



E-ISSN: 2278-4136

P-ISSN: 2349-8234

[www.phytojournal.com](http://www.phytojournal.com)

JPP 2021; 10(1): 777-783

Received: 27-10-2020

Accepted: 25-12-2020

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## Foliar and bunch nutrition studies on yield and economics of banana (*Musa paradisiaca* L.) cv. Rajapuri

**Nethravathi BC, Kantharaju V, Anil I Sabarad, Manukumar HR and K Ramachandra Naik**

**Abstract**

The present study entitled "Foliar and bunch nutrition studies on yield and economics of banana (*Musa paradisiaca* L.) cv. Rajapuri" was carried at ICAR-AICRP on Fruits, Kittur Rani Channamma College of Horticulture, Arabhavi, Belagavi district, Karnataka during the year 2019-2020. The experiment was laid out in randomized complete block design with eight treatments with three replications. Among the different treatments, the treatment T<sub>1</sub> (Foliar spray of 2% SOP and 1% of urea at 6, 7, 8 months after planting followed by bunch spray of 2% SOP and 1% Urea after denavelling and one month after denavelling) significantly improved the finger weight (113.30 g), finger length (13.71 cm), finger girth (12.35 cm), weight of third hand (1.71 kg), number of hands per bunch (9.01), bunch length (53.16 cm), bunch width (41.43 cm), bunch weight (15.30 kg), yield per hectare (47.21 t/ha) and B:C ratio (2.61:1) over control (T<sub>8</sub>).

**Keywords:** SOP, urea, foliar and bunch spray, banana, Rajapuri

**Introduction**

Banana (*Musa paradisiaca* L.) is one of the major fruit crops in the tropics and subtropics and make a vital contribution to the economies of a number of countries. It is an herbaceous, perennial, monocotyledonous and monocarpic crop and belongs to the family Musaceae in the order Scitamineae. It grows well in humid tropical low lands and is predominantly distributed in 30° N and 30° S of equator (Patil and Jagadeesh, 2016) [21]. Globally, banana is cultivated in 5.6 million ha with the annual production of 114 million tons and productivity of 20 tons/ha. In India, it is cultivated throughout the year and is the second most important fruit crops next to mango. It ranks first in production (30.48 million tons) and second in area (0.87 million ha) with the productivity of 30.17 tons/ha (Anon., 2019) [3]. Among the different varieties of banana grown in Karnataka, the cultivar Rajapuri belonging to AAB group and is very popular commercially grown in Belagavi, Vijaya Pura, Bagalkot and Dharwad districts of North Karnataka. It is also known as Jawari bale meaning local type. It fetches very good price in the market as compared to other varieties due to many desirable characters such as, the fruits are attractive colour with medium size, good, sweet and acid blend with unique flavour. It is also a hardy crop and withstand the strong winds.

Banana crop receives its last dose of fertilizer after 7<sup>th</sup> months of planting to fulfil the requirement of nutrients from shooting to harvest stage. Any limitation in the supply of nutrients at this stage leads to poor finger filling & development, reduce the bunch size and quality (Jeyakumar *et al.*, 2010) [11]. However, it is not advisable to go for soil application of fertilizers at finger development stage, because the uptake of nutrients is very slow and low at this stage. Hence foliar application with fully water-soluble fertilizers at these critical stages increases yield and quality. As uptake of nutrients through the foliage is considerably faster than through roots (Sandhya *et al.*, 2018) [24].

Post shooting spray of various nutrients during fruit development stage increases the fruit yield and quality of banana. It has been found to respond well to foliar spray of nitrogen and potassium sprays (Sandhya *et al.*, 2018) [24]. Nitrogen is essential constituent of protein, nucleic acid, nucleotide, amino acid and chlorophyll. It plays important role in synthesis of auxin (Kannan, 1980) [12]. In banana, fruit quality is mainly judged by the sugar content and acidity in the pulp. The foliar and bunch spray of sulphate of potash appeared to be effective in enhancing various quality parameters such as TSS, reducing sugar, non-reducing sugar, total sugars and acidity (Gamit *et al.*, 2017) [8]. The micronutrients are required by the plants in minute quantities, but they play a vital role in regulating the plant growth and also promotes

