Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-7: 526-529

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-7 pp. 526-529**
Journal homepage: http://www.ijcmas.com

Original Research Article

Studies on Quality Parameters in Banana cv. Grand Naine (AAA) as Influenced by Different INM Packages

S. Firoz Hussain* and M. L. N. Reddy

Department of Horticulture, Dr. Y.S.R. Horticultural University, Venkataramannagudem, India
**Corresponding author*

A B S T R A C T

A field investigation was conducted at Dr YSRHU, College of Horticulture, Anantharajupeta during the years 2012 – 2013, to ascertain the effect of different INM (Integrated Nutrient Management) treatments on quality parameters of banana cv. Grand Naine. The results showed that application of 80 % RDF (recommended dose of fertilizers) + 20 % RDN (recommended dose of nitrogen) through vermicompost (VC) along with *Azospirillum* + Phosphate solubilising bacteria (PSB) + *Frateuria aurantia* (FA) has registered highest total soluble solids (TSS) (24.00 ^{0}B), least titrable acidity (0.62%) and Non reducing sugars (4.77 %) concomitant with extended shelf life of fruits (14.16 days). In contrast, application of 80 % RDF (recommended dose of fertilizers) + 20 % RDN (recommended dose of nitrogen) through farmyard manure (FYM) along with *Azospirillum* + Phosphate solubilising bacteria (PSB) + *Frateuria aurantia* (FA) has resulted in highest reducing sugars (3.65 %).

Keywords

Banana, Grand Naine and INM

Introduction

Banana (*Musa spp*) is the most important fruit crop of tropical and sub-tropical regions of the world and popularly termed as Apple of paradise or Kalpataru. India leads the globe in total acreage and production of banana. In India, it is being grown in an area of 0.85 m ha with an annual production of 29.16 million tons and productivity of 34.3 t ha^{-1} (Anonym, 2016). Amongst all the fruit crops in India, the area and production share of banana is 13% and 31.4%. Banana is a heavy feeder of nutrients and requires large quantities for its growth, development and yield (Hazarika and Ansari, 2010). Indiscriminate usage of chemical fertilizers causes deterioration of soil fertility, damaging the soil flora and fauna besides declining the soil physical and chemical properties along with polluting the environment. Therefore, a new strategy has been adopted *viz* Integrated Nutrient Management (INM), a new approach for utilization of available resources *viz* organic, inorganic and microbial inoculants with an integrated approach for sustainable economic yield (Hazarika *et al.*, 2011). Banana responds positively to organic manures which improve physical, chemical and biological properties of the soil but heavy organic manuring is required to equalize chemical fertilization in banana (Lahav, 1973). Chemical fertilizers have some deleterious effects on fruit quality besides adverse effects on soil, water and environmental conditions (Dutta *et al.*, 2010). Hence, there is an urgent need to

think of alternate source of safe fertilizers which may enhance crop yields without having adverse effects on soil properties. Thus, the use of biofertilizers seems to be array of hope in this direction. Biofertilizers have been considered as a cheap, eco-friendly way of improving soil fertility status (Hazarika *et al.*, 2014). Grand Naine is a popular variety grown mostly in all export oriented countries of Asia, South America and Africa. This is a superior selection of Giant Cavendish which was introduced to India in 1990's. Due to many desirable traits like excellent fruit quality, immunity to *fusarium* wilt etc, it has proved better variety (Singh and Chundawat, 2002). However, its requirement of nutrients through organic sources along with inorganic fertilizers is not well documented. Keeping these aspects in mind, the investigation was undertaken to find out the suitable combination of organic, inorganic and biofertilizers for tissue cultured Grand Naine banana under Anantharajupet conditions.

