

**Hort
Innovation**

Xylella fastidiosa: New R&D towards preparedness

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GM Trade & Biosecurity R&D

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Photo credit: Toni Chapman, NSW DPI



Australian horticulture at a glance

\$16 billion

Total production value of Australian horticulture in 2021/22

17 per cent

Horticulture's share of total agriculture production value

116,900

Total number of people employed in Australia's horticulture sector in 2021/22

12,105

Approximate number of Australian horticulture businesses in 2020/21

Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australia's horticulture industry

- **We advance** Australia's \$16 billion horticulture industry by investing in research and development, marketing and trade to build a prosperous and sustainable future for growers.
- **We partner** with Australian and international co-investors including government, leading science, technology, and consumer strategy experts to anticipate future challenges and opportunities.
- **Our role** is to capture value from the investments we make to benefit all levy payers.



Our guiding strategy

OUR VISION

A prosperous and sustainable Australian horticulture industry built on innovation

OUR STRATEGIC IMPERATIVES

Enhance and safeguard supply

- **PRIORITY 1.1**
Lead world-class innovation to ensure Australian horticulture is globally competitive
- **PRIORITY 1.2**
Partner with industry on their sustainability priorities and research needs to support social and environmental stewardship
- **PRIORITY 1.3**
Excel in breakthrough research to strengthen industry's readiness for existing and emerging opportunities and threats
- **PRIORITY 1.4**
Collaborate with industry to bolster resilience and future-proof supply chain disruptions

Accelerate local and global demand

- **PRIORITY 2.1**
Access and expand high-value markets to deliver profitability and sustainability for industry
- **PRIORITY 2.2**
Drive consumption through high-impact, evidence-based domestic and export marketing campaigns
- **PRIORITY 2.3**
Deliver valuable data and insights that transform decision making
- **PRIORITY 2.4**
Advance solutions to reduce and utilise waste to deliver new revenue streams for growers

Maximise and diversify investments

- **PRIORITY 3.1**
Partner with industry to deliver Annual Investment Plans ensuring industry levy-funded projects deliver impact at scale
- **PRIORITY 3.2**
Build strategic partnerships to deliver bigger, bolder investments in innovation for Australian horticulture
- **PRIORITY 3.3**
Create a flexible investment framework attracting new partners and alternative funding resources

Make the culture thrive

- **PRIORITY 4.1**
Collaborative and customer focused
- **PRIORITY 4.2**
High performance, inclusive culture
- **PRIORITY 4.3**
Empower our people
- **PRIORITY 4.4**
Invest in industry capability

Work simply and effectively

- **PRIORITY 5.1**
Quality compliance and governance
- **PRIORITY 5.2**
Transparent relationships
- **PRIORITY 5.3**
Minimise complexity

OUR GOALS

- **Foster collaborative relationships**
– stakeholder engagement > 60 per cent
- **Strong teamwork and shared purpose** – employee engagement > 70 per cent
- **Deliver real impact for growers** – Benefit Cost Ratio > 5:1
- **Live our values** – focus on our customers and innovation
- **Satisfaction with service** – partner and member rating > 60 per cent
- **Execute for industry** – Strategic Investment Plans delivered on time and on budget
- **Help grow value** – preference for Australian horticulture in key markets
- **Be ambitious** – 100 per cent annual investment target and attract new partners



Trade & Biosecurity investment

\$150M

Hort Innovation is currently investing more than \$150 million into initiatives that support Australian horticultural **trade & market access**

\$130M+

Hort Innovation is currently investing more than \$130 million over 44 projects on **biosecurity** (excluding pollination)

Biosecurity along the spectrum of management



Xylella fastidiosa:

Australia's Number 1 Exotic High Priority Plant Pest



Cost to Australian producers:
\$1.2-\$11.1 billion over 50 years

Why the large investment in *Xylella*?

