Raspberry Fruit Quality and Performance in Storage by Color Group

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Current PhD Research:
Apple Breeding: resistance to physiological disorders like scald and sunburn

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<table>
<thead>
<tr>
<th>Genotypes</th>
<th>Species</th>
<th>Berry Color</th>
<th>Fruiting Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td><em>R. idaeus</em> L.</td>
<td>Yellow</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Kiwigold</td>
<td><em>R. idaeus</em> L.</td>
<td>Yellow</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Caroline</td>
<td><em>R. idaeus</em> L.</td>
<td>Red</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Heritage</td>
<td><em>R. idaeus</em> L.</td>
<td>Red</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Mandarin</td>
<td><em>R. idaeus</em> L.</td>
<td>Red</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Prelude</td>
<td><em>R. idaeus</em> L.</td>
<td>Red</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>Spinefree Willamette</td>
<td><em>R. idaeus</em> L.</td>
<td>Red</td>
<td>Flori</td>
</tr>
<tr>
<td>8FFBBR</td>
<td><em>R. × neglectus</em> Peck</td>
<td>Purple</td>
<td>Flori, Primo</td>
</tr>
<tr>
<td>NY03-01</td>
<td><em>R. × neglectus</em> Peck</td>
<td>Purple</td>
<td>Flori</td>
</tr>
<tr>
<td>Royalty</td>
<td><em>R. × neglectus</em> Peck</td>
<td>Purple</td>
<td>Flori</td>
</tr>
<tr>
<td>Bristol</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
</tr>
<tr>
<td>Earlysweet</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
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<tr>
<td>Explorer</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori, Primo</td>
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<tr>
<td>Huron</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
</tr>
<tr>
<td>Jewel</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
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<tr>
<td>Munger</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
</tr>
<tr>
<td>Wes-04</td>
<td><em>R. occidentalis</em> L.</td>
<td>Black</td>
<td>Flori</td>
</tr>
</tbody>
</table>
**Temperature:** maximum, minimum, average

**Humidity:** maximum (night), minimum (day), average

**Solar radiation:** maximum, average

**Precipitation:** daily total
Berry firmness: 6 berries/plot

- Day 0
- Day 6, after storage at 5°C
6 other berries/plot, two sides each berry

- Day 0
- Day 6, after storage at 5°C

Konica Minolta colorimeter: $L^*$, $a^*$, $b^*$
Protectors:
• Antioxidant capacity
• Phenolics
• Anthocyanins

Flavor:
• SS/TA ratio
• Soluble solids
• Titratable acids
• pH
Ethylene and respiration
None of the berry color groups were significantly softer after cold storage.
Black and purple raspberries darkened in cold storage but red and yellow did not.

Yellow raspberries became more red and less yellow after 6 days in cold storage.
Red raspberries

• Tart, with lowest soluble solids and highest acidity SSC/TA = 6.85
• Intermediate antioxidant levels
• Intermediate firmness
• Bleed more when harvested after overcast, rainy days and a humid night
• Decay faster when harvested after hot, humid days
Yellow raspberries

• Less acidic than red raspberries
  SSC/TA=7.82
• Lowest antioxidant levels
• Among the most firm
• Bled the least, but bled more if harvested on an overcast day
• Decayed the fastest, especially when harvested on a cool, overcast, humid day
No correlation between rate of decay and rate of bleed.
### Correlation analysis

<table>
<thead>
<tr>
<th>Phenolics</th>
<th>72% (p&lt;0.0001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-ORAC</td>
<td>63% (p&lt;0.0001)</td>
</tr>
<tr>
<td>L-ORAC</td>
<td>62% (p&lt;0.0001)</td>
</tr>
<tr>
<td>Anthocyanins</td>
<td>53% (p=0.0002)</td>
</tr>
</tbody>
</table>

**Factor analysis**

- Dimension 1 (49.43%)
- Dimension 2 (19.13%)

**Correlation with decay rate**
Black raspberries

• Best ratio of soluble solids/acidity = 8.90
• Highest antioxidant levels
• Bleed the most, especially after rainy, humid, overcast days
• Decayed the least and unaffected by weather
Purple raspberries

• Antioxidants intermediate between red and black
• Sweet-Acid ratio between black and yellow = 7.73
• Least firm
• Bled like black raspberries, especially in cool weather
• Resisted decay like black raspberries, except with daytime humidity
Red and yellow raspberries gave off ethylene, peaking 5 days in storage.

Berries from all four color groups gradually decreased their respiration rates in storage.