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Effect of Post Harvest Treatments and Wrapping Materials 0f Mango Cv. Dashehari During Ambient Condition

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ABSTRACT
An attempt was made during 2014-15 and 2015-16 to study the effect of post-harvest treatments on ripening and shelf life of mango cv. Dashehari as influenced by different physico-chemical treatments during storage with a view to improve storage quality and shelf-life of mango fruits. The experiment was designed under completely randomized design (CRD). Out of 22 treatments applied the fruits treated with ethrel 1000 ppm + brown paper had significantly better fruit quality over other treatments in respect of physical parameters i.e., Day to fruit ripening, fruit skin colour, pulp colour, pulp quality, flavour/aroma and skin shrivelling . The post-harvest treatment i.e., ethrel 1000 ppm + tissue paper was found to be next best over other treatments in respect of ripening index, Physiological loss of weight, Marketability, decay per cent, specific gravity, and organoleptic quality. Based on results obtained from the present study, it can be concluded that ethrel 1000 ppm + brown paper was found to be best post-harvest treatment on account of physical parameters of Dashehari mango.
Keywords: *Post-harvest treatments, shelf-life, Dashehari Mango*

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INTRODUCTION

Mango *(Mangifera indica* Linn.), which is a dicotyledonous fruit belonging to the order sapindales in the family *Anacardiaceae,* originated in the Indo-Burmese region [21]. The word 'mango' originated as early as 16th century from the ancient Tamil word 'mangos'. Mango is known to be the most important tropical fruit of Asia, grown commercially in more than 87 countries [14, 15].

Mango is the most important fruit of India, with more than a thousand varieties known so far [7]. Cultivation of mango in India covers an area of 2163.47 thousand hectare and production about 18526.98 thousand MT. The total area under mango cultivation in Uttar Pradesh was 250.74 thousand hectare with 4347.50 thousand MT an annual production. The productivity of mango was approximately 16.4 MT ha^{-}1. Uttar Pradesh contributes 23.0 % share in area and production under mango cultivation in the country after Andhra Pradesh 14.8% and Karnataka 9.5 % [3]. Maharastra, Karnataka, Bihar, Himachal Pradesh, Orissa, Tamil Nadu and West Bengal are the other major mango producing states. Most of the Indian varieties possess strong aroma and more intense peel coloration, characterized by attractive fragrance, delicious taste and high nutrition value, owing to high amounts of vitamin C, p-carotene and minerals [16]). About 55585 thousand metric tonnes mango were exported and fetched foreign exchange in Indian Rs.26472 Lakh [2].

Mango fruit is vulnerable to post harvest losses due to its high perishable nature. Storage and ripening of mango are beset with number of problems. The post harvest losses in mango are about 20 to 40 per cent. Many factors, such as cultivar, stage of maturity, size grading, method of harvesting, handling, packaging and mode of transport, affect the storability of mango fruits. Most losses are caused by preventable transportation and inappropriate storage methods. The post harvest life of mango usually does not exceed 2-3 weeks and is limited by physiological deterioration of the fruit related to over-ripening and by pathogen infection and development leading to decay. Various methods of post harvest techniques have been employed to extend the shelf life of mango fruit and reduce losses, through inhibition of respiration and ethylene production, which slows deterioration and senescence [18]. These can be classified as physical and chemical methods, which include refrigeration or cold storage, polythene film packaging,

wax coating, sub-atmospheric pressure storage, controlled atmosphere storage, modified atmospheric storage, irradiation, heat treatment and use of various chemicals. A combination of these can also be adopted to extend the shelf life of the fruit [9]. To reduce this loss and to increase the shelf life, efforts are need to develop post harvest technologies which are not health hazardous and would suit climatic and socio-economic conditions of India [10].

Keeping the above facts in mind, the present investigation entitled "Study on Effect of post harvest treatments on ripening and shelf life of mango cv. Dashehari as influenced by different physico-chemical treatments during storage".

