Effect of optimized number of suckers and use of PGR on growth, yield and quality of banana (*Musa paradisiaca* L.) cv. Udhayam

Abstract

The experiment was conducted in Randomized Block Design with 10 treatments with three replications of different levels of IAA and desuckering. IAA levels ranged between 80 and 100 ppm, while desuckering levels ranged between 1 to 3 suckers per plant. Treatment T_4, which consisted of the Mother plant + 1 sucker + IAA (80 ppm) had the best effect on height of mother plant (3.49 m), height of suckers (215.68 cm), number of days taken from stalk opening to harvest (120.44 days), number of leaves per plant (11.57), leaf area (32.39 m^2), leaf area index (7.34), firmness of finger at ripening stage (4.33 kg/cm^2), moisture content of finger at ripening stage (78.84 %), total soluble solid (TSS) (16.26° Brix), total chlorophyll content (SPAD-502 value, 60.05), number of hands per stalk (10.88), number of fingers per hand (14.14) , finger length (15.09 cm), finger girth (4.31 cm), stalk weight (22.62 kg), yield (51.27 t/ha). From the economics point of view, Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) had highest B:C ratio 3.89.

Keywords: Banana, IAA, Desuckering, Growth, Yield, Quality, Economics.

1. INTRODUCTION

The banana, *Musa paradisiaca* L., is a fruit that grows in humid tropical and subtropical regions and is a member of the family Musaceae and the order Zingiberales. Bananas evolved in South-East Asia, in the jungles of Malaysia, Indonesia, and the Philippines **(Stover and Simmonds, 1987)**. Potassium, phosphorus, calcium, and magnesium are all present in large amounts. The fruit digests quickly and has little fat or cholesterol. It is recommended for persons with high blood pressure, arthritis, ulcers, gastroenteritis, and renal conditions since it lowers the risk of heart disease when used consistently **(Kumar *et al.*, 2012).**

With a yield of 34.6 Mt/ha and a production of 29.13 million tonnes from 0.841 million hectares, India is the top banana producer in the world**.** India is responsible for 25.58 percent of global production while having only 15.5% of the world's land area. They cover 5.6 million acres and are grown in over 130 countries, producing 114 million tonnes of bananas and plantains **(Rathod *et al.*, 2021).**

Fast-growing plants like bananas need lots of food and water to maintain a year-round cycle and ensure harvests that are profitable. Banana plants start to produce suckers a few weeks after planting, which compete with the parent plant for nutrients and water and reduce yield **(Oluwafemi, 2013).** Therefore, controlling suckers in bananas is a crucial cultural practise that involves removing undesired suckers that emerge from the mother plant's base, leaving just a suitable sword sucker to produce the ratoon crop. Eliminating extra suckers that compete with the mother plant is the goal for better growth and yield. **(Daniells, 1984).**

Plant growth regulators are essential for regulating the growth and development of plants **(Taiz and Zeiger, 2010)**. Fruits of inferior quality are frequently produced. Therefore, increasing fruit crop productivity and quality through foliar application or bunch feeding of plant growth regulators would be profitable **(Nandan, 2010).** Organic chemical molecules known as plant hormones or regulators work to influence or control physiological processes in plants when used at lower quantities **(Kumari *et al.*, 2018).** These substances function in very specific ways. Even if plants produce the majority of them, it's still vital to artificially deliver some of them in the required quantities and concentrations to boost growth, quality, and output **(Nandan, 2010).**

The source-sink relationship of bananas can be changed by using the right plant growth regulators, which could lead to an increase in production. In addition, any improvement in crop physiological efficiency achieved through the application of PGR may have a significant

impact on productivity. After harvest, banana retains some nutrients and assimilates in the pseudo stem and leaves, which reduces the crop's ability to transfer assimilates to sink **(Simmonds, 1966).** The use of a suitable growth regulator may be helpful to treat this condition. Most tissues showed responsiveness to auxin amount among the several plant growth regulators. IAA, or indole acetic acid, is the most significant auxin present in plants **(Jutta, 2000).** It promotes tissue differentiation, apical dominance, and responses to pathogens, light, and gravity. It also promotes cell division and elongation **(Aloni *et al.*, 2006; Tian *et al.*, 2014).**

In light of the foregoing, this study was conducting to find out the optimized number of suckers & effect of PGR on growth, yield and quality of Banana and to estimate the economics of various treatments.

