The Pharma Innovation Journal 2021; 10(12): 325-327

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(12): 325-327

www.thepharmajournal.com
Received: 06-09-2021
Accepted: 16-10-2021

G Balaji Rahul
M.Sc., Department of Agronomy NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Dr. Joydawson
Professor and Head, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Corresponding Author:
G Balaji Rahul
M.Sc., Department of Agronomy NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Effect of zinc and spacing on growth and yield of babycorn (*Zea mays* L.)

G Balaji Rahul and Dr. Joydawson

Abstract
The field experiment was conducted during *zaid* season of 2021 at Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P). The soil of the experiment plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.2), low in organic carbon (0.72%), available N (278.48 kg/ha), available P (27.80 kg/ha) and available K (233.24 kg/ha). The treatments consisted of three levels of zinc (5, 10 and 15 kg/ha) and three spacings (30 cm x 20 cm, 40 cm x 20 cm and 50 m x 20 cm) and one control plot, respectively. The experiment was laid out in randomized block design with ten treatments and were replicated thrice. Results defined that number of leaves (11.07/plant), dry weight (112.08 g/plant), cobs (1.67/plant), cob length (18.13 cm), cob girth (8.78 cm), cob weight (with husk) (55.47 g) and cob weight (without husk) (24.14 g) were recorded maximum with application of 15 kg/ha + 50 cm x 20 cm treatment combination. However, plant height (173.05 cm), cob yield (with husk) (12.47 t/ha), cob yield (without husk) (4.69t/ha), green fodder yield (23.18 t/ha) and harvest index (35.73%) were obtained highest in the treatment combination of 15 kg/ha + 30 cm x 20 cm, respectively. Maximum gross returns (Rs. 2, 10,611.90/ha), net returns (Rs. 1, 43,468.90/ha) and benefit: cost ratio (2.14) were obtained highest in the treatment combination of Zn at 15 kg/ha + 30 cm x 20 cm. whereas, lowest gross returns (Rs. 1, 76,795.11/ha), net returns (Rs.1, 17,930.11/ha) and benefit: cost ratio (1.92) were noticed in control plot.

Keywords: Economics, seed yield, spacings, stover yield, zinc

Introduction
Baby corn (also known as young corn, mini corn or candle corn) is the ear of maize (*Zea mays* L.) plant harvested young, when the silks have either not emerged or just emerged and no fertilization has taken place. It is one of the most important dual purpose crops grown round the year in India (Singh *et al*., 2015) [1]. Baby corn is becoming popular in domestic and foreign markets and has enormous processing and export potential. An interesting recent development is of growing maize for vegetable purpose (Dass *et al*., 2008) [5]. Currently, Thailand and China are the world leaders in baby corn production. In India, baby corn is being cultivated in Meghalaya, Western Uttar Pradesh, Haryana, Maharashtra, Karnataka and Andhra Pradesh (Reena Rani *et al*., 2017) [4].

It is not only used as a cereal but also as vegetable and fodder crop. Maize cobs which are used as a vegetable are known as baby corn. Baby corn having unfertilized young cobs harvested two or three days after silk emergence. Globally, as a vegetable, baby corn has attracted an increasing number of people preference due to the enhancement of living standards and shift in dietary habit from non-vegetarian to vegetarian.

In India, corn is being cultivated in an area of about 9.18 million hectares with a production of 27.23 million tonnes and an average productivity of 2965 kg/ha which is fifth largest producer in the world contributing three per cent of the global production. Madhya Pradesh tops the list with the contribution of 14.87 per cent (1.37 million tonnes) to the total Indian maize grown area. In India, Karnataka produces corn of about 3.73 million tonnes with a per cent of 13.69 among the states and highest productivity was noticed in Tamil Nadu of about 6551 kg/ha. While, Uttar Pradesh contributes an area of about 0.73 million hectares with a 7.98 per cent to all over India which has the production of about 1.53 million tonnes (5.63 per cent to all - India) and productivity is 2090 kg/ha, respectively (Agricultural Statistics at a Glance, 2019).

