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Which are Australia's emerging winegrape varieties?

Kym Anderson and German Puga

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Contact details:

Wine Economics Research Centre

School of Economics

University of Adelaide

SA 5005 AUSTRALIA

Email: wine-econ@adelaide.edu.au

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Kym Anderson and Germán Puga

Wine Economics Research Centre, University of Adelaide

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Corresponding author:

Professor Kym Anderson
Executive Director, Wine Economics Research Centre
School of Economics and Public Policy
University of Adelaide
Adelaide SA 5005, Australia
Phone +61 414 254 121
kym.anderson@adelaide.edu.au

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Australia's mix of winegrape varieties is becoming increasingly concentrated, and more similar to that of the world (Anderson and Puga, 2023a; Puga and Anderson, 2023). This strengthening focus on a few major (mostly French) varieties raises the question of whether Australia is making the most of the terroir of its various regions. It is not a new question. Hickinbotham (1947) believed seven decades ago that Australia's hot regions were not focused enough on varieties from warmer parts of Europe. Four decades ago Dry and Smart (1980) suggested that if the addition of acid had been outlawed in Australia, its hot regions would have been forced to at least add 'improver' varieties to their varietal mix. More recently, McKay et al. (1999) felt that varieties from the warmer parts of Italy were under-represented in Australia.

Meanwhile, wine writers, consumers and hence vigneron appear to be paying much more attention to 'alternative' or 'emerging' varieties, and since 2001 there has been an annual Australian Alternative Varieties Wine Show (AAVWS). Initially that Show defined an alternative variety as anything other than the top dozen varieties growing in Australia (Dry 2010). In 2021-23 the top dozen accounted for 91% of the national winegrape bearing area. AAVWS is now less prescriptive, and it also 'graduates' varieties once it deems them to have become mainstream. Halliday (2018) and Higgs (2019) describe dozens of varieties they have identified as being grown in Australia but which have not yet shown up in databases of bearing area or crush because of their smallness. A new book by Allen (2023) details the exciting ride this century in exploring these as-yet minor varieties in Australia.

The motivation for vignerons to explore alternative varieties are various: to better suit their region's evolving climate conditions, to broaden the range of cellar door/wine club offerings, to promote some different wine styles, to reduce the weather- or market-related risks from specialization, etc.

This article focuses on that sub-set of alternative varieties whose area or production is expanding, leaving aside minor varieties that may have potential but were not detected to have expanded over the 2002-22 period as reported in Anderson and Puga (2023b) and reviewed here.

Is there a way to identify this group of varieties, and thus to see the extent of their emergence in Australia this century? This article examines one approach using standard statistical analysis and a recently developed data set covering the past two decades (Anderson and Puga, 2023a,b). It begins by describing that set of data and then the statistical method to be used. The results are then presented before concluding with some caveats.

The data

A comprehensive new data set has been compiled by Anderson and Puga (2023b) which includes, for the first time, estimates of the bearing area of winegrapes in each of Australia's wine regions from 2001 to 2023. Such data have been available for South Australia from Vinehealth Australia (previously the Phylloxera and Grape Industry Board of South Australia) as published by Wine Australia (2023a and earlier), but for the rest of Australia there have been no official data on the bearing area of winegrapes by variety and region since 2015. That was when the Australian Bureau of Statistics stopped collecting data on national,

state and regional vine areas. Neither did it collect them in 2009, 2011, 2013 and 2014. To compile a database for wine regions outside South Australia and thus for the nation as a whole, Anderson and Puga (2022b) brought together available annual data from Wine Australia (2023b and earlier) and other sources for winegrape crush volumes and prices by variety and region, and then made a series of assumptions to estimate the missing bearing area data so as to provide a complete set from 2001 to 2023.

