Act like it is already here…

How is Australia preparing for Xylella?

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President, Queensland Wine Industry Association

"There's no other better way of letting people understand how bad it is then by saying ***it is the Ebola of the plant world**.*"

www.stanthorpeborderpost.com.au/news/safe-guarding-industry/3750878/

What do we know?

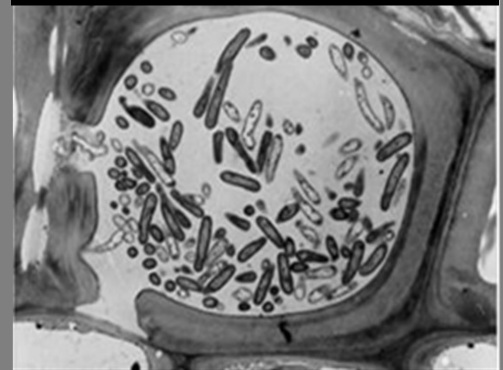
The Basics…

- Australia's Number 1 Plant Biosecurity Threat
- A gram-negative aerobic bacterium found in the xylem tissue of infected plants
- A broad host plant range which produces symptoms similar to water stress…
  - Plant death and dieback
  - Leaf scorch and leaf drop
  - Stunted shoots
  - Reduced fruit size

  <u>Can be asymptomatic for extended periods (1-10 months) in some hosts</u>
- Infection blocks the xylem vessels inhibiting the movement of water and nutrients
- Transmission via:
  - Xylem feeding (Sapsucking) insect vectors
  - Infected plant material

  <u>Negligible risk</u> for transmission by seeds or mechanically

Almond leaf scorch symptoms showing zonate pattern (source: Jack Kelly Clark, UC)



Glassy winged sharpshooter (source: C. Ray, www.invasive.org)

Pierce's disease symptoms (on Chardonnay) (source: J. Clark, UC)

Oleander leaf scorch (source: Francoise Petter, EPPO)

Cherry (source: Donato Boscia, Institute for Sustainable Plant Protection)

Acacia saligna (source: D. Boscia, Institute for Sustainable Plant Protection)

Westringia fruticose (source: D. Boscia, Inst. for Sustainable Plant Protection)

Olive Quick Decline Syndrome (source: Jaap Janse)

Citrus variegated chlorosis (source: M. Scortichini)

Coffee plant (source: Bruno Legendre, Plant Health Laboratory, Angers)

Blueberry (source: Phillip Brannen, University of Georgia)

