EVALUATION OF HYDROCOOLING AS A POSTHARVEST TREATMENT FOR SO₂ FUMIGATED ‘HLH MAURITIUS’ LITCHI FRUIT

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ARC- Institute for Tropical and Subtropical crops
Nelspruit, 1200
• Hydrocooling (HC): Postharvest cooling method
• HC cools warm produce by immersion in/spraying with ice water
• HC is commercially used to cool litchi fruit in China
• Used SO₂ and non-SO₂ fumigated litchi
• Fumigated = wet pericarp
• Wet fumigation promotes colour retention and reduces browning (Chinese)
• Cv. dependant (Haak Yip & Fey Zee Siu)
Advantages of HC

• Rapid cooling
  – 15x faster than forced air (FA)

• Minimal weight loss

• Uniform cooling
Disadvantages of HC

- $\text{H}_2\text{O}$ contact
- Necessity for drying
- High Decay potential: Chlorine ineffective in killing fungal spores & latent infections
- N/A to all packaging
- Large quantities of clean & disposing of waste $\text{H}_2\text{O}$
BACKGROUND....

• Studies (90’s): HC does not improve the quality of RSA litchis

• Visit to China: renewed interests by SA litchi producers

• ARC-ITSC commissioned to verify HC on South African litchis

• Study: determine the effect of HC on HLH Mauritius litchis before and after fumigation
The study consisted of 2 experiments (2010 Onderberg harvest window)

- **Experiment 1:** Early season fruit
  (1st 2 wks of Dec 2010)

- **Experiment 2:** Late season fruit
  (last 2 wks of Dec 2010)
MATERIAL AND METHODS

• Location: Ivaura packinghouse, Malelane district

• 4 treatments applied on ‘HLH Mauritius’ cv

  1. $\text{SO}_2$ only
  2. $\text{HC} + \text{SO}_2$
  3. $\text{SO}_2 + \text{HC}$
  4. $\text{HC} + \text{SO}_2 + \text{HC}$
MATERIAL AND METHODS.

Hydrocooling

• 100L plastic basin filled with cold water and ice (5°C for 15 min)

• Temperature maintained by addition of ice & agitation

• Pulp temp recorded before, during & after HC
MATERIAL AND METHODS..

Sulphur fumigation

• $\text{SO}_2$ - 3m$^3$ tent x 2
• Two 20 kg crates (1 crate/treatment) x 4 rep
• Dry fruit = 30 min (T1 & T3)
• Wet fruit = 35 min (T2 & T4)
• Fruit packed in coolers & transported to the ARC
PACKAGING & STORAGE

• Packing done under cold temp. (5 °C)
• Packed in 2 kg litchi boxes
• 10 boxes/treatment - 5 for quality analysis
  - 5 for residue analysis
• Cold stored at 1 °C for 30 days
• Shelf storage at 13 °C for 6 days
MATERIAL AND METHODS....

Quality criteria
• TA and TSS: refractometer & titration
• Weight loss: mass before & after storage
• Fungal infection: % fruit with FI
• Pericarp color retention: 5 point scale

Statistical analysis
• T-test and Chi square (p<0.05)
RESULTS

• Only significant results presented
  - Pulp temperature
  - Mass loss
  - TA
  - Fungal growth
Pulp temperature of HLH Mauritius litchi fruit during HC

\[ y = -0.0091x^3 + 0.3053x^2 - 3.56x + 21 \]

\[ R^2 = 0.9876 \]
Percentage mass loss that occurred during storage of HLH Mauritius litchi fruit
Titratable acid contents of HLH Mauritius litchi fruit after storage.
Fungal growth incidence during the shelf life phase of early season HLH Mauritius litchi fruit
Fungal growth incidence during the shelf life phase of late season HLH Mauritius litchi fruit
Appearance of HLH Mauritius litchi fruit after storage

SO2 only  
SO2 + HC  
HC + SO2  
SO2 + HC
CONCLUSIONS

• Hydrocooling did not improve the quality of South African HLH Mauritius litchi fruit during export simulation trials whether applied before or after SO\(_2\) fumigation.
  – Increased fungal infection rate
  – Increased moisture loss
  – Decreased acid retention

• Not recommended at this stage.
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