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## Effect of foliar application of different nutrients on maturity parameters, finger and bunch characteristics and yield of banana cv. grand naine

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**Abstract**

The field experiment was laid out in Randomized Block Design (RBD) with thirteen treatment viz., T<sub>0</sub> control, T<sub>1</sub> KH<sub>2</sub>PO<sub>4</sub> 0.25% + 1% urea, T<sub>2</sub> KH<sub>2</sub>PO<sub>4</sub> 0.5% + 1% urea, T<sub>3</sub> KH<sub>2</sub>PO<sub>4</sub> 0.75% + 1% urea, T<sub>4</sub> SOP 1.0% + 1% urea, T<sub>5</sub> SOP 1.5% + 1% urea, T<sub>6</sub> SOP 2.0 % + 1% urea, T<sub>7</sub> KNO<sub>3</sub> 0.5%, T<sub>8</sub> KNO<sub>3</sub> 1.0%, T<sub>9</sub> KNO<sub>3</sub> 1.5%, T<sub>10</sub> 19:19:19 (1%), T<sub>11</sub> 19:19:19 (2%) and T<sub>12</sub> 19:19:19 (3%), with three replications. Observations on maturity and yield attributes of individual treatments were recorded. The results obtained for maturity parameters, fingers characteristics, bunch parameters, yield attributes had significant influence due to foliar application of various nutrients. The treatment T<sub>6</sub> i.e. foliar application SOP 2.0% + 1% urea was found significantly superior in yield contributing attributes as compared with other nutrient treatments. The maximum weight of finger (156.00 g), circumference of finger (12.93 cm), length of finger (21.00 cm), weight of bunch (17.66 kg) and yield (78.50 Mt/ha) was recorded in treatment T<sub>6</sub> i.e. SOP 2.0 % + 1% urea.

**Keywords:** banana, KH<sub>2</sub>PO<sub>4</sub>, grand naine, SOP, urea, KNO<sub>3</sub>

**Introduction**

Banana (*Musa sp.*) is an important fruit crop of tropical countries like India, China, Brazil, Philippines etc., Belongs to Musaceae family and *Musa* genus to the order Zingiberales. Banana is native to tropical South and Southeast Asia. In India banana are known for its antiquity and are interwoven with Indian heritage and culture. The plants are considered as the symbol of prosperity and fertility. Owing to its greater socio-economic significance and multifaceted uses banana is popularly known as *Kalpataru* (A plant with virtues). It is tree that all parts of the plant including leaves, pseudostem, flower bud and corn can be used in one or another way (Chaddha, 1974).

Banana is cultivated in the world in an area 4.80 million ha. with global production 99.99 million Mt (Anon., 2014)<sup>[2]</sup>, having 20.8 Mt/ha productivity. In which India contribute 29 per cent and ranked first in area and production of banana in the world. Beside India, China ranked second, whereas, Philippines ranked third country in the production, contributing 10 per cent and 9 per cent, respectively. Other major banana producing countries are Ecuador (8%), Brazil (7%), Indonesia (6%), Tanzania (3%), Guatemala (3%), Mexico (2%) and Colombia (2%) (Anon., 2014)<sup>[2]</sup>.

In India banana is one of the major and economically important crop, the second largest growing fruit crops that of Mango, occupy 20 per cent area among the total area under crop. Total area under banana crop is 830,000 ha. and total production is 29.78 million Mt. with productivity 37.0 Mt/ha and production share of major fruit crops in India is 33.4 per cent. (Anon., 2014)<sup>[2]</sup>.

The largest area under banana cultivation in India is in Tamil Nadu state (118,400 ha) followed by Karnataka (102,800 ha), Maharashtra (83,000 ha), Andhra Pradesh (90,300 ha), Gujarat (64,700 ha), Assam (50,600 ha), West Bengal (45,000 ha), Madhya Pradesh (38,100 ha), Uttar Pradesh (32,400 ha) and Bihar (34,900 ha). Maximum productivity was recorded in Tamil Nadu (47.9Mt/ha) followed by Gujarat (63.5Mt/ha) and Maharashtra (58.2Mt/ha) due to adoption of improved crop management techniques (Anon., 2014)<sup>[2]</sup>.

