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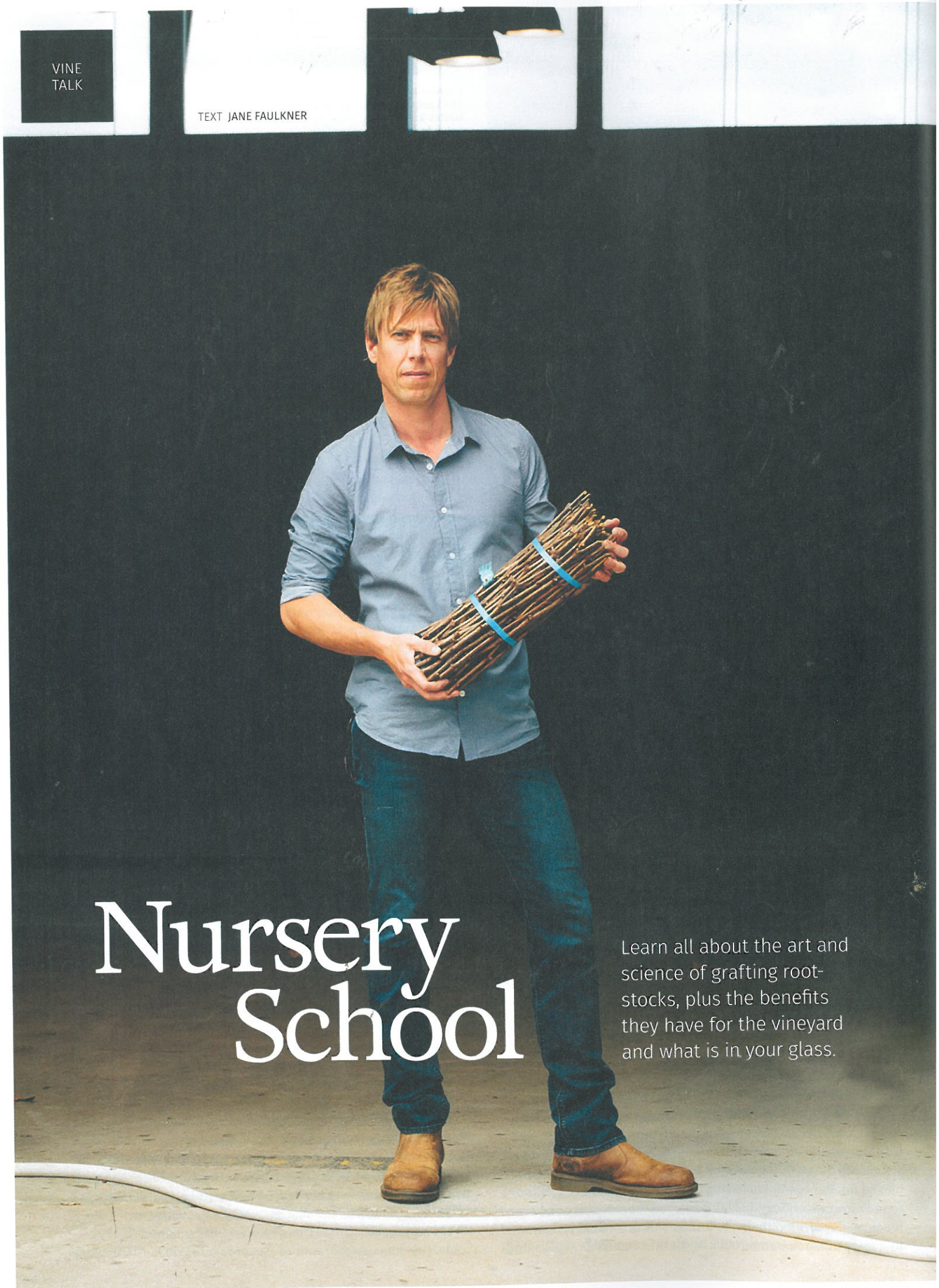


Nursery School

Learn all about the art and science of grafting root-stocks, plus the benefits they have for the vineyard and what is in your glass.

