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Performance of Baby Corn (*Zea Mays* L.) in Integration of Organic and Inorganic Nitrogen

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Abstract Nitrogen (N) fertilization mostly determines the productivity of a crop. The supply of N can be ensured in both inorganic and organic means. Slowly released organic N can be combined with inorganic N to minimize the detrimental effect of chemical fertilizers to environment as well as to ensure the sustainable production. To observe the response of baby corn in integration of organic and inorganic N field experiments were conducted in N deficit soil in consecutive winter and summer. There were five nutrient levels as treatment in the experiment. The treatments used in the winter season were T_1=N 0 kg + CD 15 t ha^{-1}, T_2=N 60 kg + CD 15 t ha^{-1}, T_3= N 90 kg + CD 10 t ha^{-1}, T_4= N 120 kg + CD 5 t ha^{-1} and T_5= N 150 kg + CD 0 t ha^{-1} while in the summer season T_1=N 30 kg + CD 15 t ha^{-1}varied and others remained same as in the winter season. The lowest cob yield without husk was found where minimum inorganic N was combined with organic N in both seasons. Plant received only N from inorganic source represented highest cob yield. Statistically similar yield was also obtained from one combination of inorganic and organic N (120 kg N + 5 ton CD ha^{-1}), where the rate of inorganic N was 20% lower than that of sole inorganic N source. Between seasons, significantly positive yield response was recorded in winter irrespective of nutrient levels. Therefore, one fifth of inorganic N application can be minimized in terms of integrated N management from organic and inorganic sources without affecting potential yield of baby corn.

Keywords Baby Corn, Organic and Inorganic N, Growth, Yield

1. Introduction

Maize (*Zea mays* L) is the third most important cereal crop next to rice and wheat (Mahmoodi & Rahimi [23]) and has the highest production potential among the cereals. Maize, being a C4 plant, able to adapt in an adverse climatic condition such as high temperature, drought, elevated CO_2 and can efficiently convert absorbed nutrients into food (Lara & Andreo [20]; Archana & Bai [3]). For diversification and value addition of maize as well as growth of food processing industries, recent development is of growing maize for vegetable purpose, which is commonly known as 'baby corn'. It is dehusked young cob of maize harvested at the silk stage (Kumar & Bohra [19]). The high-nutritive value, eco-friendly and crispy nature of baby corn have made it a special choice for various traditional and continental dishes apart from canning in the elite society. It has higher nutritive value, reported that 100 g of baby corn contained 89.1% moisture, 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 (Thavaprakaash et al. [28]; Das et al. [8]).

Yield and quality of baby corn are affected by cultural management applied to the maize crops especially fertilizer application (Lone et al. [21]). Nitrogen is the most important nutrient for the growth and yield of corn (Henrique Demari et al. [17]). The application of chemical fertilizer may assist in obtaining maximum production of baby corn but keeping in mind that chemical fertilizer may lead to hazardous effect on environmental health besides increasing production cost as such the judicious uses of fertilizers from different source will maintain the environmental health and sustainability (Dadarwal [7]). Besides, organic agricultural products becoming more popular to the consumers considering health environmental benefit (Muhammad et al. [24]). The practice of organic sources helps to uphold soil physical, chemical, and microbiological properties of soil (Timsina [30]). The energy crisis, environmental degradation and hike in prices of the inorganic fertilizers necessitate the use of organic N in crop production. However, N mineralization from organic sources slow enough to restrict potential uptake of N for corn especially early part of growing season and reduce yield (Pang & Letey [26]). Not only depending fully inorganic or organic N source, the sustainability in crop production and soil health can be achieved through integrated nutrient management (Dawe et al. [9]). In addition, N mineralization and requirement of corn depends on growing season. Because the key machine of mineralization process are soil microbes (bacteria, fungi, and actinomyces) and their activity depends on seasonal variable soil temperature, water content and aeration (Kitchen & Goulding [18]). Therefore, this study was designed to investigate the suitable combination of organic and inorganic N without affecting the potential growth and yield of baby corn in two consecutive summer and winter seasons.

2. Materials and Methods

2.1. Site and Soil Conditions

To observe the combine response of organic and inorganic N fertilizer on baby corn a field experiment was conducted to assess the performance of the yield and yield attributing characters of baby corn. The study was established in agronomy research field of Sylhet Agricultural University. The geographical location of the site is 24°54''- 33°73'' N latitude and 91°54''- 05°69'' E longitude and altitude, 30 m above the sea level. The soil of study field was loamy texture with low pH (5.05), organic matter (1.01%), N (0.058%) content. The study was done in two consecutive seasons winter (November, 2016 to February, 2017) and summer (April, 2017 to June, 2017).

