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GENETIC VARIABILITY FOR YIELD PARAMETERS IN MAIZE (*Zea Mays* L.) GENOTYPES

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ABSTRACT

The present study was conducted to assess the magnitude of genetic variability in maize genotypes for yield and yield components under agro climatic conditions of Peshawar valley. The experiment was conducted at NWFP Agricultural University Peshawar, during spring 2005. Significant variability was observed for cob length, grains rows cob^{-1}, fresh cob weight, grain moisture content, 300-grains weight and grain yield. Sarhad white had maximum cob length (16cm) while PESV-3-1 and EV-2 x Pahari had least cob length (11cm). Azam and EV-2 x Pehari had maximum number of grain rows cob^{-1} (16cm), while minimum grain rows cob^{-1} was recorded in Jalal and FRW-4 x EV-3 (13cm). Data recorded for fresh cob weight showed that genotype FRW-4 X EV-3 (Late) had maximum fresh cob weight (14.30kg) while the minimum fresh cob weight (4.4kg) was recorded for EV-2. The maximum percent grain moisture content was obtained in genotype PESV-3-3 (43.40%), while the minimum was obtained in the genotype EV-2 (15.00%), maximum value for 300 grain weight was shown by Azam (11.0g), while the minimum value (6.2g) was recorded in genotype FRW-4 x EV-3 (Late). FRW-4 x EV-3 (Late) showed higher grain yield ha^{-1} with the value of 11900 kg ha^{-1}, while the genotype Azam had low grain yield ha^{-1} (1171 kg ha^{-1}). The present study revealed considerable amount of diversity among the tested populations which could be manipulated for further improvement in maize breeding.

Keywords: maize, variability, yield, divergence, genotypes.

INTRODUCTION

Maize-an important Kharif cereal crop, cultivated throughout the world, is of significant importance for countries like Pakistan, where rapid increase in population have already out stripped the available food supplies. Maize is primarily used as an energy crop, but specialized version for protein, oil, waxy, sweet corn, and pop corn are also common. Increased production per unit area is the primary objective in many maize breeding programmes. Of these grain yield is the most important and complex character with which the maize breeders work. Being quantitatively inherited trait and controlled by numerous minor genes, is a result of different vital processes of the entire plant, such as photosynthesis, transpiration and storage of food materials. Maize display an orderly sequence of development of yield components namely number of cobs plant^{-1}, number of kernel rows, number of kernel rows^{-1} and kernel weight (Viola *et al.*, 2003). Thus, indirect selection can be used through searching for improved yield components (Welsh, 1981).

Genetic improvement in traits of economic importance along with maintaining sufficient amount of variability is always the desired objective in maize breeding programs (Hallauer 1972). Grzesiak (2001) observed considerable genotypic variability among various maize genotypes for different traits. Bernardo (1995) and Ihsan *et al.* (2005) also reported significant genetic differences for morphological parameter for maize genotypes. This variability is a key to crop improvement (Welsh, 1981).

The present study was conducted to evaluate the performance of different maize genotypes under the agro climatic condition of Peshawar valley and assess the magnitude of diversity among them. The objective was to search for maize genotype(s) with improved yield along with other desirable traits.

MATERIALS AND METHODS

The present study was conducted to evaluate maize genotypes for genetic variability in yield and yield component, at NWFP Agricultural University Peshawar, Pakistan, during spring 2005. The selected genotypes were OPVs and were having more heterogeneity as compared to hybrids. The experiment was laid out in randomized complete block design with three replications. The genotypes were grown in three rows plots, with row length of 5m, having row to row and plant to plant distance of 0.75 and 0.25m, respectively. Two seeds per hill were planted, which were thinned to one plant per hill at 4-5 leaf stage. Fertilizer in the form of urea and DAP was applied at the rate of 250 and 125kg ha^{-1}, respectively. Standard cultural practices were followed from sowing till harvesting during the entire crop season.

Data was recorded on five competitive plants from each plot for yield related traits viz; cob length (cm), grains rows cob^{-1} , fresh cob weight (kg), grain moisture content (%), 300-grains weight and grain yield (kg ha^{-1}) was calculated for the entire plot, converted into yield ha^{-1}. Data were statistically analyzed using analysis of variance appropriate for randomized complete block design. Means were compared using LSD test at 0.05 level of probability when the F values were significant (Steel and Torrie, 1984).

