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Pak. j. life soc. sci. (2008), 6(2): 118-120

Pakistan Journal of Life and Social Sciences

Comparative Yield Performance of Different Maize (*Zea mays* L.) Hybrids under Local Conditions of Faisalabad-Pakistan

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Abstract

In field experiment at Faisalabad, Pakistan conducted during August 2006, the comparative yield performance of different Maize hybrids under local conditions of Faisalabad was investigated. Plant population, plant height, number of cobs/plant, number of grain rows per cob, number of grains per cob, 1000-grain weight and grain yield were significantly affected. Maximum number of grains per cob, maximum 1000-grain weight and ultimately maximum grain yield was obtained in maize hybrid HG-3740.

Key words: Maize hybrids, 1000-grain weight, yield.

Introduction

Maize (*Zea mays* L.) is an important food and feed crop of the world. In Pakistan, area under maize occupies third position after wheat and rice, 98% of which is grown in Punjab and N.W.F.P. It is intensely grown on world wide bases and often referred as "king of grain crops". In Pakistan, maize is grown on an area of 896 thousand hectares with an annual production of 2775 thousand tonnes of grain and average grain yield of about 3097 $kgha^{-1}$ (GOP, 2005). Maize grain has high nutritional value as it contains 72% starch, 10% protein, 4.8% oil, 8.5% fiber, 3% sugar and 1% ash. (Chaudhary, 1983).

At present yield level is much lower than the potential of our existing varieties. Main constraints to enhance maize productivity are suboptimal plant density, inadequate fertilizer use, inadequate water supply, weed infestation, insect pest attack and the selection of unsuitable cultivars under a given set of environments. Adoption of high yielding suitable hybrids not only improves the grain yield and its quality but also leads to higher income per hectare as compared to conventional varieties of maize (Abbas, 2001). Modern maize hybrids have greater potential as compared with older hybrids (Russel, 1986). Since the yield potential of our existing varieties is deteriorating day by day, so the selection of good varieties with high potential and wide range of adoptability is highly essential. Besides tolerance to abiotic and biotic stresses, the likely cause for high yield in modern hybrids has been more ear bearing plants per unit land area without reduction in kernels per ear. During the last decade crop yield in Pakistan has been declining despite increased inputs of fertilizer and pesticides. This is due to the sowing of synthetic or composite varieties which have less potential as compared to hybrids (Njeru, 1983).

Keeping this in view, the present study was therefore, designed to compare the production potential of different available maize hybrids and to select a suitable one for maximum yield potential under the local conditions of Faisalabad.

Materials and Methods

A field experiment to evaluate the comparative yield performance of different maize under local conditions of Faisalabad was carried out at the Agronomic Research Area, University of Agriculture, Faisalabad during autumn, 2006. The experiment was laid out in randomized complete block design (RCBD) with 4 replications, having a net plot size of 7.5m x 3m. Crop was sown on 7th August 2006, with the help of dibbler using seed rate of 25 kg ha^{-1} with plant to plant distance of 20 cm and row to row distance 75cm. Fertilizer was applied @ 250 kg N, 120 kg P and 125 kg K per hectare. Half of the N and all the P & K were applied at sowing in the form of urea, single super phosphate and sulphate of potash. While the remaining nitrogen was applied at the knee height stage. The plant population was controlled in all treatments by gap filling and thinning after germination. The crop was harvested on 15th November 2006. All other agronomic practices were kept uniform for all treatments.

Results and Discussion

Optimum plant population at harvest presented in Table showed that different hybrids did not affect the plant population significantly. These results did not differ with those reported by Mulkey and Pietch (1980) who also recorded similar plant population among various maize hybrids.

Plant height is a genetically as well as environmental controlled factor and different cultivars and hybrids have different plant height. Data representing plant

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height are given in Table1which indicated highly significant results. All maize hybrids differed significantly for plant height. Significantly the maximum plant height (206.00cm) was recorded in Pioneer-32B33. However, it was followed by FSH-421 (200.00cm), HG-3740 (196.75cm) and pioneer-3062 (195.00cm). The minimum plant height (173.75 cm) was observed in Rafhan-2303. This was due to the fact that plant height is a genetically controlled factor so the height of different varieties does not remain equal. As for the effect of environmental factors on plant height is concerned it could not be neglected but the selection of proper crop cultivar manages the influence of environment. These results are in accordance with the results of Ali (1994) who also reported difference of plant height in different hybrids.

The number of cobs per plant is a genetically controlled factor but environmental and nutritional level may also influence the number of cobs per plant. The more number of cobs per plant results in more grain yield. A significant difference in number of cobs per plant is evident from the table. Maximum number of cobs per plant (1.20) was recorded in HG-3740 and Pioneer- 32B33. Minimum number of cobs per plant (1.00) was found in Rafhan-2315, Monsanto-919 and MMRI- 523. These results were also reported by Ali (1994).

The number of rows per cob is a genetically controlled factor but environmental and nutritional level may also influence the number of rows per cob. The more number of rows per cob results in more grain yield. A significant difference in number of rows per cob was recorded in HG-3740 which did not significantly differ from pioneer-32B33 and Rafhan -2303, which were statically at par with each other. Minimum number of rows per cob (12) was found in Rafhan-2315, which was also statistically at par with pioneer-3062 (12). These results were in line with Ahmad *et al.* (1978).