2.2. Setup and Design

The experiment was laid out in RCBD design with four replications during each season. The size of experimental unit was 2.0 m x 1.5 m. Single baby corn hybrid seeds (Baby Star) were sown per hill with 50 cm row to row and 15 cm seed to seed distance. Both the experiments comprised different doses of organic manures (Cowdung) and inorganic fertilizer (N). Five levels of combinations of Cowdung (CD) and Nitrogen were used as treatments in both winter and kharif seasons. The treatments used in the winter season were T_1=N 0 kg + CD 15 t ha^{-1}, T_2=N 60 kg + CD 15 t ha^{-1}, T_3= N 90 kg + CD 10 t ha^{-1}, T_4= N 120 kg + CD 5 t ha^{-1} and T_5= N 150 kg + CD 0 t ha^{-1} while in the summer season the treatment T_1=N 30 kg + CD 15 t ha^{-1}varied and others remained same as in the winter season.

2.3. Fertilizer Application

The field was fertilized with P, K, S and Zn at the rate of 125-80-125-8 kg ha^{-1} in the form of triple super phosphate (TSP), muriate of potash (MOP), gypsum and zinc sulphate respectively. The whole amount of CD, TSP, MOP, Gypsum and zinc sulphate and half of urea were incorporated in the soil at the time of final land preparation in each plot according to the experimental setup. The remaining half of urea as a source of N was top dressed at 30 days after emergence of seedling.

2.4. Intercultural Operations

Weeding was done by hand twice during the whole growing period, the first weeding was done after 15 days of sowing and the second was done after 35 days of sowing during both seasons. During winter season four irrigations were applied at 15, 30, 55 and 75 DAS while in summer only two irrigations were applied at 30 and 50 DAS. Diazinon 10 G was used at the rate of 12 kg ha^{-1} to control the cutworm in the crop field.

2.5. Harvesting

Baby cob corn was harvest at 2-3 days after silking. First harvest was done on 9-10 February 2017 in winter while on 26 June in summer manually by hand. Final harvest was done on 17-19 February of winter crop and 28 June-1 July of summer crop. During first five fresh baby corn cobs were randomly selected as per treatment from each plot for recording data on yield attributes.

2.6. Data Collection

The data were collected at every 15 days interval on different growth and yield contributing characteristic viz. plant population m^{-2}, plant height, number of leaves, leaf area index, total Dry matter weight, leaf chlorophyll concentration (SPAD value), number of cobs $plant^{-1}$, baby corn cob yield with husk, baby corn cob yield without husk, TSS (Brix %), fodder or green biomass yield and biological yield (t ha^{-1}).

2.7. Statistical Analysis

The statistical analysis of the data was done by using R and STAR programs to find out the Analyses of Variances (ANOVA). The comparisons were made at 5% level of significance.

3. Results

3.1. Plant Height

The plant height differed within the treatment irrespective to growing period (Figure 1). The tallest plant was obtained from the treatment T_5 and the shortest plant was found in the treatment T_1 where minimum nutrient dose was applied irrespective to the growing periods.

