E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(8): 231-234
Received: 15-05-2024
Accepted: 19-06-2024

Yogesh R Gawande
Agriculture Research Station, Buldhana, Maharashtra, India

Dr. DG Kanwade
Agriculture Research Station, Buldhana, Maharashtra, India

Achal A Bhagat
Agriculture Research Station, Buldhana, Maharashtra, India

Corresponding Author:
Yogesh R Gawande
Agriculture Research Station, Buldhana, Maharashtra, India

Effect of sowing dates on seed quality and ancillary traits of maize (*Zea mays* L.) hybrid seed production

Yogesh R Gawande, Dr. DG Kanwade and Achal A Bhagat

DOI: https://doi.org/10.33545/2618060X.2024.v7.i8Sd.1276

Abstract
The present investigation was conducted at Agriculture Research Station, Buldhana during 15th July to 15th November, 2022 revealed that sowing of maize hybrid BMH 18-2 (PDKV Aarambha) on 15th October turned out to be the best treatment. Female (V1543) and male (V1551) parents of BMH 18-2 were sown at monthly intervals (from July 15th, 2022 to November 15th 2022) with 6:2 row ratio in RBD with four replications.
Sowing date significantly influenced the flowering behaviour, seed quality parameters and ancillary traits in hybrid maize seed production. Sowing of hybrid seed production program in T_4 (October) and T_5 (November) was found optimum and highly remunerative which resulted in high seed yield and quality besides good germination and seedling vigour index – I of hybrid seed. The impacts of sowing dates and varieties on maize growth, development and quality parameters are discussed in this article.

Keywords: Maize, hybrid, sowing dates, seed yield

Introduction
Maize (*Zea mays* L.) is one of the most important cereal crop in the world. It belongs to family Gramineae. Maize, an important staple food crop, is grown on largest cropped area every year for food and fodder in India. Maize is known as 'Queen of cereals' for its highest yield potential among the cereals. This crop also has the highest potential of per day carbohydrate productivity. Maize stands third among important food crops of India after rice and wheat.
Maize is warm weather plant. It grows from sea level to 3000-meter altitude. *Kharif* season is the main growing season in northern India. In the south, maize may be sown any time from April to October. Maize requires considerable moisture and warmth climate from germination to flowering. The most suitable temperature for germination is 21 °C and for growth 32 °C extremely high temperature and low humidity during flowering damage the foliage, desiccate the pollens and interfere with proper pollinations.
One of the most important factors contributing to yield gap is sowing of maize on inappropriate dates. For optimum production seed must be sown on proper time. Considerable reduction in yield can occur if the crop is sown too early or too late (Chaudry, 1994) [3]. Ismail (1996) [4] reported that early sowing of maize lead to an increased maize yield. Shafshak *et al.* (1995) [8] concluded that delay in sowing reduced a wide variety of plant and ear growth parameters and early sowing (1st May) gave the highest yield. The maize inbred response to delay/early planting and mechanism underlying for development of optimum sowing time for maize inbred for quality and quantity hybrid seed production.
The most significant factor in the hybrid seed production of the field is the synchronization of flowering *i.e*., the synchronization of flowering between female and male parents of the field. To achieve an effective seed set, the stage of anthesis of the male parent and the stage of stigma receptivity of the female parent should coincide. If there is no proper synchronization of flowering between male and female parents it leads to a reduction in the yield. Another important reason for the yield gap is unsuitable sowing dates *i.e*. if the crop is sown too early or too late. The important factor in farming is the Planting date, which has a significant effect on crop growth stages, development, and yield and yield components (Mashreghi *et al*., 2014) [6].

Materials and Methods

The proposed research study was conducted at Agriculture Research Station, Buldhana during July 15th to November 15th, 2022. The monthly meteorological data pertaining to rainfall, temperature and relative humidity prevailed during crop growth period from July to February 2022 was obtained from the Meteorological Observatory located at Agricultural Research station, Buldhana. Mean meteorological data during crop growth period at fortnightly intervals of each month was presented in Figure 1.

