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Study the Effect of Different Surface Coating on Shelf Life of 'Kagzi Lime'

Abhinay Guleria[1] and Dr. Kumari Manisha[2]
[1,2]Department of Agriculture, Sant Baba Bhag Singh University, Khiala, Jalandhar, Punjab

Abstract:- The study was conducted to assess influence of different chemical and oil coatings on storage life of kagzi lime fruits (Citrus aurantiifolia). Fruits were harvested at green matured stage and washed with distilled water and dry in shade. Fruits were treated with different concentrations of chemicals viz., KMnO4 and different oil coatings viz., (coconut oil, linseed oil, and soybean oil), and wax coatings viz., (sugarcane wax, beewax). Coated fruits were kept in trays and stored under ambient conditions till the 21 days of storage. Different physical and chemical parameters were analyzed like PLW, marketable fruits, unmarketable fruits, marketable fruit retained over control, TSS, acidity, ascorbic acid and also organoleptic values. Among the various treatments, the result revealed that edible oil emulsion coconut oil had significantly effect on reduction in PLW (16.94%) and maximum marketable fruit retained (53.33%), TSS (2.47%), acidity (5.45%), ascorbic acid (41.96 mg/100) and juice content (34.03%) of fruits. Among all treatments, coconut oil proved best because it maintained relatively higher levels of acidity, flavor, vitamin C content and fruit firmness and also prevented disease attack.

Keywords:- *Citrus Aurantiifolia, Edible Coatings, Post-Harvest Treatment, Shelf Life, Quality Parameters.*

I. INTRODUCTION

The leading cultivar of lime is kagzi lime. It had highest annual production in Gujarat (605.62 MT) and Madhya Pradesh (306.73 MT). Sweet orange and mandarin are most important citrus species but kagzi lime also achieved a third position in citrus family. Kagzi lime belongs to family *Rutaceae.* After maturity stage, it becomes a non-climacteric fruit. It is a shrubby in nature and grown straight with many thorns. Edible coatings are applied as thin coating that forms a protective barrier around fruit and can be consumed along with the coated product. Verma and Dashora (2000) reported that effect of oil emulsion and diphenyl on post harvest physico nutritional changes in kagzi lime. Like any other fruits kagzi lime is perishable in nature, around 25–40% harvested fruits are lost before consumption due to faulty post harvest handling and microbial attack after harvest (Mahajan and Singh 2008). To increase the shelf life of kagzi lime, various treatments were used such as coatings, growth regulators, radiations, low temperature and different type of packaging materials. Choudhary et.al (2020) studied the effect of post harvest treatment on the Indian jujube during ambient and cold storage conditions. Matured ber fruits cv. Umran was harvest and dipped in aqueous solution of calcium chloride (0.5, 1.0 and1.5%) and gibberellic acid (20, 40, 60 ppm) for 5 minutes. Bola and Jain (2017) improved the shelf life of strawberry with the edible coating with chitosan. Different chemicals were used for the experiment such as (calcium chloride, carboxymethyl, cellulose and chitosan) and their combination increased the storage life of strawberry. Bisen and Pandey (2008) studied that shelf life of kagzi lime was increased by using the different treatments, that treatment was gamma radiation, coatings and growth retardants. Akhtar abbasi *et.al (*2009) studied the effect of chitosan coating on the post harvest quality of mango. Treatment given to the fruit was irradiated crab and shrimp chitosan (CHlirr, Mv= 5.14× 104), un-irradiated crab chitosan (CHlun, Mv= 2.61× 105). Post harvest loss of fruit is still high because farmer is small in India and had a lack of knowledge. Also farmers cannot afford these high cost postharvest treatments. Therefore, low cost technology would be need to standardized for reduce the post harvest losses. These techniques are economical viable and easily available in the view point of farmers. Alternate low cost technologies are edible coating of oil, chemical and wax and these techniques attained a worldwide attention. Keeping the above in view, an experiment was designed to study the different surface coating on shelf life of kagzi lime fruits.