The Basics…

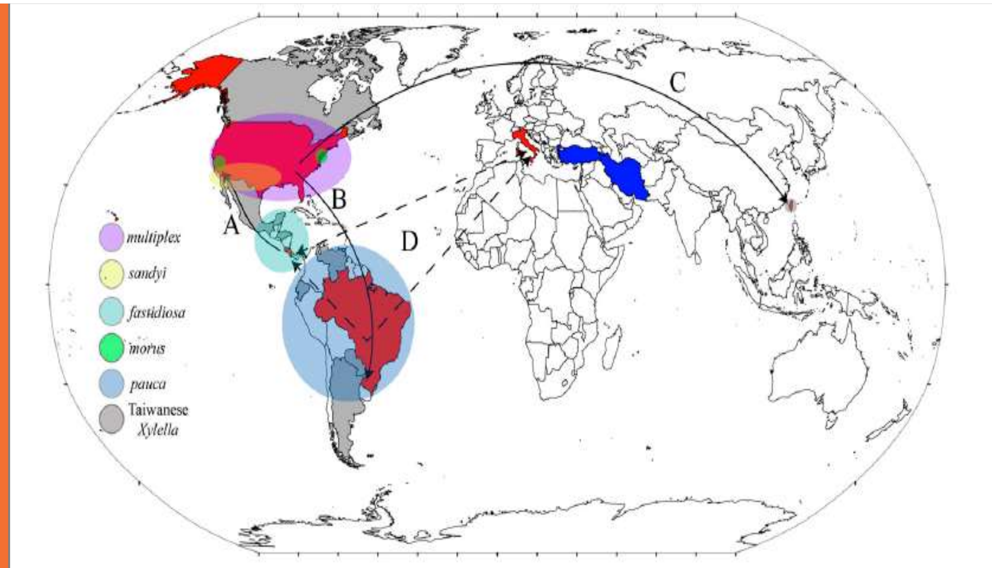
Xylella fastidiosa - 7 sub-species

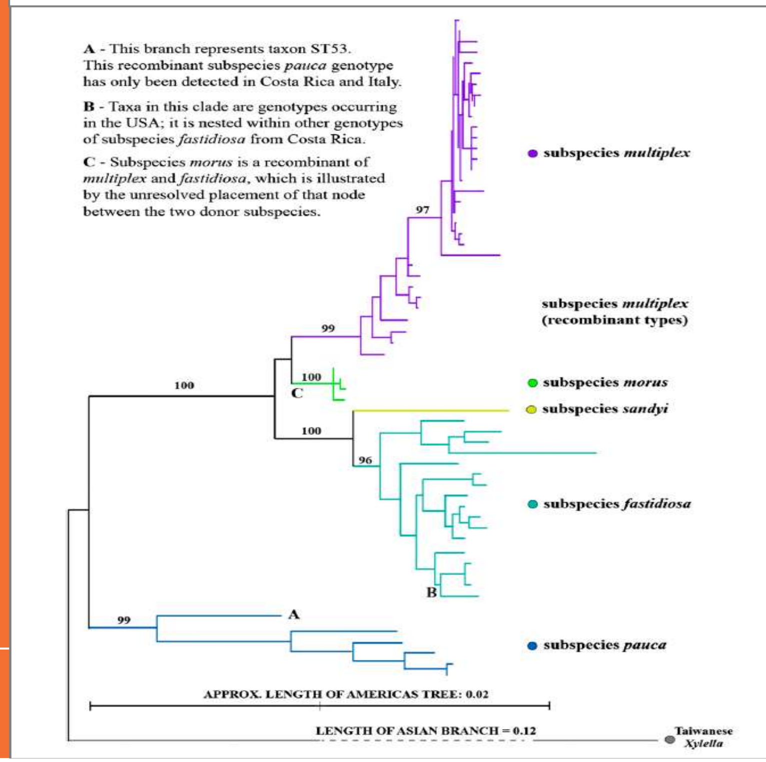
- ***fastidiosa***
- *multiplex*
- *sandyi*
- *morus* (proposed)
- ***pauca***
- *tashke* (proposed)

Xylella taiwanensis

First described in California, near Anaheim, in 1892 as Pierce's Disease

- California vine disease, Anaheim disease (Grape)
- Dwarf disease (Lucerne and alfalfa)
- Phony disease (Peach)
- Leaf scald (plum)
- (Bacterial) leaf scorch (Almond, coffee, elm, maple, mulberry, oak, oleander, sycamore)
- Citrus variegated chlorosis (Citrus)
- Olive Quick Decline Syndrome (Olive)





Further Information:

Almeida, R.P.P & Nunney, L. (2015) *How do plant diseases caused by Xylella fastidiosa emerge?* in Plant Disease, November 2015, The American Phytopathological Society

Denance, N., Briand, M., Gaborieau, R., Gaillard, S. and Marie-Agnes, J. (2019) *Identification of genetic relationships and subspecies signatures in Xylella fastidiosa*, BMC Genomics 20:239

What is at risk?

