

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2024; 8(8): 517-519
www.biochemjournal.com
 Received: 21-05-2024
 Accepted: 25-06-2024

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Physico-chemical properties of mango fruits cv. Alphonso as influenced by the post flowering foliar nutrition

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i8g.1785>

Abstract

The investigation was carried out at Mango research Sub-Centre, Rameshwar, Sindhudurg during the season 2017-18 on uniformly growing, 30 years old Alphonso mango trees. The experiment was laid in RCBD design with three replications and seven treatments. The treatments included viz; Control (No spray), Urea (1 and 3%), Potassium nitrate (1 and 3%) and 19: 19: 19 NPK (1 and 3%). Two sprays were taken in each treatment as 1st spray at pea stage of fruit development and second spray was given at marble stage. The significantly maximum fruit length and breadth (9.27 cm and 7.97 cm, respectively) and highest fruit weight (245.33 g) were measured in T₅ - KNO₃ (3%) treatment. The least fruit weight (229.67 g) was recorded in Control (T₁). At harvest stage, the highest T. S. S. (8.98 °B) was recorded in KNO₃ (1%) treatment while at ripe stage, KNO₃ (3%) exhibited highest T. S. S. (20.32 °B). The highest total sugars and ascorbic acid content (16.28% and 55.47 mg/ 100 g of fruit pulp, respectively) was found in KNO₃ (3%) treatment. The spongy tissue intensity was significant reduced in the mango fruits by foliar nutrition. The lowest intensity (5.5 percent) was observed in KNO₃ (3%) treatment.

Keywords: Mango, Alphonso, foliar nutrition, fruit weight, spongy tissue

Introduction

The mango (*Mangifera indica* L.) is the premier, most celebrated tropical fruit. It is known as 'King of the fruits' due to its delicious taste, admirable flavour, appealing aroma and attractive colour and other several desirable characters. Mango has intimate association with religious, cultural, aesthetic and economical values since from long time and therefore it the national fruit of India. Alphonso is the leading export cultivar of India followed as this variety is best suited not only as a fresh/Table fruit but also has high potential for value addition due to its ideal properties of fruits from processing point of view. The cultivation of 'Alphonso' is spread across the Konkan region of Maharashtra. Irregular bearing, low productivity, sensitive to climatic aberrations are the limitations of this variety. The hot and humid climate throughout the year with dry season from November to May in the Konkan region is most ideal for Alphonso mango (Malshe *et al.*, 2022) [5].

The management of mango crop from flowering to fruit harvesting is a vital and several cultural practices are being followed by the growers to achieve higher production. The nutrition during fruit development stage helps to improve the fruit retention and fruit quality. In mango the efficacy of the foliar nutrition was studied by various scientists and the quality improvement was also reported. Few foliar nutrient grades are normally used by mango growers. The present investigation was undertaken to assess the influence of some foliar nutrient grades on physico-chemical properties of Alphonso mango fruits

Materials and Methods

The present investigation was carried out at Mango research Sub-Centre, Rameshwar, Dist. Sindhudurg during the season 2017-18. Uniformly growing, 30 years old Alphonso mango trees were selected for experiment. The recommended cultural practices were followed uniformly for management of experimental trees. The experiment was laid in RCBD design with three replications and seven treatments. The treatments included viz; Control (No spray), Urea (1 and 3%), Potassium nitrate (1 and 3%) and 19: 19: 19 NPK (1 and 3%).

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Two sprays were taken in each treatment as 1st spray at pea stage of fruit development and second spray was given at marble stage. The observations on the fruit size and weight were recorded by adopting standard procedures. The chemical parameters were recorded as per the procedure given by A.O.A.C. (1975). The occurrence of spongy tissue was visually observed and reported in intensity percentage. Data were analyzed statistically (Panse and Sukhatme, 1985) [6].

Results and Discussion

The data pertaining to the physical properties of Alphonso mango fruits as influenced by foliar nutrition are presented in the Table 1. It is cleared from the data that the length and breadth of the fruit and average fruit weight were significantly varied due to foliar nutrition treatments. The fruit size and the fruit weight were improved in all the nutrient treatments than control. The maximum fruit length and breadth (9.27 cm and 7.97 cm, respectively) were measured in T₅ - KNO₃ (3%) treatment and it was at par with T₄ treatment. The lowest length of fruit (8.40 cm) was observed in Control (T₁). The increased size of fruit in the KNO₃ other nutrient treatments might be due to supplementary nutrition in fruit development stage. Bansode (2012) [2] reported that the 1 percent potassium nitrate improved the fruit length in mango.

The significantly highest fruit weight (245.33 g) was recorded in KNO₃ (3%) treatment (T₅) and it was at par with T₄ and T₇ treatments. The least fruit weight (229.67 g) was recorded in Control (T₁) and was on par with T₂ treatment. The increased fruit weight by foliar nutrition may be due to involvement of nutrient in cell division and cell elongation which eventually boost the weight of mango fruits. These results are in accordance with Bhatt *et al.* (2008) [3].