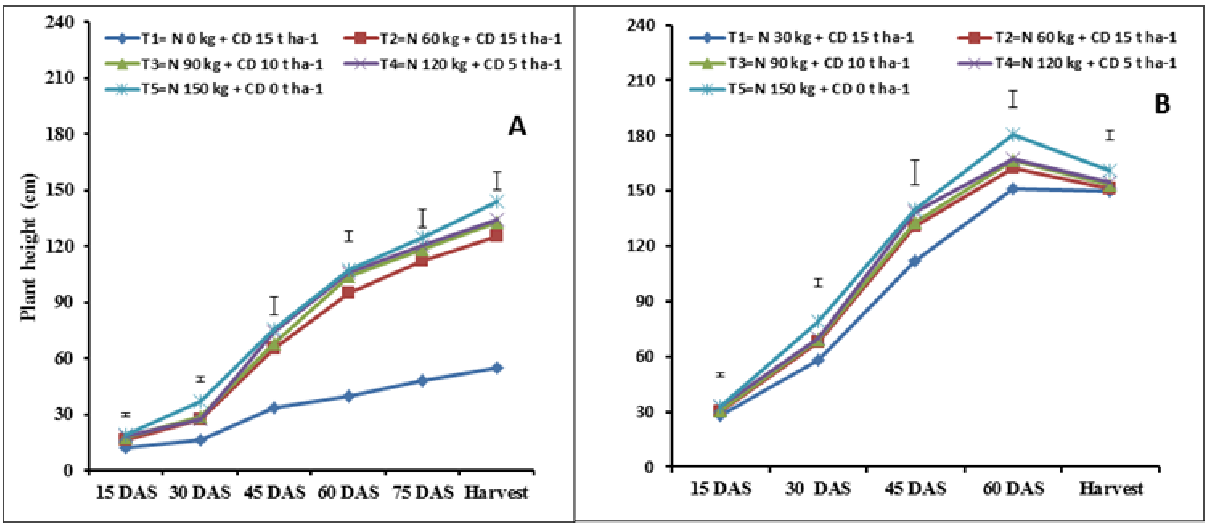

Figure 1. Plant height (cm) at 15 days intervals during consecutive winter 2016 (A) and summer 2017 (B). Whiskers indicate individual standard deviation of the mean

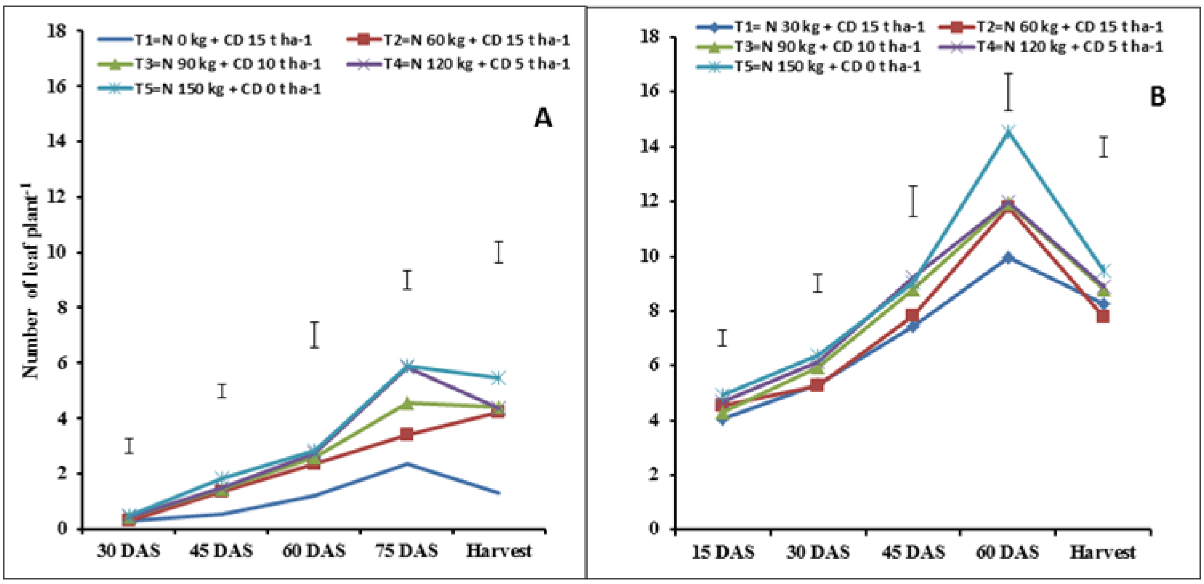

Figure 2. Number of leaf plant^{-1}at 15 days intervals during consecutive winter 2016 (A) and summer 2017 (B). Whiskers indicate individual standard deviation of the mean

3.2. Number of Leaves Plant^{-1}

In winter season, the results exhibited that at 15 and 30 DAS the treatment T_5 produced the highest number of leaves plant^{-1} which was significantly different from other treatments but at 45 and 60 DAS the treatments T_5 also produced the highest number of leaves plant^{-1} which was statistically similar to that of T_3 and T_4 (Figure 2).

In summer, the highest number of leaves plant^{-1} was found in T_5 also and it was statistically similar to T_3 and T_4 at 15, 30 and 45 DAS. The minimum number of leaves plant^{-1} was found in the treatment T_1.

3.3. Leaf Chlorophyll Concentration

Nutrient levels significantly influenced the Soil Plant Analysis Development (SPAD) chlorophyll meter value of baby corn at all measurement dates after sowing at regular interval and at harvest during both seasons (Table 1). In winter, the highest SPAD values of 41.78, 36.83 and 34.03 were recorded from the treatment T_5 at 60 DAS, 75 DAS and at harvest respectively. In summer, the results revealed that the highest SPAD values of 25.27, 38.43, 36.33 and 26.20 were recorded from the treatment T_5 at 15, 30 and 45 DAS and at harvest respectively in summer season. It was observed that SPAD values increased with the age of the crop plants and reduced at harvest to some extent (from 7.60% to 25.17% in winter and 27.88% to 34.32% in summer).

