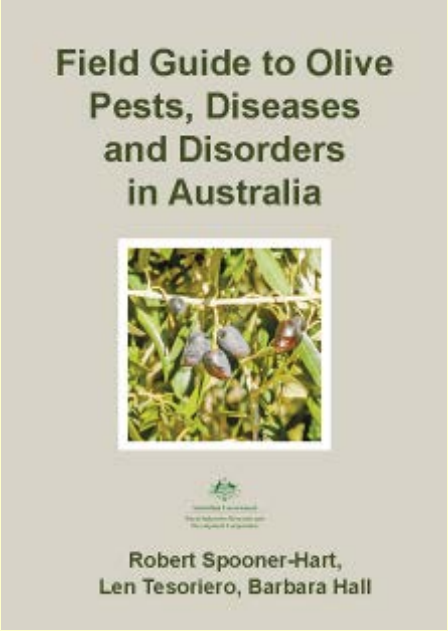
The Evaluation of Key Chemicals for Pest Management – Anthracnose and Lace Bug, what to look for and when to act

Robert Spooner-Hart
Vera Sergeeva

Centre for Plants and the Environment

University of Western Sydney

MORE THAN 30 OLIVE PESTS AND DISEASES RECORDED IN PEST & DISEASE FIELD GUIDE,



BUT

LIMITED PERMITTED PESTICIDES AGAINST A NUMBER

RIRDC / AOA PROJECT

Evaluation of key chemicals for pest management in the olive industry

KEY PESTS/DISEASES TARGETED

- **Fruit rots, including anthracnose**
- **Olive lace bug**

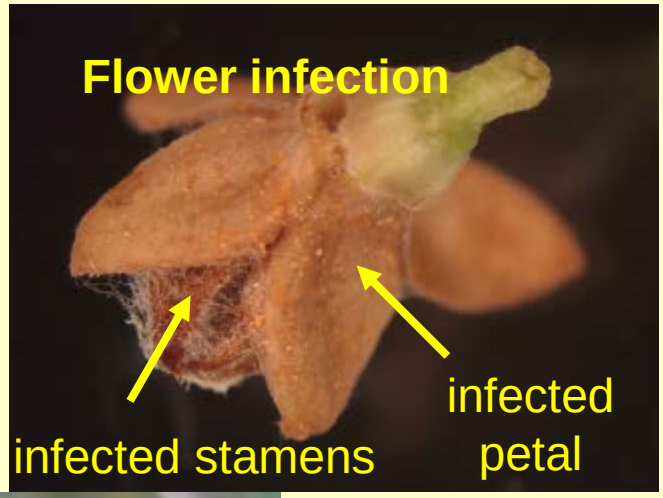
Anthracnose caused by *Colletotrichum acutatum* and *C gloeosporioides*

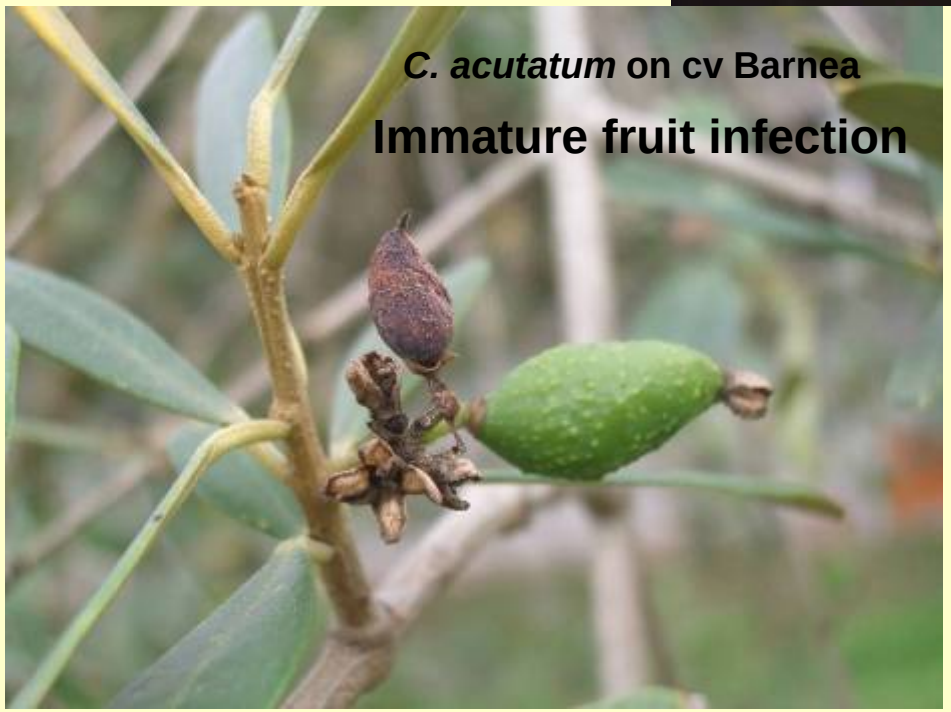
Both fungus species can occur in one olive grove and fungal isolates appear to be quite diverse

Fruits caused by *C. acutatum* soft and leaky with orange or cream masses of fungal spores

Fruits caused by *C. gloeosporioides* soft or slightly sunken light brown spots with orange or cream fungal spores

Anthracnose is a latent disease- can infect olive flowers or immature fruit.

