### Potential vectors of exotic Xylella fastidiosa in Australia

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Innovation

Hort

Australian Government







PLANT BIOSECURITY **RESEARCH INITIATIVE** 

### Xylella fastidiosa (Xf)

- Xylem-limited, plant pathogenic bacteria
- Exclusively transmitted by xylem feeding insect
- There are at least four recognized *Xylella* subspecies which infect several plant species inflicting different types of symptoms.
- Affects number of economically important plant species worldwide, not present in Australia
- For most plant species, Xf does not cause disease nor reaches high populations within a host
- For few plant species, presence of *Xf* results in symptoms expression and systemic and chronic infection
- *Xf* inhabits xylem vessels, multiplying and clogging, which results in restricted flow and water stress
- Xf symptoms are often host specific





















#### *Xylella fastidiosa (Xf)* vectors

#### *Homalodisca vitripennis* (glassy-winged sharpshooter)



#### Philaenus spumarius (meadow spittlebug)





# Support the development of effective vector monitoring, surveillance and control strategies for *X. fastidiosa* by:

- Identifying potential vectors (obligate xylem feeders) of *Xylella* in Australian plant industries at risk
- Determining the critical times of the year when potential vector populations peak and the spread of *Xylella* can be most rapid
- Understanding of the biology and population dynamics of potential vectors
- Understanding the feeding behaviour and plant host range of potential vector species
- Update the revised National Diagnostic Protocol for *Xylella* to include a vector component for isolation of pathogens and molecular analysis of samples.

#### *Xylella vectors project aimed to:*

Provide the tools and knowledge to mitigate the potential spread of *Xf* in Australia by understanding biology and population dynamics of potential vectors of *Xf* in grapevines, olives and citrus plantations











Vineyard	No. Leafhoppers planthoppers & treehoppers						
All Saints Estate	64						
Pfeiffer Wines	118						
Scion Wines	220						
Buller Wines	55						
Fighting Gully Road	20						
Brown Brothers	40						
Pizzini Wines Organic	10						
Pizzini Wines	0						



#### Survey in North-East Victoria





#### Bathyllus albicinctus



Olives, Grampians VIC





#### Incidence of *Bathyllus albicinctus*

2019												
2020												
2021												
2022												
2023												
	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec

#### Colony of *Bathyllus albicinctus*

- Sweep net collections and direct collections
- Transplantation of host plants
- Insect cages
- Multiple plant species
- Hight mortality rate with in 24 hours for adults







# Development and survival of *B. albicinctus*





Max. of Survived (days)









Second





#### Probing

Mean time (min) from the beginning of the recording until the:

- first probe,
- mean time from 1<sup>st</sup> non probing until first xylem contact (Xc)
- xylem ingestion (Xi).

Mean time to 1st probe
Mean time from 1st np to 1st Xc
Mean time from 1st np to 1st Xi

30



#### Xylem ingestion

- All the insects were able to perform sustained xylem ingestion (longer than 5 minutes),
- Duration of xylem ingestion (Xi and Lf waveforms) represents
   62.6% of the total duration of the recordings

# Mean Xc duration Mean Xi duration Mean Lf duration

180



#### Xylem activity and Xylella transmission

Xe waveform, egestionis represents *X. fastidiosa* transmission

Xe waveform was observed in insects feeding in all the tested plants.

Percent of insects that performed Xe waveform:

- 43% orange
- 28% olive
- 50% grapevine



- *Bathyllus albicinctus* persists in olives, citrus and vineyards
- Feeds on olives, citrus and grapevine
- Performs feeding activity indicative to transmission of Xylella

## Acknowledgments

