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Influence of Various Oil Coatings on the Shelf Life of Guava cv. Allahabad Safeda

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ABSTRACT

The present investigation entitled "Influence of various oil coatings on the shelf life of guava fruit cv. Allahabad safeda" was conducted in the Laboratory of Department of Horticulture, Khalsa College, Amritsar during the year 2017-18to find out suitable coating for extension of shelf life of guava. The fruits were harvested at the maturity at colour break change from green to scant yellow. Present experiment was laid out in Factorial Randomized Block Design (RBD factorial) with twelve treatments replicated three times viz. T_1 (Rice bran oil + Ambient condition), T_2 (Olive oil + Ambient condition), T_3 (Coconut oil + Ambient condition), T_4 (Cinnamon oil + Ambient condition), T_5 (Palm oil + Ambient condition), T_6 (Untreated + Ambient condition), T_7 (Rice bran oil + Cold storage), T_8 (Olive oil + Cold storage), T_9 (Coconut oil + Cold storage), T_{10} (Cinnamon oil + Cold storage), T_{11} (Palm oil + Cold storage), T_{12} (Untreated + Cold storage). Quality evaluation was done to find out suitable oil coating for guava fruits. The results of the study revealed that the guava fruits treated with (T_8) olive oil coating at cold storage conditions were selected as better performed treatments in extending the shelf life of guava (32 days in cold storage and 16 days at ambient conditions) than cinnamon oil (8 days in cold storage and 4 days at ambient conditions) and caused minimum changes in physiological weight loss, retained fruit color, better organoleptic quality, maximum TSS, and ascorbic acid content as compared to cinnamon oil and other treatments.

Key words: *Ambient, Oil coatings, Shelf life, Quality, Cold storage.*

INTRODUCTION

Guava (*Psidium guajava* L) is also known as apple of tropics or the poor man's fruit. It belongs to the family Myrtaceae and occupies fourth position in terms of area and production among fruit crops of India[14]. It is one of the most common and major fruit of India and considered the 4th most important fruit in area and production after mango, citrus and banana[11]. It is indigenous to tropical America stretching from Mexico to Peru[1]. The flavor of guava is sweet, musky and ripe fruit is aromatic to a high degree[10]. It is rich in antioxidant pigments namely carotenoids and polyphenols, giving them relatively high dietary antioxidant value among plant foods.

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Besides, its use as a desert fruit it is stewed and used in short cakes, puddings, sauce, ice cream, butter, marmalade and pies. It is also processed into puree juice, concentrate, jam, jelly, nectar or syrup[6]. There is an increasing demand of fruits for fresh as well as processing purpose in domestic and international markets[2]. Guava fruit becomes fully ripe between three to five days at room temperature. The control of fruit ripening is fundamental due to such perishability, for increasing shelf life after harvest. The replacement of the traditional chemical fungicides by edible oils and other coatings is a favourable factor for the acceptance of agricultural products in the international market due to the strict regulations on the chemical use for food production[13]. Panday *et al.*[12] reported that treatment of guava fruits with coconut oil coating was found significantly effective in increasing the post harvest life of fruits for 12 days over control without adversely affecting the fruit quality. Coating of fruits with some safe coating materials or some oils may reduce physical weight loss (PLW), loss of moisture and retained better quality for long time. In this context the present study was planned to develop an edible coating of various oils to be used for the shelf life of guava cv. Allahabad safeda.