An outbreak would cost Australia \$1.2-\$11.1 billion over 50 years*

Xylella fastidiosa (Olive quick decline) is Australia's **#1 Exotic High Priority Plant Pest**

Estimated cost to the Olive Industry: \$55-\$273 million*

It is a bacterium that affects many crops and other plants

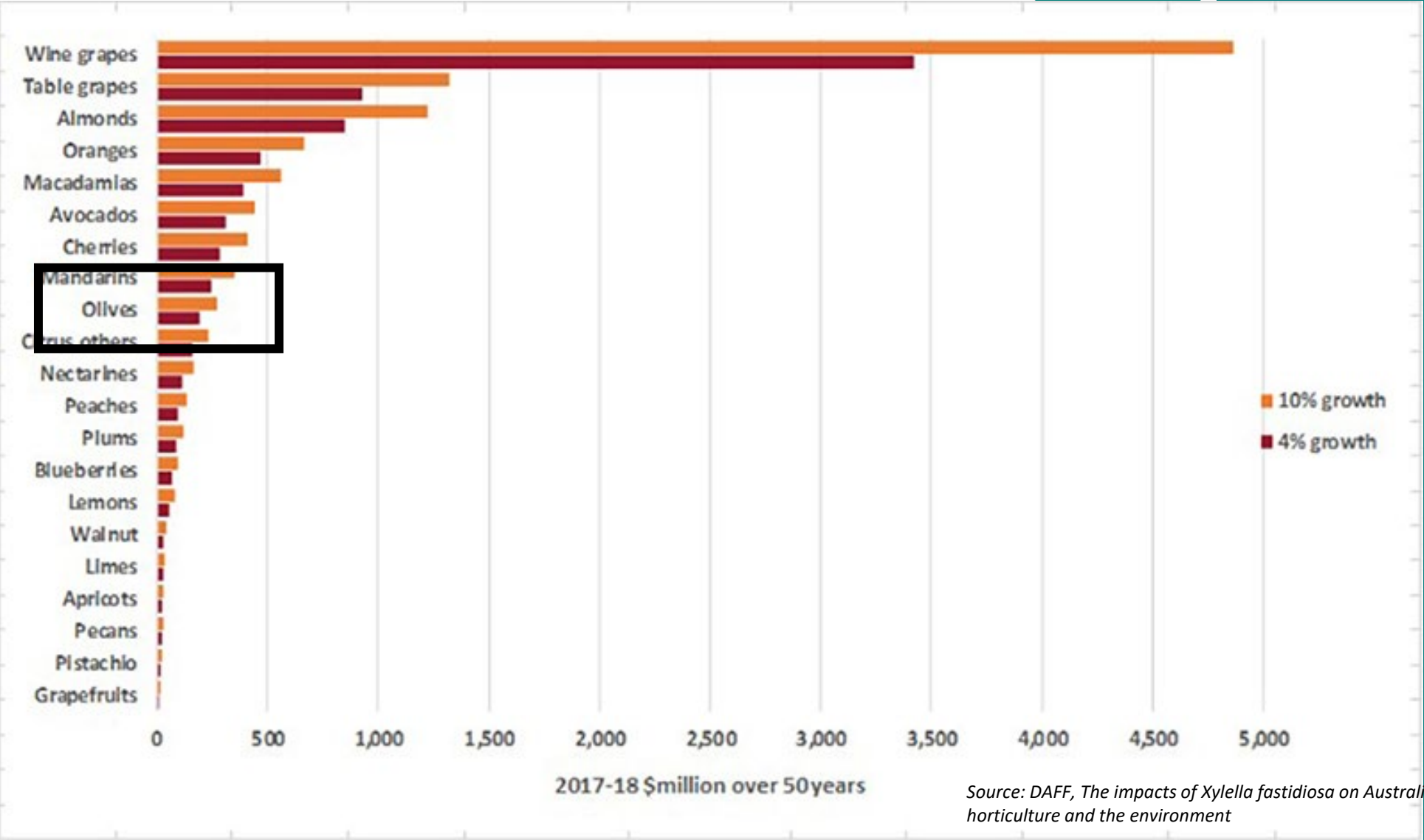
Spread by insects and grafting

**Source: DAFF, The impacts of Xylella fastidiosa on Australian horticulture and the environment*



Photo credit: Toni Chapman, NSW DPI

Potential cost to industry



Source: DAFF, The impacts of Xylella fastidiosa on Australian horticulture and the environment

Xylella investments by Hort Innovation

Hort Innovation has invested over \$10 million in 4 projects since 2018

Coordinated projects to develop rapid diagnostic tools, technologies and protocols to support early detection and surveillance

- *Xylella* Coordinator - communication
- Diagnostics - identification
- Insect vectors - surveillance
- Gene technology - control (RNAi)



Photo credit: Toni Chapman, NSW DPI



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Xylella in olives: a series of unfortunate events