MATERIAL AND METHODS

An experiment was conducted at the laboratory of Post-harvest, Dept. of Horticulture, Sardar Vallabhbhai Patel University of Agricultural and Technology Meerut during August 2014-15 and 2015-16. The experimental materials was mango variety namely Dashehari which were collected from Horticulture Research Centre, SVPUA&T, Meerut. Maturity of mango was identified on the basis of specific gravity (1.00) at the time of harvesting. The experiment was laid out in Completely Randomized Design (CRD) with 3 replications. Each replication was consist of 5 fruits. Thus, total 330 of fruits were taken for experiment The details of treatments viz., ethrel 500, ethrel 750 ppm , ethrel 1000 ppm, bavistin 500 ppm, bavistin 1000 ppm, bavistin 1500 ppm, pedicellate fruits with 15 mm pedicel and control The harvested fruits were wrapped with brown paper, tissue paper and butter paper separately. These wrapped fruits were placed in ventilated light weight card board boxes at ambient room temperature. Thereafter, data were recorded on the basis of various physical parameters at 4^{th}, 8^{th} and 12^{th} day of storage.

Physical qualitative characters i.e. ripening index, Physiological loss of weight, marketability, decay per cent, specific gravity, and organoleptic quality were recorded with opinion of panel of 5 judges and they scored according to Hedonic scale suggested by (Amerin *et al*., 1965). During sensory evaluation, fruits were rated in terms of Excellent (6 points), Very good (5 points), Good (4 points), Fair (3 points) and Non-acceptable (1 point). Data on the decay (%) were recorded on the 4th , 8th and 12th to examine the spoilage of condition fruits during ripening period and expressed as % based on the appearance of visible symptoms on fruit skin in terms of spoilage and shrinkage. A four points scale (scoring technique) suggested by Ranganna (1986) was used to calculate the fruit ripening index: 4, very attractive bright barium yellow and ripe fruit with excellent aroma; 3, barium yellow and ripe fruit with good aroma; 2, light yellow and moderately ripe with light aroma; 1, greenish yellow and unripe fruit with no aroma. The process was continued still ripening at four days interval. Per cent total physiological weight loss was calculated by using following formula:

% Weight loss (WL) = IW-FW / IW x 100

Where,

% WL = Physiological weight loss

IW= Initial fruit weight and

FW = Final fruit weight

Specific gravity = Weight of fruit (g)/Volume of water displaced by fruit (ml)

RESULTS AND DISCUSSION

Effect on ripening index:

Data framed in (Table No.1) in all the treatments, an increasing trend has been reported in ripening index upto 8^{th} day, but it was slightly decreased from 8^{th} to 12^{th} day of storage except for ethrel 1000 ppm + brown paper during both years. The maximum ripening index was recorded for fruits treated with higher concentration of ethrel 1000 ppm + brown paper at 4^{th}, 8^{th} and 12^{th} day of storage during both the years, while minimum ripening index was observed with carbendazim 500 and 1000 ppm + brown, tissue and butter paper, pedicillate fruit 15 mm + brown, tissue and butter paper and the similar pattern was also recorded in control at 4^{th} day of storage during both the year of experimentation. In other hand, the minimum ripening index was obtained with carbendazim 1500 ppm + butter paper on 8^{th} day and carbendazim 500 ppm + butter paper at 12^{th} day of storage. The similar result was also found by [6].

Effect on physiological loss of weight:

Data illustrated in (Table No. 2), the percentage of loss in weight of fruit was increased with advancement of the storage period irrespective of treatments during both seasons. The minimum physiological loss of weight was found in treatment like ethrel 500 ppm + brown paper at 4^{th}, 8^{th} and 12^{th} days of storage, while maximum physiological loss of weight was reported in control at all the storage period. This is might be due to reduction in rate of respiration and evaporation as well delaying in ripening due to restricted ethylene accumulation in the treated fruits. Similar results were reported by [8, 13, 20].

