The Pharma Innovation Journal 2021; 10(11): 1602-1604

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(11): 1602-1604

www.thepharmajournal.com
Received: 04-09-2021
Accepted: 12-10-2021

Vontari Manideepthi
M.Sc. Scholar, Department of Agronomy, NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Rajesh Singh
Assistant Professor, Department of Agronomy, NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Ekta Singh
Ph.D., Agronomy Student, Department of Agronomy, NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Vontari Manideepthi
M.Sc. Scholar, Department of Agronomy, NAI, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

Response of various intra-row spacing's and phosphorus levels on yield and economics of sweet corn (*Zea mays* L.) during summer season

Vontari Manideepthi, Rajesh Singh and Ekta Singh

Abstract
An experimental study was done to understand the response of various intra-row spacings and phosphorus levels on yield and economics of sweet corn during summer season which was conducted at crop research farm, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. At last the experiment concluded that maximum green cob yield (13.45 t/ha) and green fodder yield (22.47 t/ha) was reported with incorporation of 60 cm row to row with 15 cm plant to plant spacing along with application of phosphorus at 75 kg/ha. Whereas, harvest index (41.54%) was recorded higher in 60 cm row to row and 25 cm plant to plant spacing and at par values were noticed in 60 cm row to row with 15 cm plant to plant spacing and 60 cm row to row with 20 cm plant to plant spacing along with application of phosphorus at 75 kg/ha. However, gross returns (₹ 1,96,168.30/ha), net returns (₹ 1,34,553.30/ha) and B:C ratio (2.18) also denoted higher values in 60 cm row to row with 15 cm plant to plant spacing along with application of phosphorus at 75 kg/ha, respectively.

Keywords: Economics, green cob yield, green fodder yield, intra-row spacing, phosphorus

Introduction

Sweet corn scientifically known as *Zea mays* L. var *Saccharata* is one of the varieties of maize with high sugar content. It is the result of a naturally occurring recessive mutation in genes which controls the conversion of sugars to starch in the endosperm of the corn. Generally, field corn varieties are harvested when the kernels get dry and mature (dent stage) but sweet corn must be picked when they are immature (milk stage) and are eaten as a vegetable, instead of consuming as grains. Since the process of maturing involves in conversion of sugar to starch, sweet corn stores poorly and must be freshly eaten, frozen or canned, before the kernels turn hard and starchy (Ronley C. Canatoy, 2018) [8]. Sweet corn differentiates from other corns (field maize, popcorn and ornamental) because kernels have a high content of sugar during the milk stage to early dough stage. The crop is consumed at immature stage. Sweet corn kernels taste much sweeter than normal corn, especially at 25-30% maturity.

In modern systems of producing sweet corn, appropriate plant-to-plant variation results in increased competition among plants at progressively higher plant densities for limiting resources, soil moisture and incident photosynthetically active radiation. Planting densities are very important in crop growth. The optimum planting density shows the way for better utilization of light, time, precipitation, temperature and other resources. Planting density has a particular role in sweet corn because it does not contain the tillering capability to adjust to adjustment in plant stand. In order to achieve higher cob yields, maintaining the optimum planting density is the most important factor for growth of corn (Fakeerappa Arabhanvi and Hulihalli, 2019) [6].

Phosphorus is a component of chemical responsible for the reaction of synthesis of carbohydrates and degradation. It is also important for seed and fruit development and crop maturation. Phosphorus encourages the ripening of fruits thus counteracting the effect of excess nitrogen incorporation to the soil. This helps to strengthen the skeletal structure of the plant leads to prevention of lodging. It also helps in increasing the grains quality and plant resistance to diseases (Wasim Khan and Vikram Singh, 2017) [14].

Considering the above facts, a field research study was conducted to understand the response of various intra-row spacings and phosphorus levels on sweet corn crop.

Material and Methods

The purpose of this field study was to find out the interaction of various intra-row spacings and phosphorus levels on yield and economics of sweet corn (*Zea mays* L.) grown in *zaid* season, 2021 which was located in Prayagraj, Uttar Pradesh. The research was done with three intra-row spacings (60 cm x 15 cm, 60 cm x 20 cm and 60 cm x 25 cm) and phosphorus levels (45, 60 and 75 kg/ha). Overall nine treatments were made up and replicated thrice in a Randomized Block Design. The crop was grown in summer season so that two irrigations were given at the time of sowing and one more irrigation during tassel formation. Green cob yield, green fodder yield and harvest index were recorded just before harvest regarding the crop and economical parameters like cost of cultivation, gross returns and benefit: cost ratio were also considered. The data was analysed statistically by analysis of variance.