Olives are only a recent host for *Xylella*

Unknown in Olives until it was found in Italy

- Thought to have been present in the Puglia region since 2008
- A single infected coffee plant from Costa Rica was all it took
- Spittlebugs fed on the coffee plant then moved to olives
- This is believed to be the only time X.f. has jumped to olives
- Only this strain spreading through olives
- Superspreader event: insects can infect a tree multiple times through feeding, overwhelming the immune response
- Italian growers in the infected zone are replanting with resistant cultivars

Plant Biosecurity Research Initiative (PBRI)

Cross-RDC projects

PBRI is a cross-RDC/DAFF vehicle for co-investment in plant biosecurity research

It enables the leveraging of industry funds with other affected industries such as wine

A multi-crop pathogen such as *Xylella* is the perfect focus for PBRI investment

Hort Innovation, Wine Australia, B3 New Zealand are investing in projects identified in the Commonwealth's *Xylella* National Action Plan

PLANT BIOSECURITY
RESEARCH INITIATIVE



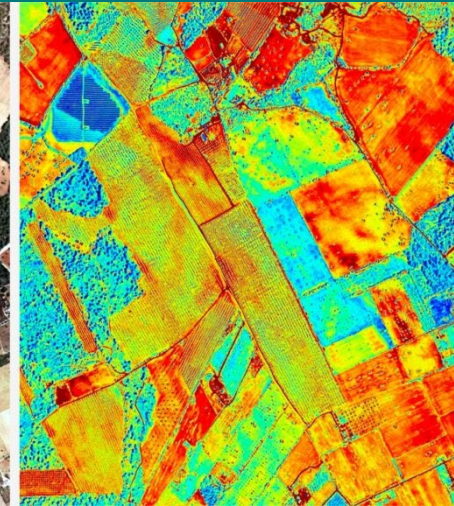
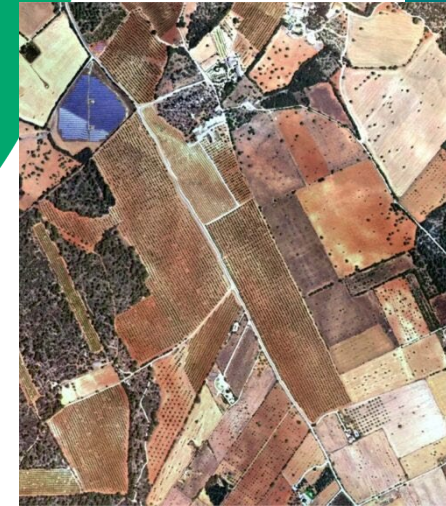
Plant Biosecurity Research Initiative (PBRI)

Cross-RDC projects

- **National Diagnostic Protocol** - Having the most sensitive and accurate test on hand to avoid any delays in diagnosing *Xylella* if it was detected in Australia.
- **Insect vectors** - Understanding if we have similar insects that may spread *Xylella* in Australian growing regions.
- **Extension and Communication** – A *Xylella* coordinator was appointed to create awareness for growers and identify gaps in the National Action Plan.
- **XF Actors (Euphresco)** - early detection of *Xylella fastidiosa* in dormant plant material
- **BeXYI project (EU project)**– remote sensing for *Xylella* symptoms Australian sub-project (proposed).



BEXYL
BEYOND XYLELLA



Plant Biosecurity Research Initiative

Ensuring Australia has access to the latest *Xylella* knowledge by continually engaging with international researchers and policy makers:

- MOU with Euphresco (European equivalent of PBRI), connecting Australian & European researchers
- FAO meeting in Bari, Puglia on transboundary pests including *Xylella* and Fall armyworm 2023
- Field trip to olive orchards and nurseries in the Puglia region, 2023
- *Xylella* Conference, Ajaccio, 2019





