



# 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  
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# Managing avocado pests with romance, intrigue and war – integrating pheromones, assassins and weapons of mass destruction

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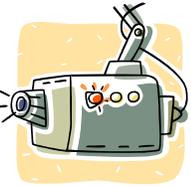




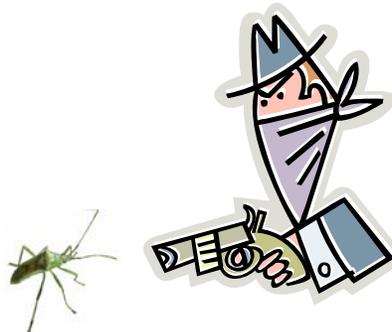
# Managing avocado pests with romance, intrigue and war – integrating pheromones, assassins and weapons of mass destruction



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# In many districts, the Queensland avocado pest complex is dominated by fruitspotting bugs

*Amblypelta nitida*



This presentation will focus on these bugs as they are the key pests in the system

Fruitspotting bug damage



*Amblypelta lutescens*



# *The*

# *Romance*

Finding a mate



For an insect, what does finding a mate involve?

# Being where the action is, helps!

Host plants facilitate this by attracting insects to a common feeding site.

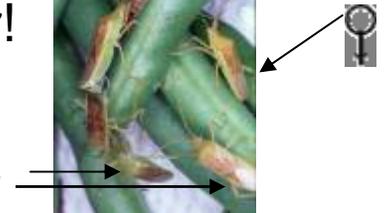
For insects, once they get to the venue, attraction to the opposite sex on the 'dance floor' is usually via pheromones.



- Either sex may produce the attractant pheromone, depending on the insect group
- In moths, the female produces the pheromone
- Males produce the pheromone in some weevils and true bugs
- Fruitspotting bug males produce the pheromone
- Sex - a fatal flaw to be exploited in a species' behaviour!



Note the interest in the mating pair from all these females



Fruitspotting bugs have **glands that produce defensive odours**, but they have **no discrete pheromone-producing glands**.

For these bugs, the pheromones have to be collected from the air after they are released to enable identification of the active compounds.

## Aeration

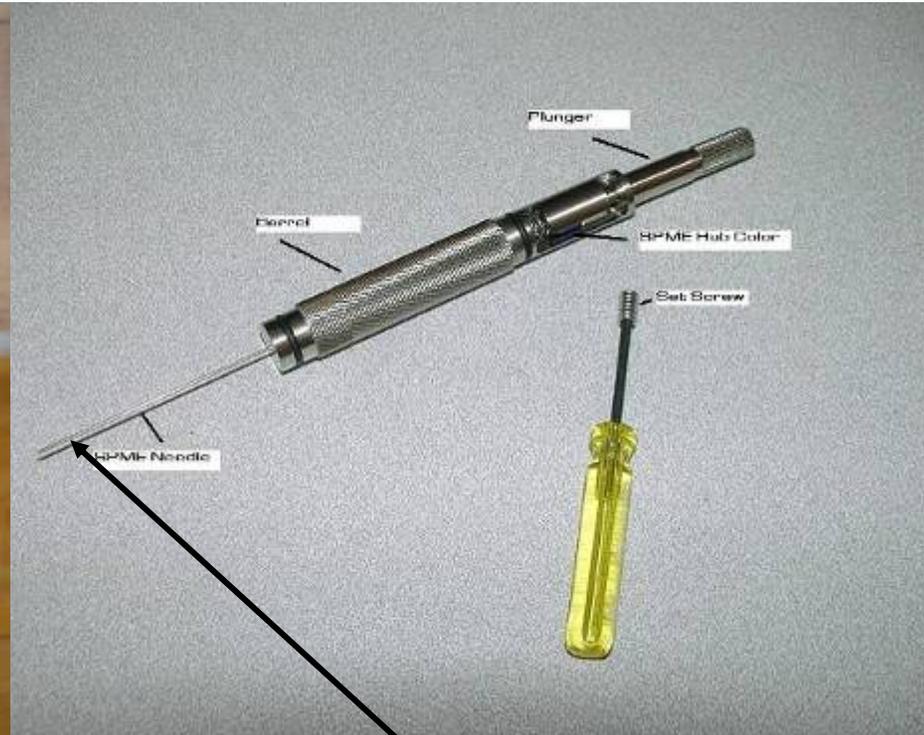
Aeration technique used for collecting fruitspotting bug pheromones



