Choosing alternative grapevine varieties for the Padthaway, Mt Benson and Robe regions of the Limestone Coast

Prepared by	**Libby Tassie** **Viticulturist** **Tassie Viticultural Consulting**

Date	**August 2016**

Contents

Choosing alternative grapevine varieties for the Padthaway, Mt Benson and Robe regions of the Limestone Coast

Aim

This document aims to assist growers of the Limestone Coast GI with the process of investigating potential new varieties for their regions. It outlines the steps to be taken when considering new varieties, the factors to consider, and provides extra references for those interested in exploring further. A number of varieties that may be interesting for the regions of Padthaway, Mt Benson and Robe are presented.

Introduction

History of the wine industry has shown changes of varietal plantings over time. Chardonnay was relatively unheard of in Australia prior to the 1970s, and emphasis was on the fortified wine market in the very early days of the industry in the late 1800s to mid 1900's. The varieties planted were a function of what was available and suitable for wine production of the day. Plantings relied on the initial imports, primarily those of James Busby, from varieties collected in Spain and France. Wine styles and production were oriented for the English market and tastes, or, later, American and European. A more global perspective of food and wine has emerged over the last few decades and there has been a gradual change in lifestyles, preferences and markets. Knowledge of, and accessibility to, international wines and varieties has increased. There has been a shift in tastes and markets from the west to the east, with greater Asian influence in food and wines within Australia and Asia emerging as a destination point for Australian wines.

In addition to the marketing environment, climate change predictions pose some challenges for the grape grower, with increases in temperature and weather extremes expected together with potential reductions in rainfall, with the degree of change varying with location. Expanding the varietal mix in the vineyard is an option to mitigate some of the challenges associated with climate change predictions.

Businesses and grapegrowers need to be aware of the opportunities and impacts associated with the changing climate and markets so they can investigate and plan accordingly.

What will the future look like for the Limestone Coast region and the Australian wine industry more broadly? Will Shiraz and Cabernet Sauvignon still dominate the landscape, and if so, will the wine styles be the same or will the wine preferences continue the current move to lighter reds, more textural whites and less alcoholic styles? Smaller wine producers/growers may have more flexibility to change than growers reliant on winery contracts.

There has been a burgeoning interest in broadening the varietal mix in vineyards and wines since the early 2000s, with alternative varieties being used as either single varietal wines or in blends. From the late 1990s there have been a number of significant private importations of alternative varietal material into Australia, resulting in a new and expanded range of available planting material for growers.

On a global scale, there has been a reshuffling of the order of the varietal planting mix, with Tempranillo for example undergoing a significant rise in planting area. It increased from

seventh in the red wine grape planted area in 2000 (92,985 ha) to third in 2010 (232,561 ha) (Table 1).

Table 1. Largest plantings of red winegrape varieties globally (top 8) in 2000 and 2010 (from Anderson and Aryal, 2013).

Variety	Hectares planted in 2000	Variety	Hectares planted in 2010
Cabernet Sauvignon	220,890	Cabernet Sauvignon	290,091
GarnachaTinta	213,987	Merlot	267,169
Merlot	211,967	Tempranillo	232,561
Mazuelo	126,650	Syrah	185,568
Syrah	101,516	Garnacha Tinta	184,735
Bobal	100,128	Pinot Noir	86,662
Tempranillo	92,985	Mazuelo	80,178
Monastrell	76,304	Bobal	80,120

The success of a new variety in a region depends on its performance in a new environment and on the market acceptance of the wine. How a variety will respond to a new environment might be predicted by the similarity of the new climate to its traditional place of cultivation and by the adaptability of the variety. Some varieties, such as Chardonnay, perform well in environments that differ from their traditional climate, exhibiting a high level of plasticity. Others, like Pinot Noir and Nebbiolo, are more demanding of their environment and only exhibit their classic varietal 'typicity' in a very particular environment.

As varieties are increasingly grown in regions outside their region of origin, information from those new regions can also be used to assess their suitability to different environments. The ultimate assessment of success is to plant the variety in a new site and see how it performs under the unique conditions offered by the individual vineyard site.

Investigation of varietal options

Growers may investigate alternative varieties for a number of reasons, driven by the requirements of the viticulture, wine style or marketing area.

Viticulturally, there has been interest in finding varieties better suited to the impacts of a changing climate, such as a variety that may extend the season by ripening either early or late, enable lower water use, or ripen earlier with lower alcohol levels but good flavour and colour.

Different wine styles may be sought; a lighter red or more textural white, or just a new blending component for Cabernet Sauvignon; or a substitute for Merlot. Along with wine production changes, directions in wine marketing may change to differentiate a product range, push boundaries, change regional or producer profiles, or accommodate changing consumer trends to lighter, more savoury reds, textural whites or sparkling wines.

The search for a new variety may either

- look at regions of similar climate and then assess varieties within those regions, *or*
- look at a variety or wine first, and then consider the climate of the region of origin to evaluate suitability in a new region, *or*
- consider characteristics of the variety that may indicate potential suitability.

It may be that the viticultural characteristics of a variety (whether it will ripen, have good disease resistance, loose bunches and thick skins, and produce the desired wine style) can be assessed more easily and carry more weight than whether its region of origin matches with the new region. The importance of climatic comparisons depends on the adaptability or plasticity of the variety, which is usually difficult to predict.

The ideal way of assessing a new variety is of course to have small – or even tiny – trials in the region.

An alternative variety has been defined by the Australian Alternative Varieties Wine Show (AAVWS) in 2012 as: "… any variety other than Cabernet Sauvignon, Chardonnay, Chenin Blanc, Colombard, Grenache, Merlot, Pinot Gris/Grigio, Pinot Noir, Sauvignon Blanc, Semillon, Shiraz, Riesling and Verdelho". That list may soon include Tempranillo, as a mainstream variety. For the purposes of this document, an alternative variety is any variety that is not commonly grown in the Limestone Coast.

There are believed to be about 5,000 grapevine varieties globally and in Australia the current varietal choice is from imports undertaken over the last 220 or so years. Importing varieties not currently in, or available in, Australia, is another option for the industry. A number of paths are available to find a new variety or a group to choose from, including investigating:

- varieties from specific climatic regions e.g. Mediterranean or cooler regions
- trends in varieties or wines internationally
- varieties recently imported and promoted in Australia
- varieties doing well elsewhere within Australia
- varieties in the media or in wine shows e.g. AAVWS.

Investigating alternative varieties ideally involves a process that considers the following factors:

- climatic comparisons – comparing the climate where the variety traditionally grows to the new intended regional climate
- varietal characteristics – viticultural growth and production attributes and subsequent wine potential

- varietal planting material – availability, information on trueness to type, health status and clonal performance
- wine styles required and market acceptability – will it fit expectations?

It should be noted that once a variety has been selected, the assessment process is a lengthy one and can take more than seven years, from planting material procurement, establishing the vines, wine production through to marketing. Companies with experience in trying new varieties maintain that not all varieties will necessarily be a success at the final stage: there is a degree of risk that needs to be evaluated.

Factors to consider when choosing alternative varieties

1. Climate and Climatic comparisons

The climate of a region has a significant influence on varietal performance and resultant wine style and quality. Temperature is the most influential climatic factor to consider, with its affect on grapevine growth, quality of production, and fundamentally, the ability of the grape to mature. Within a region there can also be temperature variations as a result of differences in altitude, aspect, or proximity to water bodies – lakes, rivers and oceans – that influence wine styles in subregions. Other climatic variables to consider include rainfall, evaporation, relative humidity, solar radiation and wind.

Homoclime studies identify regions with similar climates and have been used to assess varietal suitability across regions. Early studies were based on simple, generally averaged, temperature indices, with later work incorporating a broader range of climatic indices to improve the homoclime search accuracy. Smart and Dry (1980) developed a classification system for grapevine regions in Australia based on temperature that also included aridity (the difference between rainfall and evaporation), humidity and sunshine hours as solar radiation, looking at both annual and growing season figures. Some examples of homoclimes for Australia are given by Smart and Dry (2004) including those developed by Smart and Gwalter.

In the last couple of decades as more sophisticated technology and access to international climatic data has become available, more complex calculations have searched for greater detail and also tried to capture within region variability. The climatic indices used include growing degree days (GDD), biologically effective degree days, average growing season temperatures, the Huglin index, cold night index and dryness index (Jones et al 2009).

Where homoclime data is not available, looking at some more simple climatic variables, primarily temperature indices, can be useful.

Current climatic attributes for Limestone Coast GI regions have been reviewed in the document *Unearthing Viticulture in The Limestone Coast*, by Longbottom et al (2011). This is useful information to compare with other regions (see Table 2). According to the MJT (mean January temperature) criteria and classification of winegrowing regions by Iland et al (2011), the region of Padthaway is at the lower end of a warm region (classified as 20-21.1°C), and the Robe and Mt Benson regions are in the cool region class (classified as 18-19.9°C).

Table 2. Climatic variables for the regions of the Limestone Coast, after Longbottom et al (2011).

	Mean January Temp. MJT°C	GDD trunc[1]	Biol. Eff. DD[2]	Avg Temp March °C appr	Avg Temp April °C appr	GS rainfall[3] mm	Cont'ty[4]	RH[5] % 3pm Oct-Apr
Mt Gambier	18.2	1227	1145	16.8	14	290		50
Wrattonbully	19.6	1421	1282	18.2	14.8	195	10.1	45
Coonawarra	19.3	1392	1256	17.5	14.2	230	9.8	45
Mt Benson	19.1	1445	1377	17.5	15.2	171	8.2	58
Robe	18.1	1346	1367	17	15.2	213	7.3	64
Padthaway	20.2	1513	1395	18	15.2	195	10.2	46

[1] Growing degree days with 19°C truncation
[2] Biologically effective degree days
[3] Growing season rainfall
[4] Continentality
[5] Relative humidity

Obtaining the same level of information for regions outside Australia may not be easy, however basic information on average temperatures is available on some websites. Some information on major international wine regions is available in John Gladstone's books (1992, 2011).

Where information from the region of origin is not readily available, useful performance information can be found by investigating another climate where the variety is grown successfully. In Australia, other regions that are more advanced at evaluating new varieties can be useful references. Dry and Coombe (1998, 2004) outline the relative climates of grape growing regions in Australia that can be used for comparison. For an initial comparison of climates, investigating temperature indices is a useful place to start.

1.1. Temperature and temperature indices

The temperature of a region determines the length of growing season, grapevine growth and the ability of a variety to ripen adequately. It also influences fruit composition, particularly the acid/pH balance and the development of flavour components. There are a number of different ways of assessing the temperature of a region to define its climate, including that of the hottest month, of the growing season, or night time temperatures.

Regions with cool climates and relatively short growing seasons, such as Robe and Mt Benson, require varieties that ripen early, and have a greater risk of some varieties not ripening sufficiently in cool years. Warmer climates, such as Padthaway, may ripen a greater range of varieties, but those varieties that require cool temperatures for higher quality may not perform optimally.

The production of flavour and quality determinants is influenced by temperature over the whole ripening period as well as by night-time temperatures which reflect the mean daily range figures, i.e. the difference between day and night temperatures.

Temperature indices commonly used to compare and better understand the ripening conditions of a region are mean January temperature (MJT) and heat summation degree days (HDD) or growing degree days (GDD).