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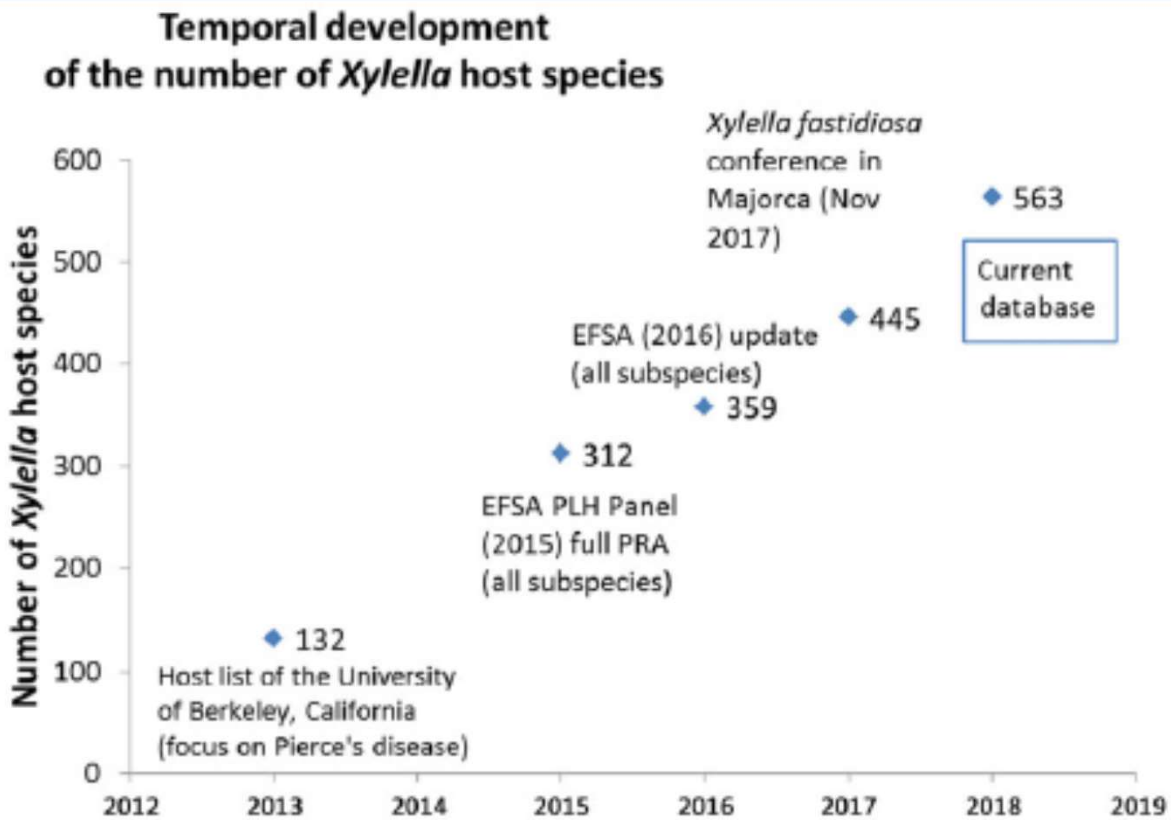

Figure 1: Temporal pattern of the total number of reported *Xylella* spp. host plants (2013–2018)

European Food Safety Authority (2018) *Scientific report on the update of the Xylella spp. host plant database*. EFSA Journal 2018;16(9):5408

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What is at risk?

Subspecies name	Host(s)	Associated disease(s)	Found in
Subsp. *fastidiosa*	Alfalfa, almond, grape, maple	Almond leaf scorch, Pierce's disease of grapevines	North America, Central America, Iran, Taiwan
Subsp. *multiplex*	Almond, blueberry, elm, peach, pigeon grape, plum, sycamore	Phony disease of peach, plum leaf scald	North and South America, France
Subsp. *pauca*	Citrus, coffee, olive	Citrus variegated chlorosis	South America, Italy
Subsp. *sandyi*	Oleander	Oleander leaf scorch	North America
Subsp. *morus* (proposed)	Mulberry	Mulberry leaf scorch	North America
Subsp. *tashke* (proposed)	Chitalpa (ornamental hybrid)		North America
Pear leaf scorch	Pear	Pear leaf scorch	Taiwan

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Where is at risk in Australia?