In total there are 72 regions in the data set, and area, crush and price data (and hence gross revenue per hectare) are available for 118 ‘prime’ varieties as defined by Anderson and Nelgen (2020b) based on Robinson, Harding and Vouillamoz (2012) or otherwise www.vivc.de. There are also another 62 more-minor prime varieties whose data are aggregated into ‘other red’ or ‘other white’ for confidentiality reasons.¹ Confidentiality concerns also mean data for some other minor varieties appear separately only in some years. Hence the statistical analysis in what follows focuses on the area increase since 2002 for only those varieties with at least 10 bearing hectares in Australia in 2022. We do, however, also provide an extra list of emerging varieties for which we have no area data but which produced at least 40 tonnes of winegrapes in 2023 (or 2021).

The statistical method

We perform a statistical (k-means cluster) analysis based on two variables: the 2022 bearing area of each winegrape variety with at least 10 hectares, and the ratio of each of those varieties’ 2022 to 2002 bearing areas. We standardise these variables before performing the standard k-means cluster analysis. We can include in the cluster analysis only those variables with a positive area in 2002 (otherwise the ratio of their 2022 to 2002 areas would be infinity), and we also exclude Pinot Gris from the cluster analysis as its area increased 326 times during 2002-22 (from 15 ha in 2002 to 4,892 ha in 2022).²

Results

Our statistical analysis leads to six clusters,³ denoted in different colours in Figure 1 and Table 1. We classify these six groups into four categories. The first (‘**Top 3**’) includes the top three varieties by area: Syrah/Shiraz, Cabernet Sauvignon and Chardonnay. The second category (‘**Next 5**’) includes the next five varieties by area: Merlot, Sauvignon Blanc, Pinot Noir, Sémillon and Riesling. Those eight varieties account for 85% of the Australian vine bearing area. Except for Sémillon and Riesling, their areas have increased this century. The area planted to Syrah/Shiraz increased by half, Pinot Noir’s area increased by two-thirds, and that of Sauvignon Blanc by about 140%.

[Location of Figure 1 and Table 1]

The third category includes the next-most-popular varieties, each of whose area was lower in 2022 than in 2002 with three exceptions: Barbera’s rose by one-tenth, Gewürztraminer’s by one-third, and that of Côt (Malbec) by four-fifths. We’ve called that category ‘**Others**’. Among those that have declined a lot are Cabernet Franc (now less than

¹ Of that total of 183 varieties, 178 of them have been exported at some time in the past 22 years – but just five have accounted for around four-fifths of the total volume of Australia’s wine exports in the past five years.

² This quantitative method cannot pick up on quality improvements that are emerging, as has been happening dramatically with Garnacha Tinta (Grenache) in recent years, for example. Its area peaked in the mid-1970s at >6000 ha and was <2000 ha in the 1990s and 1800 ha in 2019-23.

³ We use the Calinski-Harabasz stopping rule to assist us in determining the appropriate number of clusters. This rule suggests a three-cluster solution may be the most appropriate, followed by a six-cluster solution. On inspection of the results we choose the latter as the best classification for present purposes.

half what it was in 2002), and Ruby Cabernet (down by two-thirds). For the sake of brevity we list only the five largest ‘Other’ varieties in Table 1, each of which had more than 1000 ha in 2022.

The final category, comprised of three (differently coloured) clusters, is what we call ‘Emerging’. Together with ‘Emerging*’ (see below), these varieties accounted in 2022 for only 3.6% of the Australian winegrape bearing area (or 7% if Pinot Gris is included), but each of their areas has at least doubled in the last two decades with most rising several-fold.

Besides Pinot Gris, there are another 14 varieties that were not included in our statistical analysis because they were not producing (or not reported) in 2002. These varieties are listed in Table 1 as ‘Emerging*’. Those 14 account for less than 1% of the country’s bearing area.

Note that all of the top eight varieties planted in Australia are from France, whereas the most important source of the two dozen emerging varieties listed in Table 1 is Italy while France accounts for only one-third of them.

Another 19 emerging varieties for which we have no area data but which produced more than 40 tonnes of winegrapes in 2023 (or 2021) are listed in Table 2. Six are from France, five from Italy, three from Spain, two from Portugal and one from Greece.