1.1.1. Mean January/July temperature (MJT)

MJT is the mean temperature of the hottest month – January in the Southern hemisphere and July in the Northern hemisphere. It is a simple and thus popular index. However, there are a number of things to consider when looking at this index.

Firstly, MJT may not adequately reflect the whole ripening period, particularly in regions of high continentality. Mean annual range (MAR), or continentality (CTL), is the difference between the average mean temperature of the hottest and coldest months (Gladstones, 1992) or July and January temperatures (Dry and Coombe 2004). Many inland European grape-growing regions have high continentality and temperatures tend to drop considerably after the warmest month, so grapes ripen under cooler temperatures than in regions with a lower continentality. Identical MJT values may be misleading as regions can have very different ripening month temperatures. For example, at Barolo, northern Italy, the MJT, is 23.4°C (McKay et al 1999) which is similar to the MJT of Merbein, Victoria at 23.3°C (Gladstones 1992). However, the temperatures over the next three months are quite different, with Nebbiolo ripening in Barolo in October with an average temperature of 12.7°C, while Mildura has an average temperature of 16.2 in the equivalent month.

It can thus be useful in these situations to also look at mean ripening month temperature (see Longbottom et al 2011).

Secondly, the weather station location can lead to misleading data as it may be located at lower altitudes than the surrounding winegrowing areas. In Campania, southern Italy for example, most vineyards are in the mountains inland from Naples. Data taken from a weather station at Naples is not representative for vineyards that are 400–600 metres or more above sea level as temperatures drop approximately 0.6°C for every 100 metres of altitude. On some meteorological internet sites, the altitude of the weather stations is provided, so adjustments to temperatures can be estimated.

Thirdly, the process of averaging the data may obscure higher maximums and lower minimums that can lead to the same mean temperature, but create quite a different temperature environment for the grapevines. For example, the MJT for Nuriootpa is 21.2°C and that for Avellino, Campania, southern Italy is 21.5°C but Nuriootpa has higher maximums and lower minimums than Avellino.

1.1.2. Heat degree days (HDD)

Heat degree days (HDD), also known as growing degree days (GDD), are calculations that sum the heat input over the growing season, with a base of 10°C. In areas of low continentality, this tends to correlate with MJT. It is monthly mean temperatures above 10°C multiplied by the number of days in the month, for the seven-month growing season, October to April, in the southern hemisphere. Gladstones (1992) made some modifications to facilitate predicting grape ripening dates, to take into account the temperature response curve for grapes (truncation at 19°C), the site latitude and day length, and diurnal temperature range. This modified summation is known as the 'biologically effective' degree days (BEDD) and differs from GDD as it ignores the temperatures over 19°C and results in a lower summation. Smart and Gwalter (unpublished 1999) argue that the truncation at 19°C may be misleading in some cases, as it actually results in different regions having similar GDD for warmer individual months. For example, the regions of Padthaway, Coonawarra, Berri and Mildura all have a GDD value of 279 for January. However, it is a widely used index and useful to summarise growing season temperature. It has also been used as a basis for maturity classification of varieties.

1.1.3. Other temperature indices

A number of other temperature indices have been included in recent homoclimes studies.

- Growing season temperature – the mean average daily temperature over the seven month growing season. Refer to Hall and Jones (2009), and Tonietto and Carbonneau (2003) for further description.
- Cool night temperature or cool night index (Tonietto and Carbonneau 2003) – this may become increasingly significant as recent work has shown night temperature is responsible for turning on a significant number of genes that influence flavour and quality parameters and, with climate change, the night time minimums appear to be increasing more than maximums (Schulz 2016).
- Effective heat hours or effective heat days – another more complex index developed by Smart and Gwalter (Smart and Dry 2004) to find a series of Australian homoclimes for Italian regions incorporating a continentality, latitude and day length effect, and a slightly different temperature regime to that used by Gladstones for biological effectiveness.
- The Huglin Index – this is often used in European literature and is similar to GDD, but gives greater weight to maximum temperatures, calculates over six instead of seven months, and takes latitude into account. Refer to Tonietto and Carbonneau, (2003) for further description.

1.2. Other climatic factors

The climatic variables of rainfall, evaporation, relative humidity, continentality and wind, can be useful to provide more information on a variety's performance in certain conditions. For example, the variety Albariño grows in a very high annual rainfall area of Spain, so it is likely to do well under similar conditions elsewhere and have good tolerance to Botrytis. Similarly, Prosecco, from north-east Italy, comes from a region with high rainfall and relative humidity. Risk factors such as frost, heat or drought can further indicate potential vine performance where relevant. Among varieties from the hot climates of southern Italy, Negro Amaro and Nero d'Avola have shown good heat tolerance in the Murray and Riverland areas of Australia.

References

Dry, P.R. and Smart, R.E. (2004) The Grape growing regions of Australia, in 'Viticulture Volume 1- Resources'. Eds. P.R. Dry and B.G. Coombe, Winetitles, Adelaide, Australia.

Gladstones, J. (1992) *Viticulture and Environment*, Winetitles, Adelaide, Australia.

Gladstones, J. (2004) Climate and Australian Viticulture, in 'Viticulture Volume 1 - Resources'. Eds. P.R. Dry and B.G. Coombe, Winetitles, Adelaide, Australia.

Gladstones, J. (2011) *Wine, Terroir and Climate Change*, Wakefield Press, Adelaide, Australia

Hall, A. and Jones, G.V (2009) Effect of potential atmospheric warming on temperature based indices describing Australian winegrape growing conditions. *Australian Journal of Grape and Wine Research* 15 (2): 97-119.

Hall, A., and Jones, G.V. (2010) Spatial analysis of climate in winegrape-growing regions in Australia. *Australian Journal of Grape and Wine Research.* 16 (3): 389-404.

Iland, P., Dry, P.R., Proffitt, T., and Tyerman, S.D. (2011) *The grapevine from the science to the practice of growing vines for wine*. Patrick Iland Wine promotions, Adelaide.

Jones, G., Moriondo, M., Bois, B., Hall, A., and Duff, A. (2009) Analysis of the spatial climate structure in viticulture regions worldwide. *Bulletin de l'OIV* 82 (944-946): 507-517.

Jones, G.V. (2006) Climate and terroir: impacts of climate variability and change on wine. In; McQueen, R.W. and Meinert, L.D. Fine wine and terroir: a geoscience perspective: 203-216.

Longbottom, M., Maschmedt, D., and Pichler, M. (2011) Unearthing viticulture in the limestone coast: The climate, geology, soils and environment of South Australia's limestone coast. http://limestonecoastwine.com.au/regional-info/unearthing-viticulture/

McKay, A., Crittenden, G., Hardie, W.J. and Dry, P.R (1999) *Italian Winegrape Varieties in Australia*. Winetitles Adelaide, Australia

Smart, R.E. and Dry, P.R. (1980) A climatic classification of Australian viticultural regions. *Australian Grapegrower and Winemaker*, 196, 8-16.

Smart, R.E. and Dry, P.R. (2004) Vineyard Site Selection in 'Viticulture Volume 1- Resources' 2nd Edition. Eds. P.R. Dry and B.G. Coombe, Winetitles, Adelaide, Australia.

Smart, R.E. and Gwalter (1999). Homoclime studies for Italian winegrape varieties in Australia *in* Italian Varieties for Australia; A seminar series. (unpublished)

Tonietto, J. and Carbonneau, A. (2003) A multicriteria climatic classification system for grape-growing regions worldwide. *Agricultural and Forest Meteorology*. www.science direct.com.

1.3. Future climatic conditions

The impacts of climate change on the viticultural industry are pertinent when investigating the suitability of alternative varieties and the useful role new varieties may play under the changed conditions.

Climate change scenarios and implications for the Limestone Coast region have been summarised in the paper by Thomas and Hayman (2013).

> *Climate change models …suggest that by 2030 the Limestone Coast will be about 0.5 to 1°C warmer with a 10 to 20% reduction in rainfall over winter and spring.*

While there may be some uncertainty over the degree of change, it is predicted that it will get warmer; there will be more variable and extreme events; more heatwaves; and there may well be less rainfall. The changes are likely to be more significant for inland regions than those on the coast, and there is greater confidence in the predictions for temperature change than for rainfall.

Impacts of climate change for vineyards include earlier budburst leading to earlier harvest, with varieties ripening under warmer conditions at an earlier time. Webb et al (2007) estimated the effect on the harvest dates. They estimate that the harvest of Cabernet Sauvignon in Coonawarra will be 15 to 23 days earlier by 2030 (from the base of 1990) and 21 to 45 days earlier by 2050. Currently, at more than halfway through the first stage of the predictions, in the 2016 vintage, Cabernet Sauvignon harvest has, on average, moved from late April - early May to early-mid April.

Varieties differ in response to heat. Late ripening varieties are noted to be more sensitive to elevated temperatures and advance maturity at a greater rate than the earlier ripening varieties. Work by Petrie and Sadras (2008) has shown Cabernet Sauvignon in Padthaway to be advancing in maturity to 21.8 Brix by 1.6 days per year from 1993 to 2006; Chardonnay by 1.3 days; and Shiraz by 1.49 days. The figures from Coonawarra showed an even greater advancement for Cabernet Sauvignon of 2.18 days per year.

If varieties are ripening under warmer conditions, the resultant wine styles may change along with the suitability of existing varieties, and it may be prescient to trial potential substitute varieties.

Planting a range of early and late maturing varieties may be a useful strategy to alleviate not only the potential impacts of compressed harvest dates with the subsequent logistical challenges, but also the increased likelihood of heatwaves. The potential damage from extreme heat events depends on the variety's phenological stage at the time of the event, as discovered in the heatwave of 2009. For example, a spread of varieties at different phenological stages may reduce the chance of losing the total crop due to heat damage at flowering.

The likely scenario of greater aridity and increased demand for irrigation water may be one reason to look at earlier ripening varieties that would have a lower water use than later ripening varieties in Padthaway.

References

Petrie, P.R. and Sadras, V.O. (2008) Advancement of grapevine maturity in Australia between 1993 and 2006: putative causes, magnitude of trends and viticultural consequences. *Australian Journal of Grape and Wine Research*, 14: 33-45.

Thomas, D.S. and Hayman, P.T. (2013) *Managing climate risk for viticulture in the Limestone Coast*. South Australian Research and Development Institute.

Webb, L.B., Whetton, P.H., and Barlow, E.W.R. (2007) Modelled impact of future climate change on the phenology of winegrapes in Australia. *Australian Journal of Grape Wine Research* 13 (3): 165-175.

Schulz, H (2016) The global adaptation challenges for viticulture. In; The 16th Australian Wine Industry Technical Conference. Adelaide (not yet published).

2. Varietal characteristics

Information on viticultural properties of a variety – its phenology, growth and production, susceptibility, adaptation to different soil and climates, and harvest factors – gives some idea of adaptability of a variety, and its management requirements. Knowledge of a variety's fruit characteristics and current wine styles can also indicate its potential end use and market.

This information may come from the region of origin or from growers elsewhere growing those varieties.

2.1. Viticulture characteristics

2.1.1. Phenology

Information on the timing of ripening is a critical factor, and together with budburst timing may be gleaned from region of origin as early, moderate or late. The reported timing of maturity may be influenced by crop load, management factors, end use, or legislation in the country of origin and it may also be skewed if relative only to a small number of varieties in that region.

