

Study of Variation in Yield and Yield Components between Varieties of Hybrid Maize

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Introduction: In India, Indian Council of Agricultural Research has started a co-ordinated maize breeding scheme with the collaboration of Rockefeller Foundation in the year 1957. Since then a number of hybrid-maize varieties have been evolved and now released to farmers for cultivation. Investigations carried out in different parts of the country clearly indicate the superiority of hybrids over the local variety ranging from 31 to 173% (Dhawan *et al*, 1961; Nezamuddin *et al*, 1963 and Singh *et al*, 1966).

In order to evaluate the performance of four maize hybrids, *viz.*, Ganga hybrid Makka 101, Ganga hybrid Makka-3, Ganga hybrid Makka-2 and Deccan hybrid Makka, an yield trial was conducted at the College of Agriculture, Banaras Hindu University during summer and rainy seasons for three years consecutively from 1965 to 1968.

Materials and Methods: Certified seeds of varieties Ganga hybrid Makka and Deccan hybrid Makka were procured from U. P. Agricultural University, Pantnagar and National Seed Corporation, New Delhi respectively. Randomised block design was adopted with three replications. Plots were of 20' x 30' dimensions. Plants were spaced 40 inches apart in rows and 8 inches apart within the rows. At the sowing time 60 lb N in the form of urea, 60 lb P₂O₅ in the form of single superphosphate and 40 lb K₂O in the form of muriate of potash were applied per acre in band. The second dose of 40 lb N was applied as broadcast when the plants were at knee-high stage. The third dose of 40 lb N was applied at silking stage.

Summer trials were sown between the 1st and 15th February and seven irrigations were given during the entire period of crop growth. *Kharif* trials were sown after break of monsoon and no irrigation was given to this crop.

Results: Results of pooled analysis with respect to each season are presented in table 1.

TABLE 1. Mean yield in lb/acre

Hybrid/variety	Summer crop	Monsoon crop
Ganga hybrid Makka-101	2446.3	4476.4
Ganga hybrid Makka-3	2056.8	4227.3
Ganga hybrid Makka-2	1641.1	4076.3
Deccan hybrid Makka	2051.0	4030.8
Whether significant	Yes	Yes
S.E. $\frac{1}{\sqrt{r}}$	12.30	11.87
C. D. at 5%	35.20	33.95

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During 1965-66 summer, the acre yields of Ganga hybrid Makka-101, Ganga hybrid Makka-3 and Deccan hybrid Makka were highly significant to that of Ganga hybrid Makka-2. Ganga hybrid Makka-101 outyielded others in all the three consecutive years, although yields per acre were very inferior.

Kharif trials: Results of each year, pooled for all the experiments are presented in table 2 in respect of ear characters.

TABLE 2. Average number of rows/ear, number of grains/ear and thousand grain weight.

Hybrid/variety	No. of rows/ear	No. of grains/ear	Thousand grain weight (g)
Ganga hybrid Makka-101	16.2	344.6	537.0
Ganga hybrid Makka-3	14.0	271.3	565.3
Ganga hybrid Makka-2	14.0	268.3	517.3
Deccan hybrid Makka	16.0	269.0	480.8
Whether significant	No	Yes	Yes
S. E. \pm	0.56	2.04	3.02
C. D. at 5%	—	5.851	8.662

Ganga hybrid Makka-101 recorded the highest yield lb per acre which was significantly superior to the yields of the other three hybrids, while Ganga hybrid Makka-2 gave the lowest yield per acre in the group. There was no significant difference between the yields of Ganga hybrid Makka-3 and Deccan hybrid Makka, though their yields were significantly higher than the yield of Ganga hybrid Makka-2. It was noted that Ganga hybrid Makka-101 had given the highest yield in all the three experimental years and in both the seasons. Next best hybrids were Deccan hybrid Makka, Ganga hybrid Makka-3 and Ganga hybrid Makka-2 respectively.

It is evident from the above results that Ganga hybrid Makka-101 is the top yielder in the group of hybrids under trial for Varanasi region. Variety hybrid Makka-3 has given yields which were either equal to or lower than the Deccan hybrid Makka. The Ganga hybrid Makka-2 has given the lowest yields in the trial during both the seasons and in all the experimental years.

Post-harvest characters: The data obtained in respect of average number of rows per earhead, number of grains and thousand grain weight are presented in table 2.

The data on being subjected to statistical analysis indicated that the differences between the varieties in this group were significant for the three characters studied except for the number of rows per ear. Ganga hybrid Makka-101 has maximum number of rows per ear followed by Deccan hybrid Makka, Ganga hybrid Makka-3 and Ganga hybrid Makka-2. It is seen that Ganga hybrid Makka-101 recorded the highest and significant number of

grains per ear over the three varieties under trial. Although there were no significant differences between other three varieties in respect of number of grains per ear Ganga hybrid Makka-3 ranked second followed by Deccan hybrid Makka and Ganga hybrid Makka-2 respectively.

Deccan hybrid Makka recorded maximum thousand grain weight and it was highly significant over other three hybrids. The Ganga hybrid Makka-2 has again given lowest thousand grain weight like other attributes.

Discussion : The present investigation was conducted with a view to see the performance of newly released hybrids of maize under Varanasi region. The Deccan hybrid Makka which was recommended for Peninsular India was also included in this trial. The study reveals that the different varieties tested exerted significant influence on the yield and yield components of hybrid maize. It is the intention here to analyse and discuss how and how far these differences exist in different hybrids regarding yielding ability.

In the present investigation Ganga hybrid Makka-101 outyielded others in yield. The reasons for this rise in maize yield can be explained on the basis of number of rows per ear and number of grains per earhead. Because, Ganga hybrid Makka-101 possessed highest number of rows per earhead and number of grains per ear followed by Deccan hybrid Makka. It seems true because, Ganga hybrid Makka-2 has got lowest number of rows per ear and number of grains per earhead. Hence, it was natural that with the increase in yield there was also an increase in the number of rows per earhead and number of grains per ear. This result is in conformity with those of Hemingway (1957).

The other possible reasons for yield variation in varieties of hybrid maize may be the high photosynthetic activity of leaves, peduncle, and/or ear as was suggested by Watson, Thorne and French (1963), although there is no experimental proof for this assumption. The still other reason may be the difference in the growth potentiality of grains and water content as observed by Asana and Baggs (1966) for wheat varieties P bc 281 and NP. 720. A third possibility may be slower senescence and therefore, longer continuation of photosynthetic activity in a high yield variety (Eijnatten, 1963 and Stov, 1965).

Summary and Conclusions : Yield trials were conducted during summer and rainy seasons in which the four maize hybrids, viz., Ganga hybrid Makka-101, 3, 2 and Deccan hybrid Makka were included. Ganga hybrid Makka gave the highest yield in the group of hybrids. Next in the rank of yields was Deccan hybrid Makka. Ganga hybrid Makka-2 gave the lowest yield in the group of hybrids and Ganga hybrid Makka-3 gave more or less similar to Deccan hybrid Makka. The study revealed that (1) Ganga hybrid Makka-101 may be grown successfully in Varanasi region because of its very

high yield, (2) Deccan hybrid Makka which is not recommended for the tract may also be grown successfully and (3) Ganga hybrid Makka-2 may only be grown for earliness.

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