Evaluation of Maize (*Zea mays* L.) Hybrids Under Agroclimatic Conditions of Prayagraj, U.P.

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The field experiment was conducted during *kharif* season of 2021 at Crop Research Farm Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P.). The experiment was carried out to find the performance of 10 hybrids, which laid out in Randomized Block Design (RBD) & replicated thrice. The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (PH 7.8), low in organic carbon (0.35%), available N (243.00 kg/ha), available p (20.10 kg/ha), available k (105.00 kg/ha). The hybrid UM-11 recorded significantly higher in plant height, number of leaves, dry weight. The hybrid UM-11 also recorded significantly higher in yield and yield attributes *viz.* cobs per plant (No.), cob length (cm), rows per cob (No.), grains per row (No.), seed yield and stover yield. Higher gross return, net return and B:C ratio was also observed in hybrid UM-11.

Key words*: Hybrids. Yield Attributes, Growth Attributes, Economics.*

1.Introduction

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 the highest genetic yield potential among the cereals. It is cultivated on nearly 150 m ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 36 % (782 m t) in the global grain production. It is cultivated in the tropics, sub-tropics and temperate regions. The major producing countries are USA, China, Brazil, Mexico, France and India. It ranks first in world production (868 million tons from 168 million hectares) followed by wheat (691 million tons) and rice (461 million tons). This represents 38% of the total grain production as compared to 30 % for wheat and 20% for rice.

In India, maize is the third most important food crops after rice and wheat. The maize is cultivated throughout the year in all states of the country for various purposes including grain, fodder, green cobs, sweet corn, baby corn, pop corn in peri-urban areas. The predominant maize growing states that contributes more than 80 % of the total maize production 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 %), Himachal Pradesh (4.4 %). Apart from these states maize is also grown in Jammu and Kashmir and North-Eastern states. Hence, the maize has emerged as important crop in the non-traditional regions i.e. peninsular India as the state like Andhra Pradesh which ranks 5th in area (0.79 m ha) has recorded the highest production (4.14 m t) and productivity (5.26 t ha-1) in the country although the productivity in some of the districts of Andhra Pradesh is more or equal to the USA.

In Uttar Pradesh maize occupies 7.36 lakh hectare area with production of 12.86 lakh tons and productivity of 18.47 kg/ha (**Dept of Ag. Govt. of UP 2013),** which is below the national productivity of 25.56 q/ha . In general varieties performance in the state are not giving yield as high as hybrids can give. Thus, there, is great need to replace maize verities with hybrids of different maturity groups.

2.Materials and methods

A field experiment was conducted during *kharif* season of 2021 at the Crop Research farm, Department of Agronomy, Naini Agriculture Institute, Sam Higginbottom university of Agriculture,

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Technology and sciences (SHUATS), Prayagraj, (U.P). which is located at 25.28^{o} N latitude, 81.54^{o} E longitude and 98 m altitude above the mean sea level (MSL) on sandy loam soil, having moderately basic pH (7.8), organic carbon (0.35%), available N (243.0 kg/ha), P (20.10 kg/ha), K (105.0 kg/ha), EC (0.29 dSm^{-1}). The climate of this region is typically sub-tropical and semi-arid with monsoon commencing by the third week of June and withdrawing by end of October. The temperature reaches up to 43^{o}C and in winter it goes down to as low as 2-3^{o}C. The experiment was laid down in randomized block design (RBD) with 10 hybrids and 3 replications. Sowing of maize hybrid seeds by 60 x 20 cm spacing. The crop was fertilized with recommended dose of NPK 120:60:40 kg/ha was applied. Full dose of phosphorus and potassium fertilizers were applied as basal while, half of nitrogen was applied as basal and remaining half was applied 25, 45 days after sowing. Similarly, $ZnSO_4$ was applied as basal dose at the rate of 25 kg/ha for correction of zinc and Sulphur deficiency. Irrigation was done at critical stages i.e. vegetative stage, tasseling stage, cob filling and maturity stage. However other normal cultural practices were weeding and spraying of insecticide was done timely. One quadrate was harvested in every plot for the determination of results and data was subjected to statistical analysis separately by using analysis of variance technique. The difference among hybrid means was compared by using least significant difference test at 5% probability levels.

3.RESULTS AND DISCUSSIONS

GROWTH ATTRIBUTES

The significantly plant height (218.48cm) was recorded with UM-11. However, hybrids UM-14 (209.79 cm) was found statistically at par with UM-11. Plant height is a genetically as well as environmental controlled factor and different cultivars and hybrids have different plant height by **Tahir *et al*. (2008).** During harvest, significantly highest number of leaves/plant (No.) was recorded by UM-11(12.63). However, hybrids UM-13 (12.53) was found statistically at par with UM-11 hybrid. Leaf numbers are an essential metric of the morphological characteristics of maize and can vary with plant genotype and environmental conditions. Most studies on the response of leaf numbers to plant genotypes have demonstrated that the final leaf number varies between different types of cultivars. **Liu *et al.* (2020).** Significantly the maximum plant dry weight (153.87 g) was recorded by UM-11. Theminimum plant dry weight (137.70 g) was found in UM-8.Maize hybrids of different genotypes can be considered mature from the physiological aspects once dry mature accumulation reaches its maximum value **Bodnar *et al*. (2018).**

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Table 1: Evaluation of Growth attributes of Maize Hybrids Under Agro-climatic Conditions of Prayagraj U.P

