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Effect of Integrated Nutrient Management on Growth and Yield of Banana Cv. Grand Naine (AAA) (Main Crop)

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ABSTRACT: For optimal productivity and economic benefits, the banana crop requires a high fertilizer supply. High crop yields are obtained with good soil fertility, which can be increased by adding organic and inorganic fertilizer sources. The present investigation was carried out during 2017-2018 at Horticultural Research Station, Aswaraopet, Bhadradri Kothagudem district, Telangana State. The experiment was carried by planting tissue culture banana Cv. Grand Naine plants at spacing of 1.8 × 1.8m with eleven treatment combinations with different fertigation levels along with organics like arka microbial consortium, neem cake, jeevamrutha with and without bunch covering which was conducted as a integrated study with Randomized Block Design (RBD) and replicated thrice. For the growth characters like pseudostem height, after three and five months of planting the treatment T_4 has recorded significantly highest pseudostem height of 79.32cm and 159.30 cm respectively, which are significantly differing and superior over all other treatments, whereas lowest pseudostem height (68.33cm and 150.17cm respectively) was observed in T_1 likewise the other characters like pseudostem girth, functional leaves, leaf length, leaf breadth, leaf area, leaf area index and number of suckers the results were found to be maximum in treatment which received 75 per cent fertigation with combination of all organic nutrients and minimum results were observed with Recommended Dose of Fertilizers(RDF). The flowering parameters *viz.* early shooting (210.70days) less number of days (90.74 days) from shooting to harvesting and fruit parameters *viz.* maximum number of hands per bunch (10.17), finger length (20.38 cm), finger girth (13.88cm), finger weight (135.41g), weight of hand (4.10 kg) and highest yield (28.82 kg/plot and 86.89 t/ha) obtained in treatment with 75 percent fertigation with combination of all organic nutrients in main crop of banana. The integrated use of organics and inorganics increased growth and yield parameters of banana.

Keywords: Arka Microbial Consortium, Arka banana special, Neem Cake, Jeevamrutha, INM.

INTRODUCTION

Banana (*Musa* spp.) belongs to the family Musaceae is one of the oldest fruits known to mankind. It is also known as Apple of Paradise and one of the most important sources of tropical fruits in the world as it is a significant staple food as well as a major export commodity (Rahman *et al*., 2013). Banana is a fourth important food crop in terms of gross value exceeded only by paddy, wheat and milk products and forms an important crop for subsistence farmers.

Application of inorganic fertilizers though increases the yield substantially but could not able to sustain the fertility status of the soil and have caused several undesirable consequences in the fragile soil eco-system, leading to gradual decline in productivity. Chemical fertilizers have some deleterious effects on fruit quality besides adverse effects on soil, water and environmental conditions (Dutta *et al*., 2010). On the other hand, organic and microbial sources of nutrients

have advantage of consistent and slow release of nutrients, maintaining ideal carbon and nitrogen ratio, improvement in water holding capacity and microbial biomass of soil profile, without having any adverse residual effects. In recent years, a new approach for utilization of available resources *viz.*, organic, inorganic and microbial inoculants with an integrated approach for sustainable economic yield termed as 'Integrated Nutrient Management' (INM) has emerged which has already been receiving wide attention for contributing substantially towards acceleration of crop productivity by maintaining chemical, physical and biological balance in soil plant system (Bhalerao *et al*., 2010). Fertigation with organics in banana improved yield (Meghwal *et al.,* 2021).

The organics and biofertilizers help in better utilization of added inorganic fertilizers thus reduces its level of application as well as reduce the deleterious effect of harsh chemical residues that the inorganic fertilizers leave in the soil (Umar, 2007). The contents of Fe, Mn, Zn, Cu, and B in plant organs estimate the plant nutrient status (Villasenor *et al.,* 2021) thus micronutrients play important role in increasing growth and yield of banana.

