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Effect of various preharvest treatment on yield of mango (*Mangifera indica* L.) cv. Alphonso under Konkan climatic condition

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Abstract
An investigation entitled "Effect of various preharvest treatment on yield of mango (*Mangifera indica* L.) cv. Alphonso under Konkan climatic condition" was undertaken at the mango orchard 'Centre of Excellence for Mango', College of Horticulture, Dr. BSKKV, Dapoli, during the year 2022-23 in Randomized Block Design (RBD) with the aim to improving the yield and physical quality of Alphonso mango. The present study revealed that all the treatments had a significant effect on yield and physical Quality of fruits of Alphonso mango. The investigation suggested that treatment T_4 (Foliar application of combination of n-ATCA 10% and folic acid 0.2%) spraying and bagging with newspaper bags at marble stage for protection, excelled the yield as well as physical quality fruits.

Keywords: Alphonso, mango, yield, physical quality

Introduction
Mango, scientifically known as (*Mangifera indica* L.) stands as a paramount tropical fruit crop of global significance. Most commercially grown mango cultivars are classified within the same species and belong to the Anacardiaceae family. Mango cultivation covers 2258.13 thousand hectares in India, with a yield of 21822.32 MT and a productivity of 9.7 MT per hectare. Maharashtra is the only state with 166.76 thousand hectares of land, 791.36 MT of output and an average yield of around 4.75 MT of mango crop per hectare (Annon., 2018) [1]. One of the biggest mango-growing regions in the nation is the Konkan region of Maharashtra, which covers 1,82,000 hectares and contributes significantly more than 35% of all mango exports from India to the nation's total area under mango cultivation (Haldankar *et al*., 2020) [6].

The most well-known mango cultivating region in the state is the Konkan region, which is located along the western coast. The most well-known mango type produced there is the Alphonso variety. The area in question has duly acquired the title of "mango hub of Maharashtra." Although Maharashtra is a major mango-growing region, the southern Konkan region specifically, the districts of Ratnagiri and Sindhudurg is a home to the highest quality Alphonso mangoes. However, climate change, fruit drop, recurrent flowering, fruit fly attack, unseasonal rainfall and alternate bearing are considering as major factors that influenced the Alphonso mango yield in the Konkan region of Maharashtra, while Dr. BSKKV, Dapoli suggested a number of packages of practices to address these issues, weather variability poses a serious threat to Alphonso mango yields with this in mind, a variety of preharvest treatments have been established to address these issues and enhance productivity in the Konkan region.

Materials and Methods
The present investigation was undertaken at the mango orchard 'Centre of Excellence for Mango', College of Horticulture, Dr. BSKKV, Dapoli, during the year 2022-23 in Randomized Block Design (RBD) and data was analysed as per the Panse and Sukhatme (1985) [9], 20-year-old rejuvenated mango plants selected for research trial with spacing (10 x10 m) in lateritic soil condition, with the aim to improving the yield of Alphonso mango. There were six treatments i.e. T_1-Foliar application of KNO_3-1% at pea, marble and egg stage + Bagging with newspaper bags at marble stage, T_2- T_1 + spreading of 20 cm thick dry grass mulch at pea stage, T_3- T_1+ Irrigation @150 lit. At 15 days interval starting from pea stage to one month before harvesting, T_4-Foliar application of combination of (n-ATCA 10% and folic

acid 0.2%) spraying at 50% flowering (1 ml/lit), pea stage (1.5 ml/lit), egg stage (1.5 ml/lit), and 75 days after fruit set (2 ml/lit) + Bagging with newspaper bags at marble stage, T_5- Foliar application Amrashakti (2.5%) at vegetative stage, 50% flowering and egg size fruit + Bagging with newspaper bags at marble stage, T_6- Control and four replications having two mango trees in each replication. One plant required minimum of 10 litres of water for the foliar application of chemicals, and spraying was done in the morning time. Potassium nitrate 1%, Amrashakti 2.5% and combination of (n-ATCA 10% and folic acid 0.2%) and cultural practices such as mulching with dry grass mulch was done at pea stage of fruit, bagging with newspaper bags (20 x 25 cm) was done at marble stage of fruit and irrigation application was done in accordance with the treatment plan. Fruits of trees were separately harvested by (Nutan Zela developed by Dr. BSKKV, Dapoli) without any damage of fruits in the morning hours dated 5th, 9th, 12th, 17th, and 25th May and harvested fruits were transported from the orchard to the Fruit Science laboratory without any type of physical damage. The average of sixteen fruits was worked out as a mean value.