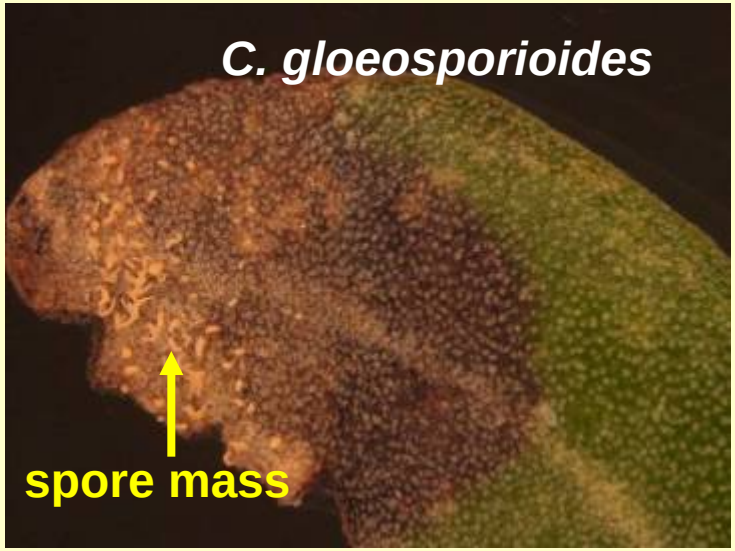


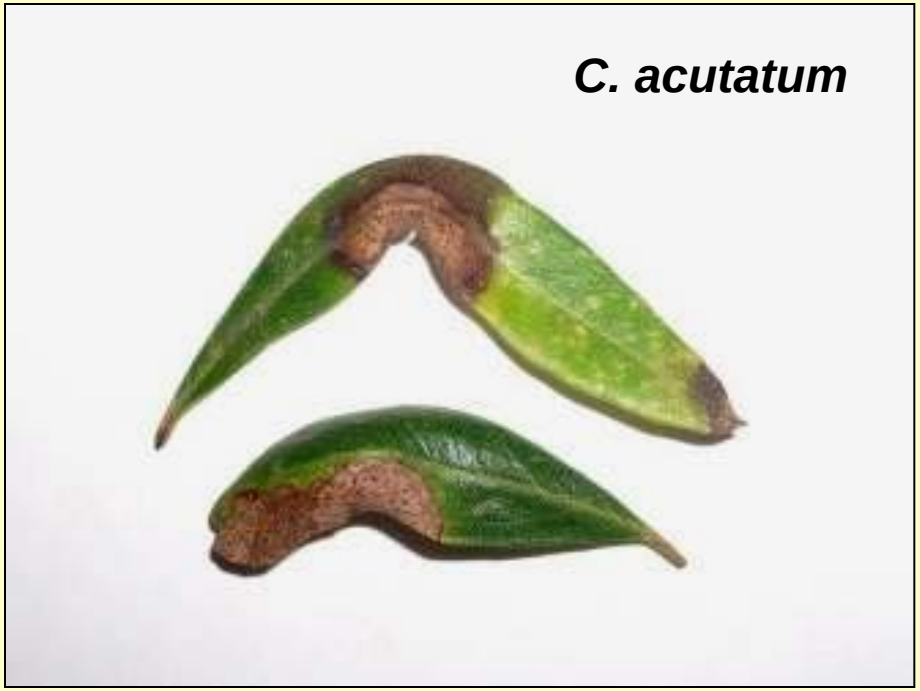


C. gloeosporioides **on young fruit cv Manzanillo**

Fungus can be present, but dormant, in plant tissue and will become active when fruit begin to ripen

Anthracnose can also infect olive leaves





Spores from these leaf fungal colonies could be important sources for secondary infection of flowers or fruits.

Mummified fruits caused by anthracnose on olive tree before harvest

C. gloeosporioides cv. Manzanillo

C. acutatum cv. Barnea

• Anthracnose and other fungal fruit rots increase in presence of damage, such as by hail or fruit fly or green vegetable bug

• Difference in anthracnose susceptibility between olive varieties- Manzanillo, Barnea most susceptible

- **Optimum conditions for anthracnose infection warm temperatures (25-30° C) and rain/high humidity.**

- **Germination *of C. acutatum* spores require**

  -minimum 4 h continuous moisture with 100% spore germination 21-48 h at 25-30° C

  -minimum 8 h with 100% spore germination 42-120 hours at 15-20° C

- **Field infections can occur under these conditions. Given that infection can occur from flowering to fruit harvest, these conditions may occur frequently, especially in areas with summer-dominant rainfall.**

- **Mycelial (vegetative) growth normally restricted at high temperatures (>30-35° C), although this varies between different isolates.**

Non-pesticide anthracnose management strategies

- Reduce the overwintering inoculum levels by removing unharvested fruit from trees and grove floor.

  - Mechanical removal preferable

  - Also slashing/mulching fruit and leaf to encourage desiccation/decomposition

- Pruning to open tree canopy.

