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Original Research Article

Effect of Coatings of Paraffin Liquid on Size, Volume and Physiological Loss in Weight of Mango Fruits cv. Dashehari

Arun Kumar Tiwary[1*] and C.P. Singh[2]

[1]Department of Horticulture, G.B.P.U.A. & T Pant nagar, Uttrakhand, India
[2]Department of Hortioculture, Birsa Agricultural University, Kanke, Ranchi, Jharkhand, India
**Corresponding author*

A B S T R A C T

The present investigation was undertaken to evaluate the effect after use of paraffin liquid on physical quality and physiological loss in weight of mango fruits (*Mangifera indica* L.) cv. Dashehari kept in CFB box during storage period at ambient conditions. The experiment was laid out in Completely Randomized Design with total 9 treatments and three replications. The treatments included 5 cm fruit stalk, 2 cm fruit stalk, 0.5 cm fruit stalk, 0 cm fruit stalk as coated and uncoated with with paraffin liquid. Whole unstalked fruits were also a treatment and unstalked uncoated fruits were considered as control. Minimum reduction in length was 3.34% and width was 3.50% in Whole fruit without stalk coated as comparision with 6.14% and 10.59% respectively in control. Reduction in fruit volume and weight was also minimum in whole coated unstalked fruits. Physiological loss in weight was observed till 14th day at every 02 days interval till 14th day. However, as per pooled data, the longest mean shelf life (10 days) was observed with the fruits kept in CFB box. On 10th day minimum PLW was 10.29% in same treatment in comparision with 18.18% in control. On 14th day it was minimum 14.59% and maximum 25.51% in unstalked uncoated fruits.

Keywords

Paraffin wax, Coatings, Shelf life, Fruit- size, Fruit- volume and Physiological Loss in Weight

Introduction

The king of fruits Mango (*Mangifera indica* L.) contains as much vitamin A in pulp as butter. Besides its exemplary nutritive value, it has luscious taste, captitive flavour, attractive fragrance and beautiful colour. Mango fruits take 6-10 days to ripe under ambient temperature and become over-ripe and spoiled within 15 days. A series of biochemical changes such as degradation of chlorophyll, biosynthesis of carotenoids, anthocyanins, essential oils and flavour components increase the activity of cell wall degrading enzymes. The symptoms of these appear physically in decrease in size, weight and volume. These are also a result of its increase in rate of respiration causing physiological, biochemical and organoleptic changes. By retarding the rate of respiration and moisture loss we can get longer storage life with good quality fruits. Increased rate of respiration ultimately affect characteristic colour, taste, aroma with desirable softening [15]. In the harvesting season, there is a glut of fruits in the market so it becomes imperative to prolong the shelf life of the fruits in the best interest of farmers' community and consumers as well. There are different methods of extending storage

period viz., pre-cooling, cold storage, controlled atmosphere storage and wax coating. In all these methods, the shelf life is extended by reducing the respiration rate and moisture loss from the fruits. In places, where refrigeration and storage facilities are not available, protective skin coating is one of the methods for increasing storage life of fresh fruits by retarding the rate of loss in size, volume and physiological weight. Coating by paraffin liquid is one of the best methods to solve the purpose. Hence the present experiment was conducted in Experimental Farm Area of GBPUA&T, Patherchatta, Pantnagar.