The observations are recorded immediately after harvesting**.** The weight of fruits was recorded by using monopan electronic balance and expressed in grams, fruit girth and length was measured with the help of digital vernier callipers. The volume of each fruit was recorded by water displacement method and the average volume of fruit was calculated. The number of days required from fruit set to maturity on the day when harvesting done was noted on a count basis.

The specific gravity of mango fruits was determined by dividing the weight of the fruit by volume of the fruits obtained by the water displacement method.

$$\text{Specific gravity of fruit} = \frac{\text{Weight of the fruit}}{\text{Volume of the fruit}} \times 100$$

Results and Discussion

Yield parameters

The data regarding the impact of various preharvest treatment on the number of fruits per tree, yield per tree (kg), and yield per hectare in (t) and days required for harvesting of Alphonso mangoes were summarized in Table 1.

The highest number of fruits per tree (128.00), fruit yield (36.60 kg/tree) and yield (3.66 t/ha^{-1}) were recorded in the treatment T_4, while the lowest number of fruits per tree (98.41), fruit yield (23.35 kg/tree) and yield (2.33 t/ha^{-1}) were obtained in treatment T_6 (Control) which was inferior over all the treatments. However, the shortest duration from fruit set to harvest which was (110.00 days) observed in treatment T_4 which was (10 days) earlier than control treatment

The highest numbers of fruits per tree, yield kg/tree and yield t/ha were observed in treatment T_4 might be due to the synergistic impact of employing both bagging and the foliar application of combination of n-ATCA and folic acid. A combination of n-ATCA and folic acid, a compound comprising sulphur-containing amino acids such as cysteine and folic acid, is readily absorbed by the leaves. This absorption process facilitates chelation and the transport of essential mineral nutrients. Additionally, it leads to an elevation in the levels of proline and hydroxyproline, compounds associated with increased tolerance to both biotic and abiotic stresses. Furthermore, the application of n-ATCA and folic acid contributes to an upsurge in chlorophyll concentration and enhances the overall photosynthetic output. These combined effects culminate in improved fruit setting and ultimately, a higher yield of fruits per tree (Hota *et al*., 2017) [5]. Bagging creates microclimate surrounding the fruits which promote growth and development of fruit and reduces the fruit drop which may cause due to higher temperature (Santosh *et al*., 2017) [13].

A similar result was found by Hota *et al*. (2017) [5] in apricot cv. New Castle, Chauhan *et al*. (2018) [2] in apple cv. Starking Delicious, Ramteke and Somkumar (2005) [10] in grapes and Guo *et al*. (2019) [4].

In the present investigation minimum days required for harvesting in treatment T_4 might be due to the synergistic effects of both bagging and the foliar application of combination of n-ATCA and folic acid. The process of bagging raises the fruit's temperature by 1 to 2 °C compared to normal conditions. Consequently, this temperature increase accelerates the maturation and development of the fruit compared to normal fruit (Santosh *et al*., 2017) [13]. Treatment T_3 took maximum period for harvesting. This delay in harvesting might be due to application of irrigation which enhance the rate of photosynthesis and delay the stress of the tree resulting in development of fruit for longer period.

A similar result was obtained by Malshe *et al*. (2020) [8] corroborated these findings, demonstrating a maturity delay of (103.93 days) as a result of the application of 150 litres of water at 15 days intervals. This irrigation regimen commenced at the pea stage of fruit development and continued until one month before harvesting.

Table 1: Effect of various preharvest treatment on yield parameters of mango cv. Alphonso

Treatments	Number of fruits per tree	Yield per tree (kg)	Yield per ha^{-1} (t)	Days required for harvesting
T_1	121.44	30.72	3.07	112.00
T_2	113.81	31.22	3.12	115.00
T_3	125.25	32.28	3.23	123.00
T_4	128.00	36.60	3.66	110.00
T_5	113.81	28.93	2.89	112.00
T_6	98.41	23.35	2.33	120.00
Mean	116.79	30.52	3.05	115.33
S.Em±	2.90	1.04	0.10	1.771
CD at 5%	8.76	3.14	0.31	5.17

Physical parameters of fruit

The data on various pre harvest treatment *viz.* foliar application of nutrients, plant growth regulators, mulching, irrigation and bagging on fruit weight (g), fruit length (cm), fruit girth (mm), fruit volume (ml) and specific gravity in mango cv. Alphonso at the harvest stage was presented in Table 2.

