



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(4): 1334-1336
© 2022 TPI

www.thepharmajournal.com

Received: 06-02-2022

Accepted: 13-03-2022

Akash Shukla

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

AK Dwivedi

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

VK Tripathi

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

Ravi Shankar Singh

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

Manoj Kumar

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

Jitendra Kumar Shukla

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

Corresponding Author:

Akash Shukla

Department of Fruit Science,
C.S. Azad University of
Agriculture and Technology,
Kanpur, Uttar Pradesh, India

Effect of INM on yield parameters of tissue cultured banana CV. Grand Naine under north Indian condition

Akash Shukla, AK Dwivedi, VK Tripathi, Ravi Shankar Singh, Manoj Kumar and Jitendra Kumar Shukla

Abstract

Banana is an important tropical fruit and is one of the oldest known fruits used for various purposes. The research on effect of INM for better growth, yield and quality of tissue cultured banana cv. Grand Naine under North Indian Condition. The objective of experiment includes to find out the effect of INM through organic, inorganic nutrient sources in combination with bio-fertilizers for higher yield of banana. The experiment was conducted in the Horticulture Garden, Department of Fruit Science, Chandra Shekhar Azad University of Agriculture & Technology Kanpur (U.P.) India, during the cropping season 2019-20. The experiment was laid out in RBD with three replications and ten treatments. The results showed that application of T₇ (75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB) has resulted in the maximum bunch weight (19.99kg), number of hand per bunch (11.71), number of finger in hand (19.29), number of finger in bunch (223.44), finger weight (139.12g), fruit yield per plant (31.10kg), fruit yield (95.79 t ha⁻¹), finger length (21.67cm) and finger girth (17.79cm).

Keywords: Banana, NPK, FYM, vermicompost, azospirillum, PSB and yield parameter

Introduction

Banana is perennial fruit crop which belongs to the family Musaceae and order Scitamineae (Simmonds, 1962) [6]. There are two genera viz., *Ensete* and *Musa* with about 50 species in the family. The best known banana of commerce from all over the world belongs to the pure *acuminata* (AAA) group. It is one of the dominating fruit crops in the world market and is well recognized as the "Apple of paradise", taxonomically called as *Musa paradisiaca*. Banana fruits contain 70% water, 27% carbohydrates, 0.5% crude fiber, 0.3% fat, 1.2% protein, 460mg potassium, 36mg magnesium, 27mg phosphorous, 7mg calcium and 10mg ascorbic acid per 100gm of fruits (Bal, 1997) [1]. India rank first in area and production having total area 0.875 million hectares and production of 29.65 million metric tonnes with productivity of 35.17 MT ha⁻¹ followed by Brazil and China. In India, banana ranks first in production and third in area among fruit crops. In India, major banana producing states are Andhra Pradesh followed by Gujarat and Maharashtra. Banana is propagated by suckers or rhizomes; however, tissue culture technique is now being extensively used for its multiplication. Plant produced by tissue culture technique are mostly free from various diseases, have uniform growth habit, produce more and earlier yield than suckers or rhizomes propagated plants. Banana requires large quantities of nutrients for plant growth, rooting pattern and phenomenon of bud differentiation which have relationship with the yield (Hazarika and Ansari, 2010) [3]. Integrated nutrient management (INM) has emerged as an important techniques which has already been receiving wide attention and also contributing substantially towards the acceleration of crop productivity by maintaining physical, chemical and biological balance in soil for plant growth system.

Material and Methods

The present experiment was conducted at Horticulture Garden, Department of Fruit Science, Chandra Shekhar Azad University of Agriculture & Technology Kanpur (U.P.) India, during the cropping season September, 2019-20 with spacing 1.8 X 1.8 m². The experiment was laid out in Randomized Block Design (RBD) with three replications and ten treatments viz., (T₀-Control, T₁-100% RDF of NPK 110: 30: 330g, T₂-75% RDF of NPK + 25% FYM + 50g *Azospirillum* + 50g PSB, T₃- 50% RDF of NPK + 50% FYM + 50g *Azospirillum* + 50g PSB, T₄-75% RDF of NPK + 25% vermicompost + 50g *Azospirillum* + 50g PSB, T₅-50% RDF of

NPK + 50% vermicompost + 50g *Azospirillum* + 50g PSB, T₆-75% RDF of N + 100% RDF of PK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB, T₇-75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB, T₈-75% RDF of K + 100% RDF of NP + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB, T₉ 100% FYM + 100% vermicompost + 50 g *Azospirillum* + 50 g PSB). Observations were made on different yield parameter. Other cultural practices like weeding, earthing up, de suckering, irrigation, insect-pest and disease management were common all treatment.

Results and Discussion

Yield parameters

The data are presented in table 1 indicates that significant differences were observed with regard to yield parameters viz., bunch weight (kg), number of hand per bunch, number of finger in hand, number of finger in bunch, finger weight (g), fruit yield per plant (kg), fruit yield (t ha⁻¹), finger length (cm) and finger girth (cm).

Significantly maximum bunch weight (19.99kg) and finger weight (139.12g) was obtained with the application of T₇ (75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB) per plant, whereas the minimum bunch weight (13.59kg) and finger weight (104.08g) was recorded under untreated control plants (T₀). These findings are in line with the findings of Hazarika *et al.*, (2011)^[4] and Tripathi (2017)^[7] in banana.