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RESULTS AND DISCUSSION

Data on cob length are presented in Table-1. Perusal of the data revealed that the tested genotypes differed significantly for the trait. Among the tested genotypes, Sarhad white had maximum cob length (16cm), while the genotype PESV-3-1 and EV-2 x Pahari showed minimum cob length (11cm). Number of grains row cob^{-1} varied significantly among the tested genotypes of maize (Table-1). Genotype Azam and EV-2 x Pehari produced maximum number of grain rows cob^{-1} (16), while minimum grain rows cob^{-1} was recorded in genotype Jalal and FRW-4 x EV-3 (Late) (13cm). Mean values were significantly different for percent grain moisture content at harvest (Table-1). The maximum percent grain moisture content was obtained in genotype PESV-3-3 having a value of 43.40%, while the minimum was obtained in the genotype EV-2 (15.00%).

Scrutiny of the data regarding fresh cob weight plot^{-1} revealed significant differences for the parameter among the studied genotypes (Table-1). According to the mean values genotype FRW-4 X EV-3 (Late) had maximum fresh cob weight (14.30kg) while the genotype EV-2 showed minimum fresh cob weight (4.4kg). Data pertaining 300-grain weight (g) of the 12 genotypes (Table-1) were significantly different. Maximum value for 300-grain weight was shown by Azam (11.0g), while the minimum value was recorded in genotype FRW-4 x EV-3 (Late) (6.2g). Similarly, data recorded for grain yield (kg ha^{-1}) showed significant differences among the studied genotypes. Genotype FRW-4 x EV-3 (Late) showed higher grain yield ha^{-1} (11900kg ha^{-1}), while the genotype Azam produced minimum grain yield ha^{-1} (1171kg ha^{-1}).

The possible reason for the observed differences could be variation in their genetic make up. Different researchers have reported significant amount of variability in different maize populations including top-crosses and open pollinated varieties (Sampoux *et al.* 1989). Our results are in line with those of Grzesiak (2001), who also observed considerable genotypic variability among various maize genotypes. Similarly, Sokolove and Guzhva (1997) reported pronounced variation for different morphological traits among inbred lines. Different Hybrids have also been evaluated for morphological and agronomic traits, showing significant amount of variation among these (Ihsan *et al.*, 2005). Shah *et al.* (2000) have reported significant amount of variability for different morphological traits. Mitchell-Olds and Waller (1985) have also reported increased performance of heterogeneous populations over those resulted from selfing. Such genotypes help farmers compensate their inputs, as compared to hybrid cultivars, which asks for a strict crop production package. Based on present study, genotype Sarhad White could be recommended for general cultivation in the agro-climatic condition of Peshawar valley.

Table-1. Data on cob length, grains rows cob^{-1}, fresh cob weight, grain moisture content, 300-grains weight and grain yield (kg/ha) of maize genotypes, during spring-2005.

Genotypes	**Cob Length** (cm)	**Grains Rows Cob^{-1}**	**Grain Moisture Content** (%)	**Fresh Cob Weight** (kg plot^{-1})	**300-Grains Weight** (g)	**Grain Yield** (kg/ha)
Ev-2 x (FRW-4 x PESV-3)	14 ABC	14 BC	29.1 BC	9.5 CD	8.5 B	7955 BC
FRW-4 x EV-3 (Cobly)	15 AB	15 AB	16.5 EF	10.6 DC	8.2 B	10450 AB
FRW-4 x EV-3 (Late)	15 AB	13 C	29.8 B	14.3 A	6.2 C	11900 A
EV-2	14 ABC	14 BC	15.0 F	4.4 F	7.2 BC	4420 D
EV-2 x Pahari	11 D	16 A	23.7 BCDE	4.8 EF	7.6 BC	4323 DE
PESV-3-1	11 D	15 AB	39.2 A	7.8 CDE	8.5 B	5639 CD
PESV-3-2	13 BCD	13 C	39.5 A	8.7CD	8.6 B	6235 CD
PESV-3-3	12 CD	14 BC	43.4 A	8.3 CD	7.9 B	5558 CD
Jalal-2003	13 BCD	13 C	39.3 A	9 CD	8.5 B	6474 CD
Sarhad White	16 A	15 AB	27 BCD	14 A	8.7 B	11850 A
Pahari	15 AB	15 AB	20.5 DEF	6.5 DEF	8.8 B	6149 CD
Azam	13 BCD	16 A	22.1 CDEF	12.7 AB	11.10 A	1171 E
Lsd<0.05	2.27	1.86	3.75	3.07	1.6	3175.1
CV %	9.9	7.8	16.4	22.3	12.2	28.5

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