http://www.pjbs.org

PJBS

ISSN 1028-8880

# Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 6 (14): 1229-1231, 2003
ISSN 1028-8880


# Response of Maize Cultivars to Different NP-levels under Irrigated Condition in Peshawar Valley

Ashiq Saleem, Habib Iqbal Javed, Zulfiqar Ali and Ihsan Ullah
National Agricultural Research Centre, Pulses Programme, Islamabad, Pakistan

**Abstract:** The present study included evaluating different morphological and seed parameters of maize germplasm and their response to NP-levels for higher production. Germplasm having different morphological characteristics affect their performance with their different genetic constitution. In order to increase maize yield unit area$^{-1}$, selection of a suitable germplasm in maize is of greatest importance. Different NP-levels used were Control, 100:50, 120:60, 140:70 and 160:80. While the germplasm studied were FRHY-10, EV-1089, Margalla, Rawal and Gauher. Results showed that grain yield of the germplasm was significantly affected by NP-levels and highest grain yield was produced at 140:70 followed by 120:60, 160: 80, 100:50 and control. Significant differences were also obtained with NP levels in the germplasm with regard to the plant height, number of leaves/plant. Days to 50% Silking, were also significantly affected by both NP-levels and germplasm. Highest grain yield of 3550 kg ha$^{-1}$ was recorded in genotype FRHY-10 with NP level of 140:70 NP kg ha$^{-1}$.

**Key words:** Maize, *Zea mays* L., cultivars, NP-levels

## Introduction

Pakistan is an agricultural country, where different crops are grown for food and fodder purpose. Maize is consumed as food, feed and fodder and also has many industrial uses. It's potential to contribute towards more nutritive food for human consumption is high. (United Nations, 2000). Average maize yield (1700 kg ha$^{-1}$) in Pakistan (GOP, 2000) is much lower then those of the developed countries and there is also a large gap in potential and actual maize yield in Pakistan (United Nations, 2000). Maize is one of the most important crop of NWFP. It is a staple food for a large part of population especially in hilly areas during winter season. Maize is a good source of high quality edible oil. However, yields are low as compared to other maize growing countries in the world. The scientists have been trying to search ways for enhanced production of maize. Reeves (1997) endorsed the finding of Pinstup-Anderson and Pandya-lorch that the application of the results of agricultural research in the worlds is meant for enhanced food production, higher yields with reduced risks, lower production costs and ultimately for lower food prices which benefit both rural and urban poor people. Dowswell *et al.* (1996) mentioned that the seed of improved variety and fertilizer are the over riding importance of the modernization process. Maize is an exhaustive crop that requires higher nutrient input to obtain maximum grain yield. Soils in Pakistan are generally low in fertility and proper amount of nutrients are required through fertilizers to get proper returns. A good variety having a high yield potential plus balanced nutrition is the key towards improving corn yields. Nitrogen, along with, other nutrients plays important role in improving the growth of the plants and increasing productivity of the crops. Yadaw *et al.* (1990) also observed significant increase in corn yields with the application of 150 kg N and $P_2O_5$. Caberera *et al.* (1986) studied the affect of fertilizer and found that application of NP increases the grain yield of maize crop. Ali *et al.* (1988) studied the effect of rate of fertilizer application and found that maize yield increased linearly with increased fertilizer dose up to 150 kg NPK each ha$^{-1}$ (2955 kg ha$^{-1}$) further increased in fertilizer dose decreased yield. Viera and Fillo (1982) reported that yield increased with increasing nitrogen rate up to 135 kg N ha$^{-1}$.

The present study was designed to generate useful information to optimize NP-levels for enhancing maize yields in the Peshawar valley.

## Materials and Methods

The experiment was conducted at Malakandher Farm of N.W.F.P, University of Agriculture, Peshawar during 1997. The experiment was laid out in a Randomized Complete Block Design (RCBD). Five cultivars viz. FRHY-10, Ev-1089, Margala, Rawal and Gauher of maize were used in the main plots while NP levels (Control, 100:50, 120:60, 140:70, 160:80) were assigned to sub-plots. Sowing was done during the first week of June 1997. Each sub-plot contained 4 rows of 3 m length.Row to row distance was maintained 0.5 m. Full dose of phosphorus and half of N was applied before planting. All the cultural practices

were applied equally to all the treatments from sowing till harvesting. The remaining dose of fertilizer (N) was applied with first irrigation.The data were recorded on number of leaves plant$^{-1}$, days to 50% silking, days to 50% tasseling, plant height (cm) and grain yield kg ha$^{-1}$.Yield data in all the treatments, were recorded by harvesting the whole plot and threshing them. The data were analyzed for variance and means were separated using LSD test.

