

RESEARCH PROGRAMME

Studies on various pre-harvest sprays on bunch development, yield and quality of banana cv. Grand Naine under Punjab conditions

DISSERTATION -II REPORT

BY

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**In partial fulfillment for the award of the degree
Of
Master of Science (Fruit Science)**

**Under the guidance of
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CERTIFICATE

Certified that this synopsis of Pardeep Singh registration no.11615293 entitled '**Studies on various pre-harvest practices on bunch development, yield & quality of Banana cv. Grand Naine under Punjab conditions**' has been formulated and finalized by the student himself on the subject.

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Introduction

Banana is one of the most important fruit is used in different regions as staple food owing to its rich and easily digestible carbohydrates. The scientific name of banana is *Musa species* and belongs to family Musaceae. Banana fruits are rich source of minerals like magnesium, sodium, potassium and phosphorus and fair source of calcium and iron. Ripe fruits are delicious and are used for table purpose .The immature fruits are used for vegetable. Many products are made from banana such as chips, soft drink, flour and jam.

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, Uttar Pradesh, West Bengal and Assam are major banana growing states. The plant grows well under high rainfall areas an average 100 mm rainfall per month appears to be satisfactory for growth of banana. Banana grow in a variety of soils provided soil moisture is available. Deep well drained, friable loamy soil with adequate organic matter is ideal for its cultivation. In Punjab, it is suitable for growing in wet area, river banks and central zone comprising Moga, Ludhiana, Fatehgarh Sahib, Sangrur and Barnala districts.

The plant growth regulators like GA, NAA, 2,4-D, ethrel, 2,4,5-T etc are useful in banana cultivation for improving yield and quality. The cultivars differ in their response to growth regulators. The bunch cultural practices involve the use of various combinations of hormonal and nutrient resources as well as cultural operations in order to increase bunch yield and improve finger characters. Development of bunch cultural practices benefits the growers for increasing and sustaining productivity and income.

In India, people prefer fresh fruits instead of canned products. Banana is also one of the fruits, people prefer fresh, the economics of banana depends on the cost of transportation and storage. Pre harvest practices in banana found to be an important aspect of banana trade. Early and even maturity of bunches are the immediate needs of the banana growers of the region. In this view, an experiment gets formulated to study the effect of plant bioregulators and micronutrients on growth, 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 bioregulators and micronutrients on banana production
- To observe the response of banana cv. Grand Naine to certain pre-harvest practices.

Review of literature

Athani and Hulamani (1998) reported that spraying of 2,4-D @ 30 ppm, 7 days after shooting can be adopted for early maturity and higher yields. According to Shirgavi *et al.* (2000), the shelf-life of fruits of banana cv. Rajapuri greatly influenced with several growth regulator treatments. Application of GA (100 ppm) extended the shelf-life by 6 days followed 2, 4-D (30 ppm) by 3 days while the ethrel (0.25 and 0.5 ml-1) marked influence on early ripening.

Ebeed *et al.* (2008) observed that in banana cv. Grand Naine bunches were sprayed twice (just after emergence of the last hand and one 3 month later) with GA at 100 and 200 ppm in presence or with removing male bud. Results revealed that removing male bud and spraying GA had a positive effect on improving yield and fruit quality .

Jeyakumar *et al.* (2010) reported that the soil application of 300:50:300 g NPK plant-1 and bunch spray of CPPU 4 ppm immediately after last hand opening and 15 days after resulted in heavier bunch (26.2 kg). Bunch spray of CPPU 4 ppm immediately after last hand opening and 15 days after resulted in higher TSS (23°B) and reduced titrable acidity (0.32%), apart from higher bunch weight.

Biswas and Minontipait (2012) made an investigation to standardize a suitable bunch cultural practices for improving bunch and finger characters of banana variety Robusta. The results showed that bunch shape index and finger girth increased when the treatment of removal of two apical hands along with spraying of 50 ppm GA one month after bunch emergence was given. The finger length and number of fingers falling in the acceptable range were also improved by application of GA 50 ppm clubbed with dehanding of one or two apical hands.

Duguma *et al.*, (2014) evaluated the efficiency of postharvest treatments to improve the storage of banana fruits by using gibberellic acid (GA3) and reported that the mature green banana fruits were treated by immersion in 100, 200 and 300ppm of GA3 for 15 minutes. This indicate that gibberellic acid prevent the fruit ripening. Therefore, postharvest application of gibberellic acid was an efficient method to delay banana fruit ripening. As gibberellic acid concentration increases, ripening further delayed.