II. MATERIALS AND METHODS

The present study was conducted at Sant Baba Bhag Singh University, Khiala Jalandhar district during February (2021). The lab experiment was conduct out in complete randomized design (CRD). Fresh green matured fruits were collected from village Mangu Mehra district Kangra, Himachal Pradesh. Harvested fruits rinsed in distilled water for 5 minute and then dry in shade. The fruits were treated with oil coating, chemicals and wax i.e. control (T_0), coconut oil (T_1), $KMnO_4$ (T_2), linseed oil (T_3), soybean oil (T_4), sugarcane wax (T_5), beewax (T_6). Observations were taken on the same day of harvest and after 7, 14 and 21 days of storage at ambient conditions. PLW was recorded on initial weight basis and expressed in percentage. TSS was measured with help of Zesis Hand Refractometer of 0-32° Brix range. The acidity and ascorbic acid content were determined by method AOAC (2002). The sensory parameter was evaluated by the panel of 5 judges using the 9-point hedonic scale (Amerrine et al. 1965).

- *Statist=ical analysis*

The treatments were replicate 3 times and experiment was laid in a complete randomized design and result analysed statistically (Cochran and cox 1957). Thirty fruits were taken for each treatment in each replication.

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III. RESULT AND DISCUSSION

➢ *Physical Parameter*

The data presented in Table 1 and Fig. 1 showed that the post harvest treatment significantly affect the physiological weight loss kagzi lime. The physiological weight loss increased due to advancement in storage period. The final day of storage period minimum weight loss was recorded under the treatment T_1 (16.94 %) followed T_0 (27.11%) and maximum fruit weight loss was noted under the treatment T_5 (40%) followed by T0 (39.48%). Marketable as the storage period 7, 14, 21 days minimum marketable fruit percentage were recorded in T_0 and maximum fruit percentage were observed in T_1 .

Fruit length, the storage life increased 7 to 21 days, maximum fruit length was recorded under T_1 (35.66%) followed by T_6 (33.33%). Whereas, minimum fruit length was recorded in T_5 (24.33%). Fruit width after the 21 days of storage smallest fruit width was observed in T_4 (21.3%) followed by T_6 (22.3%) and highest fruit width was recorded in T_1 (36.3%) followed by T_0 (28.3%). Rind thickness of storage period enhanced 7 to 21 days, minimum rind thickness of fruit was found under T_2 followed by T_1, T_4, T_5 and T_6 . Whereas largest rind thickness was observed in T_2. Marketable retained over control At the 7 to 21 day of storage period, T_2 showed the minimum marketable percentage of fruit and T_1 treatment showed the maximum marketable percentage of fruit.

➢ *Chemical Parameter*

TSS When storage period increased 7 to 21 days, minimum TSS was recorded in T_2 followed by T_3. Whereas, maximum TSS was recorded in T_4 followed by T_3. Juice percentage was continuously decreased during the advancement in storage period. After the 21 days of storage period, lowest juice percentage was noted in T_0 followed by T_6. Whereas, highest juice percentage was noted in T_1 followed by T_4. Acidity of the fruit increased days of storage period. At 7 to 21 days of storage period highest acidity percentage was recorded under the T_0 and minimum was recorded in T_5 followed by T_1. Ascorbic acid, the last day of storage period highest ascorbic acid content was recorded under T_1 followed by T_3. Whereas, lowest ascorbic acid content recorded under the treatment T_5 followed by T_6.

Organoleptic score, in the organoleptic score 7, 14 and 21 days of the storage period. The coconut oil is very good score in all 21 days in colour, falvour, taste, appearance and while the poor show in control in all storage days.

Table.1 Effect of different surface coating treatment on the physiological weight loss of kagzi lime

Treatment	7	14	21
T_0	7.63	12.84	27.11
T_1	2.01	11.33	16.94
T_2	11.3	24.56	39.48
T_3	11.09	30.65	43.6
T_4	6.6	21.83	36.00
T_5	10.9	28.12	40
T_6	21.6	26.30	38.09