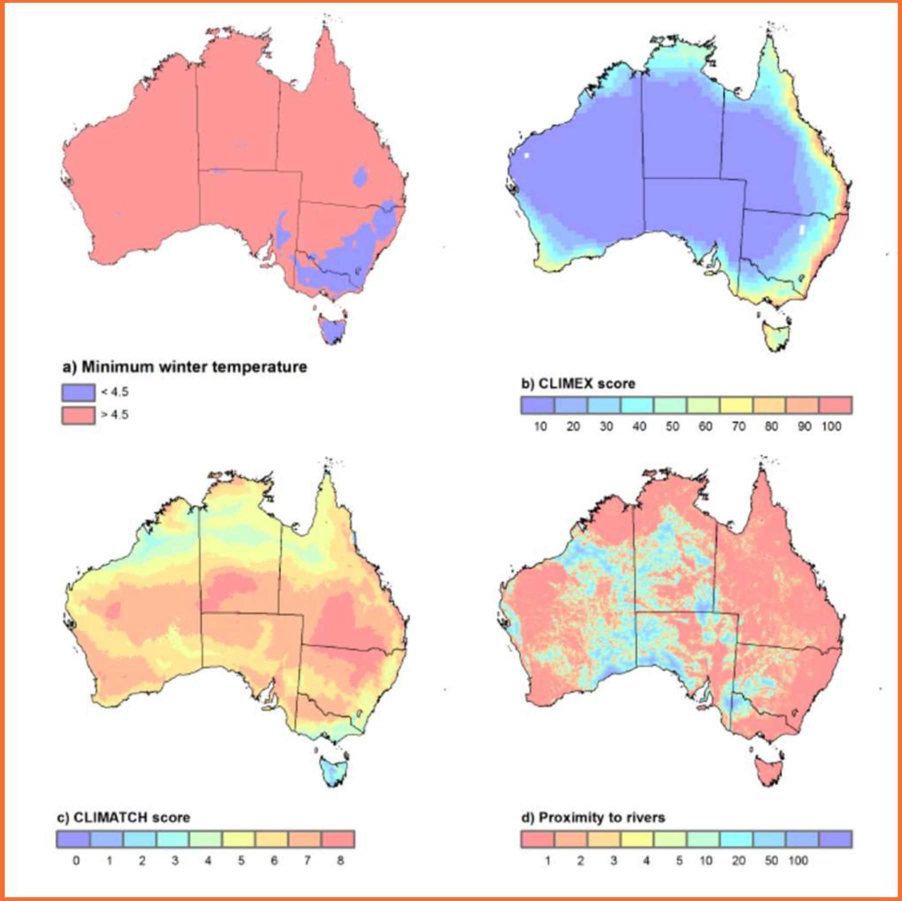
The greatest impacts are found in areas with mild winters

Climate modelling

- Average minimum winter temperature - Not suitable $<1.7^{\circ}$C, partially suitable 1.7-4.5°C, highly suitable $>4.5^{\circ}$C
- Ecoclimatic index score via the CLIMEX habitat suitability model
- Climate suitability score via the CLIMATCH climate matching model

Riparian vegetation

- Assumes linkage between insect vectors and proximity to riparian vegetation (Californian experience)



Hafi, A, Randall, L, Arthur, T, Addai, D, Tennant, P & Gomboso, J (2017) *Economic impacts of Xylella fastidiosa on the Australian wine grape and wine-making industries*, ABARES, Canberra, November

