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Response of different post-harvest treatments on shelf-life and quality of mango (*Mangifera indica* L.) cv. dasheri

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Abstract
A Laboratory experiment 'was carried out in Department of Horticulture at Post Graduate College, Ghazipur, UP` during 2018-2019 to study the response of different post harvest treatments on shelf life and quality of Dasheri mango. The post harvest treatments consisting of non perforated and perforated polythene bags, perforated and non perforated aluminium foil, cardboard box, 1% and 2% solution of calcium chloride and 1% and 2% solution of calcium nitrate. Fruits without any packaging materials and any post harvest treatment were compared as the control. The fruits kept in the non perforated aluminium foil statistically proved most effective to enhance the shelf- life of Dasheri mango. This post harvest treatment also sustains the fruit quality and appearance of fruits. Better appearance, enhanced shelf-life and sustained quality of fruits are beneficial to growers as well as consumers.

Keywords: *Mangifera indica*, mango, dasheri

Introduction
Mango is the very popular fruit of India as well as tropical Asia and this fruit has developed its own importance all over the world. Being and useful and delicious fruit, it was the part of culture and religion since long time. Besides of its being in fine taste and good qualities, the mango is known as the "King of Fruits" throughout the world. A very favourite fruits in India and other tropical countries, the mango is becoming increasingly popular in North America as well as in European countries. Mango are exceptionally high in beta carotene which the body convert to vitamin-A. An average size of mango about 230 g in weight has 135 K-Calories and 57 mg of vitamin-C, which is more than the 50% of the Recommended Dietary Allowances (RDA). It also provides plentiful amount of fibre and healthy amount of potassium; mangoes are rich source of pectin which is control the constipation. A soluble dietary fibre is important in controlling blood cholesterol. The Mango is one of the most important fruit among the tropical and sub-tropical fruits in the world and it is popular both in the fresh and the processed forms. It is commercially grown in more than 80 countries. India is largest producer among the all countries of world and occupies 54% of the total world's production of mango. Moreover mango fruits are more perishable in nature due to high content of moisture and sugar, so their shelf-life and consumption life is for a few days. Attempts have also been made to extend to increase shelf- life by irradiation, controlled atmospheric condition and hypobaric storage. The process of irradiation is so difficult and not possible to practiced in common but controlled atmosphere and hypobaric storage with some treatments is promising method to extend the shelf-life of mango fruits. Hence the present study was undertaken with respect to response of different post-harvest treatment of mango cultivar Dasheri fruits in order to enhance the shelf-life as well consumption life of mango.

Materials and Methods
The experiment was conducted in the laboratory of Department of Horticulture of Post Graduate College, Ghazipur, UP, India. The experiment was laid out in complete randomized design to test the effect of different post-harvest treatment on the shelf life and quality of Dasheri mango. For present investigation mango full mature fruits of Dasheri cultivar likely to be equal in size were selected from college fruit orchard, all the fruits were cleaned by washing with tap water and dried in air, twenty mangoes were kept under each treatment as T_1 (Non Perforate polythene bag), T_2 (Perforate polythene bag), T_3 (Non Perforate Aluminium Foil), T_4 (Perforate Aluminium Foil), T_5 (Card Board Box), T_6 (1% Solution of $CaCl_2$), T_7 (2% Solution of $CaCl_2$), T_8 (1% Solution of $CaNO_3$), T_9 (2% Solution of $CaNO_3$), and T_{10} (Fruits kept under open as Control).

Result and Discussion

The percentage physiological weight loss of harvested fruits was recorded at 10 and 15 days after storage. The percentage weight loss of fruit was significantly increased with advancement of storage life under all the treatment. The enhancement of percentage weight loss of post harvested fruits was may be due to the excessive transpiration of water and respiration of fruits. The percentage weight loss of post harvested fruits was the minimum when fruits were kept under T3 (Non Perforated Aluminium Foil). The findings are in agreement with the findings of Khader *et-al* (1988) [4] and Singh *et-al* (2003) [6]. The palatability rating after 10 and 15 days after storage of post harvested fruits was also significantly influenced by different post-harvest treatments. However, maximum and minimum palatability rating were observed with T_4 (Perforate Aluminium Foil) and T_9 (2% Solution of $CaNO_3$) respectively after 10 1nd 15 days of the storage. The present findings are collaborated with the findings of Kahlon and Uppal (2005) [3]. In present investigation all post-harvest treatment significantly enhanced the ripening period as compare to the control (Fruits kept under Open condition). This may be due the post-harvest treatments reduce the ethylene formation inside the fruits while maximum delayed ripening was recorded under 2% solution of $CaNO_3$ followed by 2% solution of Ca Cl_2. Similar opinion were also opined by Gautam *et-al (*2003) [2]. This phenomenon may be due to the reduction in the rate of biological processes of post-harvest fruits.