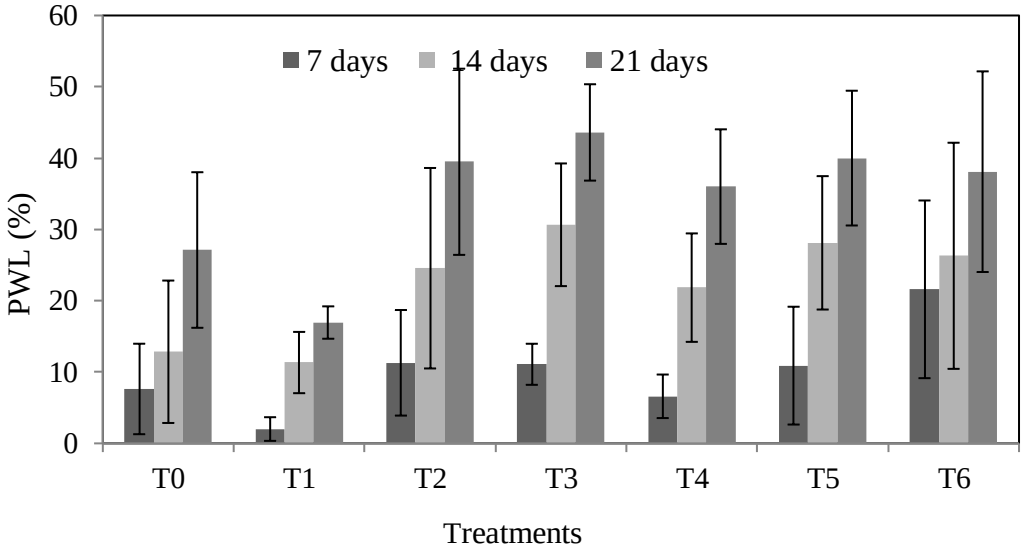

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Table.2 Effect of different surface coating treatment on percentage of marketable fruits

Treatment	7 days	14 days	21 days
T_0	76.66	68.88	33.33
T_1	95.55	91.11	86.66
T_2	86.66	72.21	37.77
T_3	88.88	83.33	62.21
T_4	93.33	83.33	49.99
T_5	83.33	71.11	38.88
T_6	82.22	76.66	45.55

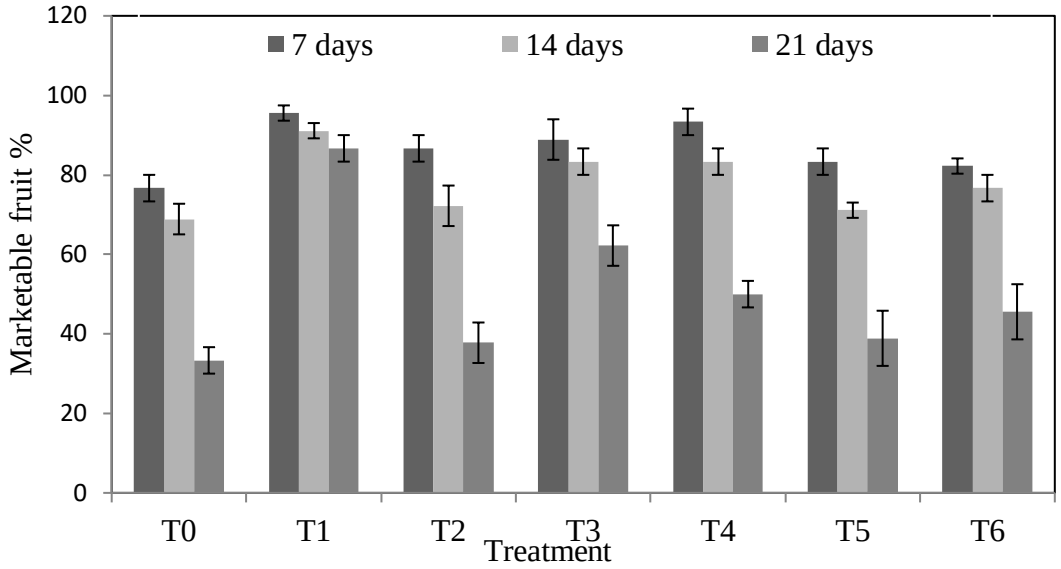

Table.3 Effect of different surface coating treatment on unmarketable fruit

Treatment	7 days	14 days	21 days
T_0	23.33	26.66	41.11
T_1	4.44	8.88	13.33
T_2	13.33	27.77	51.10
T_3	11.10	16.66	37.77
T_4	6.66	21.10	49.99
T_5	16.6	28.88	61.10
T_6	17.7	27.7	53.33

