***Original Research Article***

# Influence of Spacing and Varieties on Growth and Yield of Baby Corn (*Zea mays* L.)

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## ABSTRACT

A field experiment was conducted during *kharif*, 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P).The soil of given experimental plot was sandy loam in texture, neutral in soil reaction (pH 7.1), low in organic carbon (0.36 %), available N (171.48 kg/ha), available P (15.2 kg/ha) and available K (232.5 kg/ha).The experiment was laid in Randomized Block Design with Ten treatments and three replications. The treatments are as follows, $T_1$: G-5414 + 40 cm x 15 cm, $T_2$: G-5414 + 50 cm x 15 cm, $T_3$: G-5414 + 60 cm x 15 cm,$T_4$: G-5417 + 40 cm x 15 cm, $T_5$: G-5417 + 50 cm x 15 cm, $T_6$: G-5417 + 60 cm x 15 cm, $T_7$: Shine-60 + 40 cm x 15 cm, $T_8$: Shine-60 + 50 cm x 15 cm, $T_9$: Shine-60 + 60 cm x 15 cm are used. The results showed that application of treatment Shine-60 + 60 x 15 cm was recorded highest plant height (172.38 cm), No. of leaves/Plant (12.75), Plant dry weight (90.00 g/plant) whereas, Crop Growth Rate (39.77 g/$m^2$/day) and Relative Growth Rate (0.036 g/g/day) was recorded significantly highest in treatment G-5414 = 40 x 15 cm. However, No. of Cobs/Plant (2.82), length of the Cob/Plant (17.55 cm), Cob weight with husk (44.18 g), Cob weight without husk (17.94 g), Cob yield with husk (28.78 t/ha) and Cob yield without (6.87 t/ha) was obtained in the treatment of Shine-60 + 60 cm x 15 cm as compared to the other treatments.


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**Key words:** G-5414, G-5417, Shine-60, Spacing, Yield.


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## INTRODUCTION

Maize (*Zea mays* L.) is called as miracle crop and it is the third most important crop in the world among cereals after wheat and rice. With the rise in standards of living and advancement in science and technology, there is a change in the traditional usage of maize as food and increase in the consumption of green ears as food especially in cities and towns, for that "Baby corn"is a profitale crop that allows a diversification of production, aggregation of value and increased income **(Pandey *et al.*,2002).** Baby corn as the name implies, is not genetically dwarf maize but it is the immature ear of normally grown maize harvested within 2-3 days of silking. In Indian agriculture, baby corn assumes special significance on account of its utilization as food, feed and fodder besides several industrial uses.

Baby corn is not a separate type of corn like sweet corn or popcorn. Baby corn is dehusked maize ear, harvested young especially when the silk have either not emerged or just emerged and no fertilization has taken place or the shank with unpollinated silk is baby corn. Baby corn ears are in light yellow colour with regular row arrangement,10-12 cm long and a diameter of 1.0-1.5 cm arrangement, are preferred in the market **(Aravinth *et al.*, 2011)**. The economic product is harvested just after silk emergence (1-2 cm long). Maize (*Zea mays* L) is grown on an area of 9.5 m ha, with production and productivity of 25.0 mt and 26.3q $ha^{-1}$, respectively in India. In the world it accounts for 8% and 25% of the area. Maize assumes a special significance in Indian agriculture on account of its utilization as food, feed, fodder, silage and specially corn besides several industrial uses. Baby corn is one of the most important dual-purpose crops grown. Currently, Thailand and China are the world leaders in baby corn production.

Crop geometry is considered as one of the most important factors which has to be maintained optimum crop level to harvest maximum solar radiations and utilizes the soil resources effectively and in turn better photosynthetic formation. Though the spacing requirement has been standardized for grain and fodder maize, the information on the influence of spacing on yield of baby corn composite is still obscure **(Gosavi *et al.*,)**. A spatial arrangement of plant governs the shape and size of the leaf area per plant, which in turn influences efficient interception of radiant energy and proliferation and growth of shoots and their activity. Maximum yield can be expected

only when plant population allows individual plant to achieve their maximum inherent potential. Thus, there I need to work out optimum plant spacing by in relation to other agronomic factors **(Prodhan *et al.*, 2007)**.

