Terroir

A review of the unique features of the Orange wine region

NSW - Australia

Orange Region Vignerons Association
Figure 1. The Orange wine region in NSW. Source: NSW Department of Industry & Investment
The Orange wine region was accepted as a distinct Geographic Area (GI) by the Australian Wine & Brandy Corporation in 1997. The Orange wine region is defined as the contiguous (continuous) land above 600m elevation in the Shires of Cabonne, Blayney and Orange City. This New South Wales Region is within the Central Ranges Zone and adjacent to the Cowra, Mudgee and Bathurst wine regions (Figure 1).

Wines of the Orange region have a unique style as a result of the local climate, soils and topography (terroir). The modern Orange wine industry began to develop in the early 1980s and now has over 1500ha of winegrapes being grown on some 80 vineyards. Over 40 wine labels are now available in the region. This region is also a major producer of a range of regional foods within a spectacular rural landscape and is an exciting destination for wine and food tourism.

Terroir is the French word used to define the features of a wine growing region that includes its climate, geology, topography and soils which contribute to the individuality and renown of wines produced there. It also includes the historical and human effects on site expression of the vineyard and wines produced (Martin 2000).
The Orange region has a long history of grape growing since the town was gazetted in 1846. Early settlers established fruit orchards that often included table grapes. Black muscats were mainly grown by settlers of British or German descent (e.g. West, Stanford, Hicks, Carthew, Dale, Schmich, Bohringer, Offner and Gersbach families) at a similar time to development of the Mudgee and Bathurst regions. Over 180ha of table grapes were cultivated by 1925-6 in mainly the Mt Canobolas, Nashdale and Borenore areas. Later a number of Italian families also came to the district to become orchardists and grape growers. Wines were made from these grapes for local sale and the D’Aquino family has continued such a business since the mid 1950s. Very little table grape production now occurs in the region due mostly to earlier varieties in drier, irrigated areas dominating the fresh market.

Winegrapes were planted at Molong in 1952 by the NSW Government Viticulturist Harry Manuel as an experimental vineyard. Cabernet sauvignon and Shiraz were planted under dryland conditions with success.

The modern Orange region wine industry was pioneered with early plantings in 1980-1 by the Fardells at Nashdale (Nashdale Vineyard) and the Bourkes at Millthorpe (Sons & Brothers). These vineyards were followed in 1983-5 by the Doyle (Bloodwood), Swanson (Cargo Road Wines) and Crawford (Forest Edge) families. Other early winegrape growers included Canobolas-Smith, Highland Heritage, Ibis and Philip Shaw Wines.

Photos: Courtesy of Philip Stevenson
The Orange region is the highest wine region in Australia, extending from 600m to over 1000m elevation. This region is quite distinct from the Great Dividing Range to the east and it also rises some 500m above the surrounding tablelands (Map 1).

This elevated area is dominated by the extinct volcano Mount Canobolas which lifted and developed above the old sedimentary landforms of the Lachlan Fold Belt. The Mount Canobolas volcano was at the younger southern end of the volcanic boomerang that extended from Queensland to Oberon that includes the Warrumbungles. At least three separate eruptions occurred 11-13 million years ago above the northwest tending Canobolas Divide (Figure 2). This Divide and now Mount Canobolas separate the northerly draining Macquarie River catchment from the southerly draining Lachlan River system.

The first eruption formed a large shield volcano which spread magma over the older sediments of the region that include limestone, shales, slate, older volcanics and greywacke. Fluid basalt lava later covered a large area from Borenore to Millthorpe at mostly the 850-1000m elevation. The last eruption produced slower moving trachyte lava which formed the steep sided domes at high elevation such as Young Man Canobolas, Old Man Canobolas and Towac Peak.

Figure 2. Development of Mount Canobolas 11-13 million years ago. Source: Chan RA. (2003) Bathurst and Forbes 1:250000 Map Sheets, NSW
This map incorporates data which is © Commonwealth of Australia (Geoscience Australia), 2008, and the Bureau of Meteorology (derived using ANUCLIM software of the Fenner School of Environment and Society, ANU). The map incorporates other data which is © Crown Copyright NSW Land and Property Management Authority, Bathurst, Australia and Department of Environment, Climate Change and Water. All rights reserved.

