Original Research Article

Growth and yield performance of baby corn (*Zea mays* l.) as influenced by row spacing and phosphorus application in black cotton soils of Krishan zone of Andhra Pradesh, India

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ABSTRACT

Baby corn having high remunerative value, Provides opportunities for crop diversification value addition and revenue regeneration. So, there is a need to standardize the agro techniques for its cultivation. Hence, a field experiment was conducted during the rabi season in black clayey soils at Fodder Production Farm of Livestock Research Station, Sri Venkateswara veterinary University, Lam Farm, Guntur-522034, Andhra Pradesh, India to find out the Influence of different levels of phosphorus (40, 50, 60 kg/ha) and various row spacings (40 x 15 cm, 45 x 15 cm, 50 x 15 cm) on growth and yield of baby corn. The experiment was laid out in Randomised Block Design with nine treatments each replicated thrice. It is observed that crop established with 50 x 15 cm spacing along with application of 50 kg/ha Phosphorus produced Maximum growth attributes viz. Plant height (161.10 cm), N~~o.~~umbers of leaves (12.47), Plant dry weight (90.21 g/plant) and yield attributes viz. No. of cobs/ plant (4.03), Length of cob (24.34 cm), Length of corn (9.47 cm), Cob weight (56.38 g), corn weight (11.61 g), Cob yield (35696.67 kg/ha), Corn yield (7560 kg/ha).

Key words: Baby corn, ~~Growth ,~~Growth, Phosphorus, Row Spacing~~,~~ , Yield

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INTRODUCTION:

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- The reasons that led the author to select the topic and why
hence the study event. Must be clearly identified, the purpose
Of the investigation.
- A general synthesis of the topic or theme.
- The contributions that the study will generate, although in a general way and end with the hypothesis of the study and objective.

Maize *(Zea mays L.*) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions (Olivares et al. 2018). With the rise in Living standard of people and shift in food item from non-vegetarian to vegetarian in the world evolved several vegetables, one such vegetable is called baby corn. The small sized fresh green cobs of maize, when picked within 36 hours of silk emergence, popularly known as baby corn. Baby corn production provides opportunities for crop diversification, value addition and revenue generation and is becoming increasingly popular among farmers due to its high remunerative value. **(Pandey *et al* 2002)**.

One Baby corn can be compared with an 'egg' in terms of minerals. It is a low calorie vegetable having higher fibre content without cholesterol (**Kumar *et al.*, 2006**). Besides nutritive advantage, it is also free from residual effect of pesticides as it is harvested within a week of tassel emergence. Baby corn has a prime place as a safe and quality vegetable. With the increasing concern for health, people are looking for quality food

in place of bulky items. So, Baby corn has prime place as a safe and quality vegetable.

To commercialize this new crop, there is an urgent need to find out suitable agro-techniques for higher production and ultimately higher income to the farmers.

Maintenance of optimum crop geometry is essential to harvest maximum solar radiation and to utilize the soil resources effectively in addition wider spacing provided uniform spread of plants because of less crowding which resulted into healthy cobs. Maize being exhaustive crop requires high quantity of nutrients for its growth and development Judicious use of fertilizer is a key for profitable Baby corn crop production as they alone contribute 40-60 per cent of the crop yield. Phosphorus plays a vital role besides nitrogen in plant nutrient that influences well developed roots, that are able to penetrate the ground and gather all the nutrients required by the plant for development.it helps to strengthen the skeletal structure of the plant there by preventing lodging **(**Rangothama~~Rangothama~~**, 1999)** and hence improves the root growth, vigour of the plant and quality of baby corn yield.

There is no current review of scientific literature

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MATERIALS AND METHODS:

A field experiment was conducted during *Rabi* season of 2020 in field No.6B/FPF at Fodder Production Farm, of Livestock Research Station, Sri Venkateswara Veterinary University, Lam Farm, Guntur-522034, Andhra Pradesh, India. Guntur Andhra Pradesh, India, which is having Sub tropical climate with maximum and minimum temperatures of 31.37 and 15.82 °C, respectively. The soil of experimental field was black clay in nature with pH 8.5 and EC 0.45 dms^{-1} low in Organic carbon (0.42 %) medium in available N (288 kg/ ha^{1}), high in both available P_2O_5 (174 kg / ha^{1}) and K_2O (418 kg / ha).