MATERIALS AND METHODS

The present investigation was carried at Horticultural Research Station, Ashwaraopet. The experiment field was thoroughly ploughed and was levelled and divided into plots as per the layout. Field was laid out in Randomized block design with three replications and eleven treatments. The treatment combinations are T_1-100 % RDF of N and K (farmers practice with fertigation), T_2-75% RDF of N and K (fertigation) + 25% Neem cake + jeevamrutha @3.0 percent + Arka banana special @5 %foliar spray+Bunch covering, T_3-75% RDF of N and K (fertigation) + Arka microbial consortium(300g) + jeevamrutha @3.0 percent +Arka banana special @ 5% foliar spray Bunch covering, T_4-75 % RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium (300g)+ jeevamrutha @ 3.0 percent + Arka banana special@ 5% foliar spray + Bunch covering, T_5-75 % RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium (300g), T_6-75% RDF of N and K (fertigation) + Arka microbial consortium (300g), T_7- 50% RDF of N and K (fertigation) + 50% Neem cake + jeevamrutha @ 3.0 percent + Arka banana special @5% foliar spray + Bunch covering, T_8-50% RDF of Nand K(fertigation) + Arkamicrobial consortium (300g) + jeevamrutha@ 3.0 percent + Arkabanana special @ 5% foliar spray + Bunch covering, T_9-50 % RDF of N and K (fertigation) + 50% Neem cake + Arka microbial consortium (300g) + jeevamrutha @ 3.0 percent + Arka banana special@ 5% foliar spray + Bunch covering, T_{10}-50 % RDF of N and K (fertigation) + 50% Neem cake + Arka microbial consortium (300g), T_{11}-50% RDF of N and K (fertigation) + Arka microbial consortium (300g). The observations were recorded for the growth and yield parameters.

RESULTS AND DISCUSSION

A. Pseudostem height(cm)

The data pertaining to pseudostem height of banana in main crop is presented in Table 1. After three and five months of planting the treatment T_4 has recorded significantly highest pseudostem height of 79.32cm and 159.30cm respectively, which are significantly differing and superior over all other treatments, whereas lowest pseudostem height (68.33cm and 150.17cm respectively) was observed in T_1. At seven months after planting the highest pseudostem height (197.75cm) was observed in treatment T_4, and the lowest pseudostem height (188.64cm) was observed in control (T_1). At shooting stage of the highest pseudostem height (230.17 cm) was observed in treatment T_4, whereas lowest pseudostem height (201.67 cm) was observed in T_1 (control).

B. Pseudostem girth(cm)

The data revealed that there was significant difference at 5 months after planting and shooting stage. T_4 has recorded significantly higher pseudostem girth (36.57 cm and 71.61 cm) at 5 MAP and at shooting respectively. Among different treatments, pseudostem girth was higher in T_4 at 5 MAP and at shooting stages whereas treatment T_1 recorded lowest pseudostem girth (28.67cm and 61.47cm). At three and seven months after planting, no significant differences were found among the treatments regarding to pseudostem girth. However, the pseudostem girth ranged from 16.03 cm to 19.52 cm at 3MAP and 57.67cm to 63.88cm at 7MAP respectively.

In the present investigation, the combined application of fertigation, organic nutrients and consortium of biofertilizers recorded higher plant height and girth as compared to recommended dose of fertilizers through soil application thus indicating a positive effect of the combination of fertigation and consortium of biofertilizers were superior in inducing higher vigour to the banana plants as compared to the conventional practice (Senthil Kumar *et al*., 2016). Combination of micronutrients helps to increase the plant growth like plant height, canopy spread due to presence of zinc an activator of enzyme, involved in the protein synthesis and had direct effect on the level of auxin in the plant as documented by Bindu (2019); Premalatha and Suresh (2019).

Table 1: Effect of integrated nutrient management on pseudostem height(cm) and pseudostem girth (cm)at different growth stages of banana Cv. Grand Naine in main crop.