It can be useful to obtain ripening and budburst timing using a familiar reference variety such as Chardonnay or Shiraz. The French have a system of ranking variety maturity using the early ripening Chasselas as their reference, with a variety's maturity ranking as days before or after Chasselas (Anon, 2006).

In cool climates, varieties with a long growing season requirement, i.e. late maturity, may not ripen adequately. However, manipulation of timing of ripening is possible to some extent by certain management techniques. For example, Graciano, typically a late maturing variety, is successfully grown in the cool Canberra district at Mt Majura Vineyards by Frank van de Loo, with appropriate crop and canopy manipulation.

Early ripening varieties growing in warmer climates may lose some of their classic varietal flavour and sugar acid balance, e.g. Riesling or Pinot Noir. However, some varieties that are typically grown in cool climates can also produce good quality wines in warmer climates. This was recently illustrated with Verdejo, a white from northern Spain, produced by Trentham Estate Wines in Sunraysia, winning both the 2014 Best Murray Valley Region Wine and best Spanish White Wine in 2014 at the AAVWS.

There has been work on grouping varieties according to their time of maturity linked to temperature indices required, or optimal, to ripen them. The most recent classification by Gladstones (2011) using biologically effective degree days has nine groups that can be divided into three groups of three: early, mid-season and late season, with three subgroups in each category (Table 3). It is based on extensive information from France, America, New Zealand and Australia. This ranking of maturity assumes similar environmental conditions and management practices, while acknowledging the potential variation in ripening times under different management techniques. Varieties vary in their response to climatic conditions outside the range to which they are accustomed. As previously discussed, warmer than normal conditions have a significant impact on the rate of ripening of Cabernet Sauvignon for example. Cabernet Sauvignon (classified in group 6, Table 3) may mature earlier under certain environmental conditions and thus before earlier varieties, such as Shiraz (classified in group 5, Table 3).

Table 3. Examples of grape maturity groups and the biologically effective degree days required for the varieties to ripen. Adapted from Gladstones (2011).

Maturity Group	BEDD	Red varieties	White varieties
1	1020		Schönburger, Reichensteiner
2	1080	Meunier, Zweigelt	Chasselas, Auxerrois
3	1140	Gamay, Pinot Noir	Albariño, Chardonnay
4	1200	Dolcetto,Blaufränkisch, Tempranillo	Grüner Veltliner, Riesling
5	1260	Cabernet Franc, Lagrein, Shiraz	Arneis, Viognier
6	1320	Sangiovese, Cabernet Sauvignon	Crouchen, Malvasia Bianca
7	1380	Graciano, Grenache	Garganega, Petit Manseng
8	1440	Montepulciano,Aglianico, Mataro	Grenache Blanc, Verdicchio
9	1500	Negro Amaro	Biancone, Doradillo

Another system by Jones (2006) used average growing season temperatures to establish four groups – cool, intermediate, warm and hot – and illustrated ripening of individual varieties spanning both across and within those climatic groups, to indicate the variability of ripening times of varieties.

Dry (2004) tabled the phenological timing of the 60 most important varieties in Australia at the time, which included many non-mainstream varieties such as Cabernet Franc, Malbec, Graciano and Tempranillo.

An indication of the maturity of alternative varieties has been compiled from various references and Australian grower surveys undertaken over the last few years (Table 4). Information from growers generally relied on comparison with either Shiraz for the red varieties or Chardonnay for the white varieties. Once again, these rankings should only be seen as a relative guide as they may vary with season, management regime, and the variety's differing response to those variations.

Table 4. An initial indication of maturity of a few alternative varieties (sourced from various references including some overseas references, Australian vineyard survey results, http://www.chalmersnurseries.com and Dry and Coombe (2004)).

Note these results can vary depending on yield, management, vine age and climatic conditions. Some varieties are listed in more than one column to signify that they may vary in ripening timing.

	Possible Maturity Ranking				
	Early		***Midseason***		***Late***
Whites	*Chardonnay* Albariño Schönburger Savagnin Pinot blanc	Albariño Arneis Grüner Veltliner Moscato Giallo Schönburger Verdejo Vermentino	Arinto Fiano Verdejo Garganega Malvasia Istriana Vermentino	Arinto Fiano Garganega Greco Grenache Blanc Malvasia Istriana Petit Manseng Prosecco Vermentino	

Reds	Gamay	Tempranillo Dolcetto Malbec	*Shiraz* Barbera Blaufränkisch Cabernet Franc Dolcetto Lagrein Malbec Mencia Sangiovese Shavkapito Tempranillo	*Cabernet Sauvignon* Barbera Graciano Montepulciano Nero d'Avola Tannat	Aglianico Graciano Mataro Montepulciano Nero d'Avola Negro Amaro Sagrantino Saperavi

2.1.2. Growth characteristics

The growth characteristics of a variety, such as vigour, growth habit, bud fruitfulness and wood brittleness can influence the choice and suitability of management options, such as trellis and pruning options, planting locations and distances, rootstock choice and canopy manipulation requirements.

Reports of high vigour of a variety may partly reflect the regional conditions and tradition, with some regions with high potential soil types and high rainfall using expansive trellis types. For example, Albariño is grown in a very high rainfall region of north-west Spain, traditionally under high expansive trellises to accommodate the vigour, although recently more moderate trellises, including VSP, are used. This variety does still appear to have reasonable vigour where it is grown in a few of the newer regions.

Fruitfulness may be cited to be low, with many varieties traditionally cane-pruned in their areas of origin, but under Australian conditions fruitfulness has been fine with shorter spur pruning, possibly due to high sunshine hours in Australia. However, Nebbiolo is an example of a variety with low basal bud fruitfulness and requires long or cane pruning to bear a reasonable crop.

2.1.3. Susceptibility

Varietal susceptibility to factors such as diseases, pests, drought, sunburn, rain or berry splitting can indicate potential management strategies required. Reported disease susceptibility from different sources may be conflicting, possibly due to variable disease pressure or management. Fiano has been reported from overseas sources to be susceptible to downy and powdery mildew, but it has shown good disease tolerance under a very high disease pressure year in McLaren Vale. Botrytis susceptibility may be exacerbated by compact bunches from low bud numbers and partially a function of the pruning regime. There may be some clonal variability, for example with bunch compactness. Susceptibility due to thin skins may indicate a challenge with Botrytis in difficult ripening conditions, and potential requirement for hand harvesting as is the case with Greco, a white variety from Campania, Italy.

2.1.4. Soil and climatic preferences and varietal plasticity

Evidence of varietal adaptation to a range of climatic and soil types indicates a broad possibility for success in many regions. Varietal plasticity or adaptability to produce good fruit quality in a range of environmental conditions can only be determined once varieties are grown in a number of environments. Chardonnay was traditionally grown in a limited climatic zone in France, but has proven to be very plastic as it adapted well to a wide range of climates internationally. Nebbiolo and Pinot Noir are examples of more demanding and less plastic varieties whose performance is more dependent on environment.

Certain wine styles may require specific environments, but a variety may produce good quality and different styles in a range of climates. Top quality Chardonnay may require cool sites, but it can produce good commercial wines across a range of environments, displaying high plasticity or adaptability. The wine style of Shiraz varies with environment; that from cooler sites exhibiting more pepper and a more restrained, less alcoholic style than the fuller, more fruit-driven warmer climate Shiraz.

Some of the newer Italian varieties such as Lagrein, Montepulciano and Nero d'Avola have performed well in both warmer and warm to cool environments (Riverland, McLaren Vale, Heathcote and Marlborough). Tempranillo is now widely grown but seems to do best in more moderate climates, and is possibly moderately plastic, with better wines coming from moderate and cool climates, but not necessarily from warm to hot climates. Some of the new whites, in particular Vermentino and Fiano, appear to have reasonable plasticity, with successful wines produced from a range of climatic regions: the Murray Darling, Riverland to Heathcote, McLaren Vale, Clare and some parts of the Adelaide Hills.

Many of the newer varieties have only been grown in a narrow climatic region and their plasticity is untested.

The ideal way to determine plasticity for a variety is to trial it across different environments and regions. This is now happening in Australia with a number of varieties through serendipity rather than as a planned exercise.

2.1.5. Harvest factors

Factors that influence performance at harvest are important indicators for potential performance in new sites. These include yield components such as bunch and berry size, ability to hang on the vine, berry skin toughness and bunch compactness, acid retention or degradation. Tempranillo loses acid rapidly on ripening and harvest decisions are made by monitoring the acid and pH, so its optimal performance in warm to hot regions may present some challenges. Arneis also loses acid rapidly on ripening. Conversely, Fiano tends to retain high levels of acid during the ripening phase and acid additions may not be necessary. A variety's suitability for mechanical harvesting can be influenced by soft thin berry skins or brittle wood. Greco, the white variety from Campania, has thin skins and needs to hang on the vine for a long time to ripen and is also hand-pruned in Langhorne Creek (Briony Hoare, pers comm).

2.2. Wine characteristics

Knowledge of a variety's wine styles can influence the decision on the potential for success of that variety in a new location. Some varieties are known for diverse wine styles, such as

Lagrein which is made as a light, rosé style or a medium to full bodied style. Other varieties may be known for a limited, more specific style but other options may be possible. The potential for varieties hitherto unknown for rosé is being explored as the market for rosé wines expands. White varieties with more textural components are finding a niche with different markets and flavours. Some whites have historically been reported as susceptible to oxidation, but this has changed as winemaking has improved in the last few decades. Verdejo in Spain is the classic example. It was historically made into a sherry style wine but after revised winemaking practices it became known as a white of great potential and plantings in Spain increased from 4453 hectares in 2000 to 16 578 hectares in 2010.

Some varieties' strengths may be as a useful blending component to complement another variety's specific structure. Australia has typically pursued the straight varietal path, but many European wines are made with blends from years of production to achieve maximum complementarity from the various components. Cerasuolo di Vittoria DOC in Sicily has Nero d'Avola (max. 60%) blended with the lower acid variety Frappato and possibly other varieties such as Nerello Mascalese and Grosseto Nero. In Australia, blends of different combinations are becoming more prevalent. Two SAMU Nero blend wines from the Riverland, one with Merlot and one with Lagrein, each received gold medals in the AAVWS in 2015. In 2013, Steve Pannel's 2012 Tempranillo Touriga was awarded Best Blended Wine, Best Spanish Red Wine and Best Red Wine.

References

Anonymous (2006) Catalogue des variétés et clones de vigne cultives en France Institut Français de la Vigne et du Vin (INRA Montpellier).

Clingeleffer, P.R. and Davis, H.P. (2015) Enhanced varieties and clones to meet the challenges of climate change and deliver lower alcohol wines. CSIRO Agriculture. http://research.wineaustralia.com/wp-content/uploads/2016/02/CSP-0902-Final-report-public.pdf

Dry, P.R. (2004) Grapevine Varieties. In : 'Viticulture Volume 1- Resources'. Eds. P.R. Dry and B.G. Coombe, Winetitles, Adelaide, Australia.pp132- 149

Dry, P.R. (2010) Alternative varieties Technical Booklet. http://research.wineaustralia.com/wp-content/uploads/2012/09/2010-02-FS-Alternative-Varieties.pdf

Gladstones, J. (2004) Climate and Australian viticulture, in 'Viticulture Volume 1- Resources'. Eds. P. R. Dry and B. G. Coombe, Winetitles, Adelaide, Australia.