Materials and Methods

The present investigation was conducted at College of Horticulture, Anantharajupet during the year 2012-13. The experiment was laid out in randomized block design comprising of eleven treatments which were replicated thrice. The plants were spaced at 1.8 m × 1.8 m. Recommended dose of nitrogen (300 g N plant^{-1} crop cycle^{-1}) and potassium (300 g K plant^{-1} crop cycle^{-1}) inorganic fertilizers were applied in twelve equal split doses at an interval of 15 days starting from 15 days after planting till shooting by pocketing method at 30 cm away from plant on either side of plant. While, entire dose of phosphorus (50 g for 100% RDF and 40 g for 80% RDF) was applied at the time of planting. The treatments included were T_1 - 100% RDF inorganic (300:50:300 g NPK plant^{-1} crop cycle^{-1}), T_2 - 80% RDF inorganic (240:40:240 g NPK plant^{-1} crop cycle^{-1}) + 20% RDF (vermicompost), T_3 - 80% RDF (inorganic) + 20% RDF (vermicompost) + *Azospirillum*, T_4 - 80% RDF (inorganic) + 20% RDF (vermicompost) + Phosphate solubilizing bacteria (PSB), T_5 - 80% RDF (inorganic) + 20% RDF (vermicompost) + *Frateuria aurantia*, T_6 - 80% RDF (inorganic) + 20% RDF (vermicompost) + *Azospirillum* + PSB + *Frateuria aurantia*, T_7 - 80% RDF (inorganic) + 20% RDF (FYM), T_8 - 80% RDF (inorganic) + 20% RDF (FYM) + *Azospirillum*, T_9 - 80% RDF (inorganic) + 20% RDF (FYM) + (PSB), T_{10} - 80% RDF (inorganic) + 20% RDF (FYM) + *Frateuria aurantia*, T_{11}- 80% RDF (inorganic) + 20% RDF (FYM) + *Azospirillum* + PSB + *Frateuria aurantia*. Biofertilizers *viz., Azospirillum lipoferum* and phosphate solubilizing bacteria (*Bacillus megatherium*) @ 50g each plant^{-1} whereas *Frateuria aurantia* @ 25g plant^{-}1 were amended in the respective organic manures (vermicompost @ 4.285 kg plant^{-1} and FYM @ 5.309 kg plant^{-1}) separately one week before application in the field and applied in the pits at the time of planting of seedlings.

Fruit quality parameters *viz*., Total soluble solids, titrable acidity, reducing sugars and non – reducing sugars along with shelf life were quantified at eaten-ripe stage of the fruit. Total soluble solids (TSS) content was recorded with the help of a hand refractometer and expressed in degree Brix. The acidity was determined in terms of tartaric acid by diluting the juice extracted from five gram of sample and filtered through muslin cloth and made up to known volume with distilled water (100 ml). From this, five ml of aliquot was taken and titrated against standard NaOH (0.1 N) using a phenolphthalein indicator. The appearance of light pink colour was recorded as the end

point. The values were expressed in terms of tartaric acid per cent titrable acidity of the fruit (Ranganna, 1977). Reducing and Non-reducing sugars (%) were quantified by following Somogyi (1952) method.

Results and Discussion

Quality parameters

It is conspicuous from table 1 that significant differences were observed with respect to TSS content of fruits and maximum TSS (24.00 ^{0}B) was observed with the application of 80 % RDF + 20 % RDN through VC + Azospirillum, PSB and FA (T_6) and it was on a par with application of 80 % RDF + 20 % RDN through FYM + Azospirillum, PSB and FA (T_{11}), 80 % RDF + 20 % RDN through VC + FA (T_5). Improvement in fruit quality (TSS) could be due to the involvement of organic manures (FYM and vermicompost), which might have supplied nutrients especially micronutrients, since organic manures are the rich source of micronutrients.

This beneficial influence can also be attributed to biofertilizers particularly *Azospirillum*. Jeeva *et al.*, (1988) recorded an improvement in the TSS content of the fruits in banana with *Azospirillum* inoculation. However, significant differences were not observed in acidity, reducing and non-reducing sugars with the application of different INM treatments.