	Pseudostem height (cm)				Pseudostem girth (cm)			
Treatments	**3MAP**	**5MAP**	**7MAP**	**At shooting stage**	**3MAP**	**5MAP**	**7MAP**	**At shooting stage**
T_1	68.33	150.17	188.64	201.67	16.03	28.67	57.67	61.47
T_2	75.92	154.14	195.57	226.70	18.62	33.93	61.13	68.60
T_3	77.23	156.18	196.67	227.00	19.33	34.00	61.59	69.59
T_4	79.32	159.30	197.75	230.17	19.52	36.57	63.88	71.61
T_5	76.33	155.08	194.63	226.33	18.48	32.60	60.19	68.26
T_6	75.00	154.01	194.58	223.17	18.32	32.23	60.04	66.25
T_7	73.33	153.00	192.92	222.67	18.24	30.80	59.28	64.24
T_8	73.92	153.00	192.92	223.00	18.23	30.93	59.52	65.59
T_9	74.17	153.49	193.50	223.15	18.32	31.73	59.87	66.23
T_{10}	72.17	152.75	192.63	221.63	17.43	30.73	57.94	62.85
T_{11}	70.50	152.35	191.41	202.00	17.36	29.80	57.84	61.65
CD(p=0.05)	**1.70**	**1.77**	**3.64**	**5.69**	**NS**	**4.20**	**NS**	**3.34**
SE.m±	**0.58**	**0.60**	**1.23**	**1.93**	**0.66**	**1.42**	**1.20**	**1.13**

T_1-100% RDF of N and K (farmers practice with fertigation)
T_2-75% RDF of N and K (fertigation) + 25% Neem cake + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_3-75% RDF of N and K (fertigation) + Arka microbial consortium +jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_4-75% RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium + jeevamrutham @ 3.0 % + Arka banana special @ 5% foliar spray + Bunch covering
T_5-75% RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium
T_6-75% RDF of N and K (fertigation) + Arkamicrobial consortium
T_7-50% RDF of N and K (fertigation)+50% Neem cake + jeevamrutham @ 3.0 % + Arka banana special @ 5%foliar spray + Bunch covering
T_8-50% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% +Arka banana special @ 5% foliar spray + Bunch covering
T_9-50% RDF of N and K (fertigation)+50% Neem cake + Arka microbial consortium + jeevamrutham@ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_{10}-50% RDF of N and K (fertigation) + 50% Neem cake +Arka microbial consortium
T_{11}-50% RDF of N and K (fertigation) + Arka microbial consortium
MAP-Months After Planting

C. Time taken for initiation of suckers(days)

The data pertaining to the time taken for initiation of suckers in main crop of banana differed significantly among the treatments and presented in Table 2. The lowest average number of days (46.83) taken for initiation of suckers in main crop was found in T_4. The highest average number of days (65.10) taken for initiation of suckers in T_1.

D. Number of suckers per plant

At third month after planting, the number of suckers produced per plant differed significantly. The highest number of suckers (1.64) were recorded in T_4 which was significantly superior over rest of the treatments. The lowest number of suckers (1.25) was recorded in T_1. The number of suckers noticed per plant during 5 months after planting did not differed significantly with nutrient management practices. Whereas, at 7 months after planting and shooting the highest number of suckers (6.69 and 8.95) per plant was recorded in T_4 while the lowest number of suckers (4.62 and 5.95) were recorded in T_1.

E. Time taken for the initiation of functional leaves(days)

The data on number of days taken for initiation of functional leaves after planting of main crop is presented in Table 2.

The days taken for initiation of functional leaves differed significantly among treatments. The significantly less number of days (8.60) was taken for initiation of leaves in T_4 and which was at par with T_3 (8.63), T_2 (8.67), T_5 (8.80) and T_6 (8.90) over rest of the treatments. Significantly a more number of days (9.74) was observed for initiation of leaves in T_1.

F. Number of functional leaves

There was trend of gradual increase in number of leaves per plant at different months of planting and shooting stages. The highest numbers of leaves (9.33, 13.00, 15.24 and 14.16) were found in T_4 at 3, 5, 7 months after planting and at shooting stages respectively and the treatment. While, the least number of leaves (5.00, 7l.00, 11.36, 11.31) were observed with T_1 at all crop growth stages.

Banana crop should produce sufficient number of leaves to harness the light energy and synthesize adequate photosynthates for biomass production. The role of number of leaves retained at shooting is crucial in determining the yield potential. This positive affect may be due to favourable effect of fertigation and beneficial effect of consortium of biofertilizers (Senthil Kumar *et al.*, 2016) which helped in maintaining physiologically active leaves due to the regular supply of nutrients, particularly N and K through fertigation even at latter stages than the soil application of fertilizers (Bhalerao *et al.*, 2010).