Current Situation

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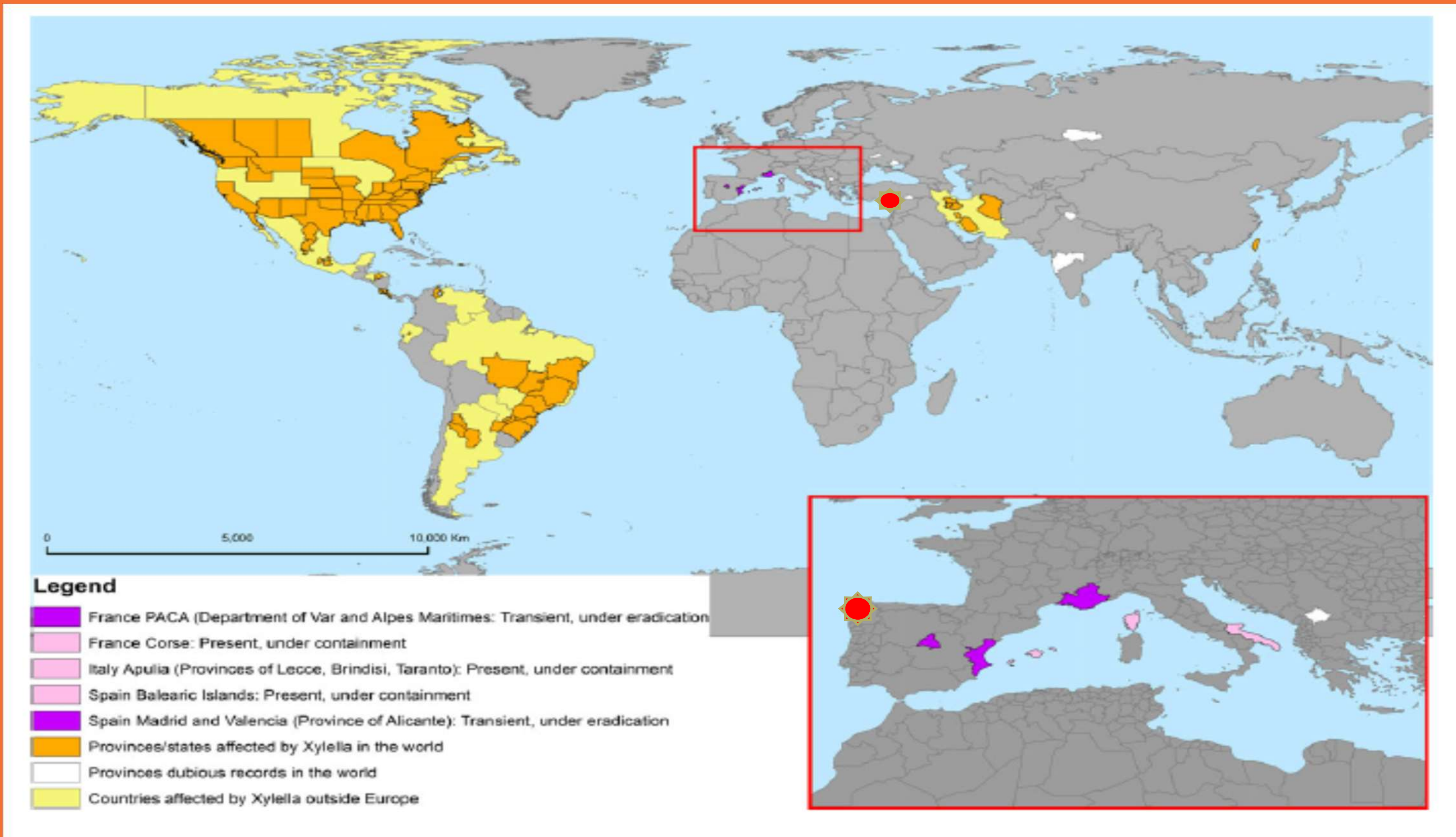

Further Information (including sub-species maps) - EFSA PLH Panel (EFSA Panel on Plant Health), (2018) *Scientific Opinion on the updated pest categorisation of Xylella fastidiosa*. EFSA Journal 2018;16(7):5357

So Why Should We Care?

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Australia is currently free of Xylella

There is no known way of eliminating the bacteria

So Why Should We Care?

Economic

- Pierce's disease currently costs California USD104 million p.a. to manage
- South American citrus regions have lost 44-63% of trees & costs USD120 million p.a. to manage
- 33% of Italian olive producers affected, over 4m trees destroyed across approx. 1 million hectares, lost production estimated at €1.4 billion
- Modelling of Australian grape & wine sector impacts = $2.2 billion -7.9 billion over 50 years

