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IMPACT OF INORGANIC AND ORGANIC SOURCES OF NITROGEN AND ROW SPACING ON BABY CORN *(Zea mays L.)*

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ABSTRACT
A field experiment was conducted during Zaid 2020 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The treatment consisted of 75% Nitrogen through urea + 25% Nitrogen through FYM + 30 x 15 cm whose effect is observed on Baby corn. Experiment was laid out in RBD there were 9 treatments and replicated thrice it was observed that T5 75% Nitrogen through urea + 25% Nitrogen through FYM + 30 x 15 cm was found to be the best treatment for obtaining growth and yield attributes such as plant height (191.39 cm), number of leaves (12.23 cm), plant dry weight (91.98 g/plant) and fodder yield (36.66 t/ha) while net return (125793 Rs/ha) and B:C ratio (1.84) were also recorded in 75% Nitrogen through urea + 25% Nitrogen through FYM + 30 x 15 cm. From the above investigation it was concluded that application of 75 % Nitrogen through urea + 25% Nitrogen through FYM + 30 x 15 cm was more productive as well as economic.

INTRODUCTION

Maize (*Zea mays* L.) is the world's third leading cereal crop following wheat and rice, and has the highest production potential among the cereals. In India, maize is grown in 9.22 M ha area with a production and productivity of 28.72 million tonnes and 3,115 kg/ha respectively contributing 2.53% share over world's production (Directorate of Economics and Statistics 2018, FAO Statistics 2020).Baby corn is a vegetable crop that can potentially improve the economic status of farmers (Das *et al*.,2008).Baby corn is the young, finger-length de-husked corn young ear of female inflorescence, harvested within 2-3 days of silk emergence but prior to fertilization and is crisp and sweet in taste. (Pandey *et al*., 2000). It is a profitable crop that allows a diversification of production, aggregation of value, and increased income Pandey *et al*. (2002). It is highly remunerative and farmers can get a high return in a short period of 45-60 days.

As baby corn is a high demanding crop which provide more income within a short period, farmers are cultivating those on large scale with huge input of inorganic fertilizers which in turn leads to land degradation. The main idea of this research is to supplement some source of organic formulations in replacement of inorganic fertilizer.

Nitrogen is most deficient primary nutrient in Indian soil and varies from state to state. Nitrogen is considered as one of the most important plant nutrients for growth and development of crop plant. It also plays an important role in synthesis of chlorophyll and amino acids that contribute to the building unit of protein and thus, growth of plants. Nitrogen helps in early establishment of leaf area capable of photosynthesis. Nitrogen promotes leaf and stem growth rapidly which consequently increase the yield and its quality. (Chouhan *et al*., 2010). Research substantiates that available nitrogen status increased with increased supply of nitrogen in the form of either fertilizers or organic manures which ultimately increased the productivity of maize. As far as grain yield in cereal is concerned the role of nitrogen is vital. It is therefore, necessary to identify the critical steps associated with nitrogen use efficiency. The nitrogen use efficiency is only about 30-40% in Indian soil. Farm Yard Manure (FYM) is valuable soil improver which enhances and restores a range of natural properties of the soil. It increases soil fertility, adds humus and slow releasing nutrients to the soil, aids water and nutrient retention, attracts worms to the soil, ideal for mulching. Application of FYM is known to maintain soil productivity longer than inorganic fertilizer . Farm Yard Manure contains all the macro and micro nutrients required for the plants growth .Hence the paper deals with effect of inorganic and organic sources of nitrogen and row spacing on growth, yield and economics of Baby corn.

MATERIALS AND METHODS

Farm yard manure and inorganic fertilizer

Fertilizer required for maintaining adequate supply of nutrients for increased yield, and reduced environmental pollution.

