

Yield of Mango (*Mangifera Indica* L.) Cv. Alphonso as Affected by Post Flowering Nutrient Foliar Sprays

Abstract

Fruit retention and yield of mango (*Mangifera indica* L) cv. Alphonso as affected by post flowering nutrient foliar sprays was carried out at Department of Horticulture, College of Agriculture, Dapoli (M.S.) in Randomized Block Design with three replications and fourteen treatments comprising of foliar sprays of Urea, KNO₃ and MPP (Monopotassium phosphate,) Sujala, K₂SO₄ and NAA at various concentrations along with control (No spray). These foliar sprays were given at three different fruit growth stages (pea, marble and egg stage). The application of 2% urea at pea stage, 0.5% MPP each at marble and at egg stage significantly increased fruit retention, number of fruits and yield per plant. It was at par with the treatments KNO₃ 1% at pea stage, MPP 0.5% each at marble and egg stage; Urea 2% each at pea, marble and egg stage; Urea 2% at pea stage, KNO₃ 1% at marble stage and MPP 0.5% at egg stage and Urea 2% at pea stage, KNO₃ 1% each at marble and egg stage. Most of the fruit quality parameters at ripe stage were observed to be non significant among all the treatments under study.

Keywords: Mango, Urea, KNO₃, MPP, Sujala, K₂SO₄, NAA, fruit retention, yield.

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Introduction

Mango is cultivated throughout the tropics and subtropics all over the world. India is the largest producer of mango in the world producing 45 % of world mango. Alphonso is the choicest variety accepted nationally and internationally owing to its unique flavour attractive shape, colour and good keeping quality. It is grown popularly in the Konkan region of Maharashtra comprising of 1, 85,000 ha area (Anonymous, 2013) In spite of several advantages, the variety has many drawbacks like low percentage of hermaphrodite flowers, severe fruit drop due to recurrent flowering, occurrence of physiological disorders such as spongy tissue and alternate bearing habit leads to low productivity of Alphonso mango in the Konkan region of Maharashtra.

Further, fruit drop is serious problem in mango production and has become a limiting factor for increasing the production in India. In spite of profuse flowering and very high initial fruit set in the on year, the ultimate retention and total yield in mango is very low due to heavy fruit drop. Among the various causes of the fruit drop, lack of nutrition is one of them.

As mango is grown as rainfed crop, the soil application of manures and fertilizers is generally done during rainy season. The split application at various active growth stages is not possible due to unavailability of sufficient soil moisture during flowering and fruiting season. Hence, the only alternative is to supply the nutrients through foliar application. Such applications can be beneficial in improving the quality as well as quantity of production by improving fruit retention and appearance of fruit. Keeping this in view, investigation was carried out to find out the best combination of nutrients through foliar sprays which will be useful in improving productivity in Alphonso mango.

Materials and Methods

Thirty years old uniformly grown, one hundred twenty six Alphonso mango trees planted at 10x10 m spacing were selected for the experiment at Department of Horticulture, College of Agriculture, Dapoli (M.S.). These trees were manured uniformly on 1st July, 2010 with 1.5 kg N, 0.5 kg P₂O₅ and 1.0 kg K₂O and 50 kg FYM per plant. Each experimental tree was treated with soil application of Paclobutrazol (3 ml/m canopy diameter) on 12th August, 2010. Plant protection schedule recommended by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli for mango blossom protection

was followed strictly in order to protect the blossom from major pests like mango hopper, thrips, midge fly and disease like anthracnose and powdery mildew. The water soluble fertilizers namely potassium nitrate (13:00:46), urea (46:00:00), mono potassium phosphate (00:52:34), potassium sulphate (00:00:50), Sujala (19:19:19) in various treatment combinations and Naphthalene Acetic Acid (NAA) were applied as foliar spray. The nine treatments were arranged in Randomized Block Design with 3 replications. The study was carried out from June, 2010 to March, 2011. The experimental details are as follows.

Treatment	At Peanut Stage	At Marble Stage	At Egg Stage
T ₁	KNO ₃ (1%)	KNO ₃ (1%)	KNO ₃ (1%)
T ₂	KNO ₃ (1%)	KNO ₃ (1%)	MPP (0.5%)
T ₃	KNO ₃ (1%)	MPP (0.5%)	MPP (0.5%)
T ₄	Urea (2%)	Urea (2%)	Urea (2%)
T ₅	Urea (2%)	KNO ₃ (1%)	MPP (0.5%)
T ₆	Urea (2%)	KNO ₃ (1%)	KNO ₃ (1%)
T ₇	Urea (2%)	MPP (0.5%)	MPP (0.5%)
T ₈	Urea (2%)	Sujala (1%)	Sujala (1%)
T ₉	KNO ₃ (1%)	KNO ₃ (1%)	Sujala (1%)
T ₁₀	KNO ₃ (1%)	Sujala (1%)	Sujala (1%)
T ₁₁	NAA 20 ppm	NAA 20 ppm	-
T ₁₂	K ₂ SO ₄ (0.5 %)	K ₂ SO ₄ (0.5 %)	K ₂ SO ₄ (0.5 %)
T ₁₃	KNO ₃ (1.5%)	K ₂ SO ₄ (1.5 %)	K ₂ SO ₄ (1.5 %)
T ₁₄	Control (No foliar spray)		

The unit of three plants per treatment per replication was taken for experiment.