The experiment was carried out in Randomized Block Design with four replications having gross plot size 15 x 5 m^2 (10.2 x 5 m^2). Hybrid maize BMH 18-2 (PDKV Aarambha) were investigated to evaluate the ideal sowing date for realizing maximum seed yield and seed quality. Five sowings were taken up at monthly intervals from July 15th to November 15th. Seeds of female (V1543) and male (V1551) parents were dibbled by hand on 1/3rd of ridge with 1:2 or 1:3 or 1:4 ratio.

Application of fertilizers was done @ 120:60:40 kg NPK/ha in the form of Urea, Single Super Phosphate and Murate of Potash. Basal dose of 40 kg N + 60 kg P + 40 kg K are applied. The second dose of 40 kg N at 30 DAS and the third dose of 40 kg N at 60 DAS are applied. Detasseling was done for female (V1543) rows when the tassel was well out of the leaf sheath but before the anthers had shed pollen. Moisture in grain at harvesting should be around 18-20% in female seed. Cob should be dried up to 13-14% moisture content before shelling. Seed should be dried 8-10% moisture before bagging.

Result and Discussion

Effect of sowing dates on seed quality and ancillary traits in hybrid seed production of maize

1. Flowering behavior

1.1. Days to first pollen shed

Days to first pollen shed varied significantly among the treatments. Crop sown on T_5 recorded maximum days to first pollen shed (73 days) followed by T_4 (71.50 days), T_3 (62.00 days) and T_2 (59.75 days) while minimum days to first pollen shed were observed in crop sown on T_1 (58.25 days) (Figure 2). Minimum days to first pollen shed might be due to long days and high temperature conditions prevailed during T_1 (27.1 °C) and T_2 (27.2 °C). Maximum days to first pollen shed might be due to short days and low temperature conditions (23.3 °C) during other treatments. These results were in conformity with the findings of Oktem *et al.* (2004) [7].

1.2. Days to 50 percent pollen shed

Days to 50 percent pollen shed varied significantly among the treatments. Minimum days to 50 percent pollen shed was observed in plots sown on T_1 (61 days) followed by T_2 (62.50 days), T_3 (65.25 days) and T_4 (74 days) while maximum days to 50 percent pollen shed was recorded in plots sown on T_5 (75.50 days) (Figure 2). Minimum days to 50 percent pollen shed might be due to long days and high temperature conditions during T_1 (27.1 °C). Maximum days to 50 percent pollen shed might be due to short days and low temperature conditions (23.3 °C) T_5.

1.3. Days to first silking

The treatments had significant effect on days to first silking. Plots sown on T_1 recorded minimum days to first silking (60 days) followed by T_2 (61.50 days), T_3 (63.25 days) and T_4 (73.00 days) while maximum days to first silking were observed in T_5 (74.25 days) (Figure 2). Maize crop was subjected to optimum temperature (25.1 ºC) and comparatively high relative humidity (80%), which enhanced the crop optimum vegetative growth so that the plants may reach the reproductive phase very quickly. This was supported by Tamura *et al.* (1989) [9].

1.4. Days to 50 percent silking

Significant differences were observed in days to 50 percent silking among all the treatments. Minimum days to 50 percent silking was observed in T_1 (61.75 days) followed by T_2 (63.50 days), T_3 (65.50 days) and T_4 (74.50 days) while maximum days to 50 percent silking was observed in T_5 (76.25 days) (Figure 2). The increase in days to 50 percent silking might be due to decrease in mean temperature (23.3 °C). Khan *et al.* (2011) [5] was reported decrease in days to silking with increase in mean temperature.

1.5. Tassel length (cm)

Tassel length as influenced by various date of sowing. Crop sown on T_5 produced significantly long tassels (34.05 cm) which was found to be at par with T_4 (33.23 cm) and T_3 (32.98 cm) while shorter tassels (31.55 cm) were produced in plots sown on T_1 (31.55 cm) followed by T_2 (32.98 cm) (Figure 2). The tallest branches in T_5 and T_4 were mainly due to the expansion of the tassels under favorable weather.