Varieties play an important role in gaining better and highest yield. Depending upon the variety~~.~~ ~~We~~ we can obtain disease~~-free,nest~~free, nest-free, hybrid etc. varieties are one of the very important parameters in crop production~~.~~. Most of the agronomic requirements of baby corn are similar to grain maize; however, for successful production of baby corn, ~~selection of suitable varieties need~~selection of suitable varieties needs to be studied under local agro-climatic conditions. Varieties also play a significant role in obtaining higher growth, yield contributes and yields viz., plant dry weight, crop growth rate, days to tasseling, days to silking number of cobs/plant, weight of cob with husk, weight of cob without husk, corn yield and fodder yield etc **(Sharma *et al.*, 2014)**.

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## MATERIAL AND METHOD

The experiment was carried out during *Kharif*, 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj, Uttar Pradesh, which is located at 25.28$^{o}$ N latitude, 81.54$^{o}$ E longitude and 98 m altitude above mean sea level. The experiment laid out in Randomized Block Design which constitute of nine treatments with $T_1$: G-5414 + 40 cm x 15 cm, $T_2$: G-5414 + 50 cm x 15 cm, $T_3$: G-5414 + 60 cm x 15 cm, $T_4$: G-5417 + 40 cm x 15 cm, $T_5$: G-5417 + 50 cm x 15 cm, $T_6$: G-5417 + 60 cm x 15 cm, $T_7$: Shine-60 + 40 cm x 15 cm, $T_8$- Shine-60 + 50 cm x15 cm, $T_9$- Shine-60 + 60 cm x 15 cm in three replications.

The experiment site was uniform in topography and sandy loam in texture, neutral in soil reaction (pH 7.1) low in organic carbon (0.38%), medium available N (225 kg/ha), higher available P (19.50 kg/ha) and medium available K (213.7 kg/ha). The three varieties were sown in respective plots and spacing was maintained as per the treatment details. In the period from germination to harvest several plant growth parameters were recorded at frequent intervals along with it after harvest several yield parameters were recorded those parameters are growth parameters like plant height (cm), Number of Leaves/Plant and Plant dry weight (g) were recorded. The yield parameters like Number of Cobs/Plant, Length of the Cob/Plant, Cob weight with husk, Cob weight without husk, Cob yield with husk, Cob yield without husk were recorded and statistically analyzed using Analysis of Varience (ANOVA) as applicable to Randomized Block Design **(Gomez K.A and Gomez A.A. 1984)**.

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## RESULTS AND DISCUSSION

### Growth Attributes

**Plant Height (cm):**

Data in table 1 shows that significantly highest plant height (172.38 cm) was observed in the treatment with Shine-60 + 60 cm x 15 cm, all over the treatments. However, the treatments with application of G-5417 + 60 cm x 15 cm (171.32 cm) and Shine-60 + 50 cm x 15 cm (171.97 cm) which were found to be statistically at par with treatment Shine-60 + 60 cm x 15 cm. the probable reason for the influence in plant height might be due to Shine-60 variety proved superior over other varieties. These findings are in line with the earlier findings by **Enujeke (2013)** and spacing practices had significant effects on plant height ((cm) of maize. This may be due to the competition between the inter and intra plants for sun light, water, nutrients and space at closer spacing, whereas optimum spacing helped in significantly highest plant height. Significant results were obtained due to the optimum spacing of 60 cm x 15 cm and similar results were obtained by **Neelum and Dutta (2018).**

**Number of leaves/plant:**

Treatment with Shine-60 + 60 cm x 15 cm were recorded with significantly maximum Number of leaves/plant (12.75) over all the treatments. However, the treatments with G-5417 + 60 cm x 15 cm (12.53) and Shine-60 + 50 cm x 15 cm (12.68) which were found to be statistically at par with Shine-60 + 60 cm x 15 cm. The variety Shine-60 recorded higher number of leaves compared to G-5417 and G-5414 variety. The probable reason might be due to the genetical potential of the variety that has helped in producing higher number of leaves. The optimum spacing resulted in increase in stem elongation and root growth which resulted in higher number of leaves and also the receiving adequate amount of sunlight, water and nutrients also resulted in higher leaves production. The results were in accordance with **Scaria *et al.*, (2016) and Neelum and Dutta (2018).**

**Plant dry weight (g/plant)**

Treatment with Shine-60 + 60 cm x 15 cm was recorded with significantly maximum dry weight (90.00 g/plant) over all the treatments. However, the treatments with G-5417 + 60 cm x 15 cm (89.10 g/plant) and Shine-60 + 50 cm x 15 cm (89.34 g/plant) which were found to be statistically at par with Shine-60 + 60 cm x 15 cm. shine-60 variety showed highest dry weight due to higher growth and biomass accumulation when compared to other varieties. Similar trends were observed by **Alom *et al.*, (2010).** The higher dry matter production is observed in 60 cm x 15 cm spacing due to better photosynthetic activity due to greater exposure of light and increase availability of nutrients of plants have also resulted in higher dry weight, the treatment showed the increasing trend in dry weight up to harvest stage, **Sarker *et al.*, (2020)** also reported similar results.

