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Yield Performance of Baby Corn (*Zea mays* L.) as Influenced by Nitrogen Sources and Row Spacing

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Abstract

Field experiment were carried out on sandy loam soil during pre-*kharif* season of 2008 and 2009 to evaluate the yield performance of baby corn (*Zea mays* L.) as influenced by N sources and spacing. The experiment was laid out in randomized block design (4 × 2 factorial) replicated thrice with 4 nitrogen sources viz. N_1(100% N through urea), N_2 (75% N through urea + 25% N through FYM), N_3 (50% N through urea + 50% N through FYM) and N_4 (25% N through urea + 75% N through FYM) and 2 row spacing viz. S_1 (40 cm × 15 cm) and S_2 (30 cm × 15 cm). The results clearly revealed that 75% N through urea + 25% N through FYM (N_2) and spacing of 40 cm ×15 cm (S_1) were found best source of nitrogen and spacing, respectively and their combination N_2S_1 (75% N through urea +25% N through FYM + 40 cm × 15 cm spacing) emerged superior over all other treatment combinations in relation to yield attributes viz., cobs/plant, cob length and cob girth (cm) finally yield of baby corn for commercial cultivation of baby corn under agro-climatic conditions of Varanasi.
Key words : Baby corn, Nitrogen, Spacing, Cob weight, Baby corn girth.

Baby corn (*Zea mays* L.) is immature dehusked, unfertilized maize ear, harvested 1 to 2 days after silking at 2–3 cm long silk stage are consumed as vegetable due to its sweet flavor. High nutritional value, eco-friendly and crispy nature of baby corn has made it special choice for various traditional and continental dishes apart from the canning in the elite society. After the harvest of baby corns, economics potential is further enhanced since it supplies green, soft, succulent, nutritious, palatable fodder with higher digestibility. Recently cultivation has started and gaining popularity in peri-urban areas due to its export potential besides huge employment generation. Being a short duration crop (50—60 days) it can be sown and harvested 3 to 4 times in an year. In rice-wheat system, cultivation of summer mungbean (*Vigna radiata*) is a recommended practice which has been reported not remunerative when planted beyond 10 April. Besides being the privilege of bonus mungbean is grown on limited area, otherwise such lands remain unused between the turnover periods of wheat and paddy. Natural resources and irrigation system also found unutilized but paid for their services charges. The pre-season period (15 April—15 July) if put under the cultivation of short duration vegetables like baby corn it will not cause any problem to the rice-wheat. Baby corn is nutrient exhaustive crop and due to high plant density and extremely short duration, requires heavy application of nitrogen along with phosphorus and potassium. The integrated nutrient supply including organic (FYM) and inorganic fertilizers improved the productivity of major cropping systems along with maintaining better soil quality on cost effective basis. Crop geometry is one of the important factors which have to be maintained at optimum level to harvest maximum solar radiation and utilize the soil resources effectively. Hence, to cope-up with the situation, present investigation was taken to evaluate the yield performance of baby corn as influenced by N sources and spacing.

Methods

Field experiment was conducted during pre-*kharif* season of 2008 and 2009 after the harvest of wheat at Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. The farm is situated at 25^0 18 N′ latitude, $83^0$03′ E longitude and at an altitude of 78.1 m above mean sea level. The sandy-loam soil of the experimental field

Table 1. Yield attributes and yield of baby corn as affected by sources of Nitrogen (N) and Spacing (S) (pooled data of 2 years).

Treatments	Cobs/ plant	Cob length (cm)	Cob girth (cm)	Cob weight with husk (g)	Cob weight without husk (g)	Cob yield (q/ha)	Forage yield (q/ha)
Sources of Nitrogen (N)							
N_1	1.92	6.19	2.06	44.36	6.90	24.48	118.32
N_2	1.96	6.33	2.31	46.13	7.31	26.45	125.61
N_3	1.89	6.09	1.91	43.68	6.70	23.38	114.83
N_4	1.81	5.77	1.58	40.16	6.25	20.98	103.03
CD (P=0.05)	0.02	0.07	0.09	0.48	0.15	0.58	1.83
Spacing (S)							
S_1	2.25	6.33	2.43	45.71	7.27	27.30	144.38
S_2	1.54	5.86	1.50	41.45	6.31	20.33	86.51
CD (P = 0.05)	0.02	0.05	0.06	0.34	0.11	0.41	1.29

was low in organic carbon (0.32%) and available N (182 kg/ha), medium in available P (17.86 kg/ha) and K (260.45kg/ha) with pH 7.4. The experiment was laid out in randomized block design (4 × 2 factorial) replicated thrice with 4 nitrogen sources viz. N_1 (100% N through urea), N_2 (75% N through urea + 25% N through FYM), N_3 (50% N through urea + 50% N through FYM) and N_4 (25% N through urea + 75% N through FYM) and 2 row spacing viz. S_1 (40 cm × 15 cm) and S_2 (30 cm × 15 cm). Variety Malviya Makka-2 were sown adopting the seed rate of 40 kg/ha leveled soil by opening 5 cm deep furrow at 40 cm × 20 cm spacing. Baby corn was sown on 12 May and 14 May during 2008 and 2009, respectively. FYM (0.45—0.2—0.5% N-P-K) was used as an organic source of nitrogen and applied as per treatment. Urea, diammonium phosphate and muriate of potash were taken as fertilizer sources for N, P and K, respectively. Farmyard manure and fertilizer were calculated and applied as per treatment. Full dose of FYM, P, K and half-dose of N were applied as basal. Remaining N was top dressed at knee high stage. Crop received the 5 irrigations during both the year. All the agronomic practices were followed throughout the cropping period. The immature cobs (baby corn) were harvested at 2 to 3 days after silk emergence. These baby cobs were counted weighted and thereafter husked and silk was removed and baby corn yield was recorded. Crop was harvested on 2 and 3 August, 2008 and 2009, respectively. Forage yield was calculated by subtracting cob yield from bundle weight. The data collected was analyzed using Fisher's analysis of variance technique and least significant differences (LSD) test at 5% probability level to compare the treatment means.

