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RESEARCH ARTICLE :

Performance of Babycorn (*Zea mays* L.) under different crop geometry

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SUMMARY : An experiment entitled "Performance of baby corn (*Zea mays* L.) under different crop geometry" was carried out during 2013-14 at research field, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.). The experiment was laid out in factorial randomized block design with three replications. The seeds were sown under five different crop geometry; S_1 (30cm × 30cm), S_2(45cm × 15cm), S_3(45cm × 30cm), S_4(60cm × 15cm) and S_5(60cm × 30cm).The performance of baby corn was found significant under different crop geometry. Most of the growth parameters such as number of leaves plant^{-1}, leaf area, leaf area index and leaf chlorophyll content were found maximum in crop geometry S_3 (45 × 30 cm), which also shows the maximum cob weight and almost all the quality parameters; protein, moisture and total sugar content. While the crop geometry, S_1 (30 × 30 cm) recorded the highest fibre content. The dry matter accumulation plant^{-1}, No. of cobs plant^{-1}and yield plant^{-1}were obtained in the wider geometry S_5 (60 × 30 cm). However, the closer geometry S_2 (45 × 15 cm) gives highest plant height and yield hectare^{-1}and fodder yield hectare^{-1}.

KEY WORDS :
Baby corn, Crop geometry, Growth, Yield, quality

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BACKGROUND AND OBJECTIVES

Baby corn is not a separate type of corn like sweet corn or popcorn and any corn type can be used as baby corn. It is the dehusked maize ear, harvested young especially when the silk have either not emerged or just emerging and no fertilization takes place or the shank with unpollinated silk is baby corn. Baby corn cultivation promises to have an important role in the future of crop production due to its fresh and safe product. The short growth duration offers an intensive rotation cultivation system which is an excellent solution for promoting economic and poverty alleviation in countries with high populations like India and at the same time it will generate rural employment for the rural poor. The other advantage of growing baby corn is its remaining biomass after harvesting which can be use as feed for animal and aquaculture raising (Nguyen *et al.*, 2003).

Space available to the individual plant decides the utilization of soil resources and also harvest of solar radiation, both together in turn decides the yield of baby corn. 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 geometry allows individual plant to achieve their maximum inherent potential and unlike the plants of tillering traits *i.e.*, rice or wheat baby corn cannot compensate for lost space. Information on the optimum crop geometry to explore the available resources and suitable sowing dates for better performance and utilization of available moisture on baby corn yield and quality is meagre. Therefore, it is of great importance to establish the optimum crop geometry for the region concern.

RESOURCES AND METHODS

The experiment was conducted at vegetable research field, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.) during the year 2013-14. The experiment was laid out in factorial randomized block design with three replications. The seeds were sown 3-5 cm depth @ two to three seeds per hill under five different crop geometry; S_1 (30 cm × 30 cm), S_2 (45 cm × 15 cm), S_3 (45 cm × 30 cm), S_4 (60 cm × 15 cm) and S_5 (60 cm × 30 cm). The experimental field was prepared by ploughing, removing weeds, roots, stubbles etc. and 2-3 cross harrowing. FYM @ 10 t/ha was incorporated in the soil at the time of last harrowing. Fertilizer NPK was applied @ 150:60:60 Kg ha^{-1} in the form of urea, SSP, and MOP. Other intercultural operations like weeding, earthing up, control of pests and diseases were carried out as and when required. For recording observations, five plants were selected randomly from each plot.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads :

Growth parameters:

Most of the growth characteristics *viz.*, number of leaves $plant^{-1}$, leaf area, LAI and leaf chlorophyll content were found maximum in crop geometry S_3 (45 × 30 cm) Table 1. The highest number of leaves $plant^{-1}$ (13.02) might have been due to better utilization of available resources by the plants. The higher number of leaves $plant^{-1}$ at wider spacing was also reported by various researchers as Kunjir *et al.* (2009), Aravinth *et al.* (2011) and Gaikwad *et al.* (2015). The highest leaf area (511.74 cm^2) and LAI (3.56) might be due to the fact that, the

Table 1 : Growth parameters of baby corn (*Zea mays* L.) as influenced by different crop geometry

Crop geometry	Plant height (cm)	No. leaves $plant^{-1}$	Leaf area (cm^2)	LAI	Leaf chlorophyll (mg g^{-1})
S_1	195.82	12.47	507.42	3.40	1.67
S_2	198.27	12.22	505.46	3.29	1.64
S_3	192.80	13.02	511.74	3.56	2.31
S_4	194.85	12.43	508.64	3.36	1.69
S_5	191.98	12.90	511.64	3.55	2.30
F test	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.502	0.062	0.092	0.005	0.005
C.D. (P=0.05)	1.438	0.178	0.262	0.014	0.014

