HEAT FOR APPLE DISINFESTATION - FRUIT RESPONSE AND ISSUES

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We have investigated the potential of hot water and hot air treatments combined with coldstorage for control of quarantine pests on apples. The objective of this work is to identify treatments which will control these pests without causing fruit damage.

Hot air treatment

Royal Gala and Fuji fruit have been subjected to hot air treatments of 44, 46 and 48°C for 2 to 7.5h (depending on temperature), followed by 7 weeks coldstorage at 0.5°C then 7 days at 20°C before assessment.

Key findings

- Incidence of fruit damage in the form of skin and internal browning increased with increasing temperature and duration of treatment.
- Royal Gala apples were found to be more sensitive to heat treatment than Fuji.
- Royal Gala did not tolerate any of the 44°C treatments tested (shortest duration tested = 4h), but tolerated 46°C for up to 3 h and 48°C for up to 2.75 h.
- Fuji tolerated 44°C treatment for up to 5 h, and 46°C and 48°C treatments for up to 3 h.
- Both Royal Gala and Fuji apples appear to tolerate treatments (hot air followed by coldstorage) which will control quarantine leafroller pests.

Issues impacting on practical implementation

- Approach with potential to control pests located inside or on the surface of fruit
- Variation in cultivar tolerance to treatment
- Potential influence of preharvest and pretreatment temperature conditions on fruit susceptibility to damage
- Influence of fruit maturity on response to treatment
- Development of handling and treatment system appropriate for fruit volumes concerned.

Hot water treatment (HWT)

Royal Gala apples from two regions in New Zealand and from a range of harvest dates have been subjected to hot water treatments of 44, 45 or 46°C for 35, 40 or 45 min. Following heat treatment, fruit were coldstored at 0.5°C for 0, 4, 7 or 10 weeks, then held at 20°C for 7 days prior to assessment for quality.

Key findings

- HWT was associated with fruit damage in the form of skin or flesh browning.
- Incidence of damage increased with increasing temperature and duration of treatment, and with increasing length of time in coldstorage.
- Incidence of HWT-associated damage varied between region, harvest date and orchard from which fruit were sourced. Early harvest fruit had lower levels of damage than mid and late harvest fruit.
- A HWT of 44^{o}C for 35 min followed by 7 or 10 weeks coldstorage, was found to be tolerated by all fruit tested. This treatment has been shown to be effective in controlling quarantine leafroller pests.

Issues impacting on practical implementation

- Approach more suited for controlling pests located on or near the surface than those located inside the fruit
- Potential influence of preharvest and pretreatment temperature conditions on fruit susceptibility to damage
- Influence of fruit maturity on response
- Development of handling and treatment system appropriate for fruit volumes concerned.