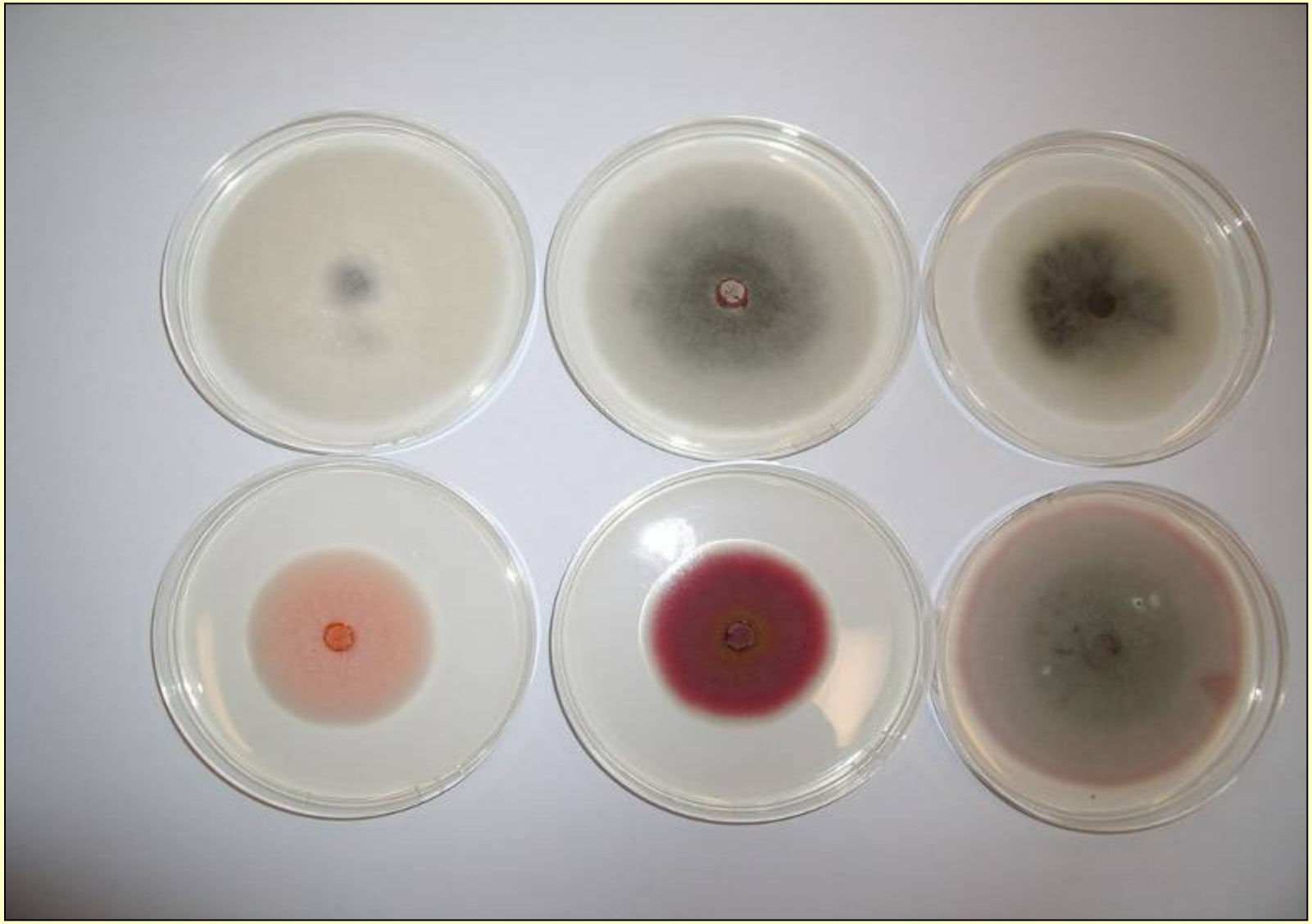
  - Increase light intensity

  - Increase air movement

  - Increase penetration of pesticides

Colletotrichum isolates from different states of Australia

Different appearance, growth rates, tolerance of copper



OTHER FUNGAL PATHOGENS CAUSE FRUIT ROTS
Cercosporiosis fruit rot caused by *Pseudocercospora cladosporioides*

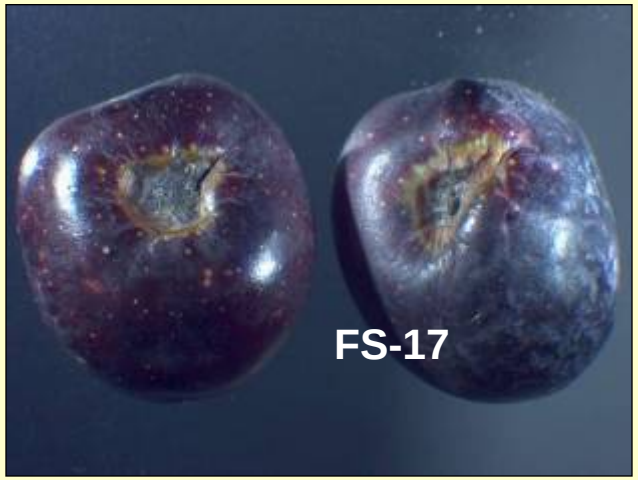
P. cladosporioides **normally considered a leaf pathogen**
Fruit damage may be as important as leaf infection

