

## Original Research Article

# Effect of Different Levels of Phosphorus on Growth and Yield of Banana cv. Grand Naine

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## ABSTRACT

A field experiment was conducted at Banana Research Station, Nanded during 20012-13 to investigate the effect of different levels of phosphorus on growth and yield of banana. The experiment was conducted in Randomised Block Design with four replications and six treatments. There were five levels of phosphorus viz., T<sub>1</sub>. Application of 40 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>2</sub>. Application of 80 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>3</sub>. Application of 120 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>4</sub>. Application of 160 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>5</sub>. Application of 200 g P<sub>2</sub>O<sub>5</sub>/plant and T<sub>6</sub>. Control (No application of phosphorus). The recommended packages of practices of banana were adopted during investigation. Significantly maximum number of hands (8.02), weight of finger (139.81g), length of finger (19.88cm), girth of finger (13.00cm), weight of bunch (19.13kg) and Banana yield (83.28Mt/ha) was recorded by treatment T<sub>5</sub> i.e. application of 200 g P<sub>2</sub>O<sub>5</sub>/plant and were found at par with treatment T<sub>4</sub> i.e. application of P<sub>2</sub>O<sub>5</sub> of 160 g (81.67Mt/ha) as compared to rest of the phosphorus levels treatments under study.

### Keywords

Phosphorus,  
Banana, Grand  
Naine

## Introduction

In India, banana is the important and highly remunerative fruit crop grown in tropical and subtropical region. It represents the second most important fruit crop after mango in India. In banana production acceptability quality fertilizer input is decisive time and management involving appropriate time and great importance. Studies on quantitative nutrient and fertilizer utilization is lacking further there is a general consensus that all the required fertilizer need to be applied before flower bud initiation (Simmonds 1982). Banana crop needs sufficient fertilizer for higher production. Evidence available on response

of banana to phosphorus indicates that growth and productivity are affected if nutrient are not supplied in optimum quantity (Murray, 1960; Singh et al., 1990). The phosphorus is important for growth of plant. As Indian soils are deficient in phosphorus, the choice and dosage of nutrient to be applied depends on cultivar inherent soil fertility stage of plant growth climate. The better vegetative growth ensures better bunch development. High fertilization requirement of banana is mainly due to its rapid and vigorous growth and high fruit yield. Grand Naine is a popular variety of banana grown mostly in all export

orientation countries of Asia. It has proved better variety (Singh and Chundawat 2002). However its requirement of nutrient inorganic fertilizer is not well documented. The optimum requirement of phosphorus has not been worked out in Marathwada region in Maharashtra. Keeping this in mind the present investigation "Effect of different levels of phosphorus on growth and yield of Banana." were planned to gather the much needed information on nutrient management in banana.

### **Materials and Methods**

The Field experiment was conducted at Banana Research Station, Nanded, VNMKV, Parbhani, during 2012. The experiment was conducted in randomized Block Design with four replication and six treatments. The recommended spacing 1.5 x 1.5 was used and recommended doses of N and K were used. the treatment details were T<sub>1</sub>. Application of 40 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>2</sub>. Application of 80 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>3</sub>. Application of 120 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>4</sub>. Application of 160 g P<sub>2</sub>O<sub>5</sub>/plant, T<sub>5</sub>. Application of 200 g P<sub>2</sub>O<sub>5</sub>/plant and T<sub>6</sub> - Control (No application of phosphorus). ½ dose of each treatment were applied after 30 days of planting and remaining ½ dose was applied after 30 days after planting. All recommended package of practices were adopted during experimentation. The data were recorded on growth and yield characters.

### **Results and Discussion**

The effect of various levels of phosphorus on vegetative growth was observed in terms of pseudostem height, girth of stem, Number of leaves. The uniform vigour plants selected and recorded observation. The results were obtained are presented and discussed below. The data pertaining to the

effect of phosphorus fertilizer on pseudostem height is presented in Table 1 revealed that the significant differences were observed in height of plant and girth of stem. Significantly maximum plant height (180.19 cm) and girth of stem (62.63 cm) were recorded by the treatment T<sub>4</sub> i.e. application of 160 g P<sub>2</sub>O<sub>5</sub> per plant followed by the treatment T<sub>5</sub> i.e. application of phosphorus 200 g P<sub>2</sub>O<sub>5</sub> per plant and were found at par with each other as compared with rest of the levels of phosphorus under study.