Table 2: Effect of integrated nutrient management on time taken for initiation of suckers (days), number of suckers, time taken for initiation of functional leaves (days) and number of functional leaves at different growth stages of banana Cv. Grand Naine in main crop.

Treatments	Time taken for initiation of suckers (days)	Number of suckers				Time taken for initiation of functional leaves (days)	Number of functional leaves			
		3MAP	5MAP	7MAP	At shooting stage		3MAP	5MAP	7MAP	At shooting stage
T_1	65.10	1.25	2.71	4.62	5.95	9.74	5.00	7.00	11.33	11.36
T_2	48.96	1.59	3.11	6.59	8.55	8.67	7.67	11.67	13.53	13.83
T_3	46.96	1.59	3.45	6.61	8.65	8.63	8.33	11.67	14.00	13.99
T_4	46.83	1.64	3.62	6.69	8.95	8.60	9.33	13.00	15.24	14.16
T_5	63.78	1.57	3.03	6.47	8.45	8.80	7.67	11.33	13.37	13.47
T_6	51.96	1.53	2.97	5.71	7.89	8.90	7.67	10.00	13.16	12.97
T_7	58.65	1.39	2.92	4.84	7.22	8.98	7.00	9.00	12.79	12.32
T_8	56.91	1.42	2.92	5.35	7.22	8.93	7.33	9.33	13.00	12.35
T_9	53.55	1.50	2.95	5.53	7.69	8.91	7.33	10.00	13.12	12.85
T_{10}	62.55	1.37	2.91	4.79	6.85	9.16	6.00	8.67	12.78	12.30
T_{11}	63.78	1.28	2.88	4.69	6.09	9.33	5.67	7.33	11.33	11.71
CD(p=0.05)	**4.96**	**0.07**	**NS**	**0.21**	**0.25**	**0.37**	**1.41**	**1.91**	**2.09**	**1.45**
SE.m±	**1.67**	**0.02**	**0.18**	**0.07**	**0.08**	**0.12**	**0.48**	**0.65**	**0.71**	**0.49**

T_1-100% RDF of N and K (farmers practice with fertigation)
T_2-75% RDF of N and K (fertigation) +2 5% Neem cake + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_3-75% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_4-75% RDF of N and K (fertigation)+ 25% Neem cake+Arka microbial consortium + jeevamrutham @ 3.0 % + Arka banana special @ 5% foliar spray + Bunch covering
T_5-75% RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium
T_6-75% RDF of N and K (fertigation) + Arka microbial consortium
T_7-50% RDF of N and K (fertigation) + 50% Neem cake + jeevamrutham @ 3.0% + Arka banana special @5 % foliar spray + Bunch covering
T_8-50% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_9-50% RDF of N and K (fertigation) + 50% Neem cake + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_{10}-50% RDF of N and K (fertigation) + 50% Neem cake +Arka microbial consortium
T_{11}-50% RDF of N and K (fertigation) + Arka microbial consortium
MAP-Months After Planting

Table 3: Effect of integrated nutrient management on flowering characters and crop duration (days) of banana Cv. Grand Naine in main crop.

Treatments	Days taken for shooting	Days taken for shooting to harvest	Crop duration (days)
T_1	236.45	119.38	355.83
T_2	218.50	95.30	313.80
T_3	213.70	92.19	305.89
T_4	210.70	90.74	301.44
T_5	218.70	98.05	316.75
T_6	219.03	99.27	318.30
T_7	229.37	106.05	335.42
T_8	225.37	105.21	330.58
T_9	220.33	100.63	320.96
T_{10}	230.33	107.32	337.65
T_{11}	231.33	117.11	348.44
CD(p=0.05)	**6.23**	**11.77**	**10.07**
SE.m±	**2.11**	**3.99**	**3.41**