Effect on marketability

The data recorded on (Table No. 3), the fruit marketability was significantly influenced by the various physico-chemical treatments along with using wrapping materials during both seasons. The good marketability was observed up to 8th day of storage, thereafter it was slightly decreased in all the applied treatments except pedicillate fruit 15 mm + brown paper, tissue and butter paper. The maximum marketability per cent at 4th and 8th day of storage was recorded with ethrel 1000 ppm + brown paper followed by ethrel 1000 ppm + tissue and butter paper. While, the minimum marketability per cent was obtained with carbendazim 500 ppm + tissue paper upto 8th day during both years. The maximum marketability per cent at 12th day was found with pedicillate 15 mm + tissue paper whereas, the minimum marketability per cent was determined with control at 12th day of storage during both the seasons. The significant improvement in sensory attributes namely skin colour, pulp colour, aroma and flavour which were used as tools for determining the fruit marketability clearly indicate the positive effect was noted with ethrel treated. It may be due to the defined concentration of ethrel + wrapping materials was used, respectively uniform ripening during the storage period and enhance the marketability. Similarly, pedicillate fruits covered with all the wrapping material may be responsible for minimum loss of moisture content. These results are in close conformity with of the earlier workers [5, 19, 20, 12]**.**

Effect on decay per cent

A persual of (Table No.4) no decay in fruits was found at 4th day of storage in all treatments during both seasons. Over all the physico-chemical treatments, the minimum fruit decay was recorded in ethrel 500, 750 ppm + brown, tissue and butter paper, ethrel 1000 ppm + brown and tissue paper, pedicillate fruit 15 mm + brown, tissue and butter paper on the 8th day and carbendazim 1000 ppm + tissue paper was minimum at 12th day of storage during both year, while maximum decay per cent was observed under control at 8th to 12th day of storage. This may be due to additional contributory strength of cell wall. Irrespective of in vivo calcium content of tissue cell wall, substantially increased concentration might have provide additional strength facilitating delayed degradation of tissues followed by increased permeability of cell wall. Similar finding were reported by [19, 11]**.**

Effect on specific gravity:

Data framed in (Table No.3) the specific gravity under different physico-chemical treatments was found statistically not significant in all the treatments during storage periods. Generally, the specific gravity of fruit was markedly decreases with each increment of storage upto 12th day during both the seasons. The maximum specific gravity upto 12th day of storage with pedicillate fruit 15 mm + brown paper because of higher fruit weight, while minimum specific gravity was recorded in control at 12th day of storage during both the years. The decreasing trend in specific gravity with advancement in storage period may be due to the loss of fruit weight by reduction in moisture content, resulting mass volume of fruit is disturbed. Similar results were reported by [4, 17, 8]**.**

Effect on organoleptic quality:

Data illustrated shows that (Table No.6) the application of various physical and chemical treatments gave the significant effect on the organoleptic taste upto 8th day of storage. The findings clearly indicated that the organoleptic taste was significantly decreases with each increasing day of storage 8th to 12th day during both the years. The highest rating of organoleptic quality was observed when the fruits treated with ethrel 1000 ppm + brown paper followed by ethrel 1000 ppm + tissue paper and ethrel 500 ppm + butter paper upto 8th day of storage. However, the maximum rating of organoleptic quality was obtained with ethrel 750 ppm + brown paper followed by ethrel 500 ppm + butter and tissue paper at 12th day of storage. The minimum rating of organoleptic quality was recorded with control during storage periods. The treated fruits of ethrel had also more amylase acidity due to the addition of ethrel in the treatments, the organoleptic quality of fruit was further improved in comparison with treatments containing of carbendazim and pedicillate fruits. A similar result was reported by [13, 20, 22].

CONCLUSIONS

Based on the results summarized, the various post-harvest treatments and wrapping materials significantly affected the various parameters like ripening index, Physiological loss of weight, marketability, decay per cent, specific gravity, and organoleptic quality. Among the applied treatments, ethrel 1000 ppm + brown paper was gave the better results on ripening index, physiological loss of weight, marketability, decay per cent, specific gravity, and organoleptic quality as compared to control and other treatments. It is concluded that the ethrel 1000 ppm + brown paper was found to be superior in most of the parameters, therefore, the treatments like ethrel 1000 ppm + brown paper is suggested to

improve, shelf-life and post-harvest quality of Dashehari mango, minimum loss of weight and decay per cent.