[Location of Table 2]

By definition, emerging varieties are a work in progress for many vigneron. They are also unfamiliar to many consumers. Hence it is not clear whether one should expect their profitability to be above or below the average for established varieties. Table 1 and Figure 2 reveal that the Australian average gross revenue per hectare (price times yield/ha) for emerging varieties range from less than \$4,000 to more than \$18,000 when averaged over the three vintage 2021-23, which compares with about \$8,200 for established varieties. Costs of production also would vary across varieties, and both costs and returns would vary across regions and vintages. Thus this information on its own provides little guidance to vigneron contemplating planting one or more of these emerging varieties.

[Location of Figure 2]

It also follows that the most successful emerging varieties need to ‘graduate’ at some point. The Australian Alternative Varieties Wine Show has already ‘graduated’ Pinot Gris, Prosecco and most recently Durif, deeming them to be now established varieties (<https://www.aavws.com/definitions>); and it expects to soon also graduate Tempranillo and then Fiano from their list of ‘alternative’ varieties.

Concluding comments

This classification of emerging varieties is, to our knowledge, the first to be generated using multivariate statistical techniques. Certainly other classifications may be equally relevant, but this one at least provides a consistently generated list. If we follow the Australian Alternative Varieties Wine Show and exclude Pinot Gris, Prosecco and Durif from that list, the other emerging varieties in Table 1 accounted for just 2.8% of Australia’s total bearing area in 2022.

In addition to the emerging varieties listed in Table 1 and Figure 2, there are another 60-plus being produced in Australia but each with a recorded bearing area below 10 ha or otherwise not showing up separately because of data confidentiality – although together they would account for no more than 1% of the national area. The Appendix below lists the names of those additional varieties, not all of which may have been in production this decade. What this means is that vigneron have plenty of varieties already available in Australia from which

to choose – even if they represent less than one-tenth of the more than 1,700 prime varieties whose global bearing areas are listed in Anderson and Nelgen (2020).⁴

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[Location of Appendix table]

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⁴ A list of 1,565 of those varieties sorted by their growing season average temperature is provided in the last Excel sheet of the supplementary data of Puga et al. (2022). Australian winegrowers could use that information to explore varieties that might work for them based on the climates of their regions – also provided in the first sheet of that Excel file.

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Table 1: Winegrape varieties' 2022 bearing areas in Australia, the ratio of their 2022 to 2002 areas, their gross revenue per ha, and their classification^a