The number of grains per cob is a genetically controlled factor but environmental and nutritional level may also influence the number of grains per cob. Grain yield is directly related to number of grains per cob. The more number of grains per cob results in more grain yield. A perusal of the data indicated significant effect of all the hybrids on number of grains per cob. Maximum number of grains per cob (648.00) was found in HG-3740 which differed significantly from all other hybrids. Minimum number of grains per cob (436.25) was found in Rafhan-2315. These results were in line with Ali (1994).

1000-grain weight is an important factor directly contributing to final grain yield of crop. Data in the table indicated highly significant results. There was a prominent effect of different hybrids on 1000-grain weight. Maximum 1000-grain weight (279.75 g) was recorded in HG-3740 which differed significantly from all other hybrids. Minimum 1000-grain weight (240.30 g) was found in Rafhan-2315. This was due to the fact that 1000-grain weight is a genetically controlled factor so 1000-grain weight of different hybrids was different. As for the effect of environment factors on 1000-grain weight is concerned it could not be neglected but the selection of suitable hybrid can manage the influence of environment. The same results were also reported by Jing *et al.* (2003) and Ali (1994).

Table 1 Comparative yield performance of different maize (*Zea mays* L.) hybrids under local conditions of Faisalabad

Treatments	Plant pop. at harvest ha-1	Plant height(cm)	No. of cobs/plant	No. of grain rows/cob	No. of grains per cob	1000- grain weight (gm)	Grain yield ($kgha^{-1}$)
MMRI-523	65989 NS	180.25 cd	1.0 c	14 bc	580.75 c	248.75 cd	6881 de
Rafhan-2303	66012	173.75 e	1.10 b	16 ab	592.0 bc	255.07 bc	7793 b
Pioneer-3062	66050	195.0 b	1.10 b	12 cd	592.5 bc	250.52 cd	7176 cd
FSH-421	66016	200 b	1.10 b	14 b	604.75 bc	251.77 cd	7256 c
Pioneer-32B33	66085	206 a	1.20 a	17 a	611.5 b	260.75 b	8060 b
Monsanto 919	66109	179 d	1.0 c	14 b	537.25 d	246.20 dc	6653 e
HG-3740	66118	196.75 b	1.20 a	18 a	648.0 a	279.75 a	8831 a
Rafhan-2315	66093	184.5 c	1.0 c	12 cd	436.25 e	240.30 e	5929 f
LSD	-	5.080	0.06576	2.116	27.70	6.981	305.0

Grain yield of a crop is the ultimate objective of all the research of grain crops. It is a factor which is related with many other factors such as plant density, number of cob per plant, number of row per cob, number of grains per row and 1000-grain weight etc. So an increase or decrease in any of the above factors may influence the crop yield. Data in the table indicated that maize hybrid varied significantly for

grain yield. The maximum grain yield (8831 kg ha^{-1}) was obtained from HG-3740 which differed significantly from all other hybrids under study. It was followed by pioneer-32B33 (8060 kg ha^{-1}) which was statically at par with Rafhan-2303(7793 kg ha^{-1}). The significantly minimum grain yield (5929 kg ha^{-1}) was obtained from Rafhan-2315. More grain yield in HG-3740 was due to more plant density, number of cob per plant, number of row per cob, number of grains per row and 1000-grain weight in this hybrid. These results are in line with those of McCutcheon *et al.* (2001), who reported significant differences among maize cultivars for grain yield.

References

Abbas, M.A. Genetics and crop improvement. In. General Agriculture. 2nd. Emporium publisher, Lahore, Pak.2001: 218.

Ahmad, M., Mian, M.A., Chaudhry, M.A. and Anwar, M. Correlation study in maize. J. Agri. Res., 1978, 16 (3): 399-405.

Ali, Z. Studies on comparative economic returns of different maize genotypes. M.Sc. Thesis, Deptt. Agron., Univ. Agri., Faisalabad. 1994.

Chaudary, A.R. Maize in Pakistan Punjab Agri. Research Coordination Board Univ. of Agri. Faisalabad. 1983.

GOP. Economic Survey Govt. of Pakistan 2004-2005, Finance Division, Economic Advisory Wing, Islamabad, Pakistan. 2005, 8.

Jing, Q., Bingwv, W. and Yong, M. A study on Comprehensive evaluation of maize hybrids. Journal of Jilin-agricultural University. 2003, 25: 139-142.

McCutcheon, J., Siegrist, H. and Rzenwncki, P. Fair field, Licking, and Perry counties- osu extension commercial corn hybrid side by side performance trials. Special circular Ohio agriculture research and development center. 2001, (179): 54-56.

Mulkey, j.R. and. Pietch, D. Corn hybrids performance, Uvald, tocas-1979. Publication taxas Agri. Experiment station, No. PR 3654, 10 PP. 9Field crop Absts., 1980, 34 (10): 8959; 1981).

Njeru, N. Some physiological studies of different maize varieties at N.A.R.S. Kitale. Rome, Italy. FAO.1983, 511-517 (Field Crop Absts., 37(5:2876; 1984).

Russel, W.A. Contribution of breading to maize improvement in United States 1`920s-1980s. Lowa State J.Res., 1986, 61: 5-34