NSW GOVERNMENT Department of Primary Industries

HAL Horticulture Australia

Queensland Government

ACIAR

The University Of Queensland AUSTRALIA

A multi target approach to fruitspotting bug management

- Update March 2014 -

Australian Macadamias®

Avocados Australia

ALGA

Papaya Australia

Custard Apples Australia INC.

PASSIONFRUIT AUSTRALIA INC.

Mid-term project review

- Recommendation
  - Revise Project towards two central outcomes:
  - 1. Developing effective insect thresholds
    - Pest and crop monitoring techniques need to be refined;
    - Pheromone and trap crops need to be developed and use strategies for traps defined;
  - 2. Developing suitable chemical control options.
  - Without any increase in funding:
    - Research for biocontrol agent be contracted or stopped
    - Trap crop research be narrowed and refocused to a small number of sites.

Research update March 2014

- Chemical control
  - Laboratory screening
  - Field trials
- Trap Crops
- Pheromone traps
- Biological control

Chemical control

- Linkage with other groups working on bugs
- Laboratory screening
  - New chemicals
  - Eggs
  - Nymphs
- Field trials
  - Centre for Tropical Horticulture Alstonville
  - Commercial farms

Chemical control (cont.)

- Laboratory screening of eggs
  - FSB eggs (5 per rep) were put on post-it notes and dipped in different insecticides
    - Insecticides tested: abamectin, beta-cyfluthrin (Bulldock™), chlorantranilprole (Product 2), flonicamid (Prodcuct 3), flupyradifurone (Product 1), tolfenpyrad (Product 4), sulfoxaflor (Transform™), trichlorfon (Lepidex™), acephate (Lancer™), diazinon, chlorfenapyr (Product 5), tolfenpyrad (Product 4)+ chlorfenapyr (Product 5).
  - None of the tested insecticides had a significant impact on hatching of FSB.
    - Positive for egg parasitoids survival

Chemical control (cont.)

- Laboratory screening of nymphs
  - Drop test (1 µl of insecticide on each insect)

A. Lutescens lutescens

A. nitida

Chemical control (cont.)

Treatment	Mortality % at day 3	Treatment	Mortality % at day 3
Abamectin-1.0ml/L	99.78	Lepidex-2.0ml/L	91.87
Bulldock-0.5ml/L	99.78	Pyganic-2.0ml/L	32.28
Control	9.78	Product 1-1.0ml/L	99.78
Diazinon-1.25ml/L	49.78	Sulfoxaflor -0.8ml/L	99.78
Endosulfan-1.5ml/L	99.78	Supracide-1.25ml/L	99.78
Product 2-1.0ml/L	99.78	Product 4 -1.0ml/L	56.94
Product 3-1.0mg/L	0.00	Product 4 -2.0ml/L	0.00
Product 3-2.0mg/L	26.87	Product 4 -4.0ml/L	25.00
Product 3-4.0mg/L	0.00	Product 4 -8.0ml/L	50.00
Product 3-8.0mg/L	25.00	Product 4 & Product 5 -1ml/L	79.78
Lancer-0.8ml/L	99.78	Water	60.20
Lannate-2.0ml/L	69.78		

Chemical control (cont.)

Laboratory screening of nymphs

Residue test (nymphs exposed to treated *Murraya* after 1 day)

Chemical	Rate ml/L	Mortality@ 7 days	%mortality
Abamectin	1.0ml/L	5	100
Bulldock	0.5ml/L	5	100
Product 1	1ml/L	3	60
Diazinon	1.25ml/L	5	100
Endosulfan	1.5ml/L	5	100
Product 2	1.0ml/L	1	20
Product 3	2.0gm	1	20
Lannate	2.0ml/L	4	80
Lancer	0.8ml/L	5	100
Lepidex	2ml/L	5	100
Pyganic	2.0ml/L	2	40
Sulfoxaflor	0.8ml/L	5	100
Supracide	1.25ml/L	5	100
Product 4	1.0ml/L	5	100
Product 4 & Product 5	1.0ml/L	5	100
Water		0	0

Chemical control (cont.)

- Field trials:
  - CTH macadamias:

Before Christmas (all orchard):

- Diazinon (20 Aug2013), Bulldock and Spin (16 Oct 2013), Lancer (02 Dec 2013)

After Christmas (individual tree treatments)

- Beta-cyfluthrin (Bulldock™),
- Product 2,
- Product 1,
- Sulfoxaflor
- Trichlorfon (Lepidex™),
- Acephate (Lancer™)
- Abamectin