2. MATERIALS AND METHODS

2.1.EXPERIMENTAL SITE

The present study was carried out at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, during 2021-2022.

The experimental field is located close to the Yamuna River, about 8 kilometres from Prayagraj city.

2.2. LAYOUT AND TREATMENT

Experiment was laid out in Randomized Block Design, with Ten Treatments replicated thrice. The treatment details and treatment combinations are displayed in Table 1. In the current study, uniform, healthy-bearing banana plants of the Udhayam variety were used, produced using comparable cultural practices. Desuckering was periodically performed, leaving one, two, or three suckers per plant depending on the treatment's needs, and it involved cutting off the suckers without damaging the parents. In order to prepare an 80 ppm IAA solution, 80 mg of IAA was weighed, dissolved in alcohol, and then the final volume of 1 litre was made up with distilled water. Similarly other concentration were also prepared. A knapsack sprayer was used for the spraying of different treatments. The second spray was repeated one month after the first spray and last spray was done just before flowering of banana.

Table 1. Treatment Details & Treatment combinations

S.No.	Treatment symbols	Treatment combinations
1.	T_0	Control (water spray)
2.	T_1	Mother Plant + 1 Sucker
3.	T_2	Mother Plant + 2 Suckers
4.	T_3	Mother Plant + 3 Suckers
5.	T_4	Mother Plant + 1 Sucker + IAA (80 ppm)
6.	T_5	Mother Plant + 1 Sucker + IAA (100 ppm)
7.	T_6	Mother Plant + 2 Suckers + IAA (80 ppm)
8.	T_7	Mother Plant + 2 Suckers + IAA (100 ppm)
9.	T_8	Mother Plant + 3 Suckers + IAA (80 ppm)
10.	T_9	Mother Plant + 3 Suckers + IAA (100 ppm)

2.3.DATA COLLECTION AND ANALYSIS

Growth attributes like height of mother plant (m), height of suckers (cm), number of days taken from stalk opening to harvest, number of leaves per plant, leaf area (m^2), leaf area index, photosynthesis attribute like chlorophyll content (SPAD-502), yield attributes like number of hands per stalk, number of fingers per hand, finger length (cm), finger girth (cm), stalk weight (kg), yield (t/ha) and quality attributes like firmness of finger at ripening stage (kg/cm^2), moisture content at ripening stage (%), Total Soluble Solid (TSS) (° Brix) were recorded and analysed.

3. RESULTS AND DISCUSSION

3.1.GROWTH ATTRIBUTES

The height of mother plants (m) are shown in Table 2, Treatment T_4, which consisted of Mother Plant + 1 sucker + IAA (80 ppm), had significantly highest height of mother plant, which was at 3.49 m, while Treatment T_0, which consisted of control, recorded significantly lower height of mother plant, which was at 3. m. The reason being highest height of mother plant in the treatment T_4 was due to less competition of nutrients and water among banana plants **(Stover and Simmonds, 1987; Robinson and Nel, 1990)**. The action of IAA on cell proliferation and elongation of cells may have contributed to the taller plants **(Muthulakshmi and Pandyarajan, 2013).**

The observations in terms of height of sucker (cm) are shown in Table 2, where Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was highest sucker height of 152.11 cm, 171.26 cm, 193.47 cm, and 215.68 cm whereas treatment T_0 i.e., Control recorded significantly lower height of sucker per plant 79.91 cm, 95.75 cm, 111.77 cm & 127.79 cm at

30, 60, 90 & 120 days respectively. The increase in sucker height was probably caused by less competition between the surplus suckers and the mother plant for nutrients and water **(Stover and Simmonds, 1987; Robinson and Nel, 1990)**. Furthermore, (**Sadak *et al.*, 2013 and Ogwu *et al.*, 2015)** hypothesise that IAA's impact on cell growth and elongation may have contributed to the increased sucker height.