VINE GARDEN
Tending young vines at Yalumba, Opposite: Nick Dry Yalumba Nursery's manager.

There's a chill this morning as the fog stubbornly refuses to lift, lingering instead across the Barossa Valley. In the midst, neatly pruned, dormant grape vines are waiting for spring to bring them back to life and while sparse, there's a calm among the vineyards. Except the peace is soon broken by a click-clack, click-clack noise emanating from a nearby large shed.

It's the sound of vine grafting machines. Click-clack. Click-clack. This is Yalumba Nursery in Nuriootpa and the shed is bustling with activity.

Winemakers think winter is the perfect time for a holiday, but it's not a consideration for Yalumba Nursery manager and viticulturist Nick Dry. This is the peak season and by day's end, his team will have grafted up to 30,000 vines. The target is 1.5 million and there's only a 12-week period to meet it.

While the process is simple, utmost care is needed and it's labour intensive. Sure the German and French bench grafting machines help with the precision cut and join, but it's still very much hands-on.

Welcome to wine's least glamorous side. Although, arguably, it is one of the most important.

To explain the process briefly, rootstocks are selected for their ability to thwart certain pests plus offer viticultural benefits, more on that shortly. The scion or fruiting body features the variety taking in clonal variation. For example, there are about a dozen or so pinot noir clones in Australia such as Abel, Pommard, Bernard 777, 114 and 115 including our own heritage clone, MV6. "From a nursery perspective, rootstock and scion matching is really important," says Dry. "What we are trying to do is match the cambium (tissue) layer of the rootstock with the cambium layer of the scion so we get a nice join."

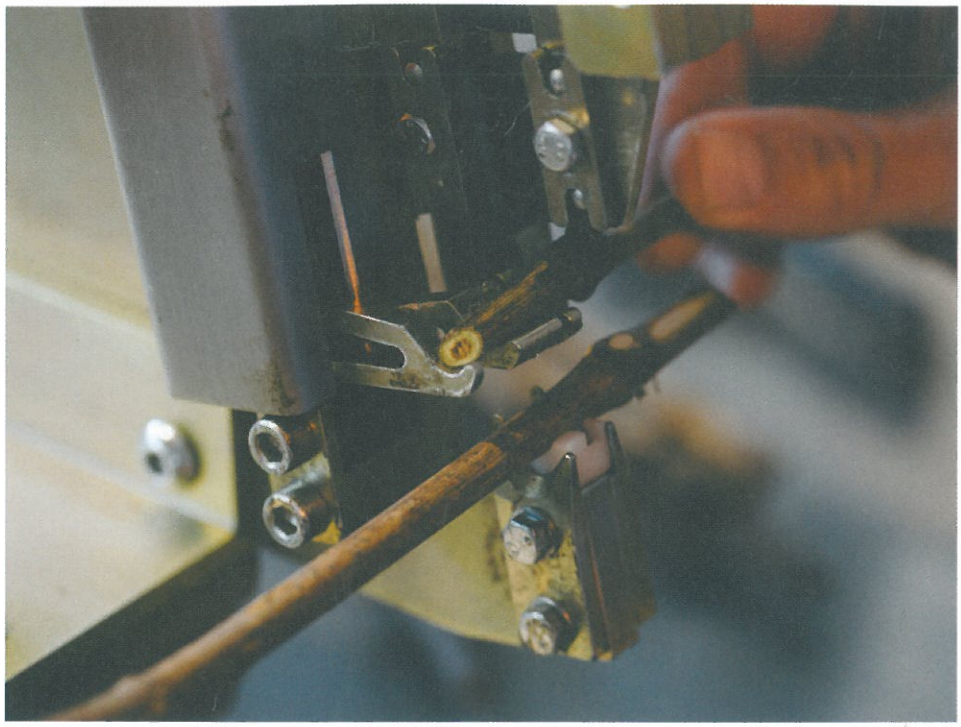
The end result, two small pieces of wood become one via an omega graft, so named because it resembles the last letter of the Greek alphabet and connects snuggly like a piece in a jigsaw puzzle. However, that's nowhere near the end of it as the grafting process involves many layers and takes months.