Table 2 : Yield and yield parameters of baby corn (*Zea mays* L.) as influenced by different crop geometry

Crop geometry	No. cobs $plant^{-1}$	Cob weight (g)	Cob yield $plant^{-1}$(g)	Cob yield ha^{-1}(q)	Fodder yield ha^{-1}(t)
S_1	2.62	8.27	21.63	67.30	37.42
S_2	2.47	7.97	19.65	72.76	40.61
S_3	2.87	8.79	25.24	56.09	33.60
S_4	2.65	7.90	20.94	62.03	36.29
S_5	3.00	8.67	26.03	46.28	30.40
F test	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.032	0.043	0.229	0.654	0.107
C.D. (P=0.05)	0.093	0.123	0.657	1.871	0.306

baby corn grown at wider row crop geometry had helped the individual plants to make better spatial utilization of moisture, nutrients and light which in turn increased the leaf area and LAI. Similar increased in leaf area as well as LAI under wider spacing was also reported by Aravinth *et al.* (2011), Sobhana *et al.* (2012) and Tajul *et al.* (2013).The higher chlorophyll value at wider spacing was also reported by Tajul *et al.* (2013).However, the closer geometry S_2 (45 × 15 cm) gives highest plant height (198.27 cm). At closer crop geometry, more severe competition for light and higher intra and inter-row competition for nutrients and water due to overcrowding of plants might be responsible for increasing the plant height. Similar result was reported by Gaikwad *et al.* (2015) and Kunjir *et al.* (2009).

Yield and yield parameters:

The different crop geometry had been found to exert a significant increase on growth parameters which in turn increases the yield and its parameters (Table 2). The highest number of cobs plant^{-1} (3.00) and cob yield plant^{-1} (26.03 g) was observed under the widest crop geometry S_5 (60 × 30 cm). While, the crop geometry S_3 (45 × 30 cm) exhibited maximum cob weight (8.79 g). The crop under the wider spacing has utilized the available resources more efficiently and hence, producing more number of cobs plant^{-1}, higher cob weight attributing to higher cob yield plant^{-1}.However, the crop under closer geometry S_2 (45 × 15 cm) exhibited highest cob yield ha^{-1} (72.76 q ha^{-1}) and fodder yield (40.61 t ha^{-1}) as compared to the wider geometry though the values of yield attributes were poor with closer spacing. The yield might have compensated these because of more number of plants ha^{-1}. The result is similar to the findings of Cho *et al.* (2001) and in close conformity to those findings of Gosavi and Bhagat (2009), Mathukia *et al.* (2014) and Singh *et al.* (2015).

Quality parameters:

The quality parameters were also significantly influenced by different crop geometry (Table 3). The highest fibre content (5.59 %) was observed under S_1 (30 × 30 cm) which is in close conformity to the result obtained by Talware (2013). While the crop geometry S_3 (45 × 30 cm) showed the highest value for protein (17.73 %), total sugar (3.35 %) and moisture (89.50 %). The dry matter accumulation plant^{-1} was however, found highest (172.79 g) at widest crop geometry S_5 (60 × 30 cm) which is in close agreement with the results obtained by Sobhana *et al.* (2012) and Vishuddha (2015). The wider crop geometry had helped the individual plants to make better spatial utilization of available moisture, nutrients and higher interception of solar radiation with lesser competition which contributed towards more dry matter production per plant.

Conclusion :

From the results it can be concluded that, baby corn performs better under the wider crop geometry S_3 (45 × 30 cm) when increasing almost all the growth, yield parameters and quality parameters. While for higher yield, the closer crop geometry S_2 (45 × 15 cm) was more suitable.Further studies may however, be needed to optimize the specific crop geometry.

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Table 3 : Quality parameters of baby corn (*Zea mays* L.) as influenced by different crop geometry

Crop geometry	Protein (%)	Fibre (%)	Moisture (%)	Total sugar (%)	Dry matter accumulation plant^{-1}(g)
S_1	16.81	5.59	88.19	3.27	156.83
S_2	16.32	5.57	87.97	3.24	140.60
S_3	17.73	5.48	89.50	3.35	169.64
S_4	16.50	5.57	87.97	3.27	145.57
S_5	17.55	5.51	89.13	3.34	172.79
F test	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. ±	0.094	0.005	0.166	0.007	0.435
C.D. (P=0.05)	0.269	0.016	0.474	0.019	1.246

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