Social

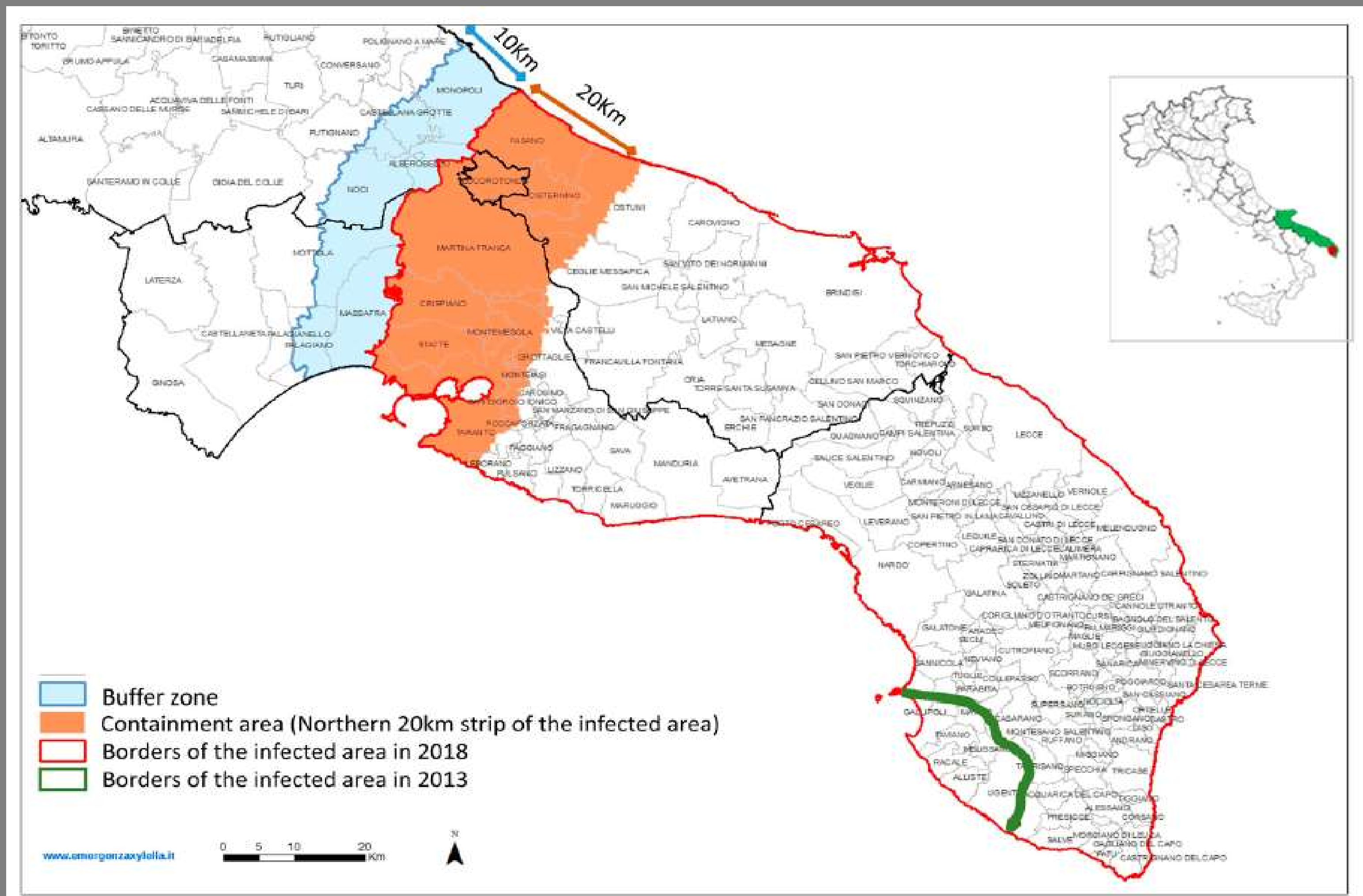
- Loss of livelihoods directly and indirect flow-on effects – social isolation & dislocation
- Loss of cultural icons (Italian monument trees) and generations of effort

Environmental

- Known to infect some Australian native species… remember the Myrtle rust experience

Xylella in Puglia
Olive Quick Decline Syndrome

Xylella in Puglia
Olive Quick Decline Syndrome



What Don’t We Know?

What Don't We Know?

