



# ROOT STOCKS

## THE FUTURE



## Rootstocks are now considered standard when planting or replanting, but understanding the interactions between rootstock, variety, soil and climate is critical. Cindie Smart reports.

WORDS CINDIE SMART

**W**hen a rootstock is matched with the right vinifera variety and site, it will deliver an equal or better result than own roots. That's a sentiment echoed by many vineyard owners and winemakers in Australia.

In fact, rootstocks are now considered standard when planting or replanting, mainly due to production advantages offered, with a secondary but vital biosecurity benefit.

Yet still across Australia, vine plantings on rootstocks are low – about 25 percent in South Australia, according to Vinehealth Australia, which keeps an up-to-date Register of all vineyards of 0.5 hectares or larger in the State.

There are no complete databases of vineyard plantings in other States, so the national percentage of grafted vine area is unknown, but anecdotal evidence suggests it would be at a similar 25 percent.

However, in regions such as the Yarra Valley, where phylloxera presence makes rootstocks a necessity, the figure is believed to be higher.

While rootstock plantings are increasing, the cost of replanting on rootstock is a key prohibitor. Rootstock material can cost more than double that of own-rooted material – an own rooted vine is \$2 to \$2.50 while a grafted vine is usually \$5 to \$7 – due to the time and expertise involved in preparing, grafting and waxing, along with the lower success rate of rootstock cuttings in the nursery.

But this initial cost is well worth the long-term gains, according to Yalumba and Hill-Smith Family chief winemaker Louisa Rose.

Almost all the Hill-Smith Family-owned vines in the Barossa, Riverland and Tasmania are on rootstock, apart from their own-rooted old vines, some that date back more than 100 years.

“Anything that we've planted in the past 50 years or so is on rootstock. There's no reason not to,” Louisa says. “If you have a good match of rootstock and vinifera variety, the grapes will be as good as own roots or often better.

“If you have the perfect soil, the perfect climate – if everything is absolutely perfect –

own roots are great. But there are many situations where we compromise a little bit on where we're planting grapes. Looking forward if we want to grow our industry, we will be looking to plant in more marginal soils.

“It might be a dry site, or a wet site, or a frosty site and you want a later budburst, or maybe the soils are a bit saline or low in fertility. Or you might have nematodes or phylloxera. With all these things, we know that the right rootstock will improve the quality and yield of your grapes and the sustainability of your vineyard.”

Treasury Wine Estates agrees. Ben Harris, regional viticulture manager, Wynns Coonawarra Estate, says TWE has increased its percentage of vines under rootstock from about 30 percent in 2018 to more than 40 percent in 2022.

“Here at Wynns, the choice to use rootstocks is really driven by the pursuit of quality, improving diversity within our vineyards and a changing climate,” Ben says.

“Rootstocks are an excellent tool for managing variability in soil types. We create soil maps including soil depth and type, and align rootstocks based on those soils.

“We're more likely to put our whites on more vigorous soils and then manage that vigour with a rootstock such as Schwarzmann. Then we might use 110 Richter where it's shallow and more prone to water stress.

“We also use different rootstocks to build more diversity within our vineyards, to level out vintage variability.

“No two vintages are the same, and so diversity in the vineyard is another insurance policy to ensure we have combinations that perform well each year. Clonal material and rootstocks are important tools to achieve this.”

### ROOTSTOCK SUPPLY

While certain rootstocks were reportedly hard to get a few years ago, demand and supply are now closer to balance.

“The balance in supply seems to be returning given the current pressure on the

industry,” says Peter Arnold from Riverland Vine Improvement Committee (RVIC).

“1103 Paulsen and Ramsey rootstocks are the two main varieties demanded by table grape growers and hence are competing with demand from wine grapegrowers.”

Nick Dry from Foundation Viticulture and former manager of Yalumba Nursery, says popular rootstocks can be harder to get, so it pays to order early. “There are specific requirements in regions, for example 3309C is in demand in cool climate regions due to its earlier ripening tendencies and there's been some inability to meet that demand,” Nick says.

“But rootstock demand is a shifting picture. We're already starting to see a change in demand because of what's happened with the wine market in China – plantings are slowing down. Then, in time, we'll likely see a rapid expansion in plantings again. It's cyclical.”

Nick is working on a project with Vinehealth Australia to try to understand rootstock supply and demand levers.



Louisa Rose.

As nurseries produce to order and the process of producing rootstocks is labour and time intensive, delivery is generally 18 months, but for some combinations of rootstock and variety/clone you might be waiting two years.

“I’m working with nurseries and private source block owners and vine improvement groups to get an idea about what the current supply is of each of the rootstock types in Australia. And then to examine whether we, as a vine material supply sector, can meet the demand of the Australian wine industry,” Nick says.

