



SESSION THREE

Session Three
Pest Disease Control
Strategies, Integrated
Production Systems and the
Impact on Market Access

New Zealand and Australia Avocado
Grower's Conference'05
20-22 September 2005
Tauranga, New Zealand

HAL Project AV02003:

Development of a non-chemical treatment system for avocado against Queensland fruit fly for interstate trade

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Introduction

- Summarise current avocado/fruit fly situation internationally and within Australia.
- Report on field studies to quantify host susceptibility of four avocado cultivars to Queensland fruit fly.
- Present results of a novel approach to postharvest cold disinfestation.

Avocados and fruit flies

Avocados are recorded as hosts for a range of fruit fly species, including Queensland fruit fly.

However in Australia:

- Generally accepted as a poor host.
- Most existing records do not include variety.
- Host records generally from ripe or damaged fruit.
- No data available on host status of hard mature fruit. (commercial harvest stage)

Mexico



2004 – Aluza *et al*

Nonhost status of commercial *Persea americana* 'Hass' to *Anastrepha ludens*, *Anastrepha obliqua*, *Anastrepha serpentina*, and *Anastrepha striata* (Diptera: Tephritidae) in Mexico.

Western Australia



De Lima – 2001

Developed Interstate Certification Assurance (ICA-30) “Hard Condition of Avocado”

Procedure to allow trade with eastern states based on conditional non-host status of hard avocados to Mediterranean fruit fly.

Hawaii

- In 1990, developed trade with mainland USA based on non-host status of Sharwil to the pest fruit fly species in Hawaii.
- Suspended in 1992 after detection of larvae. Severe weather and poor nutrition contributing factors to protocol breakdown.
- Currently revisiting potential for a system with more rigorous quality control.

Current Situation - Australia

- Interstate trade
postharvest treatment – dimethoate or fenthion (? future)
- Export trade
postharvest cold at 1°C for 16 days
 - based on 3rd instar larvae in ripe fruit
 - not practical for interstate trade.

HAL Project AVO2003

- Major aim
 - Develop a system to provide phytosanitary security against fruit flies for interstate trade of avocados
 - Conditional non-host status
- OR • Treatment system:
 - hard condition of fruit and short cold treatment

Host status and resistance studies

- 4 varieties tested
 - Shepard, Wurtz, Hass and Lamb Hass
- Hard mature fruit caged on trees and exposed to flies
 - Unblemished fruit
 - Pinpricked fruit
- Control fruit, field and laboratory checks
- Fruit sampled to assess natural infestation.



Results – host resistance

Variety	Eggs / control or check fruit	Number pupae/ pricked avocado	Number pupae/ unpricked avocado	Number of pupae per unblemished field collected fruit
Hass	125	0.5	0	0
L. Hass	292	0.1	0	0
Shepard	424	8.8	0	NA
Wurtz	295	5.3	0.01	0

Host resistance - Conclusion

- Hass, Lamb Hass
 - Conditional non-host
- Shepard, Wurtz
 - Less likely to meet interstate requirements
 - Additional postharvest treatment may be required

Market access protocols

- Historically based on postharvest treatments which are effective irrespective of relative host susceptibility.
- Treatments include chemical, fumigation, heat, cold, irradiation.
- Fruit quality issues with some commodities.

Cold trials

- Incorporate inherent host resistance (ie hard fruit)
- Selected most tolerant stage possible in hard fruit i.e. mature eggs
- Preliminary range finding tests (short times).

Cold trials

- Shepard and Wurtz
 - Infested fruit with Qfly
 - Treated in coldroom at 2.5°C
 - Removed at 4, 5, 6, 7 days
 - Held at 26°C to rear surviving insects
 - Control fruit (infested ripe) held at 26°C to estimate insects treated



Wurtz (Hard) at 2.5°C

Treatment time (days)	Estimated Number of Insects Treated	Number of Survivors	Mortality	True Mortality * (95% CL)
4	15 917	6	99.96	99.9256
5	15 917	2	99.99	99.9605
6	15 917	0	100	99.9812
7	15 917	0	100	99.9812

* Required efficacy for interstate trade is 99.5% at the 95% confidence level

Shepard (Hard) at 2.5°C/3.0°C

Treatment time (days)	Estimated Number of Insects Treated	Number of Survivors	Mortality	True Mortality * (95% CL)
4	28263	175	99.38	99.3184
5	28263	5	99.98	99.9628
6	28263	0	100	99.9894
7	28263	0	100	99.9894

* Required efficacy for interstate trade is 99.5% at the 95% confidence level

Cold trial – summary

Cultivar	Treatment temperature (°C)	Treatment time (days) required
Wurtz	2.5±0.5	4
Shepard	2.5±0.5 (3.0±0.5)	5

Implications for industry

- Interstate trade
- Potential replacement for postharvest chemical treatments
 - Conditional non-host status
 - New cold treatments at 2.5°C (4-5 days)
- Submission required for Interstate quarantine authorities

