

# Determination of maize (*Zea mays* L.) genotypes under agro-climatic conditions of prayagraj, uttarpradesh, India.

## ABSTRACT

Maize (*Zea mays* L.) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally maize is Known as 'Queen of cereals' because it has highest genetic yield potential among the cereals. To find out the best Genotype among the maize hybrids, a field experiment was conducted during the *kharif* season of 2022 at the experimental field of the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India. The study was conducted for "Agronomic Evaluation of Maize (*Zeamays* L.) Genotypes under agro-climatic zones of Prayagraj, Uttar Pradesh". The experiment was done on 10 maize Genotypes. It was carried out in Randomized Block Design (RBD) with three replications. The report of the study indicates that among different maize Genotypes, M-410 produced significantly higher plant height (218.35 cm), number of leaves per plant (15.60), dry weight per plant (152.24g), cob length (19.26 cm), number of rows per cob (14.85), number of grains per row (37.03), seed yield (9.54 t/ha) and stover yield (21.62 t/ha). Hence, it was concluded that the Maize hybrid M-410 was found to be the most suitable, productive and economical for the agroclimatic Zones of Prayagraj, Uttar Pradesh.

*Keywords: Hybrid maize; yield attributes; growth attributes; Kharif ; varietal response.*

## 1. Introduction

Maize (*Zea mays* L.), is the world's leading crop and is widely cultivated as cereal grain that was domesticated in Central America. It is one of the most versatile emerging crops having wider adaptability. Globally, maize is known as queen of cereals because of its highest genetic yield potential. In India, maize is predominantly cultivated as rainfed crop but due to focused research on single cross hybrids. Moreover, local varieties of Uttar Pradesh failed to give higher yields in comparison with hybrids. Consequently, there was a great need for replacing local varieties with hybrids of different groups [3]. It is cultivated on nearly 197 Mha with a production of 1148 MT and productivity of 5823.8 kg/ha all over the globe, contributing 37 per cent of the global grain production [4]. India has produced 21.24 MT in an area of 8.15 Mha in 2021-22. India is the world's seventh largest maize producer, with the fourth greatest production area. In 2021-22, India produced 21.24 million tonnes over an area of 8.15 million hectares [5]. Maize is a largely cultivated crop in north India. Major maize producing states are Andhra Pradesh (20.9 %), Karnataka (16.5 %), Rajasthan (9.9 %), Maharashtra (9.1 %), Bihar (8.9 %), Uttar Pradesh (6.1 %), Madhya Pradesh (5.7 %) and Himachal Pradesh (4.4 %). Madya Pradesh ranks first in maize production. In Uttar Pradesh maize accounts for a 0.74 Mha area with the production of 1.53 MT and productivity of 2082 kg/ha [6].

The progress achieved on hybrid maize in the United States led to the initiation of hybrid research all over the maize world. The adoption of high yielding variety seed helped to accelerate the growth rate of production and yield of maize [7]. In recent years, farmers started and continue to replace traditional cultivars with the newer higher-yielding maize hybrids, because they are having 3 times more productivity than traditional varieties. However, changing environmental conditions have an impact on maize hybrids growth and production, thus it's crucial to test them in specific agro-climatic conditions. The objective of this study was to identify the superior maize hybrid that is suitable for the Prayagraj, Uttar Pradesh conditions based

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**Comment [AR2]:** to evaluate some agronomic characteristics of maize genotypes under .....

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**Comment [AR4]:** result

**Comment [AR5]:** Based on the result obtained M-410 is most suitable, productive and economical to be grown in the study area and therefore recommended as planting material in the agroecological zone.

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on the performance of maize hybrids in the field condition. Keeping an eye on the above aspects the present study entitled "Agronomic Evaluation of Maize (*Zea mays L.*) Genotypes under agro-climatic Zones of Prayagraj, Uttar Pradesh." was carried out at Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh during 2022 *Kharif* Season.

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## 2. MATERIALS AND METHODS

The experiment was conducted during the *kharif* season of 2022 at the Crop Research Farm, Sam Higginbottom Institute of Agriculture, Technology & Sciences Prayagraj, Uttar Pradesh, which is located at 25.24°N latitude, 81.51°E longitude and 86 m altitude above the mean sea level. It was laid out in Randomized Block Design (RBD) with three replications, and it consisted of 10 maize Genotypes viz., T<sub>1</sub>: M-400, T<sub>2</sub>: M-410, T<sub>3</sub>: M-502, T<sub>4</sub>: M-512, T<sub>5</sub>: M-600, T<sub>6</sub>: M-608, T<sub>7</sub>: M-612, T<sub>8</sub>: M-618, T<sub>9</sub>: M-702 and T<sub>10</sub>: M-710.

The maize hybrid seeds were provided by the Uttar Pradesh Council of Agricultural Research (UPCAR). They were sown at rate 20 kg/ha by maintaining the spacing of 60 cm x 20 cm in net plot area of 3 m x 3.2 m on 9<sup>th</sup> of July 2022.