Produced by the Resource Information Unit, Industry & Investment NSW, July 2010.
Subsequent weathering of this volcanic area has produced a steep to undulating landscape dissected by many headwater creeks and streams. The base geology is closely linked to elevation as are the soil types derived from such material. Sediments from older Lachlan Fold Belt rocks become visible below about 850m. Limestone rocks and caves (Borenore Caves) can be seen on the western side at lower elevation (600-700m) as a result of coral/shell deposits at ancient shore lines.

The high elevation of the region provides a cool climate and the sloping country provides an escape from cold air. Most vineyards are located on hillsides to avoid cold air channels and are relatively safe from the very low temperatures seen in valleys below.

Climate and weather

The Orange region has mild summers and cold winters. Weather conditions are typical of inland NSW but are significantly modified by the high elevation and proximity to Mount Canobolas. This region is well clear of easterly coastal cloud and rain that extends from the coast to the Great Dividing Range.

Sunshine

The Orange region claims to have one of the sunniest cool climate wine regions in Australia with over 9hrs of bright sunshine per day during the growing season (Very Sunny) with 1872 sunshine hours for October to April. Cool sunshine is vital to develop high fruit colour and maintain grape flavour. The cold air drainage away from Mount Canobolas also minimises winter fogs to allow high levels of winter sun to offset the cold temperatures. High elevation sunshine has increased levels of ultra-violet light which can increase the levels of phenolics that build flavour, colour and mouth feel of wine.
**Temperature**

Orange region temperatures change dramatically with elevation. Mean January temperature (MJT) is 19.15°C at Millthorpe (960m) but increases to around 21.5°C at Molong (600m) due to the 0.6°C temperature increase per 100m fall in elevation (Figure 3). This temperature band is significantly cooler than adjacent wine regions Mudgee (454m) at 23.25°C and Cowra (300m) at 24°C.

The Orange region also has a continental climate where there is a wide range (15°C) between mean summer and winter temperatures. Spring growth begins slowly as the mean temperature reaches 10°C in mid September but increases rapidly up to mid summer. In a similar way autumns cool down quickly with little extra fruit ripening achieved after mid April.

The harvest of grapes in the region extends from February at 600m elevation to March/April at higher elevations. The grape harvest is delayed by about one week for each 100m rise in elevation. Maximum daily temperatures in January range from 30°C near 600m down to 26°C at high elevation. Most grapes grown at mid elevations ripen with 25°C daytime temperatures – an ideal temperature for premium table wine production. Aromatic white varieties are generally grown above 800m whereas other varieties are grown at a range of elevations.

Figure 3. Mean monthly temperatures for the Orange and adjacent regions.
The grape growing season extends mostly from October to April. The accumulated Growing Degree Days (GDD) above 10°C range from 1200 at 950m elevation to 1670 at 600m elevation. Officially the Orange region is mostly classified as a Mild region (1201-1500 GDD) as distinct from the Hot and Very Hot regions of Mudgee and Cowra respectively (Kirk 1986). Figure 4 shows the effect of elevation on the mean January temperature (MJT) and seasonal Growing Degree Days which impacts on ripening time and fruit flavour profiles.

![Orange region - Elevation, MJT and GDD](image)

Figure 4. Growing Degree Days and Mean January Temperatures in the Orange Region.

**Rainfall**

The Orange region has generally uniform rainfall across the year ranging from 700-950mm (Figure 5). Reliable winter rain usually provides for excellent spring and summer vine growth. Despite moderate summer rainfall, vine growth slows prior to ripening in the drier months of autumn. The autumn break in mid March usually precedes a cold end to the season in late April.
Annual rainfall is closely linked to elevation and proximity to Mt Canobolas (Map 2). Most rain comes from the northwest which falls more heavily on the southeast side of the mountain. Cool conditions and uniform rainfall enables most elevated vineyards to crop well with no or minimal irrigation (0-0.5ML/ha). Vineyards at lower elevation will generally require 1-2ML/ha of irrigation in drier years.