the physiological responses in plants. Zinc regulates the plant growth hormone and enzyme system, necessary for carbohydrate and starch formation. Iron promotes formation of chlorophyll pigment which acts as an oxygen carrier involving cell division and growth (Yadlod and Kadam, 2008)<sup>[27]</sup>. Bio stimulants are the substances obtained from natural origin that contribute to boosting plant yield, by stimulating the plant metabolism and improving nutrient use efficiency of the plant besides reducing the dependency on chemical fertilizers. Now a day's biostimulants such as humic acid and seaweed extract, have attracted the attention of fruit growers and researchers for commercial production and scientific studies (Haider *et al.*, 2012)<sup>[10]</sup>. The considerable research work has been done on banana foliar and bunch nutrition on different varieties, but very meagre work has been done on foliar and bunch nutrition in Rajapuri variety. Keeping all these factors in consideration the present investigation was undertaken to study the "Foliar and bunch nutrition studies on yield and economics of banana (*Musa paradisiaca* L.) cv. Rajapuri".

### Material & Methods

The experiments were carried at ICAR- AICRP on Fruits, Kittur Rani Channamma College of Horticulture, Arabhavi, UHS, Bagalkot, Karnataka, India. The experiment was laid out in randomized complete block design (RCBD) with eight treatments, three replications and twelve plants per treatment. The five plants are selected randomly for recording observations from each treatment. The treatment details given below.

T<sub>1</sub>: Foliar spray of 2% Sulphate of Potash (SOP) + 1% Urea @ 6,7 and 8 months after planting (MAP) followed by, bunch spray of 2% SOP + 1% Urea after denavelling and one month after denavelling (MAD).

T<sub>2</sub>: Bunch feeding with 500 ml cow dung slurry with 1.5% Sulphate of Potash (SOP) immediately after denavelling.

T<sub>3</sub>: Foliar spray of IIHR Arka Banana Special @ 0.5% at 6, 7 and 8 MAP followed by, bunch spray of IIHR Arka Banana Special @ 0.5% after denavelling and one MAD.

T<sub>4</sub>: Foliar spray of Banana Sakhti @ 2% at 6, 7 and 8 MAP followed by, bunch spray of Banana Sakhti @ 2% after denavelling and one MAD.

T<sub>5</sub>: Foliar spray of ZnSO<sub>4</sub> @ 0.5% + FeSO<sub>4</sub> @ 0.5% at 6, 7 and 8 MAP followed by, bunch spray of ZnSO<sub>4</sub> @ 0.5% + FeSO<sub>4</sub> @ 0.5% after denavelling and one MAD.

T<sub>6</sub>: Foliar spray of Seaweed extract @ 0.3% at 6, 7 and 8 MAP followed by, bunch spray of Seaweed extract @ 0.3% after denavelling and one MAD.

T<sub>7</sub>: Foliar spray of Humic acid @ 1% at 6, 7 and 8 MAP followed by, bunch spray of Humic acid @ 1% after denavelling and one MAD.

T<sub>8</sub>: Control

The data on different yield parameters were recorded and was subjected to statistical analysis for meaningful conclusions.

### Results and Discussion

#### Finger weight (g)

Finger weight of banana has significantly influenced by foliar and bunch sprays (Table 1). Increased finger weight (113.30 g) was recorded in treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6,7 and 8 months after planting (MAP) followed by bunch sprays of 2% SOP + 1% urea after denavelling and one after denavelling (MAD) whereas, the lowest finger weight (85.96 g) was recorded in T<sub>8</sub> (Control). The results of present study close conformity Nandankumar *et al.* (2011)<sup>[19]</sup>

in cv. Nanjanagud Rasabale and Rao and Swamy (2017)<sup>[23]</sup>, Devkate *et al.* (2018)<sup>[5]</sup>. The increased weight of finger might be due to fast growth and development of cells leads to more accumulation of sugars, carbohydrate and water in expanded cells (Kumar and Kumar, 2007)<sup>[14]</sup>.