Cercosporiose on olive immature fruits

Green fruits develop irregular slightly sunken dark brown spots

Cercosporiosis on olive fruits at harvest

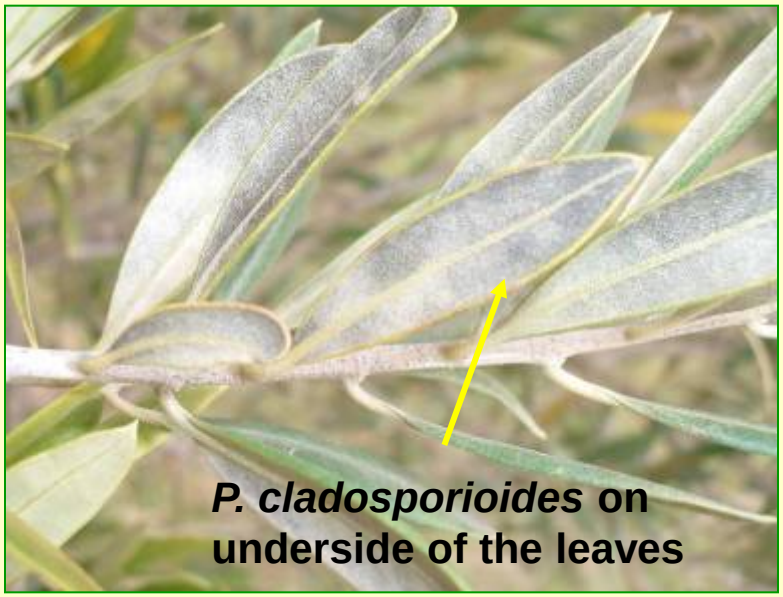
Disease symptoms on the fruits vary according to cultivar, ripening stage, locality & fungal strain(?)

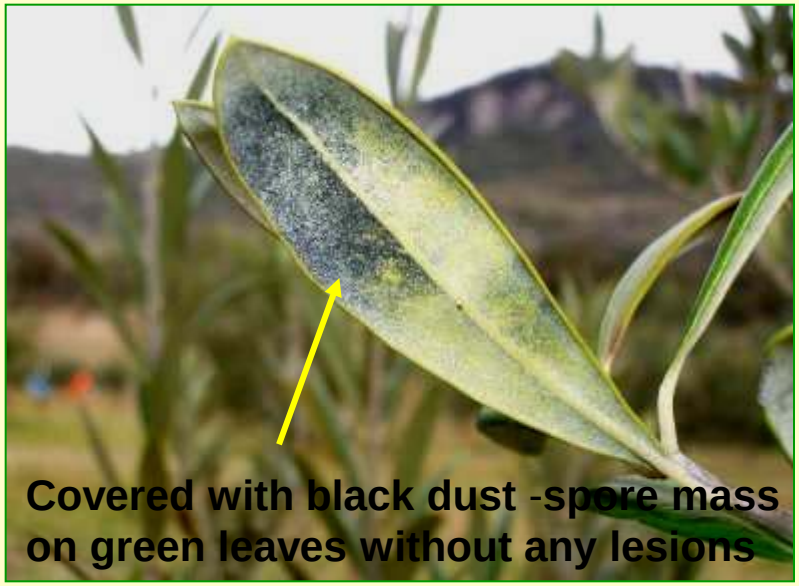


On ripening olives, the epidermis of infected tissues has an ash-gray appearance, slightly sunken light brown spots


Cercosporiosis
on olive fruits at harvest

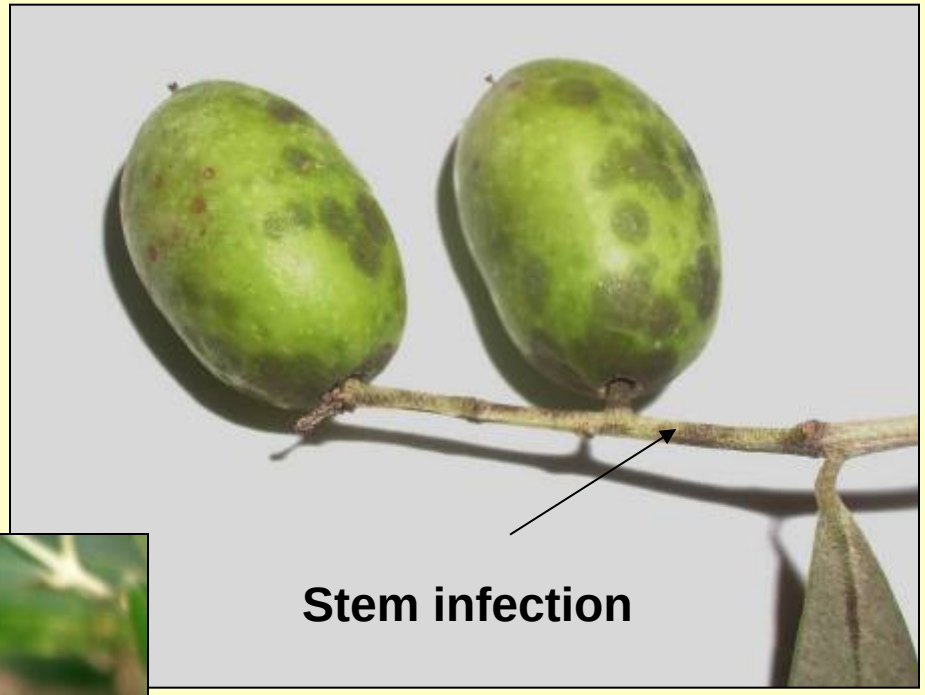
Different symptoms of cercosporiosis on olive leaves





Leaves showing high level of inoculum

Peacock spot *(Fusicladium oleagineum)* on olive fruits
Not commonly observed



Fruit drop caused by Peacock spot fungus

Symptoms of peacock spot *Fusicladium oleagineum* commonly seen on olive leaves

The symptoms on leaves: dark green to black spots sometimes surrounded by a yellow halo

CURRENT PRODUCTS ABLE TO BE USED AGAINST FRUIT ROTS

PRODUCT	PERMIT	CONDITIONS OF USE
Copper oxychloride	Registered (various products)	Also peacock spot, cercosporiosis
Copper hydroxide	PER11360	Until Dec 2013 Also peacock spot, cercosporiosis

LIKELY CANDIDATES FOR EVALUATION AGAINST FRUIT ROTS

- **Tri-base Blue (Tribasic copper sulphate) (NuFarm).**

Lower copper load. Preventative (protectant)

- **Cabrio Top (Pyraclostrobin + Metarim) (NuFarm).**

Systemic, curative and protectant.