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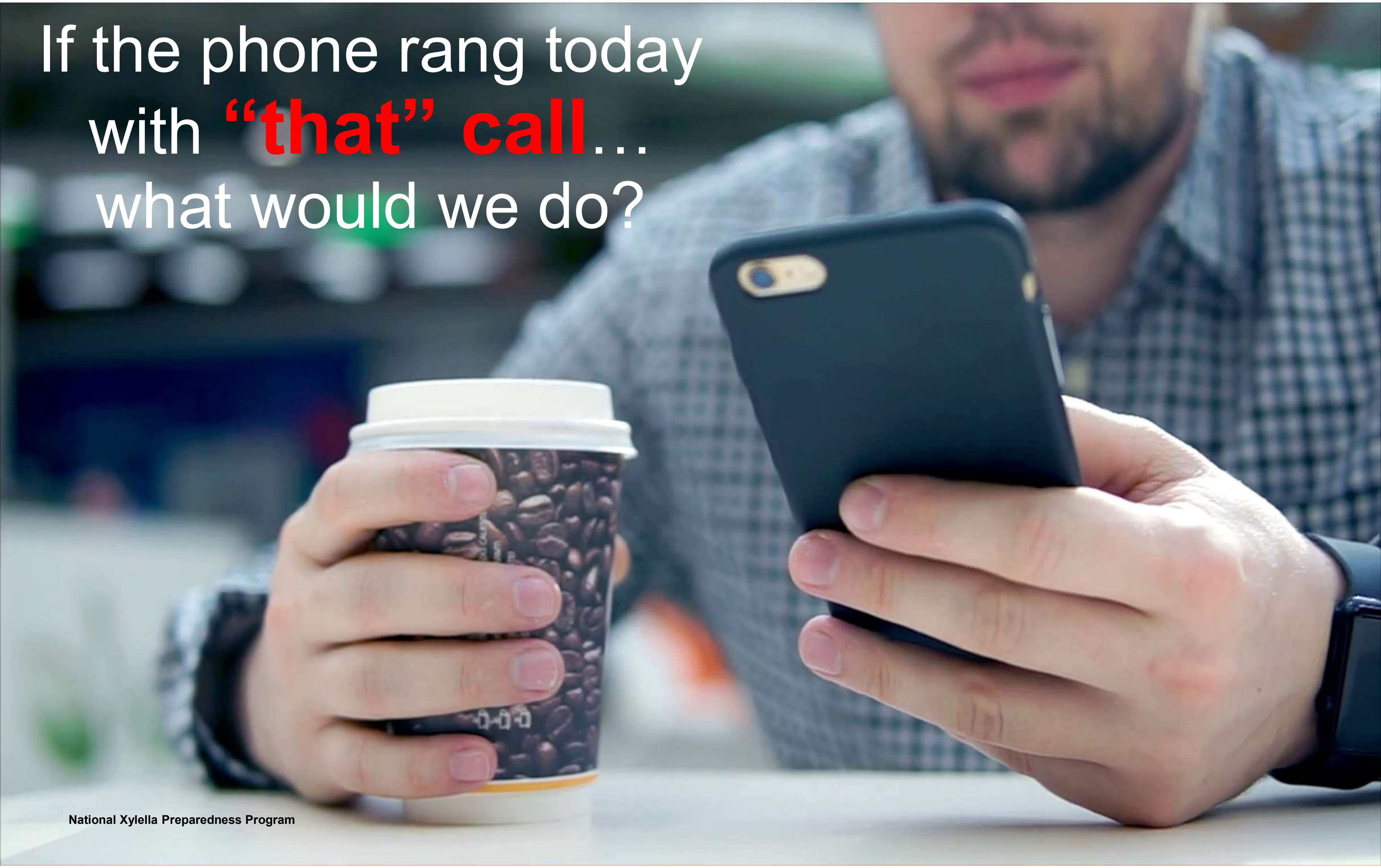
- How broad that host plant range really is
- What the (quantified) level of impact would be on the economy or the environment
- What native insect vectors exist
- How effectively we could deploy sufficient response numbers for operational work and in diagnostics
- How soon would we detect it
- What our operational strategies would be - Size of destruction, containment and movement control zones
- What recovery arrangements we need
- What ongoing management might look like
- What the community (backyard) reaction will be

What are we doing?


