Original Research Article

Influence of growth regulator and organic manure on the baby corn (*Zea mays L.)*

ABSTRACT

The experiment comprised of ten treatments of different combinations of organic and plant growth regulator nutrient management replicated thrice in a Randomized Block Design. The main objective of the experiment was to evaluate the Influence of organic manure and plant growth regulator on the growth and yield of baby corn *(Zea mays* L.) Prayagraj condition. The three levels of of organic manure and plant growth regulator are FYM (10t/ha) and NAA (30ppm), FYM(10t/ha) and GA_3(15.47ppm), FYM (10t/ha) and Seaweed sap (Ascophyllum nodosum) 5% from the present investigation it may be concluded that the profitable production of baby corn can be secured by FYM (10t/ha) and NAA (30ppm) + FYM(10t/ha) and GA_3(15.47ppm) (T_6).

Keywords: Baby corn, organic manure, growth regulator, yield and quality

Introduction

Maize (*Zea mays* L) is the most versatile and emerging crop with wide range of adaptability under different agro-climatic conditions.Across the globe it is famous as queen of cereals since it possess high ergenetic yield potential among other cereal crops like rice,wheat,oat,millets etc. In most of the developing countries maize contributes major share for food security.In India,maize is the third most important crop followed by rice and wheat.It ssignificanc eliesin the way that it is not only utilized for human consumption and animal feed but also it is utilized by the industries for the production of cornstarch,cornoil etc.Countries like Thailand and Taiwan achieved successful results duetothe cultivation of babycorn.Later more attention is given on the cultivation of maize by the researchers and agriculturist stotapits potentialities for earning more foreign revenue in addition to get maximum returns to the producers.Baby corn is not a genetically dwarf maize as the name suggests,it Is the immature ear of normal maize.Mature dmaize ear are too hard so,can'tbeusedas vegetables.Where as baby corn ear are soft and consumed as vegetable by human being (Jinjala *et al.*,2016) The young 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(Muthukumar *et al.*,2005).Baby corn is a delicious, decorative,low caloric nutritious vegetable without cholesterol and is rich in fibre content.It is Maize(*Zea mays* L.) is the most versatile and emerging crop with wide range of adaptability under different agro-climatic conditions.Across the globe it is famous as queen of cereals since it possess higher genetic yield potential among other cereal crops like rice,wheat,oat,millets etc. In most of the developing countries maize contributes major share for food security.In India,maize

is the third most important crop followed by rice and wheat.Its significance lies in the wayt hatitis not only utilized for human consumption and animal feed,but also it is utilized by the industries for the production of corn starch,cornoil etc.Countries like Thailand and Taiwan achieved successful results duet of the cultivation of babycorn.Late rmore attention is given on the cultivation of maize by the researchers and agriculturist stotapits potentialities for earning more foreign revenue in addition to get maximum returns to the producers.Babycorn is not a genetically dwarf maize as the name suggests,it is the immature ear of normal maize.Matured maize ear are too hard so,can'tbeusedas vegetables.Where as baby corn ear are soft and consumed as vegetable by human being(Jinjala *et al.*,2016).The young babycorn 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(Muthukumar *et al.*,2005).

Baby corn is a delicious, decorative,low caloric nutritious vegetable without cholesterol and is rich in fibre content. It is free from pests and diseases and it contains protein upto 15 to18 percent,sugar0.016to0.020 percent phosphorus 0.6to0.9 percent,potassium 2to 3percent,fibre 3to 5percent,calcium 0.3to0.5per cent and ascorbic acid 75to 80mg100/g.As green fodder,it is the best suited formil chainmails since it has lactogenic properties(Reenarani *et al.,* 2017).For the past few decades in creaseduse of synthetic fertilizer reduced the usage of organi cmanures which affected the soil fertility and productivity.Organic way of crop production enhanced the sustainability and soil health without affecting the ecosystem.