The advice from nurseries: plan well and don’t be in a rush.

## SITE MATTERS

Understanding the interactions between rootstock, variety, soil and climate is critical.

Adam Hall, manager of Yalumba Nursery, which supplies propagation material to all parts of Australia except Western Australia, says in two different sites, the same rootstock can do two opposite things.

“In a warmer climate like the Riverland, 1103 Paulsen could be used to improve quality by preventing overcropping on the heavier soils, while still giving you enough drought tolerance to get by. So if you’re trying to get your fruit to a higher quality level in a warm climate, 1103 Paulsen would be a good choice, particularly on a red grape,” Adam says.

“But if you use 1103 Paulsen on a high potential variety such as Shiraz in cooler parts of the Eden Valley or the Adelaide Hills, where you have reasonably fertile sites, then 1103 Paulsen might be too vigorous in that case. You’re going to increase your potential too high and be better suited to another stock.

“It’s really about understanding your site conditions – what are your soil conditions, what are your weather conditions, what is the variety and what is your targeted style or price point – what are you trying to achieve?”

“Then, at the nursery, we can help people narrow down what might be the right rootstocks for them to suit those parameters.”

Advanced Viticulture & Management (AVM) has clients across the Sunraysia, Riverland, Barossa Valley and Limestone Coast and of the vineyards they manage, approximately 15 percent are planted on rootstocks.



Adam Hall.

“But of the recent developments we have been involved in, approximately 30 percent have been planted on rootstock while 70 percent are on own roots. Some of this is driven by the cost of rootstocks over own rooted vines,” says Clark Skinner, operations manager at AVM.

Most of AVM’s recent vineyard redevelopments have been in the Barossa Valley and have had a quality focus. “At this stage there appears to be little if any difference in quality from the rootstocks, while the yields have been more consistent on rootstocks through the drier years,” Clark says.

## WHY DO GRAFTED VINES COST SO MUCH?

Peter Arnold from Riverland Vine Improvement Committee says the production of grafted vines is a very labour-intensive and long process.

“During the season we can employ up to 100 staff for collection of cuttings – both rootstock and vinifera – and treatment of cuttings, including fungicide and hot water treatment, labelling, cold storage, disbudding, grafting, callusing, waxing and planting,” Peter says.

“DNA testing and regular virus tests are also an essential and costly part of supplying high quality material.”

Peter says planting conditions must be of the highest quality as the young vines are vulnerable to the outside elements. “Our team is continually monitoring soil conditions to ensure the highest possible take,” he says.

“We’ve tended to use Ruggeri 140 and Richter 110 in the Barossa Valley. Both rootstocks have the capacity to exclude salt, they perform well under extreme drought conditions, are tolerant to nematodes present in the Barossa Valley, have growth habits of medium vigour (R110) and medium to high vigour (R140), making them both good candidates for the array of soil types throughout the Barossa when aiming for quality – and both are both phylloxera tolerant.”

“The ability to produce and maintain healthy canopies and crops in all grapegrowing regions with less water and nutritional inputs through the use of appropriate rootstocks is a significant advantage as the climate shifts towards drier and hotter growing conditions.”

## COOL CLIMATES AND ROOTSTOCKS

According to Louisa Rose, the use of rootstocks in cool climates results in better yields for the Hill-Smith Family vineyards – both more grapes and more consistent yields from vintage to vintage.

At their Jansz vineyards in Tasmania, vines planted on 1103 Paulsen have delivered up to 50 percent more yield than vines on own roots.

“In many cases, that’s taking it from a semi-unviable yield to a viable yield, because in those really cool climates, grapegrowing is expensive. The lever you’ve got to make grapegrowing and winemaking profitable is yield,” Louisa says.

“Obviously, that yield has to be right for whatever variety you’re growing and whatever style you want to make. But apart from the few people who have more money than they know what to do with, most people want to make money as well as great wine.”

Louisa says, in her experience, the use of rootstocks in cool climates can also deliver better growth in young vines. “They just hit the ground running to the point where we’ve had crops, in some cases, off one-year-old vines, which you don’t expect,” she says.

“One of the things I’ve heard people say over the years about rootstocks is that they can’t afford to plant on rootstocks because the vines are much more expensive. But you don’t need to get too many extra tonnes and get them a year earlier to pay for them.”

## A GRADUAL PROCESS

Franco D’Anna, owner and winemaker at Hoddles Creek Estate in the upper Yarra Valley, has been gradually replanting his vineyards with a range of different rootstocks over the past eight years.

