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Fruit Quality and Shelf Life of Banana Cv. Grand Naine Influenced by Chelated and Non Chelated Micronutrients

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ABSTRACT

Field experiment was conducted at Regional Horticultural Research Station, Navsari Agricultural University, Navsari during the year 2005 to study the effect of micronutrients on fruit quality and shelf life of banana (*Musa paradisiaca* L.) Cv. Grand Nain. The experiment was laid out in randomized block design with nine treatment combinations involving two levels of FeEDTA and $FeSO_4$ (25g and 50g per plant) and ZnEDTA and $ZnSO_4$ (20g and 40g per plant) with common application of $MnSO_4$, $CuSO_4$, and Borax (20, 5, 10g per plant respectively) except control. The treatments were replicated thrice. The higher level of chelated zinc produced favorable effect on fruit quality in terms of TSS per cent, total sugars, reducing sugars, sugar / acid ratio and acidity per cent. This treatment also increased the shelf life of banana fruit.

Key words : Banana, FeEDTA, Micronutrients, ZnEDTA

Banana is the most important fruit of India. It is considered as apple of Paradise. The production of poor quality of fruits is a matter of common experience. It would therefore, be worthwhile to improve the physico-chemical quality of crops with feeding of nutrients. Macro elements like nitrogen, phosphorus and potash play vital roles in promoting the plant vigor and productivity. Where as micro-nutrients help in the uptake of major nutrients. Some research workers have reported favorable responses of banana and other fruit crops to micronutrients application. (Kavitha *et al*. 2000, Singh and Brahmachari 1999 and Dixit *et al.* 1997). Keeping this in view, the present experiment was under taken to study the effect of chelated and non-chelated micronutrients on fruit quality and shelf life of banana (*Musa paradisiaca* L.) Cv. Grand Nain.

MATERIAL AND METHODS

The experiment was conducted in randomized block design with three replications and nine treatments at Regional Horticultural Research Station, Navsari Agricultural University, Navsari (GUJARAT) during the year 2005. The soil of experimental field was clayey with pH 7.3 and Ec (dsm^{-1}) 0.94. Healthy plants multiplied by tissue culture were planted at spacing of 2.1x1.5m. Ten kg of FYM was applied in each pit before planting. Recommended dose of fertilizer (RDF) was applied at the rate of 200 g nitrogen, 90 g phosphorus and 200 g potassium per plant. The 1/3 nitrogen and potassium and whole amount of phosphorus applied at the three months after planting. Remaining nitrogen and potassium was applied in two splits i.e at four and five months after planting. The various treatments are Control (RDF)-T_1, RDF + $FeSO_4$ 25 g -T_2, RDH + $FeSO_4$ 50 g -T_3, RDH + FeEDTA 25 g -T_4, RDF + FeEDTA 50 g-T_5, RDF + $ZnSO_4$ 20 g -T_6, RDF + $ZnSO_4$ 40 g -T_7, RDF + ZnEDTA 20 g - T_8, RDF + ZnEDTA 40 g - T_9. The common application of $MnSO_4$ 20g, $CuSO_4$ 5 g and Borax 10 g were given in all the treatments except control. The treatments applied in two equal splits , three and four months after planting. All plant protection and intercultural operations were under taken when ever necessary as per the recommendation. The physico-chemical composition of fruits were analyzed after ripening, TSS were recorded with the help of hand refractometer. The total sugars content of fruits was determined by following the standard method. (Ranganna, 1977)

RESULTS AND DISCUSION

The observations recorded (Table-1and 2) revealed that the fruit quality characters viz. the pulp to skin ratio, non-reducing sugars and starch were not altered significantly due to the application of micronutrients whereas TSS, total sugars, reducing sugars, acidity and sugar: acid ratio were significantly influenced by micronutrients. The higher

Table 1. Response to chelated and non- chelated micronutrients on ripe fruit characters and shelf life of banana cv. Grand Nain.

