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RESEARCH PAPER

Effect of date of sowing and row spacing on yield attributes and yield of baby corn

Lipika Talukdar* **and** Pradip Chandra Bora
Assam Agricultural University, Jorhat (Assam) India (Email: lipikatalukdar13@gmail.com)

Abstract : A field experiment was carried out at the Instrutional-Cum-Research farm. Assam Agricultural University, Jorhat in the year of 2017-18, during *Rabi* season. The treatment consisted of two different factors, *viz*., four dates of sowing 31st October (D_1), 10th November (D_2), 20th November (D_3) and 30th November (D_4) and three row spacing 60 cm x 20 cm (S_1), 45 cm x 20 cm (S_2) and 30 cm x 20 cm (S_3). Experimental findings revealed that almost all the yield attributes such as number of cobs per plant, cob length, cob girth, cob weight and baby corn yield were significantly influenced by different dates of sowing. In most of cases early sowing on 31st October and 10th November were statistically at par and shown their superiority over late sowing on 20th November and 30th November sown crop. Results showed that wider spacing of 60 cm x 20 cm had significantly higher number of cobs plant^{-1}, weight of cob and length of cob and cob girth, however, the lowest values were found at 30 cm x 20 cm spacing. Yield of cob with husk, without husk was found to be the higher under spacing 45 cm x 20 cm (88.24 q ha^{-1} and 20.79 q ha^{-1}, respectively). Cob yield with husk obtained under 45 cm x 20 cm spacing increased by 8.40, 17.57 per cent over other spacing *viz.,* 60 cm x 20 cm and 30 cm x 20 cm, respectively.

Key Words : Yield attributes, Sowing date, Row spacing , Baby corn, Yield

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INTRODUCTION

Baby corn is a delicious and nutritive vegetable, consumed as a natural food. It is very tasty and easy to consume because of its tenderness and sweetness with nutritive value addition. It provides carbohydrates, protein, fat, sugar, minerals and vitamins in palatable, wholesome, hygienic and digestible form. Das *et al.* (2009) reported that 100 g of baby corn contained 0.2 g fat, 1.9 g protein, 8.2 mg carbohydrate, 0.06 g ash, 28.0 mg calcium, 86.0 mg phosphorus and 11.0 mg of ascorbic acid. It is rich in phosphorus content (86 mg Phosphorus per 100 g edible portion in comparison to 21 to 57 mg in other commonly used vegetables). It is a low calorie vegetable having higher fibre content without cholesterol.

The proper sowing time exerts a marked effect on the growth and eventually the yield of crop. When sowing is delayed in winter season due to low temperature, crop growth is less and hence, the crop yield gets reduced.

Again, the space allowed to individual plant is one of the determining factors controlling their development and yield. Closer spacing leads to over crowing and more

***Author for correspondence:**

plant competition for growth factors, whereas wider spacing reduce the plant population enhance the vegetative growth and provide favourable condition to weed growth and thereby decreasing the total yield. The optimum plant spacing provides better conditions for plant growth which results in timely commencement of reproductive phase and formation of sink. The establishment of an optimum plant population per unit area of land is the contributory factor, which determines the yield of baby corn.

However, the location specific technologies for the crop are not available. Therefore, agro-techniques to achieve higher production are the need of the day. Baby corn being a relatively new introduction in our country, the development of suitable production technology for realizing higher baby corn yield and monetary returns is of utmost importance. To meet out the demand of baby corn as vegetable for the increasing population, the increase in production of baby corn is necessary which is possible only through maximization of its yield.

