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Influence of Growth Regulator and Organic Fertilizers in the Cultivation from Baby Corn (*Zea mays* L.)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The experiment consisted of ten organic and diverse combination treatments plant growth regulator nutrient management replicated in triplicate in a randomized block design. The primary purpose of the trial was to evaluate the effect organic manure, plant growth regulator, growth and yield of baby corn (*Zea mays* L.) state of Prayagraj. Three organic levels manure and plant growth regulator are FYM (10t/ha) and NAA (30 ppm), FYM (10t/ha) and GA_3 (15.47 ppm), FYM (10t/ha) and Seaweed sap (Ascophyllum nodosum) 5% can be concluded from the current study that profitable production of baby corn can be ensured FYM (10t/ha) and NAA (30 ppm) + FYM(10t/ha) and GA_3 (15.47 ppm) (T_6). Baby corn is free from pesticides and its nutritional value is comparable to popular vegetables

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like cabbage and cucumber. Its by-products such as tassel, young husk, silk and green stalks provide good cattle food. It is high in potassium, folic acid, and is a rich source of A, B, E and many other minerals. Corn will remain one of the important, field crops in the developing countries. Considerable scopes exists from promoting baby corn technology in Asia-pacific region. The baby corn industry provides opportunities for higher income, generates employment for the rural poor potential for export. Baby corn is expected to catch the attention of more and more consumers and farmers because of its superior taste and texture.

Keywords: Baby corn; organic manure; growth regulator; yield; quality.

1. INTRODUCTION

Maize (*Zea mays* L) is the most versatile and emergent crop with many adaptations to different agroclimatic conditions. It is famous as the queen of cereals because of its genetic yield potential among other cereal crops compared to rice, wheat, oats, sorghum and others in the Obeer region. In most developing countries, maize contributes a major part of food security. Maize is the third most important crop in India after rice and wheat. Not only for human consumption and animal feed, but also for maize, corn, etc. That is why it is used in industry for production. Then more attention was paid to the cultivation of corn by researchers and agronomists. in addition to maximizing profits for producers, take advantage of the opportunity to generate more foreign exchange earnings [1-6]. Baby corn, as the name suggests, is not genetic corn, but an immature ear of common corn. The ear of corn is hard and cannot be used as a vegetable. Baby corn ears are tender and eaten by humans as a vegetable [7-14] Baby corn was harvested during silking stage. After harvesting, the external sheath was removed and the ear was used for vegetable purpose viz., salad, soup, pickles etc [15-17]. Baby corn is a delicious, decorative, low caloric nutritious vegetable without cholesterol and is rich in fibre content [18-22]. It is free from pests and diseases and it contains protein upto 15 to 18 percent, sugar 0.016 to 0.020 percent phosphorus 0.6 to 0.9 percent, potassium 2to 3 percent, fibre 3 to 5 percent, calcium 0.3to0.5per cent and ascorbic acid 75to 80mg100/g. As green fodder, It is the best suited for mil chainmails since it has lactogenic properties [23-28]. For the past few decades in creaseduse of Synthetic fertilizers have reduced the use of organic fertilizers affecting soil fertility and productivity [29-38]. Organic farming methods have improved the sustainability and health of the soil without affecting the ecosystem [39-48].