Rootstocks and grafts are hardly the topic of conversation at hipster bars, actually they barely rate a mention in any wine discussion. So with a glass in hand, it's time to find out why.

At Yalumba, there's a choice of 15 rootstocks, 20 grape varieties comprising 127 clones. For example, if you want shiraz, 14 clones are available.

"We do a lot of trials with different clones and different rootstocks," says Dry. "We offer more than just selling vines. We get quality information on clones and rootstocks so the intellectual property we have at this nursery is hugely valuable and one we're always willing to share with our customers."

What if someone picks a rootstock and variety that Dry thinks might not be



CHOP, CHOP
Yalumba Nursery's vine grafting machine at work.

ideal to the proposed vineyard site? "My job is to advise," he says. "We want to match the stock to the site as best as possible. The clone probably doesn't matter as much, but the rootstock is hugely important and getting that right is what we are aiming to do in order to achieve a balanced vine. Different rootstocks have different inherent characters and vigour levels. It's a calculation."

Although Yalumba Nursery is highly regarded for its expertise and advice, grafting is not foolproof. Dealing with a living organism means Dry has to factor in a certain failure rate, which is consistent across all nurseries. For example, he says if an order comes through for 6,500 vines, 10,000 will be grafted. In other words, the aim is a 60-65 per cent success rate.

And it takes about 15 months from the time of ordering the vines until they are delivered. In a nutshell, this is how it works: Yalumba grow scion stock and 50 per cent of its American rootstock, buying the rest from not-for-profit specialist vine improvement businesses, such as the Riverland Vine Improvement Committee. Once grafted, there's essentially a wound, and the plant's way of healing itself is to form a callus. Dry likens it to scar tissue. The vines are placed into metal bins containing two natural substances: vermiculite and perlite that stimulate the callus and keep the environment damp but not wet. The vines are stored in callus rooms at 80 per cent humidity and 27 degrees celsius. Two weeks later, the scion top gets a wax seal to protect it from the elements ready for planting at Yalumba's nursery vineyard in the Riverland. The following winter, the grafted vines have developed long shoots and roots and are ready to be uprooted and returned to the nursery at Nuriootpa.

Every grafted vine is pressure tested to ensure the union has worked, some don't, and each has also been heat treated to 50 degrees celsius to kill off any external and internal pathogens. Finally, tops and bottoms are trimmed then the newly grafted vines are bundled up in packs of 25 ready for a spring planting. The whole process is fascinating, yet given the level of expertise involved it is understandable rootstocks are not discussed more openly.

While primarily a grafting nursery, Yalumba still sells about 15 per cent of own-rooted vines. The price difference couldn't be more obvious: for orders up to 49, each ungrafted vine is $3 decreasing with larger orders, the least expensive $1.80 each for 5,000 or more. Grafted stock cost almost three times as much: A$8 per vine up to 49 to A$4.95 each for 5,000 or more.

Given the seemingly vast price difference, why bother with grafting at all? Well, partly, for the same reason the practice was introduced more than a century ago – to thwart an opportunistic insect barely the size of a pinhead known as phylloxera. In the 19th and early 20th centuries the pest decimated Europe's vineyards. Depending on the strain, it sapped the life out of the leaves or roots of *Vitis vinifera* (European vines, which we have in Australia), resulting in vine death.