The data presented in Table 2 revealed that the significant differences were observed in weight of bunch, number of hands/bunch, weight of fruit length of fruit, girth of fruit and banana yield significantly maximum weight of bunch was recorded by the treatment T<sub>4</sub> i.e. application of phosphorus 160 g/plant (19.13 kg) followed by the treatment T<sub>5</sub>. Application of phosphorus 200 g/plant (18.74 kg) which were found at par with each other. Significantly maximum number of hands was recorded by the treatment T<sub>5</sub> i. e. application of phosphorus @ 200 g/ plant (8.02) and treatment T<sub>4</sub> i.e. application of phosphorus @ 160 g/plant (7.87). Maximum weight of fruit (139.81), length of fruit (19.88 cm) and girth of fruit (13.00 cm) were recorded by the treatment T<sub>4</sub> i.e. application of phosphorus @ 160 g / plant which were found at par with the treatments T<sub>5</sub> i.e. application of phosphorus @ 200 g/ plant and significant superior over rest of the treatment and control under study.

Significantly maximum banana yield was recorded by the treatment T<sub>5</sub> i.e. application of phosphorus @ 200 h/plant (83.28 mt/ ha) treatment T<sub>4</sub> i.e. application of phosphorus @ 160 g/plant (81.67 Mt/ha) and treatment T<sub>3</sub> i.e. application of phosphorus @ 120 g/plant (79.35 Mt/ ha) which were found at par with each other as compared with rest of

the treatments and control under study. Results for number of fingers/bunch, pulp/peel ratio and TSS (%) were found non-significant. The maximum plant height (180.19 cm) and girth of stem (62.63cm) were recorded by the treatment i.e. application of 160 g P<sub>2</sub>O<sub>5</sub> per plant followed by the treatment T<sub>5</sub> i.e. application of phosphorus 200 g P<sub>2</sub>O<sub>5</sub> per plant. Results are supported by Khalid and Rashid (2009) and Tirckey *et al.*, (2003). The increased height and girth of plant might be due to the additional dose of nutrient phosphorus supplied through single super phosphate which was utilized by plants.

Significantly maximum banana yield was recorded by the treatment T<sub>5</sub> i.e. application of phosphorus @ 200 g/plant (83.28 mt/ ha) treatment T<sub>4</sub> i.e. application of phosphorus @ 160 g/plant (81.67 Mt/ha) and treatment T<sub>3</sub> i.e. application of phosphorus @ 120 g/plant (79.35 Mt/ ha) which were found at

par with each other as compared with rest of the treatments and control under study. The increases in bunch weight by increasing phosphorus (200g/plant) and 160g/ plant could be attributed largely increased growth, higher bunch weight, more number of fingers per bunch which might have been increased by timely availability of the nutrients at critical stages which enhance photosynthesis that lead to accumulation of more carbohydrates and other metabolites ultimately translocation towards the accordance with the findings Navaneethkrishana *et al.*, (2013) and Khalid and Rashid (2009). Phosphorus increased the growth and which improved ATP formation thus providing more physiological efficiency to the plant which in directly helped in better yield. Increased in yield in the treatment T<sub>4</sub> and T<sub>5</sub> could be attributed to increase in morphological traits and also higher nutrient uptake by the plants Navaneethkrishnan *et al.*, (2013).

**Table.1** Effect of different phosphorus levels on growth characters of banana cv. Grand Naine

Treatment	Height of plant (cm)	Girth of stem (cm)	No. of leaves/ plant
T <sub>1</sub>	162.35	53.35	13.0
T <sub>2</sub>	160.25	56.36	13.0
T <sub>3</sub>	169.76	54.33	13.15
T <sub>4</sub>	180.19	62.63	13.87
T <sub>5</sub>	177.81	60.85	13.12
T <sub>6</sub>	161.11	53.11	12.50
SE ±	1.78	1.87	0.23
CD at 5%	5.35	5.62	NS

**Table.2** Effect of different phosphorus levels on yield and yield attributes of banana cv. Grand Naine

Treatments	Bunch attributes			Fruit attributes			Yield/ mt/ ha	Quality	
	Weight of bunch (kg)	No of hand/ bunch	No. of fingers/ bunch	Weight of fruit (gm)	Length of fruit (cm)	Girth of fruit (cm)	Banana yield mt/ ha	Pulp : peel	TSS (%)
T <sub>1</sub>	17.60	7.42	122.75	121.88	18.40	11.40	73.73	1:2.08	22.62
T <sub>2</sub>	17.66	7.52	121.50	123.06	18.72	12.05	76.28	1:2.22	23.25
T <sub>3</sub>	17.85	7.82	122.00	130.15	18.46	12.44	79.35	1:2.26	22.87
T <sub>4</sub>	19.13	7.87	127.00	139.81	19.88	13.00	81.67	1:2.59	23.37
T <sub>5</sub>	18.74	8.02	128.50	138.85	19.02	12.82	83.28	1:2.39	22.87
T <sub>6</sub>	16.45	7.25	120.50	118.11	16.44	10.87	73.62	1:2.00	22.37
SE ±	0.151	0.718	2.590	1.59	0.570	0.222	1.57	0.155	0.50
CD5%	0.454	0.216	NS	4.79	1.71	0.669	4.56	NS	NS

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