Farm yard manure is a heterogenous composted organic material consisting of dung, crop residue, and/or household sweeping in various stages of decomposition. Farm Yard Manure contains 05 % N Farm yard manure. it is an important organic resource for agricultural production in livestock based

farming system in many countries including semi-arid regions of India. Urea contains 46% Nitrogen content. It is primarily used for bloom growth and promotes the green leafy growth and make the plant look lush. Urea also aids the photosynthesis process to plant.

Experimental Site Information

A field experiment was conducted at the collage Farm of Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) which is located at 25º 39′ 42" N latitude, 81º67′56" E longitude and 98 m altitude above the mean sea level (MSL).the soil experimental site soil was sandy loam with pH 7.2,Organic carbon 0.48 %,Available Nitrogen 171.48 kg/ha, phosphorus 13.6 kg/ha, potassium 215.4 kg/ha, The irrigation water used for the experiment was of good quality devoid of any salinity.

Experimental Details

The experiment was laid out in randomized block design. The treatment comprised of 2 levels of Nitrogen by using Urea and Farm Yard Manure and on spacing. There were 9 treatments and replicated trice during zaid season (March-April) of 2020.

Crop management

The crop management practices were similar in all treatments but there is a difference in fertilizer application to each treatment. Farm Yard Manure (25%, 50%, 75%) collected from dairy department incorporated into soil before sowing. Inorganic N (25%, 50%, 75%, 100%) were applied as basal application at the time sowing.

The field preparation was done by ploughing once, there after the land was measured and divided into the three replications with one main irrigation channel and one sub irrigation channel. Organic manure and inorganic fertilizers were uniformly applied and incorporated at 10 cm depth to each plot as per treatments. The seeds are sown in 5 cm depth with different spacing 30 x 15cm and 40 x 15 cm. Hand weeding was done after 25 and 40 DAS. Three irrigations were given. one at pre sowing, one irrigation before tasseling stage and one irrigation during silking stage. Detasseling is an essential operation for maintaining the quality of baby corn. It was done by removing the tassel of the plant soon after emergence of flag leaf, which was done between 35-40 DAS

To control the attack of Maize borer (Chilopartellus), Phorate 10 Kg/ha was applied at 15 DAS and 30 DAS. To control Termites Chlorpyriphos 500 ml/ha was applied.

Chemical analysis of soil

Composite soil samples were collected before layout of the experiment to determine the initial soil properties. The soil samples were collected from 0-15 cm depth and were dried under shade, were powdered with wooden pestle and motar, passed through 2 mm sieve and were used for analysis. Collected soil samples were analyzed for organic carbon by rapid titration method (Sparks, 1996), Available nitrogen was estimated by alkaline permanganate method by Subbiah and Asiia (1956), available phosphorus by Olsen's method as outlined by Jackson (1967), available potassium was determined by extracting with neutral normal ammonium acetate solution and estimating by using flame photometer (ELICO Model) as outlined by Jackson (1973) and available S was estimated by turbid metric method as described by Sparks (1996).

Statistical analysis

Experimental data collected was subjected to statistical analysis by adopting Fishers method of Analysis of variance (ANOVA) as outlined by Gomez and Gomez (2010). Critical Difference (CD) values were calculated the 'F' test was found significant at 5% level.

RESULTS AND DISCUSSION

Impact of Inorganic and Organic source of Nitrogen and crop geometry on plant height

In present investigation Plant height(cm)of baby corn increased with crop age maximum plant height was obtained at 60 DAS Abundant nitrogen supply and its availability through organic and inorganic source helped the baby corn plants to attain the more vigour in terms of plant height. Higher nitrogen levels significantly increased the plant height because of enough availability of nitrogen at growing stages maximum plant height(191.39 cm) was observed with 75% Nitrogen through urea and 30 x 15 cm spacing this might have been possible due to better photosynthetic activity with better availability of light and proper spacing between the plants and abundant supply of nitrogen. Patel *et al*. (1995) Saha and Mondal (2006) and Kumar (2009)

Impact of Inorganic and Organic source of Nitrogen and crop geometry on Plant dry weight g/plant.

