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Response of Baby Corn (*Zea mays* L.) to Nitrogen Sources and Row Spacing

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Abstract

A field experiment was carried out at to study response of baby corn (*Zea mays* L.) to nitrogen sources and row spacing during the pre- *kharif* seasons of 2008 and 2009. 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 growth and yield for commercial cultivation of baby corn under agro- climatic conditions of Varanasi. Nitrogen source N_2 (75% N through urea + 25% N through FYM) recorded maximum plant height, number of leaves/plant, leaf area, leaf area index and plant dry weight followed by N_1 (100% N through urea) and the minimum was observed with N_4 (25% N through urea + 75% N through FYM). Spacing of 40 cm × 15 cm (S_1) recorded higher plant height, number of leaves/plant, leaf area, leaf area index and plant dry weight as compared to that obtained with S_2 (spacing of 30 cm × 15 cm). Treatment combination N_2 S_1 (75% N through urea + 25% N through FYM + 40 cm × 15 cm spacing) recorded maximum plant height, number of leaves/plant, leaf area leaf area index and plant dry weight followed by N_1 S_1 (100% N through urea spacing of 40 cm × 15 cm). The minimum was observed with N_4 S_2 (25% N through urea + 75% N through FYM + 30 cm × 15 cm spacing). The weight of cob with and without husk, cob yield and forage yield was recorded maximum with nitrogen source N_2 (75% N through urea + 25% N through FYM) followed by N_1 (100% N through urea) and the minimum remained with N_4 (25% N through urea + 75% N through FYM). Similarly the weight of cob with and without husk, cob yield and forage yield was also found maximum with spacing of 40 cm × 15 cm (S_1) in comparison to S_2 (spacing of 30 cm × 15 cm). Interacting treatment combination N_2 S_1 (75% N through urea + 25% N through FYM + 40 cm × 15 cm spacing) recorded maximum number of cobs/plant, length and girth of cob, weight of cob with and without husk, cob yield and forage yield followed by N_1 S_1 (100% N through urea spacing of 40 cm × 15 cm), whereas, the minimum was observed with N_4 S_2 (25% N through urea + 75% N through FYM + 30 cm × 15 cm spacing).

Key words : Baby corn, Nitrogen, Spacing, LAI, Forage yield.

Baby corn, is a new economic product of maize (*Zea mays* L.) and little is known to the maize growers in India. The term "baby corn" refers to young flowering maize cob harvested within 2—3 days of silk emergence. The lack of knowledge of use and economic importance of this product seems to be the major factors, besides lack of availability of production technology for popularizing its cultivation among cultivators. Maize is the principal rainy season crop of Uttar Pradesh and keeping in view the maize production potential of the state and low economic returns from maize grain, its cultivation as corn can be exploited to improve the economic status of poor maize growers, provided the suitable agro-techniques are made available. Maize is an exhaustive crop and requires heavy application of nitrogen along with phosphorus and potassium. The importance of nutrient supply (N, P and K) in maize is further aggravated when it is grown for baby corn production because of high plant density and extremely short duration of crop. Low response of crop to added fertilizers and declining factors productivity were noted under prevalent cropping system due to deterioration in physical, chemical and biological quality of soil and much

Table 1. Effect of sources of nitrogen (N) and spacing (S) on growth and yield in baby corn (pooled data of 2 years).

Treatments	Plant height 45 DAS	Leaves/ plant 45 DAS	Leaf area (cm^2) 45 DAS	LAI 45 DAS	Dry weight/ plant (g) 45 DAS	Cob weight with husk (g)	Cob weight without husk (g)	Cob yield (q/ha)	Forage yield (q/ha)
Sources of Nitrogen (N)									
N_1	148.95	16.62	3710.15	2.70	107.05	45.38	7.24	27.44	144.51
N_2	155.57	17.56	3802.87	2.84	109.91	43.34	6.56	21.51	92.14
N_3	137.12	16.20	3511.99	2.59	92.98	48.53	7.83	30.24	157.17
N_4	130.82	14.20	3242.19	2.36	90.49	43.74	6.79	22.66	94.05
CD (P=0.05)	1.27	0.30	63.22	0.06	3.02	44.48	7.05	26.18	138.94
Spacing (S)									
S_1	155.30	17.67	3835.08	2.87	110.63	44.47	6.95	25.36	136.92
S_2	130.93	14.62	3298.52	2.37	89.59	35.86	5.55	16.59	69.13
CD (P=0.05)	0.90	0.21	44.70	0.04	2.13	0.69	0.21	0.83	2.58

higher annual removal of nutrients by crops and cropping systems were noted than the amount added through fertilizers and resulted negative nutrient balance (1). 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 the present investigation was undertaken to find out the response of nitrogen sources and spacing on growth and yield of baby corn (*Zea mays* L.) under Varanasi condition of eastern Uttar Pradesh.