Maharashtra is the second highest banana producer state in India, with 4.30 million Metric tonnes production in an area 83,000 ha. With 58.5 Mt/ha productivity and share 15.45 per cent

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production of total banana production in India (Anon., 2014) [2]. The banana cultivars grown in Maharashtra are Dwarf Cavendish, Basrai, Robusta, Grand Naine, Ardhapuri, Lal Velchi, Safed Velchi etc. In Marathwada region, total area under banana is 1,13,288 ha (Anony, 2014) [2] which comprising in Nanded, Parbhani and Hingoli district.

Potassium is considered as major nutrient in banana cultivation. It involves in all the metabolic process in the plant and there is considerable evidence to show that, this element plays an important role in photosynthesis and helps in building up of carbohydrate in the plant. The production of dry matter is further affected by the effect of potassium on rate of respiration. The potassium deficient plants have greater respiratory rate leading to a decrease in dry matter production.

The nitrogen and potassium are the two major nutrients essential to increase the yield and quality of the banana along with other essential elements. These nutrients required by the plant during its peak growth phases and after shooting, the rate of nutrient uptake slows down (Veerannah *et al.*, 1976) [5]. But it should supply to the plant in an optimum quantity. Excess or deficiency of these nutrients may also lead to reduction in yield and deterioration in quality of the banana fruit.

### Methodology

The field study was carried out at the field of Banana Research Station, Nanded, under VNMKV Parbhani during the year 2014-15. The experiment was laid out in Randomized Block Design (RBD) with thirteen treatments, details given below:-

Treatment No.	Nutrients (%)
T <sub>0</sub>	Control
T <sub>1</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.25 % + 1% urea
T <sub>2</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.5 % + 1% urea
T <sub>3</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.75 % + 1% urea
T <sub>4</sub>	SOP 1.0 % + 1% urea
T <sub>5</sub>	SOP 1.5 % + 1% urea
T <sub>6</sub>	SOP 2.0 % + 1% urea
T <sub>7</sub>	KNO <sub>3</sub> 0.5%
T <sub>8</sub>	KNO <sub>3</sub> 1.0%
T <sub>9</sub>	KNO <sub>3</sub> 1.5%
T <sub>10</sub>	19:19:19 (1%)
T <sub>11</sub>	19:19:19 (2%)
T <sub>12</sub>	19:19:19 (3%)

## Results and Discussion

### 1. Maturity parameters

#### 1.1 Days required from flowering to maturity

The data revealed that the days required from flowering to maturity had significant, which is presented in Table 1. Significantly minimum number days required for maturity (109.66 days) were recorded in the treatment T<sub>6</sub> i.e. SOP 2.0% + 1% urea. The maximum number of days required from flowering to maturity (121.33 days) was recorded in treatment T<sub>0</sub> i.e. control.

#### 1.2 Crop duration (days)

The data on crop duration presented in Table 1. The results obtained for crop duration had non-significant. However, the Minimum crop duration (333.00 days) required for the completion of crop duration in treatment T<sub>6</sub> i.e. spraying of SOP 2.0% + 1% urea. Whereas the maximum crop duration (366.33 days) were required for completion of crop duration in the treatment T<sub>0</sub> i.e. control.

**Table 1:** Effect of foliar application of different nutrients on maturity parameters of banana cv. Grand Naine.

Treat. No.	Treatment Details	Days require from flowering to maturity	Crop duration (Days)
T <sub>0</sub>	Control	121.33	366.33
T <sub>1</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.25 % + 1% urea	120.33	344.33
T <sub>2</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.5 % + 1% urea	118.00	341.33
T <sub>3</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.75 % + 1% urea	116.66	339.66
T <sub>4</sub>	SOP 1.0 % + 1% urea	112.00	337.00
T <sub>5</sub>	SOP 1.5 % + 1% urea	112.00	335.66
T <sub>6</sub>	SOP 2.0 % + 1% urea	109.66	333.00
T <sub>7</sub>	KNO <sub>3</sub> 0.5%	115.66	345.66
T <sub>8</sub>	KNO <sub>3</sub> 1.0%	114.33	342.66
T <sub>9</sub>	KNO <sub>3</sub> 1.5%	115.00	341.00
T <sub>10</sub>	19:19:19 (1%)	114.66	354.33
T <sub>11</sub>	19:19:19 (2%)	116.00	355.00
T <sub>12</sub>	19:19:19(3%)	115.33	354.00
	S.E.±	0.638	12.269
	C.D.at 5%	1.874	N.S.

