The present investigation entitled, “Effect of various post harvest treatment on extending shelf life of pomegranate (Punica granatum L.) fruits cv. PHULE ARAKTA with three post harvest treatment and two storage conditions was conducted in the year 2005-06 with three replication in Factorial Completely Randomised Design (F.C.R.D.). The treated fruits of pomegranate cv. PHULE ARAKTA was stored at room temperature 22.17 to 24.36°C, 52.0 to 82.0 % RH and in cool store (8°C, 90.0 to 95.0 % RH). In all post harvest treatments, the treatment cool store and room temperature showed the trends of rise and falls in TSS, decrease in acidity and juice content with increasing physiological loss in weight, irrespective of storage conditions. The present study made it clear that pomegranate fruits coated with waxol + carbendazim (0.1 %) had great significance in retaining of physico-chemical characteristics and reducing the wastage during post harvest storage. The problem of fruit growers and handlers may be solved by adopting packaging material like CFB boxes along with simple post harvest treatment of wax coating and fungicides to fruit and use of cool store. The shelf life of pomegranate fruits was extended upto 50 days in case of variety Phule Arakta when treated with waxol + carbendazim (0.1 %) in cool store. The shelf life of pomegranate fruit was extended upto 24 days in case of Phule Arakta variety at room temperature storage when treated with waxol + carbendazim (0.1 %). To conclude, it may be stated that the storage of pomegranate fruit in cool store with dipping treatment of waxol + carbendazim 0.1 % should be recommended.

Pomegranate fruit has poor processing quality, therefore, mainly used for table purpose only. Under these circumstances, handling and marketing become important to sustain its increasing area and production for providing remunerative prices to farmers.

The post harvest losses in pomegranate occur due to lack of proper packing material and improper handling during long transport. Extension of shelf life can be possible by checking the rate of respiration, transpiration and microbial infection. No systematic studies have so far been carried out on extending the shelf life of pomegranate fruit by giving simple post harvest treatment like use of wax coating with fungicidal dip, packing in corrugated fibre board (CFB) boxes and storage in cool store.

**MATERIALS AND METHODS**

The experiment was conducted in AICRP on Arid Zone Fruits, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri in Ahmednagar District (M.S.) under APEDA project during the year 2004-05.

**ABSTRACT**

The present investigation entitled, “Effect of various post harvest treatment on extending shelf life of pomegranate (Punica granatum L.) fruits cv. PHULE ARAKTA with three post harvest treatment and two storage conditions was conducted in the year 2005-06 with three replication in Factorial Completely Randomised Design (F.C.R.D.). The treated fruits of pomegranate cv. PHULE ARAKTA was stored at room temperature 22.17 to 24.36°C, 52.0 to 82.0 % RH and in cool store (8°C, 90.0 to 95.0 % RH). In all post harvest treatments, the treatment cool store and room temperature showed the trends of rise and falls in TSS, decrease in acidity and juice content with increasing physiological loss in weight, irrespective of storage conditions. The present study made it clear that pomegranate fruits coated with waxol + carbendazim (0.1 %) had great significance in retaining of physico-chemical characteristics and reducing the wastage during post harvest storage. The problem of fruit growers and handlers may be solved by adopting packaging material like CFB boxes along with simple post harvest treatment of wax coating and fungicides to fruit and use of cool store. The shelf life of pomegranate fruits was extended upto 50 days in case of variety Phule Arakta when treated with waxol + carbendazim (0.1 %) in cool store. The shelf life of pomegranate fruit was extended upto 24 days in case of Phule Arakta variety at room temperature storage when treated with waxol + carbendazim (0.1 %). To conclude, it may be stated that the storage of pomegranate fruit in cool store with dipping treatment of waxol + carbendazim 0.1 % should be recommended.

**Experimental details :**

The experiment was conducted in Factorial Completely Randomised Design (FCRD) with three post harvest treatments and two storage conditions and treatment were replicated three times.

<table>
<thead>
<tr>
<th>Main treatment</th>
<th>Sub treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wax-coating (W-0-9) (T₁)</td>
<td>1. Cool store (S₁)</td>
</tr>
<tr>
<td>2. W-O-9 + carbendazim 0.1 % (T₂)</td>
<td>2. Room temperature (S₂)</td>
</tr>
<tr>
<td>3. Control-T₃</td>
<td></td>
</tr>
</tbody>
</table>

**Treatment combination : 06**

**Wax coating :**

Wax emulsion (9 %) solution was prepared in a plastic drum and the fruits were dipped in it for 40 to 60 seconds. Fungicidal treatment was given by dissolving the respective fungicide into wax emulsion. Wax emulsion does not leave only residue or import undesirable odour of flavour interfere with the natural appearance of fruit and its quality (Dalal et al.,1971).