Gladstones, J. (2011) *Wine, terroir and climate change*, Wakefield Press, Adelaide, Australia

Higgs, D. (2010) *Vino Diversity - the book: new grape varieties and wines in Australia*. Darby Higgs, Australia.

Jones, G.V. (2006) Climate and terroir: impacts of climate variability and change on wine. In McQueen, R.W.; Meinert, L.D. Fine wine and terroir: a geoscience perspective. 203-216

Kennison, K. (2012) Alternative varieties research moves north. *Wine Industry Newsletter* (102): 1-2.

Petrie, P.R. and Sadras, V.O. (2008) Advancement of grapevine maturity in Australia between 1993 and 2006: putative causes, magnitude of trends and viticultural consequences. *Australian Journal of Grape and Wine Research*, 14: 33-45.

Robinson, J., Harding J., and Vouillamoz, J. (2012) *Wine Grapes. A complete guide to 1,368 vine varieties, including their origins and flavours*. Allen Lane, Penguin Books. London.

Rose, L. (2007) Creating our Future - new varieties and styles. In Blair, R.J. , Williams, P.J., and Pretorius, I.S., (eds.) Proceedings of the thirteenth Australian wine industry technical conference, 29 July - 2 August 2007, Adelaide, SA

Petrie, P. R. (Ed) (2010) Think global plant local - alternative varieties. Proceedings of a seminar. Mildura, Vic, 5 November 2010, ASVO and Australian Alternative Varieties Wine Show.

Tassie, L., Dry, P., and Essling, M. (2010) Alternative varieties: emerging options for a changing environment. AWRI Research to Practice 142 pp.

3. Planting material – varietal accessibility, information on trueness to type, health status and production information

Having decided on a variety, the decision to go ahead may depend on whether the planting material is in Australia or needs to be imported, which means greater time and expense required. Certification of the variety's health status and proof of identity is essential; it is an expensive process if the identity of the variety is not correct. There may also be production information on some varieties and clones that can influence a clonal decision.

There is not currently a comprehensive list for the industry to indicate the presence and location of planting material in Australia. The most current, but dated, National Register of Grapevine Varieties and Clones (Nicholas, 2006) contains variety location in public germplasm collections: CSIRO, SARDI and other state and vine improvement collections. However, at time of print, the CSIRO and SARDI collections are closed to the public and a number of others are struggling to survive and have either reduced collection maintenance (Queensland) or closed (Tasmania).

Collections from private nurseries or new imports by vine improvement groups are not on the register. It may be useful to contact individual nurseries or vine improvement groups (see contacts below) and check the Vinodiversity or AAVWS websites to find out if the variety is grown and wine produced in Australia. Much of the material was imported in the mid-1960s and 1970s and some may have since undergone fragmented shoot apex culture (FSAC) to remove virus that may enhance vigour and change growth characteristics.

There are a range of new varieties available following importations by private nurseries and vine improvement organisations in the last two decades. In the late 1990s Chalmers Nursery imported up to 80 varieties and clones primarily from Italy, and more recently others have imported varieties and clones from Portugal, Spain and France.

Private individuals have also undertaken imports. For example, Peter Barry in Clare brought in the Greek white variety, Assyrtiko. Some varieties available in Australia may be under

agreement conditions; subject to non-propagation agreements; or royalty payments may be required by the importer on distribution.

Varieties that require importation must go through the quarantine process which takes two years, and there is an option of bulking up material while in quarantine to increase the number of plants received on release. Australia has a strong competitive advantage due to its low number of significant pests and diseases compared with our overseas competitors and it is in our interests to maintain that status.

It is also important to keep in mind that when moving plant material from one region to another, say from a nursery to your vineyard, a Plant Health certificate and heat treatment may be required; The South Australian Department of Primary Industry or equivalent interstate department can provide regulations for moving plant material between regions. Further information about biosecurity regulations can be accessed at www.vinehealthaustralia.com.au/biosecurity-rules-tool/

Prior to purchase of the planting material, a guarantee of trueness to type should be supplied and a good traceability system should be evident. Recent unravelling of a number of varietal confusions in Europe and verification of varietal distinctiveness via DNA work has emphasised the importance of correct identification. The imported mistake of Albariño, that turned out to be Savagnin Blanc was a very expensive process for some Australian growers. Another recent discovery of mistaken identity involves Grillo, a white Sicilian variety, where the clone imported from the US in 1969 has been DNA tested and shown to be Slankamenka, an old Balkan variety. Trueness to type can be verified from a DNA test at an internationally accredited facility and/or from visual inspection (ampelography) by a recognised ampelographer. The importance of correct identification is particularly critical with the label integrity programme (LIP) and the development of more sophisticated methods for testing wine for trueness to type.

An up-to-date health status report that confirms virus free material should also be available from the supplier of the propagation material. Virus testing should be undertaken on nursery source material and the results made available to the purchaser. In addition, if it is planned to topwork the new varietal material in the vineyard, the old stock to be used as the base should be virus tested and topworking should only proceed if the material is clean.

Some information on varietal characteristics may be available from nurseries on a varietal or clonal level that may be useful as there may be useful variability between clones (particularly clones of older varieties).

An introductory list for planting material contacts (not exhaustive)

Vine improvement (VI) organisations

- Australia Vine Improvement Association (AVIA) http://www.avia.org.au/ National Nuclear Collection, Dareton Agricultural Research and Advisory Station, Dareton, Vic
- Adelaide Hills Vine Improvement Inc. (AHVII) http://adelaidehillsvineimprovement.org

- Barossa Vine Improvement, also known as the Barossa Grapegrowers' Vine Selection Society Inc (BGVSS), http://www.barossa.com/barossa-vine-improvement
- Langhorne Creek http://www.langhornecreek.com/the-association/vine-improvement-committee/
- Riverland Vine Improvement Committee Inc. (RVIC) http://www.rvic.org.au/ Cirami Block, Harding Road, Monash SA 5342
- Australian Grapevine Foundation Planting Service (AGPFS) (Formerly SAVI and SAVII SA vine improvement**)** http://www.agfps.org.au/varieties/ – also located at Monash
- Victoria and Murray Valley Vine Improvement (VAMVVIA) http://vamvvia.org/

Nurseries with some alternative varieties (others can also provide a number of alternatives.

- Yalumba http**:**// www.yalumbanursery.com
- Chalmers http://www.chalmersnurseries.com

Further reading

Australian Alternative Varieties Wine Show, www.aavws.com**.**

Nicholas, P. (ed). (2006) National Register of Grapevine Varieties and Clones. AVIA, Irymple, Australia.

Tassie, L. (2010) Vine Identification - knowing what you have. GWRDC Fact Sheet.

Vine Health Australia, www.vinehealthaustralia.com.au/biosecurity

Vinefinders, www.vinefinders.com.au

Vinodiversity, www.vinodiversity.com

Winecompanion, www.winecompanion.com.au

4. Wine styles and market acceptability

The success of a new variety hinges on its marketability – will it sell? What wine style is wanted? How will it fit into the portfolio? These questions can be answered by market research and a market plan. The wine style produced and varietal mix in a vineyard very much depends on the producer's or grower's individual requirements and perception, or the market that the grower supplies, with more large companies now moving into the alternative varieties space.

Consumer preferences are changing with development of new markets, such as the Asia, and the emergence and popularity of new food styles. Some of the new varieties offer a greater range of flavours, textures, and wine styles to accompany these new food flavours. Recent research by CSIRO looked specifically at new varieties with a greater range of flavours such as

Harslevelu, Fiano, Verdejo, Petit Manseng, Montepulciano, Lagrein, Tannat and Saperavi (Clingeleffer and Davis 2010).

Preferences are moving towards sparkling wines (e.g. Prosecco), lighter reds or rosés and more luscious whites, together with a trend to less alcoholic wines. A recent report indicated that sparkling wine sales had increased by 80% in the UK in the five years from 2011 to 2016 (**www.foodbev.com/news/uk-sales**).

Investigations into the potential of a variety in the market place can include checking the popular press, where alternative varieties are tracked and promoted, and identifying future trends and exciting wines. Varieties such as Nero d' Avola, Grüner Veltliner, Assyrtiko, and Albariño have been included in Wine Spectator lists in the last 6-8 years, and Assyrtiko, Falanghina, Fiano, Aglianico and Nero d' Avola have been tipped as hot varieties of the future by Jancis Robinson.

The Australian Alternative Varieties Wine Show (AAVWS) has been a valuable promotional tool for alternative varieties. Trophy winning wines, awards and entry numbers can be traced on their website www.aavws.com**.** Among the whites, Fiano and Vermentino have consistently performed well and recent classes of Tempranillo have been strong. In 2015 the Nero d'Avola class was the one to excite the judges.

Some factors to consider with a new variety in the market place:

- The familiarity for consumers. For example, Montepulciano or Lagrein having similarities to Shiraz, and Verdejo to Sauvignon Blanc.
- The appeal of something different to fill the 'new and unknown' or 'hip' niche.
- Can the variety fit into an already established market, or will it be the first in the market? Marketing an unknown to be the market leader can be hard work. Hand-selling can be the only way as Mark Walpole, Beechworth, found with the little known Colorino, a red variety from Tuscany that is a component of Chianti, but has a complexity of flavours and incredible colour as a straight varietal wine (Walpole, pers comm).
- The ability to pronounce a variety name. This is helpful, with the Greek varieties Xynamavro and Agiorgitiko, a bit of a challenge for new consumers compared to Lagrein or Fiano. Yalumba spent considerable resources in promotion to help consumers pronounce Viognier.
- Export limitations with protected names. This can be the case in the EU in particular, where Prosecco and Montepulciano are not allowed to be used under those varietal names. Prosecco has been renamed as Glera in Italy and the name Cordisco is permitted as a synonym for Montepulciano.

There is also the risk element – not all varieties will succeed in the marketplace, even though they may pass the vineyard and winemaking assessment stage. Companies such as Brown Brothers, Yalumba and Coriole have years of experience in this area with a range of varieties, and have stated that some varieties make it and some don't. The message seems to be that one must be prepared to cut out the failures.

In the new and future market place with Generation Y, Z and then alpha, there may be more adventurous and globally-focused consumers and that, together with the changing market trends, may be sufficient to allow more success with alternative varieties in the future.

References

Anderson, K. and Aryal, N.R (2010) Which winegrape varieties are grown where? A global empirical picture. From http://www.adelaide.edu.au/press/

Clingeleffer, P.R. and Davis, H.P. (2011) Enhanced varieties and clones to meet the challenges of climate change and deliver low alcohol wines. In: Petrie, P. R. (Ed) (2010) Think global plant local - alternative varieties. Proc. seminar. Mildura, Vic, November 2010, ASVO and Australian Alternative Varieties Wine Show.

http://www.foodbev.com/news/uk-sales-of-sparkling-wine-rose-by-80-since-2011-data-shows. Site accessed 20–08–2016.