MATERIAL AND METHODS

The present investigation entitled **"Influence of various oil coatings on the shelf life of guava fruit cv. Allahabad safeda"** was conducted in the Laboratory of Department of Horticulture, Khalsa College, Amritsar during the year 2017-18. The material used for the present experiment were freshly harvested mature guava fruits of cv. Allahabad safeda. The guava fruits of uniform size, disease and bruise free were picked randomly from all the four directions of the plants with the help of secateurs at physiological mature stage and collected in plastic crates from the guava orchard of Khalsa College and were immediately transferred to the laboratory of Department of Horticulture, Khalsa College Amritsar. In the laboratory, the fruits were sorted, graded and washed with water. Thereafter fruits were divided into requisite lot for further handling. In the present study, five types of coatings viz. Rice bran oil, coconut oil, olive oil, cinnamon oil and palm oil were used for application on guava fruits. Present experiment was laid out in Factorial Randomized Block Design (RBD factorial) with twelve treatments replicated three times viz. T_1 (Rice bran oil + Ambient condition), T_2 (Olive oil + Ambient condition), T_3 (Coconut oil + Ambient condition), T_4 (Cinnamon oil + Ambient condition), T_5 (Palm oil + Ambient condition), T_6 (Untreated + Ambient condition), T_7 (Rice bran oil + Cold storage), T_8 (Olive oil + Cold storage), T_9 (Coconut oil + Cold storage), T_{10} (Cinnamon oil + Cold storage), T_{11} (Palm oil + Cold storage), T_{12} (Untreated + Cold storage). The fruits were analyzed after every 4 days both at ambient and in cold storage conditions up to the last stage of shelf life of fruits for different physical and biochemical constituents. Fruits were coated with edible coatings of rice bran oil, coconut oil, olive oil, cinnamon oil , palm oil and control were kept on trays. For the application of coatings on the fruits, a piece of foam pad was drenched with particular coating material and coating was applied gently on the surface of fruits. Thereafter fruits were air dried. The edible coated guava fruits were stored at different storage conditions *i.e.* at ambient and in cold storage conditions. Changes in different parameters namely weight loss, total soluble solids, and ascorbic acid content were investigated.

RESULTS AND DISCUSSION

Physiological loss in weight (%)

Minimum PLW (0.42%) was recorded in the T_8 *i.e.* olive oil coating while it was maximum (0.81%) recorded in T_4 *i.e.* cinnamon oil under

cold storage conditions which was more than untreated fruits which generated PLW of 0.69 per cent. Similar pattern was observed under ambient storage conditions after 32 days of storage. A perusal of the data clearly explains the positive effect of olive oil coating in reducing the PLW of guava fruits because edible oil coating served as semi permeable membrane around fruit surface and prevented cellular disintegration by maintaining protein and nucleic acid synthesis thus delaying senescence. Also it helped in lowering the respiratory rates and maintained tissue rigidity, checking moisture loss from fruit surface. The present findings are supported by Wijewardane[16] who stated that the coatings consisting of edible oil was found effective in reducing the PLW. Minimum reduction in PLW of guava coated with olive coating was probably due to maintenance of maximum moisture content around the surface of the fruit etc. along with storage having high humidity and cold storage conditions. The composite oil coating preserves the quality of fruit retarding ethylene emission and hence reduces PLW in pineapple fruits[15]. Similar results were also reported by Jagadeesh *et al.*[9] in guava fruits.

Fruit colour

It was observed that the maximum mean retention of excellent fruit colour (7.84) was found in fruits treated with olive oil (T_8) followed by (T_7) , (T_9) and (T_{11}) with 6.15, 4.85 and 4.29 hedonic rating with the minimum colour rating of 1.86 in cinnamon oil coating(T_{10}) which proved to be inferior than untreated conditions accounting to 3.23 ratings. Similar trend was followed in ambient conditions.Edible oil coating of olive oil proved effective than others in retaining the colour of the fruits by inhibiting degradation of chlorophyll of the fruits and increased synthesis of carotenoides and anthocyanin pigments or probably have senescence delaying action by blocking the point of attack by ethylene.The present findings were supported by Singh *et al.*[14]. In research work of Panday *et al.*[12] the highest fruit colour rating was observed in guava fruits coated with edible coating of coconut oil. It is evident from the data that the score of fruit colour decreased with increased storage period. Excellent fruit colour (9.00) was recorded on day of harvest irrespective of coatings respectively. The minimum score of fruit colour (0.98) and (0.57) was observed after 32 days of cold storage respectively. The colour of fruits exhibited downward trend, with the storage period due to cell wall changes. Improvement in fruit colour might be due to degradation of chlorophyll of the fruits and increased synthesis of carotenoids and anthocyanin pigments. These results coincides with the findings of Singh *et al.*[14].