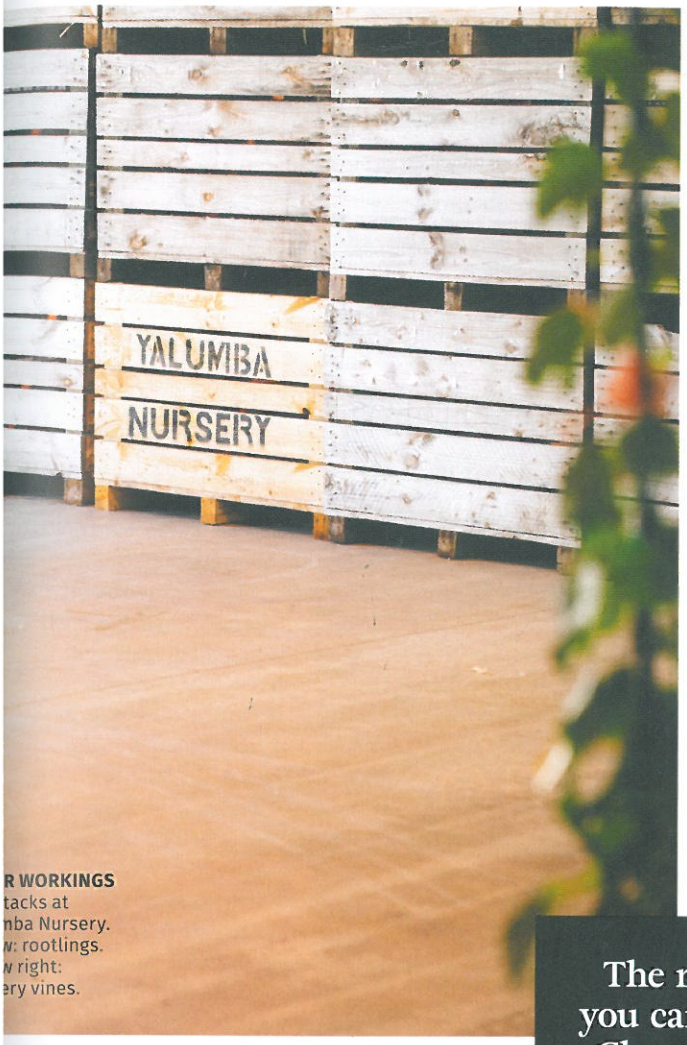
The irony is, it was discovered the damn pest came from America. Thankfully, there was a way to save vinifera vines by grafting onto resistant American rootstock. Today, there are about 70 disparate examples with names only scientists could have dished out, such as 101.14, 3309 Courderc, 110 Richter, 140 Ruggeri, SO4 and so on. They are all hybrids of American species and about 15 are used in Australia.

To put this into perspective, the reason you can enjoy Champagne, Burgundy, Barolo, Brunello di Montalcino, Rioja and much more today is thanks to rootstocks. Aside from a few areas, such as the Mosel, Santorini and parts of Mount Etna, grafted vines are the norm in Europe.

Not so in Australia. While it's difficult to source accurate figures, most vineyards are planted on their own roots. South Australia, for example, has 74 per cent ungrafted vines. That's disconcerting given phylloxera hit in 1877 via Geelong and made its destructive presence felt in six regions across Victoria and two in New South Wales. Every other state and territory is currently phylloxera free.

That it hasn't made it to South Australia is a miracle, but the state's biosecurity measures are first-rate, led by Vinehealth Australia, previously the Phylloxera and Grape Industry Board of South Australia. It takes this menace very seriously stating on its website, "of the pests and diseases endemic to Australia, our greatest biosecurity threat is grape phylloxera". Worryingly, there are several hundred genetic strains and 83 endemic in Australia, including the most widely dispersed and one of the most virulent, the G1 genotype.

Aside from phylloxera protection and as a defence to other soil-borne pests such as nematodes, grafted vines have other benefits, and this is where it gets really interesting. They can be used to improve yield and vine growth or decrease vigour and mitigate vineyard problems with benefits including tolerances against soil salinity, acidity and drought. Rootstock can influence climate and fruit set or ripening, some offer high colour and higher total phenolics with certain scion



R WORKINGS
tacks at
nba Nursery.
w: rootlings.
w right:
ery vines.

BUNCHED UP
Vine cuttings.

The reason you can enjoy Champagne and Burgundy today is thanks to rootstocks.

ON THE GROW
Yalumba Nursery.

Rootstocks protect against phylloxera and they're also a management tool.

varieties, or limit potassium intake, which is a good thing leading to lower wine pH and hence less need for acid adjustment in the winemaking. And much more besides. Proof is all in the science.