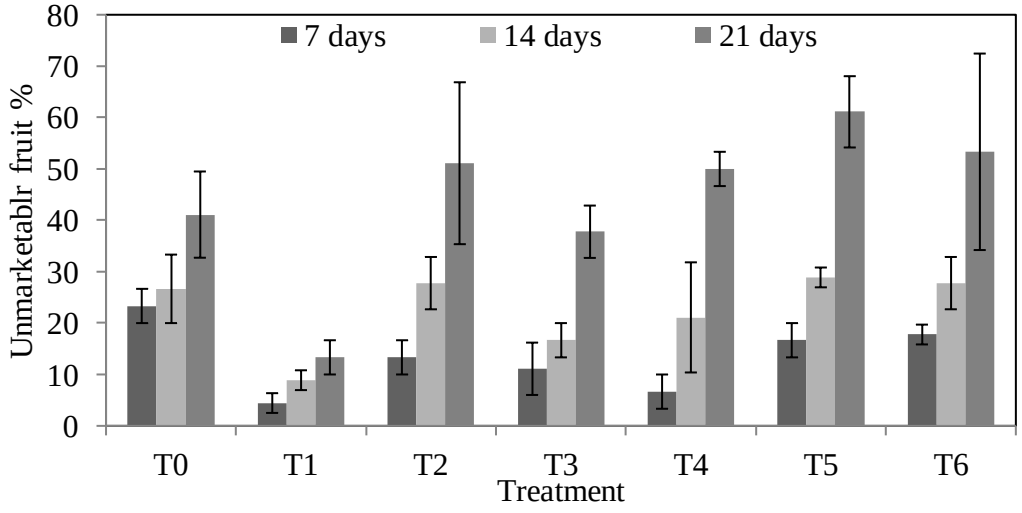

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Table.4 Effect of different surface coating on the size of fruit length

Treatment	7 days	14 days	21 days
T_0	40.33	37	33
T_1	37.66	36.33	35.66
T_2	40.66	37.66	30.33
T_3	35.66	32.33	26.66
T_4	36.33	33.33	27.33
T_5	32.33	27	24.33
T_6	39	35.66	33.33

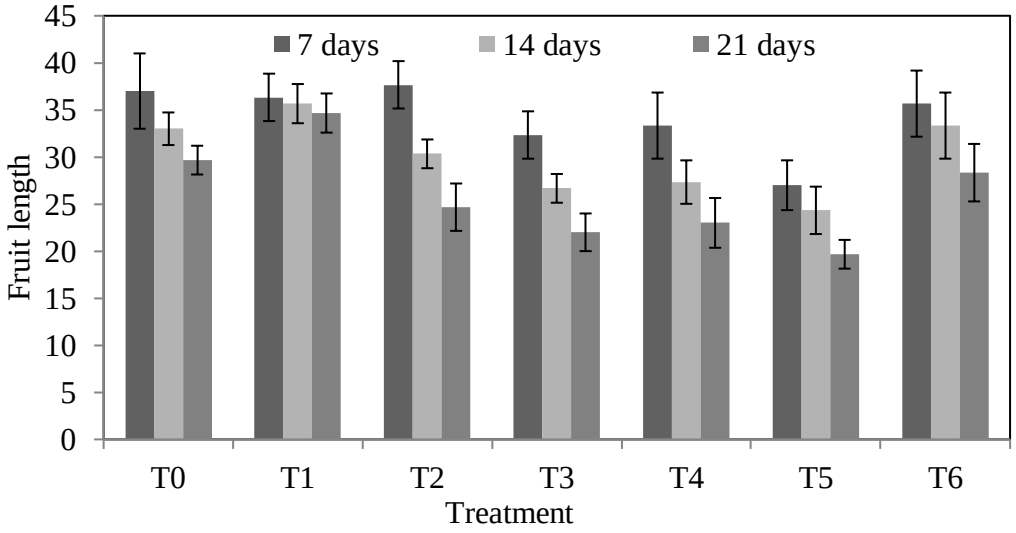

Table.5 Effect of different surface coating treatment on width and rind thickness of fruit

Treatment	7 days	14 days	21 days
T_0	35.00	31.67	28.33
T_1	38.00	37.33	36.33
T_2	34.33	28.67	23.67
T_3	32.33	27.67	23.00
T_4	28.33	24.33	21.33
T_5	33.33	28.00	24.00
T_6	29.67	25.33	22.33