Oraganoleptic rating (1-9 scale)

The maximum organoleptic rating was recorded in fruits treated with olive oil (7.43) closely followed by T_7 (6.08), T_9 (4.77) and T_{11} (4.06) respectively. Minimum organoleptic rating (1.00) was recorded in cinnamon oil treated fruits. Similar trend was obtained under ambient conditions with rating of 3.52, 3.21 and 2.50 in T_2, T_1 and T_3 respectively. Minimum rating was in the fruits treated with cinnamon oil (T_4) to the tune of 1.00 which was lower than control with rating of 2.06.This might be possibly due to the retarded rates of ripening and softening of the fruits. Also, the fruits treated with olive oil developed better juiciness flavor, texture, high TSS and total sugars due to which the fruits acquired higher organoleptic rating. These olive and rice bran oil treatments helped to check the shrivelling ageing and maintained the firmness of fruits by thickening of middle lamella of cell wall owing to increased formation and deposition of pectic substances. The present findings were supported by Singh *et al.*[14]. Wijewardane[16] reported that treatment T_1 *i.e.* wax formula and distilled water 1:1 was above the point 'like very much' which correspond to number 4 of the 5 point hedonic scale. It is evident from the data that with advancement

of storage period there is progressive decrease in organoleptic rating. High palatability rating (9.00) was recorded on day of harvest irrespective of coatings respectively. Lower organoleptic rating (0.97 and 0.62) was recorded after 32 days of storage respectively. Organoleptic rating of guava fruits decreased with increased storage interval under all the treatments. It might be due to the fact that colour, taste, flavor and physical conditions of the fruits deteriorated with the advancement of storage period due to ageing and utilization of various constituents within the fruits due to increased rate of respiration. The decreased organoleptic rating might be ascribed to certain bio-chemical changes in pear pulp which increased after prolonged storage the butter and juicy textures of the ripened pear fruits points out a possible involvement of cell wall substances and their degrading enzymes (pectinestrase and poly galacturonase) in the ripening process during storage as viewed by Singh *et al.*[14]. Similar results were observed by[12] who observed that maximum acceptability in terms of taste was retained by coconut oil coating without any objectionable change up to 8 days of storage. Dashora and Mohammed[5] reported that wax coated mosambi fruits retained good fruit quality. This corroborates with the findings of Dhaka *et al.*[7] in mango fruits.

Total soluble solids (°Brix)

The fruits subjected to cinnamon oil treatments (T_{10}) recorded significantly lower total soluble solids (2.63 ^{0} Brix) than control with TSS of (6.35^0 Brix). However, significantly higher TSS (10.21^0 Brix) was recorded in the fruits coated with olive oil (T_8) followed by T_7 and T_9 with 9.71 and 9.67^0 Brix. These were at par with each other under controlled conditions where as under ambient conditions similar sequence was noticed with maximum TSS of 5.87 and minimum 1.06^0 Brix under T_2 and T_4.The above results might be attributed to the reason that coating of olive oil retarded the ripening and senescence processes and simultaneously reduced the conversion of starch into sugars along with rice bran coating as both acted as antisenescent agents.. Present investigations are in agreement with those of Panday *et al.*[12] who observed that maximum TSS was recorded in coconut oil coating and was found to be significantly superior to control. This corroborates the findings of Chandra[3] that the physico-chemical parameters increased up to 8 days in guava fruits under storage. Similarly the increase in TSS due to coating was reported by Das and Medhi[4]. Continuous increase in TSS was observed in the fruits treated with the coating solution mixed with water in 1:1 ratio[16]. When conversion is lower than the utilization a decrease of TSS can be seen[8]. The total soluble solids (TSS) increased during storage upto 8thday of storage and slightly declined thereafter. The increase in TSS content during storage might be due to the moisture loss, hydrolysis of polysaccharides and concentration of juice as a result of degradation. The TSS increased upto 12 days under cold storage and declined thereafter which can be attributed to the fact that on complete hydrolysis of starch no further increase in TSS occur and consequently a decline in TSS is predictable as they are the primary substrate for respiration.