5. List of potential varieties for the Padthaway and Mt Benson/Robe regions

A list of potential varieties for the regions of Padthaway, Mt Benson and Robe has been compiled (Table 5). The individual varieties provide an example of the selection process, going through the logic previously outlined and incorporating the information on how to assess varieties for suitability. These varieties were selected after consideration by the project subcommittee and in response to the Limestone Coast grower survey. They cover a range of wine styles to complement or substitute some varieties; to have something different; and to have something not too different. They may not suit all situations. They are a tiny selection from a huge array of choice.

The information on the varieties comes from international and local literature from previous workshops on alternative varieties, and in some cases from surveys conducted by the author. In most cases, where a variety is growing in Australia, the information also comes from discussions with growers who have had experience with the varieties. This information may be at odds with some of the reference material and may vary between regions. Much of our planting material has been treated to eliminate virus and that may account for some discrepancies, for example in vigour, as well as the unknown management and regional influences internationally.

There is also a red variety listed that is not currently in Australia – Shavkapito, from Georgia – as it may be worthwhile investigating and in fact is just in the process of being imported under the AAWVS programme.

In trialling the new varieties, individual vineyard sites may need fine tuning, as within a region there will be variable conditions that will influence management choices. For example, soil variability and wind exposure may influence vigour, growth and ripening.

Ultimately the best way to see if a new variety will work in your environment is to try it.

Finally, the next step?

Investigate more varieties. Plant a trial.

There are many varieties that are unknown and could be successful in the regions. The ideal way to find out a variety's suitability is to plant a trial of a number of varieties that show a little promise for one reason or another; good information could come from three to 10 plants. Schönburger was on this list for the region and deleted at the last minute as possibly better elsewhere; others have not yet been considered.

The huge project undertaken by CSIRO (Clingeleffer and Davis, 2015) needs further investigation. The author only just located it as a report to Wine Australia, and there appears to be some really good information to follow up.

The opportunities are limitless; narrowing down the options with little data is very challenging. Get some data. Plant that trial.

Explore. Trial. Adopt.

Chardonnay was not in a vineyard prior to 1970.

Table 5. List of alternative varieties for Padthaway, Mt Benson and Robe, their region of origin and some climatic data

Region/variety	Region(s) of origin	MJT (°C)	*GDD (°C)	Altitude masl (m)	Continentality
Padthaway		20-20.4	1513	50	10.5
White					
Fiano	Campania, Southern Italy	26-26.4(0 masl)**		300-500	
Prosecco	Veneto, Northern Italy	22.5-22.9/23.6	1,517		18.1 (Verona)
Verdejo	Rueda, Spain Vinho Verde, Portugal	20-20.4(VV)	1,513(VV)	600-780	
Red					
Graciano	Rioja, Spain	21-21.4, 24-24.9	1,386	350–650	
Cabernet Franc	Bordeaux, Loire, France	20.5, 19-19.4	1,392		15.3(Bdx)
Montepulciano	Abruzzo, Marche, Italy	23.0(Pescara)			
Robe/Mt Benson		R 18-18.4,MB 19.1	1,346/ 1,445	50-150	7.1
White					
Albariño	Rias Baixas, Spain. Vinho Verde, Portugal	19-19.4/20.0-20.4	1,513		
Grüner Veltliner	Austria	19-19.4/19.8	1,083	210-450	20.6
Falanghina	Campania, Southern Italy	26-26.4(0 masl)**		300-500	
Red					
Gamay	Beaujoulais, France	20.5	1,213		18.1
Tempranillo	Rioja/Ribera del Duero, Spain	20-21.4	1,386	350-650/700-800	
Blaufränkisch	Austria	19-19.4/19.8	1,083		20.6

Shavkapito	Georgia- potential import	24.4			high?

* International GDD values, and some others, were taken from Gladstones (1992) for consistency, but those GDD and MJT may be slightly lower than current values. Other values from Longbottom et al (2010), Tassie et al (2010) and http://www.yr.no.

** This data is from Naples, at sea level, whereas most of the vineyards with these varieties are at higher altitudes.

5.1. Potential varieties for Padthaway

5.1.1. Fiano (W)

Fiano is traditionally grown in the Avellino province of the Campania region, southern Italy and produces the white Fiano d'Avellino wine. It has a long history; possibly back to Ancient Greek times.

Main synonyms
Apiana, Apiano, Fiana, Fiano Di Avellino, Foiano and Fiore Mendillo. Previous synonyms Santa Sofia and Latina Bianca are different varieties; Latina Bianca is known in Puglia as 'Fiano Aromatico', or 'Minutolo,' with a slight muscat flavour.

Plantings
In Campania, plantings were revived in the 1970s by the producer Mastroberardino, who championed local varieties. There were 783 hectares of Fiano in 2000 and 1,377 hectares in 2010, with reports of more plantings in Sicily and Puglia. It is also grown in California, Argentina and New Zealand. In Australia, initial plantings occurred in the early 2000s at Coriole and Oliver's Taranga Vineyards in McLaren Vale and Chalmers Vineyards in the Murray Darling.

In the 2015 AAVWS there were 35 entries of Fiano wines from diverse regions (Adelaide Hills to Murray Darling, reflecting the high interest and adaptability of the variety.

Fiano was selected due to its good performance in Australia in the vineyard; for disease tolerance; fruit and wine quality; and acceptance in the marketplace. The MJT used for comparison is at sea level, so quite a bit warmer than the Fiano vineyards that are up in the mountains from Naples.

Fiano	**Information**
VITICULTURE	
Phenology	Budburst is early to mid-season and harvest is mid-to late season, depending on region. It is similar to Shiraz in McLaren Vale and to Chardonnay in the Riverland.
Growth	Medium to high vigour, relatively upright. In Italy large overhead trellises are being replaced with VSP, and rootstock selection used to contain vigour. In Australia VSP, single wire with catch wire and 2 wire trellises are used with cane and spur pruning (both hand and machine).
Susceptibility	Good against powdery and Botrytis in a high pressure year at McLaren Vale, although there are some reports of susceptibility to powdery at flowering. Need to avoid sunburn, but vines with a good canopy are usually fine.
Soil and climatic preferences	Traditionally on deep volcanic soils, but it is grown in Australia in a range of soils and climate. Reasonably heat tolerant.
Harvest factors	Yield moderate to good in Australia, (6-8 t/ha), with or without shoot or bunch thinning. Some hen and chicken is reported. It retains high acid, and sometimes no acid is added at harvest. Harvest figures from Don Oliver's, McLaren Vale: 13 Be, 3.0-3.2 pH and 9 g/L TA.

WINE	Textural, naturally good acid, full bodied and well structured, with pome fruits, hazelnuts, almond, and spices. Different styles, early and late are possible.
PLANTING MATERIAL	In National Register (2006), IC788456, from 1970s, and tissue cultured version. Clone at Chalmers Nursery imported in late 1990s.

5.1.2. Prosecco (W)

Prosecco is traditionally grown in the north-east Veneto region of Italy and produces the increasingly popular sparkling wine of the same name. It can also produce a still wine. In Italy in 2009, the variety was renamed Glera and subsequently wine imports into the EU are unable to be named Prosecco, the DOC appellation name.

Main synonyms
Glera, Briška Glera, Prosecco Tondo, Števerjan (Slovenia) and Teran Bijeli (Croatia). Genetically it has close ties to Croatian varieties and may originate from that area. Three previously assumed clones, Prosecco Tondo, Prosecco Lungo and Prosecco Nostrana (Malvasia Bianca Lunga), are now known to be unique varieties, with Prosecco Tondo now the main variety.

Plantings
In 2010, there were 18,437 hectares globally, a significant increase from 7,498 ha in 2000. Italy had 16 500 ha in 2010 that also included the Prosecco Lungo variety. In Australia there are more than 20 producers primarily in the King Valley, but also in Wrattonbully.

Prosecco was selected for trial as an interesting wine style with an expanding market.

Prosecco	**Information**
VITICULTURE	
Phenology	Early budburst, late harvest, and picked at low Be.
Growth	Medium-high vigour, sprawling growth habit and highly fruitful with high yield potential. Cane pruning recommended in Italy, with some trimming and bunch thinning. Spur and cane pruning is used in Australia with sacrificial canes left (Coriole).
Susceptibility	Reports from Italy are that it is susceptible to fungal diseases, but Australian vineyards report it to be quite tolerant. Prosecco Tondo is evidently less susceptible than other previously believed clones. Prone to spring frost damage due to early budburst and possibly hen and chicken.
Soil and climatic preferences	Grown in a range of sites and soils in Veneto, and a number of sites in Australia. Veneto has generally high rainfall, over 800 mm, humid summers, and heat degree similar to Padthaway. Main areas of production in Australia are mild.
Harvest factors	Bunches are medium to large, long and winged, loose with round, medium berries with thin skins. Acid can drop suddenly at ripening: generally aim for about 11-12 Be (Coriole, McLaren Vale) and 9-10 Be (dal Zotto, King Valley)
WINE	The wines can be neutral, with high cropping levels, but good wines are slightly floral – jasmine, wisteria – with apple, pear and citrus notes. There is some clonal variation within Prosecco Tondo and Prosecco Lungo is more spicy.
PLANTING MATERIAL	Some recent clonal importations available. May be some variation with clones. Chalmers nursery material is Prosecco Tondo.

5.1.3. Verdejo (W)

Verdejo comes from Spain and is grown in the northern Rueda zone, in the central Castilla y Leon region. It produces a high quality aromatic wine and is now considered one of the top whites of Spain after a recent revival. It is used in blends with Sauvignon Blanc and Viura or as a straight varietal.

Main synonyms
Albillo de Nava, Boton De Gallo Blanco, Verdeja, and Verdejo Blanco. It is not the same as the variety Verdelho; Verdelho confusingly being a synonym for the white variety Godello in Portugal. Apparently, it is not the same as Planta Fina in Valencia as previously reported (Robinson et al, 2012).

Plantings
In 2010, there were 16,578 hectares in Spain, up from 11,352 in 2008. There are only a handful of producers currently in Australia, including Trentham Estate and RVIC.

Verdejo was selected for trial due to its stellar rise in Spain, the promising low alcohol, aromatic wine and its performance in a few sites in Australia.

Verdejo	**Information**
VITICULTURE	
Phenology	Budburst is mid-season, with early to mid-season harvest. In the Murray Darling, Trentham Estate, budburst is later than Chardonnay and the same as Sauvignon Blanc, and its harvest is generally a bit later than Sauvignon Blanc.
Growth	Moderate vigour, medium to high yield (Trentham).
Susceptibility	International reports of susceptibility to powdery, but this is not reported in Murray Darling. May be sunburnt if too exposed, so there is a need to maintain canopy in warm climate.
Soil and climatic preferences	Grown in the northern Rueda and the central, continental high plateau of Castilla La Mancha in Spain, with hot summers and cold winters.
Harvest factors	Small to medium bunches, moderately compact to slightly loose, with small berries.
WINE	Wines are aromatic, with descriptions of fresh citrus, light floral, tropical and stone fruits, with some herbal notes. Trentham Estate aim for a 12% alcohol wine, soft, full and long flavour.
PLANTING MATERIAL	In the National Register (2006) and VI groups.