Materials and Methods

The matured fruits were harvested on 24th June of 2009 and 2010 from 34 year old Dashehari mango trees located at Horticulture Research Centre, Patharchatta. The trees were of uniform in growth and vigour and maintained under uniform cultural practices. The fruits free from diseases and uniform in shape, size and colour were harvested in the morning time. Harvesting was performed with secateurs with more than 6 cm of fruit stalk Thereafter, fruits were washed thoroughly with running water to remove field heat, sap, adhering dirt particles and microflora and then shifted to laboratory. They were spread on blotting paper sheets and allowed to dry under fan in well ventilated and clean room. After uniform drying, fruits were graded again. The fruits of uniform size and maturity, free from pests and diseases, injuries, bruises and blemishes were selected and grouped according to treatments and replications. Treatments were as $T_{1:}$ 5 cm fruit stalk coated with paraffin liquid, $T_{2:}$ 5 cm fruit stalk uncoated, $T_{3:}$ 2 cm fruit stalk coated with paraffin liquid, $T_{4:}$ 2 cm fruit stalk uncoated, $T_{5:}$ 0.5 cm fruit stalk coated with paraffin liquid, $T_{6:}$ 0.5 cm fruit stalk uncoated, $T_{7:}$ 0 cm fruit stalk coated with paraffin liquid only on stalk point, $T_{8:}$ Whole fruit without stalk coated with 8 % paraffin liquid and $T_{9:}$ Without fruit stalk uncoated (control). Colourless and light Paraffin liquid made of LOBA Chemie PVT. LTD. Mumbai 400 005, India; was used for the purpose. The fruit stalks and fruits were coated as mentioned in treatment details. Fruit stalks were cut with sharp blades as per treatment and replication and wax coating was done simultaneously. 8% paraffin liquid solution (v/v) was made at 37.7 ^{0}C in water bath and was stirred frequently till its application. It was coated on whole fruit without stalk with the help of cotton swab. Thus, 27 lots as per treatments (9) and replication (3) were prepared having 20 fruits in each. All the lots of fruits were kept in well ventilated (2%) CFB Box lined by daily newspapers. To correlate the ambient condition with experiment during the investigation, the room temperature and humidity were recorded by Thermo-hygro clock. Mango fruits of both the experiments were stored in a clean, hygienic and well-ventilated room at ambient condition (temperature 31+_1 ^{0}C and humidity 60 +_5 %) in different lots consisting of 20 fruits per treatment per replication. Parameters recording were done on 0th day (at the day of harvest), 2nd, 4th, 6th, 8th, 10th, 12th, and on 14th day of harvest. Fruit size (length and width both), Fruit volume and Loss in weight was calculated in per cent at 2 days intervals from the date of harvesting.

Results and Discussion

Fruit length

The perusal of data presented in the table 1 indicated that treatments affected the reduction in fruit length significantly during the year 2009, 2010 and pooled data. The pooled data revealed that minimum

reduction in fruit length (2.34%) was obtained with the treatment T_8 (Whole fruit without stalk coated with 8% paraffin liquid) and maximum (6.14%) reduction in length was obtained with control. Thus, results revealed that gradual decrease in the length was recorded in all the treatments including control with increased storage period. Minimum reduction in length was observed under T_8 (Whole fruit without stalk coated with 8% paraffin liquid) and maximum reduction in length was found under control. It might be due to lesser moisture loss which might have had reduced shrinkage and loss of turgidity of the waxed fruits. On the other hand control being in direct contact with open environment would have lost more moisture ([2]; [8]; [1]).

Fruit width

Results of 2009, 2010 and pooled data of both the years revealed that gradual decrease in the fruit width was recorded in all the treatments including control with enhanced storage period (Table 2). Minimum reduction in width was observed under T_8 (Whole fruit without stalk coated with 8% paraffin liquid) and maximum reduction in width was found under control. It might be due to increased firmness provided by wax layer which retarded the rate of ripening and thus minimized the rate of softening and shrinkage as was reported in Pear fruits by [7]; [2].

Fruit volume

The results of pooled data of the year 2009 and 2010 (Table 3) showed the Changes in fruit volume which ranged between 13.33% (minimum) to 22.92% (maximum). All the treatments except T_7 reduced the fruit volume significantly under storage condition. Minimum reduction in fruit volume (13.33%) was observed under the treatment T_8 (Whole fruit without stalk coated with 8% paraffin liquid). Treatments T_1, T_2, and T_3 were significantly *at par* to each other. However, maximum reduction in volume (22.92%) was noted under control which was *at par* with T_7 (0 cm fruit stalk coated with paraffin liquid only at stalk point). The fruits under treatment T_8 had a thin coating of paraffin liquid due to which moisture loss would have been reduced affecting the less loss of turgidity as found by [2]. Since it also affects ripening by slowing down ethylene evolution, so firmness is maintained and shrinkage appearance is with slow rate.