## 2. Finger Characteristics

### 2.1 Number of fingers per hand

The results for number of fingers per hand was not significantly influenced by the different treatment. However, the maximum number of fingers per hand (16.66) were

observed in the treatment T<sub>6</sub> i.e. spraying of SOP 2.0% + 1% urea. Whereas, the minimum number of fingers per hand (14.33) was recorded in treatment T<sub>10</sub> i.e. 19:19:19 (1%).

The different finger characteristics of banana cv. Grand Naine have been presented in Table 2.

**Table 2:** Effect of foliar application of different nutrients on finger characteristics of banana cv. Grand Naine.

Treat. No.	Treatment Details	Number of fingers/hand	Length of finger (cm)	Weight of finger (g)	Circumference of finger (cm)
T <sub>0</sub>	Control	15.00	19.00	128.33	7.50
T <sub>1</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.25 % + 1% urea	15.00	20.00	140.00	8.16
T <sub>2</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.5 % + 1% urea	16.00	19.66	142.00	9.16
T <sub>3</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.75 % + 1% urea	15.33	20.66	147.33	9.43
T <sub>4</sub>	SOP 1.0 % + 1%urea	15.66	21.00	148.66	10.50
T <sub>5</sub>	SOP 1.5 % + 1%urea	16.00	20.33	152.33	11.04
T <sub>6</sub>	SOP 2.0 % + 1%urea	16.66	20.33	156.00	12.93
T <sub>7</sub>	KNO <sub>3</sub> 0.5%	15.33	18.33	134.33	10.83
T <sub>8</sub>	KNO <sub>3</sub> 1.0%	15.00	18.00	137.33	11.50
T <sub>9</sub>	KNO <sub>3</sub> 1.5%	14.66	17.00	140.66	10.83
T <sub>10</sub>	19:19:19 (1%)	14.33	18.66	139.33	11.16
T <sub>11</sub>	19:19:19 (2%)	15.66	17.00	143.33	10.33
T <sub>12</sub>	19:19:19 (3%)	15.00	18.00	139.00	10.33
	S.E.±	0.592	0.556	2.288	0.316
	C.D. at 5%	N.S.	1.662	6.717	0.925

## 2.2 Length of finger (cm)

The data on length fingers were presented in Table 2. The results obtained for length of finger had significant influence due to foliar application of various nutrients. Treatment T<sub>6</sub> i.e. foliar spraying of SOP 2.0% + 1% urea recorded significantly maximum length of finger (21.00 cm). However, it was found at par with treatment T<sub>3</sub> i.e. foliar application of KH<sub>2</sub>PO<sub>4</sub> 0.75% + 1% urea (20.66 cm), T<sub>5</sub> i.e. SOP 1.5% + 1% urea (20.33 cm), T<sub>4</sub> i.e. SOP 1.0% + 1% urea (20.33 cm). The minimum length of finger (17.00 cm) was observed in treatment T<sub>0</sub> i.e. control.

## 2.3 Weight of finger (g)

The results on weight of finger have been presented in Table 2. Treatment T<sub>6</sub> i.e. foliar application of SOP 2.0% + 1% urea recorded significantly maximum weight of finger (156.00 g), over rest of the treatment. The minimum weight of finger (128.33 g) was recorded in T<sub>0</sub> i.e. control.

## 2.4 Circumference of finger (cm)

The results for circumference of finger have been presented in Table 2. The results obtained for circumference of finger had significant influence due to foliar application of various nutrients. Treatment T<sub>6</sub> i.e. foliar application of SOP 2.0% + 1% urea recorded significantly maximum circumference of finger (12.93 cm), Over rest of the treatment. The minimum circumference of finger (7.50 cm) was recorded in treatment T<sub>0</sub> i.e. control.

## 3. Bunch characteristics

### 3.1 Number of hands per bunch

The data pertaining to number of hands per bunch are furnished in Table 3. The effect of treatment did not differ significantly for number of hands per bunch. However number of hands per bunch varied from 8.00 to 9.00 among the different treatment of bunch spray.

