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Effect of foliar application of different nutrients on qualitative properties and shelf life of banana Cv. Grand Naine

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Abstract
The field study was carried out at the field of Banana Research Station, Nanded. The experiment was laid out in Randomized Block Design (RBD) with thirteen treatment viz., T_0 control, T_1 KH_2PO_4 0.25% + 1% urea, T_2 KH_2PO_4 0.5% + 1% urea, T_3 KH_2PO_4 0.75% + 1% urea, T_4 SOP 1.0% + 1% urea, T_5 SOP 1.5% + 1% urea, T_6 SOP 2.0 % + 1% urea, T_7 KNO_3 0.5%, T_8 KNO_3 1.0%, T_9 KNO_3 1.5%, T_{10} 19:19:19 (1%), T_{11} 19:19:19 (2%) and T_{12} 19:19:19 (3%), with three replications. In the quality parameters, significantly the maximum weight of pulp (108.33 g), pulp to peel ratio (5.52), TSS (23.33^0B), reducing sugar (21.66 %) and total sugar (23.43%) was recorded in treatment T_6 i.e. SOP 2.0 % + 1% urea. The lowest acidity (0.26%) was noted in treatment T_0 i.e. control, the maximum shelf life (6.66 days) were observed in treatment T_5 i.e. SOP 1.5% + 1% urea. Close analyses of the present investigation revealed that the foliar application of SOP 2.0% + 1% urea was found more effective increasing quality parameters and shelf life of banana cv. Grand Naine.

Keywords: Banana, TSS, ASCORBIC ACID, KH_2PO_4, Grand Naine, Shelf Life, SOP, Urea, KNO_3

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) [3].

The fruit is considered a good source of vitamins A, B_1, B_2, and C. Banana is also a good source of carbohydrate, protein and minerals. Pulp of ripen banana is essentially a sugar rich and easy to digest. Eating several bananas provides a readily available supply of calories, for this reason, bananas are recommended to people who need large amounts of glucose in their blood to maintain adequate level of muscle. Therefore, due to the good nutritional value, banana is major staple food for many millions of people (Sharrock and Lusty, 1999) [5].

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) [2].

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 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.

Under traditional farming system, banana crop receive its last dose of fertilizer (nitrogen and potassium) at 7^{th} month after planting to support the requirement of nutrient unit harvest since large quantity of photosynthates are to move from the source to the since i.e. developing bunches at this phase.

Any limitation in the support of nutrients at this crucial stage affect the bunch size and quality. Because of this problem poor filling and development of fingers is often reported in almost all the cultivar of commercial importance. Hence the usefulness of post shooting spray of various nutrients during fruit development in influencing the fruit yield, shelf life and quality of banana. Banana has been found to report well to potash spray supplied through sulphate of potash, potassium nitrate or potassium dihydrogen phosphate.

Although, banana is commonly grown on fertile soils, manuring is in dispersible, because it is a heavy feeder of nutrients. However, it draws the nutrients from a very limited soil depth because of its shallow root system. A survey of the literature shows that, the choice and dosage of nutrients to be applied depends on the cultivar, initial soil fertility, stage of plant growth, climate *etc*. A judicious use of fertilizers not only gives high yield but also improves the quality of the fruit.

Nitrogen (N) plays a key role in nutrition of the plants. As a matter of fact, the plant life would not be possible without this element. Adequate amount of nitrogen is also required to obtain good yield in fruit crops.

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) [7]. 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 in table number 1.

Table 1: Treatments Details

Treatment No.	Nutrients (%)
T_0	Control
T_1	KH_2PO_4 0.25 % + 1% urea
T_2	KH_2PO_4 0.5 % + 1% urea
T_3	KH_2PO_4 0.75 % + 1% urea
T_4	SOP 1.0 % + 1%urea
T_5	SOP 1.5 % + 1%urea
T_6	SOP 2.0 % + 1%urea
T_7	KNO_3 0.5%
T_8	KNO_3 1.0%
T_9	KNO_3 1.5%
T_{10}	19:19:19 (1%)
T_{11}	19:19:19 (2%)
T_{12}	19:19:19 (3%)

Results and Discussion

Qualitative parameters

Weight of pulp (g)

The results on weight of pulp have been presented in Table 2. The results obtained for weight of pulp had significant influence due to foliar application of various nutrients. The significantly maximum weight of pulp (108.33 g) was recorded in treatment T_6 i.e. foliar spraying of SOP 2.0% + 1% urea and it was at par with treatment T_5 i.e. foliar application of SOP1.5%+1% urea (104.66 g), T_4 i.e. SOP1.0%+1% urea (100.00 g). The lowest weight of pulp (80.00 g) was recorded in T_0 i.e. control.