Table 3, displays the findings of the observations made about the number of days between stalk opening and harvest. In comparison to Treatment T_0, which included control, Treatment T_4 was effective in terms of lower number of days taken from stalk opening to harvest, which was 120.44 days. Treatment T_0 recorded significantly highest number of days taken from stalk opening to harvest, which was 134.66 days. The shorter time from stalk opening to harvest and enhanced desuckering intensity may be attributable to the increased light exposure of leaf surfaces and decrease in suckers, which increased the metabolism of the plants and accelerated physiological maturation and blooming. According to (**Chattopadhyay *et al.*, 1980).**

Table 3, displays the findings of the observations made on the number of leaves per plant. The most successful treatment, T_4 recorded the largest number of leaves per plant 11.57, whereas Treatment T_0, which contained control, recorded lowest number of leaves per plant 8. A banana crop should yield a sufficient number of leaves to capture solar energy and create enough photosynthates to produce biomass. The number of leaves per plant increased as less suckers were permitted to grow alongside mother plants across all observational periods. (**Robinson and Nel 1989),** who noted that plants with a single sucker had more functioning leaves since there was less competition among them for soil moisture, nutrients, and light intensity **(Gogoi *et al.*, 2015),** Similar results were reported by (**Sentelhas *et al.*, 1987),** who claimed that IAA spraying enhanced the number of leaves per plant.

Table 3, displays the findings of the observations about leaf area (m^2). In comparison to Treatment T_0, Treatment T_4 was highest leaf area which was 32.39 m^2, whereas Treatment T_0 recorded significantly lower leaf area 11.21 m^2. These findings can be attributed to IAA's role in promoting plant growth and development by promoting a variety of processes, such as cell division and tissue growth, phototropism and gravitropism, apical dominance, lateral root initiation, differentiation of vascular tissues, embryogenesis, senescence, and ripening **(Naeem *et al.*, 2004).**

Table 3, displays the findings of the observations made on leaf area index. In comparison to Treatment T_0, which included control, Treatment T_4 was greatest leaf area index, which was 7.34. Treatment T_0 recorded significantly lower leaf area index, which was 2.54. Leaf area index is frequently used as a measure of plant growth. Increase in the leaf area index is therefore confirmation that the phytohormones utilized in the trials are successful. These findings are supported by these results **(Muthulakshmi and Pandyarajan, 2013).**

3.2. PHOTOSYNTHESIS AND YIELD ATTRIBUTES

The results for total chlorophyll content (SPAD-502) are shown in Table 4, Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was the best among all other treatment this treatment recorded significantly highest total chlorophyll content (SPAD-502 value, 60.05), while treatment T_0, Control, recorded significantly lowest total chlorophyll content (SPAD-502 value, 48.14). According to **Damian *et al.*, (2002),** IAA application caused the gibberellin biosynthetic gene to express itself more actively and generated new wall polysaccharides to enable longer-lasting development. Certain enzymes involved in the manufacture of cell wall polysaccharides and cell wall loosening are stimulated by auxin. Auxin starts a signaling cascade that produces secondary messengers that directly activate pre-existing H+-ATPases, boosts the expression of numerous genes involved in growth and development, and consequently increases the amount of chlorophyll.

The observations regarding the number of hands per stalk are shown in Table 4, where Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was found to be the significantly effective in terms of highest number of hands per stalk of 10.88, as compared to Treatment T_0, which recorded significantly lowest number of hands per stalk of 6.64. In treatments with more number of plants, the number of hands per stalk may have increased because of less competition for photosynthates and nutrients between the mother plant and more followers (**Nambiar *et al.*, 1979)**.

Treatment T_4 Mother Plant + 1 Sucker + IAA (80 ppm) recorded considerably highest number of fingers per hand of 14.14, whereas Treatment T_0, recorded significantly lowest number of fingers per hand of 9.10. The increased in the number of fingers per hand was probably brought about by less competition for nutrients and water between the mother plant and the extra suckers (**Robinson and Nel 1990)**.

Table 4, displays the observations for finger length (cm), with treatment T_4 Mother Plant + 1 Sucker + IAA (80 ppm) had significantly highest finger length of 15.09 cm, while treatment T_0, recorded significantly lowest finger length 11.1 cm. According to the results of the experiment, desuckering and effective management methods, which are essential for producing more bananas, that caused to increase in finger length of banana. In general, plants that had extra suckers removed outperformed those that had outgrowths left on the mother plants, which is the standard farming method (**Mahdi *et al.*, 2014)**.