Treatment	Pulp wt. (g)	Skin wt. (g)	P/S ratio	Shelf life of banana (days)
T_1 = Control (RDF)	66.91	28.30	2.37	11.33
T_2 = RDF + $FeSO_4$ 25g	70.75	33.55	2.11	13.66
T_3 = RDF + $FeSO_4$ 50g	68.23	29.90	2.29	12.33
T_4 = RDF + FeEDTA 25g	76.82	33.70	2.31	13.66
T_5 = RDF + FeEDTA50g	69.73	31.93	2.23	12.66
T_6 = RDF + $ZnSO_4$ 20g	69.55	31.77	2.54	12.33
T_7 = RDF + $ZnSO_4$ 40g	79.08	34.68	2.32	14.33
T_8 = RDF + ZnEDTA 20g	70.28	32.35	2.17	13.33
T_9= RDF + ZnEDTA 40g	80.28	36.80	2.19	14.66
C.D.at 5%	NS	NS	NS	NS

Table 2. Response to chelated and non- chelated micronutrients on fruit quality of banana Cv. Grand Nain

Treatment	TSS (%)	Total Sugars (%)	Reducing sugars (%)	Non-reducing sugars (%)	Acidity (%)	S/A ratio	Starch (%)
T_1 = Control (RDF)	21.47	14.97	5.64	9.33	0.189	75.53	6.89
T_2 = RDF + $FeSO_4$ 25g	23.80	17.34	6.61	10.72	0.161	107.38	5.85
T_3 = RDF + $FeSO_4$ 50g	23.10	16.04	6.21	9.83	0.176	91.10	6.91
T_4 = RDF + FeEDTA 25g	24.23	17.52	6.89	10.63	0.159	110.12	5.97
T_5 = RDF + FeEDTA50g	23.43	16.51	6.28	10.23	0.170	97.93	6.74
T_6 = RDF + $ZnSO_4$ 20g	23.20	16.24	6.27	9.97	0.175	92.74	6.56
T_7 = RDF + $ZnSO_4$ 40g	25.07	18.83	7.16	11.66	0.157	121.26	6.00
T_8 =RDF + ZnEDTA 20g	23.50	17.01	6.51	10.50	0.164	103.65	6.29
T_9= RDF + ZnEDTA 40g	25.80	18.93	7.40	11.52	0.155	122.12	5.96
C.D.at 5%	2.28	2.09	0.87	NS	0.019	18.90	NS

percentage of total sugars and reducing sugars were recorded by the higher rate of ZnEDTA with $CuSO_4$, $MnSO_4$and Borax application. It might be due to the adequate amount of zinc improved the auxins content and it also acts as a catalyst in oxidation-reduction process in plants. Besides, zinc helped in other enzymatic reactions like transformation of carbohydrates, activity of hexokinase and formations of cellulose and change in sugar are considered due to its action on hymohexos (Dutta and Dhua, 2002). The higher TSS was recorded with higher rate of ZnEDTA with $CuSO_4$, $MnSO_4$and Borax. The higher TSS was due to the increased total sugar content owing to the efficient translocation of available photosynthates of fruit plup rather than to other parts. The acidity per cent was significantly decreased due to micronutrients minimum acidity was recorded under the treatment of ZnEDTA with $CuSO_4$, $MnSO_4$, and Borax. The reduction in acidity level may be probably due to more accumulation of sugar in fruits. The sugar acid ratio was higher in fruits of banana plant treated with ZnEDTA (40g) with $CuSO_4$, $MnSO_4$

and Borax. Increase in sugar /acid ratio is due to increase in sugar content and decrease in acidity level of fruits by this treatment. Similar findings had been observed by Kavitha *et al*.(2000) in papaya, Singh and Bramachari (1999) in guava, Dixit *et al.* (1997) in kinnow and Kumar *et al*.(1995) in litchi.

The shelf life of fruits after harvesting was not affected significantly by the micronutrients. However maximum shelf life was observed in higher dose (40g) of ZnEDTA with $CuSO_4$, $MnSO_4$, and Boron and minimum in control. This is because the shelf life of fruits depend on many factors like stage of maturity, internal ethylene content, internal chemical composition of fruits, temperature, humidity etc. which varies from plant to plant and fruit to fruit of the same bunch.

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