## Results and Discussion

Numbers of leaves plant$^{-1}$ were statistically same in FRHY-10, EV-1089 and Margalla but significantly higher then those of Rawal and Gauher. Number of leaves plant$^{-1}$ significantly increased with the increase in NP Level up to 140:70 but decreased on further increase in dose (160:80) Jiang *et al.* (1990). It means the higher dose is not beneficial for vegetative growth at least in the varieties under study. (Table 1).

Table 1: Number of leaves/plant as affected by various NP-levels in maize genotypes

| | NP Levels (kg ha$^{-1}$) | | | | | |
|---|---|---|---|---|---|---|
| Germplasm | Control | 100:50 | 120:60 | 140:70 | 160:80 | Mean |
| Frhy-10 | 7.50 | 7.00 | 7.75 | 7.25 | 7.75 | 7.45a |
| EV.1089 | 7.25 | 7.25 | 7.00 | 7.25 | 7.50 | 7.25ab |
| Margalla | 7.00 | 7.75 | 7.00 | 7.00 | 7.25 | 7.00b |
| Rawal | 7.50 | 7.25 | 6.75 | 7.00 | 7.50 | 7.20ab |
| Gauher | 7.50 | 7.50 | 7.50 | 7.50 | 7.00 | 7.40a |
| Mean | 7.35 | 7.15 | 7.20 | 7.20 | 7.40 | |

LSD value for.a: germplasms = 0.6873 b. NP-levels = 0.4473

Table 2 : Plant height (cm) as affected by various NP-levels in maize genotypes

| | NP Levels (kg ha$^{-1}$) | | | | | |
|---|---|---|---|---|---|---|
| Germplasm | Control | 100:50 | 120:60 | 140:70 | 160:80 | Mean |
| Frhy-10 | 160.00 | 167.75 | 179.00 | 192.75 | 183.75 | 176.65 |
| EV.1089 | 156.00 | 166.75 | 177.25 | 194.50 | 183.75 | 176.05 |
| Margalla | 157.25 | 168.50 | 176.75 | 192.50 | 183.25 | 173.65 |
| Rawal | 153.75 | 164.25 | 173.00 | 192.00 | 182.50 | 173.00 |
| Gauher | 159.25 | 168.50 | 175.50 | 198.00 | 191.50 | 178.55 |
| Mean | 157.25e | 167.15d | 176.30c | 193.95a | 185.35b | |

LSD value for NP Levels = 2.865

Table 3 : Number of days to 50% Silking as affected by various NP-levels in maize genotypes

| | NP Levels (kg ha$^{-1}$) | | | | | |
|---|---|---|---|---|---|---|
| Germplasm | Control | 100:50 | 120:60 | 140:70 | 160:80 | Mean |
| Frhy-10 | 60.00 | 62.00 | 64.00 | 67.25 | 70.25 | 64.70 |
| EV.1089 | 59.25 | 61.00 | 64.25 | 67.00 | 70.00 | 64.20 |
| Margalla | 61.50 | 64.25 | 67.00 | 70.25 | 73.00 | 67.20 |
| Rawal | 59.75 | 61.50 | 63.75 | 66.50 | 69.00 | 64.10 |
| Gauher | 61.25 | 62.75 | 65.75 | 68.25 | 71.75 | 65.95 |
| Mean | 60.35e | 62.30d | 64.95c | 67.85b | 70.80a | |