MATERIAL AND METHODS

The field experiment was carried out at the Instrutional-cum-Research Farm. Assam Agricultural University, Jorhat-13 during the rabi of 2017-18. The site is situated at 26º47' N latitude and 94º12' E longitude with an altitude of 86.56 meter above the mean sea level. Jorhat is a sub-tropical station with hot and humid summers and cold and dry winters. The normal monsoon rain starts from the months of June and continues upto September with pre-monsoon shower from mid March to April. The experiment was laid out in split-plot design and replicated thrice. the treatment consist of four dates of sowing 31stOctober (D_1), 10th November (D_2), 20th November (D_3) and 30th November (D_4) and three row spacing 60 cm x 20 cm (S_1), 45 cm x 20 cm (S_2) and 30 cm x 20 cm (S_3).The baby corn Cv. G-5414 was sown with application of recommended N:P_2O:K_2O (90:60:60 kg ha^{-1}) and farm yard manure (FYM) @ 2.5t ha^{-1}. At the time soil of last ploughing FYM was applied and mixed thoroughly with soil. Full dose of phosphatic and potassic fertilizers and half dose of nitrogenous fertilizers were applied as uniformly before sowing. The rest half of the nitrogenous fertilizer was applied as top dressing at the time of earthing up (30DAS). Harvesting of baby corn was done at 2-3 days of silking.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect of date of sowing on yield attributes of baby corn:

Number of cobs plant^{-1} :

The effect of dates of sowing on number of cobs plant^{-1}was found to be statistically significant. The highest number of cobs plant^{-1} (3.67) was recorded by 31st October (D_1) sown crop which was significantly higher than those for all other sowing dates. Crops sown on 10th November (D_2) and 20th November (D_3) did not differ significantly from each other in this respect, however, both the treatments recorded significantly higher cobs plant^{-1} over that of 30th November (D_4) sown crop. The lowest number of cobs plant^{-1} (1.89) was recorded by 30th November (D_4) which was statistically significant from other dates of sowing.

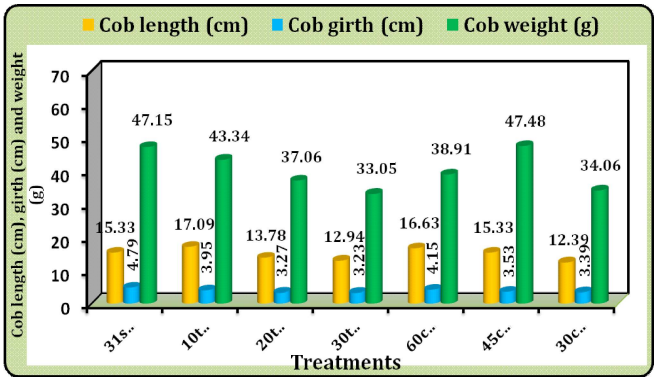

Fig. 1 : Effect of dates of sowing and row spacing on cob length, girth and weight with hus

Weight of cob with husk (*g cob^{-1}*) :

The effect of dates of sowing on weight cob with husk was found to be statistically significant. The highest weight of cob with husk (47.15 g) was recorded by 31st October (D_1) which was statistically *at par* with that of 10th November (D_2) (43.43 g). However, the values for both were significantly higher than those of 20th November (D_3) and 30th November (D_4). The lowest weight of cob with husk (33.05 g) was recorded by D_4 which was statistically *at par* with that of D_3.

Weight of cob without husk (*g cob^{-1}*):

The effect of dates of sowing on weight of cob

without husk was found to be statistically significant. The highest weight of cob without husk (8.02 g) was recorded by 31st October (D_1) which was statistically *at par* with that of 10th November (D_2) (7.37g). However, the values for both were significantly higher than those of 20th November (D_3) and 30th November (D_4). The lowest weight of cob with husk (5.62 g) was recorded by D_4 which was statistically *at par* with that of D_3.

Length of cob with husk (*cm*):

The effect of dates of sowing on length of cob with husk was found to be statistically significant. The maximum length of cob with husk (17.09 cm) was recorded by the 10th November (D_2) sown crop which was significantly higher than those for all other dates of sowing. Crop sown on 31st October (D_1) recorded significantly higher length of cob with husk than that of 20th November (D_3) and 30th November (D_4) sown crop.The lowest length of cob with husk (12.94 cm) was recorded by 30th November (D_4) which was statistically *at par* with that of D_3.