Table No.1 Effect of post-harvest treatment and wrapping materials on ripening index of Mango cv. Dashehari

Treatments	Ripening Index					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	2.05	3.64	3.54	2.07	3.68	3.55
Ethrel 500 ppm + Tissue paper	2.12	3.59	2.99	2.14	3.63	3.00
Ethrel 500 ppm + Butter paper	2.20	3.50	3.49	2.21	3.53	3.50
Ethrel 750 ppm + Brown paper	2.36	3.52	3.18	2.38	3.54	3.20
Ethrel 750 ppm + Tissue paper	2.78	3.60	3.19	2.81	3.61	3.20
Ethrel 750 ppm + Butter paper	2.74	3.74	2.80	2.77	3.77	2.81
Ethrel 1000 ppm + Brown paper	2.95	3.94	3.99	2.97	3.95	4.00
Ethrel 1000 ppm + Tissue paper	2.82	3.80	3.19	2.84	3.84	3.20
Ethrel 1000 ppm + Butter paper	2.80	3.79	2.99	2.83	3.80	3.00
Carbendazim 500 ppm + Brown paper	1.00	3.65	2.34	1.00	3.68	2.36
Carbendazim 500 ppm + Tissue paper	1.00	3.66	2.44	1.00	3.67	2.46
Carbendazim 500 ppm + Butter paper	1.00	3.68	2.29	1.00	3.70	2.30
Carbendazim 1000 ppm + Brown paper	1.00	3.73	2.65	1.00	3.74	2.69
Carbendazim 1000 ppm + Tissue paper	1.00	3.75	2.48	1.00	3.77	2.50
Carbendazim 1000 ppm + Butter paper	1.00	3.65	2.94	1.00	3.68	2.95
Carbendazim 1500 ppm + Brown paper	2.00	3.60	2.60	2.01	3.61	2.60
Carbendazim 1500 ppm + Tissue paper	2.21	3.66	3.14	2.22	3.67	3.15
Carbendazim 1500 ppm + Butter paper	2.10	3.49	2.85	2.11	3.51	2.88
Pedicillate fruit (15mm) + Brown paper	1.00	3.72	2.88	1.00	3.73	2.93
Pedicillate fruit (15mm) + Tissue paper	1.00	3.73	3.60	1.00	3.75	3.61
Pedicillate fruit (15mm) + Butter paper	1.00	3.70	3.42	1.00	3.71	3.45
Control (fresh water)	1.00	3.66	3.40	1.00	3.69	3.42
CD@1% level	**0.44**	**0.33**	**0.48**	**1.39**	**0.05**	**060**
SE (m)	**0.51**	**0.01**	**0.17**	**0.49**	**0.02**	**0.21**

Table No.2 Effect of post-harvest treatment and wrapping materials on PLW (%) of Mango cv. Dashehari

Treatments	PLW (%)					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	4.13	7.75	12.13	4.15	7.77	12.15
Ethrel 500 ppm + Tissue paper	4.50	8.41	12.51	4.54	8.44	12.53
Ethrel 500 ppm + Butter paper	4.42	8.53	12.42	4.44	8.56	12.43
Ethrel 750 ppm + Brown paper	5.23	8.37	13.10	5.25	8.38	13.11
Ethrel 750 ppm + Tissue paper	5.22	9.40	14.32	5.24	9.42	14.33
Ethrel 750 ppm + Butter paper	5.04	9.52	14.10	5.07	9.54	14.12
Ethrel 1000 ppm + Brown paper	6.10	8.91	13.31	5.98	8.92	13.33
Ethrel 1000 ppm + Tissue paper	5.30	9.22	14.22	5.33	9.24	14.23
Ethrel 1000 ppm + Butter paper	5.32	9.31	12.55	5.35	9.33	12.56
Carbendazim 500 ppm + Brown paper	5.71	8.80	14.33	5.72	8.83	14.35
Carbendazim 500 ppm + Tissue paper	6.10	9.55	14.51	6.10	9.56	14.53
Carbendazim 500 ppm + Butter paper	5.14	9.32	14.83	5.15	9.34	14.84
Carbendazim 1000 ppm + Brown paper	6.26	10.32	13.73	6.27	10.34	13.74
Carbendazim 1000 ppm + Tissue paper	6.16	10.12	13.35	6.19	10.14	13.37
Carbendazim 1000 ppm + Butter paper	6.28	10.52	15.56	6.29	10.54	15.59
Carbendazim 1500 ppm + Brown paper	5.00	10.10	15.46	5.02	10.12	15.48
Carbendazim 1500 ppm + Tissue paper	5.85	10.03	13.88	5.86	10.04	13.90
Carbendazim 1500 ppm + Butter paper	5.25	10.06	14.47	5.28	10.10	14.48
Pedicillate fruit (15mm) + Brown paper	5.28	7.98	12.74	5.29	7.99	12.77
Pedicillate fruit (15mm) + Tissue paper	5.78	8.10	12.87	5.80	8.12	12.89
Pedicillate fruit (15mm) + Butter paper	5.31	8.34	13.04	5.33	8.37	13.07
Control (fresh water)	6.97	11.43	15.98	6.98	11.45	15.99
CD@1% level	**0.78**	**0.82**	**1.08**	**0.79**	**0.85**	**1.11**
SE (m)	**0.27**	**0.29**	**0.38**	**0.28**	**0.30**	**0.39**