Table 1. SPAD values of the leaves during winter and summer (2016-2017)

Treatment	Winter			Summer			
	60 DAS	75 DAS	Harvest	15 DAS	30 DAS	45 DAS	Harvest
T_1	19.350 c	22.550 b	16.875 c	21.30b	29.00d	33.33b	21.89b
T_2	36.300 b	32.300 a	31.025 b	22.58b	34.75c	34.83ab	23.03ab
T_3	36.325 b	35.450 a	31.850 ab	24.25a	35.83bc	35.60ab	23.50ab
T_4	38.900 b	35.075 a	33.725 a	24.85a	37.75ab	35.50ab	25.78a
T_5	41.775 a	36.825 a	34.025 a	25.27a	38.43a	36.33a	26.20a
F	***	***	***	***	***	*	*

* indicates significant treatment differences ($p<0.05$)

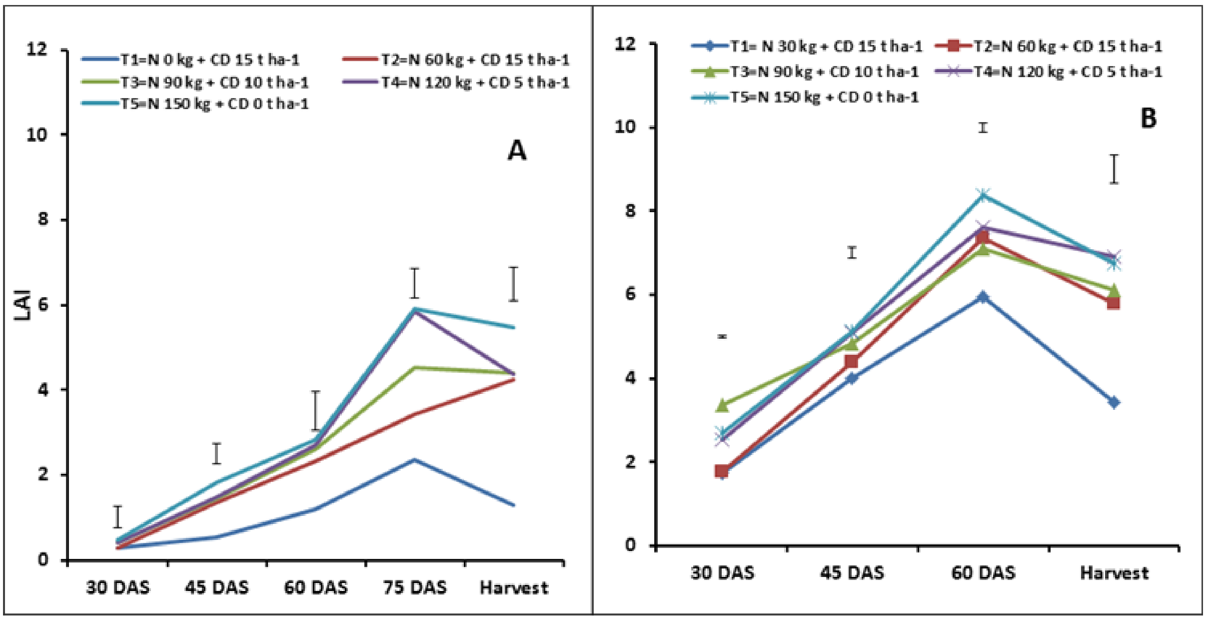

Figure 3. Leaf Area Index (LAI) at 15 days intervals during consecutive winter 2016 (A) and summer 2017 (B). Whiskers indicate individual standard deviation of the mean

3.4. Leaf Area Index (LAI)

The results presented that LAI at 30, 45, 60 and 75 DAS and at harvest differed significantly at different levels of nutrients in both seasons (Figure 3). The treatment T_5 (N 150 kg + Cowdung 0 t ha^{-1}) had the highest value of LAI at all dates of measurement except at harvest during summer. LAI increased sharply as the nutrient levels as well as the age of the crop plants increased. The treatment T_1 had the lowest LAI values throughout the intervals irrespective to growing period.