| Variety | Country of origin | Area (ha) | (2022 area)/(2002 area) | 2021-23 gross revenue (\$/ha) | Classification |
|------------------------------|-------------------|----------------|-------------------------|-------------------------------|----------------|
| Syrah/Shiraz | France | 43280 | 1.5 | 8090 | Top 3 |
| Cabernet Sauvignon | France | 26441 | 1.1 | 6900 | Top 3 |
| Chardonnay | France | 21512 | 1.2 | 8320 | Top 3 |
| Merlot | France | 8163 | 1.0 | 6120 | Next 5 |
| Sauvignon Blanc | France | 6462 | 2.4 | 10670 | Next 5 |
| Pinot Noir | France | 6029 | 1.7 | 12130 | Next 5 |
| Pinot Gris ^b | France | 4892 | 326 | 10670 | Emerging* |
| Sémillon | France | 3800 | 0.6 | 7170 | Next 5 |
| Riesling | France | 3179 | 0.9 | 7580 | Next 5 |
| Muscat of Alexandria | Greece | 1882 | 0.7 | 8050 | Others |
| Garnacha Tinta/Grenache | Spain | 1803 | 0.9 | 10450 | Others |
| Colombard | France | 1394 | 0.8 | 9810 | Others |
| Petit Verdot | France | 1116 | 1.8 | 7750 | Others |
| Verdelho | Portugal | 1058 | 0.7 | 3310 | Others |
| Muscat Blanc à Petits Grains | France | 1038 | 4.9 | 6140 | Emerging |
| Tempranillo | Spain | 856 | 16.6 | 7120 | Emerging |
| Durif ^b | France | 846 | 3.3 | 8720 | Emerging |
| Viognier | France | 692 | 4.4 | 6040 | Emerging |
| Canada Muscat | USA | 327 | 8.2 | 3580 | Emerging |
| Prosecco | Italy | 320 | | na | Emerging* |
| Fiano ^b | Italy | 188 | | 9240 | Emerging* |
| Savagnin Blanc | France | 134 | | na | Emerging* |
| Nebbiolo | Italy | 122 | 3.1 | 10540 | Emerging |
| Vermentino | Italy | 104 | | 15280 | Emerging* |
| Dolcetto | Italy | 101 | | 6640 | Emerging* |
| Nero d'Avola | Italy | 87 | | 9190 | Emerging* |
| Montepulciano | Italy | 85 | | 11120 | Emerging* |
| Tribidrag/Zinfandel | Croatia | 80 | 20.0 | 7330 | Emerging |
| Touriga Nacional | Portugal | 71 | 2.2 | 9560 | Emerging |
| Roussanne | France | 45 | 11.2 | 11310 | Emerging |
| Arneis | Italy | 38 | | na | Emerging* |
| Grüner Veltliner | Austria | 20 | | 18290 | Emerging* |
| Alicante Henri Bouschet | France | 15 | | 5110 | Emerging* |
| Carignan Bouschet | France | 14 | | na | Emerging* |
| Graciano | Spain | 13 | | 10690 | Emerging* |
| Saperavi | Georgia | 11 | | na | Emerging* |
| Lagrein | Italy | 10 | | 5290 | Emerging* |
| ALL VARIETIES | | 144,484 | 1.1 | 8210 | |

^a The colours are the same as those in Figure 1, and indicate the cluster to which each variety belongs. Three clusters constitute the 'Emerging' varieties, hence its three

different colours. Varieties not included in the cluster analysis (because of zero area in 2002) but with at least 10 ha in 2022 are classified as ‘Emerging*’.

^b The Australian Alternative Varieties Wine Show has already ‘graduated’ Pinot Gris, Prosecco and most recently Durif, and expects to soon graduate Tempranillo and then Fiano from their list of ‘alternative’ varieties. All but Pinot Gris and Prosecco are listed in Allen (2023) among his alternative varieties.

Source: Anderson and Puga (2023b), which is based largely on data in Wine Australia (2023a,b and earlier).

Table 2: Minor emerging varieties in Australia that produced more than 40 tonnes of winegrapes in 2023 (or 2021)^b

| Variety | Country of origin | Production in 2023 |
|------------------------|--------------------------|---------------------------|
| Moscato Giallo | Italy | 1470 |
| Muscat Fleur d'Oranger | France | 783 |
| Isabella | USA | 703 |
| Aglianico | Italy | 280 ^a |
| Chambourcin | France | 222 |
| Carmenère | France | 220 |
| Tannat | France | 177 ^a |
| Muscat of Hamburg | United Kingdom | 168 |
| Gamay Noir | France | 160 |
| Tinto Cão | Portugal | 159 |
| Sagrantino | Italy | 108 ^a |
| Assyrtiko | Greece | 103 |
| Alvarinho | Portugal | 91 |
| Pinot Blanc | France | 90 |
| Verdejo | Spain | 67 |
| Garnacha Blanco | Spain | 47 |
| Grillo | Italy | 44 |
| Negroamaro | Italy | 42 ^a |
| Mencia | Spain | 41 |

^a 2021 production.

^b All the above are listed in Allen (2023) as alternative varieties.

Source: Anderson and Puga (2023b), based largely on data in Wine Australia (2023a,b and earlier).