Ascorbic acid

The data pertaining to the ascorbic acid of guava was affected by different edible coating materials and storage conditions depicted that the various edible coating treatments showed a significant influenced in ascorbic acid. After 32 days of storage, maximum ascorbic acid (239.73) was found in T_8 *i.e.* olive oil coating in cold storage conditions. Whereas minimum ascorbic acid (21.11) was found in T_4 *i.e.* cinnamon oil coated guava fruits stored ambient storage conditions.

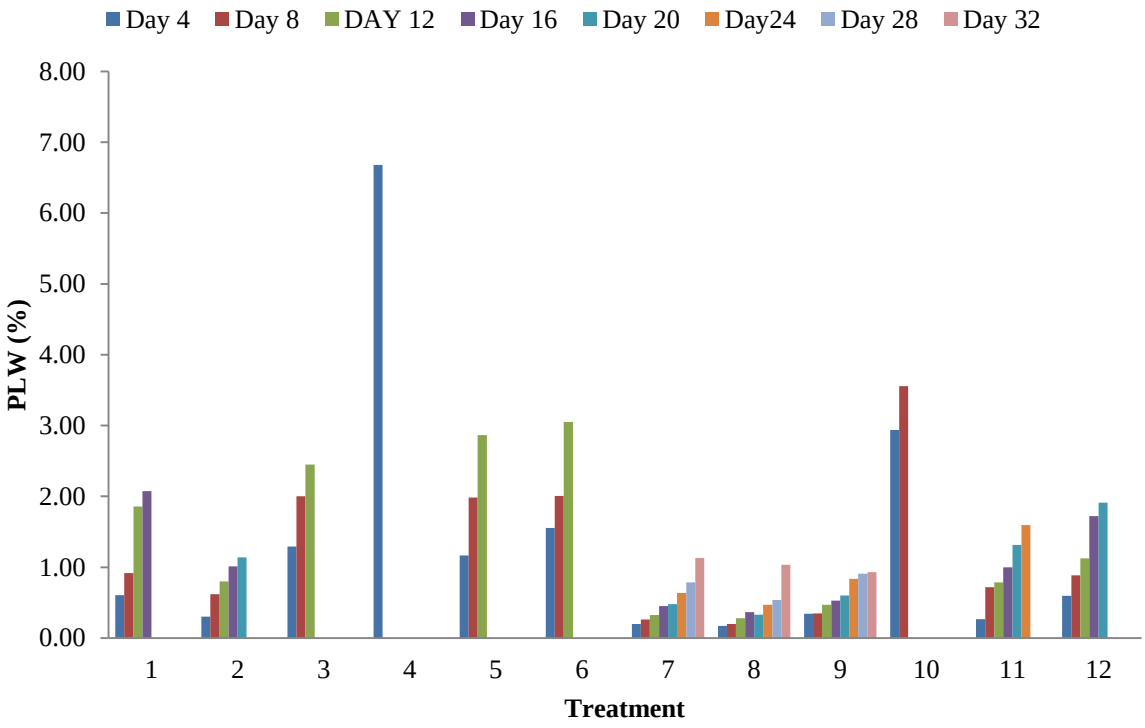

Fig. 1: Influence of various oil coatings on PLW (%) in guava cv. Allahabad safeda