In the present investigation, it was observed that the maximum number of hand per bunch (11.71), number of finger in hand (19.29) and number of finger in bunch (223.44) obtained with the application of T₇ (75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB). However, minimum number of hand per bunch (8.09), number of fingers in hand (12.55) and number of finger in bunch (101.72) were recorded under control. The increase in number of fingers per hand and per

bunch may be due to the facts that bio-fertilizers *i.e.* nitrogen fixers not only increased the availability of nitrogen to the plant roots but it also increased their translocation from root to flower through plants foliage (Singh and Singh, 2009) which ultimately increased the number of fingers. These finding are in agreement with the reports of Hazarika and Ansari (2010)^[3], Tripathi *et al.*, (2014)^[8] and Tripathi (2017)^[7] in banana.

In the present investigation it was observed that integrated dose of different nutrients with other bio-fertilizers gave remarkable increase in the weight of fingers and bunch. The maximum fruit yield per plant (31.10kg) and fruit yield per hectare (95.79 t ha⁻¹) was recorded in the plants fertilized with the T₇ (75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB) treated plants, whereas the minimum fruit yield per plant (10.64 kg) and fruit yield per hectare (32.76 t ha⁻¹) was recorded from the control. Relatively higher amount of carbohydrates could have promoted the growth rate, bunch size and in turn increased the fingers and bunch weight. These findings are in line with the findings of Hazarika *et al.*, (2011)^[4], Hazarika and Ansari (2010)^[3], Chezhiyen *et al.*, (1999) and Tripathi (2017)^[7] in banana.

The maximum finger length (21.67 cm) and girth (17.79 cm) were recorded in the plants fertilized with T₇ (75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB) whereas, the minimum finger length (14.06 cm) and girth (14.23 cm) were recorded under control. The results are in accordance with the finding of Tripathi *et al.*, (2010)^[8] in strawberry and Hazarika *et al.*, (2011)^[4] in banana. This increase in finger length and girth might be due to the better filling of the fruits and their growth with increased uptake of nutrients from soil which produced enough carbohydrates in the leaf for translocation to the sink for better filling of fruits. Similar results have been also reported by *Sathappan et al.*, (2019)^[5] in banana.

Table 1: Effect of INM on yield characters of tissue cultured Banana cv. Grand Naine under North Indian condition

Treatment	Bunch weight (kg)	Number of hand per bunch	Number of finger in hand	Number of finger in bunch	Finger weight (g)	Fruit yield per plant (kg)	Fruit yield (t ha ⁻¹)	Finger length (cm)	Finger girth (cm)
T ₀	13.59	8.09	12.55	101.72	104.08	10.64	32.76	14.06	14.23
T ₁	14.36	11.11	14.86	164.23	119.40	19.62	60.43	17.85	15.79
T ₂	14.16	9.55	16.96	161.82	128.13	20.76	63.95	16.17	16.46
T ₃	13.56	9.35	16.49	154.39	123.15	18.11	55.77	17.44	16.08
T ₄	16.64	10.22	17.06	174.30	123.03	21.51	66.24	16.94	16.27
T ₅	15.54	10.58	17.77	188.51	126.33	23.80	73.31	16.55	16.50
T ₆	18.93	10.92	19.06	210.80	129.82	27.36	84.27	19.51	16.10
T ₇	19.99	11.71	19.29	223.44	139.12	31.10	95.79	21.67	17.79
T ₈	16.63	10.02	15.66	157.22	122.41	18.18	55.99	17.09	16.42
T ₉	16.32	10.23	14.50	148.04	124.26	18.38	56.61	18.29	15.28
S.Em+	0.67	0.47	0.95	1.16	1.55	1.55	0.47	0.61	0.65
CD at 5%	1.99	1.40	2.82	3.49	4.62	4.59	1.41	1.80	1.92

Conclusion

On the basis of above findings from present investigation, It is concluded that plant treated with 75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB per plant significantly increase the yield parameter, on the basis of these observation this can be suggested that for getting substantial yield of banana fruits, the tissues cultured plant of banana cv. Grand Naine should be treated with 75% RDF of P + 100% RDF of NK + 25% FYM + 25% vermicompost + 50g *Azospirillum* + 50g PSB as

soil application in the North Indian condition (Plain of central Uttar Pradesh), India.

References

- Bal JS. Fruit Growing (Revised Edition 2006). Kalyani Publishers. 1997, 103pp.
- Chezhiyan N, Balasubramani P, Harris CV, Ananthan M. Effect of inorganic and biofertilizers on growth and yield of hill banana var. Virupakshi. South Indian Horticulture. 1999;47(1-6):161-161.

- 3 Hazarika BN, Ansari S. Effect of integrated nutrient management on growth and yield of banana CV. Jahaji. Indian Journal of Horticulture. 2010;67(2):270-273.
- 4 Hazarika TK, Nautiyal BP, Bhattacharya RK. Effect of INM on productivity and soil characteristics of tissue cultured banana CV. Grand Naine in Mizoram, India. Progressive Horticulture. 2011;43(1):30-35.
- 5 Sathappan CT, Sivanesh K, Dhanasekaran D. Studies on the Influence of Potassium on Growth, Yield and Quality of Hill Banana Var. Sirumalai. Plant Archives. 2019;19(2):1603-1605.
- 6 Simmonds NW. Banana Longman, Green and Company, London, Second Edition. 1962, 466pp.
- 7 Tripathi VK. Influence of Integrated Nutrient Management in Ratoon Crop of Tissue Cultured Banana. Progressive Research-An International Journal. 2017;12(6):2577-2580.
- 8 Tripathi VK, Kumar N, Shukla HS, Mishra AN. Influence of Azotobactor, Azospirillum and PSB on growth, yield and quality of strawberry cv. Chandler. In national symp. On conservation Hort. from March 21-23, 2010 at Dehradun, 2010, 98-99pp.
- 9 Tripathi VK, Tiwari B, Kumar S, Nayyar MA, Lal Deepa. Growth, yield and quality attributes of tissue cultured banana as affected by bio-fertilizers. Annals of Horticulture. 2014;7(1):25-29.