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Effect of type of bags on growth and development of mango fruit cv. Alphonso

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Abstract

Bagging mango fruit was undertaken at Department of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli in summer, 2015. The various treatments namely, T₁ – Newspaper bag, T₂ – Brown paper bag, T₃ – Scurling bag, T₄ – Plastic bag, T₅ – Butter paper bag, T₆ – Muslin cloth bag, T₇ – Brown paper bag with polythene coating, T₈ –Black polythene bag, T₉ Opeque colour bag and T₁₀-Control (without bag) were tried in RBD with three replications. Fruits were bagged at 60 days after fruit set (i.e. egg stage). Treatment T₁ showed best performance for, fruit weight and pulp weight of fruit. T₈ had maximum stone weight. T₃ and T₆ showed best performance for fruit retention. Thus, it is concluded that different type of bags influenced growth and development of mango fruit.

Keywords: Alphonso, bagging, egg stage, physical parameters

Introduction

Mango (*Mangifera indica* L.) is the ‘National Fruit’ of India. The choicest cultivar “Alphonso,” is mainly grown in the Konkan region of Maharashtra. It is known for its delicious taste, exceedingly acceptable flavour, pleasing colour, good keeping quality and excellent processing properties. In India, its external appearance plays an important role in considering Alphonso as the mostly consumed table fruit, obtaining premium rate in the market. Various approaches are adopted to improve the external appearance of fruit, which include bagging of fruit. The process of covering individual fruit using a specially designed paper or cloth bag is referred to as bagging. Bagging is one of the novel and eco-friendly mean to produce quality fruits to mitigate the adverse effects of climatic changes. Bag act as physical barrier to prevent and protect fruits from insect pests, diseases such as fungal infections, mechanical damage and reduces cost of spraying pesticides, also provides an estimate of harvestable fruits per tree. Hence, an experiment was undertaken to study the effect of type of bagson mango fruit cv. Alphonso.

Material and Methods

The experiment was conducted in the Mango orchard of Cv. Alphonso, Department of Horticulture, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M. S.) India, 415712 during 2015. Dapoli represents more or less tropical climate having average humidity 78% throughout the year. The average minimum and maximum temperature is 18.5°C and 30.8°C respectively with an average precipitation of 3,500 mm, distributed mainly during four months from June to September. The soil of experimental plot is red lateritic with uniform depth and good drainage conditions. Uniformly grown Alphonso mango trees were selected. The experiment was conducted in Randomized Block Design with ten treatments replicated three times with a unit of 25 fruits per treatment per replication. Different types of bags constituted the treatments viz.:T₁: News paper bags, T₂: Brown paper bags, T₃: Scurling bags, T₄: Plastic bags with perforations, T₅: Butter paper bags, T₆: Muslin cloth bags, T₇: Brown paper bags with polythene coating, T₈: Black polythene bags, T₉: Opeque white polythene bags, T₁₀: No Bagging (control). Uniformly grown fruits at egg stage (60 days after fruit set) were selected for bagging. The size of bags was 8” x 10”. Perforations were made at the bottom of bags (4mm) on all bags except for scurling and muslin cloth bags for proper ventilation required during fruit development. In case of more

than two fruits in a cluster, the smaller underdeveloped, deformed fruits, spotted fruits were removed by scateur and only 1 healthy fruit was bagged. While bagging the brown paper bags, newspaper bags, butter paper bags, scurting bags, muslin cloth bags, and plastic bags were stapled properly, so that it will not fall down as well as there will not be open space for entry of insects or rain etc. For proper colour development, newspaper bags, brown paper bags and brown paper coated with polythene bags were removed 3 days before harvesting. The mature fruits were harvested at 80 - 85 percent maturity. Fruits were ripened at ambient temperature by using traditional paddy straw as ripening material. In this method plastic crates with perforation were used. At the bottom, 2.5 cm layer of paddy straw was made on which fruit were arranged. Simultaneously, two more layers were kept on the first layer.

The length and diameter was measured with the help of Vernier Caliper and expressed in centimeters (cm). The weight of fruits, pulp weight and stone weight were recorded by using digital electronic balance and expressed in grams (g). Mango fruit pulp and stone of fruit were separated and their weight was recorded in grams (g) and ratio of pulp weight to stone weight was calculated. The fruits retained till harvest, were counted and fruit retention was worked out in per cent. The data obtained was analysed statistically as per the method suggested by Panse and Sukhatme [1]. The standard error of mean (S.Em.) was worked out and the critical difference

(C.D.) at 5 per cent was calculated whenever the results were found significant.