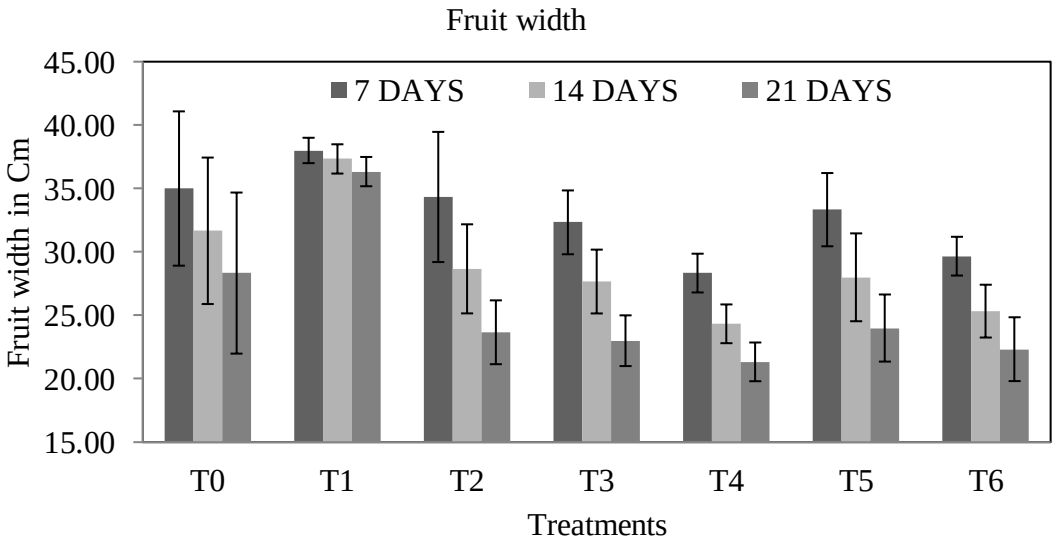

Table.6 Effect of different surface coating treatment on rind thickness of kagzi lime

Treatment	7 days	14 days	21 days
T_0	3.67	2.67	1.33
T_1	4.00	3.67	3.00
T_2	2.33	1.67	1.00
T_3	3.33	2.33	1.50
T_4	3.00	2.00	1.33
T_5	3.67	2.67	1.33
T_6	2.67	2.00	1.33

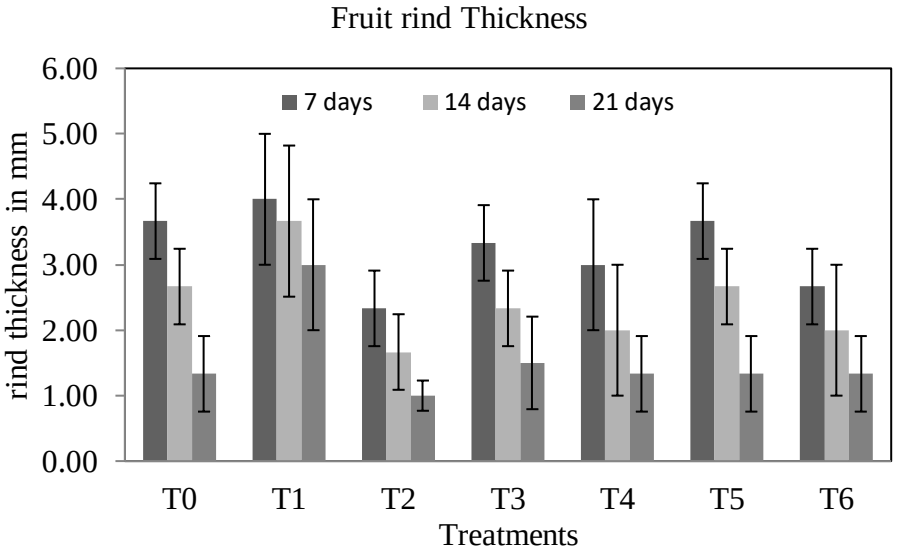

Table.7 Effect of different surface coating treatment on marketable retained over control

Treatment	7 days	14 days	21 days
T_0	0	0	0
T_1	13.3	22.33	53.33
T_2	10	5	4.33
T_3	12.43	14.44	28.88
T_4	16.65	14.43	16.66
T_5	6.64	3.34	5.44
T_6	5.55	7.78	12.22