Weight of Peel (g)

The data presented in Table 2. Significantly, the maximum weight of peel (25.00 g) was recorded in treatment T_3 i.e. foliar spraying of KH_2PO_4 0.75% + 1% urea and was found statically at par with treatment T_8 i.e. foliar spraying of KN03 1.0% (23.66 g), T_9 i.e. foliar spraying of KN03 1.5% (23.00 g), T_{11} i.e. 19:19:19 (2%) (22.00 g). The minimum weight of peel (19.23 g) was recorded in T_0 i.e. control.

Pulp to peel ratio

The results for pulp to peel ratio was found significant and have been presented in Table 2. Treatment T_6 i.e. foliar spraying of SOP 2.0% + 1% urea recorded maximum pulp to peel ratio (5.52) and found significantly superior over rest of all the treatment. The treatment T_3 i.e. of KH_2PO_4 0.75% + 1% urea was recorded minimum pulp to peel ratio (3.94).

Table 2: Effect of foliar application of different nutrients on quality parameters of banana cv. Grand Naine.

Treatment No.	Treatment Details	Weight of pulp (g)	Weight of peel (g)	Pulp to Peel ratio
T_0	Control	80.00	19.23	4.16
T_1	KH_2PO_4 0.25 % + 1% urea	89.33	20.00	4.47
T_2	KH_2PO_4 0.5 % + 1% urea	94.66	20.93	4.52
T_3	KH_2PO_4 0.75 % + 1% urea	98.66	25.00	3.94
T_4	SOP 1.0 % + 1%urea	100.00	20.66	4.84
T_5	SOP 1.5 % + 1%urea	104.66	21.66	4.83
T_6	SOP 2.0 % + 1%urea	108.33	19.66	5.52
T_7	KNO_3 0.5%	97.66	23.00	4.25
T_8	KNO_3 1.0%	96.66	23.66	4.08
T_9	KNO_3 1.5%	96.66	23.00	4.40
T_{10}	19:19:19 (1%)	92.66	21.83	4.24
T_{11}	19:19:19 (2%)	95.33	22.00	4.33
T_{12}	19:19:19(3%)	93.33	20.96	4.66
	S.E.±	2.688	0.791	0.116
	C.D.at 5%	7.892	2.323	0.340

Total soluble solid (^{0} B)

The data presented in Table 3. The results obtained for TSS had significant influence due to foliar application of various nutrients. The highest TSS (23.33^0B) was recorded in treatment T_6 i.e. foliar spraying of SOP 2.0% + 1% urea. Which was at par with treatment T_5 i.e. SOP 1.5% + 1% urea (23.26^0B), T_4 i.e. SOP 1.0% + 1% urea (23.16^0B), T_3 i.e. KH_2PO_4 0.75% + 1% urea (22.33^0B), T_9 i.e. KN03 1.5% (22.33^0B). The lowest TSS was recorded in treatment T_0 i.e. control (18.66^0B).

Table 3: Effect of foliar application of different nutrients on quality parameters of banana cv. Grand Naine.

Treat. No.	Treatment Details	TSS (^{0}Brix)	Acidity (%)	Reducing Sugar (%)	Non-Reducing Sugar (%)	Total Sugar (%)
T_0	Control	18.66	0.96	17.66	0.94	18.61
T_1	KH_2PO_4 0.25 % + 1% urea	21.66	0.40	18.00	0.97	18.97
T_2	KH_2PO_4 0.5 % + 1% urea	21.00	0.30	18.66	0.99	19.66
T_3	KH_2PO_4 0.75 % + 1% urea	22.33	0.29	18.33	1.01	19.34
T_4	SOP 1.0 % + 1%urea	23.16	0.28	21.00	1.11	22.11
T_5	SOP 1.5 % + 1%urea	23.26	0.27	20.66	1.36	22.03
T_6	SOP 2.0 % + 1%urea	23.33	0.26	21.66	1.76	23.43
T_7	KNO_3 0.5%	21.33	0.80	19.66	1.00	20.67
T_8	KNO_3 1.0%	21.50	0.58	20.66	0.973	21.64
T_9	KNO_3 1.5%	22.33	0.35	18.00	1.02	19.02
T_{10}	19:19:19 (1%)	19.66	0.95	17.00	1.11	18.11
T_{11}	19:19:19 (2%)	20.00	0.87	20.33	1.02	21.35
T_{12}	19:19:19 (3%)	19.66	0.85	19.00	0.99	19.66
	S.E.±	0.416	0.04	0.463	0.051	0.474
	C.D. at 5%	1.222	0.11	1.360	0.151	1.393

Acidity (%)

The data presented in Table 3. The results on acidity were significantly influenced by the different treatment of foliar application of nutrients. Minimum acidity (0.26%) was recorded in treatment T_6 i.e. foliar spraying of SOP 2.0% + 1% urea and it was at par with T_5 i.e. SOP 1.5% + 1% urea (0.27%), T_4 i.e. SOP 1.0% + 1% urea (0.28%), T_3 i.e. KH_2PO_4 0.75% + 1% urea (0.29%),T_2 i.e. KH_2PO_4 0.5% + 1% urea(0.30%) T_9 i.e. KN03 1.5% (0.31%). The maximum acidity (0.96%) was recorded in treatment T_0 i.e. control.

