

Phylloxera



Phylloxera on matchstick. Photo courtesy of Agriculture Victoria (Rutherglen).

VINEHEALTH AUSTRALIA TECHNICAL MANAGER SUZANNE MCLOUGHLIN SHARES THE LATEST INFORMATION ABOUT PHYLLOXERA STRAINS AND THEIR IMPACT ON ROOTSTOCK SELECTION, FOLLOWING DISCUSSIONS WITH AGRICULTURE VICTORIA RESEARCHER AND PHYLLOXERA EXPERT DR KEVIN POWELL.

There are several hundred genetic strains of grape phylloxera (*Daktulosphaira vitifoliae*) documented worldwide, and Australia is known to have 83 strains, identified using DNA typing.

Of Australia's endemic strains, about 49 are confined to roots only, around 23 are confined to leaves only, and 11 strains attack both leaf and root material.

"As a grower, it's important for you to know which phylloxera strain has been found on your property, in your region or in a region close to you, to enable an appropriate rootstock selection when planting based on knowledge of phylloxera strain-rootstock interactions," Vinehealth

Australia technical manager Suzanne McLoughlin says.

"In addition, identifying phylloxera down to the strain level can help link new infestations to their source."

Phylloxera strains each come from genetically different ancestry, are of different virulence (aggressiveness) and are potentially suited to slightly different environmental conditions.

Australia's endemic strains are confined to eight geographic regions in parts of Victoria and New South Wales. In some regions only a single strain has been detected, but in others, multiple phylloxera strains have been found.

"Grape phylloxera in Australia are thought to be genetically identical to their parents as

there is no evidence yet of sexual reproduction occurring and therefore no evidence of new strains evolving,” Suzanne says.

“This suggests the historical introduction of these separate lineages of phylloxera and has important implications for management of this pest.

“Current rootstock testing to date has been conducted using six strains – one of each of the strains of the various known lineages of our endemic strains, including G1, G4, G7, G19, G20, G30. More recently, strain G38 has been detected in the Alpine Valleys Geographical Indication and will be added in future rootstock resistance work.”

Results from this rootstock testing are summarised in Table 1.

“As you can see, own-rooted *Vitis vinifera* is susceptible to all endemic and exotic phylloxera strains. However, by comparison, many rootstocks are reported as tolerant to phylloxera which means that the phylloxera can still feed and reproduce on the roots but in lower numbers than on own-rooted *Vitis vinifera* and therefore the vine is not debilitated,” Suzanne said.

“Only some rootstocks actually convey true resistance to phylloxera though, where the phylloxera cannot develop beyond the first instar to the adult stage and cannot therefore lay eggs.”

Table 1 also shows that the level of resistance conferred by a particular rootstock is dependent on the strain(s) of phylloxera feeding on the roots. “Research continues to better understand these phylloxera strain and rootstock interactions,” Suzanne says.

Part of Dr Kevin Powell’s current research is also testing numerous disinfection techniques against the various phylloxera strains. “This is to ensure our National Phylloxera Management Protocol and state Plant Quarantine Standards for disinfection are adequate to kill a range of known endemic phylloxera strains,” says Vinehealth Australia CEO Inca Pearce.

“Vinehealth Australia strongly supports the continuation of this work, to ensure our standard practices remain effective.” ♦

strains matter

References

1. Dry, N. (2007). Grapevine Rootstocks. PGIBSA.
2. Powell, K.S. and Korosi, G.A. (2014). ‘Taking the strain’ - selecting the right rootstock to protect against endemic phylloxera strains. *Acta Horticulturae*. 1045: 99-107.
3. Powell, K.S. and M. Krstic (2015). Phylloxera: Rootstock tolerance and resistance to different genetic strains of phylloxera. *Wine and Viticulture Journal* 30(5): 48-51.
4. Umina P.A., Corrie A.M., Herbert K.S., White V.L., Powell K.S., Hoffmann A.A. (2007). The use of DNA markers for pest management: clonal lineages and population biology of Grape phylloxera. *Acta Horticulturae*. 733: 183-195.

ENDEMIC GRAPE PHYLLOXERA STRAIN	G1			G4			G7			G19			G20			G30		
	IV	G	F															
VITIS VINIFERA (OWN ROOTS)	Red																	
RAMSEY	Yellow																	
SCHWARZMANN	Light Blue																	
BÖRNER	Light Blue																	
110 RICHTER	Yellow																	
1103 PAULSEN	Yellow																	
140 RUGGERI	Yellow																	
5BB KOBER	Light Blue																	
420 A	Light Blue																	
3309 C	Light Blue																	
101-14	Light Green																	
MERBEIN 5489	Yellow																	
MERBEIN 5512	Yellow																	
MERBEIN 6262	Yellow	Yellow	Yellow	Orange	Orange	Orange	Yellow											

Table 1. Resistance ratings of rootstocks to phylloxera strains adapted from Dry (2007) and Powell and Krstic (2015). Susceptibility, tolerance or resistance of various *Vitis* rootstocks to different phylloxera strains, as assessed by in vitro (IV), glasshouse (G) and field (F) techniques.

IV IN VITRO
 G GLASSHOUSE
 F FIELD SITUATION
 Red SUSCEPTIBLE
 Orange SUSCEPTIBLE-TOLERANT
 Yellow TOLERANT
 Light Green TOLERANT-RESISTANT
 Light Blue RESISTANT
 • WORK TO BE COMPLETED