Volatile compounds absorbed by activated charcoal or Poropak Q

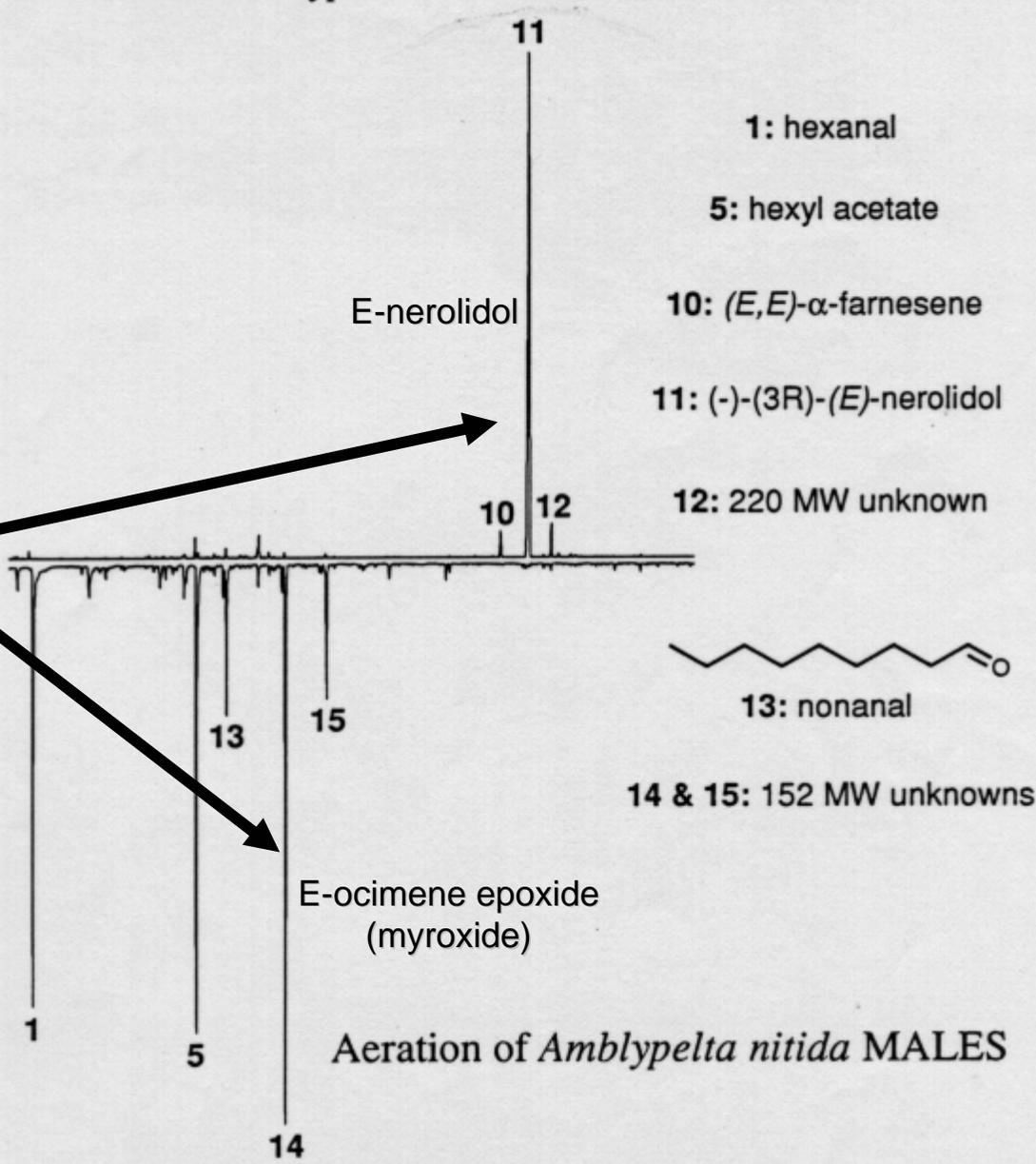
## Solid Phase Micro-extraction - SPME

SPME sampler – allows direct desorption & analysis in Gas Chromatograph of pheromones & host volatiles