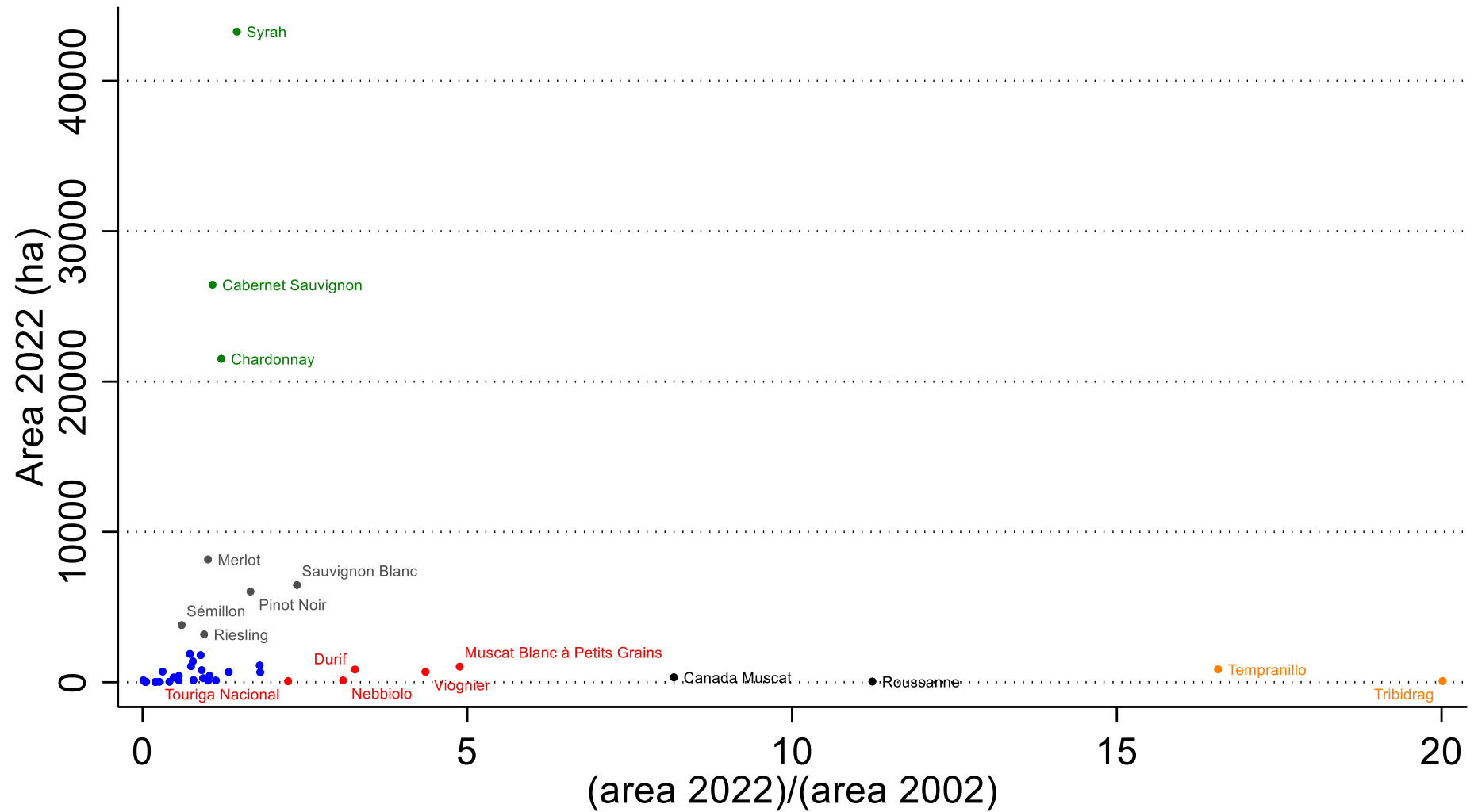


Figure 1: Six clusters of varieties, based on their 2022 bearing areas and the ratio of their 2022 to 2002 bearing areas

Source: Authors' statistical analysis based on data in Anderson and Puga (2023b).

