Harvest Time (stage) and Postharvest Storage Condition Effects on Pomegranate Fruit Quality

Harwinder S. Sidhu, Juan C. Díaz-Pérez, Dan MacLean

Pomegranate

• Bushy, dense multi stemmed, 10-12 feet.

Pomegranate

• Edible portion: Aril.
• Juice: Acidic to very sweet.
• Deciduous

Uses

• Fresh fruit
• Tea and Juice blends
• Nut mixes, Jellies
• Dry seeds

Pomegranates in Georgia

• Little known about Postharvest quality and storage potential of Local cultivars.
• Increase in production in recent years largely in response to consumer demand.
• Global production increase: fresh fruit and juice.

Experiment

• Studying the effects of harvest stage and storage conditions on the quality of fruit.
Experiment

- Harvest stages: Early (2nd week September) and Late (4th week September)
- Regular air and controlled air storage; 3 months; 5°C, 90-95% R.H.
- Controlled air: 3% O₂, 5% CO₂, 5 °C, 90% to 95% R.H

Fruit Evaluation

- Physical
  - Weight
  - Color (Colorimeter)
  - Skin smoothness (1-5)
  - Disease incidence: Cercoospora (0-3)
  - Sunscald (0-3)
  - Cracks, bruises (0-3)
**Juice evaluation**

- Standard 50 arils:
  - Weight
  - Juice weight
  - % Juice/weight

**Physiochemical**

- Total soluble solids (TSS) as % Brix with handheld refractometer.

**Physiochemical**

- Titratable acidity: titrated to pH 8.2 with Mettler Toledo automatic titrator.
- 0.5µl juice+25 ml distilled water
- Expressed as % acidity.

**Physiochemical**

- High performance liquid chromatography
- Anthocyanins content: HPLC by Agilent technologies

**HPLC**

- Zorbax Eclipse XDB-C18 column used.
- Measurements taken at 280, 320, 350, 378, 520 nm (nanometers).

**HPLC**

- 5% Formic Acid; Acetonitrile
- Injection method: 0.4ml/min @ 74 bar.

<table>
<thead>
<tr>
<th>Time</th>
<th>% Formic Acid</th>
<th>% Acetonitrile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td>19:00</td>
<td>85.0</td>
<td>15.0</td>
</tr>
<tr>
<td>20:00</td>
<td>80.0</td>
<td>20.0</td>
</tr>
<tr>
<td>21:00</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>24:00</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>24:01</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td>28:00</td>
<td>95.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Results and Discussion

• Harvest time very important

Storage condition effects

Take home message
• Controlled atmosphere storage beneficial in maintaining pomegranate fruit quality
• Decreases both fruit decay and the rate of degradation of juice constituents.
• Fruit maturity at harvest played an important role in determining fruit quality.
• Fruit harvested unripe had lesser total soluble solids, less acidity and lower phytonutrient (anthocyanins) concentration.