This might be the reason for less reduction in volume of fruits of T_8. In case of control, the fruits were in close and comparatively direct contact with atmosphere so fruits volume would have been reduced with high rate. In case of T_7 fruits paraffin liquid would have not been able to check oozing out of sap effectively and was in direct contact with atmosphere like control probably that's why reduction of volume was found higher than other treated fruits. [9] also found similar results in apple and found after ordinary storage condition that weight, length and breadth of fruits decreased continuously upto 60 days of observation.

Physiological Loss in Weight (PLW)

The effect of paraffin liquid on PLW of mango fruits was found significant. Minimum PLW was observed under T_8 (Whole fruit without stalk coated with 8% paraffin liquid) Maximum PLW was observed under control (T_9) treatment. The results of pooled data of 2009 and 2010 revealed that the lowest significant mean value of PLW (8.38%) was observed under T_8 (Whole fruit without stalk coated with 8% paraffin liquid) and maximum PLW (14.69%) was found under T_9 i.e. in control.

Table.1 Effect of Paraffin liquid on size (length) of Mango fruits cv. Dashehari (year 2009, 2010 and pooled data)

Treatment	Fruit length											
	2009				2010				Pooled data			
	0th day (cm)	Last day (cm)	Reduction in length (cm)	Percent reduction in length	0th day (cm)	Last day (cm)	Reduction in length (cm)	Percent reduction in length	0th day (cm)	Last day (cm)	Reduction in length (cm)	Percent reduction in length
T_1	11.83	11.29	0.54	4.56	11.19	10.69	0.50	4.47	11.51	10.99	0.52	4.52
T_2	11.77	11.2	0.57	4.84	11.75	11.20	0.55	4.68	11.76	11.20	0.56	4.76
T_3	11.25	10.7	0.55	4.89	12.47	11.88	0.59	4.73	11.86	11.29	0.57	4.81
T_4	11.14	10.59	0.55	4.94	11.80	11.20	0.60	5.08	11.47	10.90	0.57	4.97
T_5	10.63	10.09	0.54	5.08	11.77	11.15	0.62	5.27	11.20	10.62	0.58	5.18
T_6	11.7	11.08	0.62	5.30	11.86	11.20	0.66	5.56	11.78	11.14	0.64	5.43
T_7	10.86	10.2	0.66	6.08	11.99	11.29	0.70	5.84	11.43	10.75	0.68	5.95
T_8	10.97	10.71	0.26	2.37	12.08	11.80	0.28	2.32	11.53	11.26	0.27	2.34
T_9	10.99	10.31	0.68	6.19	12.15	11.40	0.75	6.17	11.57	10.86	0.71	6.14
S.Em.±	0.35	0.22	0.013	0.28	0.29	0.27	0.013	0.19	0.31	0.24	0.015	0.23
CD at 5%	1.05	0.66	0.040	0.84	0.87	0.80	0.038	0.58	0.94	0.72	0.046	0.70

T_1: 5 cm fruit stalk coated with paraffin liquid, T_2: 5 cm fruit stalk uncoated, T_3: 2 cm fruit stalk coated with paraffin liquid, T_4: 2 cm fruit stalk uncoated, T_5: 0.5 cm fruit stalk coated with paraffin liquid, T_6: 0.5 cm fruit stalk uncoated, T_7: 0 cm fruit stalk coated with paraffin only on stalk point, T_8: Whole fruit without stalk coated with 8 % paraffin liquid, T_9: Without fruit stalk uncoated (control)