Xylella live cultures

Collaboration with NZ vital

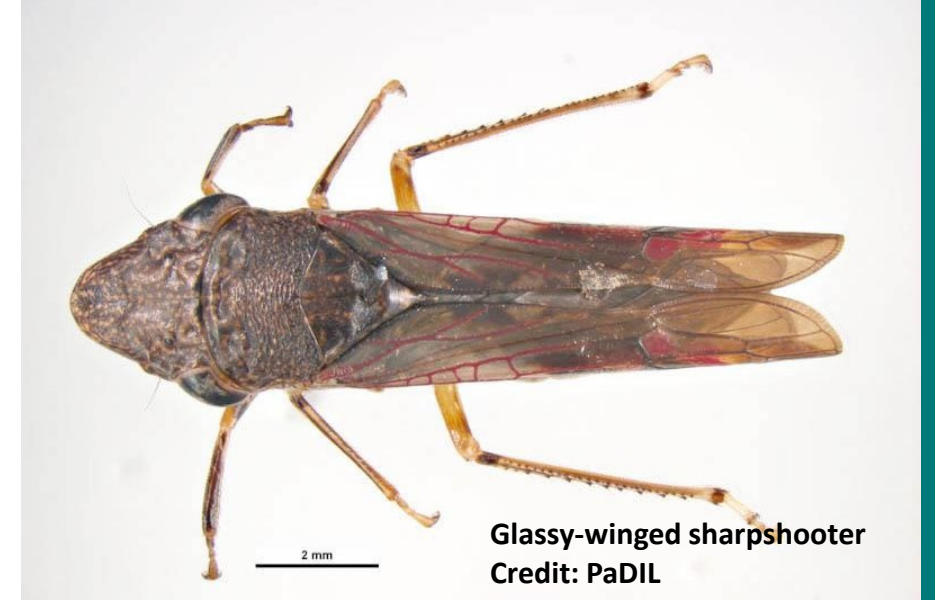
Establishment of *Xylella* live cultures & DNA library

- New Zealand imported 22 live cultures
 - Includes 1 x *Xylella taiwanensis*
 - Additionally, infected leaf tissue samples for DNA extraction
- DNA extracts from these are now held around Australia
- Assembled genomes for 97 publicly-available strains
 - Important to check sequence strains during an incursion response
- Australia (NSW DPI) imported live cultures under strict conditions in mid-2023 following a change in Australian import conditions on live, exotic cultures

Understanding Australian plants & insects

What are our local risks?

- Identify potential **local insect vectors** and confirm whether they can acquire and transmit *Xylella*
- This needs transmission experiments, which require **international collaboration**
- Identify **feeding preferences of known vectors overseas** to determine their risk to Australian and New Zealand natural environments and crops
 - New Zealand has one known vector but does not have *Xylella*
- Improve our understanding of plant-vector interactions
- Evaluate **testing protocols for *Xylella*** in potential local insect vectors
- Identify susceptibility of native plant species to the different *Xylella* species, subspecies and sequence types





Gene technology for control of *Xylella*

RNAi vaccines

Immunising citrus trees with Silvec Biologies' RNA-based tree vaccine

End game is trees with level of **resistance** against pathogen and disease = preparedness and response

Healthy, thriving trees that live with the bacterium under control

Co-investment through Hort Frontiers and leveraging existing overseas research

Dr Toni Chapman, NSW Dept. Primary Industries



Department of
Primary Industries



International collaboration

Valuable international network of experts

Xylella has brought the world together through the development of a strong, international network to tackle important research and policy challenges

Teams around the world routinely exchange information and host international visitors so that the most up-to-date information is available

In mid-2023, members of the Australian diagnostic project team visited endemic areas for experience in field identification, best-practice plant sampling, and surveillance methods

- Brazil & USA
- Europe (Italy, Spain, France)

Supporting international trade

Using industry-generated data to support area-freedom for European Union

The European Union has put much more **stringent requirements** for **importing certain plant products**

The Australian citrus industry routinely collects data to support its trade program, including *Xylella*

Citrus industry surveillance **data will be used to support Australia's claim of *Xylella* freedom** in 2023

Data from an upcoming blitz will be used by the DAFF to support claims that *Xylella* is absent from Australia

Illustrates the **power of collaboration** between government and industry



National *Xylella* Action Plan 2019–2029



Plant Health Committee

National *Xylella* Action Plan 2019–2029

Sharing responsibility and knowledge

Important work undertaken around Australia

National *Xylella* Action Plan 2019-2029

- Nationally agreed approach to *Xylella* prevention and preparedness
- Annual meeting on progress of the implementation plan
- National Border Surveillance (DAFF) annual survey
- Governments, industries, and research organisations

Recommendations for the future

Recommendations from previous research

Continually review the National Diagnostic Protocol

Ensure all **laboratories have the diagnostic capability** for testing to support surveillance programs

Continue validation of **plant hosts** across different seasons and locations in Australia and New Zealand

Evaluate the methods and **lab proficiency to detect *Xylella*** in samples spiked with live cultures

Refinement of the **rapid LAMP test** for *Xylella*

- Based on a new region identified during the comparison of different *Xylella* isolates
- Improved sensitivity of the test



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Thank you!