Reducing Sugar (%)

The data presented in Table 3, revealed that treatment T_6 i.e. foliar spraying of SOP 2.0% + 1% urea was recorded maximum reducing sugar (21.66 %) which was found significantly maximum than other treatments and was found at par with treatment T_4 i.e. foliar spraying of SOP 1.0% + 1% urea (21.0%), T_5 i.e. foliar spraying of SOP 1.5% + 1% urea (20.66%), T_8 i.e. KN03 1.0% (20.66 %) and T_{11} i.e.19:19:19 (2%) (20.33 %). The lowest reducing sugar was recorded in treatment T_0 i.e. control (17.66%).

Non-reducing sugar (%)

The data presented in Table 3. The results obtained for non-reducing sugar had significant influence due to foliar application of various nutrients. The highest percentage of non-reducing sugar (1.76%) was recorded in the treatment T_6 i.e. foliar application of SOP 2.0% + 1% urea, followed by treatment T_5 i.e. foliar application of SOP 1.5% + 1% urea (1.31 %) which were significantly superior over rest of all the treatment. The lowest percentage of non-reducing sugar (0.94%) was recorded in treatment T_0 i.e. control.

Total Sugar (%)

The effects of different treatment were found to increase total sugar percentage significantly and data is furnished in Table 3. The significantly highest total sugar (23.43%) was recorded in treatment T_6 i.e. foliar application of SOP 2.0% + 1% urea. The lowest total sugar was recorded in treatment T_0 i.e. control (18.61 %).

Shelf Life

Days required from maturity to ripening

The results presented in Table 4, revealed that days required from maturity to ripening had significant influence due to foliar application of various nutrients. The significantly maximum days required from maturity to ripening (6.66 days) was observed in treatment T_6 i.e. spraying of SOP 2.0% + 1% urea and it was at par with treatment T_9 i.e. KN03 1.5% (6.65 days), T_5 i.e. SOP 1.5% + 1% urea (6.33 days), T_8 i.e. KN03 1.0% (6.33 days), T_4 i.e. SOP 1.0% + 1% urea (6.00 days) and T_7 i.e. KN03 0.5% (6.00 days). The minimum days required from maturity to ripening (5.30 days) were recorded in the treatment T_0 i.e. control.

Table 4: Effect of foliar application of different nutrients on fruit ripening and shelf life of banana cv. Grand Naine.

Treatment No.	Treatment Details	Days require from maturity to ripening	Shelf life (days)
T_0	Control	5.30	5.16
T_1	KH_2PO_4 0.25 % + 1% urea	5.60	6.00
T_2	KH_2PO_4 0.5 % + 1% urea	5.66	5.66
T_3	KH_2PO_4 0.75 % + 1% urea	6.00	5.83
T_4	SOP 1.0 % + 1%urea	6.06	6.33
T_5	SOP 1.5 % + 1%urea	6.33	6.66
T_6	SOP 2.0 % + 1%urea	6.66	6.00
T_7	KNO_3 0.5%	6.00	5.33
T_8	KNO_3 1.0%	6.33	5.66
T_9	KNO_3 1.5%	6.65	6.00
T_{10}	19:19:19 (1%)	5.30	6.23
T_{11}	19:19:19 (2%)	5.33	6.26

T_{12}	19:19:19(3%)	5.66	6.50
	S.E.±	0.316	0.301
	C.D.at 5%	0.927	N.S.

Shelf Life

The data presented in Table 4. The number of days required after fully ripening of fruits until spoilage is the shelf life. There was not any significant influence of the different treatment of nutrients, on shelf life of banana fruits, However, the maximum shelf life (6.66 days) were observed in treatment T_5 i.e. SOP 1.5% + 1% urea. Whereas the minimum shelf life (5.16 days) observed in T_0 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 quality parameters and shelf life of banana cv. Grand Naine.

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

References

1. Anonymous. National Horticulture Board, 2011. http://www.nhb.gov.in/statistics/area-production-statistics. html, as on 12.07.2012.
2. Anonymus. NHB, National Horticulture Board, Government of India. National Database 2013.as organic bananas. IN: Holderness M, Sharrock S, Frison E, Kairo M. Organic banana 2000: Towards an organic banana initiative in the Caribbean. 2014, 143-150.
3. Chadha KL. Production technology of banana. Handbook of Horticulture. 1974, 464-470.
4. Patel RL, Patel BM. Effect of foliar applications of urea on maturity, yield and quality of banana cv. Basrai. South Indian Hort. 1987; 35(6):398-402.
5. Sharrock S, Lusty C. Nutritive value of banana. INIBAP Annual Report. 1999, 28-31.
6. Veerannah L, Selvaraj P, Azhakia Manavalan RS. Studies on the nutrient uptake in Robusta and Poovan. Indian J Hort. 1976; 33:203-208.