Table 4, displays the observations for finger girth (cm), with treatment T_4 Mother Plant + 1 Sucker + IAA (80 ppm) was highest finger girth of 4.31 cm, while treatment T_0, recorded significantly lowest finger girth 2.7 cm. This is explained by the fact that removed the sucker with the mother plant drastically increased finger girth and finger length, which are important factors in stalk weight/size (**Robinson and Nel 1990)**.

The results are presented in Table 4, in terms of Stalk weight (Kg), where Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was found to be the significantly effective in terms of highest stalk weight of 22.62 kg, whereas Treatment T_0, recorded significantly lowest stalk weight 9.6 kg. The experiment's findings suggest that the increase in bunch production may be due to desuckering and suitable management techniques, which are crucial for increased stalk yield and yields of banana. Plants that had extra suckers removed generally outperformed those whose outgrowths were kept on the mother plants, which is the conventional farming practice. Similar results were found by (**Mahdi *et al.*, 2004).**

The observations regarding Yield (t/ha) are shown in Table 4, where Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was found to be the significantly effective in terms of highest yield 51.27 t/ha, while Treatment T_0, recorded significantly lowest yield 21.76 t/ha. The results of the experiment indicate that desuckering and appropriate management practices, which are essential for increasing stalk yield and banana yields, according to standard agricultural methods, plants whose outgrowths were left on the mother plants outperformed those whose additional suckers were removed (**Mahdi *et al.*, 2004)**.

3.3. QUALITY ATTRIBUTES

The results for firmness of finger at ripening stage (kg/cm^2) are shown in Table 5, where Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) had significantly highest firmness of finger at ripening stage which was at 4.43 kg/cm^2, while Treatment T_0 recorded significantly lowest firmness which was at 3.23 kg/cm^2. The fore going findings could be explained by the

fact that IAA reduced the fruit's ABA content and elevated the concentration of ethylene, causing the fruit to soften and turn colour **(Nana, 2019).**

Table 5, displays the observations related to moisture content of finger at ripening stage (%). Treatment T_4 Mother Plant + 1 Sucker + IAA (80 ppm) had highest moisture content of finger at ripening stage which was at 78.84%, while Treatment T_0 recorded significantly lowest moisture content of finger at 73.21%. The mother plant and extra suckers were less competitive to each other for nutrients and water, which is what most likely led to increase in banana moisture content (%). These results are in agreement with those of (**Stover and Simmonds, 1987),** as well as (**Robinson and Nel 1990).**

In Table 5, which summarizes the observations related to TSS (°Brix), Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was found to be in terms of highest TSS which was at (16.26 °Brix), while Treatment T_0 recorded significantly lowest TSS which was at (12.28 °Brix). TSS concentration in the fruits was raised by IAA foliar spray. Similar outcomes were reported by (**Prajapati *et al.*, 2015)**, in which auxin administration in the form of foliar spray enhanced the growth and caliber of a variety of crops. According to reports, IAA encourages GA biosynthesis and prevents of GA inaction, which increases fruits TSS content.

3.4. ECONOMICS

The economics of treatments is an important goal in determining the best treatments that improve income and are acceptable. Table 6, shows the cost of cultivation, gross returns, net returns, and B:C ratio as affected by various treatments. Because of the variable application of PGRs and different numbers of suckers, the cost of cultivation varied from (Rs 1,57,012 to 1,57,237 /ha). Treatment T_4, had highest gross returns (Rs 7,69,050 /ha) when compared to the other treatments the highest net returns (Rs 6,11,858 /ha) was recorded in treatment T_4 with B:C ratio of (3.89).

