



EFFECT OF STAGE AND PERIOD OF PREHARVEST BAGGING ON FRUIT RETENTION AND SOME QUALITY ATTRIBUTES IN MANGO (*MANGIFERA INDICA* L.) CV. ALPHONSO

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ABSTRACT

The experiment was conducted at Mango Research Sub-Centre, Rameshwar, Deogad to study the stage and period of preharvest bagging on quality of mango cv. Alphonso. The bagging was done at marble stage and retained the bags upto 45, 60, 75 days and at egg stage and retained upto 45, 60 days and at harvest. The maximum fruit retention was recorded in T₄ (89.44%) followed by T₆ (88.11%) and T₁ (86.89%). The lowest fruit retention was recorded in control (77.0%). The maximum days (104.56) required for harvesting was recorded in treatment; Bagging at marble stage and removing bags at 75 days after bagging (T₃). The maximum fruit weight (232.53 g), The lowest spotted fruits (2.00%) were also recorded in treatment T₃. The lowest occurrence of spongy tissue in the fruits of T₆ (2.78%) which was at par with T₃ (3.56%), and T₅ (3.78%).

KEY WORDS: Mango, bagging, fruit retention, spongy tissue.

INTRODUCTION

Mango (*Mangifera indica* L.) is the leading fruit crop in world and considered to be the choicest fruit of India. It is a dominant fruit crop of India growing in almost all the states. It has varietal wealth but Alphonso is the most popular and delicious variety. It is a leading cultivar of Konkan region of Maharashtra. It has high export potential. It has distinctive characteristics like firm, fibreless flesh and good keeping quality however its productivity is comparatively less than other varieties. In the recent years, the climate aberrations during mango fruiting period had adversely affected the fruit quality. Delayed and offseason rain, deviation in temperature and humidity adversely affect the crop during fruit development causes incidence of pest and diseases, fruit drop, etc. The preharvest bagging of fruits proved the beneficial for reduction of such losses in many fruit crops like apple, banana and litchi (Sharma *et al.*, 2014).

The skirting bags which are technical textile product which are generally used for preharvest bagging in different fruit crops. The appropriate stage of bagging is also important and the attempt was made to study the stage and period of preharvest bagging on quality of mango cv. Alphonso.

MATERIALS AND METHOD

The experiment was conducted at Mango Research Sub-Centre, Rameshwar, Tal. Deogad, Dist. Sindhudurg on 35 years old Alphonso mango trees during the fruiting seasons of the years 2012-13 to 2014-15. The Uniform trees were selected and the experiment was laid out in randomized block design with three replications and seven treatments (Table 1). The recommended cultural practices were followed in experimental trees block. After fruit set,

the uniform fruits were tagged and bagging was done with skirting bags to 25 fruits of each tree as per the treatments. The bags were removed as per the treatment details. The fruits of these trees were harvested at 85% maturity. The observations on days required for maturity, average fruit weight, spotted fruits due to pest and disease incidence, incidence of stem end rot disease, occurrence of spongy tissue, days required for ripening, T. S. S. were recorded. The statistical analysis was performed as per the ANOVA suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The data on influence of stage and period of bagging on fruit retention and maturity period in mango cv. Alphonso are given in Table 2. It is evident that the preharvest bagging with skirting bags on Alphonso mango fruits exhibited the significant effect on fruit retention and maturity. Fruit retention in all the bagging treatments was significantly improved over control. The pooled data for three years exhibit that, the maximum fruit retention was recorded in T₄ (89.44%) followed by T₆ (88.11%) and T₁ (86.89%). The lowest fruit retention was recorded in control (77.0%). The beneficial effect of bagging was also reported by Kireeti (2013).