Length of cob without husk :

The effect of dates of sowing on length of cob without husk was found to be statistically significant. The maximum length of cob (9.61 cm) was recorded by the 10th November (D_2) sown crop which was significantly higher than those for all other sowing dates. Crop sown on 31st October (D_1) recorded significantly higher length of cob without husk than those of 20th November (D_3) and 30th November (D_4) sown crop and there was no significant difference between D_3 and D_4 in this respect.

Girth of cob with husk (*cm*):

The girth of baby corn with husk differed significantly due to different dates of sowing. The maximum girth of cob (4.79 cm) was recorded by the 31st October (D_1) sown crop which was significantly higher than those of all other dates of sowing. Cob girth value for 10th November (D_2) sown crop was significantly higher than 20th November (D_3) and 30th November (D_4) and later two being statistically *at par* in this respect.

Girth of cob without husk (*cm*):

The effect of dates of sowing on girth of cob without husk was found to be statistically significant. The maximum girth of cob without husk (3.02 cm) was recorded by 31st October (D_1) sown crop which was significantly higher than those of all other sowing dates. Crop sown on 10th November (D_2) recorded significantly higher girth of cob without husk than those of 20th November (D_3) and 30th November (D_4) sown crop. The lowest girth of cob without husk (1.46 cm) was recorded

Table 1 : Effect of dates of sowing and row spacing on yield attributes of baby corn

Treatments / Dates of sowing	No. of cobs plant^{-1}	Cob weight (g)		Length (cm)		Girth (cm)		Cob yield	
		With husk	Without husk	Cob with husk	Cob without husk	Cob with husk	Cob without husk	With husk	Without husk
D_1 (31st October)	3.67	47.15	8.02	15.33	8.62	4.79	3.02	90.51	21.20
D_2 (10th November)	2.85	43.34	7.37	17.09	9.61	3.95	2.30	86.43	19.73
D_3 (20th November)	2.74	37.06	6.30	13.78	7.81	3.27	1.70	76.67	17.10
D_4 (30th November)	1.89	33.05	5.62	12.94	7.58	3.23	1.46	72.64	16.30
S.Em.(±)	0.19	1.63	0.28	0.44	0.21	0.16	0.13	2.40	0.64
C.D (0.05)	0.66	5.64	0.96	1.33	0.74	0.56	0.45	8.29	2.21
Spacing (cm)									
S_1 (60 x 20)	3.32	38.91	6.61	16.63	9.17	4.51	2.63	81.40	18.47
S_2 (45 x 20)	2.77	47.48	8.07	15.33	8.36	3.53	2.00	88.24	20.79
S_3 (30 x 20)	2.27	34.06	5.79	12.39	7.68	3.39	1.72	75.05	16.49
S.Em.(±)	0.16	1.41	0.24	0.38	0.19	0.14	0.11	2.08	0.55
C.D (0.05)	0.49	4.23	0.72	1.15	0.56	0.42	0.33	6.22	1.66
Interaction (D x S)									
S.E.(±)	0.33	2.82	0.48	0.77	0.45	0.28	0.22	4.15	1.10
C.D. (p=0.05)	NS*	NS	NS	NS	NS	NS	NS	NS	NS