So why is it taking so long for producers to adopt rootstocks? The high cost is the main barrier. Surprisingly, plenty of wine folk still regard grafted vines as inferior or rather it's harder to dispel the myth that own-rooted vines are inherently superior. There's actually no proof.

"Rootstocks had a really bad reputation," says Dr Mark Krstic, Australian Wine Research Institute's (AWRI) business development manager, "and that can be traced back to trials in the 1970s and '80s where high-vigour rootstocks, such as Ramsay, Freedom or Harmony, used in table grape production, were grafted to say cabernet in warm irrigated regions. The quality wasn't good and winemakers have associated poor performance based on those trials ever since."

Today, the level of sophistication and manipulation derived from rootstocks is extraordinary and largely thanks to breeding programs and trials led by the CSIRO, the AWRI and other key research facilities. "Twenty years ago we had to prove what rootstocks could do," Krstic adds. "Now the reverse is true – prove to me that own roots produce something better than rootstocks. The evidence isn't there. I can achieve the same or better outcomes with a rootstock." And he's backing that up with science, not hearsay.

The message is slow getting out. Maybe grafted vines are the new frontier when it comes to finetuning, it's all about precision growing and quality winemaking. And no one understands that better than Mark Walpole, one of Australia's leading viticulturists and owner of Fighting Gully Road vineyard in Beechworth, a site planted entirely to rootstocks from its inception in 1997.

"Rootstocks have an enormous impact in the vineyard," says Walpole. "I've taken the approach that they're not just a protection against phylloxera, they're a management tool. For example, I've planted tempranillo on three different rootstocks to match the different soil types, which gives me greater uniformity down the row and evenness with the fruit quality."

However, being in a phylloxera region, Walpole didn't even considering own-rooted vines. Reading a line in a book years ago stating that at some point phylloxera will reach every vineyard was enough to convince him to take every precaution.

Today there are better rootstocks available and more suited to cool-climate viticulture than when Walpole first started to investigate.

In the cool climate of the Yarra Valley, producers are waging a war. In 2006, phylloxera attacked the region. It has now spread to at least 28 vineyards comprising 735 hectares and that number is expected to double by 2018. A phylloxera-infested zone has been established and it takes in all the historic producers.

Hoddles Creek Estate is currently outside the infested zone, but viticulturist and winemaker Franco D'Anna, who describes the pest as "the ticking time-bomb no one thought would come to the valley", is taking no chances. He's replanting to resistant rootstocks. There is no question he would have done so more than a decade ago if he had the knowledge, such is the benefit of hindsight. "Don't let phylloxera be the reason to change, use rootstocks as a tool regardless," he urges. Just like Mark Walpole, D'Anna is factoring in the shape of his site and tailoring different rootstocks accordingly.

D'Anna, who is also president of the Yarra Valley Wine Growers Association, says with little help from the government, the association has worked tirelessly to get the message out to its members about the benefits of rootstocks. As an aside, he says out of the phylloxera disaster is a salvage mission to preserve some of the unique, clonal material in the region. It's why the association has set up a pilot project spearheaded by De Bortoli viticulturist Rob Sutherland. A selection of vines from De Bortoli, including its 1971 plantings of shiraz, Hoddles Creek 1er pinot noir, which has morphed into a unique expression of the MV6 clone, plus vines from Seville Estate, Punt Road and Yering Station, will be grafted onto rootstocks. The aim is to set up a Yarra Valley nursery to preserve all the significant clones from the region, for the region. A great story for another day as the project is on the cusp of starting.

The Yarra Valley has accepted its fate. "It's up to other regions to make informed decisions and learn from our mistake and act now," says D'Anna. "Given what we now know and with all the research, you'd have to be naïve to think you couldn't make a better wine out of grafted vines and to use rootstocks to maximise potential."

So with a glass of D'Anna's yet-to-be released 2015 Roadblock, a new and excellent single-vineyard chardonnay – mendoza clone grafted onto 101.14 rootstock – in hand, here's to the future of rootstocks.

PHOTOGRAPHY BY DAVID MARIUZ