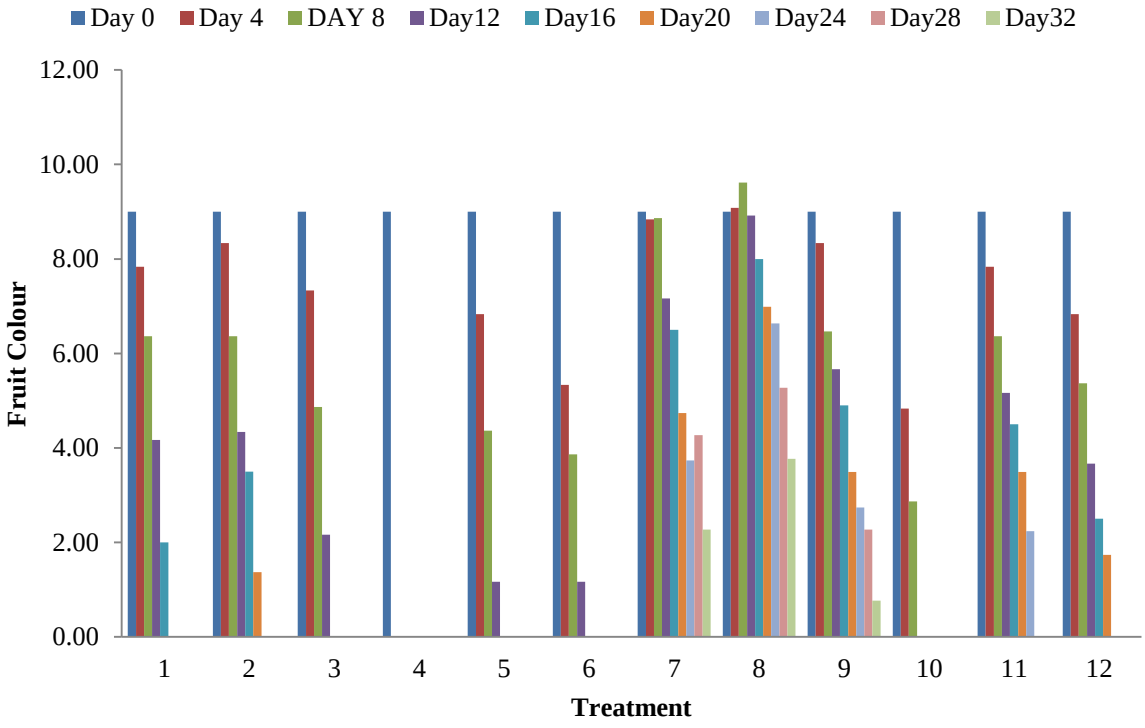

Fig. 2: Influence of various oil coatings on fruit colour in guava cv. Allahabad safeda