  - First harvest: 1. week in March 2014

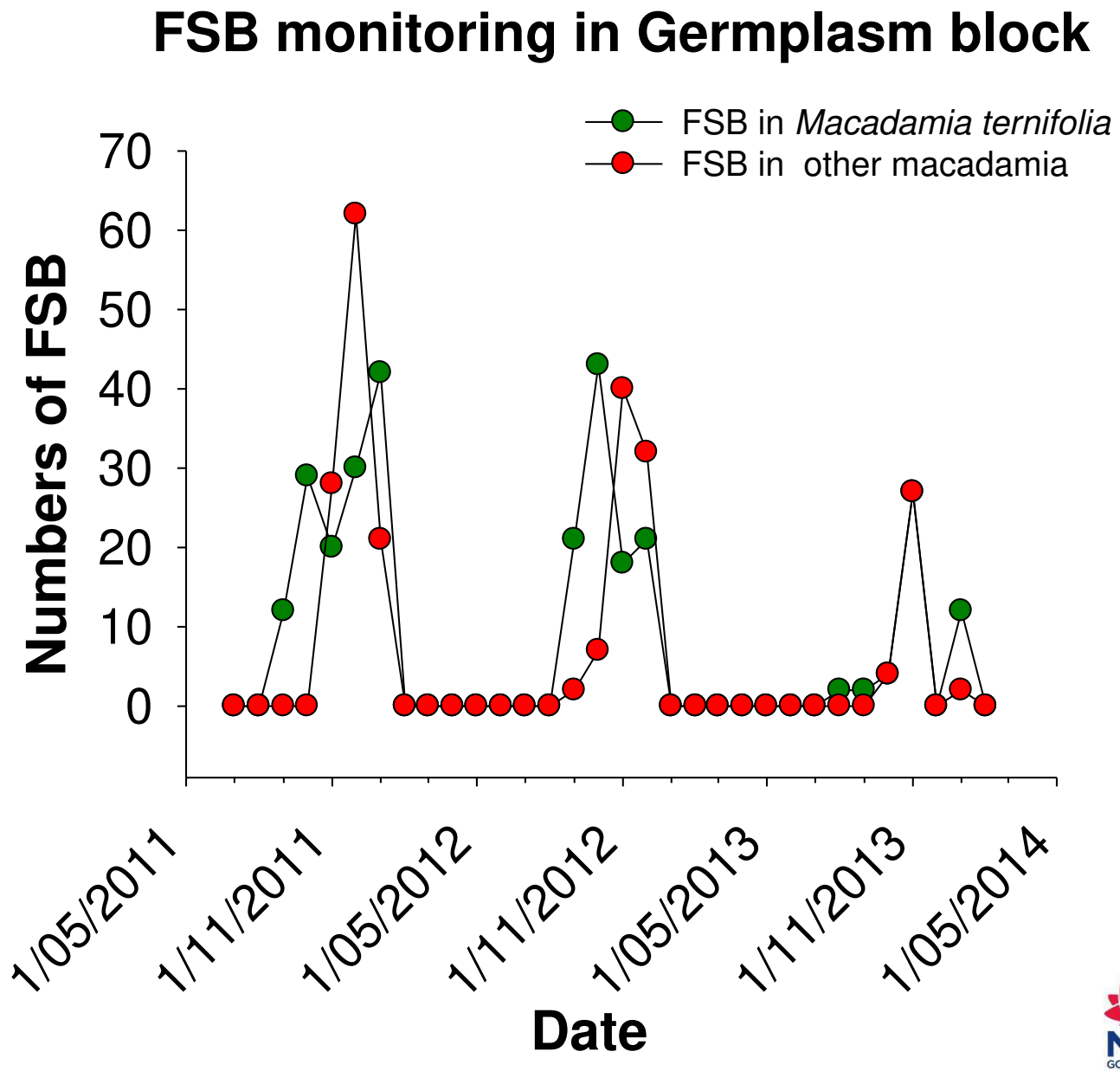
Chemical control (cont.)

- Field trials:
  - Commercial macadamias:
    - Amamoor and Alstonville:
    - Lepidex™ vs. Product 2
  - Commercial avocados:
    - Alstonville and Woodgate:
    - Product 2 vs. Rotation (2x Lepidex™ + Bulldock™)