If the phone rang today
with **“that” call**…
what would we do?
National Xylella Preparedness Program

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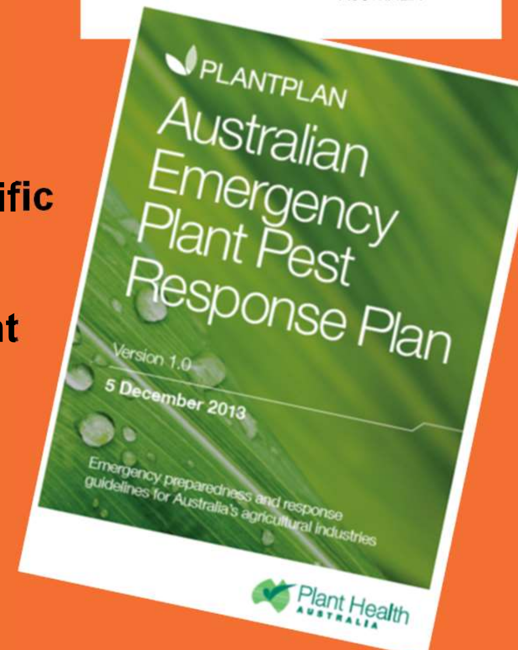
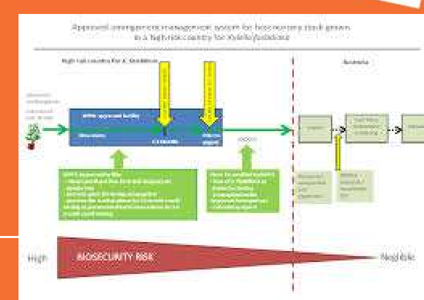
So, If the phone did ring today with the news …

- <u>We have Response Arrangements in place</u> that would be relatively effective
- We have a lot of knowledge and capacity gaps
- Xylella has the potential to have a massive impact on our horticulture sectors
- It has a broad host range
- Xylella has host-specific subspecies – the impact may be limited to specific sectors
- It is transmitted by insect vectors, none of the primary vectors are present in Australia, and through the movement of infected plant material
- There is no way of eliminating the bacteria
- There are some resistant cultivars
- There is massive room for improvement in property-level biosecurity

BIOSECURITY EMERGENCY RESPONSE TRAINING AUSTRALIA





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What Are We Doing

- Xylella (plus *Homalodisca vitripennis* (Glassy winged sharpshooter) and other exotic vectors) are notifiable pests
- Xylella and exotic vectors are prioritised in surveillance programs
- Plant material from risk areas require testing & freedom certification, Approved Arrangements for off-shore testing & certification of nursery stock or 12 mth PEQ screening
- A 3-year Preparedness Program, funded by Wine Australia and Hort Innovation under the Plant Biosecurity Research Institute, has commenced

What Are We Doing

Prevention

- Border regulation
- Pest & pathway risk assessment
- Build Asia-Pacific capacity

Detection

- Local host range identification
- Native vector identification
- Diagnostic capacity & capability
  - *High-throughput capacity*
  - *Updated NDP's*
  - *NGS and e-DNA*
  - *Field-based diagnostics*
- Landscape-scale surveillance methodologies

Response

- National Response Strategy, pre-prepared Response Plan and operational procedures
- Promote tools & systems to capture, store & analyse real-time surveillance
- Develop traceability and 'safe' movement systems

"Cross-cutting" Issues

- Develop linkages with local and international researchers and response agencies
- Map 'suitability' zones for the spread and survival of Xf
- Develop a research agenda
- Assess economic & environmental impacts
- Build awareness

Is there hope of a cure?

Resistant cultivars

- 20+ years of research and genetic breeding by UC Davis = 5 wine grape varieties about to become commercially available + 12 more in the 'pipeline'
- 2 olive cultivars identified – "Favolosa" ("Fabulous") FS-17 and "Leccino"

Potential treatment options being explored

Remember

- Prevention is better than cure
- Hope is not a plan

What do you need to do?

What Do You Need to Do?

Get serious about biosecurity … this is your business at risk

- Make it part of your conversation with neighbours
- Make property biosecurity real (and pressure your neighbours!)
- Have strong and real biosecurity in place for yourself, your workers, visitors and contractors - **#ArriveCleanLeaveClean**
- Insist on safe suppliers and know the source of products - **#Don'tBeSorry**
- Report illegal plant imports & movements
- Report suspect cases
- Monitor your property regularly
- Have a response plan ready

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Act like Xylella is Already Here!