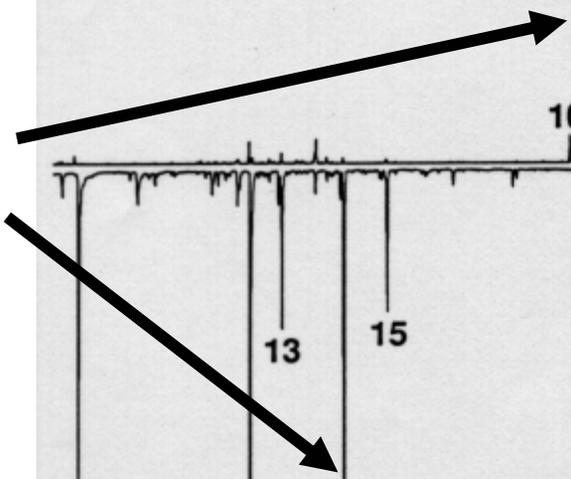


Volatile compounds (pheromones) adsorbed onto active film coating the fibre

# Aeration of *Amblypelta l. lutescens* MALES



Compounds of particular interest for each species



# Sorting out the active compounds - USDA laboratory, Beltsville



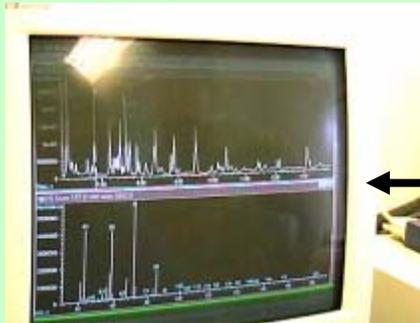
