

RESEARCH PROGRAMME

Influence of certain nutrient management practices on phenology, yield and quality in banana cv. Grand Naine

DISSERTATION -II REPORT

BY

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Of
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CERTIFICATE

Certified that this synopsis of Sachin Mathew Reg no. 11617708 entitled '**Influence of certain nutrient management practices on phenology, yield and quality in banana cv. Grand Naine**' has been formulated and finalized by the student himself on the subject.

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Introduction

Banana is a good source of vitamin A and vitamin C. Banana fruits are rich source of minerals like magnesium, sodium, potassium and phosphorus and fair source of calcium and iron. Banana contains water 70 % , carbohydrates 27% , crude fiber 0.5% , protein 1.2% , fat 0.3% and ascorbic acid 10 mg/100 g of fruit and energy 104 calories per 100 g fruit. Ripe fruits are delicious and are used for table purpose.

Major banana producing countries in the world are India, Uganda, China, Philippines, Brazil, Indonesia, Tanzania, Mexico and Colombia. The production of banana in the world is 145 million tonnes. India has first position in the world in banana production having 20 % share. Banana rank second in area under fruits in India. Total area of banana in India is 7.97 lakh hectares and production is 284.6 lakh tonnes. The highest productivity of banana is recorded 62.3 mt/ha in Gujarat as compared to average productivity of 35.7 mt/ha in India. Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Bihar , Madhya Pradesh, Utter Pradesh, West Bengal and Assam are major banana growing states .

Banana considered as the symbol of prosperity and fertility. Nutrients in banana found to be replenished every year through different nutrient sources including organic manures, mineral fertilizers as well as bio-fertilizers in order to maintain soil fertility and to permit continuous production. Efficient nutrient management plays an important role to better production of banana. Beneficial microbes increase nutrient availability, reduce disease, reduce nutrient losses, and help degrade toxic compounds. The present experiment was planned as an attempt in the above mentioned direction. In this view, an experiment proposed to study the effect of various biofertilizers in combination with RDF on phenology, yield and quality of banana cv. Grand Naine.

OBJECTIVES

The present study is to be taken up with the following objectives.

- To access the impact of several biofertilizers and RDF combinations on banana production
- To observe the response of banana cv. Grand Naine to certain biofertilizer sources

Review of literature

Parida *et al.* (1994) studied the influence of NPK on the growth of Robusta banana and observed increased plant height, stem girth, leaf number as well as shorter duration for shooting with increasing rates of each fertilizer. They reported that nitrogen had the greatest effect on height, girth and time to shooting.

Patel and Pandey (1998) reported that application of 450 g N + 450 g K plant⁻¹ to banana cv. Robusta has recorded highest plant height (2.84 m), pseudostem girth (54.16 cm) and higher number of leaves (23.43) at flowering, while application of 450 g N and 300 g K plant⁻¹ has reduced the duration of the crop and time taken for flowering.

Saad and Atawia (1999) applied K₂O @ 800g plant⁻¹ year⁻¹ to banana cv. Grand Naine and recorded maximum pseudostem height, girth and improvement in bunch weight, number of hands and fingers bunch⁻¹ as well as fruit physical and chemical characters (quality).

Hammam (2003) recorded maximum pseudostem height (300.6 cm), girth (97.9 cm) and total leaf area (35.0 m²) in banana plants cv. Williams with the application of 400 g of inorganic N fertilizer and 200 g microbein (phosphorus solubilizing bacteria- *Bacillus megatherium* and N-fixing bacteria- *Azotobacter sp.*) plant⁻¹.

Pandey *et al.* (2005) reported that the application of 300 g nitrogen, 100g phosphorus and 300g potassium plant⁻¹ has resulted in maximum plant (164.03 cm), pseudostem circumference (58.5 cm) and leaf size in banana cv. Robusta at shooting.

Nalina and Kumar (2007) observed positive response in plant growth in terms of height and girth and also recorded higher number of functional leaves at shooting stage with shorter phyllochron, greater leaf area and leaf area index and also noticed lesser number of days for shooting and harvest with the application of N @ 165 g, P @ 52.5 g and K @ 495 g plant⁻¹ to banana cv. Robusta.

Indira and Nair (2008) conducted a field experiment to standardize the requirement of NPK for banana cv. "Njalipoovan" (Musa AB group) and reported an improvement in the growth and yield with the increased application of N (100, 200 and 300 g plant⁻¹), P₂O₅ (100, 200 and 300 g plant⁻¹) and K₂O (200, 400 and 600 g plant⁻¹). They recommended application of N, P₂O₅ and K₂O at 200:200:400 g plant⁻¹ to obtain higher yields and benefit: cost ratio.