Table.2 Effect of Paraffin liquid on size (width) of Mango fruits cv. Dashehari (year 2009, 2010 and Pooled data)

Treatment	Fruit width											
	2009				2010				Pooled data			
	0th day (cm)	Last day (cm)	Reduction in width (cm)	Percent reduction in width	0th day (cm)	Last day (cm)	Reduction in width (cm)	Percent reduction in width	0th day (cm)	Last day (cm)	Reduction in width (cm)	Percent reduction in width
T_1	5.84	5.51	0.33	5.65	5.80	5.50	0.30	5.17	5.82	5.51	0.31	5.33
T_2	5.36	5.01	0.35	6.53	6.09	5.71	0.38	6.24	5.73	5.36	0.37	6.38
T_3	5.41	5.09	0.32	5.91	5.72	5.39	0.33	5.77	5.57	5.24	0.32	5.84
T_4	5.72	5.29	0.43	7.52	5.93	5.49	0.44	7.42	5.83	5.39	0.43	7.47
T_5	5.61	5.11	0.50	8.91	6.02	5.51	0.51	8.47	5.82	5.31	0.50	8.68
T_6	5.66	5.15	0.51	9.01	5.88	5.31	0.57	9.69	5.77	5.23	0.54	9.36
T_7	5.57	5.00	0.57	10.23	6.15	5.51	0.64	10.41	5.86	5.26	0.61	10.32
T_8	5.89	5.69	0.20	3.40	5.81	5.60	0.21	3.61	5.85	5.65	0.21	3.50
T_9	5.60	5.01	0.59	10.54	5.83	5.21	0.62	10.63	5.72	5.11	0.61	10.59
S.Em.±	0.29	0.17	0.008	0.35	0.19	0.16	0.008	0.32	0.23	0.17	0.019	0.33
CD at 5%	0.85	0.52	0.024	1.04	0.58	0.50	0.026	0.97	0.71	0.51	0.057	1.00

T_1: 5 cm fruit stalk coated with paraffin liquid, T_2: 5 cm fruit stalk uncoated, T_3: 2 cm fruit stalk coated with paraffin liquid, T_4: 2 cm fruit stalk uncoated, T_5: 0.5 cm fruit stalk coated with paraffin liquid, T_6: 0.5 cm fruit stalk uncoated, T_7: 0 cm fruit stalk coated with paraffin only on stalk point, T_8: Whole fruit without stalk coated with 8 % paraffin liquid, T_9: Without fruit stalk uncoated (control)

Table.3 Effect of Paraffin liquid on volume of Mango fruits cv. Dashehari (year 2009, 2010 and Pooled data)

Treatment	volume											
	2009				2010				Pooled data			
	0th day (ml)	Last day (ml)	Reduction in volume (ml)	Percent reduction in volume	0th day (ml)	Last day (ml)	Reduction in volume (ml)	Percent reduction in volume	0th day (ml)	Last day (ml)	Reduction in volume (ml)	Percent reduction in volume
T_1	190.49	160.10	30.39	15.95	204.69	171.21	33.48	16.36	197.59	165.66	31.93	16.16
T_2	169.51	141.80	27.71	16.35	209.89	175.45	34.44	16.41	189.70	158.63	31.07	16.38
T_3	164.49	136.80	27.69	16.83	198.31	164.89	33.42	16.85	181.40	150.85	30.55	16.84
T_4	169.29	139.50	29.79	17.60	200.31	164.79	35.52	17.73	184.80	152.15	32.65	17.67
T_5	160.99	131.50	29.49	18.32	206.39	168.80	37.59	18.21	183.69	150.15	33.54	18.26
T_6	173.91	140.11	33.80	19.44	194.31	155.99	38.32	19.72	184.11	148.05	36.06	19.59
T_7	169.50	132.55	36.95	21.80	200.51	156.59	43.92	21.90	185.01	144.57	40.44	21.86
T_8	164.80	145.00	19.80	12.01	199.79	171.00	28.79	14.41	182.30	158.00	24.30	13.33
T_9	179.19	138.18	41.01	22.89	217.79	167.79	50.00	22.96	198.49	152.99	45.50	22.92
S.Em.±	4.88	3.90	0.64	0.44	3.86	4.32	0.82	0.42	3.59	3.04	0.69	0.41
CD at 5%	14.50	11.60	1.92	1.30	11.47	12.84	2.44	1.25	10.67	9.05	2.07	1.24