#### Finger length (cm)

The finger length was significantly influenced by foliar and bunch nutrition (Table 1). Among all the treatments, the maximum finger length (13.71 cm) was recorded in treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6,7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) whereas, the minimum finger length (10.75 cm) was reported in T<sub>8</sub> (control). The results of present study are close conformity with Sarma *et al.* (2014)<sup>[25]</sup> in cv. Borjahaji and Dombale *et al.* (2018)<sup>[7]</sup> in Grand Naine. The increase in finger length is may due to the nitrogen supplied in the form of urea was mainly utilized for cell elongation of the fruits rather than cell multiplication (Ancy and Kurien, 2000)<sup>[2]</sup>.

#### Finger girth (cm)

The results on finger girth and diameter were significantly differed among the treatments is presented in Table 1. The treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6,7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) was recorded the maximum finger girth and diameter (12.35 cm) Whereas, the minimum (9.13 cm) was reported in T<sub>8</sub> (control). Similar observations were reported in banana by Kumar and Kumar (2007)<sup>[14]</sup> cv. Ney Poovan, Nandankumar *et al.* (2011)<sup>[19]</sup> in cv. Nanjanagudu Rasabale, Sarma *et al.* (2014)<sup>[25]</sup> in cv. Borjahaji and Garasangi *et al.* (2018)<sup>[9]</sup> in cv. Rajapuri. This is due to the presence of sulphur in SOP has a complimentary action with zinc which is essential for auxin synthesis. The auxin is responsible for inducing the synthesis of specific DNA dependent new m-RNA and specific enzymatic proteins that increases the cell plasticity resulting ultimately in cell enlargement (Ahmed *et al.*, 1998)<sup>[1]</sup>.

#### Weight of third hand (kg)

The result showed that the maximum weight of third hand (1.71 kg) was observed in treatment, T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6,7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) as against minimum (1.10 kg) was reported in T<sub>8</sub> (control) is presented in Table 1 and Fig. 1. The findings are on parallel with study of Kotur and Murthy (2008)<sup>[13]</sup> in Robusta, Millik *et al.* (2018)<sup>[16]</sup> in cv. Barjahaji and Patil *et al.* (2018)<sup>[22]</sup> in cv. Grand Naine. The potassium plays an important role in many biological activities of plant which reflects on nutritional status of plant and the sulphur helps in activation of enzymes during carbohydrate metabolism and energy transformation leads to greater accumulation and translocation of carbohydrates to fruits from other reproductive parts during bunch development stage (Ahmed *et al.*, 1998)<sup>[1]</sup>.

#### Number of hands per bunch

The results showed, the highest number of hands per bunch and number of fingers per hand (9.01) was observed in treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6,7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) as against lowest (7.12) was recorded in T<sub>8</sub> (control) is presented in (Table1). Potassium increases the cell division and cell expansion by their action

on DNA and RNA synthesis leads to internodal length between hands and bunch length was increases which in turns increases the number of hands per bunch (Mustaffa, 2005) [17].

### Bunch length and width (cm)

The data on length and width of bunch were significantly influenced by foliar and bunch nutrition (Table. 2). The treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6, 7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) reported the maximum bunch length and bunch width (53.16 cm and 41.33 cm) as against minimum bunch length and width (42.87 and 34.55 cm) was reported in T<sub>8</sub> (Control). Similar observations were reported by Shetty *et al.* (2015) [26] and Devraj *et al.* (2019) [6] in cv. Grand Naine. The increase in length and width of bunch is due to additional dose of nitrogen provided in the form of urea exploited mainly for cell elongation rather than cell multiplications as reported by Kumar and Kumar (2007) [14] in banana cv. Ney Poovan.

### Bunch weight (kg)

The results depicted that the weight of bunch was significantly influenced by foliar and bunch nutrition (Table. 2 and Fig. 2). Among all the treatments, the treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6, 7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) was recorded the highest bunch weight (15.30 kg) whereas, the lowest bunch weight (7.81 kg) was reported in T<sub>8</sub> (control). Similar results were found in banana by Kotur and Murthy (2008) [13] and Kumar *et al.* (2008) [15] in cv. Robusta. Increase in bunch weight is

accompanying with the corresponding increase in the number of hands, total number of fingers, finger weight, length and girth (Kumar and Kumar, 2007) [14].

