



Effect of foliar application of nutrients on quality characters of banana (*Musa AAB*) Nendran

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Abstract

A field experiment was conducted in the Department of Pomology and Floriculture, College of Agriculture, Vellayani during 2013-2015 to evaluate the efficiency of foliar nutrition on growth and yield of banana cv Nendran. The experiment consisted of eight treatments, as foliar sprays each at 2, 4 and 6 months after planting. Treatment T2 (3.0% K₂SO₄) recorded maximum TSS (31.50 °B) and less acidity (0.320 per cent). It also scored maximum for sweetness and overall acceptability. T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄0.2%+H₃BO₃0.2%+(NH₄)₂MoO₄0.03%) recorded high total sugar (19.42 per cent), reducing sugar (16.90 per cent) and minimum non reducing sugar (2.52 per cent) while shelf life was recorded maximum for T8 (4.23 days).

Key words: TSS, Acidity, Total Sugar, Reducing Sugar, Non Reducing Sugar, Quality

I. Introduction

Banana is one of the most important commercial crops in the world. It is estimated that 87% of banana production is for local food consumption (Bioversity International, 2008). However, banana has also good export potential. Markets such as the Russian Federation, China or Eastern European countries are emerging now as destinations for banana exports. India exports bananas mainly to Middle East countries. According to 2012 statistics, India led the world in banana production, producing around 18% of the worldwide crop of 139 million metric tons. Philippines was the next largest producer with around 7% of the worldwide crop. Application of essential nutrients in appropriate balance is fundamental for various physiological processes in plants. Nutrients like nitrogen, phosphorus and potash play a vital role in promoting the plant vigour and productivity, whereas micronutrients like zinc, boron, copper and molybdenum perform a specific role in the growth and development of plant, quality produce and uptake of major nutrients. The fertilizers applied through soil are also needed in higher quantities because some portion leaches down and some does not become available to the plants due to complex chemical reactions. The foliar application is, therefore, alternative way of applying nutrients to fruit plants in such area. The present investigations on "Foliar nutrition in banana (*Musa AAB* Nendran) for enhancement of yield and quality" were initiated with the objective of evaluating the efficiency of foliar application of nutrients on yield and quality of banana cv. Nendran.

II. Materials and methods

The experiment was consisted of eight treatments, using different foliar sprays such as 3.0 % K₂SO₄ (T2), NRC Banana formulation (4.8% iron as FeSO₄, 5.3% zinc as ZnSO₄, 2.8% boron as Borax, 2.4% copper as CuSO₄ and 4.6% manganese as MnSO₄) T3, IIHR formulation (0.5% urea, 0.5% K₂SO₄, 0.2% ZnSO₄ and 0.1% H₃BO₃) T4 and a mixture of nutrients (T5-ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%, T6-ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) , T7- ZnSO₄ 1.5 % + FeSO₄ 0.5% + CuSO₄ 0.3% + H₃BO₃ 0.3% + (NH₄)₂MoO₄ 0.05%) , T8-19:19:19 Fertilizer mixture (2.0 per cent) and a control (T1- water spray on

foliage) each at 2, 4 and 6 months after planting. The experiment was laid out in randomized block design (RBD) with three replications. Statistical analysis of non parametric data was done using Kruskal Wallis- H test.

III. Result and discussion

The present investigations indicate that quality of fruits was improved by the application of major and minor elements by foliar application (Table 1).

Maximum TSS content (31.50 per cent) was recorded in T2 (3.0% K₂SO₄) followed by T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) with 30.66 percent and T1 (Control – water spray) with 30.33 per cent. The result indicated that T2 was on par with T6 and T1.

T2 (3.0 % K₂SO₄) recorded the lowest acidity (0.32 percent) followed by T5 (ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%) with 0.426 per cent and T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) which recorded 0.426 per cent acidity of fruits.

The result showed that T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) recorded the highest total sugar content (19.428 per cent) followed by T2 (3.0% K₂SO₄) with 19.37 per cent and T5 (ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%) with 17.96 per cent. T2 was found to be statistically on par with T6 and significantly different from all other treatments.

The highest value for reducing sugar (16.903 per cent) was observed in T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) followed by T2 (3.0% K₂SO₄) with 15.456 per cent and T5 (ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%) with 14.933 per cent reducing sugars.

The lowest value for non reducing sugar was observed in T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) with 2.52 per cent which was followed by T5 (ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%) with 3.036 per cent and T2 (3.0% K₂SO₄) with 3.91 per cent. T5 was statistically on par with T2 and T6.

The longest shelf life (4.28) was recorded in T8 (19:19:19 Fertilizer mixture 2.0%) followed by T3 (NRC, Banana formulation) with 4.1 days and T1 (Control-water spray) with 4.00 days. T8 (4.28 days) was statistically on par with treatments T3 (4.10 days), T1 (4.00 days) and T4 (3.92 days).

The highest rank for sweetness and overall acceptability was obtained for T2 (3.0 % K₂SO₄) followed by T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%) and T5 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%). These treatments were statistically on par with T1, T4 and T7.