The number of days required for maturity varied significantly due to different bagging treatments. The maximum days (104.56) required for harvesting were recorded in treatment T₃ (Bagging at marble stage and removing bags at 75 days after bagging) followed by treatment T₆. In control treatment (T₇), fruits matured in 85.11 days. Weather parameters, especially temperature and relative humidity are the most important factors which are closely associated with fruit development. The fruit bagging changes the micro environment for fruit

development. The delay in maturity due to fruit bagging was reported earlier in Kesar mango (Shinde *et al.*, 2014). The fruit weight was significantly increased due to bagging of fruits as compared to control (Table 3). The maximum fruit weight (232.53 g) was recorded in treatment T₃ (Bagging at marble stage and removing bags at 75 days after bagging) while rest of the bagging treatments were at par. The fruits in control treatment recorded 198.64 g weight. The bagging changes the microclimate around the fruit which possibly helpful for fruit size and weight improvement. The bagging enhanced the fruit weight in apple (Fallahi *et al.*, 2001). The ripening of mango fruits were also significantly delayed in treated fruits. The fruits of treatment T₃ and T₆ ripened in 13.76 and 13.33 days, respectively (Table 3) and the unbagged fruits ripened in 9.79 days. The chemical changes during ripening of the fruits might be influenced by bagging. The increased shelf life of mango fruits was also reported by Shinde *et al.* (2014).

The data on percent spotted fruits and incidence of stem end rot disease are given in Table 4. The lowest spotted fruits due to pest and diseases (2.00%) were noticed in treatment T₃ followed by T₆, T₂, T₅ and T₁. The percentage

of spotted fruit was higher (17.78%) in unbagged (Control) fruits. The incidence of stem end rot disease was also noticed lowest (1.44%) in T₆ treatment (Bagging at egg stage and retaining bags till harvest) which was at par with T₃. In treatments T₃ and T₆, the period of bagging was higher as compare to rest of treatment which protects fruits for longer period at preharvest development stage. The bagging of fruits may act as barrier for disease infestation (fungal development) on fruit surface. Hofman *et al.* (1997) also reported that fruit bagging 100 days before harvest helped to reduce anthracnose and stem end rot diseases in Keitt mango.

The occurrence of spongy tissue was remarkably reduced in all the bagged fruits. It was lowest in the fruits of T₆ (2.78%) which was at par with T₃ (3.56%), and T₅ (3.78%) where fruits were not directly exposed to sunlight. The spongy tissue content recorded in control was highest (14.89%). There was low incidence in bagged fruits which might be because to less exposure fruits to sunlight. The relationship of spongy tissue with atmospheric temperature was reported by Burondkar *et al.* (1994). T. S. S. (0B) of fruits in T₃ and T₆ treatments was also slightly improved over control.

TABLE 1. Treatment details

Treatment	Stage and period of preharvest bagging
T ₁	Bagging with skirting bags at marble stage and removing bags at 45 days after bagging.
T ₂	Bagging with skirting bags at marble stage and removing bags at 60 days after bagging.
T ₃	Bagging with skirting bags at marble stage and removing bags at 75 days after bagging.
T ₄	Bagging with skirting bags at egg stage and removing bags after 45 days
T ₅	Bagging with skirting bags at egg stage and removing bags after 60 days
T ₆	Bagging with skirting bags at egg stage and retaining bags till harvest.
T ₇	Control (No bagging)

TABLE 2. Effect of Stage and period of preharvest bagging on fruit retention and maturity in mango cv. Alphonso (Pooled data from 2013-15)

Sr. No.	Treatments	Fruit retention (%)				No. of days required for maturity			
		2013	2014	2015	Mean	2013	2014	2015	Mean
1.	T ₁	86.67	87.00	87.00	86.89	96.67	96.67	92.00	95.11
2.	T ₂	82.67	83.00	83.00	82.89	98.67	103.00	95.33	99.00
3.	T ₃	84.00	85.00	83.33	84.11	103.67	108.33	101.67	104.56
4.	T ₄	89.33	89.66	89.33	89.44	92.67	94.33	91.00	92.67
5.	T ₅	80.00	79.67	80.33	80.00	95.67	95.67	95.00	95.45
6.	T ₆	88.00	88.00	88.33	88.11	100.33	104.00	97.00	100.44
7.	T ₇	76.00	77.00	78.00	77.00	87.33	85.33	82.67	85.11
	SE ±	1.53	1.72	1.14	0.30	1.01	1.39	2.48	0.93
	CD at 5%	4.73	5.28	3.52	0.93	3.10	4.29	7.63	2.86