Table 2: Effect of optimized number of suckers and use of PGR on Height of mother plant (m), Height of suckers (cm) of banana (*Musa paradisiaca* L.) cv. Udhayam

S. No.	Treatment symbols	Treatment combinations	Height* of mother plant (m)	Height of suckers (cm)			
				30 DAYS	60 DAYS	90 DAYS	120 DAYS
1.	T_0	Control (water spray)	3.03	79.91	95.75	111.77	127.79
2.	T_1	Mother Plant + 1 sucker	3.42	140.96	151.72	172.73	193.74
3.	T_2	Mother Plant + 2 sucker	3.27	116.14	133.18	152.72	172.26
4.	T_3	Mother Plant + 3 sucker	3.10	90.99	106.83	125.07	143.31
5.	T_4	Mother Plant + 1 sucker + IAA (80 ppm)	3.49	152.11	171.26	193.47	215.68
6.	T_5	Mother Plant + 1 sucker + IAA (100 ppm)	3.47	148.36	167.51	189.72	211.93
7.	T_6	Mother Plant + 2 sucker + IAA (80 ppm)	3.37	132.73	150.48	171.02	191.56
8.	T_7	Mother Plant + 2 sucker + IAA (100 ppm)	3.31	124.01	141.76	162.30	182.43
9.	T_8	Mother Plant + 3 sucker + IAA (80 ppm)	3.21	107.73	123.77	143.31	162.85
10.	T_9	Mother Plant + 3 sucker + IAA (100 ppm)	3.17	99.36	115.43	133.67	151.91
		F-Test	**S**	**S**	**S**	**S**	**S**
		S.E(d) =	**0.01**	**3.80**	**3.57**	**3.23**	**3.15**
		CD (5%) =	**0.03**	**7.98**	**7.49**	**6.78**	**6.62**
		CV =	**0.56**	**3.90**	**3.21**	**2.54**	**2.20**

*** at harvesting stage**

Table 3: Effect of optimized number of suckers and use of PGR on growth attributes of banana (*Musa paradisiaca* L.) cv. Udhayam

S. No.	Treatment symbols	Treatment combinations	Number of leaves/plant	Leaf Area (m^2)	Leaf Area Index	Number of Days taken from stalk opening to harvest
1.	T_0	Control (water spray)	8.00	11.21	2.54	134.66
2.	T_1	Mother Plant + 1 sucker	11.02	27.56	6.25	122.92
3.	T_2	Mother Plant + 2 sucker	9.90	20.00	4.54	127.74
4.	T_3	Mother Plant + 3 sucker	8.73	13.71	3.11	132.75
5.	T_4	Mother Plant + 1 sucker + IAA (80 ppm)	11.57	32.39	7.34	120.44
6.	T_5	Mother Plant + 1 sucker + IAA (100 ppm)	11.38	31.15	7.06	121.24
7.	T_6	Mother Plant + 2 sucker + IAA (80 ppm)	10.62	24.86	5.64	123.93
8.	T_7	Mother Plant + 2 sucker + IAA (100 ppm)	10.26	22.26	5.05	125.88
9.	T_8	Mother Plant + 3 sucker + IAA (80 ppm)	9.52	17.77	4.03	129.55
10.	T_9	Mother Plant + 3 sucker + IAA (100 ppm)	9.14	15.73	3.57	131.29
		F-Test	**S**	**S**	**S**	**S**
		S.E(d) =	**0.10**	**0.53**	**0.12**	**0.75**
		CD (5%) =	**0.22**	**0.12**	**0.25**	**1.59**
		CV =	**1.27**	**3.02**	**3.02**	**0.73**

Table 4: Effect of optimized number of suckers and use of PGR on photosynthesis and yield attributes of banana (*Musa paradisiaca* L.) cv. Udhayam

S. No.	Treatment symbols	Treatment combinations	Total Chlorophyll content (SPAD-502)	Number of hands/stalk	Number of fingers/hand	Finger length (cm)	Finger girth (cm)	Stalk Weight (Kg)	Yield (t/ha)
1.	T_0	Control (water spray)	48.14	6.64	9.10	11.10	2.70	9.60	21.76
2.	T_1	Mother Plant + 1 sucker	58.06	10.16	13.24	14.43	4.05	20.65	46.81
3.	T_2	Mother Plant + 2 sucker	54.33	8.62	11.49	13.02	3.48	16.55	37.53
4.	T_3	Mother Plant + 3 sucker	50.56	7.15	9.80	11.54	2.95	12.05	27.32
5.	T_4	Mother Plant + 1 sucker + IAA (80 ppm)	60.05	10.88	14.14	15.09	4.31	22.62	51.27
6.	T_5	Mother Plant + 1 sucker + IAA (100 ppm)	59.36	10.62	13.88	14.88	4.24	22.04	49.96
7.	T_6	Mother Plant + 2 sucker + IAA (80 ppm)	56.34	9.67	12.67	13.95	3.85	19.38	43.93
8.	T_7	Mother Plant + 2 sucker + IAA (100 ppm)	55.33	9.15	12.09	13.54	3.66	18.15	41.14
9.	T_8	Mother Plant + 3 sucker + IAA (80 ppm)	53.25	8.09	10.99	12.56	3.32	15.17	34.39
10.	T_9	Mother Plant + 3 sucker + IAA (100 ppm)	51.94	7.58	10.38	12.13	3.13	13.51	30.63
		F-Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**
		S.E(d) =	**0.58**	**0.14**	**0.21**	**0.13**	**0.04**	**0.81**	**1.83**
		CD (5%) =	**1.22**	**0.29**	**0.45**	**0.27**	**0.09**	**1.70**	**3.86**
		CV =	**1.30**	**1.93**	**2.21**	**1.17**	**1.47**	**5.85**	**5.85**