### Yield per hectare (t/ha)

The results on yield per plot and yield hectare was significantly influenced by foliar and bunch nutrition (Table. 2). Among all the treatments, the treatment T<sub>1</sub> (Foliar spray of 2% SOP + 1% urea at 6, 7 and 8 MAP followed by bunch sprays of 2% SOP + 1% urea after denavelling and one MAD) was recorded the maximum yield per plot and yield per hectare (47.21 t/ha) as against minimum yield per plot and hectare (24.10 t/ha) was recorded in T<sub>8</sub> (control). The similar reports were reported by Dombale *et al.* (2018) [7] and Devraj *et al.* (2019) [6] in Grand Naine. This might be due to sulphur present in SOP helps in energy transformation and activation of enzymes in carbohydrate metabolism leads to more partitioning of photosynthates which increases the yield of banana (Millik *et al.* 2018) [16] in banana cv. Barjahaji.

### Benefit: Cost ratio

The benefit: cost ratio was significantly influenced by foliar and bunch nutrition (Table 3). The highest benefit cost ratio (2.61:1) was reported in T<sub>1</sub>(Foliar spray of 2% SOP + 1% urea at 6, 7, 8 MAP, followed by bunch spray of 2% SOP + 1% urea after denavelling and one MAD) whereas, the lowest (0.98:1) was recorded in T<sub>8</sub> (control). The parallel results were reported by Garasangi *et al.* (2018) [9] in cv. Rajapuri, Avani *et al.* (2017) [4] and Patil *et al.* (2018) [22] in Grand Naine.

**Table 1:** Effect of foliar and bunch nutrition on finger characteristics of banana cv. Rajapuri

Treatments	Finger characteristics					
	Finger weight (g)	Finger length (cm)	Finger girth (cm)	Weight of third hand (kg)	No. of hands/bunch	
T <sub>1</sub>	Foliar spray of 2% SOP + 1% Urea @ 6,7 and 8 MAP followed by bunch spray of 2% SOP + 1% Urea after denavelling and one MAD	113.30	13.71	12.35	1.71	9.01
T <sub>2</sub>	Bunch feeding with 500 ml cow dung slurry with 1.5% SOP immediately after denavelling	97.33	12.30	11.28	1.35	8.15
T <sub>3</sub>	Foliar spray of IIHR Arka Banana Special @ 0.5% at 6, 7 and 8 MAP followed by bunch spray of IIHR Arka Banana Special @ 0.5% after denavelling and one MAD	103.30	13.41	11.06	1.40	8.64
T <sub>4</sub>	Foliar spray of Banana Sakhti @ 2% at 6, 7 and 8 MAP followed by bunch spray of Banana Sakhti @ 2% after denavelling and one MAD	94.63	11.71	10.89	1.31	8.54
T <sub>5</sub>	Foliar spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% at 6, 7 and 8 MAP followed by bunch spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% after denavelling and one MAD	101.59	12.73	10.92	1.32	7.75
T <sub>6</sub>	Foliar spray of Seaweed extract @ 0.3% at 6, 7 and 8 MAP followed by bunch spray of Seaweed extract @ 0.3% after denavelling and one MAD	93.49	12.42	11.33	1.35	7.89
T <sub>7</sub>	Foliar spray of Humic acid @ 1% at 6, 7 and 8 MAP followed by bunch spray of Humic acid @ 1% after denavelling and one MAD	103.67	13.53	11.67	1.51	8.64
T <sub>8</sub>	Control (without any spray)	85.96	10.75	9.13	1.10	7.12
	S. Em ±	2.94	0.38	0.43	0.04	0.24
	C. D. at 5%	8.94	1.15	1.32	0.14	0.73
	CV (%)	5.15	5.25	6.80	5.64	5.09

SOP - Sulphate of potash, MAP- Months after planting, MAD - Month after denavelling