**Table1. Effect of Spacing and different Varieties of Baby corn on Growth attributes.**

| Treatments | Plant Height | Number of Leaves/Plant | Dry weight (g) |
|---|---|---|---|
| 1. G-5414 + 40 cm x 15 cm | 163.14 | 11.35 | 85.23 |
| 2. G-5414 + 50 cm x 15 cm | 164.18 | 11.47 | 85.83 |
| 3. G-5414 + 60 cm x 15 cm | 170.20 | 12.31 | 88.10 |
| 4. G-5417 + 40 cm x 15 cm | 165.58 | 11.62 | 86.21 |
| 5. G-5417 + 50 cm x 15 cm | 168.87 | 12.17 | 87.42 |
| 6. G-5417 + 60 cm x 15 cm | 171.32 | 12.53 | 89.10 |
| 7. Shine-60 + 40 cm x 15 cm | 167.28 | 11.84 | 86.36 |
| 8. Shine-60 + 50 cm x 15 cm | 171.97 | 12.68 | 89.34 |
| 9. Shine-60 + 60 cm x 15 cm | 172.38 | 12.75 | 90.00 |
| **S. EM (±)** | 0.45 | 0.08 | 0.30 |
| **CD (P=0.05)** | 1.35 | 0.23 | 0.91 |

## Yield and yield atttributes

Significantly maximum Number of Cobs/Plant (2.82) was recorded with the application of treatment Shine-60 + 60 cm x 15 cm all over the treatments. However, the treatments G-5417 + 60 cm x 15 cm (2.70) and Shine-60 + 50 cm x 15 cm (2.76) which were found to be statistically at par with shine -60+60*15 cm. Higher number of cobs/plant might have been possible due to nore vigour and strength attained by the plants as a result of better photosynthetic activities with sufficient availability of light, and supply of nutrients in balanced quantity of the plants at growing stages. **Sarker *et al.*,(2020**) ~~observerd~~observed with similar results. Significantly maximum length of cobs per plant(17.55cm) was recorded with a application of treatment Shine-60 + 50 cm x 15 cm (17.18 cm) which were found to statistically at par with Shine-60 + 60 cm x 15 cm.

Significantly highest Cob weight (44.18 g) with husk was recorded with the application of treatment Shine-60 + 60 cm x 15 cm over all the treatments. However, the treatments with in G-5417 + 60 cm x 15 cm (43.27 g) and Shine -60 + 50 cm x 15 cm (43.72g) which were found to be statistically at par with Shine-60 +60 cm x15 cm

Significantly highest cob weight (17.94 g) without husk was recorded with the application of treatment Shine-60 + 60 cm x 15 cm over all the treatments. However, the treatments G-5417 + 60 cm x 15 cm (17.24 g) and Shine-60 + 50 cm x 15 cm (17.53 g) which were found statistically at par with Shine-60 +60 cm x 15 cm. The performance of Shine-60 variety with regards to cob length was found to be superior. The probable reason for this may be the genetic makeup of the variety that has helped in improving photosynthetic activity due to increased source of capacity and efficient translocation of photosynthesis to the sink. The results were in accordance **Kabir *et al.*, (2021).** Better availability of moisture and moderation of soil temperature which led to greater uptake of nutrients and reduced number of days taken to meet the required heat units for proper growth and development of plants and ultimately the yield attributes. The results were recorded similar with **Harigilas (2015).**

Significantly highest Cob yield (28.78 t/ha) with husk was recorded with application –of Shine-60 + 60 cm x 15 cm over all the treatments. However, the treatments with G-5417 + 60 cm x 15 cm (28.17 t/ha) and Shine-60 + 50 cm x15 cm (27.90 t/ha) which were found to be statistically at par with Shine-60 + 60 cm x 15 cm. significantly highest Cob yield (6.87 t/ha)

without husk was recorded with the application of treatment Shine-60 + 60 cm x 15cm over all the treatments. However, the treatments G-5417 + 60 cm x 15 cm (6.74 t/ha) and Shine-60 + 50 cm x 15 cm (6.66 t/ha) which were found to be statistically at par with Shine-60+ 60 cm x 15 cm.