5.1.4. Cabernet Franc (R)

Cabernet Franc is the main red variety grown in the Loire, France and the third most widespread variety in Bordeaux, after Cabernet Sauvignon and Merlot. It is the parent of Cabernet Sauvignon, and most likely originates from the Basque country in Spain. It ripens earlier than Cabernet Sauvignon, is more reliable in cooler climates and the varietal wines are lighter, softer and more aromatic with more fruit flavours. It appears that good wine may require management to contain crop, with variation from sites and possibly clones, but there is little clonal information available.

Main synonyms

Numerous in different regions and countries: Acheria, Breton, Cabernet, Cabernet Aunis, Cabernet Franco, Carmenet, Gros Bouchet, Kaberne Fran, Petit Fer, Plant Breton, Trouchet Noir, Verdejilla Tinto and Vidure. In NSW many of the older Merlot vineyards were mistakenly up to two thirds Cabernet Franc, due to a mistake in the original three vine planting material source that had one Cabernet Franc vine.

Plantings

There were 48,551 hectares globally in 2000; about 36,000 in France; 6,639 in Italy; 1,189 in the US; and 744 in Australia. Plantings increased globally to 53,599 in 2010, with new plantings in South Africa, Spain and China, and increases in Chile, Hungary and Argentina. In Australia there are about 50 producers of varietal Cabernet Franc across a range of regions, mostly from warmer to cooler regions.

Cabernet Franc was selected for trialling at Padthaway due to the recent interest in the wines in a niche market both internationally and domestically, as well as for the industry's familiarity with potential management issues.

Cabernet Franc	**Information**
VITICULTURE	
Phenology	Early budburst and mid-season harvest, before Cabernet Sauvignon, with harvest possibly closer to Shiraz.
Growth	Moderate to reasonable vigour, depending on site and possibly virus status of material. In favourable sites, may need to contain vines and crop. Spur and cane pruning used. Low crop reported in some situations.
Susceptibility	Quite good tolerance of Botrytis as well as downy and powdery mildews.
Soil and climatic preferences	It is grown on a range of soil types, but reportedly good with clay to limestone soils and good water-holding soil is important.
Harvest factors	Bunches small to medium, loose to well filled, with small to medium berries. There have been some reports of variable fruit set and others of excessive crop.
WINE	The better wines are soft, well-structured and aromatic with fruit flavours of raspberry and blueberries.

PLANTING MATERIAL	In the National Register (2006). Some imports from Europe and University of California, Davis and some possibly from old material. Differing experience may reflect clonal performance?

5.1.5. Montepulciano (R)

Montepulciano is a promising red variety grown in the central Abruzzo and Marche regions in Italy, with some plantings in nearby Lazio, Umbria, Molise and Apulia regions. It produces the wine Montepulciano d'Abbruzzo, and Rosso Conero in the Marche region. It has been confused with the variety Sangiovese that makes the wine Vino Nobile di Montepulciano, near the town of Montepulciano, in Tuscany. Traditionally a high yielding commercial variety, relatively recent vineyard management changes have shown its true potential.

Main synonyms
Cordisco, Montepulciano d'Abruzzo, Morellone, Primaticcio, Monte pulciano, Sangiovese Cordisco and Uva Abruzzi. The variety cannot be imported into the EU under the name Montepulciano as it is protected under DOC regulations, but it is allowed under the name Cordisco.

Plantings
In 2000, there were 28,679 hectares of Montepulciano in Italy, and 34 947 hectares globally in 2010, with small areas planted in Argentina, USA, NZ, Brazil and Australia. In Australia, there are about 30 relatively new producers in a range of climates. Recent Australian wines have been recognised on the international stage.

Montepulciano was selected due to its promising potential in the vineyard, success as a new wine, its similarity to Shiraz, and its potential plasticity and fit for the region of Padthaway.

Montepulciano	**Information**
VITICULTURE	
Phenology	Mid to late season budburst and late harvest, after Shiraz in Mundulla, and up to two weeks after Shiraz in Kersbrook, Heathcote and Barossa.
Growth	Moderate to high vigour, semi-erect to sprawling growth with late lignification. Crop control via bunch thinning is used in Italy and also in the Barossa. Both spur and cane pruning is used and management is important to restrict yield.
Susceptibility	Reports are variable. Some susceptibility to powdery has been reported, but it has good resistance to bunch rot and downy mildew (Tscharke, Barossa). Avoids spring frost with late budburst. Good tolerance to heat.
Soil and climatic preferences	In Australia, it has been recently grown in range of climates: Riverland, Barossa, Clare and some Adelaide Hills areas. Reported to need a sufficiently warm site to ripen. Does best in the limestone soils of Italy. Withstood heat waves and then wet and cold conditions in 2011. It has been shown to be very resilient (Barossa).
Harvest factors	Bunches semi-compact, conical with a shoulder/winged and medium to large berries with thick berry skins. Fruit retains a good acidity. Baume 14.5, pH 3.5-3.6, TA 6.5g/L (Tscharke, Barossa).
WINE	Wine styles range from rosé to medium, to complex premium red wines capable of ageing. Descriptors include blackberries, dark cherries, earthiness, herbal and spice notes.

PLANTING MATERIAL	In the National Register (2006). Some imports from Europe from 1970s and 1980s, and a newer one from Chalmers.

5.1.6. Graciano (R)

Graciano is from northern Spain, grown primarily in the northern Rioja and Navarra regions and in Sardinia, Italy and Portugal. It produces highly coloured, perfumed and well structured wine, primarily used in blends in the Rioja and in Sardinia it is blended with the Spanish varieties Mazuelo and Grenache. It is experiencing resurgence in popularity, both for blending and as a straight varietal. Overseas information indicates low yields, but some Australian experiences differ.

Main synonyms
Morrastel or Morastell (France), Tinta Miuda (Portugal), Bovale Sardo and Cagnulari (Sardinia), Graciana (Argentina) and an import from California into Australia was mistakenly known as Xeres.

Plantings
Globally there were 1,910 hectares in 2000 and 3,102 in 2010. In 2008, there were 1,478 hectares in Rioja (and more in Sardinia then Rioja). In Australia there are over 40 growers, spread across regions with just a couple in cooler climates.

Graciano was selected for trial as it is a late ripener and there is a growing interest in the wine.

Graciano	**Information**
VITICULTURE	
Phenology	Budburst tends to be late, with mid-late to late harvest, similar to Cabernet Sauvignon, depending on yield and wine style.
Growth	Moderate vigour, semi erect growth. Big crops reported in Australian vineyards and the need to crop thin by up to 50%, (Barossa). Low crops reported internationally may be due to virus. Wood not brittle and spur or cane pruning ok.
Susceptibility	Reports in Australia of good tolerance to downy and powdery mildews, but some susceptibility to Botrytis so the canopy and bunches need to be open. Some sunburn is reported if the canopy is too open.
Soil and climatic preferences	It seems to be pretty tolerant of different sites, and with good crop control can also ripen in cooler climates (Frank van de Loo, Canberra).
Harvest factors	Moderate to big bunches, small to medium berries. It has a good acidity, and low pH, and in cool climates such as Canberra acid is not added. Riper styles are bigger and plusher, but may be less distinctive.
WINE	Wines have good tannin, colour, phenolics and acid, with fresh and vibrant aromatics. Descriptors include red fruits, spicy notes, savoury, pepper, bay, and black cherries.
PLANTING MATERIAL	In the National Register (2006). Imports from the late 1960s ex UCD (University of California Davis) and Madrid, one has undergone fragmented shoot apex culture (FSAC).

5.2. Potential varieties for Robe and Mt Benson

5.2.1. Albariño (W)

Albariño is a very old variety grown in northwest Spain, in the Galicia region, Rías Baixas area, and also in northern Portugal, Vinho Verde, under the name of Alvarinho. There are still 200-300 year old grapevines found in Galicia. It has captured international attention, producing one of the best white wines in Spain, with a delicate fruit and floral aroma and crisp freshness.

Main synonyms
In Portugal it is known as Alvarinho, and Galego, Galeguiño and in Galicia, Abelleiro. Internationally the prime name is Alvarinho. Recent studies showed that Caiño Blanco (Cainho Branco or Caínho de Moreira in Portugal) is a different variety. There has been confusion internationally and in Australia following the mistaken introduction from Spain in the late 1980s, which was discovered in 2010 to be Savagnin Blanc, or White Traminer. There is now true Albariño in Australia.

Plantings
In 2010 there were 5,523 hectares globally. Plantings have been increasing in the last thirty years, and in the Rías Baixas area increased from 237 ha in 1987 to over 3,500 ha in 2008. There were 1,684 ha in Portugal in 2003. Plantings have begun in the new world countries: the USA in early 2000s and New Zealand in 2009, the latter from material imported from Portugal.

Albariño was selected for trial as a wine of great interest in the market place, with good potential and good disease tolerance.

Albariño	**Information**
VITICULTURE	
Phenology	Budburst and harvest early to mid-season.
Growth	Vigorous with fruitful laterals, may carry second crop. Historically in Galicia a large expansive pergola system is used, and more recently VSP or a sylvoz system are used with low vigour rootstocks and cane pruning. Spur pruning is fine in the Riverland.
Susceptibility	Reported as susceptible to downy and powdery. Shown good tolerance against Botrytis in NZ.
Soil and climatic preferences	In Galicia, it grows in a high rainfall region of 1000-1600 mm/year, and in granitic, sandy and alluvial soils, fertile sites. Young plantings in Nelson and Gisborne (NZ) and also Monash (Riverland).
Harvest factors	May be clonal variation, small to medium bunches, conical, semi compact to moderately loose, with small to medium berries (1.5 gms) with thick skins. Yield reports vary from low to moderate to high. In NZ bunches are described as straggly bunches and in the Riverland, small to medium slightly open bunches, medium berries, and thick skin.

WINE	Wines are aromatic and fresh, with fruit and floral characters, and those from Vinho Verde, (blended), more green apple and citrus. Noted aromas can be pear, citrus, floral, melon, or peach, spice and honey. A range of wine styles is possible and sparkling wine is also produced.
PLANTING MATERIAL	Some material now available from private nurseries.

5.2.2. Falanghina Beneventano (W)

Falanghina Beneventano is grown in southern Italy in the Campania region. There was thought to be just one Falanghina in the region, but noted ampelographic differences and DNA work in 2005 showed two distinct varieties, Falanghina Beneventano and Falanghina Flegrea. Falanghina Beneventano is grown around the province of Benevento, to the north-east of Naples in the higher country. It is rapidly expanding due to the high quality of the wines that include the DOC Guardiolo, Sant'Agata dei Goti, Sannio, Solopaca and Taburno. It also makes sparkling wine.

Main synonyms
None. May be mistaken for Falanghina Flegrea, that was in turn also mistakenly known as Biancazita, also now known to be a different variety.

Plantings
In 2010 there were 3,037 hectares in Italy, but that may include the two different varieties.

Falanghina Beneventano is not yet planted in Australia and is relatively unknown, so it may pose a greater risk than other varieties. It makes high quality wine and its late ripening may spread out the vintage. It is recommended over the Falanghina Flegrei for cooler climates (Monaco, pers comm).

