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IMPROVEMENT IN FRUIT RETENTION AND YIELD IN MANGO (*Mangifera indica* L.) CV. ALPHONSO THROUGH IRRIGATION, NAA AND POTASSIUM NITRATE

K. V. Malshe, P. C. Haldavanekar and M. S. Gawankar

Mango Research Sub-Centre, Rameshwar, Tal. Deogad, Dist. Sindhudurg (Maharashtra)

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Abstract: *The field experiment was conducted at Mango Research Sub-Centre, Rameshwar, Tal. Deogad, Dist. Sindhudurg during the mango fruiting season 2015-16 to assess their effect of mango fruiting under hard lateritic rocky area of Deogad region. The highest fruit retention (9.33 per cent and 6.63 per cent) was recorded in irrigation + KNO_3 1% treatment at egg stage of fruit development and at harvest stage, respectively. The maximum fruit weight (225.71 g) was recorded in irrigation + KNO_3 1% treatment. The highest yield (197.2 fruits tree^{-1}, 44.47 kg tree^{-1} and 4.48 T ha^{-1}) was also recorded in irrigation + KNO_3 1% treatment at it was followed by Irrigation + NAA 20 ppm treatment. The intensity of spongy tissue was lowest (9.00 per cent and 9.75 per cent) was also in KNO_3 treatments*

Key words: *Mango, irrigation, NAA, KNO_3, yield, spongy tissue.*

Introduction

Mango (*Mangifera indica L.*) is known as "King of fruits" being most palatable and rich in sugar, organic acids and minerals and thus capture thousands of varieties grown throughout the length and breadth of the country. Among them, Alphonso leads top as one of the choicest and prime variety grown along the west coast of India in Maharashtra, Goa, Gujarat and Karnataka which has major share in total mango export. It is preferred because of its characteristic sugar-acid blend, attractive colour and shape, pleasant aroma, superior fragrance, highly appreciable flavour, delicious taste and long keeping quality. The Alphonso mango from Konkan region of Mahararashtra has unique worth in the market and preferably mango fruits from Deogad tahsil of Sindhudurg districts have prime value as it grown in the unique geographic territory having hard lateritic rocky area (Malshe *et al.*, 2017).

However, this variety has certain demerits like alternate bearing habit, and excessive/heavy fruit drop at different stages of fruit growth, rendering poor yielder, occurrence of 'spongy tissue', a physiological disorder. Alphonso is very sensitive to climate aberration and in the recent years, unfavourable weather adversely affected flowering and fruiting in mango. These major problems have attracted the attention of researchers worldwide and it is necessary to investigate the suitable remedial measures by cultural practices. For reduction of fruit drop and improvement of yield varies practices like spay of nutrients, growth promoters, irrigation, etc. were recommended. The present investigation was undertaken to assess their effect of mango fruiting under hard lateritic rocky area of Deogad region.

Materials and Methods

The field experiment was conducted at Mango Research Sub-Centre, Rameshwar, Tal. Deogad, Dist. Sindhudurg during the mango fruiting season 2015-16. An experimental site was in hard lateritic rocky area. The uniform, 35 years old mango trees of Cv. Alphonso were selected for experiment. The recommended cultural practices viz, nutrient management, application of paclobutrazol, etc. were followed equally for experimental tress. The experiment was laid in Randomized block design with four replications and six treatments comprising two trees per treatment per replication. The uniformly flowered trees were selected and treatments were imposed as T_1 : Control, T_2 : Irrigation @ 150 lit water at 15 days interval, T_3 : NAA 20 ppm, T_4 : KNO_3 1%, T_5 : Irrigation + NAA

20 ppm, T_6 : Irrigation + KNO_3 1%. The irrigation in treatments T_5 and T_6 were given as in treatment T_2. The foliar sprays of NAA and KNO_3 were given three times at 15 days intervals. The observations on fruit set, fruit retention at egg stage and harvest stage were recorded by counting the fruits on randomly selected panicles and percentage was calculated based on initial fruit set. The yield data of individual experimental tree was recorded. The average fruit weight and total soluble solids, acidity in ripe fruit was analyzed. The experimental data were analyzed statistically (Panse and Sukhatme, 1967).

Results and Discussion

The data on number of fruit retention percentage at different fruit development stage are presented in Table 1. The fruit retention percentage was significantly improved due to irrigation, NAA and KNO_3 treatments. The highest fruit retention at egg stage of fruit development (9.33 per cent) was recorded in irrigation + KNO_3 1% treatment (T_6) and was followed by irrigation + NAA 20 ppm (T_5) and irrigation (T_2).Whereas, in control lowest fruit retention (4.80 per cent) at egg stage was obtained. At harvest stage, the significantly highest fruit retention (6.63 per cent) was again computed in treatment irrigation + KNO_3 1% (T_6) which was at par with T_5 and T_2. In control, the retention percentage was lowest (3.22 per cent) at harvest stage. Further, it revealed that the fruit retention percentage at harvest was increased by 3.41 per cent in the irrigation + KNO_3 1% treatment (T_6) than control (T_1). The trees which were irrigated manifested maximum number of fruits per panicle up to harvest, as compared to the minimum number of fruits per panicle in unirrigated trees. In addition to irrigation, supplementary foliar nutrition with NAA and KNO_3 reduced the fruit drop and ultimately the fruit retention percentage increased. The improvement in fruit retention percentage might be due to supplementary moisture supply during fruit development stage under hard rocky conditions, reduction in abscission due to NAA and nitrogen and potassium nutrition during development. Uddin and Amin (1994) also reported that two irrigations on mango var. Aswina resulted in higher fruit retention as compared to that of control. Shinde *et al.* (2006) reported the effect of NAA on fruit retention and Nahar *et al.* (2010) also reported the beneficial effect of KNO_3 in mango fruit retention. The soil water deficit, nutrient deficiency during the reproductive cycle cause the fruit drop. The days required for fruit maturity was also differed significantly and the delayed maturity was observed in irrigation treatment (T_2).