Methods

A field experiment was conducted during the pre-*kharif* season of 2008 and 2009 at Agricultural Research farm, Department of Agronomy, Institute of Agricultural sciences, Banaras Hindu University, Varanasi. The experiment was laid out in randomized block design (4 × 2 factorial) comprising of four sources of nitrogen 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 two row spacing S_1 (40 cm × 15 cm), S_2 (30 cm × 15 cm) making eight treatment combination each replicated thrice. The soil of the experimental plot was sandy clay loam in texture, neutral in reaction (pH 7.4), low in available nitrogen (182 kg/ha), medium in available phosphorus (13.86 kg/ha) and available potassium (260.45 kg/ha). The promising crop cv Malviya Makka-2 was sown on 12 May and 14 May during 2008 and 2009, respectively. The farm yard manure (FYM) was used as an organic source of nitrogen and applied on the basis of nitrogen content in its dry weight as per treatment. Full dose of FYM, phosphorus, potash and half dose of nitrogen (as per treatment) were applied at the time of sowing by side dressing as basal application as per the recommendation. However, the remaining dose of N was applied as top dressing at 25 DAS stages of the crop growth. The crop was raised under irrigated conditions with the application of five irrigations each year. All the intercultural operations were carried out as per requirements of the treatments. The immature cobs (baby corn) were harvested at 2—3 days of silk emergence stage and marketed as fresh after dehusking. The crop was harvested as green fodder after the competition of cob picking. In order to assess the effects of various treatments of crop growth and yields of baby corn, periodically observations were taken on plant height, leaves/plant; dry weight/plant, LAI, cob girth and cob weight yields were recorded. Five plants were selected at random from each plot for recording of growth attributes characters, whereas cob yield was calculated on plot basis and was converted into kg/ha. 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

Table 2. Interaction effects of sources of nitrogen (N) and spacing (S) on growth and yield in baby corn (pooled data of 2 years).

Treatments	Plant height 45 DAS	Leaves/ plant 45 DAS	Leaf area (cm^2) 45 DAS	LAI 45 DAS	Dry weight/ plant (g) 45 DAS	Cob weight with husk (g)	Cob weight without husk (g)	Cob yield (q/ha)	Forage yield (q/ha)
N_1S_1	154.29	17.87	3925.14	2.95	113.58	45.38	7.24	27.44	144.51
N_1S_2	143.62	15.37	3495.17	2.45	100.52	43.34	6.56	21.51	92.14
N_2S_1	162.47	19.09	4025.94	3.08	118.14	48.53	7.83	30.24	157.17
N_2S_2	148.67	16.03	3579.80	2.61	101.69	43.74	6.79	22.66	94.05
N_3S_1	153.07	17.37	3736.77	2.77	105.50	44.48	7.05	26.18	138.94
N_3S_2	121.17	15.04	3287.21	2.41	80.47	42.87	6.34	20.57	90.73
N_4S_1	151.36	16.36	3652.46	2.69	105.31	44.47	6.95	25.36	136.92
N_4S_2	110.27	12.03	2831.92	2.03	75.68	35.86	5.55	16.59	69.13
CD (P=0.05)	1.79	0.42	89.40	0.09	4.26	0.69	0.21	0.83	2.58

to compare the treatment means.

Results and Discussion

Effects on Growth Attributes

The various growth and physiological characters of baby corn were significantly influenced by different nitrogen sources and spacing (Table 1). Among the various combinations of organic and inorganic sources of nitrogen, 75% N through urea + 25% N through FYM was more effective in producing significantly taller plants with higher leaves/plant, leaf area and leaf area index. This might have been possible due to abundant nitrogen supply and its availability through organic and inorganic source which helped the baby corn plants to attain more vigor in terms of all the growth attributes (2). Among the various combinations of organic and inorganic sources of nitrogen, N_2 (75% through urea + 25% through FYM) was more effective in producing significantly higher dry weight of plant, which was statistically at par with N_1 (100% N through urea). However, the greater exposure to light leading to better photosynthetic activity and increased availability of nutrients to plants provided more vigor to the plants in becoming healthier, which in turn resulted in higher dry weight of plant (3). Due to wider spacing (40 cm × 15 cm), greater exposure to light leading to better photosynthetic activity and increased availability of nutrients to plants resulted in higher growth attributes and physiological characters of crop (4). The interaction effect among nitrogen sources and spacing was also found to be significant. Out of the eight combinations of organic and inorganic sources of nitrogen and spacing, N_2 S_1 (75% N through urea + 25% N through FYM + 40 cm × 15 cm spacing) maintained its superiority over all other treatment combinations in relation growth and physiological characters of baby corn under the agro-climatic condition of Varanasi (Table 2).

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). 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 with wider row spacing of 40 cm × 15 cm also resulted in same outcome in term of yield attributes and yield (5). However the treatments, 75% N through urea + 25% N through FYM, 40 cm × 15 cm spacing and their interaction were more effective in producing better yield attributes

and yield (Table 2) over rest of the treatment combinations. This might be due to plants with wider spacing attained more vigor due to availability of more light as well as adequate nitrogen supply, and as such, produced longer cobs with higher girth and weight resulting better yield.

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