Falanghina Beneventano	**Information from Italy**
VITICULTURE	
Phenology	Budburst early and harvest is mid-season to late, similar to Fiano.
Growth	Good vigour, semi erect growth, historically trained on large pergola trellis systems, but now also on smaller VSP systems. Low to mid basal bud fertility reported and cane pruned.
Susceptibility	Low susceptibility to Botrytis, even with compact bunch and the late ripening. Reported to be susceptible to magnesium deficiency with the use of SO4 rootstock. Incompatibility reported with 101.14 and 3309 rootstocks (Rauscedo Catalogue).
Soil and climatic preferences	Can evidently adapt to different soil types.
Harvest factors	Bunch medium size, semi-compact to compact, with medium berries. Acidity medium to high with high sugar (Manzo & Monaco 2005), possibly still high acidity for Australian standards.
WINE	The wine has been described as full bodied, good acidity with a high aromatic persistence. Descriptors include floral, tropical fruit, pineapple, pear and citrus.
PLANTING MATERIAL	Recently out of quarantine, some material will be available from Chalmers nursery in the next few years.

5.2.3. Grüner Veltliner (W)

Grüner Veltliner is the main white wine variety grown in Austria and is also prominent in Slovakia, Czech Republic, and Hungary. It has become a trendy and popular variety with increased plantings in new world countries. The top wines are full bodied with complex aromas and the styles vary according to regional soil, climate, harvest times and winemaking influences.

Main synonyms
Veltlinkske Zelene, (Slovakia and Czech Republic), and Veltlini, Zoeld Veltelini, (Hungary), as well as Weissgipfler, Zleni Veltinac and Green Veltliner. It is not related to the Roter Veltliner (red Veltliner) or Frühroter Veltliner (early red Veltliner).

Plantings
There were 18,842 hectares in Austria 2010, about 4,000 in Slovakia, 2,000 in Czech Republic and 1,500 in Hungary. There are small plantings in the US and New Zealand. In Australia there are about 30 producers with Canberra, Lark Hill and Adelaide Hills, Hahndorf Hill initially established. There is a concentration in the Adelaide Hills following a project coordinated initially by the Adelaide Hills Vine Improvement Group to distribute new material imported by Hahndorf Hill and promote it within the region.

Grüner Veltliner was selected for trial due to its promising wines, market and performance in cool climates.

Grüner Veltliner	**Information**
VITICULTURE	
Phenology	Early budburst and early to mid-season harvest, after Chardonnay, depending on style required.
Growth	Moderate vigour, fruitful on spurs, bunch thin at Kuitpo, can overcrop. Spur and cane pruning used.
Susceptibility	Quite good tolerance of Botrytis. Differing views on downy or powdery mildews susceptibility – some report tolerance others not (Adelaide Hills area).
Soil and climatic preferences	In Austria, it is grown on a range of soil types; bigger wines come from the heavier soils. It is grown in areas of reasonably high rainfall and there are reports of reasonable water requirements. Adaptable to different soils.
Harvest factors	Bunches small to medium, moderately compact to compact with medium berries (100–150 g). Pick from 10.5 to 14.5 Be, with low TA and high pH.
WINE	Aromas of pear, quince, and custard apple with a spritz of white pepper in the tail (L. Jacobs pers com.). Early wines have more apples, pear, green pepper, and a crisp mineral palate. Later harvest incorporates citrus, apricots, peach, spicy, textural and full bodied. (Seb and Geoff Hardy, Kuitpo). Quite complex wines that range from crisp and light to medium and full bodied.

PLANTING MATERIAL	In National Register (2006). Some imports from Europe, (introduced as White Veltliner) from late 1960s and more recent imports made by Hahndorf Hill and available via Adelaide Hills VI. Differing experience may reflect clonal performance?

5.2.4. Blaufränkisch (R)

Blaufränkisch, or Limburger**,** is a red variety of increasing popularity grown through central Europe. It is one of the top reds in Austria, known as Blaufränkisch, and is widely grown in Hungary as Kekfrankos where it is considered to be one of their best wines. The wine has deep colour, fine tannins, and firm acidity, can be medium to full bodied, barrel aged and is capable of ageing well.

Main synonyms
Lemberger (Germany), Blaufränkisch (Austria) and Limberger or Lemburger (USA), Kekfrankos (Hungary). Due to a misperception that it was Gamay it is known as Burgund Mare, in Romania and Game in Bulgaria. It is widely known as Limburger although the accepted international name is Blaufränkisch.

Plantings
In 2000, there were 12,723 hectares globally and 16,141hectares in 2010, with the largest plantings in Hungary. There is some planted in the US in Washington State and New York State. There are just a few growers in Australia.

Blaufränkisch was selected for trial due to the appeal of the soft but versatile wine style and its potentially good fit for a cool climate.

Blaufränkisch	**Information**
VITICULTURE	
Phenology	Budburst is early and harvest is midseason, usually before Shiraz.
Growth	Reasonable vigour, semi erect, brittle wood, and snaps easily. Spur pruning is used in the Adelaide Hills.
Susceptibility	Relatively disease resistant (Finger Lakes, US, Peter Bell). Some susceptibility to powdery and downy mildew but good tolerance to Botrytis in the Adelaide Hills (Larry Jacobs).
Soil and climatic preferences	It is grown on a range of soils and climates in Europe – mostly cool. It has been reported as avoiding water stress, with isohydric behaviour.
Harvest factors	Moderate bunch size, reasonably loose cluster, medium berries, and generally thick skin. It has good juicy acid and high phenolics.
WINE	The wine styles can be very versatile, with soft juicy acid and good phenolics, colour and weight. Descriptors include blue fruits, black cherry, fennel and warm spice. It has some rotundone that reduces with sun exposure on bunches (Bell).
PLANTING MATERIAL	In the National Register (2006).

5.2.5. Gamay (R)

Gamay is very old red variety producing the well-known Beaujolais wine in Burgundy, France. It is a sibling of Chardonnay, from a cross between Pinot and Gouais Blanc originating from medieval times.

Main synonyms
Gamay Noir, Gamay Noir à jus Blanc, Gamay Beaujolais and many others. There are mutations with coloured pulp (teinturier): Gamay de Bouze, Gamay de Chaudenay and Gamay Freaux. There has been confusion with the variety internationally and in Australia. Gamay Beaujolais imported from California in the 1960s was Pinot Noir, and later, Napa Gamay turned out to be Valdiguié. There are a number of true to type clones now in Australia.

Plantings
Globally there were 32,000 hectares of Gamay in 2010, with 30,000 of those in France, primarily in Beaujolais, as well as the Loire and Savoie. It is the second red in Switzerland behind Pinot Noir, and it is grown in other European countries and the New World. In Australia, there are about 25 producers, mainly in cooler climates.

Gamay was selected for trial as an early, lighter style red. There is a reported risk with Botrytis that needs consideration but this is not reflected with all Australian growers. According to Jancis Robinson (2016) after some recent great vintages, "this is an excellent time to take a new look at the Gamay grape".

Gamay	**Information**
VITICULTURE	
Phenology	Early budburst and harvest, maybe after Pinot Noir
Growth	Low to moderate vigour, semi-erect but very fertile, up to three bunches/shoot. If hit by a spring frost, tends to throw a second crop. Yield needs to be controlled and short pruning is recommended, but cane is also used with thinning.
Susceptibility	Reported to be susceptible to Botrytis, especially if overcropped with many bunches and crowding. Beechworth vineyards report it is no more susceptible there than Sauvignon Blanc (B Morey, S. Morris, pers comm). French reports say it is susceptible to sunburn, light brown apple moth, and wood diseases. Low vigour may exacerbate sunburn.
Soil and climatic preferences	Preferable in cool climate such as Beaujolais on granitic soils and Loire and Savoie. In Australia it is grown in mainly cool climates.
Harvest factors	Bunches small to medium, well filled with medium berries that can swell with rain or irrigation. Fruit has good acidity and balance and tends to be in ripe red berry spectrum. Sorrenberg aims for about 4 t/ac. Picked at 11 to 13 Be depending on wine style required.
WINE	Wines range from light in colour and tannin to a fuller style, similar to Pinot Noir. Carbonic maceration is widely used in Beaujolais. Wines can have delicate floral aromas and red fruits with some earthy, herbal, and savoury notes.

PLANTING MATERIAL	In National Register (2006). Some imports from Europe, and possibly old material from Bests Great Western vineyard and Rutherglen.

5.2.6. Tempranillo (R)

Tempranillo is now the most widely planted red variety in Spain, with significant and increasing international popularity. In Spanish, *temprano* means early, in reference to its ripening time. It is noted particularly in the Rioja, planted with Grenache (Garnacha), or where Grenache struggles to ripen, and in the high, cooler Ribera del Duero. In Portugal, it produces table and fortified wines, and in the warm Alentejo region, wines from 600 metres asl are noted for their superior quality.

Main synonyms
Spain: Tinto Fino (Ribera del Deuro), Cencibel (La Mancha), Ojo de Liebre (Penedes), Tinta de Toro and Tinto del Pais. In Portugal it is known as Tinta Roriz and Aragonez. In California it was known as Valdapeńas and Tinta Roriz. In Tuscany, Italy, the variety known as Malvasia Nera has been shown to be Tempranillo (Robinson et al 2012).

Plantings
In 2010, there were 232,561 hectares globally, up from 92,985 hectares in 2000. Argentina had the third largest area of Tempranillo behind Spain (207,000) and Portugal (16,000) in 2010. Australia had 41 hectares in 2000 and 476 in 2010, spread across regions (e.g. Clare, McLaren Vale, Hunter Valley, and Murray Darling).

Tempranillo was selected for trial due to its early maturity and quality potential in a cooler climate.

Tempranillo	**Information**
VITICULTURE	
Phenology	A relatively short growth cycle with mid-season budburst, after Shiraz, and early to mid-season harvest around Shiraz timing, depending on region.
Growth	High vigour, large leaves, brittle canes and upright growth, with management necessary to manage vigour, maintain open canopy and reduce fruit zone shading. Some fruit thinning and some low basal bud fruitfulness has been reported, with 3-5 bud spurs sometimes used.
Susceptibility	Susceptible to powdery mildew and to Eutypa. Both tough skins and thin skins reported, but it is tolerant to Botrytis. Sensitive to water stress. Irrigation management needs to avoid water stress and subsequent leaf drop. Birds may be an issue. Possible clonal variation in performance.
Soil and climatic preferences	Grown in range of soils and climates in Australia, Spain and elsewhere. Quality or style variation may occur in different sites. Climate and soils that provide the ability to control water stress and provide a long slow ripening period where the leaves are retained and function well are important.
Harvest factors	Bunches large, open, and berries large. May have poor fruit set and biennial bearing, possibly clonal? Yields from 5-8 t/ha in cool sites to 14-16 t/ha in warmer sites. At ripening, pH rises rapidly and acid drops; a major factor in picking. Ripe fruit characters are spicy berry to plum.

WINE	Wines range from rosé to medium or full bodied with good colour, range of flavours, suppleness and fine tannins. It is a useful blending component with its soft middle palate. Descriptors: cherry, spice, raspberry, violet, savoury, earthy, peppermint, briary fruit, juicy black fruit, rhubarb, black rose, grainy tannins, long tannins, mouth-watering tannins, and suppleness.
PLANTING MATERIAL	In the National Register (2006). Mainly two clones are used, but some new clones were recently imported by AHVII, Yalumba and AGPFS.