Materials and Methods

The current study was carried out in the Crop Research Farm, Department of Agronomy, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, during the Kharif season 2022, (U.P.). The experimental field is situated on the left side of the Prayagraj-Rewa Road, about four kilometers from Prayagraj city and close to the Yamuna River, at 25.57^{o} N latitude, 87.19^{o} E longitude and at an altitude of 98m above mean sea level. The subtropical region of Uttar Pradesh, where Prayagraj is located, has scorching summers and nice winters. The regions typical temperature ranges from 23^{0}C to 38^{o}C, seldom falling below 3^{o} C or 4^{o}C. The relative humidity levels range from 28.57% to 95%. In this location, the average annual rainfall is 1050mm. The soil chemistry analysis revealed a sandy loam texture with a p^{H} of 7.20, low amounts of organic carbon (0.83 persent) and potassium (208.8kg/ha) and a low quantity of accessible phosphorous (17.2kg/ha). The soil was electrically conductive and had a conductivity of 0.34 ds/m. For each of the nine treatment combinations, three replications were emoloyed. The therapy details and trteatment combinations are shown in Table 1 and 2, respectively. Organic manure, and plant growth regulator management and crop maintained according to the treatment combinations. Plant height (cm) at harvest, dry weight at harvest, number ofcobs/plant, cob length, cob girth, baby corn yield (t/ha) successfully measured, and an economic analysis of each treatment was completed to determine the best treatment combination for baby corn cultivation.

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	15.46ppm
NAA	30ppm

Table 2. Treatment combination

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

Results and Discussion

Growth parameters

Plant height (cm)

Table 3 shows organic manure,plant growth regulator nutrient management and crop spacing on plant height at harvest. The data indicated that significant impact on plant height during the crop growth period. Application of T6- FYM (10t/ha) + NAA (30ppm) significantly influenced the plant height of baby corn at 45DAS. The maximum plant height (189.57cm) was recored in T6 FYM (10t/ha) + NAA (30ppm) which was statistically at par with T5,T4,T3 and minimum plant height (162.17) was recorded in application of T10 Control (RDF) 120:60:40: NPK. Application of NAA enhances photosynthesis, activates several enzymes, and assimilate transport to the stem.The physiological and morphology of plants are greatly influenced by FYM. (**Meena *et al.*, 2013) .** A similar finding was also made by (Iqbal *et al.,* 2016). With an increase in organic manure 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. (lgua *et al.,* 2009) and both

saw a similar outcome (Channal,2017). Higher plant height may be caused by 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 *et al*. (2017); Almaz *et al*. (2017); Yahia and Hussein *et al.* (2017); Mahapatra *et al.* (2018); Qodliyati *et al*. (2018); Ojha *et al*. (2018), and Ganvit *et al.* (2017).

Dry weight of plant (g)

Application of T6 FYM (10t/ha) + NAA (30ppm) significantly influenced the dry weight in Table 3 shows organic, plant growth regulator nutrient management and crop dry weight per plant at harvest. The data indicated that, baby corn at 45DAS. The maximum dry weight (95.47gm) was recorded in T6 : FYM (10t/ha) + NAA (30ppm) were statistically at par with T5,T4,T3 and lowest dry weight(67.87gm) was recorded in Farmers practice –RDF (120:60:40 kg/ha N, P and K). The therapies did not differ significantly from one another.

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

Treatment details	Growth 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 (15.47ppm)	176.23	89.47
Vermicompost(4.46t/ha) + NAA (30ppm)	179.60	90.13
FYM (10t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	180.53	94.47
FYM (10t/ha) + GA_3 (15.47ppm)	185.97	95.87
FYM (10t/ha) + NAA (30ppm)	189.57	95.47
Goat manure (15t/ha) + Seaweed sap (Ascophyllum nodosum) 5%	163.40	72.90
Goat manure (15t/ha) + GA_3 (15.47ppm)	168.60	78.80
Goat manure (15t/ha) + NAA (30ppm	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 were applied, the physio-chemical characteristics of the soil may have improved, giving the soila favorable structure for root growth and soil enzymes (which continue to decompose organic matter in the soil to release nutrients and make them available near the rhizosphere for absorption by plant roots, thus improving quality (Chaoui *et al.* 2003). Additionall, 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. 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.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).

Yield parameters

Number of cobs per plant

The information on the number of cobs per plant impacted by treatments is reported in a table for in general. The number of cobs per plant rose with crop stage progression regardless of treatment and peaked at harvest. At 60 DAS, the number of baby corn cobs per plant varied depending on the 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 (30ppm) 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 and increasing the supply of N, P, and K in a more synchronized way at the treatment receiving an integrated supply of nutrients from organic manure and growth regulator, which was expressed in terms of plant height, cobs per plant, cob girth, cob length, and cob weight with and without husk by virtue of organic manure, growth regulator imorove the overall growth of the in accordance with Singh *et al*. (2015). Findings, increased availability of photosynthetic, metabolites, and nutrients to develop reproductive structures appears to have led to an increase in the number of cobs/plant, length of cobs, weight of cobs, and yield of cobs with these nutrient management treatments similar result found Wailare and Kesarwani (2017) and Kour *et al.* (2017).