**Table 3:** Effect of foliar application of different nutrients on bunch characteristics of banana cv. Grand Naine.

Treatment No.	Treatment Details	Number of hands/Bunch	Number of fingers/Bunch
T <sub>0</sub>	Control	8.33	121.00
T <sub>1</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.25 % + 1% urea	8.66	122.33
T <sub>2</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.5 % + 1% urea	8.00	123.33
T <sub>3</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.75 % + 1% urea	9.00	122.66
T <sub>4</sub>	SOP 1.0 % + 1%urea	8.00	130.66
T <sub>5</sub>	SOP 1.5 % + 1%urea	8.33	136.33
T <sub>6</sub>	SOP 2.0 % + 1%urea	9.00	141.66
T <sub>7</sub>	KNO <sub>3</sub> 0.5%	8.33	125.33
T <sub>8</sub>	KNO <sub>3</sub> 1.0%	8.66	125.00
T <sub>9</sub>	KNO <sub>3</sub> 1.5%	8.33	125.33
T <sub>10</sub>	19:19:19 (1%)	8.66	123.66
T <sub>11</sub>	19:19:19 (2%)	8.33	121.66
T <sub>12</sub>	19:19:19 (3%)	8.33	124.33
	S.E.±	0.408	5.645
	C.D.at 5%	N.S.	N.S.

### 3.2 Number of fingers per bunch

The data pertaining to number of finger per bunch are furnished in Table 3. The effect of treatment did not differ significantly for number of finger per bunch. However number of finger per bunch varied from 121.0 to 141.66 among the different treatment of bunch spray.

## 4. Yield parameters

### 4.1 Weight of bunch (kg)

The results on weight of bunch have been presented in Table

4. The results obtained for weight of bunch had significant influence due to foliar application of various nutrients. The significantly maximum weight of bunch (17.66 kg) was recorded in treatment T<sub>6</sub> i.e. foliar spraying of SOP 2.0% + 1% urea. However, it was at par with treatment T<sub>5</sub> i.e. foliar application of SOP 1.5% + 1% urea (17.00 kg). As compared with rest of the treatment under study. The lowest weight of bunch (14.16 kg) was recorded in treatment T<sub>0</sub> i.e. control.

**Table 4:** Effect of foliar application of different nutrients on yield characters of banana cv. Grand Naine.

Treatment No.	Treatment Details	Weight of bunch (kg)	Yield of banana (Mt/ha)
T <sub>0</sub>	Control	14.16	62.96
T <sub>1</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.25 % + 1% urea	15.00	66.65
T <sub>2</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.5 % + 1% urea	15.50	68.80
T <sub>3</sub>	KH <sub>2</sub> PO <sub>4</sub> 0.75 % + 1% urea	15.83	70.36
T <sub>4</sub>	SOP 1.0 % + 1%urea	16.33	72.58
T <sub>5</sub>	SOP 1.5 % + 1%urea	17.00	75.54
T <sub>6</sub>	SOP 2.0 % + 1%urea	17.66	78.50
T <sub>7</sub>	KNO <sub>3</sub> 0.5%	15.16	67.39
T <sub>8</sub>	KNO <sub>3</sub> 1.0%	15.33	68.14
T <sub>9</sub>	KNO <sub>3</sub> 1.5%	15.68	69.69
T <sub>10</sub>	19:19:19 (1%)	14.83	65.91
T <sub>11</sub>	19:19:19 (2%)	15.33	68.14
T <sub>12</sub>	19:19:19 (3%)	16.00	71.10
	S.E.±	0.245	1.090
	C.D.at 5%	0.720	3.199

#### 4.2 Yield (Mt/ha)

There were significant differences were observed for yield among various treatments of nutrients. The data presented in Table 4. Significantly maximum yield (78.50Mt/ha) was recorded in treatment T<sub>6</sub> i.e. foliar spraying of SOP 2.0% + 1% urea, which was found at par with treatment T<sub>5</sub> i.e. foliar application of SOP 1.5% + 1% urea (75.54 Mt/ha). The lowest yield (62.96 Mt/ha) was recorded in treatment T<sub>0</sub> i.e. control.

#### Conclusion

Close analysis of the present investigation revealed that the foliar application of SOP 2.0% + 1% urea, was found more effective in increasing the yield contributing characters of banana cv. Grand Naine.

Over all, it may be concluded that the banana bunches sprayed with sop 2% + 1% urea increased the yield parameters of banana cv. Grand Naine.

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