The percentage spoilage after 15 and 20 days after storage of fruits were also significantly influenced by post-harvest treatments. The earliest spoilage of stored fruits was started under control when fruits were kept in open while delayed spoilage started under fruits those were kept in T_3 (Non Perforate Aluminium Foil) followed by T_4 (Perforate Aluminium Foil). Maximum% of spoilage at 15 days of storage was observed under T_5 (Card Board Box) which was 40.25%. The minimum% of spoilage (21.24) under T_3 (Non Perforate Aluminium Foil), After 20 days of storage the maximum (72.25%) and minimum (43.03%) were noticed under T_5 (Card board Box) and T_3 (Non Perforate Aluminium Foil) respectively. This may be due to the non-entrance of microbes through aluminium foil. The TSS content of stored fruits increased simultaneously in all the stored fruits under different post-harvest treatments from starting of storage up to 10 days but after that reduced and it was quite low. The maximum (3.08%) and minimum (2.01%) tss was recorded under T_3 (Non Perforate Aluminium Foil), and T_{10} (Control). The present resultd are in agreement of those reported by Kahlon and Uppal (2005) [3] and Randhawa (1982) [5].

The acidity% was decline with advancement of storage period the lowest (0.69) and highest (0, 97%) of acidity were recorded under T_9 (2% Solution of $CaNO_3$) and T_7 (2% Solution of $CaCl_2$), respectively after 10 days of storage. Contrary to that the lowest and highest acidity were noticed under the T_8 (1% Solution of $CaNO_3$) and T_{10} (control). The findings are more or less similar to those opined by Khader *et-al* (1988) [4]. The maximum TSS/ Acidity ratio was recorded through 1% Solution of $CaNO_3$ (T_8) while lowest was under control at 10 days after storage. At 20 days after storage similar trends was also recorded under same treatments but ratio was very low as compared to at 10 days after storage. The findings are in broad agreement with the report of Garg and Ram (1973) [1]. Post-harvest treatments of Dasheri mango subjected to ascorbic acid content was significantly proved to be effective. Ascorbic acid content was higher with all the post-harvest treated fruits as compare to the control. The findings are in agreement with the report of Gautam *et- al* (2003) [2]. The fruits kept under non perforated aluminium foil (T_3) exhibit the maximum ascorbic acid content at 20 days of storage Fruits stored without any post-harvest treatment proved to be most inferior in this regard and retained minimum ascorbic acid content. (Kahlon and Uppal, 2005) [3].

Finally it may be concluded that post-harvest treatments enhanced the shelf life of Dasheri mango fruits. Fruits kept under non perforated aluminium foil proved most effective so it may be used to enhance the shelf life and maintain the quality of harvested fruits of Dasheri cultivar.

Table 1: Effect of different post-harvest treatments on shelf-life and quality of Dasheri mango fruits.(DAS= Days after Storage)

Treatments	Physiological weight loss (%)		Palatability Rating		Ripening Time	Spoilage (%)		T.S.S ºBrixt		Titrable Acidity (%)		Ratio of TSS and Acidity		Ascorbic acid Content (mg/100g)
	DAS		DAS		DAS	DAS		DAS		DAS		DAS		DAS
	10	15	10	15		15	20	10	20	10	20	10	20	15
T_1	4.97	8.88	7.14	7.16	12.03	23.42	46.36	17.86	2.96	0.93	0.48	19.83	6.13	61.47
T_2	6.25	11.38	7.20	6.50	10.07	28.47	48.25	17.25	2.53	0.83	0.39	21.28	6.26	58.79
T_3	3.25	7.76	8.16	7.30	12.60	21.24	43.06	17.94	3.08	0.94	0.48	19.56	6.42	75.63
T_4	4.56	9.65	8.60	7.63	11.67	27.35	49.48	17.90	2.67	0.84	0.44	21.83	6.31	65.67
T_5	11.25	17.67	7.27	6.57	9.80	40.25	70.25	17.49	2.10	0.93	0.52	19.20	4.04	28.75
T_6	9.46	16.00	7.53	6.13	12.33	35.42	62.31	16.85	2.45	0.93	0.44	18.58	5.83	56.79
T_7	8.95	15.46	9.06	6.03	13.67	35.21	62.14	17.42	2.21	0.97	0.41	18.18	5.54	54.25
T_8	10.38	17.25	9.09	6.23	12.53	34.27	61.45	17.89	2.62	0.71	0.38	25.45	6.77	52.63
T_9	9.83	16.98	8.13	5.93	14.33	22.24	64.23	17.26	2.20	0.69	0.40	24.95	6.64	50.47
T_{10}	11.89	18.25	7.54	6.10	8.73	39.54	69.23	17.58	2.01	0.95	0.56	18.10	3.95	25.29
C.D.5%	0.05	0.07	0.38	0.35	0.31	0.075	0.014	0.32	0.12	0.04	0.03	0.139	0.06	9.329
S.E.M. ±	0.03	0.03	0.18	0.17	0.150	0.04	0.07	0.15	0.05	0.02	0.01	0.066	0.03	4.472
Significance	***	***	***	***	***	***	***	***	***	***	***	***	***	***

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