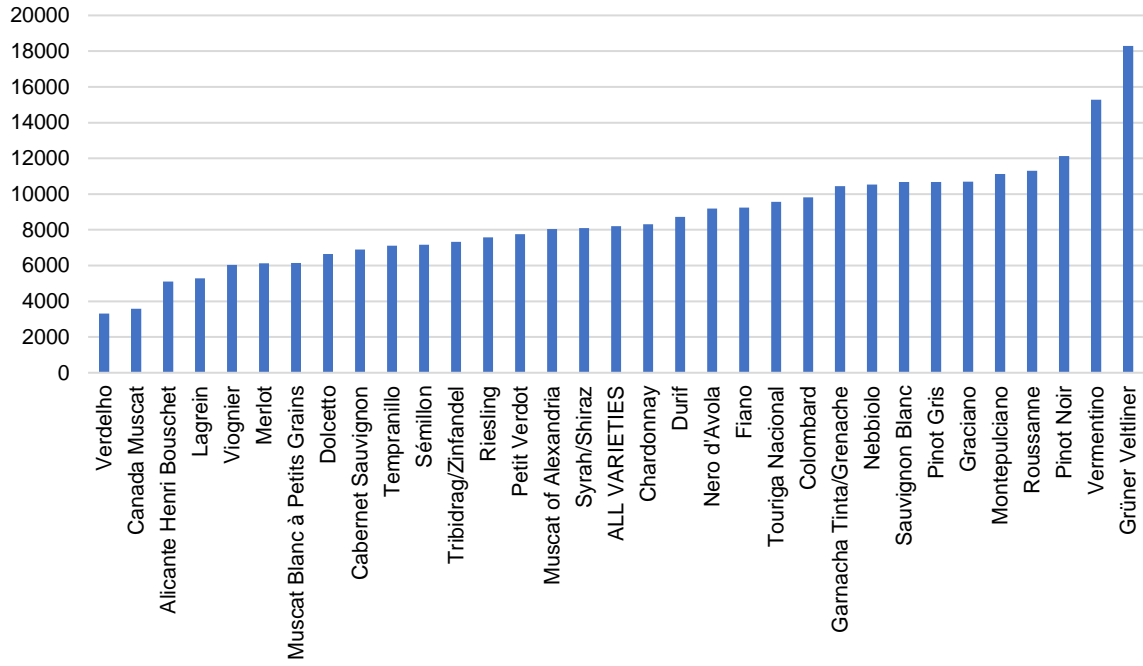


Figure 2: Gross revenue per hectare, by emerging variety,^a Australia, average for 2021-23 (\$)

Source: Anderson and Puga (2023b).

Appendix: Minor varieties bearing in 2008-23 but not shown due to confidentiality^a

