Effects of hot water treatment on postharvest quality and shelf life of lime

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Lime (Citrus aurantifolia Swingle)
Heat treatments

- non-damaging physical treatments
- hot water, vapor heat and hot air
- delay ripening
- prevent insect pests and fungal rots

Introduction

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<th>Plant</th>
<th>Treatment</th>
<th>Storage</th>
<th>Result</th>
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<td>Lemon (Rodov et al., 1994)</td>
<td>Hot water dipping 53 ºC for 3 min</td>
<td>13 ºC for 6 weeks</td>
<td>Only 15% rot</td>
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<tr>
<td>Lemon (Porat et al., 2000)</td>
<td>Hot water dipping 52 ºC for 2 min</td>
<td>2 ºC for 8 weeks</td>
<td>Decrease decay and chilling injury</td>
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<tr>
<td>Satsuma mandarins (Hong et al., 2007)</td>
<td>Hot water dipping 52 ºC for 2 min</td>
<td>5 ºC for 3 weeks then 18 ºC for 1 week</td>
<td>Decrease decay</td>
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Objective

To determine an optimum temperature and period of hot water treatment for prolonging shelf life of lime storage

Materials and methods

- **Plant materials**
  - no disease, wound or bruise
  - uniformity of size and peel color

- **Hot water treatments**
  - hot water dipping at 40, 45, 50 and 55 ºC for 2 and 5 min
  - distilled water dipping was used as a control
  - storage at 10 ºC for 6 weeks and 25 ºC for 4 weeks
**Materials & methods**

- % Weight loss
- Peel Color
  - Minolta Chroma Meter (CR-10)
  - L Value and hue angle
- Disease
  
  rating at 1 to 5 score with:
  - 1 = less than 5%  
  - 2 = 6-30%  
  - 3 = 31-60%  
  - 4 = 61-90%  
  - 5 = more than 90%

All data were analyzed by ANOVA. When differences were significant (P>0.05), individual treatment means were separated using Duncan’s Multiple Range Test (P=0.05).
Limes stored at 10 °C for 6 weeks
(A), control 2 min
(B), control 5 min
(C), 40 °C 2 min
(D), 40 °C 5 min
(E), 45 °C 2 min
(F), 45 °C 5 min
(G), 50 °C 2 min
(H), 50 °C 5 min
(I), 55 °C 2 min
Results

Percentage weight loss of limes stored at 25 °C 4 weeks

Percentage weight loss of limes stored at 10 °C 6 weeks
Results

Results of limes after incubation at 25 ºC for 4 weeks.

Discussion

- Schirra and D’hallewin (1997) reported that ‘Fortune’ mandarins dipped at 58 ºC for 3 min delay color changes.
- Broccoli through dipped at 45 ºC for 4 min to delay color changes (Dong et al., 2004).
- Hot water treatment at 52 ºC for 3 min have been shown to reduce green mold in organic lemon inoculated with the spores of Penicillium digitatum (Lanza et al., 2000).
Conclusion

40 ºC for 5 min → 10 ºC → 25 ºC

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