Pandey (2008) observed maximum pseudostem height and stem circumference in banana cv. Rasthali (AAB) with application of 75% RDF (recommended dose of fertilizers) in N: P: K ratios at 3:2:1, 1:3:2 and 2:1:3 at the vegetative stage, flowering stage and fruit development to maturity stage respectively.

Nalina *et al.* (2009) obtained higher number of functional leaves at shooting stage with shorter phyllochron, higher leaf area and leaf area index in tissue culture banana cv. Robusta with the application of N @ 165 g, P @ 52.5 g and K @ 495 g plant⁻¹.

Pandit *et al.* (2011) conducted a study to standardize the most suitable dose of fertilizer combination for banana cv. Dwarf Cavendish with 200, 300 and 400 g nitrogen plant⁻¹ through ammonium sulphate, 150, 300, 450 g phosphorus plant⁻¹ through single super phosphate and 150, 200, 250 g potassium plant⁻¹ through muriate of potash. The results showed that increasing doses of nitrogen and phosphorus has resulted

in maximum pseudostem height, while increasing doses of phosphorus and potash has resulted in maximum pseudostem girth and reduced the duration of fruit maturity whereas, increasing doses of nitrogen and potassium has resulted in maximum leaf area.

Kuttimani *et al.* (2013) the results revealed that application of 100% recommended dose of fertilizer along with 40% Wellgro soil recorded the maximum number of hands (10.2 and 10.3), number of fingers (136.3 and 145.2), bunch weight (23.9 and 25.3 kg/plant) and total yield (72.8 and 77.1 t/ha) during 2010-11 and 2011-12, respectively. Similarly, net income and B: C ratio was also influenced by integrated nutrient management practices during both years of study. Hence, integrated nutrient management practices have been found to be an ideal option to improve yield and economics of banana under soil and climatic conditions of Western zone of Tamil Nadu.

Materials and Methods

The present investigation on “Influence of certain nutrient management practices on phenology, yield and quality in banana cv. Grand Naine” will be conducted in university field, Department of Horticulture, Lovely Professional University, Phagwara during the year 2017-18.

The details of experimental materials and methodologies are furnished below.

Experimental details

The experiment is planned for conduction from March, 2017 to April, 2018.

Banana Cultivar	: Grand Naine
Spacing	: 1.8 X 1.8 m
Number of treatments	: 8
Number of replications	: 3
Design of experiment	: RBD

TREATMENT DETAILS

T ₁	= Control [regular practice with RDF]
T ₂	= 100% RDF + VAM (250g/plant)
T ₃	= 100% RDF+ PSB (50g/plant)
T ₄	= 100% RDF + Azotobacter (50g/plant)
T ₅	= 100% RDF + EM solution (20 ml per litre of water)
T ₆	= 100% RDF + Azospirillum (200g/plant)
T ₇	= 100% RDF + Azotobacter (50g/plant) + PSB (50g/plant)
T ₈	= 100% RDF + Azospirillum (200g/plant) + PSB (50g/plant)

All biofertilizers were provided at 2nd, 4th, 6th MAP in all the above indicated treatments.

OBSERVATIONS TO BE RECORDED

A. Phenological traits

- Plant Height (cm)
- No. of leaves per plant
- Pseudostem girth (cm)
- Leaf length (cm)
- Leaf width (cm)
- Duration from planting to flowering

Results and Discussion

During this semester, as per the proposed plan, the work activity commenced by March, 2017 with the planting of banana plantlets propagated with tissue culture technique on 25/03/2017. The following activities were performed from August 2017 to November, 2017.

1. Performance of interculture activities

The intercultural activities like manual weeding, earthing up and irrigation were performed once in every 15 days interval, in order to regulate the crop growth and development

2. Manuring

Fertilization with 450 g urea (200 g N) and 350 g muriate of potash (210g K₂O) in 5 split doses were applied during April, May, June, July, August and September as follows,

Fertilizer schedule for Banana cv Grand Naine

Month	Dose per plant (g)		
	Urea	DAP	MOP
February-March*	-	190	-
May	60	-	60
June	60	-	60
July	80	-	70
August	80	-	80
September	80	-	80

*At the time of planting.

3. Performance of special practices

During the initial growth phase, desuckering was performed with the removal of side suckers every month. In order to provide better nutrient supply to main crop and also for betterness in rhizome development, desuckering is found to be essential.

4. Problems observed

Tobacco Caterpillar: It was observed during September-October. They caused damage both to upper and lower surface of leaf blades while full grown caterpillars (solitary) and eat up the central whorl of plant. So, the cultural technique of collection and destroy of caterpillars by plucking the infested leaves were performed. In addition, spray of 1000 ml quinalphos per 500 litres of water concentration was given on the appearance of the pest.