*NS = Non- significant

Plate 1: Length of cob with husk

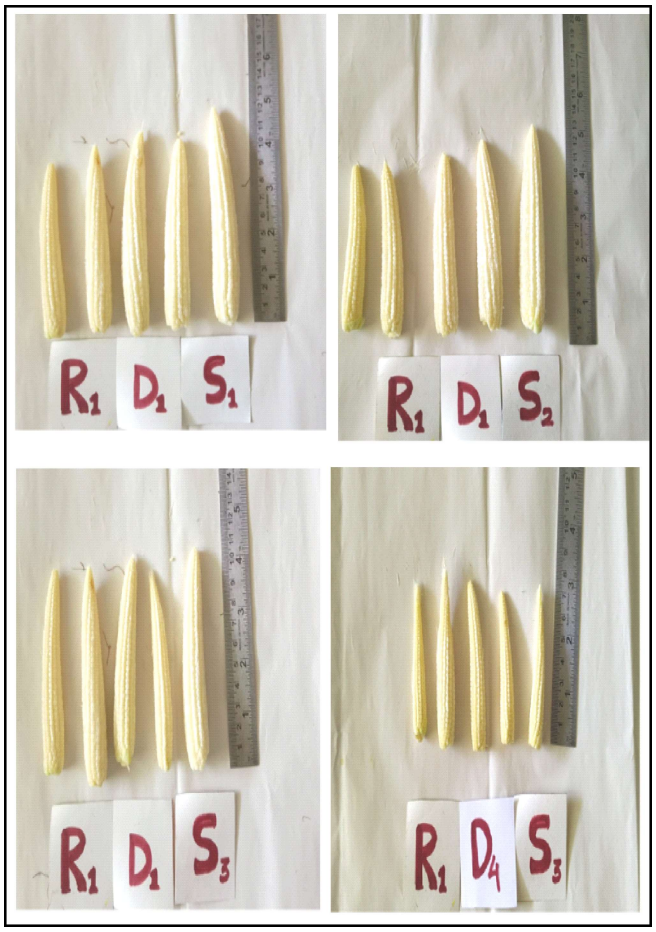

Plate 2: Length of cob without husk

by 30th November (D_4) which was statistically *at par* with that of D_3.

Effect of dates of sowing (D) on Yield (q ha^{-1}) :

Cob yield with husk (*q ha^{-1}*):

The effect of dates of sowing on cob yield with husk was found to be statistically significant. The highest cob yield with husk (90.51 q ha^{-1}) was recorded by the 31st October (D_1) sown crop which was statistically *at par* with that of 10th November (D_2) (86.43 q ha^{-1}) Sown crop, however, the values were significantly higher than those of 20th November (D_3) and 30th November (D_4). The lowest cob yield with husk (72.64 q ha^{-1}) was recorded by 30th November (D_4) which was statistically *at par* with that of 20th November (D_3) sown crop (76.67 q ha^{-1}).

Cob yield without husk (*q ha^{-1}*):

The effect of dates of sowing on cob yield without husk was found to be statistically significant. The highest cob yield without husk (21.20 q ha^{-1}) was recorded by the 31st October (D_1) sown crop which was statistically *at par* with that of 10th November (19.73 q ha^{-1}) (D_2) sown crop, however, the values were significantly higher than those of 20th November (D_3) and 30th November (D_4) sown crop. The lowest cob yield without husk (16.30 q ha^{-1}) was recorded by 30th November (D_4) sown crop which was statistically *at par* with that of 20th November (D_3) sown crop (16.30 q ha^{-1}).

Effect of row spacing on yield attributes of baby corn:

Number of cobs plant^{-1} :

The effect of row spacing on number of cobs plant^{-1} was found to be statistically significant. The highest number of cobs plant^{-1} (3.32) was recorded by 60 cm x 20 cm (S_1) which was significantly higher than those for all other row spacing. The lowest number of cobs plant^{-1} was recorded by spacing 30 cm x 20 cm (S_3) which was statistically significant from other row spacing.

Weight of cob with husk (*g cob^{-1}*) :

The effect of row spacing on weight of cob with husk was found to be statistically significant. The highest weight of cob with husk (47.48 g) was recorded by spacing 45 cm x 20 cm (S_2) which was significantly higher than those forall other spacing. The second highest weight of cob with husk was recorded under the spacing of 60 cm x 20 cm (S_1) which was significantly higher than those of spacing 30 cm x 20 cm (S_3). The lowest weight of cob with husk (34.06 g) was recorded under spacing 30 cm x 20 cm (S_3).