2. MATERIALS AND METHODS

The current study was conducted at the crop farm, Department of Agronomy, Naini Institute of Agriculture, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, during Kharif season 2022, (U.P.). The test site is located on the left side of the Prayagraj-Rewa road, about four kilometers from Prayagraj and near the unaamuna river, at 25.57o N latitude, 87.19o E longitude and at an altitude of 98 m above sea level. Uttar Pradesh, where Prayagraj is located, is a subtropical region with hot summers and cool winters. The average temperature in that area ranges from 230C to 38°C, rarely dropping below 3°C or 4°C. The relative humidity ranges from 28.57% to 95%. The average annual rainfall here is 1050mm. Chemical analysis of the soil revealed a sandy loam texture with a pH of 7.20, low organic carbon (0.83 percent) and low potassium (208.8 kg/ha) and phosphorus (17.2 kg/ha). Electrically conductive soil, with a conductivity of 0.34 ds/m. Three replicates were used for each of the nine treatment combinations. Details of treatments and treatment combinations are shown in Tables 1 and 2 respectively. Organic fertilizers, plant growth regulators and plants are applied according to the combination of cultivation. Plant height at harvest (cm), dry weight at harvest, number of weeds/ plants, seedling length, tillering, yield of baby corn (t/ha) were measured and economic analysis of each treatment was completed to determine the best treatment combination to grow baby corn.

Table 1. Treatments details

Organic manure	
Vermicompost	4.46t/ha
FYM	10t/ha
Goat manure	15t/ha
Plant growth regulator	
Seaweed-sap (Ascophyllum nodosum)	5%
GA3	15.46 ppm
NAA	30 ppm

Table 2. Treatment combination

Icon Treatment	Combinations Treatment
T_1	Vermicompost (4.46t/ha) + Seaweed sap (Ascophyllum nodosum) 5%
T_2	Vermicompost(4.46t/ha) + GA_3 (15.47 ppm)
T_3	Vermicompost(4.46t/ha) + NAA (30 ppm)
T_4	FYM (10t/ha) + Seaweed sap (Ascophyllum nodosum) 5%
T_5	FYM (10t/ha) + GA_3 (15.47 ppm)
T_6	FYM (10t/ha) + NAA (30 ppm)
T_7	Goat manure (15t/ha) + Seaweed sap (Ascophyllum nodosum) 5%
T_8	Goat manure (15t/ha) + GA_3 (15.47 ppm)
T_9	Goat manure (15t/ha) + NAA (30 ppm)
T_{10}	Control (RDF) 120:60:40: NPK

3. RESULTS AND DISCUSSION

3.1 Development Parameters

3.1.1 Plant height (cm)

Table 3 shows organic fertilizers, plant growth regulator nutrients and crop spacing in plant height at harvest. The data show a significant effect on plant height during plant growth. Application of T6- FYM (10t/ha) + NAA (30 ppm) significantly influenced the plant height of baby corn at 45DAS. The maximum plant height (189.57cm) was recorded in T6 FYM (10t/ha) + NAA (30 ppm) which was statistically at par with T5, T4, T3 and minimum plant height (162.17) was recorded in the application of T10 Control (RDF) 120:60:40: NPK. Application of NAA enhances photosynthesis, activates several enzymes, and assimilates transport to the stem. The physiology and morphology of plants are greatly influenced by FYM [49-53] A similar finding was also made by (Iqbal *et al.,* 2016). With an increase in the organic manure application rate, they saw a considerable improvement in maize plant height and leaf area index. NAA provide the necessary nutrients for promoting healthy development and physiological processes in the plant system. Plant height, leaf area index and dry matter output are all much greater when the rate of organic fertilizer application is increased. [54,55] and both saw a similar outcome (Channal,2017). Higher plant height may be due to enough room, nutrients, and sunshine being available, which drove the plants to grow vertically. The current findings closely resemble those of Kour *et al*. (2017); Husain etc. (2017); Yahya and Husayn and others. (2017); Mahapatra et al. (2018); Law and others. (2018); Ojha et al. (2018) and Ganvit et al. (2017).

3.1.2 Dry weight of plant (g)

Application of T6 FYM (10t/ha) + NAA (30 ppm) significantly influenced the dry weight in Table 3 shows organic, plant growth regulator nutrient management and crop dry weight per plant at harvest. Data shows that there is baby corn in 45DAS. The highest dry weight (95.47gm) was recorded in T6: FYM (10t/ha) + NAA (30 ppm) statistically compared to T5, T4, T3 and the lowest dry weight (67.87gm) in the experiment Farmer –RDF (120: 60: 40 kg/ha N, P and K) was recorded. Treatment methods were not significantly different from each other.