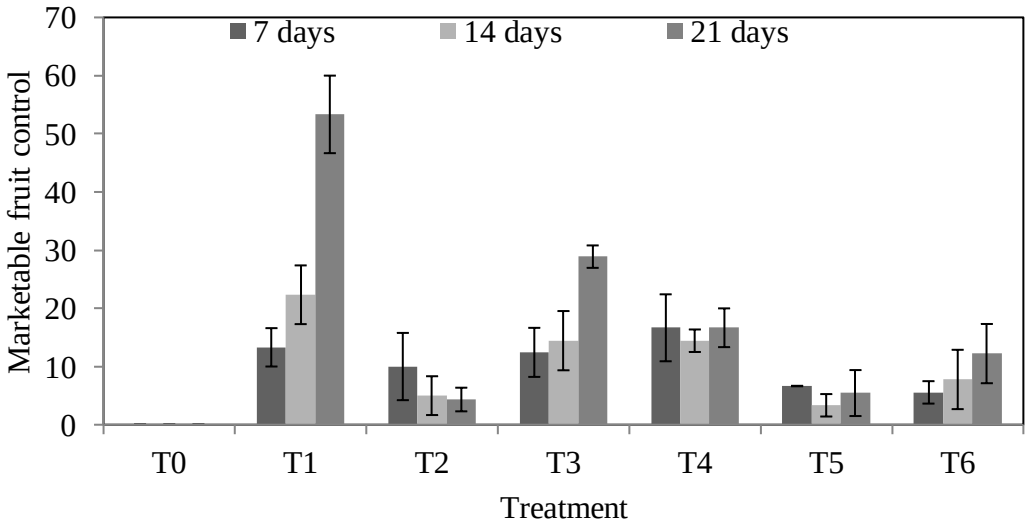

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Table.8 Effect of different surface coating treatment on total soluble of lime juice

Treatment	7 days	14 days	21 days
T_0	7.07	7.33	3.57
T_1	7.00	6.00	2.47
T_2	7.00	7.43	3.57
T_3	7.40	7.67	3.03
T_4	7.00	6.73	3.77
T_5	6.47	8.13	3.40
T_6	7.10	7.77	3.27

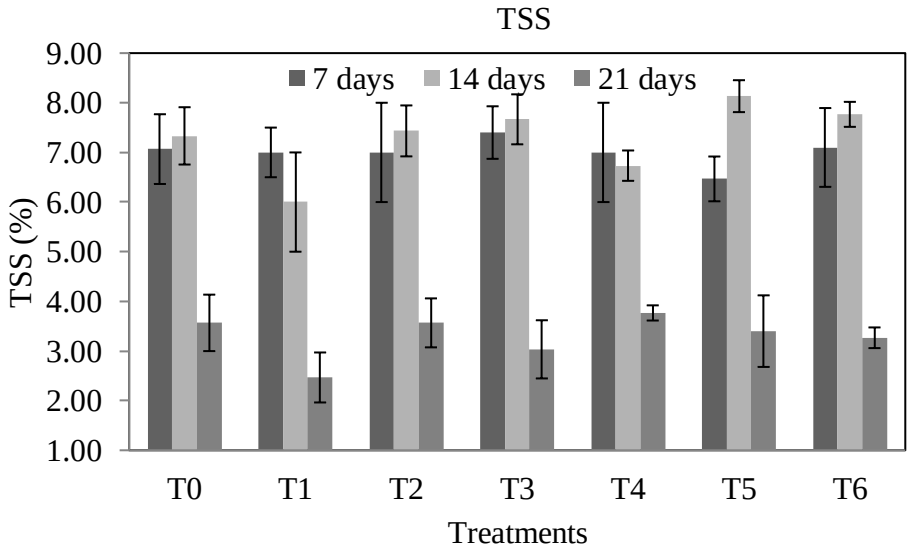

Table.9 Effect of different surface coating on juice percentage of lime

Treatment	7 days	14 days	21 days
T_0	32.63	27.63	18.83
T_1	47.50	40.63	34.03
T_2	37.37	26.23	22.37
T_3	40.43	33.87	23.00
T_4	40.20	34.19	26.20
T_5	36.00	26.93	19.98
T_6	34.73	26.47	19.13

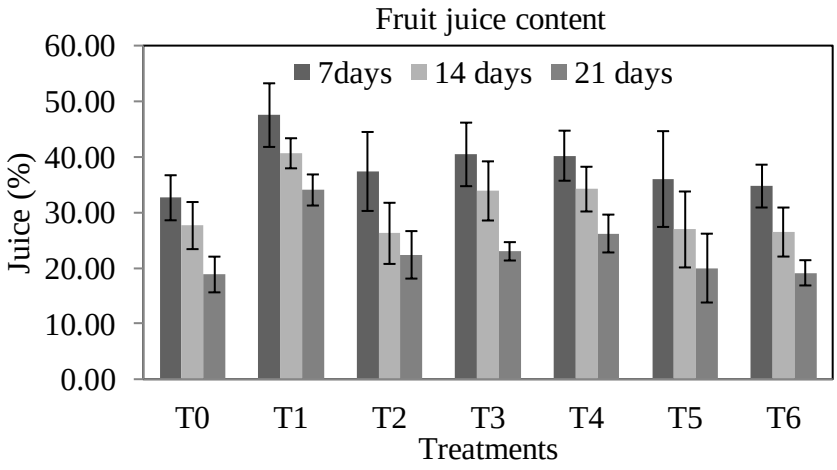

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Table.10 Effect of different surface coating treatment on acidity percentage of lime juice