**Packaging :**

The fruit were then packed in export quality...
corrugated fibre board (CFB) boxes of size 15 x 11 x 4 inches. Effective use of CFB boxes for storage and transport has been reported by Waskar and Garande (1997) for pomegranate.

**Juice per cent :**
Juice percentage was calculated by following formula:

\[
\text{Juice (\%)} = \frac{\text{Weight of juice extracted}}{\text{Weight of fruit}} \times 100
\]

**Acidity :**
Acidity of juice was determined by as per method advocated by A.O.A.C. (1975).

**Total soluble solids :**
It was determined by temperature, correlation chart A.O.A.C. (1975).

**Physiological loss in weight (PLW \%) :**
The fruits were weighted at 4 days interval at RT and 10 days interval in CS fruit and PLW was calculated by noting the difference between initial and subsequent weight and it was expressed as percentage.

\[
\text{PLW (\%)} = \frac{\text{Initial weight – Final weight}}{\text{Initial weight}} \times 100
\]

**Organoleptic evaluation :**
The organoleptic evaluation for assessing the colour, flavour and texture was done by a panel or judges using a 9 point Hedonic scale (Amerine et al., 1965).

**Pathological studies :**
The fruits were observed daily for microbial infection. The infected material was isolated, cultured and organisms associated were identified.

**Statistical analysis :**
Analysis of variance for all the characters except organoleptic evaluation and physiological loss in weight was done as per the methods suggested by Gomez and Gomez (1984).

**RESULTS AND DISCUSSION**
The results obtained from the present investigation have been discussed under following heads:

**Juice content :**
From data in Table 1. It was observed from statistical analysis that with the advancement of storage period, there was a significant decrease in juice content of pomegranate fruit of variety Phule Arakta. Juice content of control fruits decreased at faster rate than all treatments. At the beginning of storage, the juice content of pomegranate fruit was found to be 60.37 per cent.

At the end of 40\textsuperscript{th} day in RT juice content was the lowest 47.83 \% in control fruit T\textsubscript{S\textsubscript{1}}, while highest 49.63 per cent in fruit treated with waxol + carbendazim (T\textsubscript{S\textsubscript{2}}). The fruit treatment T\textsubscript{S\textsubscript{1}} and T\textsubscript{S\textsubscript{2}} had significantly low juice content as compared to T\textsubscript{S\textsubscript{3}}. At the end of 60\textsuperscript{th} day of storage period in CS, the juice content was found to be lowest 47.08 \% in control fruits (T\textsubscript{S\textsubscript{1}}) while the highest 48.50 \% in fruit treated with waxol T\textsubscript{S\textsubscript{1}}. The fruits of treatments T\textsubscript{S\textsubscript{1}} and T\textsubscript{S\textsubscript{2}} had significantly low juice content as compared to T\textsubscript{S\textsubscript{3}}. Similar result were observed in pomegranate fruits by Salunkhe and Desai (1984) and Koksal (1989).

**Acidity :**
The data from Table 1 revealed that, acidity of pomegranate fruit was found to be highest at the time of storage and it decreased with advancement of storage period. It was also observed that with advancement of the storage period, the acidity content of control fruits decreased at faster rate than other treatments. Initially, acidity of pomegranate fruit was found to be 0.39 \%.

At the end of 40\textsuperscript{th} day of storage period in RT the acidity of pomegranate fruits was found to be lowest 0.203 \% in control fruit T\textsubscript{S\textsubscript{1}}, while highest 0.240 % of fruit treated with waxol + carbendazim T\textsubscript{S\textsubscript{2}}. The fruit treatment T\textsubscript{S\textsubscript{1}} and T\textsubscript{S\textsubscript{2}} had significantly low acidity as compared to T\textsubscript{S\textsubscript{3}}. At the end of 60\textsuperscript{th} day of storage period in CS the acidity of pomegranate fruits was found to be lowest 0.193 \% in control fruit T\textsubscript{S\textsubscript{1}} while highest 0.227 \% of fruit treated with waxol + carbendazim T\textsubscript{S\textsubscript{2}}. The treatment T\textsubscript{S\textsubscript{1}} and T\textsubscript{S\textsubscript{2}} had significantly low acidity as compared to T\textsubscript{S\textsubscript{3}}.

Koksal (1989) carried out research work on post harvest behaviours of pomegranates (cv. GOK BACHE) under different conditions of storage and reported that, depending upon the temperature and duration the titrable acidity (1.44 \%) decreased throughout the period of storage.