3.5. Total Dry Matter (TDM) (G Plant^{-1})

TDM of baby corn differed significantly at all sampling dates as the age of the plant increased during both the seasons (Table 2) irrespective of nutrient levels. The lowest TDM was found in the treatment T_1 during both the seasons and dry matter accumulation increased with increasing levels of nutrient. The highest TDM of 1.68, 4.11, 17.67, 23.10 and 49.67 g plant^{-1} was found in the treatment T_5 at 30 45, 60 and 75 DAS and at harvest stage respectively in winter season.

3.6. Number of Cob Plant^{-1}

Nutrient levels produced significant effects on the number of cob plant^{-1} in both seasons (Table 3). In winter, the highest number of cob 2.33 plant^{-1} was recorded from T_5 which is statistically similar with T_4 of 2.20 cob plant^{-1}. The lowest number of cob 0.33 plant^{-1} was recorded from the treatment T_1. In summer, number of cob plant^{-1} increased significantly up to the T_5 (1.99) that is statistically similar with T_4 and lowest number of cob 1.11 plant^{-1} was found in the level.

Table 2. Total dry matter (TDM) plant^{-1} of baby corn at 15-day intervals during winter and summer (2016-2017)

Treatment	TDM (g plant^{-1})								
	Winter					Winter			
	30 DAS	45 DAS	60 DAS	75 DAS	Harvest	30 DAS	45 DAS	60 DAS	Harvest
T_1	0.21d	2.33c	3.76d	5.58c	4.84d	3.00c	10.89c	16.98d	38.59a
T_2	1.08c	3.39b	10.97c	15.82b	26.21c	2.36c	14.83ab	22.82c	32.39b
T_3	1.44ab	4.52a	12.86b	23.56a	38.15b	4.86b	15.62a	15.96d	33.67b
T_4	1.27bc	4.43a	14.24b	23.07a	38.28b	6.81a	13.98b	26.72a	33.36b
T_5	1.68a	4.11ab	17.67a	23.10a	49.67a	3.08c	15.51a	24.17b	39.38a
F	***	***	***	***	***	***	***	***	***

Table 3. Yield attributes and yields of baby corn as influenced by organic and inorganic N during winter and summer (2016-2017)

Treatment	CPP		CY*		CY**		TSS (%)
	W	S	W	S	W	S	S
T_1	0.30c	1.11d	0.68d	5.07c	0.13d	0.75d	10.00 a
T_2	1.78b	1.49c	7.84c	7.46b	1.36c	1.15c	8.25 c
T_3	1.93b	1.72b	9.69b	8.19b	1.78b	1.38b	9.75 ab
T_4	2.20a	1.95a	11.19a	9.34a	2.06a	1.64a	8.75 bc
T_5	2.33a	1.99a	11.56a	9.54a	2.13a	1.72a	8.50 c
F	***	***	***	***	***	***	**

Note: CPP=Number of cob plant^{-1}; CY*=Cob yield (t ha^{-1}) with husk; CY**=Cob yield (t ha^{-1}) without husk, TSS=sugar content

3.7. Cob Yield with and without Husk

Cob yield without husk differed significantly in variation of nutrients applied in winter (Table 3). During winter, cob yield with husk increased sharply up to the T_4 (11.19 t ha^{-1}) and beyond the level at T_5 (11.56 t ha^{-1}) yield increment was insignificant while lowest from T_1 (0.68 t ha^{-1}). In summer, the highest cob yield was noted in T_5 (9.54 t ha^{-1}), whereas the lowest from T_1 (5.07 t ha^{-1}) with significantly different from other treatments.

Cob yield without husk showed noteworthy upward trend with increased nutrient level up to T_4 in both seasons (Table 3). The highest cob yield without husk in winter and summer was recorded in T_5 (2.13 t ha^{-1}, 1.72 t ha^{-1} respectively) which was statistically similar with T_4 whereas minimum in T_1.

3.8. Fodder Yield

Fodder yield of baby corn significantly differed for different nutrient levels (Figure 4) in both seasons. There was sharp increment up to T_4 in winter while T_3 in summer. In winter, the highest fodder yield was recorded from T_5 (15.55 t ha^{-1}) which was statistically similar with T_4 (15.33 t ha^{-1}) whereas lowest fodder yield in T_1 (3.11 t ha^{-1}). In summer, the highest fodder yield was obtained from T_5 (20.36 t ha^{-1}) which was statistically similar to that of T_3 and T_4 (19.88 and 20.00 t ha^{-1} respectively).