- **Industry standard- Copper oxychloride**


JOHN DEERE
GATOR
DIESEL

RESULTS OF ANTHRACNOSE FIELD TRIAL- HUNTER VALLEY 2009-10

3 Sprays, from February to late April, applied at rate of 3.5 L spray /tree

Pre-treatment assessment recorded no fruit infection

TREATMENT	% HARVESTABLE FRUIT
Control	35.2
Copper Oxychloride	48.9
Tribase Blue	70.5
Cabrio Top	89.1

RESULTS OF ANTHRACNOSE FIELD TRIAL- HUNTER VALLEY 2009-10

RESULTS OF ANTHRACNOSE FIELD TRIAL- HUNTER VALLEY 2009-10

RESULTS OF ANTHRACNOSE FIELD TRIAL- HUNTER VALLEY 2009-10

RESULTS OF ANTHRACNOSE FIELD TRIAL- HUNTER VALLEY 2009-10

NEW INVESTIGATIONS ON FRUIT ROTS

- Further season trials with current fungicides

- Bioassay investigations of fungicide combinations?

- Use of new, superior surfactant for better fruit coverage for copper fungicides

- Effect of application of fungicide sprays at flowering on fruit set

OLIVE LACE BUG, *Froggatia olivinia* (Hemiptera: Tingidae)