Foliar application of 1.0 % urea and 2.0 % muriate of potash as mixture increased fruit quality (Vijayaraghavan and Ayyamperumal, 2000).
total sugars.

Based on several studies pre-harvest bunch spray of 3.0% K₂SO₄ twice, two and four weeks after bunch emergence is recommended to increase consumer preference in banana cv. Nendran (KAU, 2011).

Integrated Nutrient Management involving supply of 50% of nutrients by spray on leaf and bunch (0.5% urea, 0.5% SOP, 0.2% ZnSO₄ and 0.1% Boric Acid) four sprays on leaf from 5th month to 8th month improve quality in banana (IIHR, 2013). The above mentioned results support the present observations.

Similar results were obtained in banana cultivars by Kumar and Jeyakumar (2001) in Robusta, Suresh and Savithri (2001) in Nendran, Pathak *et al.* (2011) in Martaman and Ningavva *et al.* (2014) in Grand Naine.

IV. Conclusion

From the above results, it can be concluded that T2 (3.0% K₂SO₄), T6 (ZnSO₄ 1.0 % + FeSO₄ 0.3% + CuSO₄ 0.2% + H₃BO₃ 0.2% + (NH₄)₂MoO₄ 0.03%), T5 (ZnSO₄ 0.5% + FeSO₄ 0.2% + CuSO₄ 0.1% + H₃BO₃ 0.1% + (NH₄)₂MoO₄ 0.01%) and T4 (IIHR formulation (0.5% urea, 0.5% K₂SO₄, 0.2% ZnSO₄ and 0.1% H₃BO₃) as foliar application 2, 4 and 6 months after planting can be recommended for enhancing growth, yield and fruit quality in Nendran banana.

Bibliography

- [1] [Anonymous]. 2008. <http://bananas.bioversityinternational.org/> Not a funny fruit. /content/view/52/77/ lang,en/. [5 July 2015].
- [2] [Anonymous]. 2013. <http://www.iihr.res.in/technologies20developed.html>. [7 Oct 2013].
- [3] KAU [Kerala Agricultural University]. 2011. *Package of Practices Recommendations: Crops* (14th Ed.). Kerala Agricultural University, Thrissur. 195p.
- [4] Kumar, N. and Jeyakumar, P. 2001. Influence of micronutrients on growth and yield of banana (*Musa spp.*) cv. Robusta (AAA). *Dev. Plant Soil Sci.* **92**: 354-55.
- [5] Ningavva, B. V., Kulapati, H., Paramappa, M. K., and Nadukeri, S. 2014. Effect of soil application and foliar spray of zinc and boron on quality of ratoon banana cv. Grand Naine under hill zone of Karnataka. *Trends Biosci.* **7**(20): 3294-3296.
- [6] Pathak, N. L., Bauri, F. K., Misra, D. K., Bandyopadhyay, B., and Chakraborty, Y. 2011. Application of micronutrients on growth, yield and quality of banana. *J. Crop Weed* **7**(1): 52-54.
- [7] Ramesh, A. K. and Kumar, N. 2007. Sulfate of potash foliar spray effects on yield, quality, and post-harvest life of banana. *Better Crops* **91**(2): 22-24.
- [8] Suresh, S. and Savithri, P. 2001. Yield and quality of wetland banana as influenced by liming and nutrients application in an acid soil. *Haryana J. Hort. Sci.* **30**: 12-13.
- [9] Vijayaraghavan, H. and Ayyamperumal, A. 2000. Banana improvement, production and utilization, Singh H.P. and K.L. Chadha (eds), AIPUB, Trichy, pp. 292-296.

Table 1. Effect of foliar application of nutrients on TSS, acidity, total sugar, reducing sugar, non reducing sugar, shelf life at ambient conditions, sweetness and overall acceptability of fruits.

Treatments	TSS (°B)	Acidity (%)	TS (%)	RS (%)	NRS (%)	SL (in days)	Sweetness	OOA (in days)
T1	30.33	0.463	17.14	12.81	4.33	4.00	21.90	21.50
T2	31.50	0.320	19.37	15.45	3.91	3.33	37.00	38.00
T3	28.92	0.593	16.92	11.06	5.65	4.10	9.20	11.50
T4	29.17	0.556	16.93	12.08	4.85	3.92	15.40	22.00
T5	29.50	0.426	17.96	14.93	3.03	3.68	27.50	26.00
T6	30.67	0.426	19.42	16.90	2.52	3.41	34.00	30.50
T7	27.50	0.593	14.52	9.15	6.09	3.12	15.40	11.50
T8	26.17	0.660	13.13	8.95	4.17	4.23	3.60	3.00
SE	0.540	0.028	0.36	0.449	0.328	0.14	23.105	23.105
CD (0.05)	1.620	0.088	1.100	1.364	0.995	0.42		

NB: TSS- Total Soluble Solids, TS- Total sugars, RS- Reducing sugars, NRS- Non reducing sugars, SL- Shelf life at ambient conditions, OOA- Over all acceptability of fruits