Table No.3 Effect of post-harvest treatment and wrapping materials on marketability of Mango cv. Dashehari

Treatments	Marketability					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	80.31	90.66	80.18	81.32	90.67	80.20
Ethrel 500 ppm + Tissue paper	81.40	91.41	82.75	81.42	91.77	82.76
Ethrel 500 ppm + Butter paper	81.70	88.32	91.42	81.72	88.35	93.45
Ethrel 750 ppm + Brown paper	81.46	92.96	85.31	81.46	92.98	85.33
Ethrel 750 ppm + Tissue paper	81.03	86.40	85.52	81.06	86.43	81.55
Ethrel 750 ppm + Butter paper	81.02	96.26	80.70	81.04	94.29	80.71
Ethrel 1000 ppm + Brown paper	82.20	98.64	83.79	83.26	98.66	83.80
Ethrel 1000 ppm + Tissue paper	82.00	97.44	90.18	82.10	97.46	90.20
Ethrel 1000 ppm + Butter paper	81.77	94.95	90.46	81.76	96.52	91.48
Carbendazim 500 ppm + Brown paper	80.96	84.50	81.19	80.98	84.97	81.20
Carbendazim 500 ppm + Tissue paper	79.50	81.74	80.53	79.52	81.76	80.55
Carbendazim 500 ppm + Butter paper	80.41	82.00	80.10	80.42	82.83	85.11
Carbendazim 1000 ppm + Brown paper	80.75	82.63	79.38	80.77	82.65	79.40
Carbendazim 1000 ppm + Tissue paper	80.20	81.90	77.78	80.22	81.92	77.80
Carbendazim 1000 ppm + Butter paper	80.86	83.20	80.21	80.88	83.21	80.22
Carbendazim 1500 ppm + Brown paper	80.95	84.77	78.78	80.98	84.78	78.80
Carbendazim 1500 ppm + Tissue paper	78.59	91.88	80.52	78.60	91.89	80.55
Carbendazim 1500 ppm + Butter paper	80.48	82.77	77.31	80.50	82.78	77.32
Pedicillate fruit (15mm) + Brown paper	78.56	92.42	93.75	78.58	92.44	93.77
Pedicillate fruit (15mm) + Tissue paper	80.42	89.10	93.92	80.44	89.12	94.95
Pedicillate fruit (15mm) + Butter paper	80.28	87.65	90.58	80.30	87.66	91.60
Control (fresh water)	79.32	90.28	70.48	79.36	90.30	70.50
CD@1% level	**1.11**	**2.71**	**1.89**	**1.22**	**2.79**	**1.92**
SE (m)	**0.39**	**0.95**	**0.66**	**0.43**	**0.98**	**0.68**

Table No.4 Effect of post-harvest treatment and wrapping materials on Decay (%) of Mango cv. Dashehari