**Table 2:** Effect of foliar and bunch nutrition on yield attributes of banana cv. Rajapuri

Treatments	Bunch characteristics			
	Bunch length (cm)	Bunch width (cm)	Bunch weight (kg)	Yield / ha (t/ha)
T <sub>1</sub> Foliar spray of 2% SOP + 1% Urea @ 6, 7 and 8 MAP followed by bunch spray of 2% SOP + 1% Urea after denavelling and one MAD	53.16	41.43	15.30	47.21
T <sub>2</sub> Bunch feeding with 500 ml cow dung slurry with 1.5% SOP immediately after denavelling	47.43	37.34	11.01	33.98
T <sub>3</sub> Foliar spray of IIHR Arka Banana Special @ 0.5% at 6, 7 and 8 MAP followed by bunch spray of IIHR Arka Banana Special @ 0.5% after denavelling and one MAD	52.57	39.87	12.05	37.19
T <sub>4</sub> Foliar spray of Banana Sakhti @ 2% at 6, 7 and 8 MAP followed by bunch spray of Banana Sakhti @ 2% after denavelling and one MAD	49.25	38.67	11.17	34.47
T <sub>5</sub> Foliar spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% at 6, 7 and 8 MAP followed by bunch spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% after denavelling and one MAD	50.68	37.47	10.14	31.29
T <sub>6</sub> Foliar spray of Seaweed extract @ 0.3% at 6, 7 and 8 MAP followed by bunch spray of Seaweed extract @ 0.3% after denavelling and one MAD	48.04	38.48	10.25	31.63
T <sub>7</sub> Foliar spray of Humic acid @ 1% at 6, 7 and 8 MAP followed by bunch spray of Humic acid @ 1% after denavelling and one MAD	51.47	40.83	13.00	40.11
T <sub>8</sub> Control (without any spray)	42.87	34.55	7.81	24.10
S. Em ±	1.47	1.12	0.44	1.36
C. D. at 5%	4.48	3.44	1.33	4.12
CV (%)	5.17	5.09	6.72	6.72

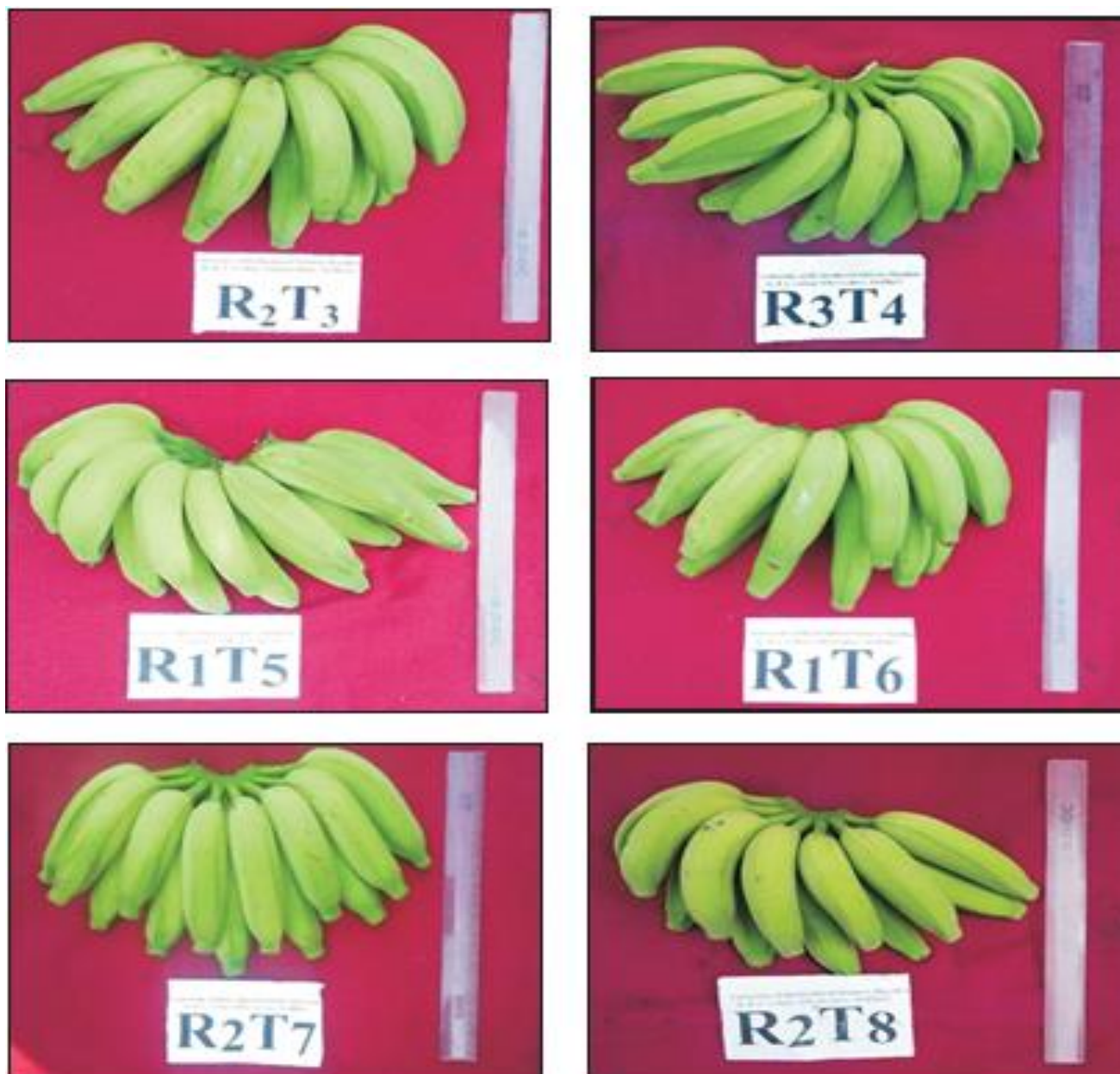
SOP - Sulphate of potash, MAP- Months after planting, MAD - Month after denavelling