Archana and Sivachandran (2015) conducted a study to assess the effects of gibberellic acid (GA3) on extending shelf-life of banana cultivar 'Kathali'. They reported that 500 ppm and 750 ppm GA3 levels significantly extended the shelf-life of Kathali cultivar of banana by 4 and 5 days, respectively. Increased concentration of GA3 may result in extending shelf-life further.

Mulagund *et al.* (2015) made a study in banana cv. Nendran and observed that combined post-shoot application of SOP (2%) with 2 ppm Brassinosteroid improved the bunch characters and fruit yield in economically cost viable.

Lima *et al.*, (2016) conducted an experiment to evaluate the effect of cytokinin and gibberellin on agronomic and physicochemical characteristics of banana cv. 'Prata' (Musa spp. AAB), according to the

formation period and position in the bunch. Treatments consisted of 2 pulverizations with water, 150 mg L⁻¹ cytokinin, 200 mg L⁻¹ of gibberellic acid, 100 mg L⁻¹ of cytokinin plus 200 mg L⁻¹ of gibberellic acid and 200 mg L⁻¹ of cytokinin plus 200 mg L⁻¹ of gibberellic acid, applied from the fourth to the last hand of the bunch. Cytokinin and gibberellin, alone or associated, regardless of formation period and position, did not affect the size and physicochemical characteristics of fruits, only delayed the bunch harvest.

Materials and methods

The ongoing investigation on “Studies on various pre-harvest practices on bunch development, yield and quality of Banana cv. Grand Naine under Punjab conditions” under performance in university farm, Lovely Professional University, Phagwara during the year 2017-18.

The details of experimental materials and methodologies adopted during the course of study 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	: 9
Number of replications	: 3
Design of experiment	: RBD
Degree of freedom	: 14

TREATMENT DETAILS

T ₁	= GA ₃ (30 ppm)
T ₂	= GA ₃ (60 ppm)
T ₃	= IAA (25 ppm)
T ₄	= IAA (50 ppm)
T ₅	= CPPU (1 ppm)
T ₆	= CPPU (2 ppm)
T ₇	= BR (1 ppm)
T ₈	= BR (2 ppm)
T ₉	= Control (Water spray)

OBSERVATIONS TO BE RECORDED

A. Plant Characters

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

- Duration from flowering to harvest

B. Fruit Characters

- Bunch weight (Kg)
- No. of hands per bunch
- No. of fingers per hand
- Finger length (cm)
- Finger girth (cm)
- Finger weight (g)
- Yield per acre (Kg / ac)
- Yield per hectare (Kg/ha)
- Bunch length (cm)
- Internodal length of bunch (cm)
- Pulp weight (gm)
- Peel weight (gm)
- Pulp: peel ratio

C. Fruit Quality Characters

- TSS (°B)
- Titrable Acidity (%)
- Total Sugars (%)
- TSS: Acid ratio
- Reducing sugars (%)
- Non Reducing sugars (%)

Results and Discussion

In this semester, as per the proposed plan, the work commenced at 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 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 equal 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. Gregarious caterpillars caused damage both on upper and lower surface of leaf blades while full grown caterpillars (solitary) eat up the central whorl of plant. So, the cultural technique of collection and destroy of gregarious caterpillars by plucking the infested leaves performed. In addition, spray of 1000 ml quinalphos per 500 litres of water concentration was given on the appearance of the pest.

Work done

- In addition to the previously indicated practices, plant characters *viz.*, Plant Height (cm), Pseudostem girth (cm), No. of leaves per plant, leaf length (cm), leaf width (cm) were recorded at monthly interval. Apart, commencement of flowering was also recorded on those plants that shown flower emergence.

Plant characters

Parameters	August	September	October	November	Mean
Plant height (cm)	122.84	165.37	208.52	256.68	188.35
Pseudostem girth (cm)	28.77	36.54	43.20	49.36	39.47
No. of leaves per plant	7.23	11.80	13.42	14.22	11.67
Leaf length (cm)	55.66	85.95	132.64	144.05	104.58
Leaf width (cm)	24.30	31.06	36.40	38.15	32.48
Commencement of flowering	Nil	Nil	Yes	Yes	Not applicable

Observations on yield and quality related traits would commence after the application of pre harvest treatments as per programme in upcoming days of the study period.



Fig. View of experimentation plot of banana cv. Grand Naine

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