In present investigation Dry weight per plant of baby corn increased with crop age maximum dry weight was obtained at 60 DAS. Among the various combination of organic and inorganic sources of nitrogen 75% Nitrogen through Urea + 25% FYM was more effective in producing higher dry weight (91.98 g) of plant this might be due to increased availability of

Table 1: Impact of Inorganic and Organic sources of plant height and dry weight of Baby corn

Treatment	Plant height (cm)				Plant dry weight (g/plant)			
	15 DAS	30 DAS	45 DAS	60DAS	15 DAS	30 DAS	45 DAS	60DAS
Control	4.69	18.45	72.92	177.82	0.53	4.47	37.91	79.22
100%Nitrogen through urea + 40 x 15cm.	5.79	20.25	77.8	183.36	0.6	5.06	39.73	83.52
100%Nitrogen through urea + 30 x 15cm.	5.4	22.38	87.06	186.25	0.57	6.02	44.65	87.25
75%Nitrogen through urea +25% Nitrogen through FYM + 40 x 15 cm.	5.38	24.93	90.5	190.88	0.6	6.56	48.07	91.51
75%Nitrogen through urea +25% Nitrogen through FYM + 30 x 15 cm	5.66	26.33	91.54	191.39	0.64	6.68	48.65	91.98
50%Nitrogen urea + 50%Nitrogen through FYM + 40 x 15 cm.	5.9	22.05	84.05	184.51	0.57	6.14	44.93	90.12
50%Nitrogen urea + 50%Nitrogen through FYM + 30 x 15 cm.	4.52	21.31	80	181.68	0.47	5.37	43.72	88.98
25% Nitrogen through urea + 75% Nitrogen through FYM + 40 x 15 Cm..	4.92	18.97	77.21	179.89	0.54	5.09	40.73	88.07
25% Nitrogen through urea + 75% Nitrogen through FYM + 30 x 15 cm.	5.51	19.46	75.46	176.95	0.49	4.78	38.96	83.53
SEm (±)	0.31	1.11	1.95	2.58	0.06	0.13	1.53	2.25
CD (5%)	0.93	3.32	5.58	7.76	NS	0.4	4.6	6.75

Table 2 : Impact of Inorganic and organic sources of yield and yield attributes of Baby corn

Treatments	Number of cobs /plant	Length of cobs (cm)	Grith of cob (cm)	Weight of with husked Baby corn(g)	Weight of with out hus ked Baby corn(gm)	Cob yield of with hus ked Baby corn(q/ ha)	Cob yield of without husked Baby corn (q/ha)	Green Fodder yield (t/ha)
Control	1.33	12.56	6.22	22.45	7.9	18.4	22.63	19
100%Nitrogen through urea + 40 x 15cm.	1.73	14.65	6.46	22.58	9.05	23.48	23.01	29.67
100%Nitrogen through urea + 30 x 15cm.	2.07	15.55	6.74	30.05	9.85	29.66	24.48	30
75%Nitrogen through urea +25% Nitrogen through FYM + 40 x 15 cm.	2.33	16.46	7.11	33.25	10.11	35.2	37.75	34.57
75%Nitrogen through urea +25% Nitrogen through FYM + 30 x 15 cm	2.53	17.4	7.88	33.7	11.11	35.24	39.32	36.66
50%Nitrogen urea + 50%Nitrogen through FYM + 40 x 15 cm.	1.93	15.33	6.66	29.66	9.02	26.85	25.9	30
50%Nitrogen urea + 50%Nitrogen through FYM + 30 x 15 cm.	1.6	13.89	6.33	27.43	8.53	24.38	30.06	22
25% Nitrogen through urea + 75% Nitrogen through FYM + 40 x 15 Cm..	1.8	15.09	6.56	25.44	8.39	20.61	26.36	25.6
25% Nitrogen through urea + 75% Nitrogen through FYM + 30 x 15 cm.	1.53	14.35	6.43	21.79	8.29	19.27	27.3	21.07
SEm (±)	0.04	0.318	0.11	1.026	0.276	0.423	0.95	3.22
CD (5%)	0.12	0.952	0.34	3.076	0.28	1.2	2.87	3.64