Significantly highest straw yield (34.63 t/ha) with husk was recorded with the treatment application of Shine-60 + 60 cm x 15 cm over all the treatments. However, the treatments G-5417 + 60 cm x 15 cm (33.79 t/ha) which was found to be statistically at par with Shine-60 60 cm x 15 cm. the performance of maize varieties in respect of seed yield was very encouraging and followed a similar trend with that of yield attributes. The maize variety Shine-60 recorded higher seed yield and straw yield over other varieties might be due to the higher production efficiency that has been reflected through improvement in different yield attributing characters. Similar findings were reported by **Asis *et al.*, (2021) and Medhi *et al.*, (2019).** The optimum spacing 60 cm x 15 cm helped plant to receive sufficient amount of heat, water and nutrients from soil which increased number of cobs/plant, productivity, profitability, and nutrient use efficiency in baby corn. The results were similar to **kumar *et al.*,(2015).**

**Table 2. Effect of Spacing and different Varieties of Baby corn on Yield and Yield attributes.**

| Treatments | Number of Cobs/Plant | Length of Cobs/Plant | Cob weight (g) | | Cob yield (t/ha) | | Straw yield (t/ha) |
|---|---|---|---|---|---|---|---|
| | | | with husk | without husk | with husk | without husk | |
| 1.G-5414 + 40cm x15cm | 2.25 | 13.24 | 40.44 | 14.26 | 24.41 | 5.96 | 29.67 |
| 2.G-5414 + 50cmx15cm | 2.37 | 14.12 | 40.96 | 14.74 | 24.72 | 6.07 | 26.27 |
| 3.G-5414 + 60cmx15cm | 2.63 | 16.28 | 42.94 | 16.81 | 26.88 | 6.47 | 25.80 |
| 4.G-5417 + 40cmx15cm | 2.41 | 14.95 | 41.47 | 15.18 | 26.13 | 6.19 | 27.53 |
| 5.G-5417 + 50cmx15cm | 2.58 | 15.85 | 42.39 | 16.32 | 27.53 | 6.54 | 30.93 |
| 6.G-5417 + 60cmx15cm | 2.70 | 16.95 | 43.27 | 17.24 | 28.17 | 6.74 | 33.79 |
| 7.Shine-60+40cmx15cm | 2.50 | 15.53 | 41.81 | 15.86 | 26.28 | 6.52 | 28.63 |
| 8.Shine-60+50cmx15cm | 2.76 | 17.18 | 43.72 | 17.53 | 27.90 | 6.66 | 32.20 |
| 9.Shine-60+60cmx15cm | 2.82 | 17.55 | 44.18 | 17.94 | 28.78 | 6.87 | 34.63 |
| **S.EM(±)** | 0.04 | 0.21 | 0.31 | 0.24 | 0.41 | 0.09 | 0.48 |
| **CD (P=0.05)** | 0.13 | 0.64 | 0.92 | 0.73 | 1.22 | 0.27 | 1.44 |

## SUMMARY

Highest plant height (172.38 cm), Number of Leaves/Plant (12.75), Plant dry weight (90.00 g/plant), maximum number of cobs/pant (17.55 cm), cob weight with husk (44.18 g), cob weight without husk (17.94 g), cob yield with husk (28.78 t/ha), cob yield without husk (6.87 t/ha) and straw yield (34.63 t/ha) were recorded with the treat Shine-60 + 60 cm x 15 cm.

At the same time Higher Gross Returns (Rs.96180/ha, net return (Rs.59294.3/ha) and Benefit Cost Ratio (1.60) was obtained in the treatment Shine-60 + 60 cm x 15 cm.

## CONCLUSION

It is concluded that in Baby corn, Shine-60 with the spacing 60 cm x 15 cm has performed well in obtaining maximum cob yield and other yield contributing characters and found to be more productive and economically viable. Hence, variety Shine-60 with the spacing 60 cm x 15 cm is beneficial under eastern Uttar Pradesh conditions.

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