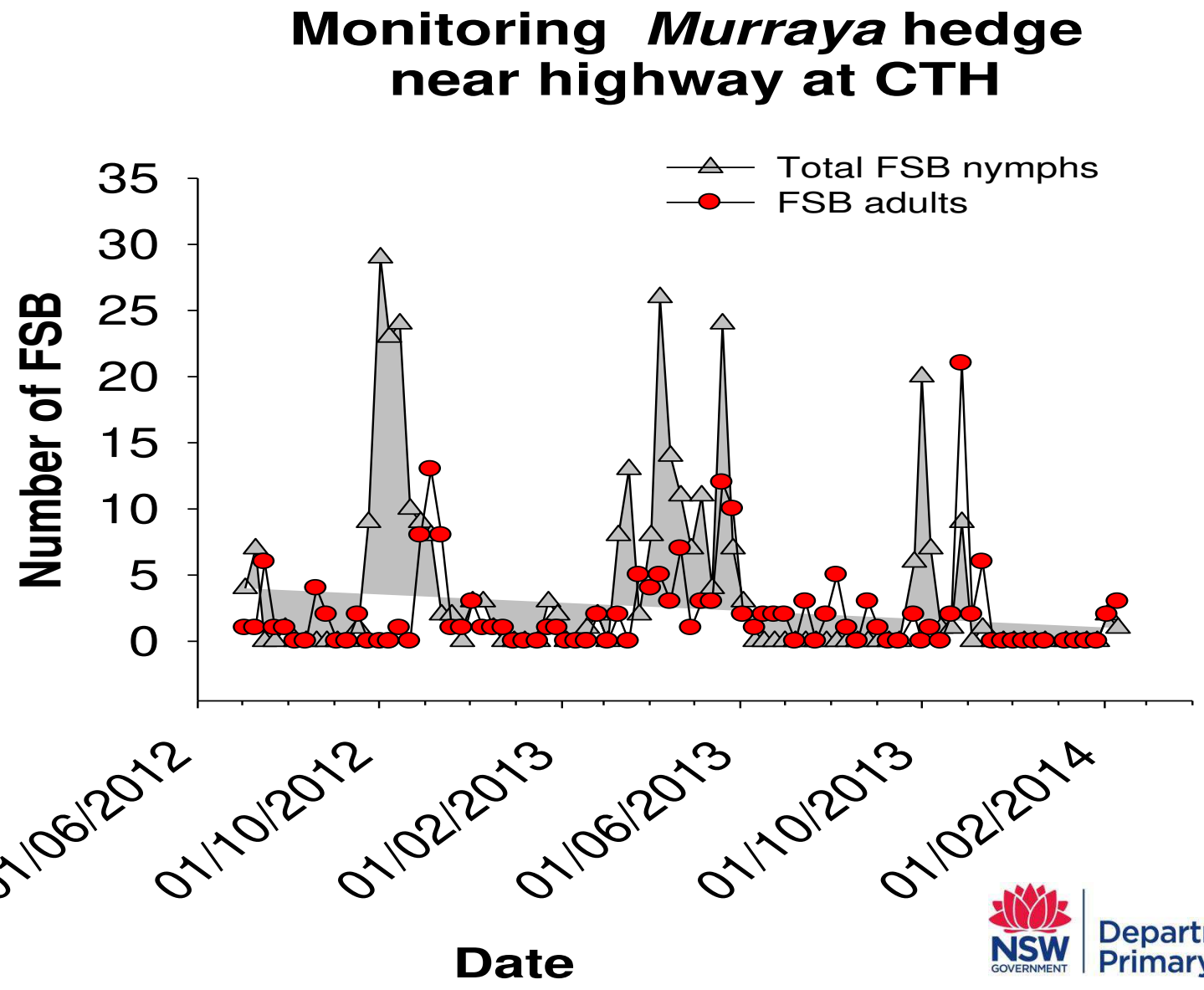
Monitoring and trap cropping

- Monitoring continued on trap hedges at CTH
  - Arboretum Murraya hedge
  - Highway Murraya hedge
  - Germplasm block
- Monitoring at commercial farms
  - Custard apple farm at Alstonville
  - Avocado farm at Alstonville
- We are getting good indications of peaks when FSB are active on hedges and management is needed

Monitoring and trap cropping (cont.)



Monitoring and trap cropping (cont.)