5.3. Potential to Import

5.3.1. Shavkapito (R)

Worthy of further investigation and possible importation

Shavkapito is a red variety from Georgia that produces light, fresh and delicately aromatic wine in cooler sites to more full bodied wines in warmer areas, reflecting the environment and winemaking methods. There is only a small area of the variety planted, with two main producers, Chateau Mukhrani and Pheasant's Tears using the traditional qvevri – a conical clay vessel. It has naturally low alcohol with good flavour and was described by Jancis Robinson (2012) as a "rediscovered and promising dark-skinned Georgian variety."

Main synonyms
Chavkapito, Shavi Kapito, and Lurjpotola Sahvkapito.

Plantings
In 2008, there were about 10 hectares in the Kartli region, in the centre of Georgia to the north-west of Tbilisi.

Shavkapito was selected for trialling for its potential as a light bodied, food-friendly red, with a significant point of difference that has impressed those who have encountered it (Anna Hooper, pers comm).

Shavkapito	**Information from Georgia**
VITICULTURE	
Phenology	Mid-season budburst and mid-season harvest.
Growth	Reported to be moderate to high yielding in one reference and low yielding in another.
Susceptibility	Average susceptibility to pests and diseases and it is good against botrytis due to thick skins and relatively loose bunches.
Soil and climatic preferences	Wines tend to reflect their environment; full bodied wines come from the valley floor, and lighter and fresher styles from higher sites. The region has a hot MJT but is very continental and possibly has quite cool ripening conditions.
Harvest factors	Medium bunches, loose, with small berries and thick skins.

WINE	Typically light, fresh and aromatic, wines of light cherry colour with berry, herbal and smoky notes. Distinctive with bright characterful flavours and light to medium palate weight (Anna Hooper).
PLANTING MATERIAL	Appears to be none currently in Australia. Suggested to investigate and possibly import into country.

References

Anderson, K. and Aryal, N.R. (2013) Which winegrape varieties are grown where? A global empirical picture. From http://www.adelaide.edu.au/press/.

Dry, P.R. (2004) Grapevine varieties. In; 'Viticulture Volume 1. Resources. Second Edition Eds. P. R. Dry and B. G. Coombe, Winetitles, Adelaide, Australia.pp132-149

Georgian wine http://georgianwine.gov.ge/eng/text/126/

Manzo, M. and Monaco, A. (2005) La risorsa genetica della Vite in Campania. Regione Campania Assessorato all'Agricoltura, Se. S.I.R.C.A.

Robinson, J., Harding, J. and Vouillamoz, J. (2012) *Wine grapes*. A complete guide to 1,368 vine varieties, including their origins and flavours. Allen Lane, Penguin Books. London.

Tassie, L., Dry, P.R. and Essling, M. (2010) Alternative varieties: emerging options for a changing environment. AWRI Research to Practice 142 pp.

Tempranillo regional report (2010). *Wine Industry Journal*. Vol 25 (1) p 68-87.

Other references cited in document.

Acknowledgements

Thanks to those people who have responded to surveys, or had discussions with the Author to help with a greater understanding of these new varieties.

For information on varieties specifically – used for this document or maybe reconsidered after a useful conversation – thanks to Mark Walpole, Frank van de Loo, Larry Jacobs, Stephen Morris, Barry Morey, Pat Murphy, Shane Kerr, Damien Nitschke, David Paxton, Paul Drogemuller, Peter Bell, Jeff Flint, Sue Bell, Fred Peacock, Anna Hooper, Jeff Grossett, Corrina Wright, Geoff Hardy, Seb Hardy, Di Stewart, Murray Edmunds, and Nigel Blietschke. Thanks to Peter Dry for general comments.

Thanks to the Limestone Coast project subcommittee: Ben Harris, Anna Hooper, Anita Goode, Nick Baverstock, Catherine Wotton and Stephen Brown.

Key References

Dry, P. (2010) *Alternative varieties* – Sourcing key viticultural, wine and market information a guide to where some currently available information may be found. http://www.gwrdc.com.au/webdata/resources/files/AlternativeVarietiesTechBooklet.pdf

Robinson, J., Harding, J. and Vouillamoz, J. (2012) *Wine Grapes*. A complete guide to 1,368 vine varieties, including their origins and flavours. Allen Lane, Penguin Books. London.

Tassie, L., Dry, P. and Essling, M. (2010) Alternative varieties: emerging options for a changing environment. AWRI Research to Practice 142 pp.

Further reading from journals

Australian & New Zealand Grapegrower & Winemaker

Traucki, D. (2009) Blends tipped to lead alternative variety charge *Aust. N.Z. Grapegrower Winemaker* (551): 79-80.

Sutton, M. (2010) Variety the spice of life. *Aust. N.Z. Grapegrower Winemaker* (563): 9-10.

Traucki, D. (2010) Alternative approach to wine varieties growing in favour. *Aust. N.Z. Grapegrower Winemaker* (563): 10.

Sutton, M. (2011) Alternative wines: a corporate perspective. *Aust. N.Z. Grapegrower Winemaker* (564): 39-40.

Sutton, M. (2011) Mixing things up in the Riverland. *Aust. N.Z. Grapegrower Winemaker* (564): 19.

Arbuckle, K. (2011) Future to be found in new varieties. *Aust. N.Z. Grapegrower Winemaker* (571): 21.

Smart, R. (2013) Australian wine sector – drowning in bulk wine? *Aust. N.Z. Grapegrower Winemaker* (591): 6.

Dry, P. (2013) Ask the AWRI: If the grape fits then you can grow it. *Aust. N.Z. Grapegrower Winemaker* (599): 57.

Australian Viticulture

Hoare, T. (2010) What next for Australia's grapegrowers? *Aust. Vitic.* 14 (4): 27-29.

Wine and Viticulture Journal *– a variety is covered in most issues, with a general introduction by Peter Dry and an article by a producer.*

Kargas, M. (2011) Bianco d'Alessano – behind the wine that triumphed at the Alternative Varieties Wine Show. *Wine Viti. J.* 26 (1): 60.

Elliott, D. (2011) Aglianico at Karanto Vineyards. *Wine Viti. J.* 26 (4): 69-70.

Fairall, R., and Conchie, J. (2011) Greco – fit for the king of the high Cs. *Wine Viti. J.* 26

(5): 86-87.

Byrne, M. (2011) Barnes-storming the Granite Belt *Wine Viti J* 26 (5): 110-111.

Byrne, M. (2011) Verdelho alternatives liven up the debate over an icon variety for the Granite Belt *Wine Viti J* 26 (5): 111-112.

Wright, C. (2011) Oliver's Taranga Vermentino. *Wine Viti. J.* 26 (6): 87

Cumbers, P. and Cumbers, M. (2012) Western Australia winning with Arneis. *Wine Viti. J.* 27 (2): 67-68.

Tassie, L., Henschke, P., and Coleman, D. (2012) Ensuring trueness to type of some alternative varieties. *Wine Viti. J.* 27 (3): 52-56.

Tassie, L., Monaco, A., Schneider, A., and Boursiquot, J.-M. (2012) Italy's Fiano - which one do we have in Australia? *Wine Viti. J.* 27 (3): 57-61.

Rogers, P. (2012) Time on the vine valuable for golden Petit Manseng *Wine Viti. J.* 27 (3): 62-66.

Dry, P. (2012) Petit Manseng. *Wine Viti. J.* 27 (3): 63.

Dry, P. (2012) Negro Amaro. *Wine Viti. J.* 27 (4): 65.

Dry, P. (2012) Garganega. *Wine Viti. J.* 27 (5): 64.

Logan, S. (2012) Canberra District matures beyond Riesling and Shiraz *Wine Viti J* 27 (5): 82-83; Grüner Veltliner and Tempranillo.

Dry, P. (2012) Nero d'Avola *Wine Viti. J.* 27 (6): 68.

Faulkner, J. and Rose, L. (2013) The allure of Iberian beauties. *Wine Viti. J.* 28 (1): 18-19.

Dry, P. (2013) Furmint. *Wine Viti. J.* 28 (1):.63.

Dry, P. (2013) Sagrantino. *Wine Viti. J.* 28 (2): 53

Dry, P. (2013) Verduzzo Friulano. *Wine Viti. J.* 28 (3): 57.

Dry, P. (2013) Marzemino *Wine Viti J* 28 (4): 63.

Dry, P. (2013) Tinto Cão. *Wine Viti J* 28 (5): 77.

Dry, P. (2013) Schönburger. *Wine Viti J* 28 (6): 58.

Dry, P. (2014) Malvasia Istriana. *Wine Viti J* 29 (1): 53-53.

Dry, P. (2014) Souzao. *Wine Viti J* 29 (2): 60.

Logan, S. (2014) Exploring the options for 'alternative' rosé. *Wine Viti J* 29 (2): 80-82.

Dry, P. (2014) Gamay. *Wine Viti J* 29 (3): 59.

Dry, P. (2014) Albariño. *Wine Viti J* 29 (4):60.

Dry, P. and Dry, N. (2014) Carignan – the unmasking of an imposter *Wine Viti J* 29 (4):

49-52.

Carter, L. (2014) Saperavi – a fascinating standalone wine and a great blender *Wine Viti J* 29 (5): 53-54.

Dry, P. (2014) Saperavi. *Wine Viti J* 29 (5): 54.

Dry, P. (2014) Verdejo. *Wine Viti J* 29 (6): 55.

Dry, P. Prosecco. *Wine Viti. J.* 30 (1): 55.

Howard, C. (2015) Natural acidity and varietal selection for a changing climate. *Wine Viti. J.* 30 (2):40-45.

Dry, P. (2015) Tannat*. Wine Viti. J.* 30 (2): 61.

Dry, P. (2015) Teroldego. *Wine Viti. J.* 30 (3): 61.

Cevaal, A. (2015) Lost Valley Cortese found at Corvaal wines. *Wine Viti. J.* 30 (4): 60.

Scott, S. (2015) Bringing Lagrein to life. *Wine Viti. J.* 30(4): 75–77.

Logan, S. (2015) Lagrein gives Shiraz drinkers something else to think about. *Wine Viti. J.* 30(4): 78–80.

WBM: Australia's Wine Business Magazine

Anonymous (2010) Bianco d'Allessano, where have you been? *WBM: Australia's Wine Business Magazine WBM* (December 10/January 11: 98-99.

Traucki, D. (2012) The Iberians are coming. *WBM: Australia's Wine Business Magazine WBM* (December-January): 78-79.

… and other articles by Trauki.

American Journal of Enology & Viticulture

Martínez-Lapuente, L., Guadalupe, Z., Ayestarán, B., Ortega-Heras, M., and Pérez-Magariño, S. (2013) Sparkling wines produced from alternative varieties: sensory attributes and evolution of phenolics during winemaking and aging. *AJEV.* 64 (1): 39-49.

Others

Bonné, J. (2015) The Italian renaissance. *Decanter* 40(supp): 34–37.

D'Agata, I. (2015) Dolcetto d'Alba. *Decanter* 40(12): 67–75.

Livingstone-Learmonth, J. (2015) Southern Rhône whites. *Decanter* 40(12): 77–84.

Wise, A. (2015) Grape variety trials on Long Island: twenty-two years of research help shape the region's wine industry. *Wines & Vines* 96(7): 75–79.