Table 3. Effect of organic manure and growth regulator on maize growth parameters

Details of treatment	Development parameters	
	Plant height (cm)	Plant dry weight (g/plant)
Vermicompost (4.46t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	171.71	88.00
Vermicompost(4.46t/ha) + GA_3 (15.47 ppm)	176.23	89.47
Vermicompost(4.46t/ha) + NAA (30 ppm)	179.60	90.13
FYM (10t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	180.53	94.47
FYM (10t/ha) + GA_3 (15.47 ppm)	185.97	95.87
FYM (10t/ha) + NAA (30 ppm)	189.57	95.47
Goat manure (15t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	163.40	72.90
Goat manure (15t/ha) + GA_3 (15.47 ppm)	168.60	78.80
Goat manure (15t/ha) + NAA (30 ppm)	170.23	82.77
Control (RDF) 120:60:40: NPK	162.17	67.87
F-test	S	S
SEM(±)	4.36	3.74
CD(P=0.05)	9.94	6.05

When organic manure was applied, the physio-chemical characteristics of the soil may have improved, giving the soila favourable root growth and soil enzyme structure (which continues to break down organic matter in the soil near the rhizosphere to remove harmful substances and be absorbed by plant roots, thereby improving quality [56-62]. Additionally, an increase in plant metabolism that appears to have encouraged meristematic activities that led to apical development might be blamed for the effect of organic fertilization by vermicompost on LAI [63-68]. This outcome is consistent with what atarzadeh and colleagues discovered (2013). The ultimate effect of photosynthesis activities is dry weight. The amount of sunlight that a plant gets determines how efficiently the photosynthesis process works and how many photosynthesis are produced [69-77]. Larger plant organs will result from increased photosynthetic activity, which will also increase the dry weight of plants. According to Shah and Ahmad (2006), Meena *et al*. (2012), Ghimire *et al.* (2013), Kour *et al*. (2017), Kumar *et al.* (2014), Shahid *et al.* (2015), Wailare and Kesarwani, and others, proper nutrition and spacing promote higher vegetative development and more sunshine to plants (2017).

3.2 Product Parameters

3.2.1 Number of bulbs per plant

Data on the number of plants that grew under the influence of treatment are reported in the table. Although processed, the number of plants growing in the harvest increased and reached a maximum in the harvest. At 60 DAS, the number of baby corn bulbs per plant varied treatment combination. At 60 DAS, Numbers of cobs/plant was found significantly and highest Number cobs/plant (3.64) was recorded in T6: FYM (10t/ha) + NAA (30 ppm) and lowest Number of cobs/plant (1.45) was recorded in T10 : Farmers practice –RDF (120:60:40 kg/ha N, P and K). By supplying the crop with the nutrients it needs from the beginning Plant height, plant head, density, length, weight with and without organic fertilizer, growth regulator Singh et al. (2015). improve overall development accordingly. The findings were similar to the increase in photosynthesis, metabolites and nutrients for the development of reproductive structures, an increase in the number of plants / plants, shoot length, shoot weight and shoot yield with this nutrient management treatment [78-82].

3.2.2 Weight of cob (without husk) (g)

The data provided on length of cobs/plant (cm) the shells affected by the treatment are shown in Table 4. In general, the plant length (cm) varied with the growth stage of the crop regardless of the treatment and reached the maximum at harvest. 60 Maize plants with and without maize (plant) length recorded at 60 DAS differed significantly with treatment combinations. At 60 DAS, bulb/plant length was found to be significant and maximum length (18.82) was recorded in T6: FYM (10t/ha) + NAA (30 ppm) and minimum length. / plants without pods (11.2) –RDF (120:60:40 kg/ha N, P and K) was recorded in farmers' experiments.