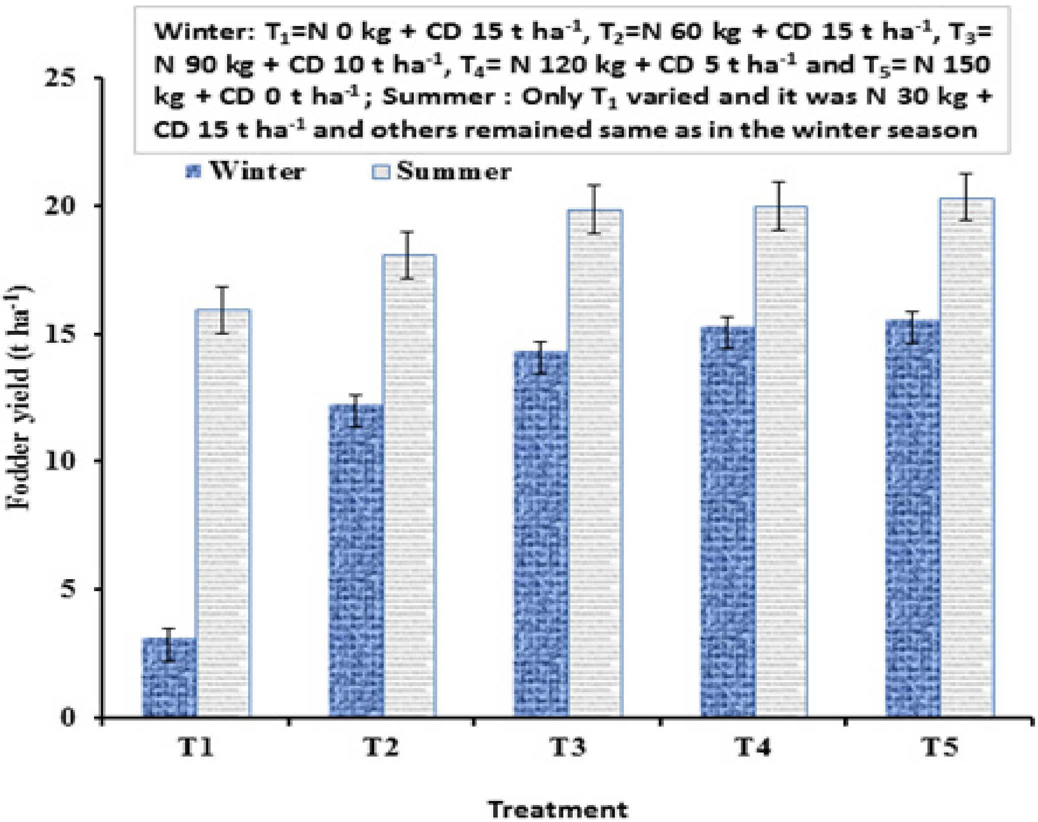

Figure 4. Fodder yield of corn in winter and summer seasons. Whiskers indicate individual standard deviation of the mean

3.9. Combined Analysis

The treatment T_1 showed variation in winter and summer only in terms of inorganic N while the remaining treatments were same. Therefore, the combined analysis was done excluding the T_1.

3.9.1. Season Effects

There was a significant difference between two growing seasons in terms of different growth and yield contributing characters (Table 4). Except plant height all the parameters were found higher in winter season. However, no significant disparity was found for cob length with husk and cob diameter without husk. It was found that about 1.67% higher cob yield with husk (10.07 t ha^{-1}) and 0.25% higher cob yield without husk (1.84 t ha^{-1}) was produced in the winter season compared to summer.

3.9.2. Effect of Nutrient Levels

From the combined analysis significant differences among the treatments in terms of parameters studied except days to silking and days to final harvest (Table 5). The treatment T_5 had the tallest plant of 142.78 cm while the shortest one of 131.68 cm was noted in T_2. Ear height did not increase significantly beyond the T_3 and the highest ear height was found in T_4 (70.18 cm). Similar trend like ear height was found for cob length with husk. The highest cob length without husk was found in T_5 (9.64 cm) that was similar to T_4 (9.11 cm) while the number of cob $plant^{-1}$ did not enhance away from the treatment T_4 (2.07) which was statistically similar with T_5 (2.16). Cob yield with husk was found significantly highest in the T_5 (10.55 t ha^{-1}) which was statistically similar with T_4 (10.27 t ha^{-1}) while lowest in the T_2 (7.65 t ha^{-1}). Similar trend like cob yield with husk was found in case of the parameter cob yield without husk.