TABLE 3. Effect of Stage and period of preharvest bagging on fruit weight and ripening in mango cv. Alphonso (Pooled data from 2013-15)

Sr. No.	Treatments	Weight of fruit (g)				No. of days required for ripening			
		2013	2014	2015	Mean	2013	2014	2015	Mean
1.	T ₁	208.03	209.33	213.33	210.23	10.7	11.0	11.3	10.99
2.	T ₂	211.47	216.00	214.33	213.93	11.7	11.3	13.0	11.99
3.	T ₃	231.93	235.00	230.67	232.53	13.7	13.3	14.3	13.76
4.	T ₄	205.40	208.00	211.33	208.24	11.0	12.0	11.0	11.33
5.	T ₅	207.73	213.33	210.33	210.46	11.3	12.3	12.7	12.11
6.	T ₆	215.57	217.67	211.67	214.97	13.0	13.3	13.7	13.33
7.	T ₇	198.6	195.00	202.33	198.64	9.7	9.7	10.0	9.79
	SE ±	5.01	3.42	4.79	1.60	0.63	0.47	0.51	0.26
	CD at 5%	15.42	10.55	14.74	4.92	1.94	1.44	1.58	0.81

TABLE 4. Effect of Stage and period of preharvest bagging on spotted fruits percentage and stem end rot incidence in mango cv. Alphonso (Pooled data from 2013-15)

Sr. No.	Treatments	Spotted fruits (%)				Incidences of Stem end rot disease (%)			
		2013	2014	2015	Mean	2013	2014	2015	Mean
1.	T ₁	9.33	9.33	6.33	8.33	2.67	2.00	2.67	2.45
2.	T ₂	7.33	5.67	6.00	6.33	2.67	2.67	3.33	2.89
3.	T ₃	3.33	1.33	1.33	2.00	0.00	3.33	1.67	1.67
4.	T ₄	12.00	9.33	8.67	10.00	4.00	4.67	4.67	4.45
5.	T ₅	8.67	7.00	7.67	7.78	1.33	2.67	3.33	2.44
6.	T ₆	6.00	5.67	4.33	5.33	1.33	2.00	1.00	1.44
7.	T ₇	21.33	18	14	17.78	6.67	6.33	5.67	6.22
	SE ±	2.24	1.15	1.41	0.72	3.32	1.00	1.22	0.46
	CD at 5%	6.92	3.53	4.42	2.20	N.S.	N.S.	N.S.	1.41

Table 5. Effect of Stage and period of preharvest bagging on of occurrence of spongy tissue and T.S. S. in mango cv. Alphonso (Pooled data from 2013-15)

Sr. No.	Treatments	Spongy tissue incidence (%)				T. S. S. (°B)			
		2013	2014	2015	Mean	2013	2014	2015	Mean
1.	T ₁	11.67	12.33	11.00	11.67	18.9	19.3	19.8	19.32
2.	T ₂	6.33	7.00	7.33	6.89	19.1	19.3	19.6	19.34
3.	T ₃	4.00	5.00	1.67	3.56	19.3	19.8	20.1	19.72
4.	T ₄	4.33	3.33	5.00	4.22	19.2	19.3	19.8	19.43
5.	T ₅	4.00	1.33	6.00	3.78	18.9	19.1	19.7	19.24
6.	T ₆	2.33	2.67	3.33	2.78	19.5	19.8	19.9	19.72
7.	T ₇	17.67	14.00	13.00	14.89	18.9	19.3	19.7	19.29
	SE ±	2.94	1.35	1.67	0.92	0.14	0.21	0.18	0.07
	CD at 5%	9.07	4.17	5.13	2.84	N.S.	N.S.	N.S.	0.22

CONCLUSION

Thus, the investigation indicate that the bagging of Alphonso fruits with PP non woven fabric at marble and retaining up to 75 days or bagging at egg stage and retaining up to harvest improved fruit retention and fruit weight. It also reduced incidences of stem end rot, percentage of spotted fruits in Alphonso. However, the days required for harvesting were extended.

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