T_1: 5 cm fruit stalk coated with paraffin liquid, T_2: 5 cm fruit stalk uncoated, T_3: 2 cm fruit stalk coated with paraffin liquid, T_4: 2 cm fruit stalk uncoated, T_5: 0.5 cm fruit stalk coated with paraffin liquid, T_6: 0.5 cm fruit stalk uncoated, T_7: 0 cm fruit stalk coated with paraffin only on stalk point, T_8: Whole fruit without stalk coated with 8 % paraffin liquid, T_9: Without fruit stalk uncoated (control

Table.4a Effect of Paraffin liquid and storage periods on physiological loss in weight (per cent) of Mango fruits Cv. Dashehari (year 2009 and 2010)

Treat.	Physiological weight loss (%)																
	2009									2010							
	Initial wt. (g)	2nd day	4th day	6th day	8th day	10th day	12th day	14th day	Mean	Initial wt. (g)	2nd day	4th day	6th day	8th day	10th day	12th day	14th day	Mean
T_1	197.0	2.80 (9.63)	5.36 (13.38)	7.26 (15.63)	9.14 (17.59)	11.42 (19.75)	14.02 (21.98)	16.51 (23.97)	9.50 (17.42)	211.0	2.93 (9.75)	5.49 (13.54)	7.39 (15.77)	9.27 (17.72)	11.55 (19.86)	14.15 (22.09)	16.64 (24.07)	9.63 (17.54)
T_2	175.0	2.85 (9.71)	5.50 (13.56)	7.42 (15.80)	9.32 (17.77)	11.93 (20.20)	14.45 (22.34)	16.95 (24.31)	9.77 (17.67)	217.0	2.98 (9.93)	5.63 (13.70)	7.55 (15.94)	9.45 (17.90)	12.06 (20.31)	14.58 (22.44)	17.08 (24.40)	9.90 (17.80)
T_3	170.0	2.90 (9.80)	5.57 (13.65)	7.57 (15.97)	9.53 (17.98)	12.28 (20.51)	14.96 (22.75)	17.46 (24.69)	10.04 (17.91)	205.0	3.03 (10.02)	5.70 (13.79)	7.70 (16.10)	9.66 (18.10)	12.41 (20.62)	15.09 (22.85)	17.59 (24.79)	10.17 (18.04)
T_4	175.0	2.97 (9.92)	5.68 (13.65)	8.19 (16.62)	10.59 (18.99)	13.39 (21.45)	15.89 (23.49)	18.43 (25.42)	10.73 (18.52)	207.0	3.10 (10.13)	5.81 (13.93)	8.32 (16.76)	10.72 (19.10)	13.52 (21.56)	16.02 (23.59)	18.56 (25.51)	10.86 (18.66)