Work done

The phenological characters *viz.*, Plant Height (cm), No. of leaves per plant, Pseudostem girth (cm), Leaf length (cm), Leaf width (cm) and Duration from planting to flowering in banana plants under all treatments were recorded at the time of panicle emergence.

Phenological characters

Treatments	Plant Height (cm)	No. of leaves per plant	Pseudostem girth (cm)	Leaf length (cm)	Leaf width (cm)	Duration from planting to flowering
T ₁	272.36	14.68	48.32	187.48	42.70	225.16
T ₂	314.74	16.82	51.80	240.66	58.22	213.72
T ₃	306.48	16.62	50.44	204.42	51.64	217.20
T ₄	321.67	16.83	51.72	202.88	49.44	212.10
T ₅	340.12	16.96	54.88	206.66	54.72	205.68
T ₆	388.64	16.85	55.74	234.54	53.60	199.42
T ₇	385.42	17.58	53.80	221.22	57.34	205.22
T ₈	403.33	17.30	56.26	236.33	57.95	197.33
Mean	341.60	16.71	52.87	216.77	53.20	206.16

Based on the observations of above mentioned parameters, the treatment T8 [100% RDF + Azospirillum (200g/plant) + PSB (50g/plant)] found to express good performance in majority of traits in phenological characters.

Observations on yield and quality related traits are yet to be recorded in upcoming days of the research programme.



View of experimentation plot



Recording of observation parameters in banana cv. Grand Naine



Panicle emergence in banana cv. Grand Naine

REFERENCES

- Archana, U. and Sivachandiran, S. (2015).** Effect of Application of Gibberellic Acid on Shelf life of Banana. *International Journal of Research in Agriculture and Food Sciences*. Vol. 3, No. 01.
- Athani, S. I. and Hulamani, N. C., (1998).** Preharvest Treatment Effect on Crop Maturity and Yield of Banana cv. Rajapuri. *Karnataka J. Agric. Sci.* 12(1-4): 234-235.
- Biswas, P. K. and Pait, M. (2012).** Studies on bunch culture practices to optimize bunch and finger characters in banana (Mussa AAA Robusta). *International Journal of Farm Sciences*. 2(2): 1-6.
- Duguma, T. Egigu, M. C. and Muthuswami, M. (2014).** The Effects of Gibberellic Acid on Quality and Shelf Life of Banana (Musa spp.). *Int J Cur Res Rev*. 6:23.
- Ebeed, S, Mostafa, E.A.M. and Saleh, M.M.S. (2008).** Effect of Gibberellic Acid and Male Bud Removal on Yield and Fruit Quality of Banana Plants. *Research Journal of Agriculture and Biological Sciences*. 4(4): 289-292.
- Kumar, J. P., Amutha, R. and Balamohan, T.N. (2010).** Nutrients Bioregulator Interaction effects on Banana. *Acta Horti. (ISHS)*. 884:517-574.
- Lima, J. D., Rosa, J. S., Rozane, D. E., Gomes, E. N., Silva, S. H. M. G. D. (2016).** Changes in the characteristics of 'Prata' Banana treated with Cytokinin and Gibberellin. *Revista Brasileira de Fruticultura*. Volume 38; doi:10.1590/0100-29452016379.
- Mulagund, J. , Kumar, S. , Soorianathsundaram, K. and Porika, H. (2015).** Influence of postharvest sprays of Sulphate of Potash and certain growth regulators on bunch characters and fruit yield of banana cv. Nendran. *Department of Fruit Crops, Horticulture College and Research Institute, Tamil Nadu Agriculture University, Coimbatore - 641 003, Tamil Nadu, INDIA*.
- Shirgavi, Y. S., Hulamani, N. C., Patil, S. N. and Athani, S. I. (2000).** Shelf-life and organoleptic quality of Banana cv. Rajapuri as influenced by pre-harvest bunch sprays of growth regulators.
- Vargas, A. and Lopez, J. A. (2011).** Effect of Dose Rate, Application Method and Commercial Formulations of GA₃ on Banana (Musa AAA). *Fruit Green Life, Corporation Bananera Nacional, Apdo 390-7210, Guapiles, Costa Rica*.
- Velayudham, K. Somasundaram, E. & P. Muthukrishnan. 2013.** Effect of Integrated Nutrient Management on Yield and Economics of Banana. *G.J.B.A.H.S.* Vol.2 (4):191-195
- Yadlod, S. S. and Kadam, B.A. (2008).** Effect of the plant growth regulators and micronutrients on growth, yield and storage life of banana (Musa spp) cv. SHRIMANTI. *The Asian Journal of Horticulture*. 3(2): 409-411.