3.9.3. Interaction of Growing Season and Nutrient Level

Data presented in (Table 6) indicated that all the parameters subjected to be combined analyses differed significantly except days to silking and days to final harvest irrespective of seasons. Ear height significantly higher at all the nutrient levels during summer compared to the winter. The cob length without husk was found highest in the T_5 during winter and the lowest was noted in the T_2 during summer. Most of the values regarding this parameter of the treatments were higher during winter. Cob yield with husk was recorded significantly highest in T_5 similar to that of T_4 during winter and lowest in T_2 during summer. The treatment T_3 of winter season produced statistically similar cob yield with husk to that of T_4 and T_5 of summer season. Similar trend was found for cob yield without husk.

Table 4. Growth, yield components and cob yield of baby corn in winter and summer (2016-2017)

Season	PHT	EHT	CLHSK	CLNHSK	CDNH	CPP	CY*	CY**	DS	DFH
Winter	119.12b	81.36a	14.92a	9.62a	8.09	2.06a	10.07a	1.84a	77.88a	97.13a
Summer	155.01a	52.22b	14.86a	8.41b	7.92	1.79b	8.63b	1.47b	60.88b	70.00b
CV (%)	4.06	2.99	7.35	3.71	7.37	10.05	5.96	3.20	1.58	0.80
F	***	***	ns	***	ns	***	***	***	***	***

Note: PHT=Plant height; EHT=Ear height; CLHSK=Cob length with husk; CLNHSK=Cob length without husk; CDNH=Cob diameter without husk; CPP=Number of cob plant-1; CY*=Cob yield with husk; CY**=Cob yield without husk; DS=Days to silking; DFH=Days to final harvest.

Table 5. Days to silking, days to final harvest, yield components and cob yield of baby corn as influenced by nutrient levels during winter and summer (2016-2017)

Nutrient level	PHT	EHT	CLHSK	CLNHSK	CDNH	CPP	CY*	CY**	DS	DFH
T2	131.68c	60.50b	13.98b	8.68b	7.16c	1.63b	7.65c	1.25c	69.50	84.00
T3	135.78b	68.49a	14.68ab	9.11ab	8.06b	1.82b	8.94b	1.58b	69.50	83.50
T4	138.05b	70.18a	15.51a	8.64b	8.18ab	2.07a	10.27a	1.85a	69.13	83.50
T5	142.78a	67.99a	15.39a	9.64a	8.63a	2.16a	10.55a	1.93a	69.50	83.25
F	***	***	**	*	***	**	***	***	ns	ns

Note: PHT=plant height; EHT=Ear height; CLHSK=Cob length with husk; CLNHSK=Cob length without husk; CDNH=Cob diameter without husk; CPP=Number of cob plant^{-1}; CY*=Cob yield with husk; CY**=Cob yield without husk; DS=Days to silking; DFH=Days to final harvest.

Table 6. Interaction of season and nutrient levels on the growth, yield components and yield of baby corn during winter and summer (2016-2017)

S × N level	PHT	EHT	CLHSK	CLNHSK	CDNH	CPP	CY*	CY**	DS	DFH
WT_2	112.30e	41.55c	13.5c	9.73ab	7.25d	1.78cd	7.84c	1.35c	77.75	96.75
WT_3	118.20d	5.58b	14.63bc	9.15bc	7.75bcd	1.93bc	9.69b	1.78b	77.75	97.00
WT_4	121.20cd	58.0b	16.18a	9.08bcd	8.38ab	2.20ab	11.19a	2.06a	77.50	97.25
WT_5	124.80c	53.75b	15.10ab	10.55a	9.00a	2.33a	11.56a	2.13a	78.50	97.50
ST_2	151.05b	79.45a	14.43bc	7.63e	7.07d	1.49d	7.46c	1.15d	61.00	69.75
ST_3	153.35b	81.40a	14.73bc	9.08bcd	8.38ab	1.72cd	8.19c	1.38c	61.25	70.00
ST_4	154.90b	82.22a	14.85b	8.20de	8.00bc	1.95bc	9.34b	1.64b	60.75	69.75
ST_5	160.75a	82.38a	15.68ab	8.73cd	8.25ab	1.99bc	9.54b	1.72b	60.50	70.50
F	*	**	*	*	*	*	*	*	ns	ns

Note:S = Summer, N = Nutrient, PHT=plant height; EHT=Ear height; CLHSK=Cob length with husk; CLNHSK=Cob length without husk; CDNH=Cob diameter without husk; CPP=Number of cob plant^{-1}; CY*=Cob yield with husk; CY**=Cob yield without husk; DS=Days to silking; DFH=Days to final harvest

4. Discussion

The result of this study revealed that the influence of the combination of different levels of inorganic and organic N sources significantly affect the growth and yield parameters of baby corn.