Live bugs



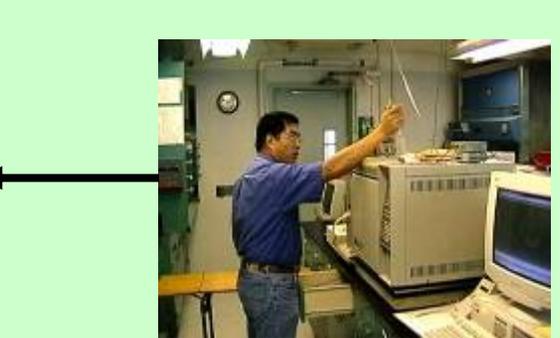
Amputating the antenna



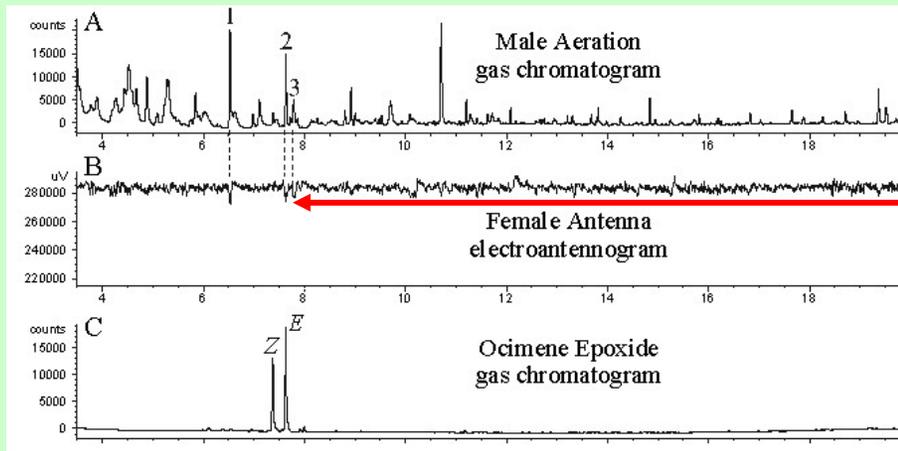
Antenna attached to electrodes



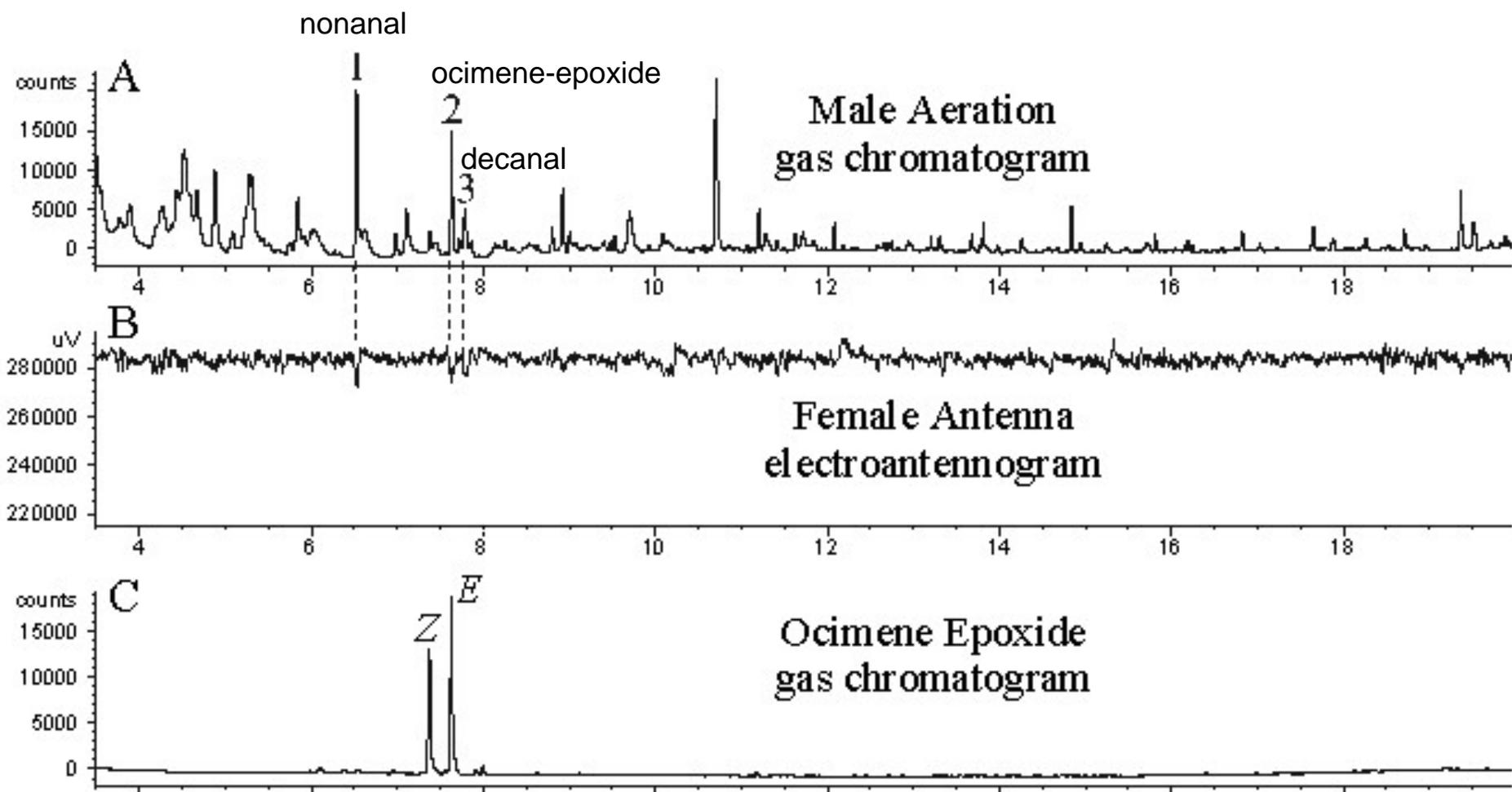
Readout of antennal reaction (AEG) top graph, and active compounds (GC) lower graph