**Total soluble solids (\%) :**
From Table 2 it was obvious that with advancement of storage period, there was a significant increase in TSS of pomegranate fruit till it reached the peak followed by a slight decline at the end of storage period. TSS of the control fruits increased at faster rate than fruits treated with waxol and carbendazim.

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At the beginning of the storage, the TSS of pomegranate fruit was found to be 13.31 per cent. In case of CS and RT the TSS was increasing upto 40th days and 20th days, respectively after that it started again decreasing in both store conditions.

At the end of 40th day in R. T. TSS was found lowest 13.37 % in control T₃S₁ and highest 13.97 % when fruit treated with Waxol + carbendazim 0.1 %.

The fruits of treatment T₃S₁ and T₃S₂ had significantly low TSS as compared to T₃S₁. Similar reports also given by Baviskar (1993), Padule and Keskar (1989).

### Physiological loss in weight (%):

It is clear from the figures in Table 2 that with advancement of storage period during RT and CS, the per cent physiological loss in weight of pomegranate fruits increased at both storage conditions. In RT conditions

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physiological loss in weight in control fruit $T_1S_2$ was highest (7.9%) and lowest 7.0% when fruits treated with waxol + carbendazim 0.1% $T_2S_2$. The $T_3S_2$ treatment proved to be superior over fruits treated with waxol ($T_1S_2$).

It is also clear from data that in case of CS physiological loss in weight in waxol treated fruits was highest 9.4% $T_1S_1$ and lowest 8.9 in fruit treatment with waxol + carbendazim 0.1%.

From the data of post harvest treatments and storage conditions both had significant effect on per cent loss of pomegranate fruits throughout the storage period, but the rate of loss of weight of pomegranate fruits was found to be faster at RT then in CS storage conditions.

The interaction between post harvest treatment and storage condition was also found to be significant for per cent physiological loss in weight of pomegranate fruit. Koksal (1989) reported the same result that there was continuous decrease in weight of pomegranate fruit.

Organoleptic evaluation and microbial count:

From Table 3, it is clear from data, that the shelf life of the fruits stored in CS was better than at RT store fruits. At RT, the shelf life of pomegranate fruits of Phule Arakta could be extended upto 24 days with application of wax coating along with carbendazim (0.1%). In case of CS the shelf life of pomegranate fruits could be extended upto 50 days in CS storage when coated with Waxol + carbendazim $T_2S_2$.

The organoleptic rating of the fruits in terms of colour, flavour and texture was maximum in fruits coated with waxol + carbendazim 0.1% $T_2S_2$ and $T_2S_1$ at the termination of storage period.

At the end of storage period of 24 days at RT, the highest score 6.32 was obtained by fruit coated with waxol + carbendazim $T_2S_1$ followed by 5.85 and 5.34 under $T_1S_2$ and $T_1S_1$ treatments, respectively.

Similarly, at the end of storage period of 50 days in CS, the highest score 7.50 was obtained by fruits treated with Waxol + carbendazim followed by 7.18 and 6.75 under $T_2S_2$ and $T_1S_2$, treatments, respectively. The storage life of fruits treated with waxol + carbendazim 0.1% was found to be maximum and fruits remains fresh, acceptable and disease free under both storage condition.

The highest percentage of pathogen were found in control fruits $T_1S_1$ and $T_2S_1$ followed by fruit treated with waxol $T_1S_1$, $T_1S_2$, and $T_2S_1$, respectively.

The pathogen responsible for spoilage at RT were Aspergillus niger and while in CS Aspergillus niger and Penicillium spp.

It is also found that fruits treated with Waxol + Carbendazim 0.1% controlled the attack of these microorganisms completely.

The results obtained in present study of storage of pomegranate fruit were in conformity with the observation of Elyatem and Kader (1984).

| Table 3 : Effect of post harvest treatments on shelf life and organoleptic evaluation of pomegranate fruit of Phule Arakta at cool store (CS) and in room temperature (RT) |
| --- | --- | --- | --- | --- |
| Treatments | Shelf life days | Organoleptic score | Colour | Flavour | Texture | Overall |
| CS | $T_1S_1$ | 40 | 6.80 | 7.55 | 7.20 | 7.18 |
| | $T_2S_1$ | 50 | 7.40 | 7.65 | 7.45 | 7.50 |
| | $T_3S_1$ | 28 | 6.30 | 7.20 | 6.75 | 6.75 |
| RT | $T_1S_2$ | 20 | 5.77 | 5.82 | 5.97 | 5.85 |
| | $T_2S_2$ | 24 | 6.35 | 6.28 | 6.32 | 6.32 |
| | $T_3S_2$ | 15 | 5.27 | 5.20 | 5.56 | 5.34 |

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REFERENCES


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