Results and Discussion

Fruit retention and days required for harvest

Data presented in the Table no. 1 showed that the difference for fruit retention was significant. The maximum fruit retention was found in T₆ (96.00%) and T₃ (96.00%). The minimum fruit retention was found in T₄ (89.33%). The results indicated that, news paper bag, Scurting and muslin cloth bag were superior to unbagged control fruit as well as other treatments. The environmental factors play key role in fruit retention bagging improve micro environment around the fruit, this environment was beneficial for fruit retention in the types of bags observed to be superior to control. The results are in confirmation with Ghanekar [2] concluded that mango fruit bagging had significant effect on fruit retention. In date palm cv. 'Halawy' bagging improved the fruit set and yield Ghalib *et. al.* [3].

The variation among different treatments for number of days required for harvesting was non-significant. The number of days required for harvesting of fruit after bagging was 50 days for all types of bag. The advancement in harvesting of fruits bagged with polythene bags and delayed in harvesting of fruits bagged with newspaper was reported by Lei and Kun [4] in tomato, Debnath and Mithra [5] in litchi.

Table 1: Fruit retention and days required for harvest

Treatments	Fruit retention (%)	Days required for harvesting after bagging
T ₁ (News paper bag)	94.67 ± 1.53	50 ± 1.73
T ₂ (Brown paper bag)	90.67 ± 2.31	50 ± 1.73
T ₃ (Scurting bag)	96.00 ± 0.00	50 ± 1.73
T ₄ (Polythene bag)	89.33 ± 3.06	50 ± 1.73
T ₅ (Butter paper bag)	93.33 ± 1.53	50 ± 1.73
T ₆ (Muslin cloth bag)	96.00 ± 0.00	50 ± 1.73
T ₇ (Brown paper bag with polythene coating)	90.67 ± 2.31	50 ± 1.73
T ₈ (Black Polythene Bag)	92.00 ± 2.00	50 ± 1.73
T ₉ (Opeque colour bag)	90.67 ± 1.53	50 ± 1.73
T ₁₀ (Control)	93.33 ± 2.08	50 ± 2.00
Range	89.33 - 96.00	50 - 50
Mean	92.67	50
S. Em ±	1.13	0.18
C. D. at 5%	3.35	NS

Effect of type of bags on physical parameters of fruits

Data presented in the Table no. 2 indicate that variation recorded for fruit length at harvest was significant. The average fruit length was 10.13 cm. The highest fruit length was observed in T₁ (10.40 cm). The lowest fruit length was noted in T₅ (9.81 cm). All type of bags improved fruit length of mango at harvest except muslin cloth bag and butter paper bag. The length of fruit may increase due to favourable temperature inside the bags near the fruit that helped for better fruit growth. These results are in confirmity with Muchui *et al.* [6] who concluded that preharvest bagging increased finger length in banana.

Though the variation was non-significant Black polythene bag, news paper bag, brown paper bag, scurting bag and brown paper bag with polythene coating recorded greater diameter of fruit than control. Hwang *et al.* [7] reported that longitudinal and transverse diameter did not differ significantly in bagged fruits in 'Ruby' grape fruit.

At harvest, the maximum fruit weight was observed in the T₁ (343.96 g) and which was at par with T₈ (338.23 g). It was followed by T₃ (331.43 g), T₂ (328.92 g), T₇ (324.00 g) and T₅ (318.05 g). All were at par with each other. The minimum fruit weight was noticed in T₁₀ (306.75 g) which was at par with T₄ (315.11 g), T₆ (309.30 g) and T₉ (308.13 g). Thus, the data indicate that pre-harvest bagging affected the fruit weight in mango cv. Alphonso. Among all the treatments the news paper bag was found to be the best. Bagging improved micro climate around fruit and the improved micro climate might have helped for improvement of fruit weight in some treatments. Fallahi *et al.* [8] observed the highest average fruit weight in bagged fruit of 'BC-2 Fuji' Apple as compared to non-bagged fruit. Debnath and Mithra [9] found the highest fruit weight in NP bag as compared to control in litchi.

At harvest, the average pulp weight was 264.48 g. Highest pulp weight was recorded in T₁ (296.07 g). Which was significantly superior over other treatments. Treatments T₅ (274.10 g), T₃ (273.30 g), T₂ (268.13 g), T₇ (263.67 g)

and T₆ (262.87 g) were at par with each other. The minimum fruit weight was seen in T₄ (239.20 g). From the data it was revealed that the pulp weight followed the similar trend that of fruit weight at the stage of harvest. Among these news paper bags were promising. Larger fruits contributed for more pulp than the smaller fruits. Awad and Al-Qurashi ^[10] opined that bunch bagging increased flesh weight over control in 'Barhee' date Palm cultivar.