Weight of cob without husk (*g cob^{-1}*):

The effect of row spacing on weight of cob without husk was found to be statistically significant. The highest weight of cob without husk (8.07 g) was recorded by spacing 45 cm x 20 cm (S_2) which was significantly higher than those for all other spacing. The second highest weight of cob without husk was recorded under the spacing of 60 cm x 20 cm (S_1) which was significantly higher than those of spacing 30 cm x 20 cm (S_3). The lowest weight of cob without husk (5.79 g) was recorded under spacing 30 cm x 20 cm (S_3).

Length of cob with husk (*cm*):

The effect of row spacing on length of cob with husk was found to be statistically significant. The maximum length of cob (16.63 cm) was recorded under the spacing of 60 cm x 20 cm (S_1) which was significantly higher than those for all other row spacing. The lowest length of cob with husk (12.39 cm) was recorded by spacing 30 cm x 20 cm (S_3) which was statistically significant from the spacing 45 cm x 20 cm (S_2).

Length of cob without husk (*cm*):

The effect of row spacing on length of cob without husk was found to be statistically significant. The maximum length of cob without husk (9.17 cm) was recorded by spacing of 60 cm x 20 cm (S_1) which was significantly higher than those for all other row spacing. The lowest length of cob without husk (7.68 cm) was recorded by spacing 30 cm x 20 cm (S_3) which was statistically significant from the spacing of 45 cm x 20 cm (S_2).

Girth of cob with husk (*cm*):

The effect of row spacing on girth of baby corn with husk was found to be statistically significant. The maximum girth of baby corn with husk (4.51 cm) was recorded by spacing of 60 cm x 20 cm (S_1) which was significantly higher than those of all other row spacing. The lowest girth of baby corn with husk (3.39 cm) was recorded by spacing 30 cm x 20 cm (S_3) which was statistically *at par* with that of 45 cm x 20 cm (S_2).

Girth of cob without husk (*cm*):

The effect of row spacing on girth of cob without husk was found to be statistically significant. The maximum girth of cob without husk (2.63 cm) was recorded by spacing 60 cm x 20 cm (S_1) which was significantly higher than those for all other row spacing. The lowest girth of cob without husk (1.72 cm) recorded by spacing of 30 cm x 20 cm (S_3) and there was no significant difference between D_3 and D_4 in this respect.

Effect of row spacing on yield (q ha^{-1}):

Cob yield with husk (*q ha^{-1}*):

The three row spacing differed significantly from each other in respect of cob yield with husk of baby corn. The highest value of 88.24 q ha^{-1} recorded by the spacing of 45 cm x 20 cm (S_2) which was significantly higher than the values for 60 cm x 20 cm (S_1) and 30 cm x 20 cm (S_3), respectively. Again the value for 60 cm x 20 cm (S_1) (81.40 q ha^{-1}) was statistically significant than that of 30 cm x 20 cm (S_1) (75.05 q ha^{-1}).

Cob yield without husk (*q ha^{-1}*) :

The three row spacing differed significantly from each other in respect of cob yield without husk of baby corn. The highest and the lowest cob yield without husk *i.e.* 20.79 q ha^{-1} and 16.49 q ha^{-1} were recorded for spacing 45 cm x 20 cm (S_2) and 30 cm x 20 cm (S_3), respectively, which were significantly different from that of 60 cm x 20 cm (S_1).