Comment [A2]: add annual average rainfall

A combination of nine treatments were replicated thrice and laid out in a randomized block design. Treatments comprised of T_1:40 x 15 cm Row spacing + 40 kg P_2O_5/ha, T_2:40 x 15 cm Row spacing + 50 kg P_2O_5/haT_3:40 x 15 cm Row spacing + 60 kg P_2O_5/ha, T_4:45 x 15 cm Row spacing + 40 kg P_2O_5/ha, T_5:45 x 15 cm Row spacing + 50 kg P_2O_5/ha, T_6:45 x 15 cm Row spacing + 60 kg P_2O_5/ha, T_7:50 x 15 cm Row spacing + 40 kg P_2O_5/ha, T_8:50 x 15 cm Row spacing + 50 kg P_2O_5/ha, T_9:50 x 15 cm Row spacing + 60 kg P_2O_5/ha. Fertilizers were applied according to the treatment description at the time of sowing. Healthy Seeds of Baby corn variety G-5414 of Syngenta Pvt. Ltd., were sown on 23rd November 2020 by dibbling two seeds manually per hill. The first harvesting of baby cobs was carried out 58 days after sowing (20.01.2021) and subsequently green cobs harvested in 2 pickings. The cobs were harvested from an area of one meter square, treatment wise and weighed with and without husk, then the obtained values were converted to per hectare and recorded as kg/ha.

Experiment data collected was subjected to statistical analysis by adopting Fisher's method of Analysis of variance (ANOVA) as outline by **Gomez and Gomez (1984)**. Critical Difference (CD) values were calculated the 'F' test was found significant at 5% level.

RESULTS AND DISCUSSION:

Growth attributes

Influence of different levels of Phosphorus with row spacings have been found to exert a significant increase on growth parameters at Harvest stage. The treatment T_8 (50 kg/ha Phosphorus + 50 x15 cm Row Spacing) exhibited the highest values for almost all the growth parameters ~~*i.e* Plant~~*i.e* Plant height (161.10 cm), Number of leaves/plant (12.47) and Dry weight/plant (90.21 g), which might be due to wider space availability between the rows and closer intra- rows helped for increase of root spread which eventually utilized the resources such as water, nutrient, space, sunlight very effectively. P, a component of fertility management, on crop growth seem to be due to maintaining congenial nutritional

environment of plant system on account of their greater availability from soil media, which might have resulted in greater synthesis of amino acids, proteins and growth promoting substances, which seems to have enhanced the meristematic activity and increased cell division and their elongation which ultimately enhanced the growth in terms of Plant height, no. of leaves and finally accumulation of dry matter, these results were stated in conformity with **Mathukia *et al.*,(2015),Singh *et al.*, (2015).**

Yield attributes and yield

The yield parameters; Length of the Cob (24.34 cm), Length of the corn (9.47 cm), Cob weight (56.38 g), Corn weight (9.47 g) were found highest in T_8 (50 kg/ha Phosphorus + 50 x15 cm Row Spacing). Regarding yield of baby corn, the treatment T_8 (50 kg/ha Phosphorus + 50 x15 cm Row Spacing) exhibited the highest cob yield (35696.67 kg/ha) and corn yield (7560 kg/ha). This might be due to increase in Phosphorus levels with wider row spacing levels led to better interception, absorption and utilization of available nutrients and soil moisture which empowered the plant to manufacture more quantities of photosynthates and accumulating enhanced sink capacity and maximum nutrient uptake by the crop. Besides, positive response of yield attributing characters such as length of cob, length of corn, cob weight and corn weight at higher levels of fertilizer dose of Phosphorus and wide spacing levels attributed to higher cob and corn yields, these results were stated in conformity with **Medhi Dhabanita and Dutta Rinjumoni (2019).**

I suggest adding these paragraphs in the discussion:

The investigations of Olivares et al. (2018) point to humidity as one of the factors that affect the availability of phosphorus in plants, these experiences indicate that the movement of phosphorus increases with the water content of the soil. On the other hand, the absorption of phosphorus by plants increases when the matrix suction of the soil decreases, which agrees with the concept that the transfer of the nutrient to the roots is carried out by means of water (Olivares and Hernández, 2019; Bertorelli and Olivares, 2020; Olivares, 2018).

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The study by Olivares et al. (2022) indicates that coarse-textured soils have lower water content than fine-textured soils at any matrix suction, and therefore less diffusion of phosphorus towards the root. On the other hand, the amount of labile or exchangeable phosphorus will be less in coarse-textured soils than those with a fine texture, which have a higher anion adsorption capacity (Olivares et al. 2020). Also, inorganic colloids are of interest in the type and amount of clay (Olivares, 2016). Soils rich in organic matter, especially active fractions of it, almost always exhibit relatively low levels of phosphorus fixation.