Treatments	Decay (%)					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	0.00	0.00	3.22	0.00	0.00	3.21
Ethrel 500 ppm + Tissue paper	0.00	0.00	6.42	0.00	0.00	6.43
Ethrel 500 ppm + Butter paper	0.00	0.00	2.41	0.00	0.00	2.42
Ethrel 750 ppm + Brown paper	0.00	0.00	4.50	0.00	0.00	4.50
Ethrel 750 ppm + Tissue paper	0.00	0.00	7.33	0.00	0.00	7.34
Ethrel 750 ppm + Butter paper	0.00	0.00	5.45	0.00	0.00	5.47
Ethrel 1000 ppm + Brown paper	0.00	0.00	4.75	0.00	0.00	4.77
Ethrel 1000 ppm + Tissue paper	0.00	0.00	3.50	0.00	0.00	3.53
Ethrel 1000 ppm + Butter paper	0.00	0.31	4.80	0.00	0.33	4.83
Carbendazim 500 ppm + Brown paper	0.00	0.35	3.00	0.00	0.37	3.00
Carbendazim 500 ppm + Tissue paper	0.00	0.34	2.10	0.00	0.36	2.12
Carbendazim 500 ppm + Butter paper	0.00	0.28	4.20	0.00	0.29	4.21
Carbendazim 1000 ppm + Brown paper	0.00	0.31	5.00	0.00	0.33	5.00
Carbendazim 1000 ppm + Tissue paper	0.00	0.25	6.40	0.00	0.27	6.42
Carbendazim 1000 ppm + Butter paper	0.00	0.37	4.78	0.00	0.38	4.80
Carbendazim 1500 ppm + Brown paper	0.00	0.38	7.54	0.00	0.40	7.55
Carbendazim 1500 ppm + Tissue paper	0.00	0.33	5.42	0.00	0.35	5.44
Carbendazim 1500 ppm + Butter paper	0.00	0.35	6.45	0.00	0.37	6.47
Pedicillate fruit (15mm) + Brown paper	0.00	0.00	3.20	0.00	0.00	3.22
Pedicillate fruit (15mm) + Tissue paper	0.00	0.00	2.85	0.00	0.00	2.88
Pedicillate fruit (15mm) + Butter paper	0.00	0.00	4.00	0.00	0.00	4.10
Control (fresh water)	0.00	0.46	8.22	0.00	0.48	8.21
CD@1% level	**0.00**	**0.18**	**0.79**	**0.00**	**0.16**	**0.64**
SE (m)	**0.00**	**0.06**	**0.28**	**0.00**	**0.06**	**0.22**

Table No.5 Effect of post-harvest treatment and wrapping materials on specific gravity of Mango cv. Dashehari

Treatments	Specific Gravity					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	0.91	0.83	0.80	0.90	0.84	0.81
Ethrel 500 ppm + Tissue paper	0.92	0.83	0.82	0.92	0.83	0.83
Ethrel 500 ppm + Butter paper	0.90	0.84	0.82	0.91	0.84	0.83
Ethrel 750 ppm + Brown paper	0.92	0.83	0.80	0.93	0.84	0.81
Ethrel 750 ppm + Tissue paper	0.89	0.83	0.81	0.90	0.84	0.82
Ethrel 750 ppm + Butter paper	0.91	0.84	0.80	0.92	0.85	0.82
Ethrel 1000 ppm + Brown paper	0.90	0.83	0.80	0.91	0.82	0.81
Ethrel 1000 ppm + Tissue paper	0.91	0.80	0.80	0.92	0.81	0.81
Ethrel 1000 ppm + Butter paper	0.90	0.82	0.82	0.91	0.83	0.82
Carbendazim 500 ppm + Brown paper	0.90	0.84	0.82	0.92	0.85	0.83
Carbendazim 500 ppm + Tissue paper	0.89	0.84	0.82	0.90	0.85	0.83
Carbendazim 500 ppm + Butter paper	0.90	0.82	0.82	0.91	0.83	0.83
Carbendazim 1000 ppm + Brown paper	0.91	0.84	0.80	0.92	0.85	0.81
Carbendazim 1000 ppm + Tissue paper	0.92	0.83	0.81	0.93	0.84	0.82
Carbendazim 1000 ppm + Butter paper	0.91	0.85	0.85	0.92	0.86	0.86
Carbendazim 1500 ppm + Brown paper	0.93	0.83	0.80	0.93	0.84	0.82
Carbendazim 1500 ppm + Tissue paper	0.92	0.86	0.80	0.93	0.86	0.81
Carbendazim 1500 ppm + Butter paper	0.91	0.85	0.83	0.92	0.85	0.84
Pedicillate fruit (15mm) + Brown paper	0.95	0.89	0.81	0.96	0.89	0.82
Pedicillate fruit (15mm) + Tissue paper	0.93	0.88	0.83	0.94	0.88	0.83
Pedicillate fruit (15mm) + Butter paper	0.92	0.87	0.80	0.93	0.87	0.81
Control (fresh water)	0.89	0.85	0.78	0.90	0.86	0.79
CD@1% level	N.S	N.S	N.S	N.S	N.S	NS
SE (m)	0.12	0.23	0.21	0.16	0.22	0.21