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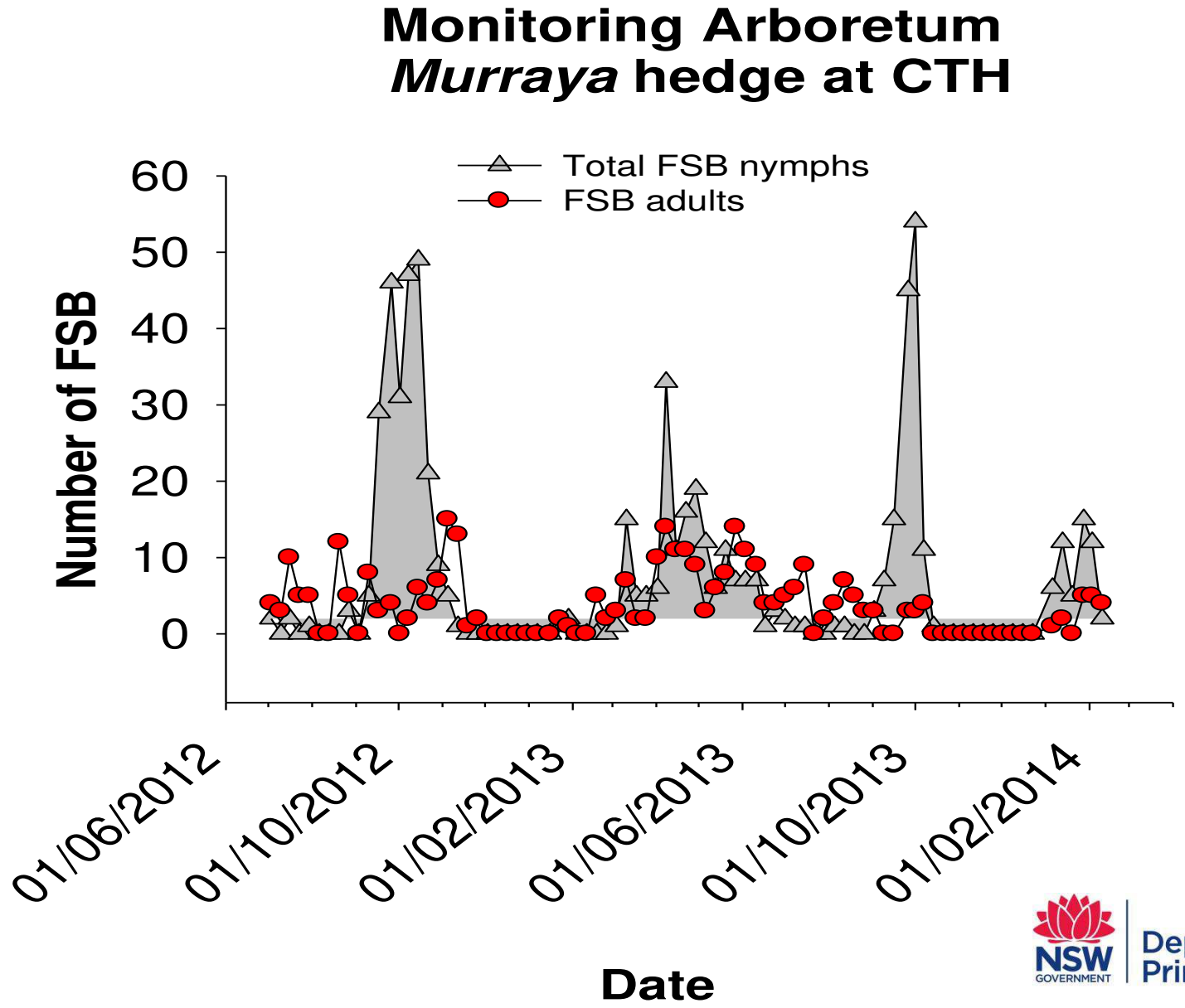
Monitoring and trap cropping (cont.)



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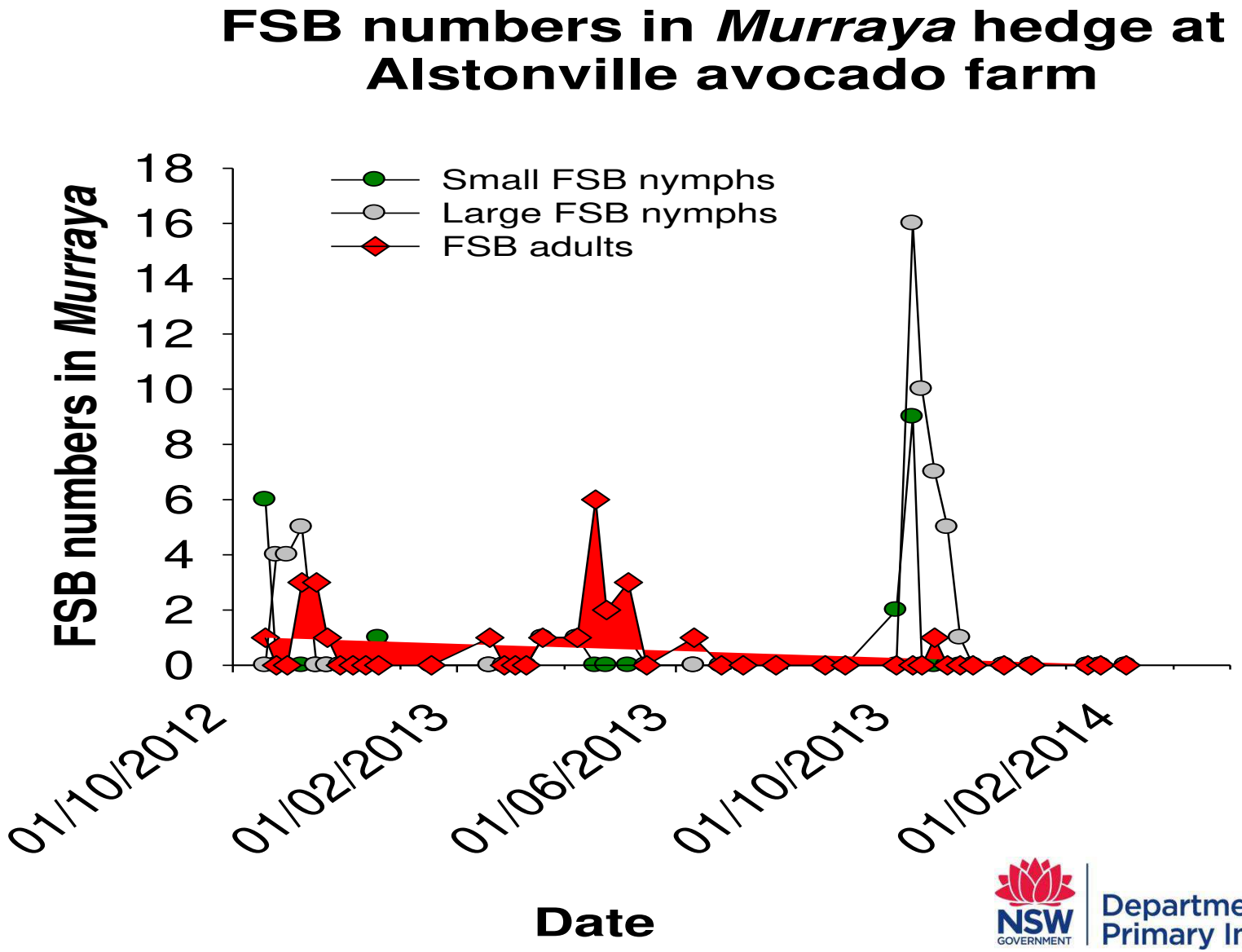
Monitoring and trap cropping (cont.)