Simultaneous injection of aeration sample into EAG device and GC



Antennal reaction to ocimene epoxide, nonanal and decanal



# Insect semiochemistry



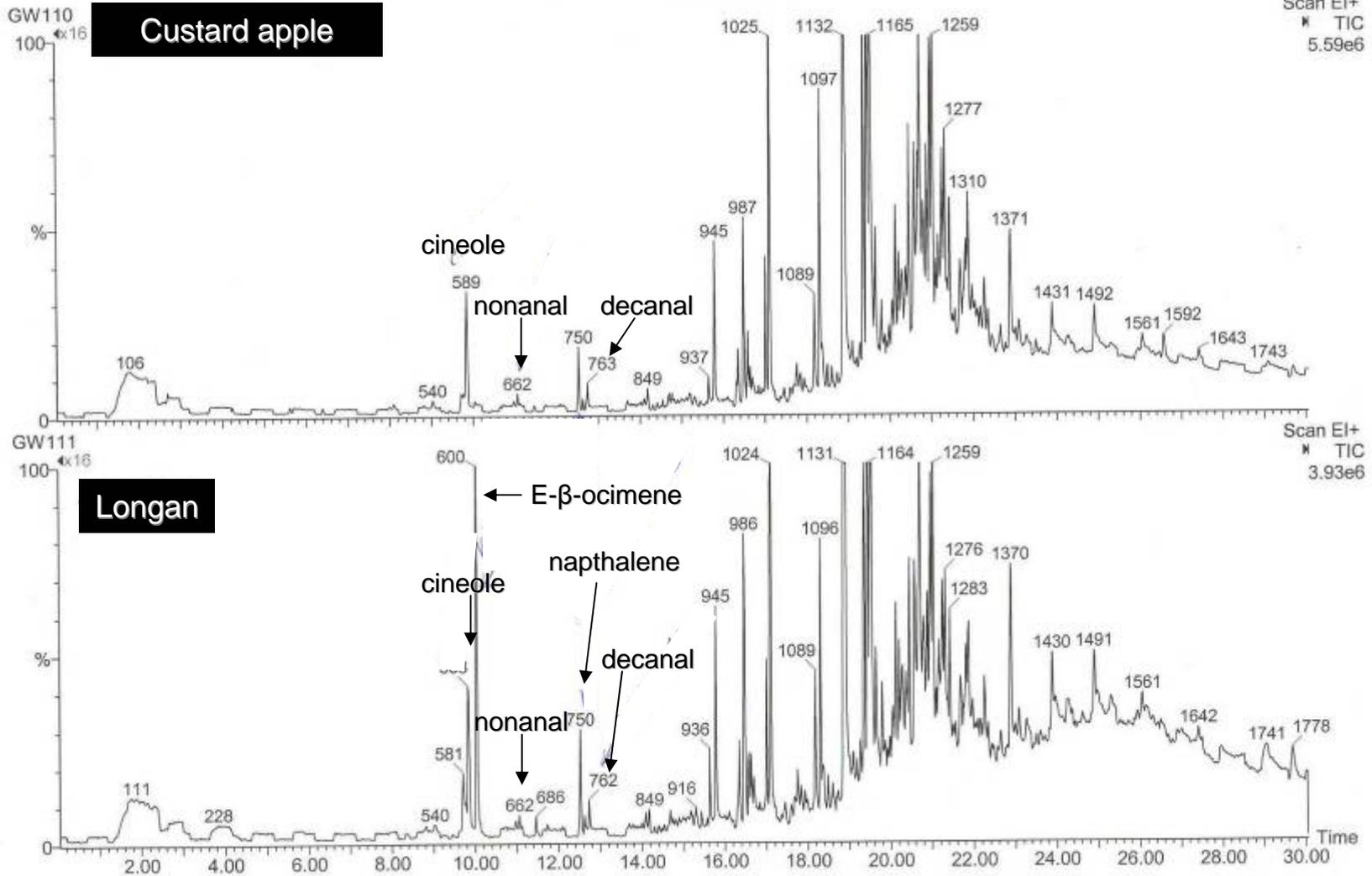
The pheromone may work in combination with host volatiles – after all, wining and dining are a part of human romancing, so why not with bugs?



# SPME samples of green fruit

Queensland Department of Primary Industries  
VG-Micromass TRIO-2000

04-Feb-2005 12:18:10



These small flies have presumably been attracted by volatile chemicals – are these produced by the ‘stressed’ bee or the assassin bug?



# Pheromones and host volatiles could be used:

- In traps for monitoring populations
- In an attract and kill strategy in combination with decoy trees

Female *Amblypelta nitida* on trap containing ocimene-epoxide, nonal and decanal



# The Intrigue

The enemy within



In IPM systems, conservation biological control is critical

## Assassins in action





Redbanded thrips infestation terminated by natural enemies - on avocado in street in Buderim

# The War



Pesticides, weapons of mass destruction of both beneficials and pests, are indispensable in most commercial orchards.

Chemical warfare waged sensibly, generally produces quality fruit.

However ---



Inappropriate use of some types of chemical can cause problems, especially with scales and mites



# So, how should we respond to pest invasions?

- The elements of 'romance' and 'intrigue' that are effective against individual pests should be applied (pheromones if available, conservation biological control)
- Incorporate these in a practical and sustainable strategy that uses tactical and targeted chemical warfare against pests for which other management options are not available
- Sustainable IPM system

In addition to understanding pest biology, behavioural and ecological studies are critical to determine opportunities for developing new management strategies, especially for key pests.