In corn, the planting densities and the distribution of the plants in the field depend on the development characteristics of the variety (height and branching of the plant) and on environmental factors (soil, precipitation and temperature, among others) (Olivares et al. 2018), which makes an optimal plant density and distribution for corn in some areas, not the best for others, especially if they differ in their growth habit.

This manuscript does not have a discussion of the results, it is recommended that the authors write paragraphs and compare with experiences related to the Research as the background of other research.

Criteria to support the discussion:

- **Social Relevance: Impact, Benefit and Social Projection.**
- **Contemporary Relevance: Analysis of the situation manifested in reality.**
- **Methodological Utility: Provides new approaches to study the event or theme.**
- **Convenience: What is the research for?**
- **Practical Justifications: New approaches, new solutions.**
- **Theoretical value: Increases existing knowledge. Develop or supports theoretical foundations.**
- **Projection: It can be applied in other institutions, communities or organizations.**

CONCLUSION:

On the basis of one season experimentation it is found that application crop established with row spacing of 50 x 15 cm along with application of Phosphorus 50 kg/ha found more

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productive (35696.67 kg/ha) for baby corn production at black clayey soils of Sub-tropical climate.

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Suggested citations are for genuine scientific reasons that emphasize the current topic of study in context.

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Table. 1 Influence of different levels of Phosphorus and Row Spacing on growth attributes of Baby corn

Tr. ~~No~~N°	Treatment Combination	Plant height (cm) At Harvest	Number of Cobs (~~No~~N°) At Harvest	Plant dry weight (g/plant) At Harvest
T_1	40 x 15 cm Row spacing + P_2O_5 40 kg/ha	134.92	10.20	83.65
T_2	40 x 15 cm Row spacing + P_2O_5 50 kg/ha	137.73	10.27	84.70
T_3	40 x 15 cm Row spacing + P_2O_5 60 kg/ha	154.72	11.40	88.69
T_4	45 x 15 cm Row spacing + P_2O_5 40 kg/ha	138.00	10.47	85.51
T_5	45 x 15 cm Row spacing + P_2O_5 50 kg/ha	148.00	10.53	86.79
T_6	45 x 15 cm Row spacing + P_2O_5 60 kg/ha	158.07	12.33	89.46
T_7	50 x 15 cm Row spacing + P_2O_5 40 kg/ha	153.27	11.07	87.07
T_8	50 x 15 cm Row spacing + P_2O_5 50 kg/ha	161.10	12.47	90.21
T_9	50 x 15 cm Row spacing + P_2O_5 60 kg/ha	152.66	11.20	88.20
	S. Em (±)	2.15	0.07	0.75
	CD (P=0.05)	6.45	0.21	2.27

Table. 2 Influence of different levels of Phosphorus and Row Spacing on yield attributes of Baby corn

Tr. ~~No~~Nº	Treatment Combination	Cob length (cm)	Corn length (cm)	Cob weight (g)	Corn weight (g)	Cob yield (kg/ha)	Corn Yield (kg/ha)
T_1	40 x 15 cm Row spacing + P_2O_5 40 kg/ha	19.32	8.02	48.49	9.53	28456.67	4533.33
T_2	40 x 15 cm Row spacing + P_2O_5 50 kg/ha	20.20	8.24	49.58	9.79	29276.67	5736.67
T_3	40 x 15 cm Row spacing + P_2O_5 60 kg/ha	23.14	8.73	54.73	11.14	35133.33	7250.00
T_4	45 x 15 cm Row spacing + P_2O_5 40 kg/ha	20.68	8.28	50.44	10.12	29573.33	6330.00
T_5	45 x 15 cm Row spacing + P_2O_5 50 kg/ha	21.37	8.43	51.42	10.53	31633.33	6436.67
T_6	45 x 15 cm Row spacing + P_2O_5 60 kg/ha	24.19	9.32	55.27	11.33	35436.67	7396.67
T_7	50 x 15 cm Row spacing + P_2O_5 40 kg/ha	22.26	8.46	52.36	10.33	32453.33	6843.33
T_8	50 x 15 cm Row spacing + P_2O_5 50 kg/ha	24.34	9.47	56.38	11.61	35696.67	7560.00
T_9	50 x 15 cm Row spacing + P_2O_5 60 kg/ha	22.73	8.53	53.62	10.73	34196.67	7126.67
	S.Em(±)	0.14	0.05	0.36	0.16	501.82	55.66
	C.D (P = 0.05)	0.44	0.16	1.08	0.47	1504.54	165.88