Original Research Article

Determination of maize hybrids under agro-climatic conditions of Prayagraj, Uttar Pradesh, India

ABSTRACT

Worldwide Maize (*Zea mays* L.) is referred to as the "Miracle Crop" due to its high genetic yield potential compared to other Gramineae family members. Hybridization plays a vital role in boosting the production and productivity of maize, which is crucial for mitigating food insecurity in developing countries. To find out the best hybrid among the maize hybrids, a field experiment was conducted during the *kharif* season of 2021 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 "Evaluation of Maize (Zea mays L.) hybrids under agro-climatic conditions of Prayagraj, Uttar Pradesh". The experiment was done on 10 maize Hybrids. It was carried out in Randomized Block Design (RBD) with three replications. The report of the study indicates that among different maize Hybrids, UM-12 produced significantly higher plant height (217.05 cm), number of leaves per plant (12.80), dry weight per plant (151.25 g), cob length (16.62 cm), number of rows per cob (14.80), number of grains per row (31.73), seed yield (8.27 t/ha) and stover yield (20.50 t/ha). Hence, it can be concluded that the Maize hybrid UM-12 was found to be most suitable, productive and economical for the agroclimatic conditions of Prayagraj, Uttar Pradesh.

Keywords: *Hybrid maize, Yield Attributes, Growth Attributes, Kharif and Varietal Response.*

Introduction

Maize (*Zea mays* L.), the "Queen of Cereals" is one of the important cereal crops in the world. It can be grown over a range of agro-climatic zones and this quality makes it a versatile crop. It is used as a key raw material across various sectors such as feed for livestock, starch, food processing and bio-ethanol. Derivatives of corn starch are extensively used in different industries including pharmaceuticals, cosmetics, food processing, textiles and the paper industry. Along with rice and wheat, maize provides at least 30% of the food calories to more than 4.5 billion people in 94 developing countries.

(Shiferaw *et al.* 2011). 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 (FAO STAT 2019). India has produced 30 MT in an area of 9.9 Mha in 2020-21. In Uttar Pradesh maize accounts for a 0.74 Mha area with the production of 1.53 MT and productivity of 2082 kg/ha.

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, the changing environmental conditions affect the performance of maize hybrids, so it is important to evaluate them in specific agro-climatic conditions. Keeping an eye on the above aspects the present study entitled "Evaluation of Maize (*Zea mays L.*) hybrids under agro-climatic conditions 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 2021 *Kharif* Season.

Materials and Methods

The experiment was conducted during the *kharif* season of 2021 at the Crop Research Farm, Sam Higginbottom Institute of Agriculture, Technology & Sciences Prayagraj, Uttar Pradesh. The soil of the experimental area was sandy loam with moderately alkaline pH (7.8); medium in organic carbon (0.35%) and medium in available Nitrogen (243.00 kg/ha), low in available Phosphorus (20.10 kg/ha) and medium in available Potassium (105.18 kg/ha). It was laid out in Randomized Block Design (RBD) with three replications, and it consisted of 10 maize hybrids *viz.*, T_1: UM-11, T_2: UM-12, T_3: UM-13, T_4: UM-14, T_5: UM-15, T_6: UM-16, T_7: UM-17, T_8: UM-18, T_9: UM-19 and T_{10}: UM-20 which was provided by the Uttar Pradesh Council of Agricultural Research (UPCAR). Observations on growth parameters, yield attributes of maize hybrids, was recorded during the experiment.

Result and discussion

Growth Parameters

The recorded and analysed data pertaining to growth parameters indicates that significant higher plant height (217.05 cm), number of leaves per plant (12.80), plant dry weight (151.25 g) was recorded in maize hybrid UM-12.

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 (2016), Pal and Bhatnagar (2012).

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 Hybrid UM-12 was recorded with higher yield attributes *viz*. Cobs per plant (No.) (1.80), Cob length (16.62 cm), Grain row per cob (No.) (14.80), Number of grains per row (No.) (31.73), Seed index (32.33 g). The maize hybrid UM-12 was also recoded significantly higher seed yield (8.27 t/ha), stover yield (20.50 t/ha) and biological yield (28.76 t/ha).

The significant difference in grain yield and other agronomic traits among various hybrids were 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, Seed index. Similar results have also been reported by Manjunatha *et al.* (2018). Kumar and Kumar (1997) also reported that plant height was positively correlated with grain yield and stover yield.

Table No. 1. Evaluation of growth parameters of maize hybrids under agro-climatic conditions of Prayagraj, Uttar Pradesh.

Hybrids	At harvest		
	Plant height (cm)	Number of leaves (No.)	Plant dry weight(g)
UM-11	187.68	12.20	142.71
UM-12	217.05	12.80	151.25
UM-13	199.49	12.53	127.93
UM-14	202.12	11.60	136.57
UM-15	199.89	12.33	140.20
UM-16	208.85	11.80	132.24
UM-17	196.48	11.40	142.65
UM-18	203.07	11.67	138.42
UM-19	204.13	11.87	145.86
UM-20	182.19	11.93	142.11
SEm(±)	**3.89**	**0.26**	**1.08**
CD (p=0.05)	**11.25**	**0.76**	**3.20**

Table No. 2 Evaluation of yield attributes and yield of maize hybrids under agroclimatic conditions of Prayagraj, Uttar Pradesh.

Hybrids	Number of cobs per 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)
UM-11	1.47	13.47	27.73	15.47	26.33	5.55	18.44	23.99
UM-12	1.80	14.80	31.73	16.62	32.33	8.27	20.50	28.76
UM-13	1.47	14.20	28.40	15.46	28.67	7.61	19.02	26.37
UM-14	1.67	13.37	30.00	14.57	27.67	5.97	18.67	24.64
UM-15	1.67	13.42	24.80	13.81	27.67	6.80	15.67	22.47
UM-16	1.47	13.00	28.27	15.29	29.67	6.67	13.47	20.14
UM-17	1.27	12.20	30.33	16.51	26.00	5.49	12.78	18.27
UM-18	1.47	14.47	28.00	15.32	25.67	5.54	15.68	21.22
UM-19	1.53	12.87	28.27	15.37	30.33	7.71	19.05	26.76
UM-20	1.60	13.30	28.33	16.43	27.67	5.77	18.40	24.18
SEm(±)	**0.16**	**0.41**	**0.99**	**0.38**	**1.44**	**0.42**	**0.60**	**0.83**
CD (p=0.05)	**-**	**1.17**	**2.88**	**1.09**	**-**	**1.20**	**1.75**	**1.17**

Figure 1 Field preparation

Figure 2 Sowing

Figure 3 Taking readings

Figure 4 Photo with Treatment Details

Figure 5 Harvesting

Conclusion

Based on the findings of this field experiment it is concluded that among 10 tested maize hybrids, UM-12 was found the most suitable maize hybrid to be recommended as it was found more adaptive, productive and profitable when compared to others under agro-climatic conditions of Prayagraj, U.P.

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