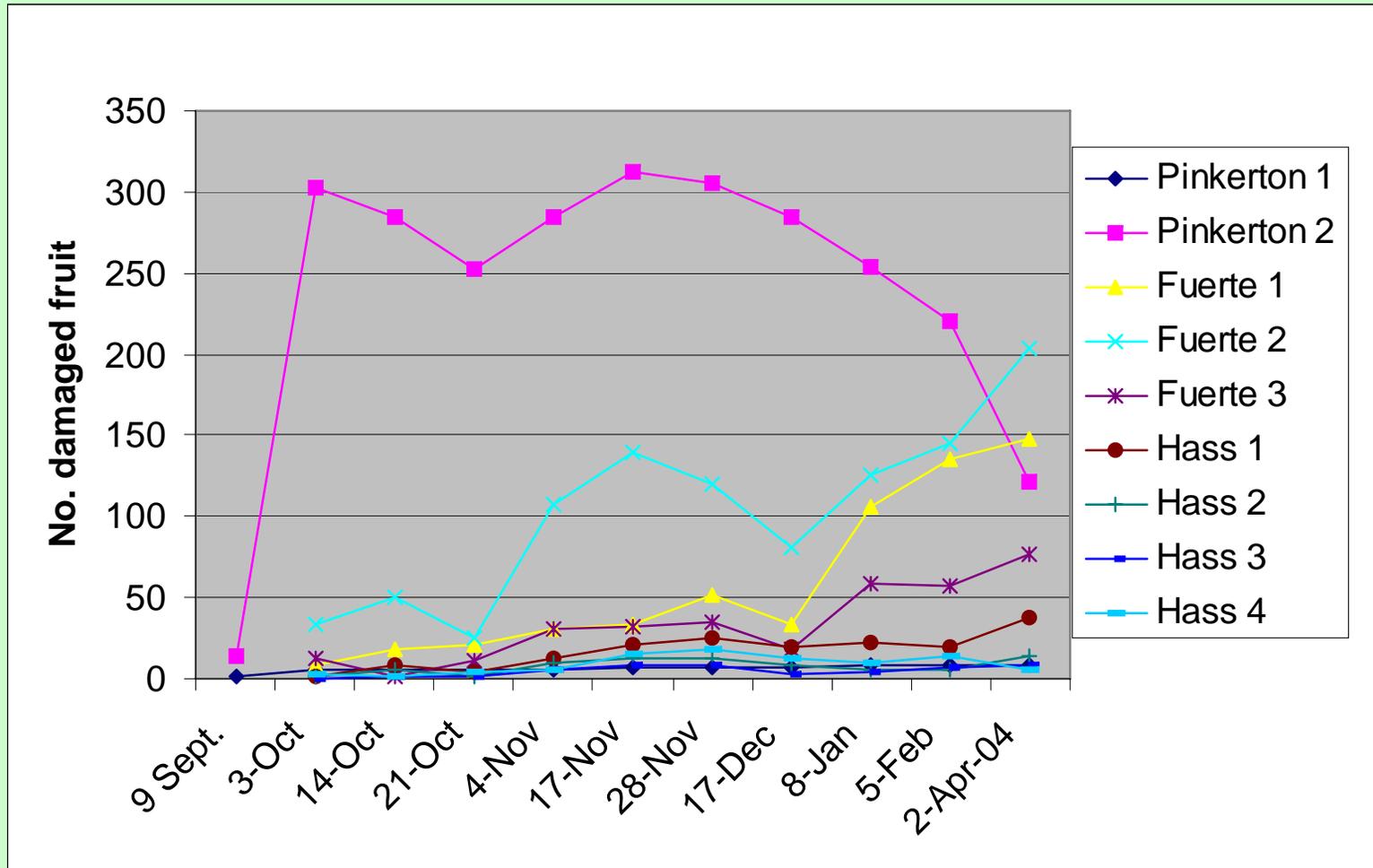


For fruitspotting bugs, this has led to the formulation of the 'hotspot' strategy



Fruitspotting bugs have also exhibited preferences for certain avocado (and macadamia) cultivars, which could be used as trap trees in a 'Hass' orchard