Results and Discussion

Yield of sweet corn

In Table 1, the data shows that green cob yield, green fodder yield and harvest index of sweet corn which was recorded at harvest stage was reported significant difference among the treatment combinations. However, the data in Table 1 represents higher values green cob yield (13.45 t/ha) of sweet corn recorded significantly in the treatment combination of maintaining 60 cm x 15 cm spacing along with incorporation of 75 kg of phosphorus per hectare. And at par values of green cob yield (12.42 t/ha) were recorded in the treatment combination of maintaining the plant density of 60 cm x 15 cm spacing along with application of 60 kg of phosphorus per hectare. It was observed that narrow intra-row spacing resulted higher yield than wider intra-row spacing and also application of higher levels phosphorus directly related to the vegetative and reproductive growth phases of the crop and attributed to complex phenomenon of phosphorus utilization in plant metabolism. Similar results were obtained by Habib Akbar *et al.* (2002) [7], Arun Kumar *et al.* (2007) [2] and Arvadiya *et al.* (2012) [3].

Significantly higher green fodder yield (22.47 t/ha) was noticed in the planting density of 60 cm x 15 cm and higher dose of phosphorus application at 75 kg/ha which was followed by the treatment combination of maintaining the plant density of 60 cm x 20 cm with application of 60 kg phosphorus per hectare (21.73 t/ha) (Table 1.). In case of green fodder yield, almost the same trend was observed as was noted 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 Spandana Bhatt (2012) [13], Shankar Lal Golada *et al*. (2013) [10] and Dutta *et al.* (2015) [5].

But in case of harvest index (Table 1.), the treatment combination of 60 cm x 25 cm (wider spacing) with application of phosphorus at 75 kg per hectare recorded significantly higher values of harvest index (41.54%) which was statistically at par with the treatment combination of 60 cm x 20 cm planting geometry with full dose of phosphorus application at 75 kg/ha (39.73%) and 60 cm x 15 cm narrow planting geometry with full dose of phosphorus at 75 kg/ha (39.49%), respectively. These results were in conformity with findings of Shamim Eskandarnejad *et al*. (2013) [9] and Chavan (2015) [4].

Economics

A persual of the Table 2, clearly denotes the economical values of gross returns, net returns and benefit: cost ratio based on the treatment combinations. However, maximum gross returns (Rs. 1,96,168.30/ha), net returns (Rs. 1,34,553.30/ha) and benefit: cost ratio (2.18) was recorded in the treatment of 60 cm x 15 cm + 75 kg P/ha. Whereas, least values of gross returns (Rs. 1,13,872.00/ha), net returns (Rs. 64,586.97/ha) and benefit: cost ratio (1.31) was noticed in 60 cm x 25 cm + 45 kg P/ha. Similar results were reported by Sopan Baliram Dhanwade *et al.* (2018) [12], Alka Jyoti Sharma *et al.* (2018) and Singh (2016) [11] suggesting beneficial effects of sowing of sweet corn at a spacing of 60 cm x 15 cm along with 75 phosphorus per hectare resulting in terms of higher net and gross monetary returns as well as benefit: cost ratio.

Table 1: Response of intra-row spacing and levels of phosphorus on yield of sweet corn

S. No.	Treatments	Green cob yield (t/ha)	Green fodder yield (t/ha)	Harvest index (%)
1.	60 cm x 15 cm + 45 kg P/ha	10.80	20.86	34.40
2.	60 cm x 15 cm + 60 kg P/ha	12.42	21.73	36.81
3.	60 cm x 15 cm + 75 kg P/ha	13.45	22.47	39.49
4.	60 cm x 20 cm + 45 kg P/ha	9.09	16.41	36.08
5.	60 cm x 20 cm + 60 kg P/ha	10.84	17.59	38.56
6.	60 cm x 20 cm + 75 kg P/ha	12.03	18.61	39.73
7.	60 cm x 25 cm + 45 kg P/ha	7.93	13.70	37.11
8.	60 cm x 25 cm + 60 kg P/ha	8.89	14.62	38.27
9.	60 cm x 25 cm + 75 kg P/ha	10.92	15.25	41.54
	S.Em+	0.41	0.25	0.82
	CD (P=0.05)	1.22	0.75	2.47