Weight of cob(without husk) (g)

The data providedon length ofcobs/plant (cm) without husk affected by treatments are presented in Table 4. In general the length of cobs/plant (cm) without husk differed with the advancement in crop stages, irrespective of the treatments and reached maximum at the time of harvest. The length of cobs/plant (cm) with and without husk of Baby corn was recorded in 60 DAS differed significantly with treatment combinations. At 60 DAS, length of cobs/plant was found significantly and highest length of cobs/plant (cm) without husk (18.82) was recorded in T6 : FYM (10t/ha) + NAA (30ppm) and lowest length of cobs/plant without husk (11.2) was recorded in Farmers practice –RDF (120:60:40 kg/ha N, P and K).

Weight of cob(with husk) (g)

Table 4 shows organic manure and growth regulator on weight of cob (with husk). Shows organic, growth regulator nutrient management and crop weight of cob (with husk). The data revealed that various treatments of highest of the highest, Cob weight (g) with husk recorded at harvest stage. Thedat shown that there was a significant effect among treatments .At 60 DAS, length of cobs/plant was found significantly and highest length of cobs/plant (cm) with husk (25.13) was recorded in T6 : FYM (10t/ha) + NAA (30ppm) and lowest length of cobs/plant with husk(21.12) was recorded in Farmers practice –RDF (120:60:40 kg/ha N, P and K). By supplying the crop with the nutrients it needs from the beginning and increasing the supply of N, P, and K in a more synchronized way at the treatment receiving an integrated supply of nutrients from organic manure and growth regulator, which wasexpressed in terms of plant height, cobsper

plant, cob girth, cob length, and cob weight with and without husk by virtue of organic manure growth regulator did significantly improve the overall growth of the in accordance with Singh *et al.* (2015), findings, increased availability of photo-synthases, metabolites, and nutrients to develop reproductive structures appears to have led to an increase in the number of cobs/plant, length of cobs, weight of cobs, anf yield of cobs with these nutrient management treatments, similar result found Wailare and Kesarwani (2017) and Kour *et al.* (2017).

Table 4. Effect of organic manure, growth regulator on growth and yield 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
Goat 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

Cob yield (t/ha) with and without husk

The data obtained on weight of cobs yield (kg/ha) with and without husk affected by treatments are presented in Table 4. In general the weight of cobs yield (kg/ha) with and without husk differed with the advancement in crop stage, irrespective of the treatment and reached maximum at the time of harvest. The weight of cobs yield (kg/ha) with and without husk of baby corn was recorded at 60 DAS differed significantly with treatment combinations. At 60 DAS, weight of

cobs yield was found significantly and highest weight of cobs yield was found significantly and highest weight of cobs yield (q/ha) with husk (3.68 q/ha) and without husk (3.15 kg/ha) was recrded in T6 : FYM (10t/ha) + NAA (30ppm) and lowest weight of cobs/plant (cm) with husk (2.72) and without husk (2.10) was recorded in Farmers practice –RDF (120:60:40 kg/ha N, P and K). Organic manure and growth regulator did bring about significant improvement in overall growth of the crop by providing needed nutriebts fron initial stage and increase in supply of N, P, and K in more synchronize way at the treatment receiving integrated supply of nutrient from organic manure along with growth regulator and which expressed in terms of plant height, cobs per plant, cob girth, cob length, cob weight with and without husk by virtue of increased photosynthetic efficiency.Thus greater availability of photosynthetic, metabolites and nutrients to develop reproductive structures seems to have resulted in increased number of cobs/plant, length of cobs, weight of cobs and yield of cobs with these integrated nutrient management treatments which coincides with results Shah and Ahmad (2006), Ghimire *et al*. (2013); Lone *et al*. (2013); Kumar *et al*. (2014); Ukonze *et al.* (2016) and Kour *et al*. (2017).

Conclusion

On the basis of results obtained in present investigation, it is concluded that the profitable production of baby corn can be secured by FYM (10t/ha) + NAA (30ppm) (T_6). These practices may be passed on to the farmers for obtaining higher returns in this agro-climatic zone. It is also recorded the maximum gross return, net return and benefits cost ratio.

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