- **Native Australian species**

- **Original host *Notelaea longifolia* (native olive)**

- **Normally 3 generations/year**

- **Recorded in NSW, Qld, Vic, SA, WA (2002 and 2006)**

Hatching nymphs of *F. olivinia*

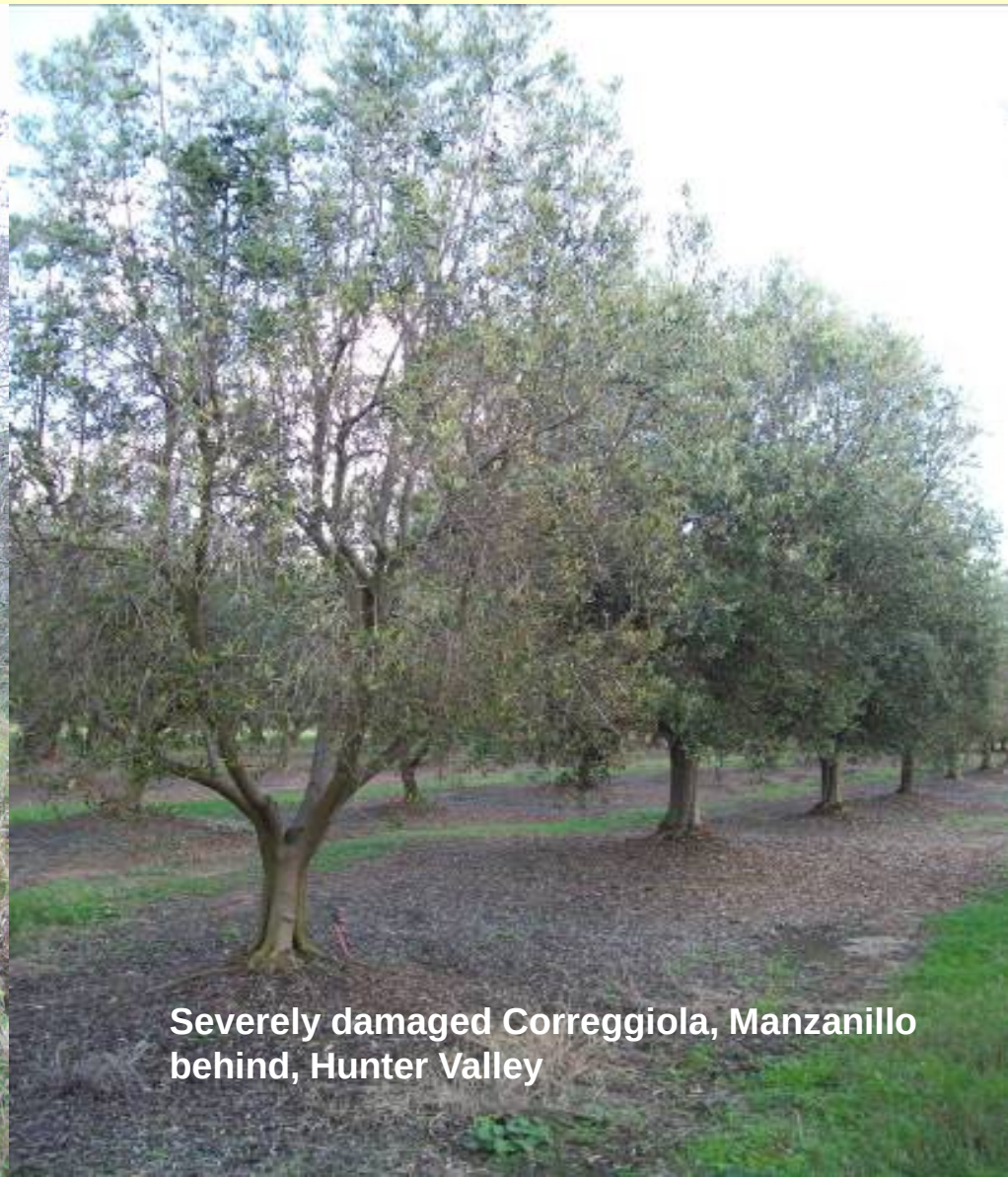
Mixed nymphal instars of *F. olivinia*

OLIVE LACE BUG LIFE CYCLE

Olive lace bug damage

Field damage by OLB- leaf drop, twig and even tree death

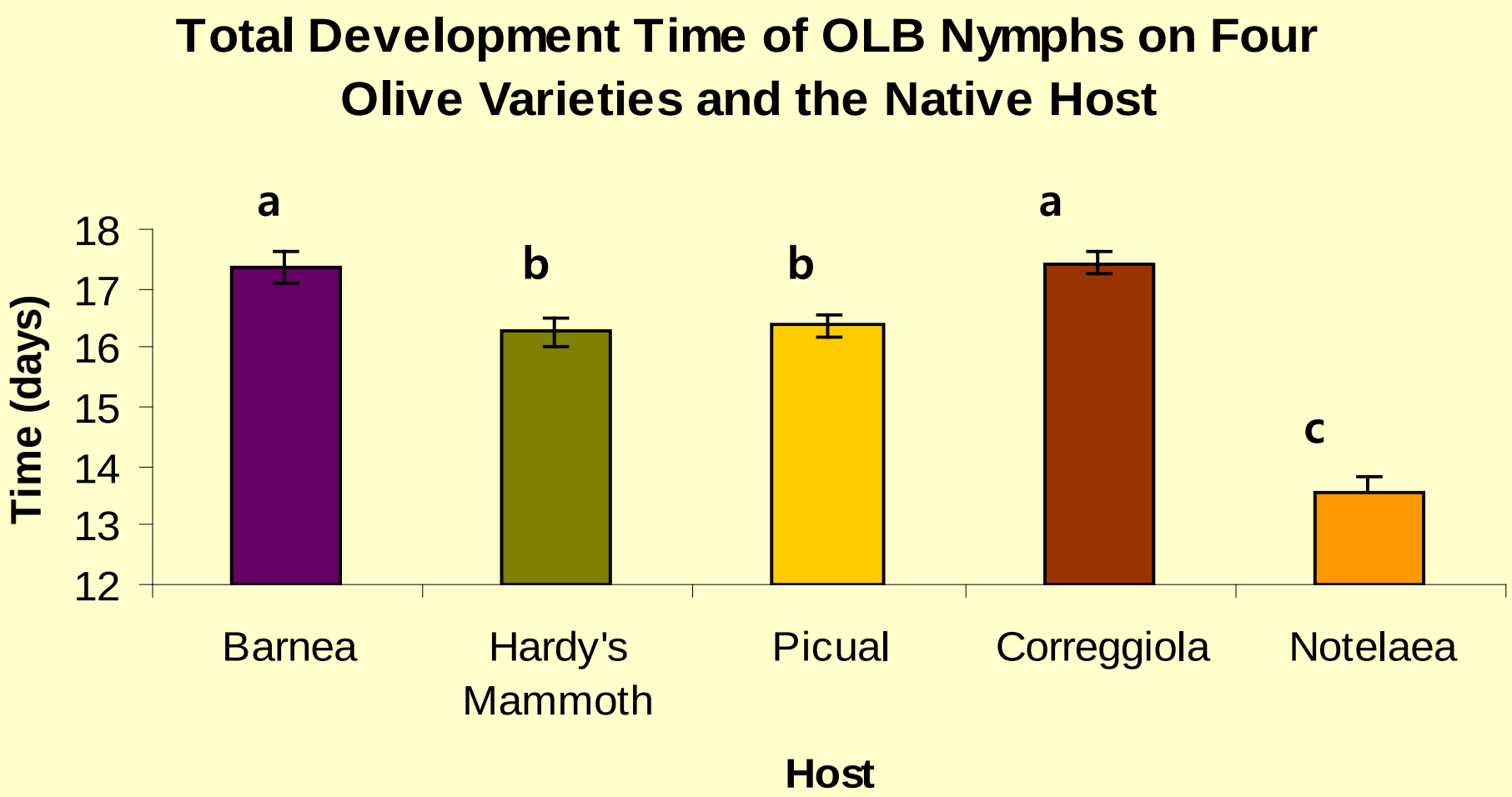
Severely damaged UC trees, SE Qld



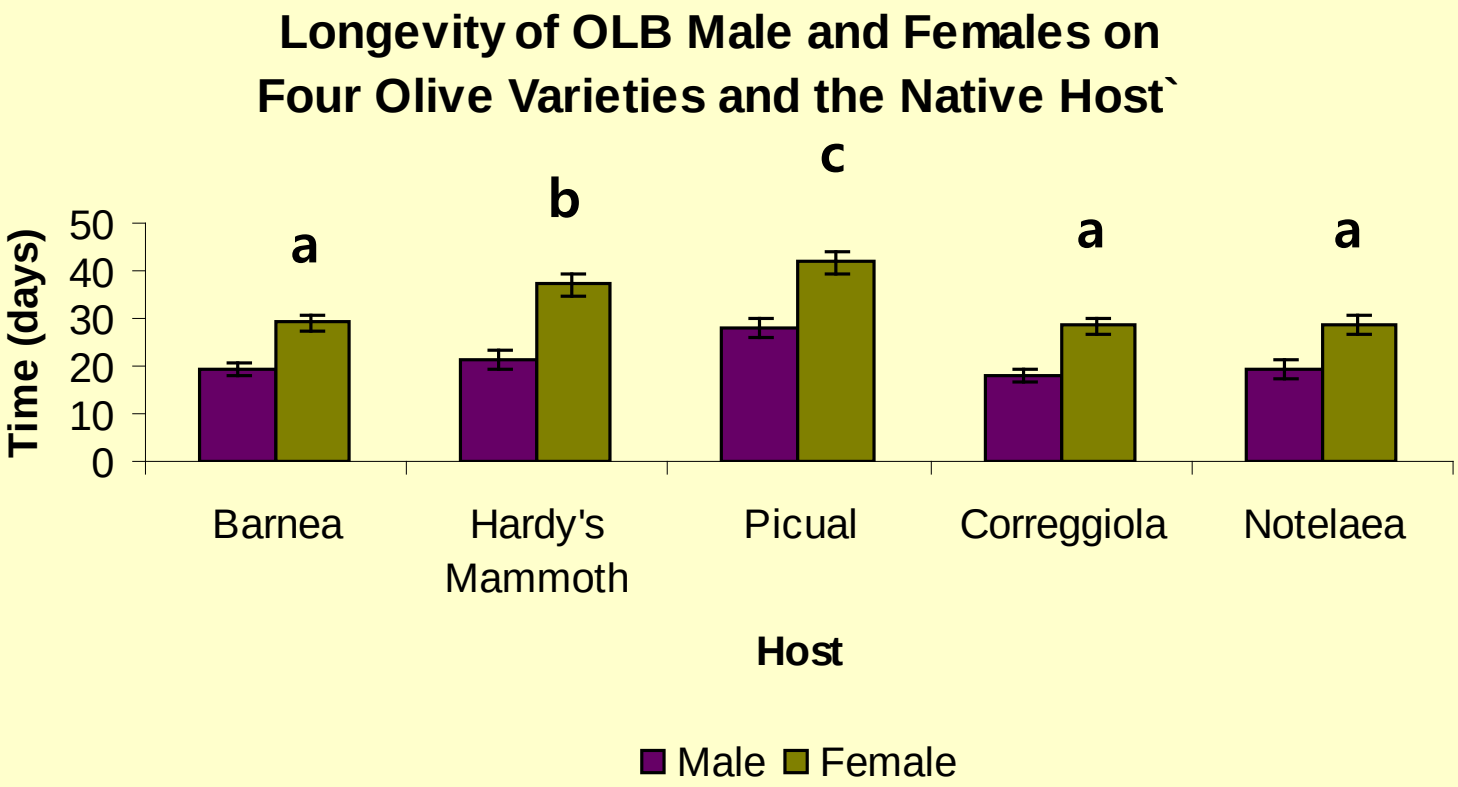
Severely damaged Correggiola, Manzanillo behind, Hunter Valley

- All motile stages have piercing and sucking mouthparts
- Nymphal stages are clustered on undersides of leaves
- Adults less clustered, fly short distances

OLB nymphal development at 26°C



Effect of variety on OLB male and female longevity at 26° C



CURRENT PESTICIDES ABLE TO BE USED AGAINST OLIVE LACE BUG

PRODUCT	PERMIT	CONDITIONS OF USE
Fenthion	PER10455	Olive nursery stock- Quarantine treatment WA
Fenthion	PER11782	Until March 2011 Also green vegetable bug, Rutherglen bug, fruit flies
Natrasoap	PER11152	Until Sept. 2013
Dimethoate	PER11780	Until March 2011. Also green vegetable bug, Rutherglen bug