Table.1 Quality parameters as influenced by different INM treatments in tissue culture banana cv. Grand Naine

Treatments	TSS (^{0}Brix)	Acidity (%)	Reducing sugars (%)	Non-reducing sugars (%)	Shelf life (Days)
T_1 : 100 % RDF	20.25	0.91	3.57	4.01	9.08
T_2 : 80 % RDF + 20 % RDN through VC	21.25	1.09	3.50	4.33	12.58
T_3 : T2 + *Azospirillum*	22.06	0.61	3.61	4.04	11.50
T_4 : T2 + PSB	22.19	0.72	3.52	4.08	12.33
T_5 : T2 + FA	22.34	0.87	3.57	4.42	12.58
T_6 : T2 + *Azospirillum* + PSB + FA	24.00	0.62	3.22	4.77	14.16
T_7 : 80 % RDF + 20 % RDN through FYM	21.33	1.05	3.41	4.03	12.66
T_8 : T7 + *Azospirillum*	21.55	0.70	3.51	4.07	12.50
T_9 : T7 + PSB	22.19	1.15	3.49	4.62	12.33
T_{10} : T7 + FA	21.73	0.82	3.65	4.34	12.58
T_{11} : T7 + *Azospirillum* + PSB + FA	23.83	0.66	3.65	4.75	13.75
Mean	**22.06**	**0.83**	**3.51**	**4.31**	**12.36**
S.Em. (±)	0.59	0.20	0.11	0.25	0.31
C.D. (P=0.05)	1.76	N.S	N.S	N.S	0.93

RDF: Recommended dose of fertilizers, RDN: Recommended dose of nitrogen, PSB: phosphate solubilising bacteria, FA: Frateuria aurantia

Shelf life of the fruits was significantly influenced by different treatments. Fruits obtained with the application of 80 % RDF + 20 % RDN through VC + *Azospirillum*, PSB and FA (T_6) have shown significantly higher shelf life (14.16 days) and it was at par with 80 % RDF + 20 % RDN through FYM + *Azospirillum*, PSB and FA (T_{11}) treatment. In general, polyamines play a role in extension of shelf life of fruits by

affecting the permeability of cell membranes along with their opposing effects on the action of ethylene. In banana, extension of shelf life could be ascribed to the rate of degradation of polyamines in fruits with longer shelf life (Bhagawan *et al.,* 2000).

References

Anonymous, 2016. 2rd Advance Estimate. NHB Data.

Bhagawan, A, Reddy, Y.N, Shankaraiah, V, Sharma, P.S. and Reddy, G.S. 2000. Effect of post-harvest application of sodium benzoate on polyamine levels and shelf life of banana cv. Robusta. In: *Proceedings of the conference on challenges for banana production and utilization in 21st century* held at Trichy, India on 24-25 September 1996 edited by H.P. Singh and K.L. Chadha AIPUB, India. Pp – 441-447.

Dutta, P, Kundu, S and Biswas, S. 2010. Integrated nutrient management in litchi cv. Bombai in new alluvial zone of West Bengal. *Indian Journal of Horticulture.* 67: 181-184.

Hazarika, B.N. and Ansari, S. 2010. Effect of integrated nutrient management on growth and yield of banana Cv. Jahaji (AAA). *Indian Journal of Horticulture*. 67:270-273.

Hazarika, T.K, Nautiyal, B.P. and Bhattacharya, R.K. 2011. Effect of INM on productivity and soil characteristics of tissue cultured banana cv. Grand Naine in Mizoram, India. *Progressive Horticulture*. 43(1):30-35.

Hazarika, T.K, Nautiyal, B.P. and Bhattacharya, R.K. 2014. Economic analysis of tissue cultured banana (*Musa* x *paradisiaca*) production under the influence of integrated nutrient management. *Indian Journal of Agricultural Sciences*. 84(5):656-60.

Jeeva, S.M, Kulasekaran, K, Shanmugavelu and Obilisami, G. 1988. Effect of *Azospirillum* on growth and development of banana cv. Poovan (AAB). *South Indian Horticulture*. 36: 1-4.

Lahav, E. 1973. Effects and interactions of manures and fertilizers in banana plantation. *Israel Journal of Agricultural Research*. 23: 45-57.

Ranganna, S. 1977. Manual of analysis of fruit and vegetable products, Tata McGraw- Hill publishing company limited, New Delhi, India.

Singh, H.P. and Chundawat, B.S. 2002. Improved Technology of Banana. Ministry of Agriculture, Government of India. Pp- 1-46.

Somogyi, M.S. 1952. Notes on sugar determination. *J.Bio.Chem*. 200: 24.