1.6. Number of spikelets tassel^{-1}

There was significant difference between the planting dates to the total number of spikelet tassel^{-1} (Figure 2). Total number of spikelet tassel^{-1} were more in T_4 (20.20) followed by T_5 (18.80), T_3 (18.20) and T_2 (17.20) while minimum number of spikelet tassel^{-1} was observed in T_1 (17.13) (Figure 2). This was supported by Bechoux *et al.* (2000) [1].

2. Physiological attributes

2.1. Number of leaves plant^{-1} at harvesting stage

The results indicated that treatments had significant effect on number of leaves plant^{-1} at harvesting stage. Number of leaves decreased significantly with delay in sowing. Maximum number of leaves was recorded in crop sown on T_5 (12.05) which was found to be at par with T_4 (11.95), while minimum number of leaves plant^{-1} were observed in crop sown on T_1 (9.73) followed by T_2 (10.05) and T_3 (10.73) (Figure 3). Minimum number of leaves were noticed in T_1 due to delayed sowing. These results were in accordance with the findings of Beiragi *et al.* (2011) [2].

2.2. Ear height

The results indicated that sowing dates had no significant effect on ear height with different treatments. Ear height ranged from 62.80 cm to 69.88 cm with an average ear height 66.39 cm. Minimum values for ear height was recorded in T_1 (62.80 cm) followed by T_2 (63.63), T_3 (67.38) and T_4 (68.30) while maximum values for ear height were recorded in T_5 (69.88 cm) (Figure 3).

2.3. Plant height- Male and Female (cm)

The results revealed that treatments had significant effect on plant height. For male plant, maximum height was observed in T_5 (215.30 cm) followed by T_4 (207.70 cm) T_3 (204.90 cm) and T_2 (197.58 cm), while minimum height was noticed in T_1 (188.40 cm) (Figure 3). The difference in plant height of the male parent (V1551) with the treatments might be due to interaction between the altered aerial and edaphic crop environment.

For female plant, trait was ranged from 134.73 cm to 144.83 cm with an average height of 138.46 cm. Maximum height was

observed in T_5 (144.83 cm) which was found to be at par with T_4 (139.65 cm) (Figure 3).

3. Seed quality characters

3.1 Germination (%)

Data related to seed germination percentage as influenced by different treatments were recorded by placing the seeds for germination test i.e., between paper method (BP) and recording the number of seeds germinated were presented in Table 1. The statistically analyzed data in the Table 1. Showed that there was no significant effect of sowing dates on seed germination percentage.

3.2 Seeding vigour index-I

Data related to seed vigour index - I was influenced by different treatments were presented in the Table 1. The statistically analysed data in Table 1. Showed that there was no significant effect of sowing dates on seed vigour index - I.

Table 1: Effect of sowing dates on quality characters of seed parent of Maize hybrid BMH 18-2 (PDKV Aarambha).

Dates of sowing	Germination %	Seedling vigour index I
July 15th, 2022 (T_1)	93.00	2968.00
August 15th, 2022 (T_2)	94.00	3006.50
September 15th, 2022 (T_3)	94.00	3060.00
October 15th, 2022 (T_4)	96.00	3140.50
November 15th, 2022 (T_5)	98.00	3213.50
Grand mean	95.0	3090.85
S.Em. ±	N.S.	N.S.
S.Ed.	N.S.	N.S.
C.D. (0.05)	N.S.	N.S.
C.V. (%)	N.S.	N.S.