“We’re very fortunate because we don’t have phylloxera here yet, so replanting on rootstock was an insurance policy for the future, to ensure we had some productive vines on rootstock for when phylloxera does arrive,” Franco says.

“The first blocks we replanted were the varieties that really weren’t suited for up here. When the vineyard was first planted, it was like a fruit salad. Now we really just want Chardonnay and Pinot Noir, so we pulled out Sauvignon Blanc first and replanted that.

“Then in the last three years I’ve bought two adjoining properties, so we’ve stopped pulling out existing vines and just started planting out those new properties with Pinot Noir on a variety of different rootstocks.

“I figure, if we can get ahead of the game, we can keep our existing plantings with some of that on own roots and we won’t start pulling them out until we actually see phylloxera or a decline and, by that time, we’ll have a bit of vine age on those younger vines, and we’ll be able to maintain our production.”

That’s important financially. Three years ago, Yarra Pinot Noir was at \$1,800 a tonne and now it’s at \$4,000 a tonne.

“We’ve got more than 300 acres in total now and about 50 percent of the vines are on rootstock, compared to about 35 percent on rootstock about four years ago,” Franco says.

“We’re still trialling rootstocks. Some of those early rootstocks we put in four or five years ago probably weren’t the best. Everyone was planting 101-14, because that’s what they plant in Burgundy, but Burgundy has a completely different climate and soils than Australia. 101-14 sees the weather forecast for the week and starts going yellow if there’s no rain forecast!”

Franco now has four different rootstocks on his new properties – Teleki 5C, 1103 Paulsen, 140 Ruggeri and on some deeper soils, 101-14 – and is monitoring the vine growth and fruit quality. “We keep everything separate in the winery, so we have an understanding about how those rootstocks affect the fruit composition,” he says.

“We’ve worked out what clones work best

up here for Chardonnay, Pinot and other key varieties. Now we’re working on that matrix of what rootstocks work best with which clones and where. It’s a pretty big jigsaw puzzle, but we’re getting there.”

## PHYLLOXERA

Franco D’Anna, who is chair of the Yarra Valley Wine Growers’ Association, says the association has focused significant effort on educating locals about rootstocks.

“A lot of the Yarra is being replanted on rootstock now,” Franco says. “There was an initial delay, because when they first found phylloxera, it was limited to a few vineyards, but then it spread and spread and spread. It got to the point where so many vineyards were affected, vineyard owners either had to replant or get out of the industry.

“The Yarra would be 50 percent of the size it is now if we hadn’t started replanting. We’re lucky that we’ve got some really proactive and passionate growers here and some big companies who are leading the way, including Oakridge, Chandon and De Bortoli. And to all these companies’ credit, they are willing to share information and knowledge about rootstocks as well.”

Franco says winemakers are now seeing the use of rootstocks as an opportunity to improve wine quality.



“There’s no secrets,” he says. “Really, wine quality is dependent on site and the choices you make when you’re planting the vineyard, so if collectively we can get those right, we’re going to help enhance the reputation of wines of the Yarra, and everyone wins.

“Wine quality has gone up tenfold compared to when we first started as a region. I think it’s a combination of understanding our varieties a bit more. And as the vines are getting older, we’re seeing better balance.

“That’s the challenge with the region planting a lot of new vines on rootstock – trying to maintain that balance and having some older vines in the mix. We’re also managing younger vines better.”

Franco questions why more vineyard owners around Australia aren’t using rootstocks when replanting.

“I don’t understand why anyone wouldn’t be planting on rootstock, no matter where they’re based in Australia,” he says. “We never thought we would get phylloxera here in the Yarra. And that was our biggest problem, because the region was so reliant on own roots. We didn’t plant with rootstocks when we could have and that was a mistake.

“You look at France and Italy – some of the best wine regions in the world are all planted on rootstocks. If you do it gradually, it’s manageable financially and you save money later on. The cost for us to rip out and replant in one big hit, and the loss of production, would be enormous.”

## MANAGEMENT OF BIOSECURITY RISK

Rootstocks are an important part of the Hill-Smith Family’s biosecurity management strategy, along with farm-gate hygiene activities.

“If you think that just because you’re in South Australia or Tasmania you don’t have to worry about phylloxera, well that’s just putting your head in the sand,” Louisa Rose says.

“Most of Victoria thought it was free of phylloxera too until about 20 years ago, but bit by bit one vineyard found phylloxera and then another vineyard found phylloxera, then another and on it spread. Most of these vineyards are being completely replanted on phylloxera tolerant rootstock. By planting on rootstocks, not only will those vines be more resistant if phylloxera ever comes to the

region, but they will greatly increase the chance that an incursion could be controlled.”

Similarly at TWE, gradual replanting on rootstocks is an important part of the company’s biosecurity philosophy.