Table No.6 Effect of post-harvest treatment and wrapping materials on organoleptic quality of Mango cv. Dashehari

Treatments	Organoleptic quality					
	2014			2015		
	4thdays	8thdays	12thdays	4thdays	8thdays	12thdays
Ethrel 500 ppm + Brown paper	3.02	3.42	3.03	2.70	3.55	3.18
Ethrel 500 ppm + Tissue paper	3.04	4.12	3.56	3.11	4.20	3.82
Ethrel 500 ppm + Butter paper	3.44	3.28	3.67	3.92	4.40	3.87
Ethrel 750 ppm + Brown paper	2.79	3.18	3.90	2.79	4.26	3.91
Ethrel 750 ppm + Tissue paper	2.87	3.38	3.19	2.90	3.49	3.21
Ethrel 750 ppm + Butter paper	2.70	3.36	3.04	2.87	3.39	3.08
Ethrel 1000 ppm + Brown paper	3.78	5.00	2.57	3.99	4.99	2.52
Ethrel 1000 ppm + Tissue paper	3.68	4.32	2.98	3.69	4.33	3.05
Ethrel 1000 ppm + Butter paper	3.29	4.22	3.03	3.30	4.23	3.04
Carbendazim 500 ppm + Brown paper	1.77	3.15	2.87	1.85	3.18	2.92
Carbendazim 500 ppm + Tissue paper	1.65	3.79	3.55	1.77	3.09	3.24
Carbendazim 500 ppm + Butter paper	1.84	3.11	2.97	1.87	3.20	3.01
Carbendazim 1000 ppm + Brown paper	2.75	3.40	3.00	2.89	3.41	3.11
Carbendazim 1000 ppm + Tissue paper	3.00	3.88	3.19	3.10	3.92	3.21
Carbendazim 1000 ppm + Butter paper	1.95	3.22	2.89	1.91	3.23	2.92
Carbendazim 1500 ppm + Brown paper	2.08	3.33	3.09	3.10	3.44	3.13
Carbendazim 1500 ppm + Tissue paper	1.79	3.28	2.78	1.89	3.31	2.89
Carbendazim 1500 ppm + Butter paper	2.00	3.29	2.92	3.01	3.30	2.95
Pedicillate fruit (15mm) + Brown paper	1.75	3.21	2.99	1.79	3.18	2.72
Pedicillate fruit (15mm) + Tissue paper	1.87	3.28	3.20	1.90	3.31	3.22
Pedicillate fruit (15mm) + Butter paper	1.88	3.49	2.85	1.95	3.50	2.87
Control (fresh water)	1.59	3.08	2.54	1.55	3.13	2.58
CD@1% level	1.27	1.03	0.66	1.30	1.07	0.74
SE (m)	0.44	0.36	0.23	0.46	0.38	0.26