The maximum fruit weight (286.50 g), fruit length (10.08 cm), fruit girth (70.50 mm), fruit volume (282.50 ml) was recorded in treatment T_4, while the lowest fruit weight (237.69 g), fruit length (8.33 cm), fruit girth (67.00 mm) and fruit volume (232.75 ml) recorded in treatment T_6. The highest specific gravity of fruit (1.02) was recorded at the harvesting stage in treatment T_1, T_5 and T_6. The lowest specific gravity fruit (1.00) was recorded in treatment T_3.

The synergistic combination of (n-ACTA and folic acid) and pre-harvest fruit bagging plays a crucial role in enhancing stress tolerance, ultimately resulting in increased fruit weight (g), fruit length (cm), and fruit volume (ml) in mango cv. Alphonso.

The data concerning the specific gravity of fruit at the harvesting stage was found to be non-significant across the treatments. This was because the specific gravity of mango fruits depends on the maturity stage of the fruit. However, fruits could be harvested at a relatively similar level of maturity. At the mature stage, there was a slight variation in the specific gravity of mango fruit, typically measuring around 1.00 or 1.02. According to Kapse and Katrodia (1997) [7], mango fruit with a specific gravity falling within the range of 1 to 1.02 was regarded as being at the peak of maturity.

Table 2: Effect of various preharvest treatment on physical parameters of fruits at harvest stage and days required for harvesting in mango cv. Alphonso

Treatments	Fruit weight (g)	Fruit girth (mm)	Fruit length (cm)	Fruit volume (ml)	Specific gravity of fruit
T_1	252.75	67.68	8.60	246.75	1.02
T_2	275.00	70.39	9.05	270.75	1.01
T_3	257.63	68.00	9.48	255.75	1.00
T_4	286.50	70.50	10.08	282.50	1.01
T_5	254.19	69.27	8.68	248.50	1.02
T_6	237.69	62.00	8.33	232.75	1.02
Mean	260.63	68.81	9.03	269.50	1.01
S.Em±	8.96	1.95	0.29	7.87	0.007
CD at 5%	27.03	NS	0.90	23.74	NS

Physical quality of fruits

The data on various preharvest treatment *viz*. foliar application of nutrients, plant growth regulators, mulching, irrigation and bagging on the percent of spotted fruits per tree, fruit fly attack and stem end rot in (%) of mango cv. Alphonso at the fruit ripe stage was presented in Table 3.

Plants subjected to treatments T_1, T_2, T_3, T_4, and T_5 displayed no instances of spotted fruits and fruit fly attack. Conversely, treatment T_6 (Control) recorded the highest percent of spotted fruits and fruit fly attack accounting for (5.89%) and (11.25%) respectively per tree. The lack of spotted fruit and fruit fly attack in treatments T_1, T_2, T_3, T_4, and T_5 can be attributed to the protective effect of bagging. Treatments T_1, T_2, T_3, and T_5 showed no occurrence of stem end rot. However, treatment T_6 (Control) had the highest incidence of stem end rot (11.25%) and treatment T_4 had (2.00%) stem end rot.

Bagging protects the fruit from all insects and other injuries. Similar findings were reported by Sarker *et al*. (2009) [11], who discovered that all bagging materials provided 100% protection against fruit fly infestation for mango fruits, the use of brown paper bags was identified as the most effective method for safeguarding mango fruits. Sharma *et al.* (2014) [12] indicated that bagging is a physical protection method that not only improves the visual quality of fruit but helps to reduce pest and disease incidence and mechanical damage. Edirimanna *et al.* (2015) [3] reported that bagging has a significant effect on fruits to protect them from fruit fly attacks.