“While we’re doing everything we can to prevent the introduction of phylloxera, setting our vines up to survive if phylloxera did arrive, is key. Rootstocks are an insurance policy,” Ben Harris says.

“Australian vineyards are vulnerable to phylloxera due to our reasonably slow uptake of rootstocks. If phylloxera was to get in here at Coonawarra, we would be forced to adapt but it would be terrible. We’d lose our heritage material, including our propagation material which is an important part of the Wynns story.

“The biosecurity benefits of rootstocks are important. Along with good farm-gate hygiene practices.”

Adam Hall at Yalumba Nursery says there is a growing trend to plant on rootstocks that offer phylloxera tolerance in regions outside of Australia’s Phylloxera Infested Zones.

“I’m hearing from some vineyard owners that when they’re replanting a particular block that’s on own roots, they are planting a certain percentage on rootstocks to safeguard themselves,” Adam says.

“It’s not that they are panicking or are scared, they are just doing their due diligence and doing some risk management.

“There has been a good program from Vinehealth Australia to encourage people to do that. To safeguard our regions. And to slow down the spread of the pest if we do have an outbreak. I’m seeing private growers planting on rootstocks as well as wine companies.”

Vinehealth Australia would like to see the percentage of plantings on rootstock increase in Australia, balanced with increased uptake of farm-gate hygiene activities to protect own-rooted vines.

“Protecting the diversity of our existing own-rooted vineyards is key. And for future plantings, we encourage growers to consider rootstocks, to manage exposure to phylloxera,” says Inca Lee, Vinehealth Australia CEO.

### COONAWARRA ROOTSTOCK TRIAL

Vinehealth Australia is running a long-term rootstock trial with Wynns Coonawarra Estate and Coonawarra Vignerons, which is examining the performance of Cabernet Sauvignon (CW44) planted to different phylloxera-tolerant rootstocks compared to own rooted vines:

- 110 Richter
- Ramsey
- 1103 Paulsen
- 140 Ruggeri
- Börner
- M6262
- M5489
- M5512

Phylloxera can feed, reproduce and cause some root galling (nodosities) on phylloxera tolerant rootstocks, but limited economic damage occurs compared to own roots, meaning the vine can continue producing grapes despite the presence of the pest.



Ben Harris

At Advanced Viticulture & Management, biosecurity risk planning is a big driver for the use of rootstocks. “It’s likely phylloxera will continue to spread in Victoria and make its way to South Australia and other wine growing regions eventually,” Clark says.

“So it’s important when redeveloping vineyards to ensure there is a good proportion of phylloxera resistant rootstocks to own rooted vines to manage your risk profile.

“Soil nematode loading is also a key consideration when undertaking vineyard developments. Selecting a rootstock that is tolerant to the specific nematodes that are present is critical to ensuring a healthy vineyard well into the future.”

## THE FUTURE

There is significant work being done around the world with rootstock breeding, including in Australia where CSIRO is developing next generation rootstocks with durable resistance to phylloxera and root knot nematode.

Ben Harris says this work is important, as the industry currently relies on only a handful of rootstocks. He would like to see more rootstock breeding programs in Australia.

“How do we continue to evolve? As an industry we need to look to the future and look at our breeding programs – for rootstocks and clonal material – and ensure we’re always looking to drive improvement,” he says.

“I do think there’s more we can be doing as an industry. Breeding is such an important tool, but it’s so long term, we need to be working hard now for the benefit of the industry in 2040 and 2050.”

Clark Skinner at AVM would like to see more R&D money injected into new and hybrid rootstocks that offer a range of benefits to give growers more options in the future.

Nick Dry agrees that the Australian wine industry needs more rootstocks in its toolbox, and an industry-funded rootstock importation program would deliver this.

“There are five new rootstocks from UC Davis called UCD GNR-1, UCD GNR-2, UCD

GNR-3, UCD GNR-4 and UCD GNR-5, which have strong and broad nematode resistance. There are also some new Italian rootstocks that look good for Australian conditions,” Nick says.

“And very importantly, UC Davis has also developed new rootstocks that are resistant to Pierce’s Disease (*Xylella*). It’s important for Australia to have access to these varieties for mitigating the risk of *Xylella* spread in Australia, if it arrives here.

“As an industry we need strategic, industry-funded importation of these kinds of rootstocks. And any rootstocks that are developed here in Australia should be broadly available to everyone in the Australian wine industry.” ♦

For more information about the rootstock trial visit: <https://vinehealth.com.au/tools/rootstocks/coonawarra-rootstock-trial/>

For information about rootstock selection visit: <https://www.grapevinerootstock.com/>

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