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Evaluation of maize (*Zea mays* L.) hybrids on growth and yield under agro-climatic conditions of Prayagraj, U.P.

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Abstract

A field experiment was conducted during kharif season of 2021 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, Uttar Pradesh, India on soil with sandy loam in texture to study the "Evaluation of Maize (*Zea mays* L.) Hybrids under agroclimatic conditions of Prayagraj, U.P.". The experiment consists of 10 Maize hybrids viz., UM-01, UM-02, UM-03, UM-04, UM-05, UM-06, UM-07, UM-08, UM-09, UM-10. The experiment was laid out in Randomized Block Design (RBD) with 10 hybrids replicated thrice. 50% of recommended dose of nitrogen was applied as basal application and remaining 50% was applied at 25 and 45 DAS. Full dose of phosphorus and potassium fertilizers were applied as basal application. The study revealed that, among different Hybrids UM-2 produced significantly higher plant height (216.79 cm), number of leaves per plant (12.74), dry weight/plant (159.88 g), number of cobs per plant (2.00), cob length (17.30), number of rows per cob (15.93), number of grains per row (33.36), Seed yield (6.98 t/ha) and stover yield (20.40 t/ha). The hybrid UM-2 recorded significantly minimum number of days to 50% Tasseling (45.67 days) and 50% silking (49.00 days). Hybrid UM-2 also fetched highest gross returns (1,85,606.00 INR/ha), net returns (1,32,911.00 INR/ha) and benefit cost ratio (2.52) when compared to other hybrids.

Keywords: Hybrid maize, varietal response, growth attributes, yield attributes, *Zea mays* L.

Introduction

Maize (*Zea mays* L.) is considered as one of the most important food grains in India after the main cereals rice and wheat. India ranks fifth in the area and third in production and productivity over other cereal crops and members of the Gramineae family. It is the third most important crop in Uttar Pradesh and is also regarded as the „Queen of Cereals“. It has great potential to meet the food demands of living beings which collectively include both humans and animals. Maize is grown on 8.49 million hectares in India, with a production of 21.28 million tonnes at a productivity of 2.57 tonnes per hectare. Given that Uttar Pradesh accounts for 8.33 percent of total area and 9.65 percent of total maize production in the country. while the global average productivity is 5.75 t/ha, India lies far behind in terms of productivity, hence evaluation of a pre-eminent hybrid has become necessary to counter the problem of productivity.

Hybrid maize cultivars possessed a prominent role in enhancing the production and quality of maize which is used for feed, fiber, and aesthetic value. These not only help with their direct contribution but also created a way for the adoption of other components of production. But the global climate changes have led to increased temperatures and increased frequency of droughts and floods in some parts of the globe. High temperature stress at critical developmental stages of maize plants causes significant yield loss. In order to promote maize production and productivity, there is a need to develop or identify hybrids that tolerate to various climatic changes. Hence the study and evaluation of adaptability of different hybrids of maize to various climatic conditions is necessary before releasing it for commercial cultivation.

Materials and Methods

A field experiment was conducted during *kharif* season of 2021 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of

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Agriculture, Technology & Sciences, Prayagraj, and Uttar Pradesh, India. The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.4), medium in organic carbon (0.48%), medium in available Nitrogen (278.93 kg/ha), low in available Phosphorous (19.03 kg/ha) and medium in available Potash (238.1 kg/ha). The treatments consist of 10 Maize hybrids viz., UM-01, UM-02, UM-03, UM-04, UM-05, UM-06, UM-07, UM-08, UM-09,

UM-10. The experiment was laid out in Randomized Block Design (RBD) with ten hybrids replicated thrice. The experiment comprising of ten hybrids, viz., T₁: UM-1, T₂: UM-2, T₃: UM-3, T₄: UM-4, T₅: UM-5, T₆: UM-6, T₇: UM-7, T₈: UM-8, T₉: UM-9, T₁₀: UM-10, observation regarding growth and yield attributes was recorded during the field experiment.

Table 1: Evaluation of growth parameters of maize hybrids under agroclimatic conditions of Prayagraj, Uttar Pradesh

Hybrids	Plant height (cm)	At harvest Number of leaves (No.)	Plant dry weight (g)
UM-1	205.03	10.03	151.96
UM-2	216.79	12.74	159.88
UM-3	199.93	12.13	148.54
UM-4	188.08	11.07	152.31
UM-5	197.27	11.13	149.10
UM-6	194.51	10.63	158.38
UM-7	186.65	11.83	152.88
UM-8	206.21	11.40	154.48
UM-9	208.96	12.60	159.19
UM-10	198.06	11.80	148.48
S.Em(±)	2.90	0.44	2.77
CD (p=0.05)	8.70	1.30	8.24

Table 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/cob (No.)	Cob length (cm)	Seed index (g)	Seed yield (t/ha)	Stover yield (t/ha)	Biological yield (t/ha)
UM-1	1.47	13.61	26.95	16.27	28.00	5.98	15.43	21.41
UM-2	2.00	15.93	33.36	17.30	32.33	6.98	20.40	27.38
UM-3	1.67	14.19	28.63	15.41	31.33	6.78	17.65	24.43
UM-4	1.60	13.23	30.96	16.56	28.00	5.78	18.40	24.17
UM-5	1.53	13.52	31.30	16.00	26.00	6.50	14.02	20.52
UM-6	1.40	13.10	24.47	13.84	27.00	5.70	15.65	21.36
UM-7	1.73	13.69	25.06	15.79	30.66	6.57	15.54	22.12
UM-8	1.87	15.71	28.26	16.57	26.66	6.53	13.43	19.96
UM-9	1.67	13.50	30.74	17.22	28.33	6.94	18.19	25.13
UM-10	1.27	14.43	26.29	14.91	31.66	6.49	14.39	20.87
S.Em(±)	0.10	0.37	1.71	0.61	1.68	0.28	0.76	0.72
CD (p=0.05)	0.31	1.10	5.08	1.81	-	0.83	2.27	2.14

Result and Discussion

Growth

The recorded and analyses data pertaining to growth parameters indicates that significant higher plant height (216.79 cm), number of leaves per plant (12.6), plant dry weight (159.88 g) of maize was recorded in maize hybrid UM-2.

The differential growth with respect to plant height, number of leaves per plant and plant dry weight among the hybrids may be attributed to differences in genetic characterization of the individual, including rapid growth rates, tallness or shortness of species. Similar findings were recorded by Pal and Bhatnagar (2012), Gollar *et al.* (1996), Sangai and Salvador (1998) [7, 3, 9].

Yield and yield attributes

Yield attributes such as Cobs per plant (No.), Cob length (cm), Grain row/cob (No.), Number of grain/row (No.), Seed index (g) varied among different maize hybrids. The Hybrid UM-2 was recorded with higher yield attributes viz. Cobs per plant (No.) (2.00), Cob length (17.30 cm), Grain row/cob (No.) (15.93), Number of grain/row (No.) (33.36), Seed index (32.33 g). The maize hybrid UM-2 was also recorded significantly higher seed yield (6.98 t/ha), stover yield (20.40

t/ha) and biological yield (27.38 t/ha)

Increases in yield attributes such as cobs per plant, number of grains per row, number of grain rows per cob, cob length and seed index have resulted in an increase in seed production as a result of different genetic makeup (Kumar and Kandel 2020)

Conclusion

Based on the findings of this field experiment it is concluded that among all maize hybrids, UM-2 was found the most suitable maize hybrid to be recommended as it was found more adaptive, productive and profitable when compared to others under agroclimatic conditions of Prayagraj, U.P.

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