Table 3: Effect of various management practices on number of spotted fruits, fruit fly attacks and stem end rot on mango fruits cv. Alphonso

Treatments	Number of spotted fruits (%)	Fruit fly attack (%)	Stem end rot (%)
T_1	0.00	0.00	0.00
T_2	0.00	0.00	0.00
T_3	0.00	0.00	0.00
T_4	0.00	0.00	2.00
T_5	0.00	0.00	0.00
T_6	5.89	11.25	11.25
Mean	0.98	1.88	2.21
S.Em±	1.01	0.41	1.12
CD at 5%	3.05	1.26	3.38

Conclusion

The findings suggestted that treatment T_4 i.e. Foliar application of combination of n-ATCA 10% and folic acid 0.2% spraying at 50% flowering (1 ml/lit), pea stage (1.5 ml/lit), egg stage (1.5 ml/lit) and 75 days after fruit set (2 ml/lit) and bagging with newspaper bags at marble stage for protection, excelled in enhancing the morphological, physical, and yield-related attributes. Specifically, T_4 demonstrated significant increase in fruit length, width, volume, weight and overall yield in mango cv. Alphonso. Further study revealed that bagging with newspaper bags had found to be significant impact on physical quality of fruits and colour development at ripening stage in fruits. However, T_4 registered the highest benefit-cost ratio (1.51) over the other treatments.

References

1. Anonymous. Horticultural statistics at a Glance 2018. Horticulture statistics Division, Department of Agriculture, Cooperation and farmer's Welfare; c2018.
2. Chauhan N, Sharma N, Upender S. Effect of Elanta Super (n-Acetyle thiazolidine-4-carboxylic acid) on fruit set, yield and quality of apple cv. Starking delicious. J of Pharm. And Phyto. 2018;7(3):1759-1763.
3. Edirimanna E, Amarathunga D, Amarasena B, Kirinde T. Effect of bagging materials and bag colour on fruit weight and quality of guava (*Psidium guajava* L.). Annals Sri Lanka Dept. Agri. 2015;17:297-302.
4. Guo SH, Xu TF, Shi TC, Jin XQ, Feng MX, Zhao XH, *et al*. Cluster bagging promotes melatonin biosynthesis in the berry skins of (*Vitis vinifera*) cv. Cabernet Sauvignon and Carignan during development and ripening. Food Chem. 2019;305:125502.
5. Hota D, Sharma DP, Sharma N, Mishra G, Solanki SP, Priyadarshi V. Effect of Forchlorfenuron and N-Acetyl Thiazolidine 4- Carboxylic Acid on Size and Yield of Apricot (*Prunus armeniaca* L.) cv. New Castle. Int. J Curr. Microbiol. App. Sci. 2017;6(9):1852-1860. Doi: https://doi.org/10.20546/ijcmas.2017.609.228.
6. Haldankar PM, Burondkar MM, Singh AK, Patil P, Parulekar YR, Godse SK, *et al*. Sustainable mango production technology for climatic aberration on costal agroclimate of Maharashtra. Adv. Agri. Res. and Tech. J. 2020;4(1):73-87.
7. Kapse BM, Katrodia JS. Ripening behaviour of Kesar mangoes in relation to specific gravity. Acta. Hort. 1997;455:669-678.
8. Malshe KV, Shinde VV, Sawant BN, Salvi BR. Competitive study on effect of irrigation during fruit

development on yield in mango cv. Alphonso. J Pharmacognosy and Phytochemistry. 2020;9(2):2338-2339.
9. Panse VG, Sukhatme PV. Statistical Methods for Agriculture Workers. I. C. A. R., New Delhi; c1985.
10. Ramteke SD, Somkumar RG. Effect of quantum on increasing growth, yield and quality of grapes. Karnataka J of Agri. Sci. 2005;18(1):13-17.
11. Sarker D, Rahman MM, Barman JC. Efficacy of different bagging materials for the control of mango fruit fly. J Agri. Res. 2009;34:165-168.
12. Sharma RR, Reddy SVR, Jhalegar MJ. Pre-harvest Fruit Bagging: A useful Approach for Plant Protection and Improvement Postharvest Fruit Quality. J Horti. Sci. Biotech. 2014;89(2):101-113.
13. Santosh DT, Tiwari KN, Reddy RG. Banana bunch covers for quality banana production- A review. Int. J Curr. Micro. Appl. Sci. 2017;6:1275-1291.