	Longans	***Murraya panniculata***			**Custard apples**
	FSB adult	FSB males	FSB females	FSB nymphs	FSB adults
Jan-13	1	0	0	0	4
Feb-13	4	1	1	0	11
Mar-13	1	0	1	3	0
Apr-13	0	0	1	4	0
May-13	0	0	0	0	0
Jun-13	0	0	0	0	0
Jul-13	0	0	0	0	0
Aug-13	0	0	2	0	0
Sep-13	0	0	0	0	0
Oct-13	0	0	0	0	0
Nov-13	0	0	0	0	0
Dec-13	0	0	0	0	0
Jan-14	0	1	0	1	1
Feb-14	1	1	2	1	2

Monitoring and trap cropping (cont.)



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FSB Pheromone Trapping Component for HAL Project MT 10049 Feb 2014

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USDA

HAL
Horticulture Australia

Fruit Spotting Bug Pheromone Traps

Two species (FSB & BSB) are key pests for avocado, macadamia, custard apple, papaya, lychee, passionfruit, mango & other crops…

There are effective few chemical options and those that can be used, are broad-spectrum (no IPM)

Need for monitoring tools and economic thresholds

A pheromone trap, may allow less reliance on broad scale calendar spraying (broad spectrum)

Possibly targeting “hotspots”

A Brief History

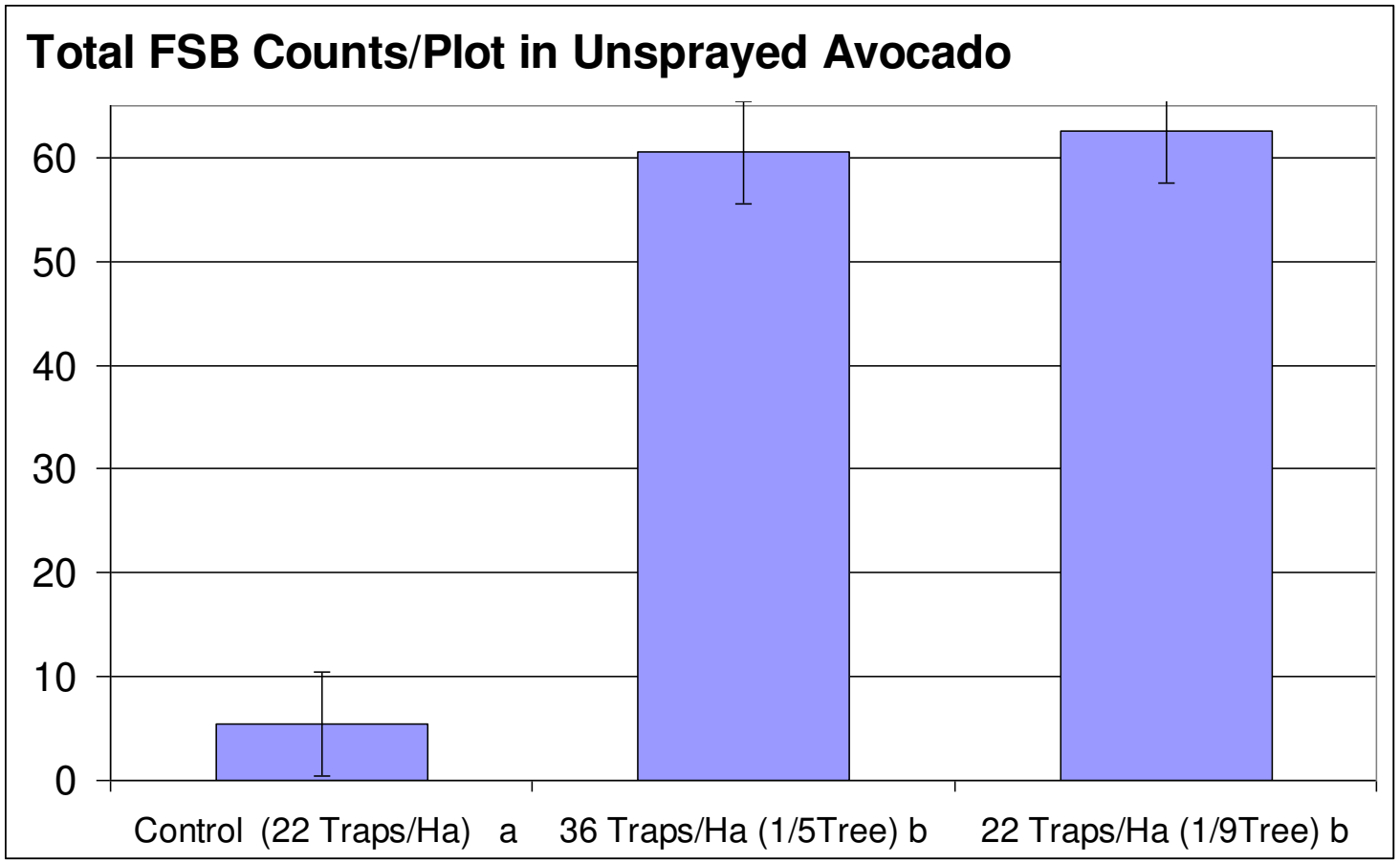
- Some Components Identified 20+ yrs ago (USDA/ QDPI Aldrich/Waite *et al* 1993)
- 2009 Harry Fay / USDA identified the last BSB *A. lutescens* component (ACIAR Funded).