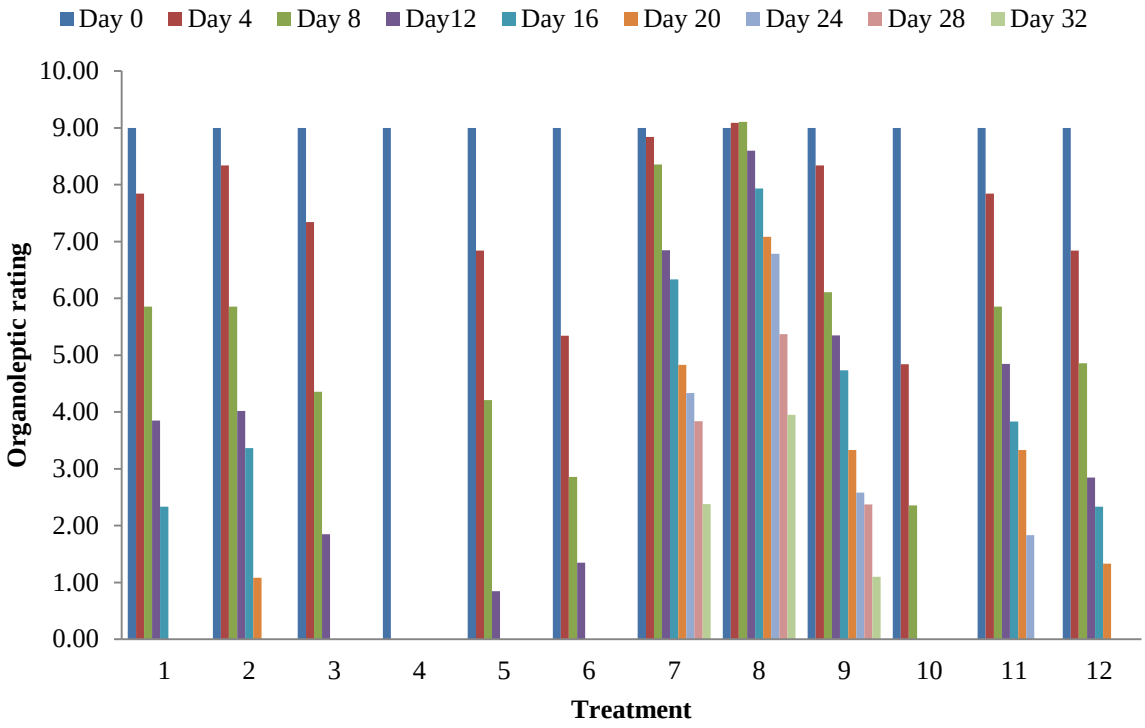

Fig. 3: Influence of various oil coatings on organoleptic rating in guava cv. Allahabad safeda

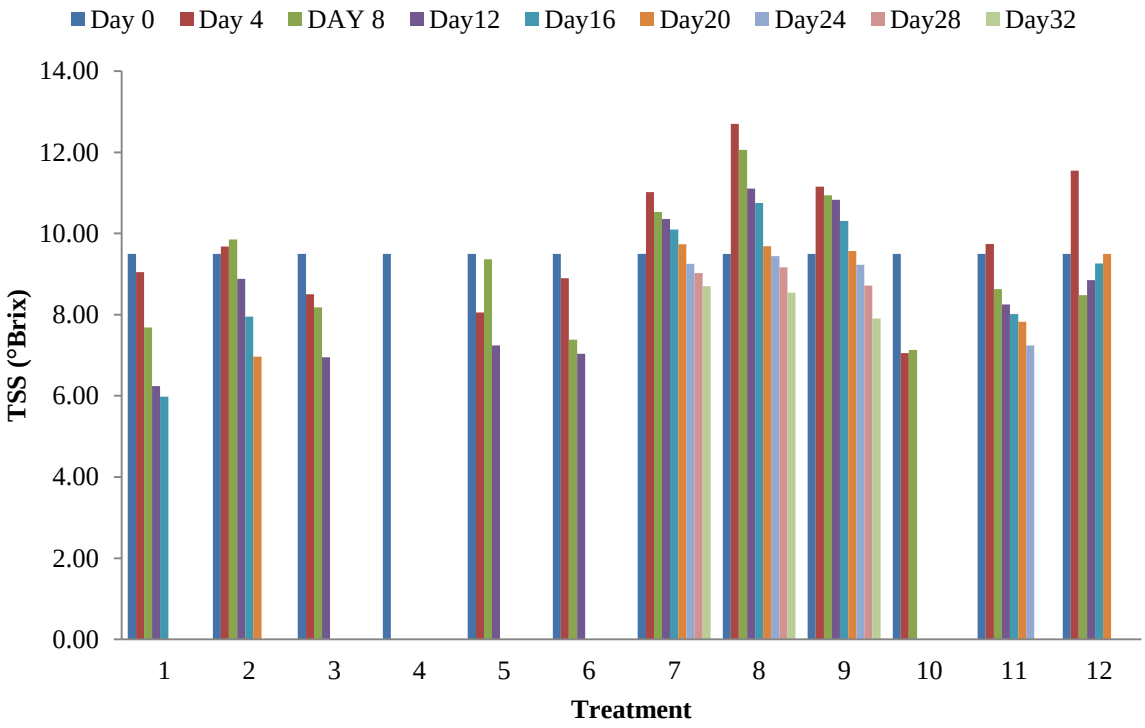

Fig. 4: Influence of various oil coatings on TSS (°Brix) in guava cv. Allahabad safeda