Treatment	7 days	14 days	21 days
T_0	9.26	11.51	7.25
T_1	3.567	6.37	5.45
T_2	3.73	6.72	6.02
T_3	7.6	6.58	6.77
T_4	7.56	6.56	6.84
T_5	10.6	9.37	4.92
T_6	10.1	8.43	5.62

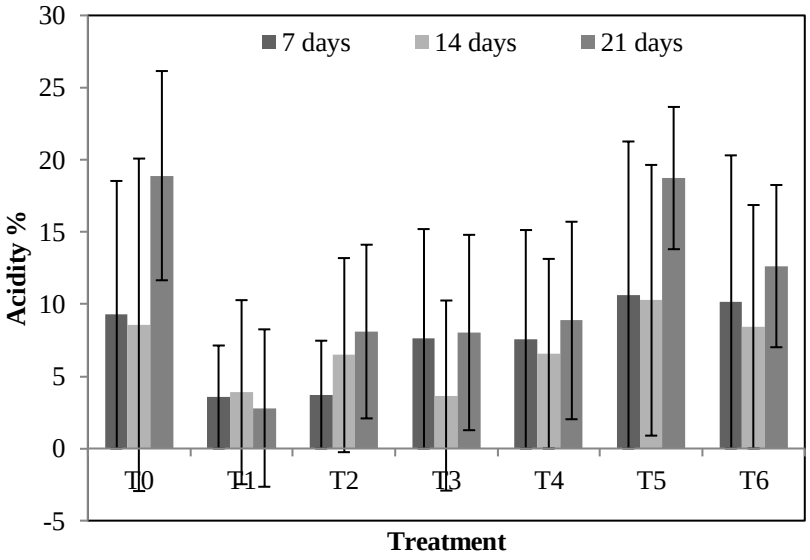


Table.11 Effect of different surface coating treatment on ascorbic acid of lime juice of fruit

Treatment	7 days	14 days	21 days
T_0	44.56	40.96	38.16
T_1	48.05	45.2	41.96
T_2	43.8	41.5	38.4
T_3	44.9	42.16	39.16
T_4	44.2	40.96	38.46
T_5	39.8	36.86	33.6
T_6	42.43	40.26	37.4