The data pertaining to the Total soluble solids (T. S. S.) and acidity of Alphonso mango fruits at harvest and at ripe stages as influenced by foliar nutrition are presented in Table 2. It is seen from the data that the T. S. S. of mango fruits were significantly varied due to foliar nutrition at both

the stages but the acidity was not influenced by the treatments. It is also observed that the T. S. S. was increased at ripe stage and acidity was decreased irrespective of treatments. At harvest stage, the highest T. S. S. (8.98 °B) was recorded in KNO₃ (1%) treatment while at ripe stage, KNO₃ (3%) exhibited highest T. S. S. (20.32 °B). The lowest T. S. S. was (8.24 °B and 19.24 °B, respectively) was recorded in Control (T₁). The combine effect of nutrients that enhanced the conversion of complex polysaccharides into simple sugar might be helpful to increase in T. S. S. The present results are in conformity with Gupta and Brahmachari (2004) [4] in mango cv. Bombai.

The data presented in Table 3 revealed that the total sugars and ascorbic acid content in the mango cv. Alphonso mango fruits were significantly influenced by the foliar nutrition treatments. The highest total sugars and ascorbic acid content (16.28% and 55.47 mg/ 100 g of fruit pulp, respectively) was found in KNO₃ (3%) treatment. The total sugars was at par with T₄ treatment and ascorbic acid content was at par with T₇ treatment. The lowest total sugars and ascorbic acid content (15.21% and 52.40 mg/ 100 g of fruit pulp, respectively) was observed in Control (T₁). The total sugars was maximum in KNO₃ treatments which may be due to involvement of potassium in carbohydrate synthesis, Yeshitela (2004) [7] also observed the similar trend in mango. The higher ascorbic acid content might be ascertained with higher level of sugar by foliar nutrients. The findings are in accordance with Bansode (2012) [2].

The data presented in Table 3 revealed the spongy tissue intensity was significant reduced in the mango fruits by foliar nutrition. The lowest intensity (5.5 percent) was observed in T₅ and was on par with T₄ treatment. While spongy tissue occurrence was highest (19.1 percent) in control (T₁). The potassium has role in various metabolic processes like protein synthesis, enzyme activation, water uptake, transpiration, as well as stress mechanism etc. which might be helpful in reduction of spongy tissue. The similar findings were also mentioned in mango by Malshe *et al.* (2022) [5].

Table 1: Physical properties of Alphonso mango fruits as influenced by foliar nutrition (At harvest)

Treatments	Length of fruit (cm)	Breadth of fruit (cm)	Average fruit weight (g)
T ₁ - Control (No foliar nutrition)	8.40	7.33	229.67
T ₂ - Urea (1%)	8.50	7.00	230.00
T ₃ - Urea (3%)	8.77	7.77	234.33
T ₄ - KNO ₃ (1%)	9.07	7.90	243.50
T ₅ - KNO ₃ (3%)	9.27	7.97	245.33
T ₆ - 19: 19: 19 NPK (1%)	8.80	7.13	234.33
T ₇ - 19: 19: 19 NPK (3%)	8.70	7.57	237.17
S. E.m ±	0.16	0.10	3.19
C.D. at 5%	0.50	0.29	9.83

Table 2: Total soluble solids (T. S. S.) and acidity of Alphonso mango fruits as influenced by foliar nutrition (At harvest and at ripe stages)

Treatments	T. S. S. (°B)		Acidity (%)	
	At harvest	At ripe stage	At harvest	At ripe stage
T ₁ - Control (No foliar nutrition)	8.24	19.24	3.42	0.33
T ₂ - Urea (1%)	8.67	19.79	3.31	0.32
T ₃ - Urea (3%)	8.77	19.77	3.21	0.31
T ₄ - KNO ₃ (1%)	8.98	20.13	3.25	0.29
T ₅ - KNO ₃ (3%)	8.46	20.32	3.00	0.29
T ₆ - 19: 19: 19 NPK (1%)	8.53	19.53	3.40	0.28
T ₇ - 19: 19: 19 NPK (3%)	8.57	19.57	3.70	0.28
S. E.m ±	0.16	0.176	0.01	0.007
C.D. at 5%	0.50	0.541	NS	NS

Table 3: Total sugars and ascorbic acid content in Alphonso mango fruits and occurrence of spongy tissue as influenced by foliar nutrition

Treatments	Total sugars (%)	Ascorbic acid (mg/100 g of fruit pulp)	Spongy tissue intensity (%)
T ₁ - Control (No foliar nutrition)	15.21	52.40	19.1 (25.90)*
T ₂ - Urea (1%)	15.36	53.17	15.0 (22.81)
T ₃ - Urea (3%)	15.28	53.13	16.8 (24.20)
T ₄ - KNO ₃ (1%)	16.03	53.37	6.3 (14.52)
T ₅ - KNO ₃ (3%)	16.28	55.47	5.5 (13.59)
T ₆ - 19: 19: 19 NPK (1%)	15.51	54.17	10.3 (18.70)
T ₇ - 19: 19: 19 NPK (3%)	15.49	54.68	9.7 (18.15)
S. E.m ±	0.21	0.57	1.37
C.D. at 5%	0.63	1.77	4.12

* Figures in the parenthesis indicates the arcsin values

Conclusion

From the present investigation it is cleared that the foliar nutrition with potassium nitrate (KNO₃ - 3%) during fruit development stage found better in improving the physico-chemical properties of Alphonso mango fruits and also for reducing the spongy tissue incidence.

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