Table 5: Effect of optimized number of suckers and use of PGR on quality attributes of banana (*Musa paradisiaca* L.) cv. Udhayam

S. No.	Treatment symbols	Treatment combinations	Firmness of finger at ripening stage (Kg/cm^2)	Moisture Content of finger at ripening stage (%)	TSS (°Brix)
1.	T_0	Control (water spray)	3.23	73.21	12.28
2.	T_1	Mother Plant + 1 sucker	4.30	78.17	15.58
3.	T_2	Mother Plant + 2 sucker	4.03	76.21	14.35
4.	T_3	Mother Plant + 3 sucker	3.76	74.29	13.15
5.	T_4	Mother Plant + 1 sucker + IAA (80 ppm)	4.43	78.84	16.26
6.	T_5	Mother Plant + 1 sucker + IAA (100 ppm)	4.38	78.78	15.99
7.	T_6	Mother Plant + 2 sucker + IAA (80 ppm)	4.21	77.57	15.19
8.	T_7	Mother Plant + 2 sucker + IAA (100 ppm)	4.13	76.86	14.72
9.	T_8	Mother Plant + 3 sucker + IAA (80 ppm)	3.94	75.61	13.98
10.	T_9	Mother Plant + 3 sucker + IAA (100 ppm)	3.85	75.00	13.55
		F-Test	**S**	**S**	**S**
		S.E(d) =	**0.03**	**0.02**	**0.16**
		CD (5%) =	**0.06**	**0.06**	**0.33**
		CV =	**0.91**	**0.04**	**1.34**

Table 6: Effect of optimized number of suckers and use of PGR on Economics of banana (*Musa paradisiaca* L.) cv. Udhayam

Treatments	Cost of cultivation (Rs/ha)	Total Yield (t/ha)	Price per tonne (Rs)	Gross return (Rs/ha)	Net Return (Rs)	B:C
Control (water spray)	157012	21.76	15000	326400.00	169388.00	1.08
Mother Plant + 1 sucker	157012	46.81	15000	702150.00	545138.00	3.47
Mother Plant + 2 sucker	157012	37.53	15000	562950.00	405938.00	2.59
Mother Plant + 3 sucker	157012	27.32	15000	409800.00	252788.00	1.61
Mother Plant + 1 sucker + IAA (80 ppm)	157192	51.27	15000	769050.00	611858.00	3.89
Mother Plant + 1 sucker + IAA (100 ppm)	157237	49.96	15000	749400.00	592163.00	3.77
Mother Plant + 2 sucker + IAA (80 ppm)	157192	43.93	15000	658950.00	501758.00	3.19
Mother Plant + 2 sucker + IAA (100 ppm)	157237	41.14	15000	617100.00	459863.00	2.92
Mother Plant + 3 sucker + IAA (80 ppm)	157192	34.39	15000	515850.00	358658.00	2.28
Mother Plant + 3 sucker + IAA (100 ppm)	157237	30.63	15000	459450.00	302213.00	1.92

CONCLUSION

From the present investigation it is concluded that the Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) was found to be best in terms of growth, yield and quality of banana. From the economics point of view, highest net return was found in the Treatment T_4 Mother Plant + 1 sucker + IAA (80 ppm) with 6,11,858 Rs/ha and the highest B:C ratio 3.89.

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