LSD value for: a. Germplasm= 0.9872 b. NP-Levels = 0.5423

Table 4: Grain yield ha$^{-1}$ as affected by different germplasm and various NP-levels in maize

| | NP Levels (kg ha$^{-1}$) | | | | | |
|---|---|---|---|---|---|---|
| Germplasm | Control | 100:50 | 120:60 | 140:70 | 160:80 | Mean |
| Frhy-10 | 2121.3fgh | 3085.0d | 3938.8b | 4757.5a | 3847.5b | 3550.00a |
| EV.1089 | 1912.5hi | 2560.0e | 3226.3cd | 4055.8b | 3398.8c | 3030.65b |
| Margalla | 1446.3j | 2068.8fgh | 2668.8e | 3155.0d | 2678.7e | 2403.50c |
| Rawal | 1360.0jk | 1987.5gh | 2575.0e | 3113.8d | 2596.2e | 2326.50c |
| Gauher | 1158.8k | 1718.8i | 2275.0f | 2601.3e | 2147.5fg | 1980.25d |
| Mean | 1599.75d | 2284.0c | 2936.75b | 3536.6a | 2933.75b | |

LSD value for: a. Varieties = 115.1 b. NP-Levels= 100.8
c. Interaction = 225.3

**Plant height:** Germplasm did not differ in plant height statistically but was affected significantly by different doses of N and P fertilizers. Plant height increased up to dose of 140:70 but decreased on further increase. Similar by Maqbool and Silva (1998) observed that NP in combination increased plant height significantly compared to N alone (Table 2).

**Days to 50%Silking:** Germplasm used in present study belonged to the same group having same maturity period. FRHY-10, EV-1089 and Rawal were almost similar in genetic maturity indicated by days to 50% silking but were earlier statistically from Margalla and Gauher. Margalla took the maximum days to 50% silking. Maturity was significantly affected by NP fertilizers. The number of days to 50% silking increased with increase in dose of NP.

**Grain yield:** On the average, maximum grain yield was recorded in FRHY-10 followed by EV-1089, which were statistically different in yields from each other as well as from other germplasm. The highest grain yield was obtained in Gauher. Margalla and Rawal had non-significant differences from each other but significantly different from other germplasm. Again, Response of germplasm to NP doses was significant (Table 3 and 4). The grain yield was increased with increase in dose upto 140:70 but yield declined with further increase in NP-fertilizers. Maqbool and Silva (1998), Rashid and Mian (1988), Ali ali *et al.* (1988) and Gautam *et al.* (2002) also observed the same findings.

## References

Ali , A., S. Ahmed, I. Ali and M. Arshad, 1988. Effect of rate and time of application on maize grain yield. J. Agric. Res., 26: 195-201.

Caberera, M.L, D.E. Kissel and D.A. Whitney, 1986. Effect of N and fertilizer application on grain yield on maize crop. Agron. J., 78: 620-622.

Dowswell, C.R., R.L. Paliwal and R.P. Cantrell, 1996. Maize in the third World. Westview Press, pp: 268.

Gautam, R.C., N.S. Gaur and V. Singh, 2002. Effect of rate of residue and nitrogen application on wheat-maize system. Indian J. Agri. Sci., 11: 769-770.

GOP., 2000. Agricultural statistics of Pakistan. Ministry of Planning, Government of Pakistan, Islamabad, Pakistan.

Jiang, Z.H., J.W. Wang, R.F. Wang and P. Zhen, 1990. Effect of nutritional elements on the growth development and grain quality of high oil maize. Scintla Agril. Sinica, 23: 37-43.

Maqbool, A. and J.A. Silva, 1998. Growth behavior and contents of sweet corn affected by nitrogen application and intercropping. Pak. J. Soil Sci., 15: 130-134.

Rashid and Mian, 1988. Effect of phosphorus on the yield and yield components of maize. Sarhad J. Agri., 4: 849-852.

Reeves, T.G., 1997. Food security; Poverty alleviation Natural Recourses Protection-Addressing Global Inequities through Agricultural Research partnership. In CIMMYT books of Abstracts. The genetic and exploitation of hetaerists in crops. An international symposium 12-22, Mexico, D.F. Sarhad J. Agri., 16: 2002.

United Nations, 2000. United Nations Statement of food Security in Pakistan. The UN System in Pakistan, pp: 38.

Viera, F.Z.C. and J.R. Fillo, 1982. Effects of macronutrients on maize cultivation. Relatorio Ann. Depesquisan-1979, Fortabze porazil.

Yadaw, R.L, R. Kumar and R.S. Verma, 1990. Effects of nitrogen applied through new carriers on yield and quality of sugar cam. J. Agric. Sci. Cambridge, 114: 225-230.