Results and Discussion

Yield Attributes

Among the combined sources of organic and inorganic nitrogen, higher quantity of nitrogen through urea accompanied with row spacing of 40 cm × 15cm was effective in producing more cobs/plant (Table 1). 75% N through urea + 25% N through FYM and 40 cm × 15 cm spacing and their combination were producing significantly higher cob length. Significantly longer cobs were obtained with higher percentage of urea and wider spacing, which enabled the plants to attain more vigor through better photosynthetic activity. 75% N through urea + 25% N through FYM , 40 cm ×15cm spacing and their interaction were more effective in producing higher cob girth and lower cob girth observed with narrow spacing. Plants in the plots with wider spacing attained more vigor due to availability of more light as well as adequate nutrient supply finally produced longer cobs with higher girth and weight. Combination of 75% N through urea + 25% N through FYM was more effective in producing higher weight of cob with husk. Significantly higher cob weight with husk was observed with wider spacing as compared to narrow spacing. This might have been due to more vigor attained by the plants with

Table 2. Interaction effect on yield and yield attributes influenced by sources of nitrogen (N) and spacing (S) (pooled data of 2 years).

Treatments	Cobs/ plant	Cob length (cm)	Cob girth (cm)	Cob weight with husk (g)	Cob weight without husk (g)	Cob yield (q/ha)	Forage yield (q/ha)
N_1S_1	2.27	6.35	2.55	45.38	7.24	27.44	144.51
N_1S_2	1.57	6.03	1.57	43.34	6.56	21.51	92.14
N_2S_1	2.32	6.58	2.85	48.53	7.83	30.24	157.17
N_2S_2	1.60	6.08	1.77	43.74	6.79	22.66	94.05
N_3S_1	2.23	6.29	2.36	44.48	7.05	26.18	138.94
N_3S_2	1.56	5.90	1.47	42.87	6.34	20.57	90.73
N_4S_1	2.19	6.10	1.96	44.47	6.95	25.36	136.92
N_4S_2	1.43	5.44	1.20	35.86	5.55	16.59	69.13
CD (P= 0.05)	0.03	0.10	0.13	0.69	0.21	0.83	2.58

adequate supply of nitrogen and wider spacing enabling the plants to have more exposure to light and air (4). 75% N through urea + 25% N through FYM and 40 cm × 15 cm spacing were more effective in producing higher weight of cob without husk. The combination of 75% N through urea + 25% N through FYM and wider spacing (40 cm × 15 cm) resulted into higher weight of cob without husk. This might be attributable to the more vigor attained by the plants with higher percentage of N through urea and wider spacing (1).

Effects on Yield

It is evident that outstanding influence of sole inorganic sources of nitrogen application (100% N through urea) and integrated approach of nitrogen application (75% N through urea + 25% N through FYM) caused spectacular improvement in all growth characters of the crop, consequently plants of the crop attained profound growth and become capable to produce full expression of the yield attributes and yield of baby corn (Table 1). Significantly higher cobs/ plant, higher cob length, cob girth, cob weight with husk and cob weight without husk and finally the cob yield and forage yield was found to be higher when the crop was supplied with 75% N through urea + 25% N through FYM accompanied by wider row spacing of 40 cm × 15 cm. N 75% through urea + 25% N through FYM, 40 cm × 15 cm spacing and their interaction were more effective in producing better yield attributes and finally yield (Table 2) over rest of the treatment combinations. This might be due to plants with wider spacing exposed to more better plant stand due to more availability of light, nutrient as well as moisture adequately ultimately produced longer cobs with higher girth and weight resulting better crop yield. Among the combined sources of organic and inorganic nitrogen, higher quantity of nitrogen through urea (75% N through urea + 25% N through FYM) was more effective in producing higher cob yield. Wider spacing of 40 cm × 15 cm also resulted in higher cob yield. The interacting combination of 75% N through urea + 25% N through FYM + 40cm × 15cm spacing registered maximum cob yield out of the nine interacting combinations tried in this experiment (2—4). 75% N through urea + 25% N through FYM was more effective in producing maximum forage yield; 40cm × 15 cm row spacing and combination of 75% N through urea + 25% N through FYM also registered maximum forage yield. Out of the eight interacting combinations of organic and inorganic sources of nitrogen tried in this experiment, N_2 (75% N through urea + 25% N through FYM), S_1 (40 cm ×15 cm spacing and their combination N_2S_1 (75% N through urea + 25% N through FYM + 40 cm ×15 cm spacing) emerged as superior over all other treatment combinations for yield and yield attributing characters of baby corn under the agroclimatic condition of Varanasi.

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