**Mean monthly rainfall in the Orange region**

![Image of mean monthly rainfall in the Orange region](image.png)

**Figure 5. Mean monthly rainfall in the Orange region**

**Humidity**

The Orange region is rated as a **Humid** region with 60-70% Relative Humidity at 9am in January. This reduces the transpiration stress on vines and their water requirements. Higher elevation also reduces the water vapour content of the air at similar relative humidity levels which assists in reducing leaf and fruit moulds.
This map incorporates data which is © Commonwealth of Australia (Geoscience Australia), 2008, and the Bureau of Meteorology (derived using ANUCLIM software of the Fenner School of Environment and Society, ANU). The map incorporates other data which is © Crown Copyright NSW Land and Property Management Authority, Bathurst, Australia and Department of Environment, Climate Change and Water. All rights reserved.

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Climate comparisons

The climate of Orange is unique as a result of its high elevation at this latitude. The change in elevation and distance from Mt Canobolas causes rapid changes in temperature and rainfall patterns. Within Australia the Orange region is very similar to Beechworth in Victoria as both have a high elevation and continental climate (Figure 6). Orange has a similar temperature profile to Coonawarra in SA but higher growing season rainfall. Margaret River (WA) has a warmer, more maritime climate than Orange as it is close to the coast.

Figure 6. Orange temperature and rainfall as compared to Coonawarra, Beechworth and Margaret River.
The cooler elevated areas (800m+) of the Orange region are quite similar to the Burgundy region of France between Dijon and Lyon (Beaujolais) despite this region having nearly twice as many rain days as Orange with similar growing season rainfall (Figure 7). Burgundy is also more continental with cooler spring and autumn temperatures. Pinot noir, Pinot gris, Gamay and Chardonnay are the main varieties grown in Burgundy.

At slightly lower elevations (700-800m) Orange becomes more like the Bordeaux region of France with up to 20.5°C mid-summer mean temperatures. Orange has more sunshine hours and fewer rain days than this classic French region. Cabernet sauvignon, Merlot, Cabernet franc, Sauvignon blanc and Semillon are the main varieties grown in Bordeaux.

At 600-700m elevation, Orange is drier and warmer and more like the lower Rhone Valley but not as hot as Montpellier. Shiraz, Carignan, Grenache and Mourvedre are important varieties grown in the lower Rhone Valley.

**Figure 7. Growing season temperature and rainfall comparisons with regions in France.**

![Graph showing temperature and rainfall comparisons](image)
Soils of the Orange Region

After climate, soil is a major factor affecting vine growth and fruit flavours. Soil depth, water holding capacity, drainage and fertility are closely linked to vine performance. As seen on Map 3 the main soils of the Orange region closely follow elevation and proximity to Mount Canobolas. Most soils of the Orange region have evolved from various volcanic materials produced from Mount Canobolas and/or older sediments. Soil age and types can vary greatly with elevation and topography. The key viticultural soil types on the soil map (Map 3) are shown in Figure 8 and described below:

**Green**
Shallow sandy soils derived from summit volcanics (trachyte).
These soils are at elevations mostly too high for viticulture.

**Blue**
Deep well drained clay loam red and brown Ferrosol soils (Krasnozems) derived from basalt that change from red brown on hill tops to more grey brown in less well drained areas. Wind blown fine silt has added a silty texture to hilltop sites (Cattle et al, 2009). These soils surround Mt Canobolas around 800-1000m elevation and provide the fertile soil for many orchards and vineyards.

**Red**
Older medium depth red/brown silty clay loam Dermosols of uniform texture (Red Earths) derived from older volcanics (andesite) and sediments. Less well drained yellow/grey soils (Yellow Earths) occur in low lying areas. These soils tend to be more distant from Mount Canobolas and mostly occur between 700-900m elevation. They are less fertile than the Ferrosols and often require extra irrigation as they are more distant from higher rainfall near Mount Canobolas. These soils are excellent for viticulture as they provide for moderate vigour but usually at lower elevation and rainfall.

**Purple**
Aged red/brown sandy clay loams over clay subsoils (Chromosols) that are derived from old sediments such as shale, limestone, andesite and slates. These soils tend to be shallower and only of moderate fertility and water holding ability. These soils are common from 600-800m in the region and are good for viticulture if irrigation is available.