**Table 3:** Effect of foliar and bunch nutrition on Benefit Cost ratio of banana cv. Rajapuri

Treatments	Benefit Cost ratio				
	Total cost (Rs/ha)	Fruit yield (t/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	Benefit: Cost ratio
T <sub>1</sub> Foliar spray of 2% SOP + 1% Urea @ 6, 7 and 8 MAP followed by bunch spray of 2% SOP + 1% Urea after denavelling and one MAD	3,92,199	47.21	14,16,300	10,24,101	2.61
T <sub>2</sub> Bunch feeding with 500 ml cow dung slurry with 1.5% SOP immediately after Denavelling	3,72,063	33.98	10,19,400	6,47,336	1.74
T <sub>3</sub> Foliar spray of IIHR Arka Banana Special @ 0.5% at 6, 7 and 8 MAP followed by bunch spray of IIHR Arka Banana Special @ 0.5% after denavelling and one MAD	3,74,378	37.19	11,15,400	7,41,022	1.97
T <sub>4</sub> Foliar spray of Banana Sakhti @ 2% at 6, 7 and 8 MAP followed by bunch spray of Banana Sakhti @ 2% after denavelling and one MAD	3,99,452	34.47	10,34,100	6,34,648	1.58
T <sub>5</sub> Foliar spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% at 6, 7 and 8 MAP followed by bunch Spray of ZnSO <sub>4</sub> @ 0.5% + FeSO <sub>4</sub> @ 0.5% after denavelling and one MAD	4,45,742	31.29	9,38,700	4,92,958	1.10
T <sub>6</sub> Foliar spray of Seaweed extract @ 0.3% at 6, 7 and 8 MAP followed by bunch spray of Seaweed extract @ 0.3% after denavelling and one MAD	3,84,006	31.63	9,48,900	5,64,894	1.47
T <sub>7</sub> Foliar spray of Humic acid @ 1% at 6, 7 and 8 MAP followed by bunch spray of Humic acid @ 1% after denavelling and one MAD	4,05,624	40.11	12,03,300	7,97,676	1.96
T <sub>8</sub> Control (without any spray)	3,64,842	24.10	7,23,000	3,58,158	0.98

SOP - Sulphate of potash, MAP- Months after planting, MAD - Month after denavelling