Materials and Methods
Location of the experimental area
The experiment was conducted during *zaid* season of 2021 at the Crop Research Farm,

Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.). The Crop Research Farm is situated at 25.57^0 N latitude, 87.19^0 E longitude and at an altitude of 98 m above mean sea level. This area is situated on the right side of the river *Yamuna* and by the opposite side of Prayagraj city. All the facilities required for crop cultivation were available.

Climate and weather condition

Prayagraj has a sub-tropical and semi-arid climatic condition, with both extremes of temperature, i.e. winter and summer. It receives southwest monsoon rains which commence in the month of July and withdraws by the end of September. The meteorological data including the weekly average of maximum and minimum temperature, relative humidity and rainfall recorded at the Agro-Meteorological Observatory Unit, School of Forestry and Environment Sciences, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj (U.P.) during the cropping period.

Details of fertilizer applications

The recommended dose of fertilizers was 120 kg N, 60 kg P_2O_5, 40 kg K_2O/ha were applied to all the treatments. Urea, single super phosphate and muriate of potash were used as the source of nutrients. Entire dose of phosphorus, potassium and half the dose of nitrogen was applied as basal at the time of sowing. The remaining half of the nitrogen was top dressed as band placement at 30 days after sowing. Zinc sulphate was soil applied to all of the plots as per the treatment combinations according to the calculations except in the control plot.

Results and Discussion

Plant height

At harvest stage, obviously maximum plant height (173.05 cm) is recorded in Zn at 15 kg/ha + 30 cm x 20 cm and at par values were noticed in the treatment combination of Zn at 10 kg/ha + 30 cm x 20 cm and Zn at 15 kg/ha + 40 cm x 20 cm (165.76 and 160.56 cm), respectively.

The higher plant density at closer crop geometry leading to more severe competition for light and higher intra and inter-row competition for nutrients and water by the plants which coupled with the optimum sowing time, suitable growth period and favourable climatic conditions especially temperature might have resulted in maximum plant height. (Kheibari *et al.*, 2012) [7]; Ashwani Kumar Thakur *et al*., 2015) [1].

Table 1: Effects of baby corn on growth and yield parameters

Treatments	Plant height(cm)) p	Cob yield (t/ha)		Green fodder yield (t/ha)	Harvest index (%)
		With husk	Without husk		
5 kg/ha + 30 cm x 20 cm	146.23	11.05	4.13	21.20	33.05
10 kg/ha + 30 cm x 20 cm	165.76	12.01	4.40	21.78	34.69
15 kg/ha + 30 cm x 20 cm	173.05	12.47	4.69	23.18	35.73
5 kg/ha + 40 cm x 20 cm	141.13	10.93	4.06	20.10	32.47
10 kg/ha + 40 cm x 20 cm	154.15	10.74	4.33	21.44	34.39
15 kg/ha + 40 cm x 20 cm	160.56	11.28	4.36	21.58	35.54
5 kg/ha + 50 cm x 20 cm	137.93	10.25	4.06	20.08	31.52
10 kg/ha + 50 cm x 20 cm	139.71	10.43	4.10	20.28	32.33
15 kg/ha + 50 cm x 20 cm	150.79	10.71	4.29	20.46	33.40
Control	137.43	9.80	3.93	19.45	30.85
F-Test	S	S	S	S	S
S.Em+	5.58	0.44	0.13	0.65	0.31
CD (P=0.05)	16.59	1.29	0.39	1.94	0.91

With husk

Significantly higher green cob yield with husk was noticed in Zn at 15 kg/ha + 30 cm x 20 cm (12.47 t/ha) which was on par with Zn at 10 kg/ha + 30 cm x 20 cm and Zn at 15 kg/ha + 40 cm x 20 cm (12.01 and 11.28 t/ha), respectively.