T_5	166.0	3.20 (10.30)	6.05 (13.68)	8.65 (17.10)	11.41 (19.74)	13.98 (21.95)	16.46 (23.93)	19.01 (25.84)	11.25 (19.01)	213.0	3.33 (10.38)	6.18 (14.39)	8.78 (17.23)	11.54 (19.85)	14.11 (22.06)	16.59 (24.03)	19.14 (25.94)	11.38 (19.12)
T_6	180.0	3.32 (10.49)	6.22 (14.23)	9.03 (17.48)	11.99 (20.25)	14.74 (22.57)	17.44 (24.68)	20.55 (26.95)	11.90 (19.55)	201.0	3.45 (10.70)	6.35 (14.59)	9.16 (17.61)	12.12 (20.37)	14.87 (22.68)	17.57 (24.78)	20.68 (27.04)	12.03 (19.68)
T_7	175.0	3.56 (10.87)	7.26 (14.44)	11.06 (19.40)	14.51 (22.38)	17.76 (24.92)	20.21 (26.67)	23.44 (28.92)	13.97 (21.26)	207.0	3.69 (11.07)	7.39 (15.77)	11.19 (19.52)	14.64 (22.49)	17.89 (25.02)	20.34 (26.76)	23.57 (29.01)	14.10 (21.37)
T_8	177.0	2.26 (8.64)	4.33 (15.63)	6.33 (14.57)	8.30 (16.74)	10.22 (18.64)	12.28 (20.50)	14.47 (22.35)	8.31 (16.21)	206.0	2.39 (8.85)	4.46 (12.18)	6.46 (14.72)	8.43 (16.87)	10.35 (18.76)	12.40 (20.62)	14.60 (22.46)	8.44 (16.35)
T_9	185.0	3.87 (11.34)	7.51 (12.01)	11.10 (19.45)	14.81 (22.60)	18.12 (25.14)	21.54 (27.65)	25.45 (30.29)	14.63 (21.76)	225.0	4.00 (11.51)	7.64 (12.18)	11.23 (19.57)	14.94 (22.69)	18.25 (25.25)	21.67 (27.74)	25.58 (30.38)	14.76 (21.88)
Mean	–	3.08 (10.08)	5.94 (15.88)	8.51 (16.89)	11.07 (19.34)	13.76 (21.68)	16.36 (23.78)	19.14 (25.86)		–	3.21 (10.26)	6.07 (14.21)	8.64 (17.02)	11.19 (19.45)	13.89 (21.79)	16.49 (23.88)	19.27 (25.95)	
		Day			Treatment			Day × Treatment			Day			Treatment			Day × Treatment	
S.Em.±	–	0.143 (0.108)			0.163 (0.122)			0.431 (0.324)		–	0.154 (0.512)			0.175 (0.581)			0.464 (1.538)	
CD at 5%	–	0.402 (0.302)			0.456 (0.343)			1.207 (0.907)		–	0.433 (1.435)			0.491 (1.627)			1.299 (4.305)	