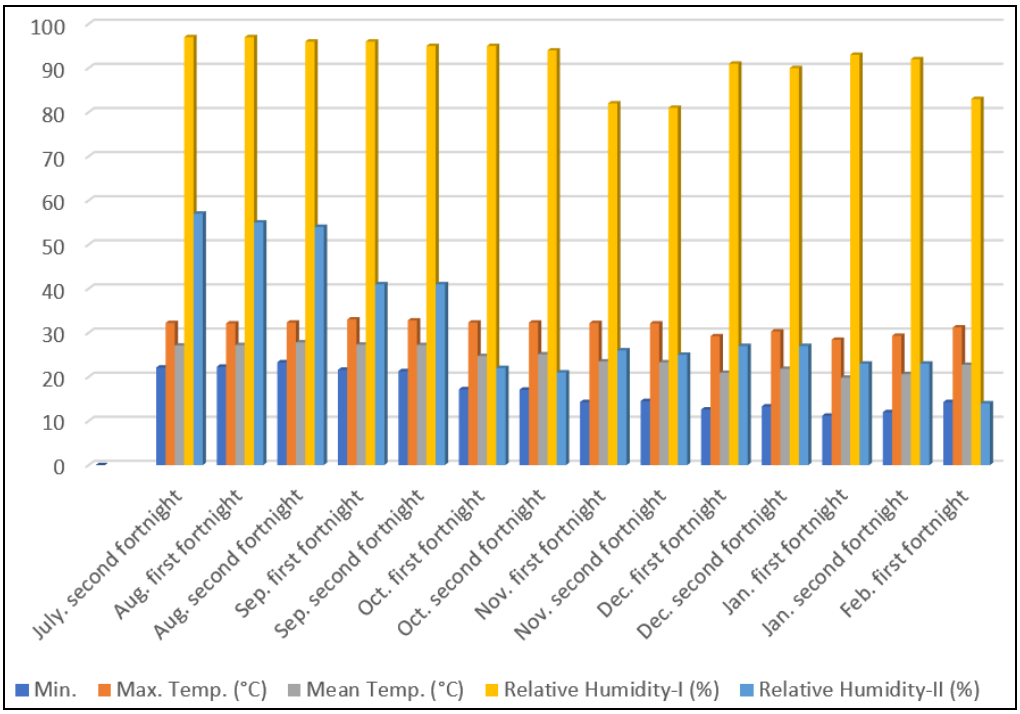

Fig 1: Fortnightly distribution of minimum, maximum and mean temperatures (°C), rainfall (mm) and relative humidity (%) during crop growth period from July to February 2022-23.

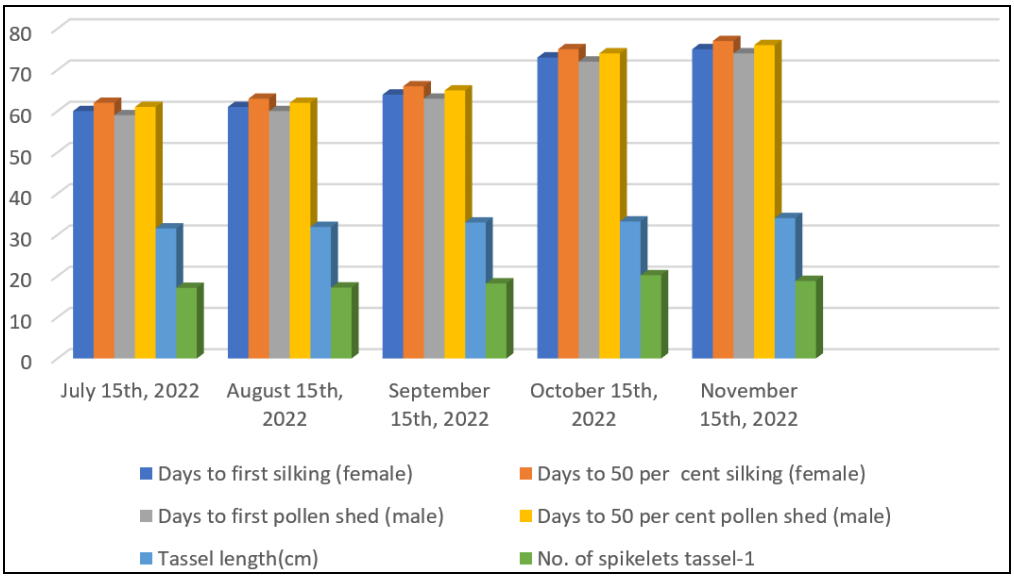

Fig 2: Effect of sowing dates on flowering behaviour of male (V1551) and female parents (V1543) of BMH 18-2 (PDKV Aarambha).