Table 3: Effect of Inorganic and organic Nitrogen levels and Row spacing on Economics of Baby corn

Treatment	Net Return	B:C Ratio
Control	58928.33	1.16
100%Nitrogen through urea + 40 x 15cm.	71131.67	1.4
100%Nitrogen through urea + 30 x 15cm.	77328.33	1.52
75%Nitrogen through urea +25% Nitrogen through FYM + 40 x 15 cm.	117423	1.72
75%Nitrogen through urea +25% Nitrogen through FYM + 30 x 15 cm	125793	1.84
50%Nitrogen urea + 50%Nitrogen through FYM + 40 x 15 cm.	71858.33	1.16
50%Nitrogen urea + 50%Nitrogen through FYM + 30 x 15 cm.	80511.67	1.3
25% Nitrogen through urea + 75% Nitrogen through FYM + 40 x 15 Cm..	75721.33	1.36
25% Nitrogen through urea + 75% Nitrogen through FYM + 30 x 15 cm.	75211.33	1.35
SEm (±)	3919.96	0.06
CD (5%)	11752.04	0.19

nutrients to plants provided more vigour to the plant in becoming the healthier which in turn resulted in higher dry weight of plant. Ramchandrappa *et al*. (2004)

Yield attributes and Yield

The Impact of Nitrogen levels and Row spacing on number of cobs/plant, cob length (cm), cob grith (cm) ,weight of baby corn with husk and without husk, cob yield (t/ha) with and without husk, fodder yield (t/ha) was significant, the highest values for number of No of cobs/plant (1.87), cob length (17.4 cm) grith of cob (7.88 cm) weight of with husked baby corn (33.7 g) weight of de husked baby corn(11.11g) cob yield of with husked baby corn (35.24 q/ha) cob of without husked baby corn (39.32 q/ha) fodder yield (36.66 t/ha) were observed in 75% nitrogen through urea + 25% nitrogen through FYM with spacing 30 x 15 cm. The lowest values for number of cob/plant (1.33), cob length (12.56 cm) grith of cob (6.22cm) weigth of with husked baby corn (21.79 g) weight of de husked baby corn (7.99 g) cob yield of with husked baby corn (18.4 q/ha) cob of without husked baby corn (22.63 q/ha) fodder yield (19 t/ha).were found in 100% Nitrogen through Urea + 40 x 15 cm. spacing remarkably influence the growth and yield attributes noted higher under wider spacing even though it resulted in less number of cobs/plant because of lower plant population per unit area these all together resulted in overall increase in the cobs and yield of Baby corn. Sangoi *et al* . (2001) application of nitrogen through different fertilizers enhanced plant yield contributing characteristics which might probably increased the grain yield of maize sahoo and Mahapatra (2014).

Impact of inorganic and organic sources of Nitrogen levels and Row spacing on Economics of Baby corn.

Application of 75 % N through urea + 25 % N through FYM + 30 x 15 cm,(Rs125793) and Higher B: C ratio (1.84) was recorded with application of 75 % N through urea + 25 %N through FYM + 30 x 15 cm, Higher gross return (Rs 193970) was recorded with application of 75 %nitrogen through urea + 25 %Nitrogen through FYM + 30 x 15 cm, 75%Nitrogen through urea + 25% Nitrogen through FYM with spacing 30 x 15 cm was found economically most beneficial as it obtained maximum cob yield, forage yield, Gross return, Net return and B:C ratio which was corresponding to the growth and yield attributing attributes for the cultivation of Baby corn .Thakur *et al*. (1997) Pandey *et al*. (2000).

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