| Prime name | Colour | Country of origin | Synonyms |
|------------------------|---------------|--------------------------|--|
| Abrusco | R | Italy | Colorino |
| Aleatico | R | Italy | |
| Aligoté | W | France | Aligote; Mukhranuli |
| Arinto de Bucelas | W | Portugal | Arinto; Arinto Roxo |
| Auxerrois | W | France | Aucerot |
| Brachetto del Piemonte | R | Italy | Brachetto |
| Canaiolo Nero | R | Italy | Canaiolo; Canaiolo Rosa |
| Chenanson | R | France | |
| Corvina Veronese | R | Italy | Corvina |
| Counoise | R | France | |
| Diamond Muscat | W | USA | |
| Dornfelder | R | Germany | Dom Felder |
| Falanghina | W | Italy | |
| Fer | R | France | |
| Flora | W | USA | |
| Furmint | W | Hungary | Malvasia Verde; Moslavac; Sipelj; Sipon; Šipon |
| Galego Dourado | W | Portugal | Galego; Pedro Luis; Dourado |
| Garnacha Roja | G | Spain | Garnacha Gris; Garnacha Rioja; Garnacha Rojo; Grenache Gris; Grey Grenache |
| Gouais Blanc | W | France | Gouais/Gwäss |
| Grand Noir | R | France | Gran Negro; Grand Noir de la Calmette |
| Grechetto di Orvieto | W | Italy | Grechetto Bianco; Grechetto |
| Greco | W | Italy | Asprinio; Greco di Tufo |
| Gros Manseng | W | France | Manseng Gros Blanc; Gross Manseng |
| Hárslevelű | W | Hungary | Feuille de Tilleul; Harslevelu; Lipovina |
| Inzolia | W | Italy | Ansonica |
| Kyoho (4N) | R | Japan | Kyoho; Kyoko |
| Madeleine Angevine | W | France | Augstler Weiss; Maddalena Angevina; Madlen Anzevin |
| Malvazija Istarska | W | Croatia | Malvasia Istriana; Malvazija |
| Mammolo | R | Italy | Sciaccarello |
| Marzemino | R | Italy | Marzemina; Marzemina Grossa |
| Mondeuse Noire | R | France | Mondeuse; Mondeuse Rouge |
| Nerello Mascalese | R | Italy | |
| Nero di Troia | R | Italy | Uva Di Troia |
| Norton | R | USA | Cynthiana |
| Nosiola | W | Italy | |
| Parraleta | R | Spain | Bonvedro; Caricagiola; Pau Ferro; Tinta Caiada; Tinta Lameira |
| Pavana | R | Italy | |
| Pecorino | W | Italy | Uvina |
| Petit Manseng | W | France | Manseng Petit Blanc |
| Petit Meslier | W | France | |
| Picolit | W | Italy | |
| Piedirosso | R | Italy | |

| | | | |
|----------------------------|---|-----------|---|
| Pignoletto | W | Italy | |
| Pinotage | R | S. Africa | |
| Ribolla Gialla | W | Italy | Rebula |
| Rondinella | R | Italy | |
| Sauvignonasse ^b | W | France | Friulano; Sauvignon Vert; Tocai; Tocai Friulano; Zeleni Sauvignon |
| Scheurebe | W | Germany | |
| Schioppettino | R | Italy | |
| Schönburger | W | Germany | Schonburger |
| Slankamenka | W | Serbia | Majarcă Albă |
| Sun Muscat | R | Australia | |
| Teroldego | R | Italy | |
| Tinta Barroca | R | Portugal | Barroco Bastarda; Bastardo; Bastardo Roxo; Bastardo Tinto; Maturana Tinta; Merenzao; Tinta; Tinta Lisboa; Verdejo Negro; Trousseau Gris; Trousseau Noir; |
| Trousseau | R | France | Bastardo Do Castello |
| Verdicchio Bianco | W | Italy | Boschera; Peverella; Trebbiano di Soave; Verdicchio |
| Verduzzo Friulano | W | Italy | Verduzzo |
| Vespolina | R | Italy | |
| Villard Blanc | W | France | Seyve Villard 12375 |
| Vinhao | R | Portugal | Sousao; Souson; Souzao |
| Visparola | W | Italy | |
| Zweigelt | R | Austria | Zweigeltrebe Blau; Zweigelt, Blauer; Zweigeltrebe |

^a Not all of these 62 varieties are emerging and the bearing areas of some (many?) of them may have declined rather than risen since 2002. All but 18 of them, and all those in Tables 1 and 2, have appeared on the labels of wines exported from Australia, according to Wine Australia's records. Allen (2023) lists just four more prime varieties not in the above list or Tables 1 and 2, namely Garganega, Kerner, Piquepoul Blanc (Synonym: Picpoul) and Refosco dal Peduncolo Rosso.

^b Sauvignonasse is referred to in Allen (2023) by its synonym Friulano.

Source: Anderson and Puga (2023b), based on tables kindly prepared by Sandy Hathaway of Wine Australia from their unpublished data.