The fruit weight was significantly improved due to treatment (Table 2). The maximum fruit weight (225.71 g) was recorded in irrigation + KNO_3 1% treatment (T_6) while rest of the treatments were at par among themselves. The lowest fruit weight (213.00 g) was in control. The present investigation clearly indicates that the moisture supply in fruit development stage and nutrient play a key role in increasing the fruit weight.

The data depicted in Table 2 revealed that the yield was significantly varied due to irrigation, NAA and KNO_3 treatments. The highest yield (197.2 fruits $tree^{-1}$, 44.47 kg $tree^{-1}$ and 4.48 T ha^{-1}) was recorded in irrigation + KNO_3 1% treatment (T_6) followed by T_5, T_2 and T_4. Whereas lowest fruit yield was in control. The beneficial effect of KNO_3 in increasing the fruit yield seems to the increased of fruit retention per panicle, fruit weight. Moreover, the applied nutrients (N and K) might have stimulated the functioning of a number of enzymes which in turn increased the translocation and mobilization of metabolites and photosynthates towards the developing fruits, resulted in highest number of fruits and fruit yield. In addition to this irrigation might be useful to maintain favourable water balance which is essential for the growth and development of the fruit as there is high water requirement particularly towards maturity. The exogenous application of NAA also reduces fruit drop and ultimately yield levels improves. The results are in agreement with Sudha *et al.* (2012) and Sarkar and Rahim (2013).

The data on Total soluble solids, acidity and intensity of spongy tissue are presented in Table 3. It

is revealed that the T. S. S. content in fruits was highest in KNO_3 treatments with and without irrigation (T_6 and T_4) indicating role of potassium nutrition in quality improvement of mango fruits. The acidity of fruit did not differ significantly. The intensity of spongy tissue was lowest (9.00 per cent and 9.75 per cent) was also in KNO_3 treatments (T_6 and T_4).

Thus, it could be concluded that supplementary irrigation with KNO3 spray was found beneficial for achieving higher fruit retention, yield of mango (Cv. Alphonso) and also in reducing the spongy tissue disorder.

Table 1: Effect of irrigation, NAA and KNO3 on fruit retention percentage of mango fruits Cv. Alphonso

Treatment	Retention at Egg stage (%)	Retention at harvest stage (%)	Improvement in fruit retention percentage over control	Days required for maturity of fruits from fruit set
T_1 : Control	4.80	3.22	0.00	96.75
T_2 : Irrigation	8.27	6.35	3.13	101.50
T_3 : NAA 20 ppm	5.30	3.75	0.52	97.25
T_4 : KNO_3 1%	7.95	5.35	2.13	94.00
T_5 : Irrigation + NAA 20 ppm	8.38	6.42	3.20	100.75
T_6 : Irrigation + KNO_3 1%	9.33	6.63	3.41	98.00
S. E. ±	0.29	0.20	-	1.34
C. D. (at 5%)	0.88	0.60	-	4.03

Table 2: Effect of irrigation, NAA and KNO3 on average fruit weight and yield of mango fruits Cv. Alphonso

Treatment	Average fruit weight (g)	No. of fruits tree^{-1}	Yield (kg tree^{-1})	Improvement in yield over control (%)	Yield (T ha^{-1})
T_1	213.00	133.3	28.28	0.00	2.83
T_2	221.28	178.2	39.51	39.72	3.95
T_3	217.25	155.5	33.78	19.46	3.38
T_4	223.53	173.8	38.89	37.52	3.89
T_5	221.08	179.7	39.73	40.49	3.97
T_6	225.71	197.2	44.47	57.23	4.45
S. E. ±	2.95	9.94	2.31	-	-
C. D. (at 5%)	8.90	29.95	6.95	-	-

Table 3: Effect of irrigation, NAA and KNO3 on T. S. S., acidity and intensity of spongy tissue in mango fruits Cv. Alphonso

Treatment	T. S. S. (^{0}B)	Acidity (%)	Spongy tissue intensity (%)
T_1	19.85	0.290	11.75 (20.05)*
T_2	19.70	0.295	12.25 (20.49)
T_3	19.70	0.298	14.38 (22.28)
T_4	20.20	0.300	9.75 (18.19)
T_5	20.08	0.293	11.25 (19.60)

T_6	20.28	0.305	9.00 (17.46)
S. E. ±	0.114	0.011	0.80
C. D. (at 5%)	0.343	NS	2.40

(* Figures in parenthesis are arc sine transformed value)

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