T_1: 5 cm fruit stalk coated with paraffin liquid, T_2: 5 cm fruit stalk uncoated, T_3: 2 cm fruit stalk coated with paraffin liquid, T_4: 2 cm fruit stalk uncoated, T_5: 0.5 cm fruit stalk coated with paraffin liquid, T_6: 0.5 cm fruit stalk uncoated, T_7: 0 cm fruit stalk coated with paraffin liquid only on stalk point, T_8: Whole fruit without stalk coated with 8 % paraffin liquid, T_9: Without fruit stalk uncoated (control)

* Physiological loss in weight per cent on the day of harvesting was considered as zero (0)

Table.4b Effect of Paraffin liquid and storage periods on physiological loss in weight (per cent) of Mango fruits Cv. Dashehari (pooled data of year 2009 and 2010)

Treatment	Physiological weight loss (%)								
	Initial wt. (g)	2nd day	4th day	6th day	8th day	10th day	12th day	14th day	Mean
T_1	204.0	2.86 (9.71)	5.42 (13.46)	7.32 (15.70)	9.20 (17.66)	11.48 (19.80)	14.08 (22.04)	16.57 (24.02)	9.57 (17.48)
T_2	196.0	2.91 (9.82)	5.56 (13.64)	7.48 (15.87)	9.38 (17.83)	11.99 (20.26)	14.51 (22.39)	17.01 (24.35)	9.84 (17.74)
T_3	187.5	2.96 (9.91)	5.63 (13.72)	7.63 (16.03)	9.59 (18.04)	12.34 (20.56)	15.02 (22.80)	17.52 (24.74)	10.10 (17.97)
T_4	191.0	3.03 (10.03)	5.74 (13.86)	8.25 (16.69)	10.65 (19.05)	13.45 (21.51)	15.95 (23.54)	18.49 (25.47)	10.80 (18.59)
T_5	189.5	3.26 (10.37)	6.11 (14.31)	8.71 (17.16)	11.47 (19.79)	14.04 (22.00)	16.52 (23.98)	19.07 (25.89)	11.32 (19.07)
T_6	190.5	3.38 (10.60)	6.28 (14.51)	9.09 (17.55)	12.05 (20.31)	14.80 (22.62)	17.50 (24.73)	20.61 (27.00)	11.96 (19.62)
T_7	191.0	3.62 (10.97)	7.32 (15.70)	11.12 (19.46)	14.57 (22.44)	17.82 (24.97)	20.27 (26.72)	23.50 (28.96)	14.04 (21.32)
T_8	191.5	2.32 (8.75)	4.39 (12.10)	6.39 (14.64)	8.37 (16.81)	10.29 (18.70)	12.34 (20.56)	14.53 (22.41)	8.38 (16.28)
T_9	205.0	3.93 (11.43)	7.57 (15.94)	11.16 (19.51)	14.87 (22.64)	18.18 (25.19)	21.61 (27.69)	25.51 (30.33)	14.69 (21.82)
Mean	–	3.15 (10.18)	6.01 (14.14)	8.58 (16.96)	11.13 (19.40)	13.82 (21.74)	16.42 (23.83)	19.21 (25.91)	
		Day			Treatment			Day × Treatment	
S.Em.±	–	0.146 (0.116)			0.166 (0.131)			0.440 (0.349)	
CD at 5%	–	0.410 (0.325)			0.465 (0.369)			1.231 (0.976)	

T_1: 5 cm fruit stalk coated with paraffin liquid, T_2: 5 cm fruit stalk uncoated, T_3: 2 cm fruit stalk coated with paraffin liquid, T_4: 2 cm fruit stalk uncoated, T_5: 0.5 cm fruit stalk coated with paraffin liquid, T_6: 0.5 cm fruit stalk uncoated, T_7: 0 cm fruit stalk coated with paraffin liquid only on stalk point, T_8: Whole fruit without stalk coated with 8 % paraffin liquid, T_9: Without fruit stalk uncoated (control)

* Physiological loss in weight per cent on the day of harvesting was considered as zero (0)

The reduced PLW of wax coating fruits might be due to its property to increase the firmness of fruits cell wall, to retard the rate of respiration and to retard the enzymatic activities responsible for disorganization of cellular structure.

The above findings substantiate earlier reports of mango cv. Zardalu [13]. Storage periods also affected PLW significantly (Table 4b). Maximum mean PLW (19.21 %) was found on 14^{th} day and minimum (0%) was on 0^{th} day i.e. on the day of harvesting. Thus gradual increase in PLW with increased storage periods was observed.

However, the rate of loss in weight was faster on earlier days of storage, which gradually slowed down as the trial proceeded till the 14^{th} day of storage. Similar results were obtained by [4] and reported that the PLW of Alphanso mango fruits gradually increased till the end of shelf life. [12] and [5] also obtained similar results. Similar observations were reported with waxed apples [11] and oranges [3].

Weight loss is a consequence of fruit dehydration due to changes in surface transfer resistance to water vapour, in respiration rate and occurance of small features connecting the internal and external atmospheres.

In the same context, wax emulsion laid down an outer thin mask on fruit surface which covered and sealed barely visible cracks and the stomata on the fruit surface. The above results substantiate the findings of [14]. This is also supported by [10] and [6]. There was gradual decrease in weight of fruits with the storage periods. [4] also observed that the PLW of Alphanso mango fruits gradually increased till the end of shelf life. [12] and [5] also obtained similar results.

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Conflict of Interest

There is no any conflict of interest between the authors with respect to their position of author name and any other issues.

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