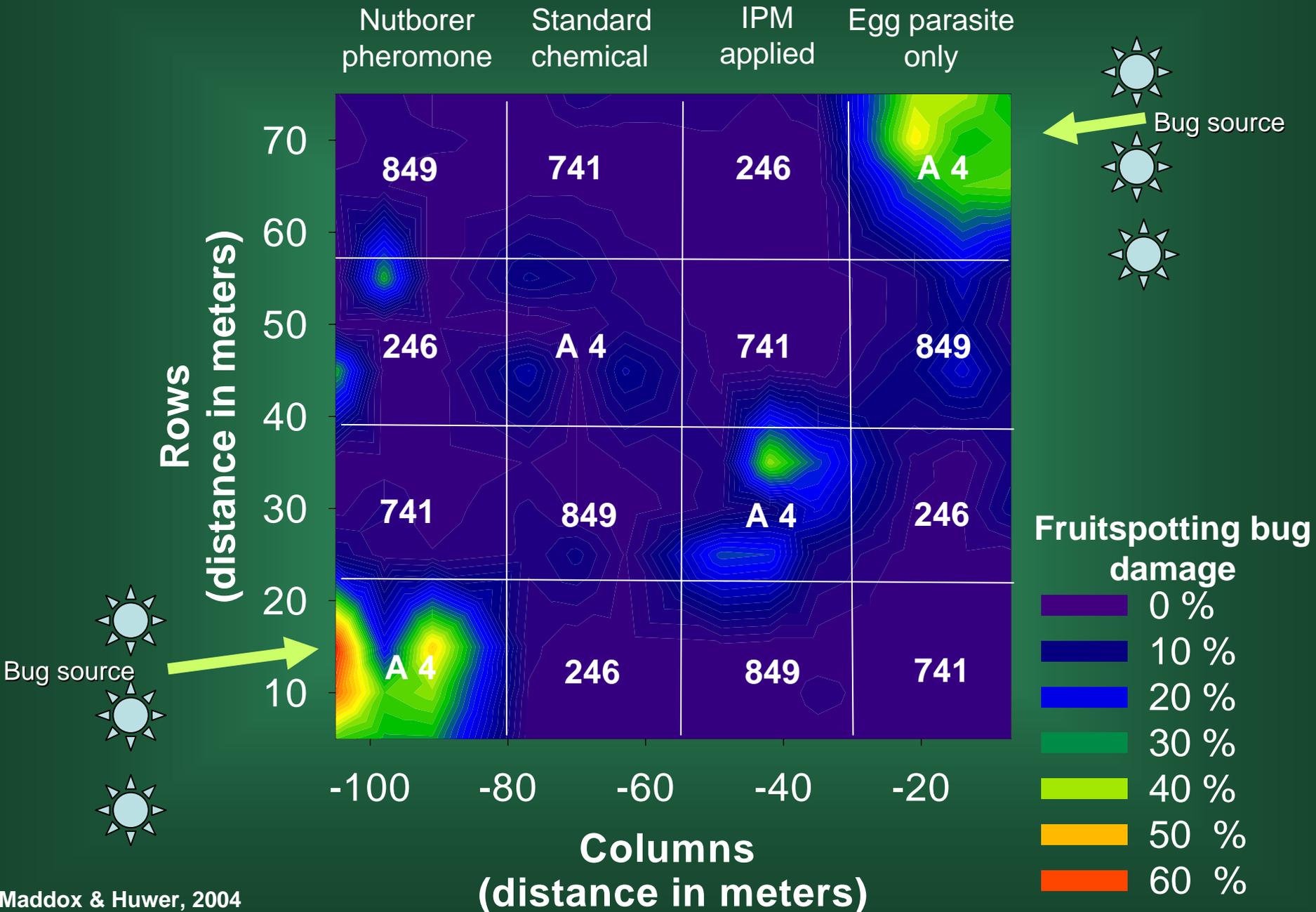
# Fruitspotting bug damage on individual unsprayed trees of various avocado cultivars, Maroochy 2003-04



# Typical fruitspotting bug hotspot situation



# Fruitspotting bug damage on macadamias 2003-04



# Fruitspotting bug edge effect in passionfruit

Second row:

Undamaged fruit = 169

Damaged fruit = 6

3.4%

Outside row:

Undamaged fruit = 62

Damaged fruit = 117

65.4%



Romance, intrigue and tactical warfare can be combined in a total orchard management system (IPM) for any avocado pest complex.