Table 2: Response of intra-row spacing and levels of phosphorus on monetary attributes of sweet corn

S. No.	Treatments	Gross returns (₹/ha)	Net returns (₹/ha)	B:C ratio
1.	60 cm x 15 cm + 45 kg P/ha	1,56,284.20	94,999.16	1.55
2.	60 cm x 15 cm + 60 kg P/ha	1,79,701.90	1,18,251.90	1.92
3.	60 cm x 15 cm + 75 kg P/ha	1,96,168.30	1,34,553.30	2.18
4.	60 cm x 20 cm + 45 kg P/ha	1,30,812.60	75,527.57	1.37
5.	60 cm x 20 cm + 60 kg P/ha	1,54,847.80	99,397.80	1.79
6.	60 cm x 20 cm + 75 kg P/ha	1,71,434.40	1,15,819.40	2.08
7.	60 cm x 25 cm + 45 kg P/ha	1,13,872.00	64,586.97	1.31
8.	60 cm x 25 cm + 60 kg P/ha	1,27,281.90	77,831.93	1.57
9.	60 cm x 25 cm + 75 kg P/ha	1,54,722.80	1,05,107.80	2.12

Conclusion
On the basis of the present research work, it is concluded that treatment combination of 60 cm x 15 cm + 75 kg P/ha was found to be beneficial for obtaining higher fresh cob and green fodder yields and also higher monetary returns.

Acknowledgement
Authors are very much thankful to Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh for facilities providing to us during the research work.

References
1. Alka Jyoti Sharma, Singh MK, Sanjay Kumar, Shweta Shambhavi. Effect of plant geometry, fertility level and zinc level on *kharif* baby corn (*Zea mays* L.). International Journal of Current Microbiology and Applied Sciences 2019;8(7):1658-1667.
2. Arun Kumar, MA, Gali A, Hebsur NS. Effect of different levels of NPK on growth and yield parameters of sweet corn. Karnataka Journal of Agricultural Sciences 2007;20(1):41-43.
3. Arvadiya LK, Raj VC, Patel TU, Arvadia MK, Patel AM. Effect of plant population and weed management practices on productivity of sweet corn. Indian Journal of Weed Science 2012;44(3):167-171.
4. 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.
5. 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.
6. Fakeerappa Arabhanvi, Hulihalli UK. Yield and yield attributes of sweet corn as influenced by planting geometry and fertilizer levels. Current Journal of Applied Science and Technology 2019;33(5):1-7.
7. Habib Akbar, Miftatullah, Muhammad Tariq Jan, Amanullah Jan, Ihsanullah. Yield potential of sweet corn as influenced by different levels of nitrogen and plant population. Asian Journal of Plant Sciences 2002;1(6):631-633.
8. Ronley Canatoy C. Effects of vermicompost on the growth and yield of sweet corn in Bukidnon, Philippines. Asian Journal of Soil Science and Plant Nutrition 2018;3(2):1-8.
9. 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.
10. Shankar Lal Golada, Ganpat Lal Sharma, Jain HK. Performance of baby corn (*Zea mays* L.) as influenced by spacing, nitrogen fertilization and plant growth regulators under sub humid condition in Rajasthan, India. African Journal of Agricultural Research 2013;8(12):1100-1107.
11. Singh MV. Effect of planting density and nutrient management on performance of *rabi* hybrid maize. *Annals of Plant and Soil Research* 2016;18(3):275-279.
12. Sopan Baliram Dhanwade, Rajesh Singh, Singh AC. Effect of planting geometry and integrated nitrogen management on growth and green cob yield of sweet corn. (*Zea mays* L. *saccharata*) var. sakata-16. Journal of Pharmacognosy and Phytochemistry 2018;7(4):2068-2071.
13. Spandana Bhatt P. Response of sweet corn hybrid to varying plant densities and nitrogen levels. *African Journal of Agricultural Research* 2012;7(46):6158-6166.
14. Wasim Khan, Vikram Singh. Response of phosphorus application on yield, quality and economics of sweet corn (*Zea mays* L. *saccharata*) varieties. Journal of Pharmacognosy and Phytochemistry 2017;6(5):2205-2208.