- HAL 10049

A. lutescens lure optimized:

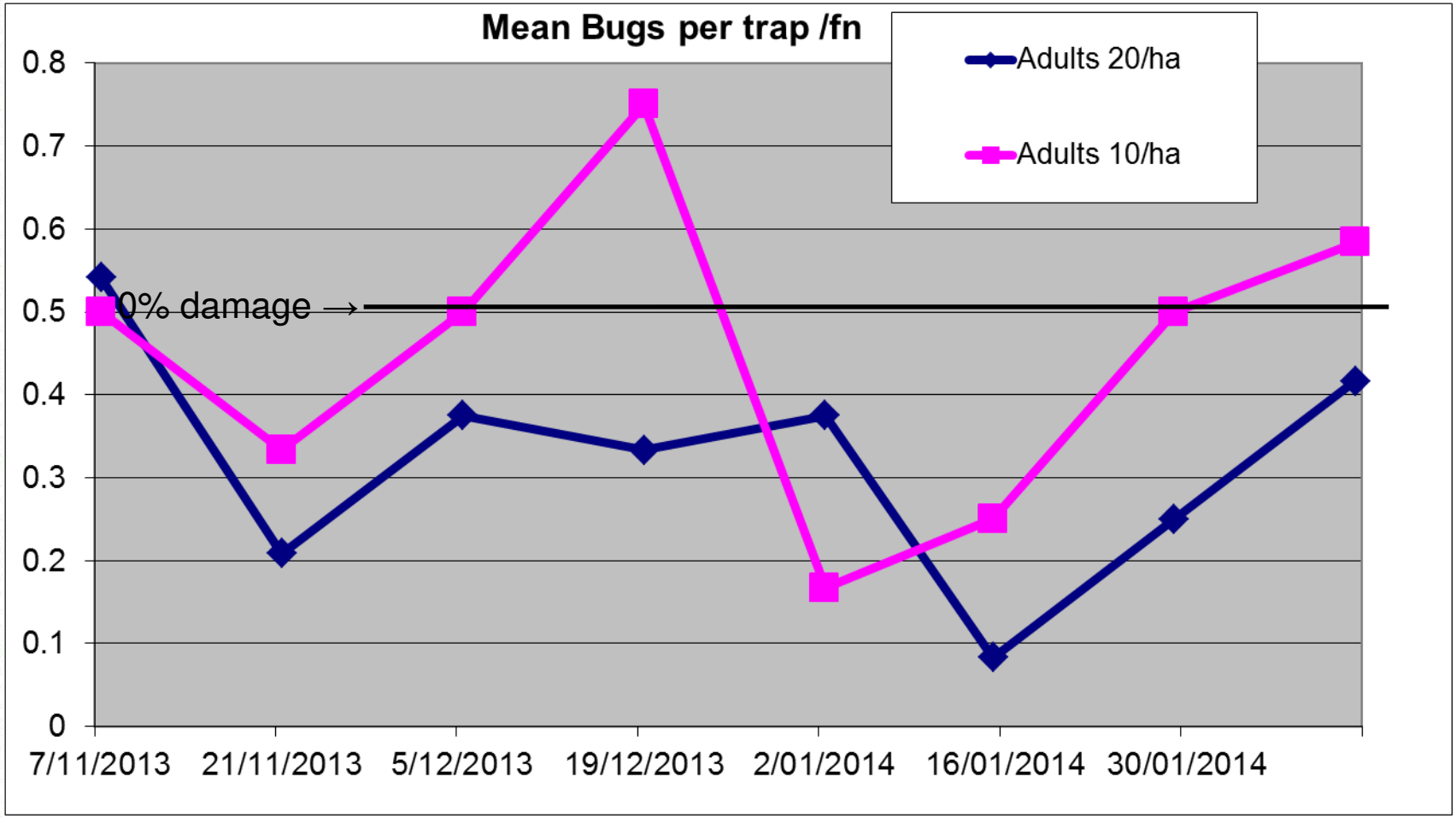
  - 4 chemical components down to 2
  - Chirality optimized
  - Dose/rate optimized
  - Lure lasts 4-6 weeks in field
  - Catches adult ♂, ♀ & nymphs