Without husk

However, green cob yield without husk (4.69 t/ha) was found to be significantly higher in treatment combination of Zn at 15 kg/ha + 30 cm x 20 cm which was statistically at par with Zn at 10 kg/ha + 30 cm x 20 cm, Zn at 15 kg/ha + 40 cm x 20 cm and Zn at 10 kg/ha + 40 cm x 20 cm (4.40, 4.36 and 4.33 t/ha), respectively. Increase in cob and corn yield in baby corn might be owing to the favourable influence of applied zinc on physiological and metabolic process of the plants, which ultimately enhanced baby cob and corn yield and found significant increase in all growth and yield attributes in wider intra-row spacing, yet concluded that narrower spacing could outstand others in yield. It was observed that narrow intra-row spacing resulted higher yield than wider intra-row spacing and also application of higher levels zinc directly related to the vegetative and reproductive growth phases of the crop. Similar results were obtained by Sarjamei *et al.* (2014) [11]; Bairagi *et al.* (2015) [2]; Dutta *et al.* (2015) [6].

Green fodder yield (t/ha)

The data shows that there was a significant difference among the treatments over green fodder yield which were presented in Table 1.

At harvest stage, green fodder yield was obtained significantly higher (23.18 t/ha) in Zn at 15 kg/ha + 30 cm x 20 cm which was followed by Zn at 10 kg/ha + 30 cm x 20 cm, Zn at 15 kg/ha + 40 cm x 20 cm and Zn at 10 kg/ha + 40 cm x 20 cm (21.78, 21.58 and 21.44 t/ha), respectively.

In case of green fodder yield, almost the same trend was observed in case of green cob yield. Plant population showed significant differences in green fodder yield the lowest being recorded with the wider spacing. The present findings are well in agreement with that of Chamroy *et al*. (2017); Dangariya *et al*. (2017) [4]. Translocation of photosynthates with applied zinc, which resulted in higher production of green fodder in the respective levels of nutrient. Similar results were also reported by Mahdi *et al.* (2012) [8].

Harvest index (%)

The harvest index obtained on the basis of green cob yield

and green fodder yield is represented in Table 1. The data shown that there was a significant difference among treatments.

However, significantly higher harvest index (35.73%) was noticed in Zn at 15 kg/ha + 30 cm x 20 cm which was followed by Zn at 15 kg/ha + 40 cm x 20 cm (35.54%), respectively. These results were in conformity with findings of Shamim Eskandarnejad *et al.* (2013) [12]; Chavan (2015) [3]; Nirjharnee Nandeha *et al.* (2016) [9].

Table 2: Effects of baby corn on economic parameters

S. No.	Treatments	Cost of cultivation (Rs./ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	B:C ratio
1.	5 kg/ha + 30 cm x 20 cm	63,811.00	1,86,564.73	1,22,753.73	2.00
2.	10 kg/ha + 30 cm x 20 cm	65,477.00	1,97,779.69	1,32,302.69	2.02
3.	15 kg/ha + 30 cm x 20 cm	67,143.00	2,10,611.90	1,43,468.90	2.14
4.	5 kg/ha + 40 cm x 20 cm	62,331.00	1,82,541.93	1,20,210.93	1.93
5.	10 kg/ha + 40 cm x 20 cm	63,997.00	1,94,699.73	1,30,702.73	2.04
6.	15 kg/ha + 40 cm x 20 cm	65,663.00	1,96,075.38	1,30,412.38	1.99
7.	5 kg/ha + 50 cm x 20 cm	59,571.00	1,82,563.37	1,22,992.37	2.06
8.	10 kg/ha + 50 cm x 20 cm	61,237.00	1,84,260.76	1,23,023.76	2.01
9.	15 kg/ha + 50 cm x 20 cm	62,903.00	1,91,830.06	1,28,927.06	2.05
10.	Control	58,865.00	1,76,795.11	1,17,930.11	1.92

Cost of cultivation (Rs./ha)

Data shown that cost of cultivation (Rs. 67,143.00/ha) was observed maximum in treatment combination of Zn at 15 kg/ha + 30 cm x 20 cm. However, minimum cost of cultivation (Rs. 58,865.00/ha) was found in control plot, respectively.

Gross returns (Rs./ha)

The gross returns (Rs. 2,10,611.90/ha) was noticed maximum in treatment combination of Zn at 15 kg/ha + 30 cm x 20 cm and minimum gross returns (Rs.1,76,795.11/ha) was noticed in control plot where no zinc was applied.

Net returns (Rs./ha)

The highest net returns (Rs. 1,43,468.90/ha) was obtained in Zn at 15 kg/ha + 30 cm x 20 cm and control plot where no zinc was applied recorded lowest net returns (Rs.,17,930.11/ha), respectively.