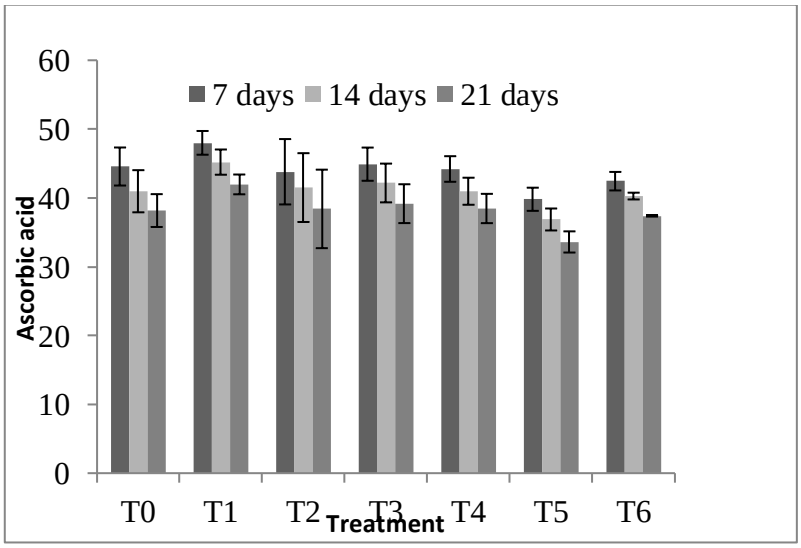
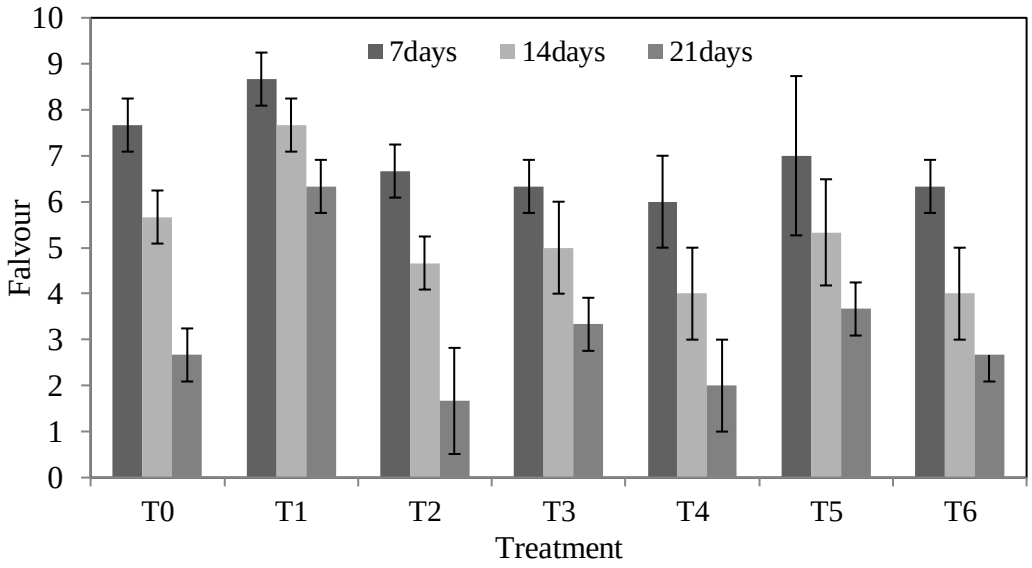


Table.12 Effect of different surface coating treatment on flavour of lime

Treatment	7 days	14 days	21 days
T_0	7.6	5.6	2.6
T_1	8.6	7.6	6.3
T_2	6.6	4.6	1.6
T_3	6.3	5	3.3
T_4	6	4	2
T_5	7	5.3	3.6
T_6	6.3	4	2.6



IV. CONCLUSIONS

It was observed in present investigation that most of the physical (Physiological weight loss, marketable, unmarketable, fruit length, fruit width and rind thickness) and chemical parameters (TSS, acidity, ascorbic acid, pH of juice and juice percentage) of fruit were significantly and positively influenced by coconut oil coating up to 21 days of storage. Hence, coating of lime fruits with pure coconut oil is useful for extending their shelf life and effective in stabilizing the market demand. Whereas, soybean oil and linseed oil coating exhibited lesser post harvest life due to appearance of brownish spots on the surface of fruit ultimately which deteriorated the physico-chemical composition of the fruit. In case of occurrence of microbial population on surface of fruits it was observed that pure coconut oil delay the appearance of moulds upto 21 days of storage while untreated fruits were affected by mould after 14 days of storage.

REFERENCES

[1]. Piyush Verma, LK Dashora (2000) Post harvest physiconutritional changes in kagzi limes treated with selected oil emulsions and diphenyl. Plant Foods for Human Nutrition 55 (4), PP. 279-284.
[2]. Mahajan BVC, Singh G. Effect of 1-methylcyclopropene (1-MCP) on storage life and quality of winter guava fruits. *J Food Sci Technol*. 2008;45:537–539.
[3]. Jitendra Singh Shivran, LN Bairwar, MR Choudhary, RK Jat, Asha Jat, Mahendra Yadav (2020) Effect of post-harvest treatments on physiochemical properties of Indian jujube during ambient and cold storage conditions. Current Journal of Applied Science and Technology, PP. 430-438.
[4]. PK Bhola, SK Jain (2017) Improvement in shelf life of strawberry cv. winter dawn with edible coatings enriched with chitosan. Indian Horticulture Journal 7 (1), PP. 42-48.
[5]. Bisen A, Pandey SK, Joushwa JE (2008) Effect of gamma irradiation, growth retardant and coatings on storability of lime fruits. Asian J Hort 25: PP. 159-163.
[6]. Nadeem Akhtar Abbasi, Zafar Iqbal, Mehdi Maqbool, Ishfaq Ahmad Hafiz (2009) Postharvest quality of mango fruit as affected by chitosan coating. Pak. J. Bot 41 (1), PP. 343-357.