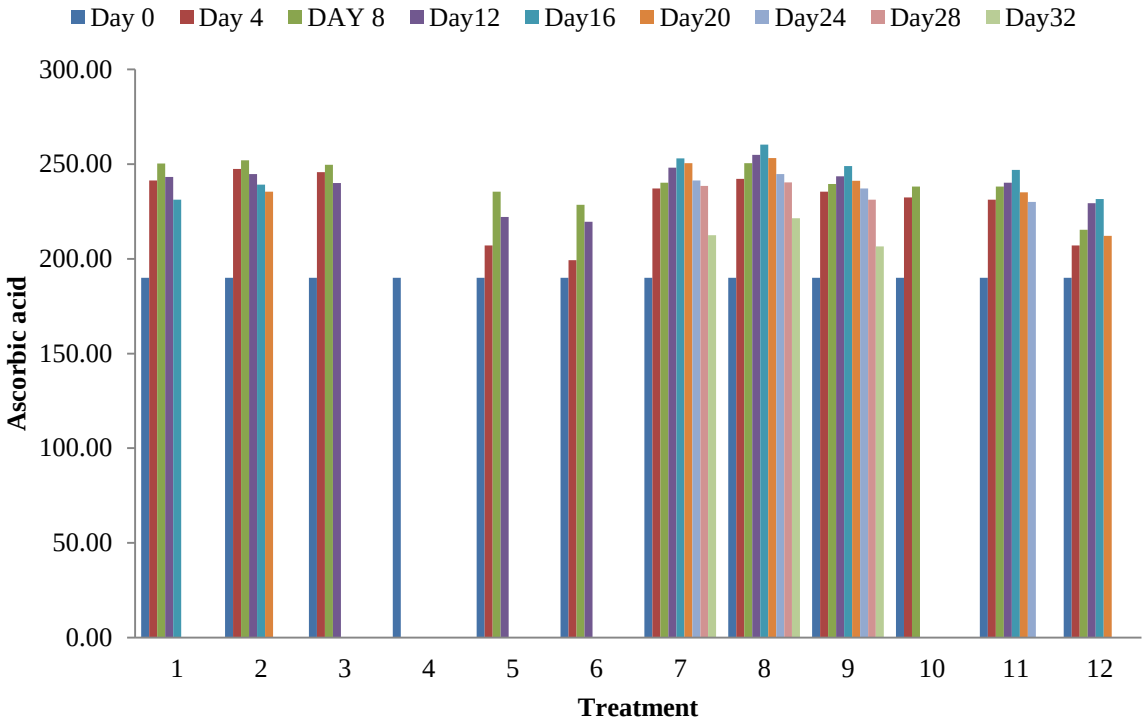

Fig. 5: Influence of various oil coatings on Ascorbic acid in guava cv. Allahabad safeda

CONCLUSION

It is concluded from the present study that the application of different edible oil coating and storage conditions not only improve the quality and post harvest life of fruits but they are also eco-friendly. The present study suggests that among the different edible oil coating treatments and storage conditions, the treatment with coating of guava fruits with olive oil and stored in cold storage conditions had minimum physiological loss in weight, maximum fruit color rating, and better organoleptic quality as compared to control and other treatments. The application of olive oil coating both in ambient and cold storage conditions seems to hold promise and considered the most benefit tested one in extending the shelf life and quality of guava.

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