Yield attributes of baby corn:

Effect of date of sowing:

Data presented in Table 1 revealed that various yield attributes *viz.,* number of cobs plant^{-1}, cob length, cob weight and cob girth were significantly influenced under varying dates of sowing. Crop sown either on 31st October or 10th November recorded the higher values for almost all the above characters than late sown crop. Better growth of plant in terms of plant height, number of leaves, leaf area index, dry matter accumulation and crop growth rate under 31st October and 10th November

sowing, reflected into better development of yield attributes under early sown crop. Moreover, congenial climatic conditions during early sowing also play vital role in development of yield attributes. Similar findings were reported by Bairagi *et al.* (2015) and Singh *et al.* (2015) with regards to number of cobs plant^{-1}, cob length and cob weight.

Effect of row spacing :

Data presented in Table 1 revealed that yield attributing characters like number of cobs plant^{-1}, weight and length of cob and girth of cob were differed significantly with variation in the plant population per unit area. Significantly higher number of cobs plant^{-1} were recorded under wider row spacing of 60 cm x 20 cm than the other row spacing of 45 cm x 20 cm and 30 cm x 20 cm. Increased in number of cobs plant^{-1} with increased in row spacing *i.e.,* decrease in plant population, might be due to the minimum competition among the plants for the absorption of water and nutrients from the soil. Similar finding were reported by Gosavi and Bhagat (2009) and Sobhana *et al*. (2012). Wider row spacing of 60 cm x 20 cm also recorded significantly higher values for girth, weight and length of cob as compared to other row spacing of 45 cm x 20 cm and 30 cm x 20 cm. Wider spacing provided uniform spread of plant because of less crowding which resulted into healthy cobs and there by increases the weight, length and girth of cob. Similar findings were reported by Sahoo and Mahapatra (2004), Arvadiya *et al*. (2012) and Golada *et al*. (2013) who also reported increase in length, weight and girth of cob with increased in row spacing.

Yield (q ha^{-1}):

Effect of date of sowing :

The data present in Table 1 shows that among different dates of sowing the highest cob yield with husk of 90.51 q ha^{-1} was recorded under 31st October (D_1) sown crop which were significantly higher than those of 20th November (D_3) and 30th November (D_4) sown crop. Crop sown on 31st October increased the cob yield by 4.72, 18.05 and 24.60 per cent, over D_2, D_3 and D_4, respectively. The increase in cob yield may be attributed to increase in growth and yield attributing characters like number of cob per plant, weight of cob with husk and without husk, length of cob with and without husk, and girth of cob with and without husk. Significant reduction in yield was also reported due to delay in sowing of baby corn in different parts of the country by several workers like Kruczek (2010), Bairagi *et al.* (2015) and Singh *et al.* (2015).

Effect of row spacing :

Yield of the cob is a function of several yield components which are dependent on complementary interaction between vegetative and reproductive growth of the crop. The highest cob yield with husk of 88.24 q ha^{-1} and fodder yield 363.34 q ha^{-1} were recorded under the spacing of 45 cm x 20 cm (S_2) which were significantly higher than the values of 60 cm x 20 cm (S_1) and 30 cm x 20 cm (S_3). The cob yield with husk increased up to the extent of 8.40 and 17.57 per cent under S_2 over S_1 and S_3, respectively. Under wider row spacing of 60 cm x 20 cm, all the yield attributing characters were at their highest but due of lesser plant population per unit area, it could not compensate the baby corn yield. The increase in cob yield under S_2 is mainly due to increased in yield attributing characters like number of cob per plant, weight of cob, length of cob and girth of cob and secondly, it might be due to more number of plants per unit area. These results are in conformity with the findings of Ramachandrappa *et al*. (2004); Thavaprakash *et al*. (2005); Kar *et al*. (2006); Thavaprakaash and Velayudham (2009); Arvadiya *et al*. (2012); Rathika (2014) and Ghosh *et al*. (2017) who also found that increase in plant population increased green cob yield upto 83.3 thousand plants ha^{-1} which was reduced thereafter. The possible reason for increased yield under row spacing 45 cm x 20 cm might be due to optimum number of plants per unit area resulting in higher green fodder yield.

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