Benefit: cost ratio

The treatment combination of Zn at 15 kg/ha + 30 cm x 20 cm which obtained higher gross returns and net returns led to attain higher B:C ratio of 2.14 and lowest B:C ratio of 1.92 was obtained in the control plot, respectively.

Similar results were reported by Ashoka *et al.* (2008); Dutta *et al.* (2015) [6]; Shankar Lal Golada *et al.* (2013); Rakesh kumar and Bohra (2014) suggesting beneficial effects of sowing of baby corn at a spacing of 30 cm x 20 cm along with 15 of zinc per hectare resulting in terms of higher gross and net monetary returns as well as benefit: cost ratio.

Conclusion

It is concluded that among different zinc fertilization levels and various spacings studied in baby corn, soil application of zinc at 15 kg/ha and maintaining spacing of 30 cm x 20 cm (T_3) recorded more baby corn yield, green fodder yield and was found economically viable with higher net returns and benefit: cost ratio.

Reference

1. Ashwani Kumar Thakur, Dushyant Singh Thakur, Rakesh Kumar Patel, Adikant Pradhan, Prafull Kumar. Effect of different plant geometry and nitrogen levels in relation to growth characters, yield and economics on sweet corn (*Zea mays saccharata* L.) at Bastar plateau zone. The Bioscan 2015;10(3):1223-1226.
2. Bairagi S, Pandit MK, Sidhya PK, Adhikary S, Koundinya AVV. Impacts of date of planting and crop geometry on growth and yield of baby corn (*Zea mays* var. *rugosa*). Journal Crop and Weed 2015;11(2):127-131.
3. Chavan PG. Growth, yield and economics of sweet corn as influenced by sowing time and plant densities under lateritic soils of Konkan. International Multidisciplinary e –Journal 2015;4(6):221-225.
4. Dangariya MV, Dudhat MS, Bavalgave VG, Thanki JD. Growth, yield and quality of *rabi* sweet corn as influenced by different spacing and fertilizer levels. International Journal of Agricultural Sciences 2017;13(1):38-42.
5. Dass S, Yadav VK, Kwatra A, Jat ML, Rakshit S, Kaul J, *et al*. Baby corn in India. Technical Bulletin, Directorate of Maize Research, Pusa Campus, New Delhi 2008;6:1-45.
6. Dutta D, Dutta Mudi D, Thentu TL. Effect of irrigation levels and planting geometry on growth, cob yield and water use efficiency of baby corn (*Zea mays* L.). Journal Crop and Weed 2015;11(2):105-110.
7. Kheibari MNK, Khorasani SK, Taheri G. Effects of plant density and variety on some of morphological traits, yield and yield components of baby corn (*Zea mays* L.). Intl. Res. J. Appl. Basic. Sci 2012;3(10):2009-2014.
8. Mahdi SS, Husain B, Singh L. Influence of seed rate, nitrogen and zinc on fodder maize (*Zea mays*) in temperate conditions of Western Himalayas. Indian *Journal of Agronomy* 2012;57(1):85-88.
9. Nirjharnee Nandeha, Dewangan YK, Premlal Sahu. Effect of crop geometry and nutrient management on yield performance of sweet corn (*Zea mays* L. *Saccharata*) under Chhattisgarh plain ecosystem. The Bioscan 2016;11(4):2293-2295.
10. Reena Rani, Sheoran RK, Pooja Gupta Soni, Sakshi Kaith, Arpita Sharma. Baby corn: A wonderful vegetable. International Journal of Science, Environment and Technology 2017;6(2):1407-1412.
11. Sarjamei F, Khorasani SK, Nezhad AJ. Effect of planting methods and plant density, on morphological, phenological, yield and yield component of baby corn. Adv. Agric. Biol. 2014;2(1):20-25.
12. Shamim Eskandarnejad, Saeid Khavari Khorasani, Saeid Bakhtiari, Ali Reza Heidarian. Effect of row spacing and plant density on yield and yield components of sweet corn (*Zea mays* L. *Saccharata*) varieties. Advanced Crop Science 2013;3(1):81-88.