**Fig 1:** Effect of foliar and bunch nutrition on hand weight of banana cv. Rajapuri (AAB) **T<sub>1</sub>**: Foliar spray of 2% SOP +1% urea **T<sub>2</sub>**: Bunch feed with 500 ml cow dung slurry + 1.5% SOP immediately after denavelling **T<sub>3</sub>**: Foliar spray of 0.5% Banana special **T<sub>6</sub>**: Foliar spray of 0.3% Sea weed extract **T<sub>4</sub>**: Foliar spray of 2% Banana shakti **T<sub>7</sub>**: Foliar spray of 1% Humic acid **T<sub>5</sub>**: Foliar spray of 0.5% ZnSO<sub>4</sub>+0.5% FeSO<sub>4</sub> **T<sub>8</sub>**: Control  
 \*All the treatments were imposed at 6,7,8 MAP, followed by, bunch sprays after denavelling and one MAD except T<sub>2</sub> and T<sub>8</sub>.





**Fig 2:** Effect of foliar and bunch nutrition on bunch characteristics of banana cv. Rajapuri (AAB) **T<sub>1</sub>:** Foliar spray of 2% SOP +1% urea **T<sub>2</sub>:** Bunch feed with 500 ml cow dung slurry + 1.5% SOP immediately after denavelling **T<sub>3</sub>:** Foliar spray of 0.5% Banana special **T<sub>6</sub>:** Foliar spray of 0.3% Sea weed extract **T<sub>4</sub>:** Foliar spray of 2% Banana shakti **T<sub>7</sub>:** Foliar spray of 1% Humic acid **T<sub>5</sub>:** Foliar spray of 0.5% ZnSO<sub>4</sub>+0.5% FeSO<sub>4</sub> **T<sub>8</sub>:** Control \*All the treatments were imposed at 6,7,8 MAP, followed by, bunch sprays after denavelling and one MAD except T<sub>2</sub> and T<sub>8</sub>.

### Conclusion

The results indicated that foliar spray of 2% sulphate of potash + 1% Urea at 6, 7 and 8 months after planting followed by bunch spray of 2% sulphate of potash + 1% Urea after denavelling and one month after denavelling significantly enhances the yield and economics of banana cv. Rajapuri which attracts the consumers and ensures highest profit.

### Acknowledgement

The authors are thankful to ICAR- AICRP on Fruits, KRC College of Horticulture, Arabhavi, Gokak, Belagavi, Karnataka, India for providing the facilities to carryout this research work.

### References

- Ahmed MK, Aditya DK, Siddique MA. Effect of N and S application on growth and yield of onion cv. Faridapur Bhatti. Bangladesh Hort 1998;16(1):36-41.
- Ancy TK, Kurien S. Bunch-stalk feeding of urea in banana *Musa* (AAB group) 'Nendran'. Sci. Hort 2000;84:205-212.
- Anonymous. Indian Horticultural Database, National Horticulture Board, Govt. of India 2019.
- Avani F, Bauri KP, Sarkar SK. Effect of potassium spray on fruit quality and shelf life of banana cv. Grand Naine (AAA). Environ and Eco 2017;35(1A):368-371.
- Devkate AM, Dhutraj SV, Khedikar AS. Effect of foliar application of soluble fertilizer on finger development and yield of banana cv. Grand Naine. J Pharmacogn Phytochem 2018;7(5):467-469.
- Devraj RP, Honnabyraiah MK, Swamy GSK, Shivanna M, Halesh GK. Effect of bunch feeding of macro and micronutrients on yield of tissue culture banana cv. Grand Naine (AAA). Int. J Chem Stud 2019;7(2):252-256.
- Dombale GB, Dhutraj SV, Syed SJ. Effect of foliar application of different nutrients on maturity parameters, finger and bunch characteristics and yield of banana cv. Grand Naine. Int. J Chem Stud 2018;6(3):3651-3654.
- Gamit S, Patil SJ, Prajapti D. Effect of post shooting foliar spray of fertilizes on quality parameters of banana (*Musa paradisiaca* L.) cv. Grand Naine. Int. J Chem Stud 2017;5(4):959-960.
- Garasangi SM, Athani SI, Hipparagi K, Alloli TB, Gopali JB, Awati M. Studies on bunch feeding on yield, post-harvest parameters and B:C ratio in banana cv. Rajapuri. Int. J Curr Microbial App Sci 2018;7(2):3118-3123.
- Haider MW, Ayyub CM, Pervez A, Asad A, Manan Raza SA *et al.* Impact of foliar application of seaweed extract on growth, yield and quality of strawberry. Int. J Agric Biol 2012;14(2):157-162.
- Jeyakumar P, Ramesh Kumar A, Kumar N. Effect of Post shooting Spray of Potash (SOP) on Yield and Quality of Banana cv. Robusta (AAA- Cavendish). Res. J Agric Biol Sci 2010;4(6):655-659.
- Kannan S. Mechanism of foliar uptake of plant nutrient: Accomplishments and prospects. J Pl Nutr 1980;2:717-723.
- Kotur C, Murthy K. Enhancing the fruit yield of Robusta banana by de-navelling and feeding nitrogen, potassium

