. 1-37.

Jakhar, D.S., Kamble, M.S., Singh, A., Kumar, S. 2016. Performance of chickpea genotypes in Kolhapur region. *International Journal of Agriculture, Environment and Biotechnology*, 9(2): 283-289.

Panse, V.G., Sukhatme, P.V. 1985. Statistical Methods for Agricultural Workers, Indian Council of Agricultural Research, New Delhi.

Parimala, K., Raghu, B., Reddy, A.V. 2011. Correlation and path analysis for yield and quality traits in maize (Zea mays L.). Plant Arch., 11(2): 1045-1047.

Patil, S.M., Kumar, K., Jakhar, D.S., Rai, A., Borle, U.M., Singh, P. 2016. Studies on variability, heritability, genetic advance and correlation in maize (*Zea mays* L.). *International Journal of Agriculture, Environment and Biotechnology*, 9(6): 1103-1108.

Pinnisch, R., Mowers, R., Trumpy, H., Walejko, R., Bush, D. 2012. Evaluation of maize (Zea mays L.) inbred lines for yield component traits and kernel morphology. Maydica, 57: 1-5.

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