The average stone weight was 34.34 g at harvest. The highest stone weight was found in the treatment T₈ (37.10 g). The lowest stone weight was recorded in T₁₀ (30.57 g) and was at par with T₂ (31.37 g). Thus the data revealed that scurting bags and Brown paper bags had favourable effect for stone weight in mango. At harvest stage, the stone weight of control fruits was less than the bagged fruits. Larger fruit has resulted

bigger stones. Awad and Al-Qurashi ^[11] reported that bunch bagging increased seed weight over control in 'Barhee' date palm cultivar.

At harvest, the deviation observed for pulp to stone ratio was significant. The highest pulp to stone ratio was noted in T₂ (8.55) which was at par with T₁₀ (8.40), T₃ (8.19), T₁ (8.16) and T₅ (8.10). It was followed by T₆ (7.85). Treatments T₇ (7.22), T₉ (7.08), T₄ (6.96) and T₈ (6.92) are at par with each other. Thus the data indicate that type of bags had effect on pulp to stone ratio. However, this effect was not consistent for a particular treatment. At harvest the fruits bagged in brown paper bag had high pulp to stone ratio than the control fruits. Awad and Al Qurashi ^[12] reported that bunch bagging in Barhee date palm cultivar improved flesh to seed ratio.

Table 2: Effect of type of bags on physical parameters of fruits

Treatments	Length (cm)	Diameter (cm)	Fruit weight (g)	Pulp weight (g)	Stone weight (g)	Pulp to stone ratio
T ₁ (News paper bag)	10.40 ± 0.05	8.41 ± 0.22	343.96 ± 7.09	296.07 ± 7.09	36.30 ± 0.44	8.16 ± 0.17
T ₂ (Brown paper bag)	10.28 ± 0.15	8.33 ± 0.35	328.92 ± 5.46	268.13 ± 5.46	31.37 ± 0.99	8.55 ± 0.20
T ₃ (Scurting bag)	10.25 ± 0.11	8.29 ± 0.29	331.43 ± 6.62	273.30 ± 6.62	33.43 ± 2.40	8.19 ± 0.33
T ₄ (Polythene bag)	10.09 ± 0.28	8.19 ± 0.09	315.11 ± 13.52	239.20 ± 13.52	34.40 ± 2.30	6.96 ± 0.05
T ₅ (Butter paper bag)	9.81 ± 0.38	8.05 ± 0.31	318.05 ± 3.43	274.10 ± 3.43	34.00 ± 2.42	8.10 ± 0.53
T ₆ (Muslin cloth bag)	9.92 ± 0.09	8.00 ± 0.14	309.30 ± 6.21	262.87 ± 6.21	33.63 ± 1.16	7.85 ± 0.70
T ₇ (Brown paper bag with polythene coating)	10.21 ± 0.17	8.23 ± 0.12	324.00 ± 10.74	263.67 ± 10.74	36.50 ± 1.71	7.22 ± 0.15
T ₈ (Black Polythene Bags)	10.38 ± 0.07	8.43 ± 0.31	338.23 ± 6.48	256.73 ± 6.48	37.10 ± 1.97	6.92 ± 0.03
T ₉ (Opeque colour bag)	9.98 ± 0.11	8.16 ± 0.29	308.13 ± 6.72	254.00 ± 6.72	36.07 ± 1.26	7.08 ± 0.68
T ₁₀ (Control)	9.97 ± 0.01	8.21 ± 0.15	306.75 ± 7.28	256.73 ± 7.28	30.57 ± 0.47	8.40 ± 0.36
Range	9.81 – 10.40	8.00 – 8.43	306.75 – 343.96	239.20– 296.07	30.57 – 37.10	6.92 – 8.55
Mean	10.13	8.23	322.39	264.48	34.34	7.74
S. Em ±	0.11	0.13	4.06	4.01	0.95	0.21
C. D. at 5%	0.31	NS	12.05	11.92	2.83	0.63

Conclusion

The study concludes that fruit retention was influenced by different types of bags. All types of bags improved the weight of fruit and stone weight over control fruits. Among the different type of bags the Newspaper bag was found to be superior type. Thus, it was concluded that different types of bags influenced growth and development of mango fruit.

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