The observations on growth parameters and yield attributes of maize hybrids was recorded during the experiment, and was subjected to statistical analysis by adopting the tactics of study of variance (ANOVA) as described by Gomez and Gomez [1]. The significance of comparison was tested. The significant difference (SD) values were calculated for a 5% probability of error. Critical difference (CD) values were calculated for comparisons between treatment means whenever the variance ratio (F value) was found to be significant.

## 3. RESULTS AND DISCUSSION

### 3.1 Growth Parameters

The recorded and analysed data pertaining to growth parameters indicates that significantly higher plant height (218.35 cm), number of leaves per plant (14.40) and plant dry weight (152.24) was recorded in the maize genotype M-410. The difference in the plant height, number of leaves per plant, plant dry weight was probably due to the diverse background of parental lines, from where the hybrids were developed. Similar findings were reported by Muchie and Fentie [13], Pal and Bhatnagar [10].

**Table 1. Evaluation of growth parameters of maize Genotypes under agro-climatic conditions of Prayagraj, Uttar Pradesh**

Hybrids	Plant height (cm)	Number of leaves (No.)	Plant dry weight(g)
M-400	188.72	15.40	143.70
M-410	218.35	15.60	152.24
M-502	197.41	15.52	137.92
M-512	198.60	14.77	136.57
M-600	198.60	15.65	141.19
M-608	211.13	14.82	130.23
M-612	195.36	14.40	143.64
M-618	198.52	14.66	133.41
M-702	184.40	14.85	144.85
M-710	180.03	14.91	140.10
<b>SEm(±)</b>	<b>3.88</b>	<b>0.25</b>	<b>1.09</b>
<b>CD (p=0.05)</b>	<b>11.24</b>	<b>0.75</b>	<b>3.21</b>

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### 3.2 Yield and Yield Attributes

Yield attributes such as Cobs per plant (No.), Cob length (cm), Grain row per cob (No.), Number of grains per row (No.), Seed index (g) varied among different maize hybrids. The Genotype M-410 was recorded with higher yield attributes viz. Cobs per plant (No.) (1.82), Cob length (19.96 cm), Grain row per cob (No.) (14.85), Number of grains per row (No.) (37.03), Seed index (38.40 g). The maize Genotype M-410 was also recorded significantly higher Seed yield (9.54 t/ha), Stover yield (21.62 t/ha) and Biological yield (30.61 t

The significant difference in grain yield and other agronomic traits among various hybrids was probably due to the diverse background from which the hybrids were developed. The higher grain yield of the above genotypes could be correlated to the higher number of Cobs per plant, Cob length, Grain row per cob, Number of grains per row and Seed index. Similar results have also been reported by Kumar and Kandel[8] and Manjunatha et al. [15].

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**Table 2. Evaluation of yield attributes and yield of maize Genotypes under agroclimatic conditions of Prayagraj, Uttar Pradesh**

Hybrids	Number of cobs/ plant (No.)	Number of grain rows/cob (No.)	Number of grains /row (No.)	Cob length (cm)	Seed index (g)	Seed Yield (t/ha)	Stover yield (t/ha)	Biological yield (t/ha)
M-400	1.46	13.80	34.50	12.60	33.22	7.70	19.32	27.02
M-410	1.82	14.85	37.03	19.96	38.40	9.54	21.62	30.61
M-502	1.53	12.60	32.66	17.45	32.67	8.69	20.74	29.52
M-512	1.23	12.20	31.64	16.98	30.67	9.35	21.41	30.39
M-600	1.70	12.42	27.02	15.08	28.24	8.47	20.45	29.28
M-608	1.42	14.40	30.50	18.68	25.00	9.31	21.23	30.48
M-612	1.57	12.84	34.34	17.52	30.32	8.45	20.57	29.11
M-618	1.34	13.40	35.78	15.28	35.70	9.23	21.60	29.93
M-702	1.65	14.60	31.35	16.95	30.60	7.64	19.43	28.22
M-710	1.44	13.20	34.68	16.53	33.40	8.51	20.20	29.64
<b>SEm(±)</b>	<b>0.15</b>	<b>0.41</b>	<b>2.30</b>	<b>0.37</b>	<b>1.45</b>	<b>0.40</b>	<b>0.18</b>	<b>1.41</b>
<b>CD (p=0.05)</b>	<b>-</b>	<b>1.17</b>	<b>6.64</b>	<b>1.08</b>	<b>-</b>	<b>1.18</b>	<b>0.72</b>	<b>4.11</b>

### 4. CONCLUSION

Based on the findings of this field experiment it is concluded that among 10 tested maize Genotypes, M-410 was found the most suitable maize genotype to be recommended as it recorded highest growth parameters, yield attributes and yield. It was found more productive, when compared to others under agroclimatic conditions of Prayagraj, Uttar Pradesh. Since the results are based on a single season of research, they can be repeated for conformation.

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Further Studies

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1. Food Sci. Nutr. 2020 8(10):5340 – 5351.  
2. South Asian Research of Bilogy and Applied Biosciences 2(1):8- 15  
3. Artificial intelligence in Agriculture 1:9 – 13  
4. Journal of current microbiology and applied sciences 6(10): 2227 – 2232 etc

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