T_1-100% RDF of N and K (farmers practice with fertigation)
T_2-75% RDF of N and K (fertigation) + 25% Neem cake + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_3-75% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @5% foliar spray + Bunch covering
T_4-75% RDF of N and K (fertigation) + 25% Neem cake +Arka microbial consortium + jeevamrutham@3.0 % + Arka banana special @ 5% foliar spray + Bunch covering
T_5-75% RDF of N and K (fertigation) + 25% Neem cake +Arka microbial consortium
T_6-75% RDF of N and K (fertigation) +Arka microbial consortium
T_7-50% RDF of N and K (fertigation) +50%Neem cake + jeevamrutham @ 3.0% + Arka banana special @ 5 % foliar spray + Bunch covering
T_8-50% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_9-50% RDF of N and K (fertigation) + 50% Neem cake + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @5 %foliar spray + Bunch covering
T_{10}-50% RDF of N and K (fertigation) + 50% Neem cake +Arka microbial consortium
T_{11}-50% RDF of N and K (fertigation) + Arka microbial consortium

G. Number of days taken for Shooting/Flowering

The number of days taken for shooting from planting differed significantly among the treatments for the main crop (Table 3). The early shooting (210.70 days) was recorded in treatment T_4 and late shooting was recorded in treatment T_1 (236.45 days).

H. Number of days taken from shooting to harvest

The number of days taken from shooting to harvest differed significantly among the treatments for the main crop (Table 3). The least number of days (90.74) from shooting to harvesting was recorded in treatment T_4 and was at par with all other treatments except T_1, T_{10} and T_{11}.While a more number of days (119.38) from shooting to harvesting was recorded in treatment T_1.

I. Crop duration (days)

The number of days taken from planting to harvest differed significantly among the different treatments for the main crop (Table 3). The more integrated combination of nutrients resulted in early (301.44 days) harvesting (T_4) which was at par with T_3 (305.89 days), T_2 (313.80 days), T_5 (316.75 days) and followed by T_6 (318.30 days). The late harvesting was observed in T_1 which took about 355.83 days.

The early shooting was attributed to better microbial activity of Azospirillum and Phosphorus solubilizing bacteria in vegetative growth. This might be due to the optimum quantity of nutrients available through chemical and organic fertilizers which might have increased the process of initiation and emergence of inflorescence due to earlier production of leaves with larger leaf area and better disposition of photosynthetic activity resulting in higher required net assimilation (Kuttimani *et al.,* 2013).

Table 4: Effect of integrated nutrient management on fruit characters of banana Cv. Grand Naine in main crop.

Treatments	Number of hands in a bunch	Finger length(cm)	Finger girth (cm)	Weight of finger (g)	Weight of hand (kg)	Fruit yield per plant (kg)	Fruit yield Per hectare (t)
T_1	7.77	16.40	8.04	98.67	2.8	24.01	72.77
T_2	9.31	19.37	11.64	124.92	3.8	27.42	83.79
T_3	9.33	19.60	11.79	128.83	4.0	27.94	84.35
T_4	10.17	20.38	13.88	135.41	4.1	28.82	86.89
T_5	9.00	19.27	11.12	124.65	3.7	26.28	81.46
T_6	8.77	19.26	10.81	114.62	3.5	26.18	80.69
T_7	8.33	18.46	9.50	104.33	3.3	25.53	78.49
T_8	8.67	18.48	10.70	106.50	3.4	25.69	79.41
T_9	8.67	19.16	10.76	111.25	3.5	26.16	79.77
T_{10}	8.22	18.34	9.39	99.33	3.1	25.47	77.87
T_{11}	8.00	18.07	9.21	98.90	3.0	24.64	77.53
CD(p=0.05)	**1.23**	**0.43**	**1.28**	**14.57**	**0.5**	**1.18**	**0.59**
SE.m±	**0.42**	**0.14**	**0.44**	**4.94**	**0.1**	**0.40**	**0.20**