LIKELY CANDIDATE CHEMICALS FOR EVALUATION AGAINST OLB

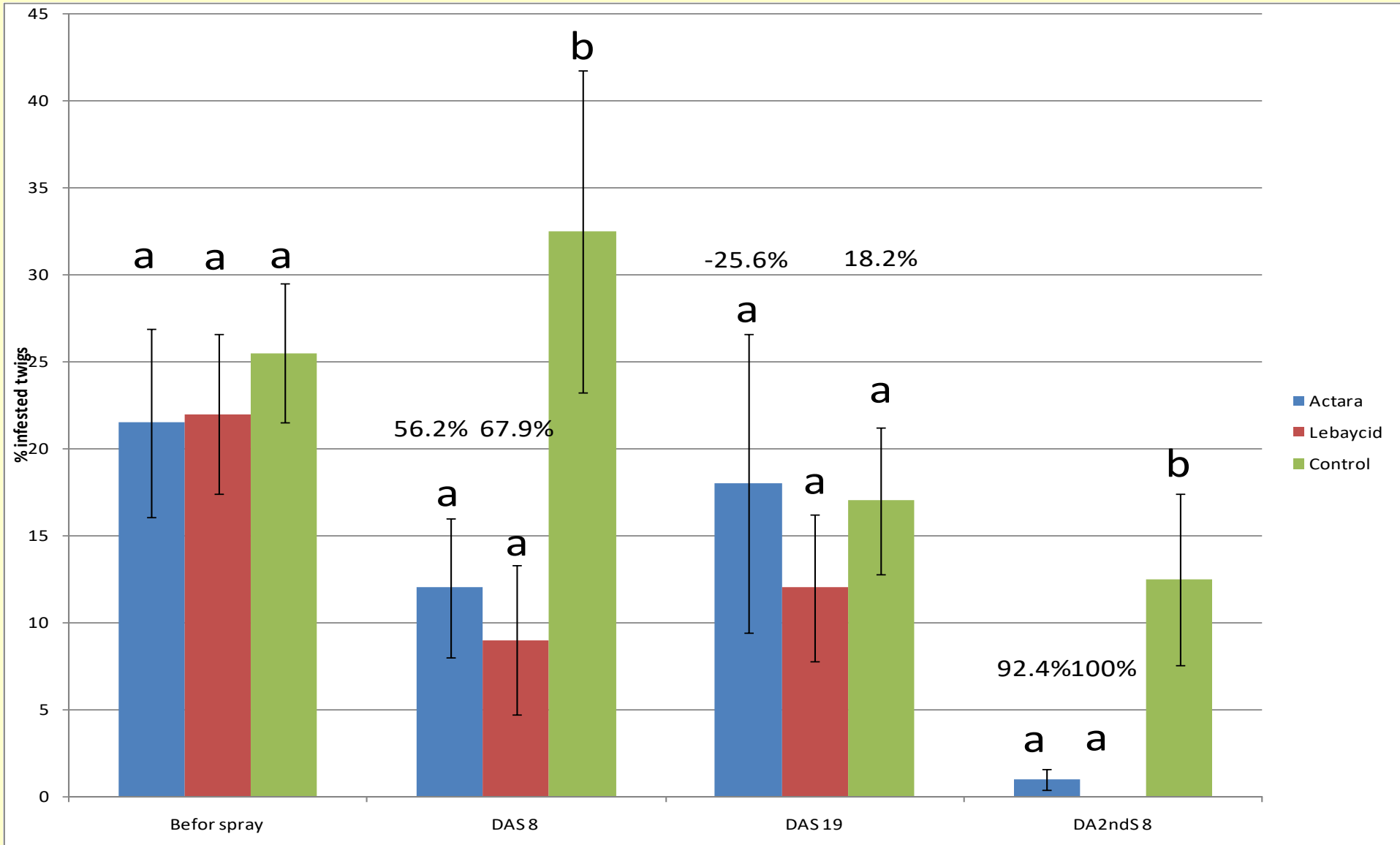
- **Thiamethoxam, Actara® (Syngenta)**
  Applied as foliar application 1-2 times 7-14 days apart

- **Clothianidin, Shield® (Sumitomo)**
  Applied as foliar application or root drench

- **Industry standard Fenthion, Lebaycid ®**
  (based on European information, not the best choice)

RESULTS FROM FIELD TRIAL AGAINST OLB, HUNTER VALLEY OCTOBER 2009

Percentage infested twigs per tree before treatment, 8 and 19 days after the first treatment and 8 days after the second treatment. Sprays applied 19 days apart.



NEW INVESTIGATIONS ON OLB

• Recent trials suggest single sprays of Actara and Shield reduced OLB by >90%, cf. Lebaycid ~70%

• New investigations on biology of lace bug, especially origin of grove infestations (Visiting Chinese scientist)

•Non-chemical management of OLB- biological control (green lace wings etc.), on small scale, removal of leaves infested with nymphs/eggs

Green lace wing larva with OLB nymph

PROJECT COMMENCED LAST SEASON and WILL RUN UNTIL END 2012

AIMS:

- **Select suitable chemicals for field evaluation**
- **Develop evaluation protocols to provide suitable data for permits/registration by APVA**
- **Generate field data on efficacy, residues in fruit/oil (with manufacturers)**
- **Provide olive industry with understanding of protocols and procedures for field evaluation of agrichemicals**
- **Collaboration between UWS and AgAware P/L**

CALL FOR GROWER PARTICIPANTS

We are still seeking groves for field trials associated with the project

Requirements

- Regular historical incidence of olive lace bug and/or olive fruit rots (particularly anthracnose)
- Commercial, bearing grove
- Member of AOA
- Manager or trained support to assist in application of pesticides etc
- Willingness not to harvest from the trial trees (normally 4-5 replicates of 1-3 trees per treatment, up to 5 treats)

ACKNOWLEDGEMENTS

WE THANK THE RURAL INDUSTRIES RESEARCH & DEVELOPMENT CORPORATION THE AOA AND NUFARM AUSTRALIA FOR FUNDING SUPPORT.

Australian Government

Rural Industries Research and Development Corporation

BACKGROUND TO NEW RIRDC PROJECT

- **AROSE FROM SARP PROJECT**

AOA/RIRDC SARP R&D meeting, Melbourne October 2008

Identification of key pests/diseases without adequate legal chemical management options

KEY PESTS/DISEASES IDENTIFIED

- **Fruit rots, including anthracnose**
- **Olive lace bug**

FACTORS FOR SELECTION OF CHEMICALS

- New chemistry rather than old chemistry
- Safety for environment and humans (growers/ consumers)
- Compatible with IPDM and “healthy” image of olive products
- Efficacy
- No major residue problems in olives or oil
- Relative ease to obtaining permits/registration from APVMA
- Preparedness of manufacturer/distributor to support its use in olives