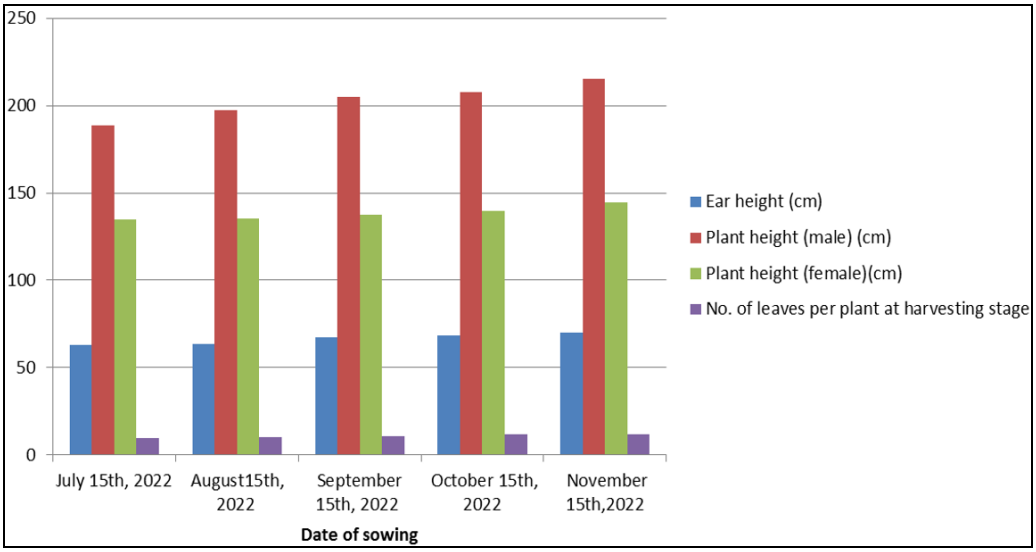

Fig 3: Effect of sowing dates on cob height, plant height and number of leaves plant^{-1} at harvesting stage of seed parent of maize hybrid BMH 18-2 (PDKV Aarambha)

Conclusion

- Sowing date significantly influenced the flowering behaviour, yield attributing characters and seed quality parameters in hybrid maize seed production.
- Sowing of hybrid seed production program in T_4 (October) and T_5 (November) was found optimum and highly remunerative which resulted in high seed yield and yield attributing characters besides good germination and seedling vigour index – I of hybrid seed.

References

1. Bechoux N, Bernier G, Lejeune P. Environmental effects on the early stages of tassel morphogenesis in maize (*Zea mays* L.). Plant Cell Environ. 2000;23:91-98.
2. Beiragi MA, Khorasani SK, Shojae SH, Dadresan M, Mostafavi K, Golbashy M. A study on effects of planting dates on growth and yield of 18 corn hybrids (*Zea mays* L.). Am J Exp Agric. 2011;1(3):110-120.
3. Chaudry AR. Cereal crop in crop productivity. J Plant Sci. 1994;3:262-265.
4. Ismail AA. Gene action and combining ability for flowering and yield in maize under two different sowing dates. Asian J Agric Sci. 1996;27:91-105.
5. Khan ZH, Khali SK, Farhatullah, Khan MY, Isar M, Basir A. Selecting optimum planting date for sweet corn in Peshawar, Pakistan. Sarhad J Agric. 2011;27(3):341-347.
6. Mashreghi M, Khorasani SK, Darban ARS. Effect of different planting methods and plant density on yield and morphological traits of fodder maize in two planting dates. Life Sci J. 2014;11(3):207-213.
7. Oktem A, Oktem AJ, Coskun Y. Determination of sowing dates of sweet corn (*Zea mays* L. *Saccharata* Sturt) under Sanliurfa conditions. Turk J Agric For. 2004;28:83-91.
8. Shafshak SE, Halim AA, Rosenberger JL, Saad AMM. Maize growth, yield and yield components as related to some agricultural practices. Ann Agric Sci Moshtohor. 1995;33:507-524.
9. Tamura Y, Takezaw AK, Konno T, Ona S, Sein OH, Monma E. Prediction of silking stage in Maize based on temperature response evaluated by a non-parametric method. Japanese Journal of Crop Science.. Tollenaar, M and Bruulsema. 1989;58(1):48-54