Observations pertaining to fruit retention (%), total yield (t/ha), physical and chemical composition of fruit and post-harvest behavior of Alphonso mango fruits were recorded. Ten panicles per tree from all the treatments were selected for recording observations. The average of ten panicles was worked out as mean value. The number of fruits retained in each panicle was counted at marble, egg and at harvest stage. Fruit yield was recorded on count basis and weight basis. Physical parameters like fruit length (cm), breadth (cm), fruit weight (g), fruit volume (ml), specific gravity were recorded. At ripe stage, fruit pulp, peel and stone of ripe fruit were separated and their weight was recorded. The percentage of Physiological Loss in weight (PLW), shelf life of fruits (days), chemical parameters like TSS (^oBrix), titratable acidity (%), ascorbic acid (mg/100g of fruit pulp), reducing Sugars (%), total sugars (%) and β-carotene (µg/100g of pulp) were also recorded. The ripe fruits were examined for their sensory qualities with 9 point Hedonic scale score (Amerine *et al.*, 1965) The statistical analysis was done

by the method suggested by Panse and Sukhatme (1995).

Results and Discussion

The results of the experiment on effect of post flowering foliar nutrient sprays with respect to fruit retention are presented in Table.1 and depicted in fig. 1

It was observed that the number of fruits per panicle was decreased consistently from peanut up to harvest in all treatments. at different stages up to the harvest. However, there was significant difference in number of fruits per panicle at marble stage, egg stage and at harvest except at pea stage.

At pea stage, the highest number of fruits (2.744) were recorded in the treatment T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage). At marble stage, the number of fruits per panicle was highest in the T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage) which was significantly superior over all the treatments except T₄ and T₆. At egg stage, significantly the highest number of fruits (0.337) per panicle was observed in the treatment T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage) and was at par with T₁, T₃, T₄, T₆ and T₅. Similarly, at harvest stage, significantly the highest number of fruits (0.330) per panicle was recorded in the treatment T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage) and was at par with T₃, T₄, T₅ and T₆.

The highest fruit drop was observed from pea to marble stage among all the treatments and on average it was 82.84 per cent. Further, at harvest fruit retention was only 8.82 per cent irrespective of treatments.

The fruit drop in mango continued from fruit set up to harvesting. Generally maximum fruit drop occurs at early stage i.e. peanut stage and later on the drop was minimum at egg stage and at harvest stage in most of mango varieties (Desai, 1980). The present investigation also indicated similar trend.

The data presented in the table 2 indicated that there was non-significant effect of different treatments on number of days required for harvesting of Alphonso mango fruits. However, it was in the range of 100.00 to 105.33 with mean of 103.48 days.

The highest number of days (105.33) for harvest were recorded in T₉ (Urea 2% at pea stage, KNO₃ 1% at marble stage, MPP 0.5% at egg stage) followed by the treatments T₄, T₅ and control (104.67). The lowest number of days (100) were recorded in T₁₂ (K₂SO₄ 0.5% each at pea stage, marble stage and at egg stage).

The data on the effect of foliar sprays on yield of Alphonso mango presented in the Table 2 indicated that there was significant effect of different foliar sprays on yield of Alphonso mango fruits. Among all the treatments, number of fruits was in the range of 100.90 to 166.00 with mean of 124.66 per tree. In control, the number of fruits per tree was 96.

The highest number of fruits was obtained in the T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage) i.e. 166.00 fruits/tree and was significantly superior over all

except T₃, T₄, T₅ and T₆. The lowest number of fruits i.e. 100.899 fruits/tree was recorded in treatment T₈ (Urea 2% at pea stage, 19:19:19 1% at marble stage and 19:19:19 1% at egg stage). However, it was at par with T₁, T₂, T₅, T₉, T₁₀, T₁₁, T₁₂, T₁₃ and T₁₄.

The highest fruit yield 41.963 kg was obtained in the treatment T₇ (Urea 2% at pea stage, MPP 0.5% at marble stage and MPP 0.5% at egg stage) and was at par with T₃, T₄, T₅ and T₆. The lowest fruit yield 26.710 kg was recorded in control (no foliar spray). Similar trend was observed, when yield expressed in terms of weight (tonnes) per ha.

The present investigation clearly indicate that the nutrient play a key role in increasing the fruit weight. The spraying of 2% urea at pea stage, 0.5% MPP each at marble and egg stage had beneficial effect on yield. This might be due to the combination effect of urea and monopotassium phosphate.

The effect of various treatments under study on pulp; peel and stone weight was also studied and the data are presented in Table 3. The difference due to treatment on weigh of pulp, weight of peel and weight of stone was non significant. However, the weight of pulp, weight of peep and weight of stone was in range of 103.33 to 170.00g, 29.67 to 51.33g and 27.33 to 40.00 g respectively. The mean pulp to peel ratio was 3.313 and was in range of 2.747 to 3.942. The highest pulp to peel ratio was recorded in treatment T₄ (3.942) and was at par with T₆ (3.848), T₅ (3.659), T₂ (3.528) and T₉ (3.483).

The effect of post flowering nutrient foliar sprays on various chemical parameters at ripe stage was also studied during investigation and the data are presented in Table 4. The various chemical parameters like PH, moisture, B carotene, TSS, titratable acidity ascorbic acid, reducing and non reducing sugars recorded non significant differences in various treatments.

Thus, the application of post flowering foliar sprays during initial stages of fruit growth (pea, marble and egg stage) increased per cent fruit retention and there by yield. However, amongst the various treatments tried, the application of 2% Urea at pea stage, 1%KNO₃ at marble stage and 0.5% MPP at egg stage (T₅) increased fruit retention and application of 2% Urea at pea stage, 1% MPP each at marble and egg stage (T₇) increased fruit yield.

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