REFERENCES

1. Amerin, M.A, Pangborn, R.M. and Roessler, E.B.(1965). Principles of sensory evaluation of food. Academic Press Inc. New York, USA, pp.366-374.
2. Anonymous (2014). Agricultural and Processed Food Product Export Development Authority website, January, 2014. Ministry of Commerce and Industry, Govt. of India, New Delhi.
3. Anonymous (2014). Indian Horticulture Data Base, Ministry of Agriculture (Govt. of India) National Horticulture Board, Gurgaon, Haryana (India).
4. Antala, D.K.; Sangani, V.P.; Cholera, S.P. and Vyas, D.M. (2008). Effect of wax coating and packaging at low temperature on the storage behaviour of Kesar mango. *Ind. Fd. Packer* **62** (6): 21-27.
5. Dhemre, J.K. and Waskar, D.P. (2003). Effect of post-harvest treatments on shelf-life and quality of Kesar mango fruits during storage. *Journal of Maharashtra Agriculture University.,* **23**.(1):159-163.
6. Freire, J.M. and Chitarra, A.B. (1999). "Effect of calcium chloride application on hydrothermally treated mango cv. Tommy Atkins fruits", *Pesquisa Agro. Brasil*., **34,** 761-769.
7. Iyer, C. P. A. (1991). Recent Advances in varietal improvement in mango. *Acta Horticulturae.* **29**: 109-132.
8. Kader, A. A. (1980). Prevention of ripening in fruits by use of controlled atmosphere. *Food Technol.* **34**: 51-54.
9. Kader, A. and Mitcham, B. (2008). Optimum procedures for ripening mangoes. In fruit ripening and ethylene management: 47-48. *Uni. Cal. Post-harvest tech.Res.Pub. series* 9.
10. Krishnamurthy, S. and Rao, D. V. S. (2011). Status of post harvest management of fruits. *Indian J. Hort*., **58**(1-2): 152.
11. Lakshmi, K. P. R., Rao, S. V. R. and Haribabu, K. (2003). Effect of certain Fungicides and packaging on post-harvest changes and losses in mango. *South Indian Horticutu.,*. **51** (1/6):12-24.
12. Madhavi, S. D. and Dilip, B. J. (2005). Effect of post-harvest ethrel treatment on ripening and quality of Sapota cv. Pala. *Indian Journal of Horticulture.,* **62**(2):187-189.
13. Patil, S., Ganesh, S., Varu, D.K. and Viradia, R.R. (2009). Effect of post-harvest treatments on physiological characters of mango cv. KESAR during storage. *Asian Journal of Horticulture.*, **4**(1): 141-144.
14. Purseglove, J. W. (1974). *Tropical crops: Dicotyledons.* Vols. 1 and 2 ELBS and Longman.
15. Ranganna, S. (1986)**. "**Handbook of analysis and quality control for fruit and vegetable products" Tata McGraw Hill Publishing Co. Ltd., New Delhi.
16. Sagar, V. R., Khurdiya, D. S. and Balakrishnan, K. A (1999). Quality of dehydrated ripe mango slices as affected by packaging material and mode of packaging. *J. Food Sci. Technol.* **36**: 67-70.
17. Sakhale, B.K., Pawar, V.N. and Kapse, B.M. (2009)**.** Studies on extension of shelf-life of Kesar mango (*Mangifera indica* L.). *Acta Horticulturae*., **820**: 643-651.
18. Shewfelt, R. L. (1986). Postharvest treatment for extending the shelf life of fruits and vegetables. *Food Technol.* **40**: 70-80, 89.
19. Singh, M.K., Malik, S., Kumar, M., Kumar, P. and Kumar, A. (2010). Effect of various chemical and Fungicidal treatment on post-harvest Quality of Mango (*Mangifera Indica* L) cv. Amarapali. *Annals of Horticulture.,* vol.**3**, No:1
20. Singh, M.K., Malik, S., Kumar, M., Kumar, V. and Kumar, A. (2012). Effect of various chemical and Fungicidal treatment on post-harvest Quality of Mango (*Mangifera Indica* L) cv.Amarapali. *J. Environ. Biol*. **33**: 227-232
21. Subramanyam, H., Krishnamurthy, S. and Parpia, H. A. B. (1975). Physiology and biochemistry of mango fruit. *Adv. Food Res.* **21**: 223-305.
22. Venkatesan, T. and Tamilmani, C. (2014). Effect of ethrel on the starch sugar changes of offseason fruits of mango (*Mangifera indica* l. Var. Neelum) during ripening. *International Letters of Natural Sciences.,* Vol. **7** pp 1-12.

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