In Queensland, the system will be enhanced by:

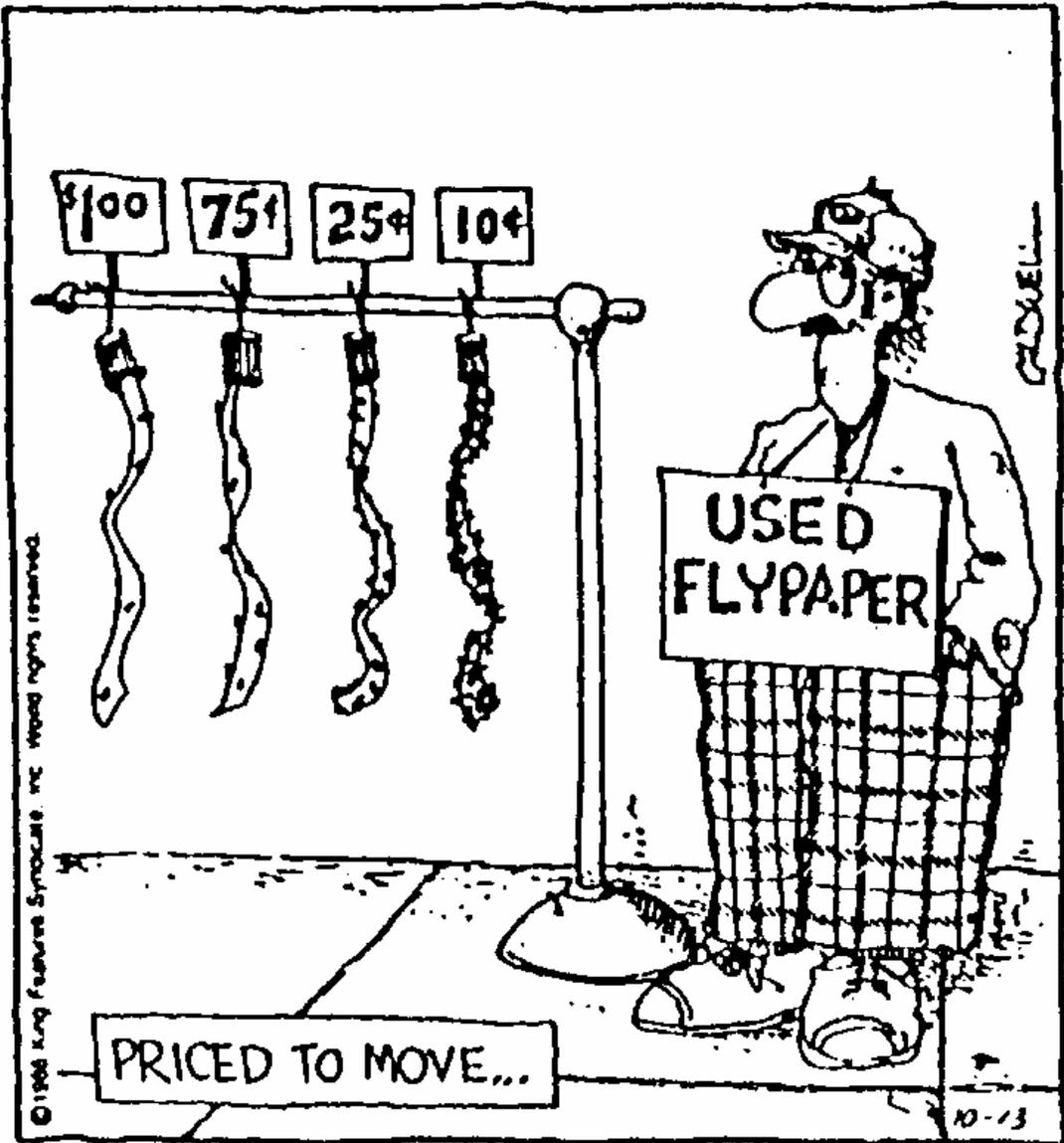
- identifying and using hotspots to monitor fruitspotting bug infestations
- spraying only the hotspots, but more frequently to prevent bug dispersal through the orchard
- using more susceptible cultivars as decoy/trap trees e.g. Fuerte

Particle film (Surround®) has been applied as an insect deterrent and sunscreen – but it washes off in rain & may induce scale outbreaks



Exclusion nets are not an option in avocados





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\$1.00 75¢ 25¢ 10¢

USED  
FLYPAPER

PRICED TO MOVE...

G. S. S.

10-13