HYBRIDS	PLANT HEIGHT(cms)	NO. OF LEAVES	PLANT DRY WEIGHT(g)
UM-6	182.26	11.00	139.90
UM-7	202.26	11.13	142.10
UM-8	194.51	11.07	137.70
UM-9	204.23	12.20	142.40
UM-10	218.48	11.27	142.37
UM-11	193.13	12.63	153.87

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UM-12	187.68	11.40	147.50
UM-13	201.15	12.53	142.20
UM-14	209.79	11.27	144.40
UM-15	199.89	11.30	141.20
F-test	S	S	S
SEm(±)	3.04	0.41	1.34
CD(P=0.05)	9.02	1.22	3.99

YIELD ATTRIBUTES

The observations regarding yield attributes viz., number of cobs/plant, cob length(cm), number of rows/cob, number of grains/row and seed index(g) were shown in table 2. The number of cobs/plant (2.13) was recorded significantly higher by UM-11. However, the hybrids UM-14 and UM-9 had recorded (1.93 and 1.90) which were found statistically at par with UM-11. The number of cobs per plant as affected by plant population density levels and hybrids revealed that the number of cobs per plant was changed significantly with plant population density and hybrids by **Zamir *et al.* (2010).** The cob length recorded was significant. The significantly higher cob length (17.71 cm) was recorded by UM-11. However, other hybrid UM-9 and hybrid UM-13 had recoded cob length (16.91 and 16.13cm) were found statistically at par with UM-11. However, maximum number of rows per cob (15.97 cm) was recorded by UM-11 which is significantly higher and other hybrids UM-8 and UM-7 had recoded cob length (15.31 and 14.95) which were found statistically at par with UM-11. The number of grains per row (32.40) was recorded significantly higher in UM-11. However, UM-13 and UM-12 had recorded (29.07 and 27.73) which were significantly at par with UM-11. **Zhang et al** who reported that the number of grains/row of corn had significantly affected by maize hybrids. The maximum test weight (32.00 g) was recorded by UM-11. The minimum test weight (26.00 g) was recorded by UM-6.

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Table 2: **Evaluation of Yield attributes of Maize Hybrids Under Agro-climatic Conditions of Prayagraj U.P**

Hybrids	No. of cobs/plant	Cob length(cm)	No. of rows/cob	No.of grains/row	Seed index(g)
UM-6	1.10	13.14	12.36	24.00	26.00
UM-7	1.77	14.75	14.95	32.00	31.00
UM-8	1.73	15.63	15.31	26.80	28.00
UM-9	1.90	16.91	13.47	27.00	28.00
UM-10	1.40	14.79	13.29	25.67	27.67
UM-11	2.13	17.71	15.97	32.40	32.00

UM-12	1.57	12.91	13.09	27.07	26.33
UM-13	1.47	16.13	14.13	29.07	28.67
UM-14	1.93	14.57	13.20	26.87	27.67
UM-15	1.67	15.39	14.04	24.80	27.33
F-test	S	S	S	S	NS
SEm(±)	0.08	0.62	0.36	1.71	1.73
CD(P=0.05)	0.25	1.83	1.08	5.08	-

Yield parameters

Yield parameters were measured in terms of seed yield(t/ha), stover yield(t/ha), biological yield(t/ha) and harvest index (%) were shown in table 3. The significantly higher seed yield (7.36 t/ha) recorded by UM-11. However, UM-13 (7.29 t/ha), UM-09 (7.16) and UM-10 (6.32 t/ha) were found statistically at par with UM-11. **Kumar and Kumar (1997)** while conducting experiment on five maize lines reported that plant height was positively correlated with grain yield. **Seyed Sharifi and Taghizadeh** observed the importance of number of kernels/ear in grain yield. The significantly higher stover yield (20.50 t/ha) was recorded by UM-11. However, UM-10 (19.17 t/ha) and UM-9 (18.93 t/ha) were found statistically at par with UM-11. The biological yield of maize (27.86 t/ha) was significantly higher UM-11. However, KM-09(26.09 t/ha) was statistically at par with UM-11. The minimum yield was observed in UM-06 (21.14 t/ha). The maximum harvest index (28.89%) was shown by UM-13. The minimum harvest index was shown by UM-12 (23.14%).

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Table 3. Evaluation of Yield of maize hybrids under agro climatic conditions of Prayagraj, U.P

Hybrids	Seed yield(t/ha)	Stover yield(t/ha)	Biological yield(t/ha)	Harvest index(%)
UM-6	5.19	15.95	21.14	24.54
UM-7	5.95	17.99	23.94	24.84
UM-8	5.61	16.88	22.48	25.02
UM-9	7.16	18.93	26.09	27.44
UM-10	6.32	19.17	25.48	24.95
UM-11	7.36	20.50	27.86	26.43

UM-12	5.55	18.44	23.99	23.14
UM-13	7.29	17.89	25.18	28.89
UM-14	6.21	18.42	24.63	25.19
UM-15	5.76	17.01	22.77	25.30
F-test	S	S	S	NS
SEm(±)	0.29	0.58	0.60	1.11
CD(P=0.05)	0.86	1.71	1.78	-

4.CONCLUSION

From the above findings it was concluded that among all hybrids, UM-11 was found to be best by obtaining highest growth, yield attributes and yield. It was found more productive, when compared to others under agro climatic conditions of Prayagraj, U.P.

FUTURE SCOPE

As there was less research happened in the field, further research should be done to obtain proper results and help farmers to choose better performing hybrid. Since the findings are based on the research done in one season, further trails are needed to confirm the results of this experiment.

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