2012-13: Avocado & Custard Apple



- No difference in total bugs (per Ha) **btw trap densities**
- i.e. 22 traps/Ha caught just as many bugs as 36 traps/Ha

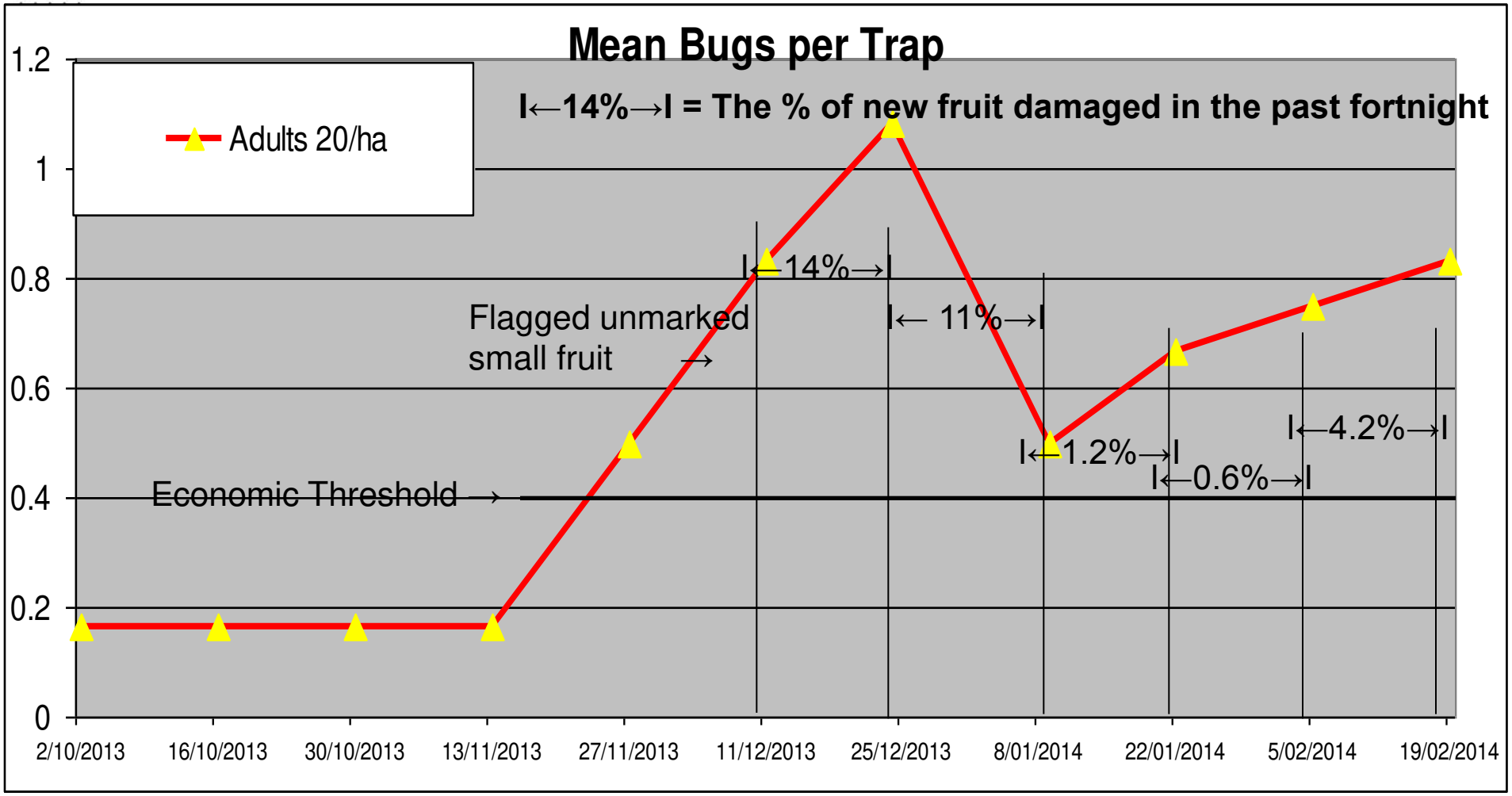
2014 Adults bugs Avocado Economic Threshold