T_1-100% RDF of N and K(farmers practice with fertigation)
T_2-75% RDF of N and K (fertigation) +25% Neem cake + jeevamrutham@ 3.0% + Arka banana special @ 5% foliar spray+ Bunch covering
T_3-75% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_4-75% RDF of N and K (fertigation) + 25% Neem cake + Arka microbial consortium + jeevamrutham @ 3.0 % + Arka banana special @ 5% foliar spray + Bunch covering
T_5-75% RDF of N and K (fertigation) + 25% Neem cake +Arka microbial consortium
T_6-75% RDF of N and K (fertigation) + Arka microbial consortium
T_7-50% RDF of N and K(fertigation) + 50% Neem cake + jeevamrutham @ 3.0% + Arka banana special @ 5 % foliar spray + Bunch covering
T_8-50% RDF of N and K (fertigation) + Arka microbial consortium + jeevamrutham @ 3.0% +Arka banana special @ 5% foliar spray + Bunch covering
T_9-50% RDF of N and K (fertigation) + 50% Neem cake + Arka microbial consortium + jeevamrutham @ 3.0% + Arka banana special @ 5% foliar spray + Bunch covering
T_{10}-50% RDF of N and K(fertigation) + 50% Neemc ake +Arka microbial consortium
T_{11}-50% RDF of N and K (fertigation) + Arka microbial consortium

J. Number of hands in a bunch

The soil application of nutrients and foliar spray of micronutrients along with fertigation had significant influences on the number of hands per bunch among the treatments in main crop of banana Cv. Grand Naine and is presented in Table 4. The maximum number of hands per bunch (10.17) was noticed in T_4. The minimum number of hands per bunch (7.77) was recorded in the treatment T_1.

K. Finger length (cm) and Finger girth (cm)

The data pertaining to the effect of integrated nutrient management practices on finger length and finger girth of main crop of banana Cv. Grand Naine is furnished in Table 4. The highest finger length (20.38cm) and finger girth (13.88cm) was obtained in treatment T_4 which was significantly superior over others. The minimum finger length (16.40 cm) and finger girth (8.04 cm) was recorded in T_1.

L. Weight of the finger (g)

The weight of finger significantly differed among the various treatments and the data on mean weight of finger for main crop was presented in Table 4. The highest finger weight (135.41g) was obtained in T_4, which was significantly at par with T_3 (128.83g), T_2 (124.92g) and T_5 (124.65g) the lowest finger weight (98.67g) was recorded in T_1.

M. Weight of the hand (kg)

The data pertaining to the effect of integrated nutrient management practices on weight of hand in main crop of banana Cv. Grand Naine is furnished in Table 4. The highest weight of hand (4.10 kg) was obtained in T_4, which was at par with T_3 (4.09 kg). While, the lowest weight of hand (2.83 kg) was recorded in T_1.

N. Fruit yield per plant (kg) and Fruit yield per hectare (t)

The highest yield per plant and per hectare (28.82 kg and 86.89 t/ha) was obtained in treatment T_4 which were significantly at par with T_3 (27.94 kg and 84.35 t/ha) and fruit yield was dominant over other treatments. While, the minimum fruit yield (24.01kg and 72.77 t/ha) was obtained in T_1.

Yadav *et al*. (2011) stated that the increase in the fruit length, fruit width, fruit weight and total yield might be due to the mineral nutrients appears to have indirect role in hastening the process of cell division and cell elongation due to which size and weight of the fruits might have increased. Higher yield response owing to application of organics ascribed to improved physical, chemical and biological properties of soil resulting in better supply of plant nutrients, which in turn led to good crop growth and yield.

CONCLUSION

From the investigation, it is concluded that banana responded favourably to organic nutrients in combination with chemical fertilizers.The integrated use of organics *i.e*, Arka Microbial Consortium (AMC), neem cake, jeevamrutha, panchagavya and inorganic nutrients through 75 per cent fertigation along with bunch protective measures has given the good results. Hence the integrated nutrient management practices in banana crop have been found to be an ideal option to improve yield.

FUTURE SCOPE

Different sources of nutrient other than the sources used in the study can be evaluated. The present study was carried up to first ratoon crop only in academic point of view, to draw more conclusions about profitability of banana crop second ratoon could also be studied further. Studies can also be carried to know the effect of water-soluble fertilizers on growth, development and yield of banana Cv. Grand Naine, as present study was done with straight fertilizers in economic point of view.

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