- and sulphur through the distal end of the bunch. *Indian. J Agric Sci* 2008;78(2):109-115.
14. Kumar A, Kumar N. Sulphate of potash foliar spray effects on yield, quality and post-harvest life of banana (India). *Better crops* 2007;91(2):22-24.
  15. Kumar RA, Kumar N, Jeyakumar P. Effect of post-shooting spray of Sulphate of Potash (SOP) on yield and quality of banana cv. Robusta (AAA). *Res. J Agri Bio Sci* 2008;4(6):655-659.
  16. Millik TT, Baruah K, Kumar V, Barik B. Effect of bunch feeding of nitrogen (N) and potassium (K) on yield characters in banana, cv. Barjahaji (*Musa* AAA Group) under Assam Condition. *Curr. J Appl Sci and Tech* 2018;26(1):1-7.
  17. Mustafa EAM. Response of Williams banana to different rates of nitrogen and potassium fertilizers. *J App Sci Res* 2005;1(1):67-71.
  18. Mustaffa MM, Tanuja B, Shivakumar KC, Kumar V, Sathiamoorthy S. Effect of preharvest treatments on bunch parameters, quality and shelf life of banana cv. Nendran. In *Banana: Technological Advancements* (Singh, H. P. and Uma, S. Eds), AIPUB, Trichy 2004, 124-132.
  19. Nandankumar CP, Sathyanarayana BN, Naresh P, Lakshmipathy M. Effect of certain pre harvest treatments in improving the yield and quality of banana cv Nanjangudu Rasabale. *Pl Arc* 2011;11(2):677-681.
  20. Pandey SN, Sinha BK. Mineral nutrition. In: *Plant Physiology*. Vikas Publishing House Pvt. Ltd. New Delhi 1999.
  21. Patil RM, Jagadeesh SL. Effect of silicon bunch spraying and bunch bagging on yield, quality and shelf life of banana var. Grand Naine. *Hort. Flora Res. Spectrum* 2016;5(3):195-200.
  22. Patil SJ, Patel NB, Patel KA. Yield and economics of banana cv. Grand Naine influenced by foliar spray of water soluble fertilizers on banana bunch. *Int. J Chem Stud* 2018;6(6):1914-1916.
  23. Rao V, Swamy GSK. Performance of banana cv. Grand Naine (AAA) for direct bunch feeding of major and micronutrients on bunch yield. *Int. J Curr Microbiol App Sci* 2017;6(11):1577-1581.
  24. Sandhya GC, Hipparagi K, Mushrif SK, Ganur A, Sampath PM. Studies on influence of post shooting sprays of nitrogen and potassium on quality attributes of banana cv. Grand Naine. *Int. J Curr Microbiol App Sci* 2018;7(3):3368-3375.
  25. Sarma I, Borgohain R, Phukon M. Effect of post shooting application of urea and sulphate of potash at the denavelled, distal stalk end of banana cv. Borjahaji. *Asian J Bio Sci* 2014;9(2):296-298.
  26. Shetty SG, Thippesha D, Shreekanth HS, Shwetha BS. Effect of foliar spray of urea and potash on bunch maturity and yield of tissue culture banana cv. Grand Naine under hill zone of Karnataka. *Environ and Eco* 2015;33(3):1167-1171.
  27. Yadlod SS, Kadam BA. Effect of plant growth regulators and micronutrients on growth, yield and storage life of banana (*Musa* spp) cv Shrimanti. *Asian J Hort* 2008;3(2):409-411.