Last season: considerable damage was observed at values btw 0.5 & 1 bugs /trap

This season Threshold >0.4 to 0.5 for 20 traps/ha

Custard Apple Thresholds-Bugs/Trap



Threshold ≈0.4 for 20 traps/ha…Same as avocados
Commercialisation: EOI
Working on the *A. nitida* lure

Biological control

- Main releases of *Anastatus* sp. stopped
- Small one off releases of *Anastatus* sp., *Gryon* sp. and *Centrodora darwini* on 2 commercial farms (Alstonville, Palmwoods) – so far no recovery of parasitoids
- Options Honours project are being investigated
- Options for importing *Trichopoda pennipes*

Area Wide Management

Establish a network of pest monitoring sites

- Rationale:
  - There is a need to establish a network of pest monitoring sites
    - These will include elements of the IPM system such as trap crops, crop monitoring and broader landscape monitoring.
- Response:
  - A small pilot Area Wide Management program will be established for the 2014/15 season in the Rous/Alstonville district.
    - At least three farms, including two case study sites
    - Fortnightly monitoring data on damage levels and bug numbers will be entered onto the PestWeb website.
    - FSB damage data and FSB numbers will be collected by NSW DPI and 2 consultants.
    - The data will be collated, including details on spray applications
    - The usefulness of the information entered into PestWeb data will be assessed by consultants and growers at the midpoint and end of season.
    - *Small pilot in Mareeba using the A.lutescens lure will also be considered*

Industry adoption

Continue extension activities related to spray application

- Rationale:
  - There is evidence that inefficient spray coverage using existing chemistry is responsible for poor FSB control outcomes.
- Response:
  - A series of pre-season spray application workshops will be conducted in mid 2014 and 2015.
    - Regions include the NSW Mid North Coast, Northern Rivers Glasshouse Mountains, Bundaberg and Mareeba and include growers.
    - Production of a spray application video as part of the MacSmart series, ready for release in June 2014.

Industry adoption (cont.)

Development of a FSB management manual

- Rationale:
  - Concise extension material needs to be developed for the core project outcomes. It is recommended that FSB management guidelines be developed.
- Response:
  - Collation of information to document new knowledge of FSB and as a guide for management of the pest based on sustainable pest management practices
  - The FSB management guide will be published in electronic form and adapted for each industry. Hard copies of the publication will also be produced subject to availability of funds.
    - A YouTube video will be developed to support the manual.

Monolepta australis – redshouldered leaf beetle

Photos by DAFFQ

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Monolepta australis (cont.)

- Description:
  - The beetles are 6 mm long and yellow, with a dark red (purple) band across the shoulders and two purple spots on the ends of the wing covers.
- Distribution:
  - Throughout northern Australia and particularly in cane-growing coastal regions
- Host range:
  - The host range is large and includes avocado, carambolas, cotton, corn, eucalyptus spp., grasses, legumes, longans, lychee, macadamia, mango, strawberry, and numerous ornamentals.

Monolepta australis (cont.)

- Life cycle:
  - Eggs are laid in the soil surface, mainly in pastures and sugarcane.
  - The larvae feed on grass roots and pupate in the soil.
  - The life cycle takes about two months during summer and there are three to four generations annually.
  - Adults usually emerge from the soil after heavy rains following a dry spell.

Monolepta australis (cont.)

- Monitoring and treatment threshold:
  - Check crops after heavy rainfall. *Monolepta* are readily assessed visually or with a beat sheet;
    - Adults are extremely flighty and numbers are difficult to accurately count on a beat sheet.
    - Estimate the number of groups of 5 or 10 beetles on the sheet to get a 'ball park' population figure.
  - Populations greater than 20 per square metre will most likely cause significant damage.
  - Adults will also go to a light trap 650nm mercury vapour light
  - They tend to go back to the same trees

Monolepta australis (cont.)

- Chemical control:
  - *Monolepta* are readily controlled with pesticides
    - Chlorpyrifos
    - Carbaryl
    - Diazinon
    - Trichlorfon
    - Acephate
    - Methidathion
  - Spot spraying of swarms in infested blocks or windbreak trees may be all that is required

Monolepta australis (cont.)

- Cultural control:
  - Plant legume crops away from susceptible larval hosts if possible.