**Pink**
Red brown sandy loam Calcarosol soils (Earthy sands/Euchrozems) derived from limestone and volcanic sediments. These classic viticultural soils are restricted to the limestone belt at 600-700m elevation.
Soils of the Orange Region

Figure 8. The main vineyard soils in the Orange region. Source: D. McKenzie, Orange.
Soil Types of the Orange Wine Region

- Alluvial Soils
- Brown Cracking Clays
- Earthy Sands
- Krasnozems
- Non-Calcic Brown Soils
- Red Earths
- Red Podzolic Soils
- Shallow Soils
- Soloths
- Siliceous Sands
- Terra Rossa Soils
- Yellow Podzolic Soils

Waterbodies

Wellington

Local Gov't Areas

Localities

Cities

Roads

Primary Road

Arterial Road

Sub Arterial Road

Elevation (m)

Map 3 - Soil types of the Orange wine Region
Viticulture in the Orange region

The range of climate and soils in the Orange region enables a wide range of grape varieties to be grown to perfection. Vineyard site selection is an important step in matching climate and soil with grape varieties. Topography can also change variety performance with slope, aspect, wind and air drainage all having an effect. The following table summarises the main varieties grown in the Orange region and the fruit flavour profile achieved at different elevations.

*Table 1. Winegrape varieties grown in the Orange region (2009) and their fruit flavour profiles at different elevations.*

<table>
<thead>
<tr>
<th>Area (ha) (Est)</th>
<th>600-750m</th>
<th>750-900m</th>
<th>Above 900m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White varieties</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chardonnay</td>
<td>200</td>
<td>rockmelon, stone fruit, citrus</td>
<td>stone fruit, lemon, grapefruit</td>
</tr>
<tr>
<td>Sauvignon blanc</td>
<td>100</td>
<td>passionfruit, tropical, boxwood</td>
<td>passionfruit, nettle, grassy, herbal</td>
</tr>
<tr>
<td>Riesling</td>
<td>40</td>
<td>lime, passionfruit, tropical</td>
<td>citrus, green apple, peach</td>
</tr>
<tr>
<td>Pinot gris</td>
<td>20</td>
<td>cooked pear, honey</td>
<td>fresh pear, honeysuckle, citrus</td>
</tr>
<tr>
<td>Viognier</td>
<td>15</td>
<td>apricot, peach, musk</td>
<td>citrus, apricot, peach</td>
</tr>
<tr>
<td><strong>Red varieties</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shiraz</td>
<td>400</td>
<td>cherry, red berries, warm spices, meaty</td>
<td>plum, red berries, liquorice, white pepper</td>
</tr>
<tr>
<td>Cabernet sauvignon</td>
<td>340</td>
<td>violets, red berry, blackberry, plum</td>
<td>cassis, blackberry, peppermint</td>
</tr>
<tr>
<td>Merlot</td>
<td>200</td>
<td>red berry, dried herbs, blackcurrant,</td>
<td>leafy, floral, mulberry, fresh herbs</td>
</tr>
<tr>
<td>Pinot noir</td>
<td>50</td>
<td>raspberry, plum</td>
<td>cherry, violets, strawberry</td>
</tr>
</tbody>
</table>
Variation in grape characteristics and wine making is producing a range of wine styles in the region. Blending of wines made from grapes grown at different elevations and soil types is increasing as we understand the interesting variability in the region. Other varieties grown in the region include Traminer, Semillon, Marsanne, Pinot meunier, Cabernet franc, Tempranillo, Zinfandel, Barbera, Sangiovese and Malbec.

Canopy management in the vineyard is an important practice in producing quality grapes in Orange. Most canopies are vertical and narrow to achieve high sun exposure with some shading from the afternoon heat. Hand pruning is used to achieve even shoot growth and fruit separation. Shoot thinning, bunch thinning, shoot trimming and leaf plucking are often used to achieve the optimum crop load and microclimate for well coloured fruit of high flavour.

The soils and climate of the Orange region minimise the need for much supplementary irrigation. Vineyards aim to be sustainable and a number are now certified organic. An active growers association- Orange Region Vignerons Association (ORVA) promotes sustainable quality wine grape production to provide the base for great wine.

Innovative winemakers are developing a range of wine styles from regional wine grapes. Straight varietals, varietal blends and intra-regional blends are being made to develop wine styles that define this region. Fruit driven, cool climate wine styles across a range of varieties are developing from the unique terroir of the region.

The Orange wine region is young but is developing a reputation for producing an interesting range of quality cool climate wines. We hope that this terroir story will help in the development of the wine region and enhance your interest as you explore the region.
References:


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