4.1. Response of Growth Parameters

In general, the treatment with higher N level in different ages showed higher plant height and number of leaves plant^{-1}. N fertilization increase plant height of corn (Onasanya et al. [25]; Asaduzzaman et al. [4]) as N-fertilizer enhances the growth of a crop plant through synthesizing more protein and chlorophyll (Zhao et al. [31]). Besides, N fertilizer provides energy for microbial activities in order to mineralize the organic nitrogen of organic manure and makes it available to crop (Rashid et al. [27]). The result also expressed that the number of leaves plant^{-1} increased with increasing plant age as well as nutrient level and reduced at harvest than the earlier dates of measurement. It may be due to the development of senescence of the older leaves (Thomas [29]). The increased LAI might be due to the increased availability of N under the higher levels of organic manure and inorganic fertilizers which ensured enough N to produce the number of leaves with the larger size (Amanullah et al. [2]). The leaf chlorophyll content showed increasing trend with increasing N supply. The chlorophyll content of leaves is positively correlated with availability of nitrogen in soil (Bojović & Marković [5]). Lower chlorophyll content of leaf at the harvesting stage might have been due to remobilization of N from leaves to reproductive organs as cob formation (Ghildiyal & Sirohi [10]). TDM increased progressively with the progressive increase in nutrient levels and the value attained peak at harvesting stage. The DM production was largely a function of photosynthetic surface, which was favorably influenced by N-fertilization. Previous few researches revealed positive correlation between N rates and dry matter yield in maize (Greef et al. [14]; Amanullah et al. [2]).

Besides, plants represented better performance in terms of plant height and number of leaves plant^{-1} in the summer than winter. In terms of season, temperature is one of the key factors affecting the rate of plant growth and development. During summer the air and soil temperature is higher than winter. Higher soil temperature increases the activity of soil microbes leading to availability of plant nutrients in soil (Lu & Xu [22]). Besides, in summer season plant receive direct sunlight leads to create more photosynthate and increase plant and ear height, chlorophyll content and LAI (Hart [16]; González-Sanpedro et al. [12]; Amanullah et al. [1]).

4.2. Yield Contributing Characters and Yield

The yield contributing characters, grain and fodder yield of baby corn also influenced by different levels of N fertilization and season. The performance of yield contributing characters and yield found higher in winter season. However, fodder yield found higher in summer. In terms of N fertilization level, although T_5 (N 150 kg + CD 0 t ha^{-1}) represented better output, no statistical differences with T_4 (N 120 kg + CD 5 t ha^{-1}). A rapid growth in higher level of nitrogen fertilization might have played a significant role in reducing competition for photosynthates and nutrients with neighbor. The available photosynthates might have influence the number of flowers and their fertilization which ultimately ensure higher yield attributes. The positive correlation of grain yield and yield attributes to higher nitrogen fertilization corroborate findings of several previous researches (Chillar & Kumar [6]; Gosavi & Bhagat [13]; Golada et al. [11]). The increased fodder yield with higher N fertilization was also recorded by some researchers (Gosavi & Bhagat [13]; Gulabrao [15]). As the result revealed that most of the growth parameters such as plant height, number of leaf number plant^{-1} was higher which finally produced higher fodder yield in summer.

There were some fluxions in the growth parameters especially in the early stages of their life cycle. The treatment with lower inorganic and organic N ratio displayed better performance. This is may be due to mineralization of N from cowdung was slow enough to supply adequate necessary N in early stage of plant. However, it did not exhibit its impact on yield severely. Therefore, our result revealed that 20% minimization of inorganic N is possible for baby corn production in integration of organic N (cowdung) source.

5. Conclusions

To investigate the response of baby corn the present study was conducted in combination of inorganic and organic N in order to reduce inorganic N supply without hindering maximum output in summer and winter seasons. Among the five nutrient levels the integration of 5 tons of CD along with 120 kg inorganic N ha^{-1} showed the best results with respect to yield and quality parameters. The nutrient level 120 kg N + 5 t CD ha^{-1} gave baby corn yield statistically similar to that of 150 kg N + 0 t CD ha^{-1} having the highest yield during both seasons. Nutrient level of 120 kg N + 5 t CD ha^{-1} on account of having significant effect on growth and yield parameters of baby corn, can be recommended for higher baby corn yield along with maintaining and sustaining soil health and reducing environment pollution for future generation as well as improving the economic stability of the farmers than sole use of either chemical fertilizers or organic manures.

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