3.2.3 Bottle weight (with shell) (g)

Table 4 shows organic fertilizers and growth regulators by container weight. It shows organic, nutrient management that stimulates the growth and weight of the onion crop. The data revealed that different treatments were recorded with maximum cob weight (g) at harvest time. The data showed a significant interaction between treatments. At 60 DAS, plant/plant length was found to be significant and the maximum length (25.13) was recorded in T6: FYM (10t/ha).) + NAA (30 ppm) and the lowest length (21.12) was recorded in farmer practices –RDF (120: 60: 40 kg/ha N, P and K). By providing plants with the nutrients they need from the beginning and multiplying the supply of N, P and K more synchronously in the integrated nutrient treatment of organic fertilizers and growth regulators Plant height, bulb growth, density, length and density weight with. the help of organic fertilizer growth regulator, Singh et al. significantly improved overall development, according to (2015), findings show that the increase in photo-synthesis, metabolites and nutrients for the development of reproductive structures lead to an increase in the number of bulbs / plants, length of bulbs, weight of bulbs and yield. this nutritional management treatment, Vail and Kesarwani (2017) and Kour et al. (2017).

3.3 Cob Yield (t/ha) and Involuntarily

Bark yield weight data (kg/ha) affected by the treatment is shown in Table 4. In general, the growth of plant meat (kg/ha) is different from the growth of plant meat, which reaches the highest level in the harvest regardless of the treatment. Seed yield weight (kg/ha) was recorded at 60 DAS and differed significantly with treatment combinations. The yield weight of onion in 60 DAS was found to be significant and the maximum weight (q/ha) was recorded for both shell (3.68 q/ha) and shell (3.15 kg/ha). In T6: Farmers –RDF (120:60:40 kg/ha N, P and K). Organic fertilizers and growth regulation, early stage nutrient supply and more synchronous increased supply of N, P, and K in the treatment receiving integrated organic nutrients resulted in significant improvement in overall crop growth. Along with plant regulator and plant height, plant head, density, length, weight and container density due to increased photosynthetic efficiency. Therefore, the high availability of photosynthetic, metabolites, and nutrients for the development of reproductive structures seems to have led to increased bulb/plant, length, weight, and yield with integrated nutrient management treatment consistent with branching and yield [83,84].

Table 4. Effect of organic manure, regulator of growth and production of baby corn

Treatment details	Yield parameters				
	No. of cobs/ plant	Cob Length (cm)	Cob Yield with husk (t/ha)	Cob yield without husk (t/ha)	Fodder Yield (t/ha)
Vermicompost(4.46t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	2.00	18.25	3.22	2.69	5.35
Vermicompost(4.46t/ha) + GA (15.47ppm)	2.43	18.69	3.33	2.86	5.42
Vermicompost(4.46t/ha) + NAA (30ppm)	2.50	18.95	3.35	2.85	5.55
FYM (10t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	3.30	19.00	3.50	3.04	5.65
FYM (10t/ha) + GA_3 (15.47ppm)	3.53	19.13	3.61	3.10	5.76
FYM (10t/ha) + NAA (30ppm)	3.64	19.26	3.68	3.15	5.88
Goat manure (15t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	1.50	15.48	2.84	2.14	5.05
oat manure (15t/ha) + GA_3 (15.47ppm)	1.65	16.74	2.93	2.25	5.15
Goat manure (15t/ha) + NAA (30ppm	1.80	17.32	3.14	2.32	5.22
Control (RDF) 120:60:40: NPK	1.45	14.72	2.72	2.10	5.01
F-test	S	NS	S	S	S
Sem(±)	0.313	1.20	0.11	0.07	0.10
CD(P=0.05)	0.93	-	0.30	0.25	0.29

4. CONCLUSION

Based on the results obtained in this study, it is concluded that profitable production of baby corn can be ensured by FYM (10t/ha) + NAA (30 ppm) (T6). This practice can be transferred to farmers for higher income in these agro-climatic zones. It also recorded the highest gross profit, net profit and profit margin.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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