

Humidity – the forgotten element?

It's the level of moisture in the soil, and its drainage, that play the biggest part in any wine's regional identity, according to research by Tasmanian wine scientist Andrew Pirie. And, writes Tyson Stelzer, his theories run counter to the conventional wisdom on what makes terroir tick



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IT WAS A misty late autumn dawn in a Riesling vineyard on the Tamar River in northern Tasmania five years ago. As winemaker and viticulturist Andrew Pirie plucked a gloriously botrytis-ridden Riesling grape, the theory he expounded on humidity as a defining feature of terroir seemed only obvious.

Since that conversation, this PhD scientist in viticulture and pioneer of Tasmanian grape growing has refined his theory, and now believes that humidity is the key to explaining not only mist-induced botrytis, but indeed the distinctive personality of every wine region on earth. Could humidity be the forgotten element of terroir?

Pirie has long puzzled over why different regions with similar temperature profiles produce such distinctive wine styles. 'There has always been a conundrum about the difference between Central Otago and Burgundy, regions which on the surface should be the same,' he says. And it doesn't only apply to the sensitive Pinot Noir grape. 'Napa and Bordeaux are very similar in growing temperature, but Napa's Cabernets are much bigger, denser and more tannic,' he points out.

It was while he was hanging out some washing in Bordeaux many years ago that Pirie first postulated an answer: 'I recall waiting for my washing to dry. Bordeaux is quite humid!'

'Cool dry like Central Otago produces very different wines to cool wet like Burgundy' Andrew Pirie

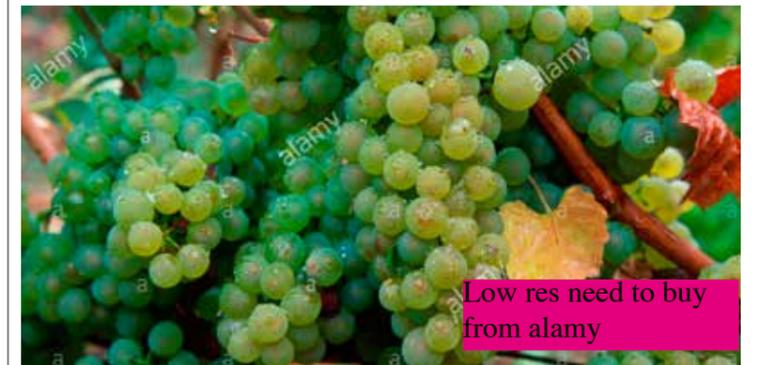
There is nothing new in the realisation that humidity is a key element of terroir, but Pirie presents a new perspective by suggesting that its impact is more profound than previously considered. 'Humidity is as important as temperature in determining wine style and the fingerprint of every region,' he proposes. 'A region's temperatures change from season to season, but its dryness is more consistent.'

Pirie cites a 2015 French research paper by Benjamin Blois & colleagues from the Université de Bourgogne in Dijon and Montpellier IHEV SupAgro, who found that the aromatic profile of Pinot Noir was related not to the temperature of the region but the dryness. 'This is the first time that a formal link has been drawn between wine style and humidity,' he suggests, though the question has been contemplated for decades.

'It goes back 50 years to when Amerine and Winkler were studying temperature summation in California,' he explains. 'They posed

Left: soil cross-section showing the famous terra rossa soil, clay loam on a limestone base, in the warm and dry Coonawarra region of South Australia

Below: moisture clings to Chardonnay grapes in the Côte d'Or, Burgundy, France



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Below: Misha's Vineyard, at the edge of Lake Dunstan in Central Otago, where the sunny, northwest-facing slopes provide dry but relatively cool conditions



Photographs: Andy Christodolo/Cephas; Tim Hawkins, Central Lakes Photography

what has been said to be the greatest conundrum in viticulture: why a cool vintage in a warm region doesn't have the same character as a warm vintage in a cool region. There is clearly something else at play.'

Any casual visitor to the Rhône Valley, Central Otago or the Barossa is confronted by stark, dry, arid conditions, a dramatic contrast to the verdant, lush vegetation of Burgundy, Bordeaux or northern Tasmania. 'Humidity is effectively a measure of how green the grass stays,' Pirie points out.

He proposes that there are two kinds of cool-climate conditions, cool dry and cool wet, with New World regions more typically dry and northern Europe predominantly wet. 'Cool dry like Central Otago produces very different wines to cool wet like Burgundy.'

Difference in the glass

It is in the level and the texture of the tannin structure that Pirie perceives the most profound impact of moisture, suggesting not only that a vine stressed by low moisture will produce more tannin, but that humidity produces different classes of tannins.

'Tannins are very responsive to location,' he points out. 'Central Otago produces more tannic wines than Burgundy.'

Ripeness and sugar levels are also determined heavily by humidity, due to the concentrating effect of dry conditions. 'The Hunter Valley is as hot as the Barossa Valley, but its sub-tropical humidity and January rainfall mean that sugar accumulation is quite reduced, hence its wines are much lower in alcohol,' he explains.

Vine stress induced by low rainfall and low humidity accelerates ripeness and produces smaller berries with thicker skins. Furthermore, recent research has revealed that hormones inside the grape are triggered by stress and the internal physiology of the grape changes, producing deeper colours.

'Correctly stressed vines will make the best wine, because the vine's energy is directed at fruit ripening' **Andrew Pirie**



Seguin's studies have revealed that the best wines are produced where the drainage of the soils produces a low but steady feed of moisture to the vines.

'This "new" theory turns traditional terroir concepts on their head,' Pirie says. 'It shifts the emphasis away from soil mineral content and more to soil drainage characteristics.'

This explains why well-drained soils are advantageous to moderate vine vigour in wetter regions such as Burgundy. 'The best soil for a region depends on how stressful the environment is,' he points out, emphasising that all the best vineyards in northern France are on dry soils.

'This is why the "poor" slate soils of the Mosel are right for this low-stress, cool-humid region, because without a very dry soil in that region the vines would not experience sufficient stress. Go into a high-stress region like the Barossa Valley in South Australia and the vines would struggle too much on slate soils, so some clay in the soils is better.'

Climate shift

Pirie's thinking has been stirred in recent months as he has faced the driest season in 50 years at his own vineyard in the Pipers River area in northern Tasmania, which registers as one of the island's less arid regions. 'El Niño has certainly had a strong impact on moisture levels for us this year, very much following the northern hemisphere pattern, though we are not seeing such an extreme effect in the southern hemisphere,' he says. In his own region, where water is plentiful and irrigation is common, Pirie's reasoning has led him to invest heavily in moisture monitoring and climate assessment equipment. His irrigation automatically kicks in as soon as his deep soil moisture reaches a minimum threshold.

His goal is to achieve a state of semi-stress in his vines, while avoiding the overt skin tannins that can come with excessive stress.

Annual fluctuations don't trouble him, but he admits a long-term drying effect would be a concern. 'This would be a game-changer and change the style every year,' he says. 'The issue isn't just warming, but a fundamental shift in climate.' He suggests that climate change globally is not producing a big change in humidity, with the exception of the Rhône in France, where climate studies show an increasing drying effect.

Pirie is currently writing a book to expound the full depth of his ideas, and admits there is still plenty to the mystery to explore. 'We don't even know how vine stress changes the flavour of a wine,' he says. 'But with a changing global environment, more knowledge can only help to maintain terroirs and develop new ones.'

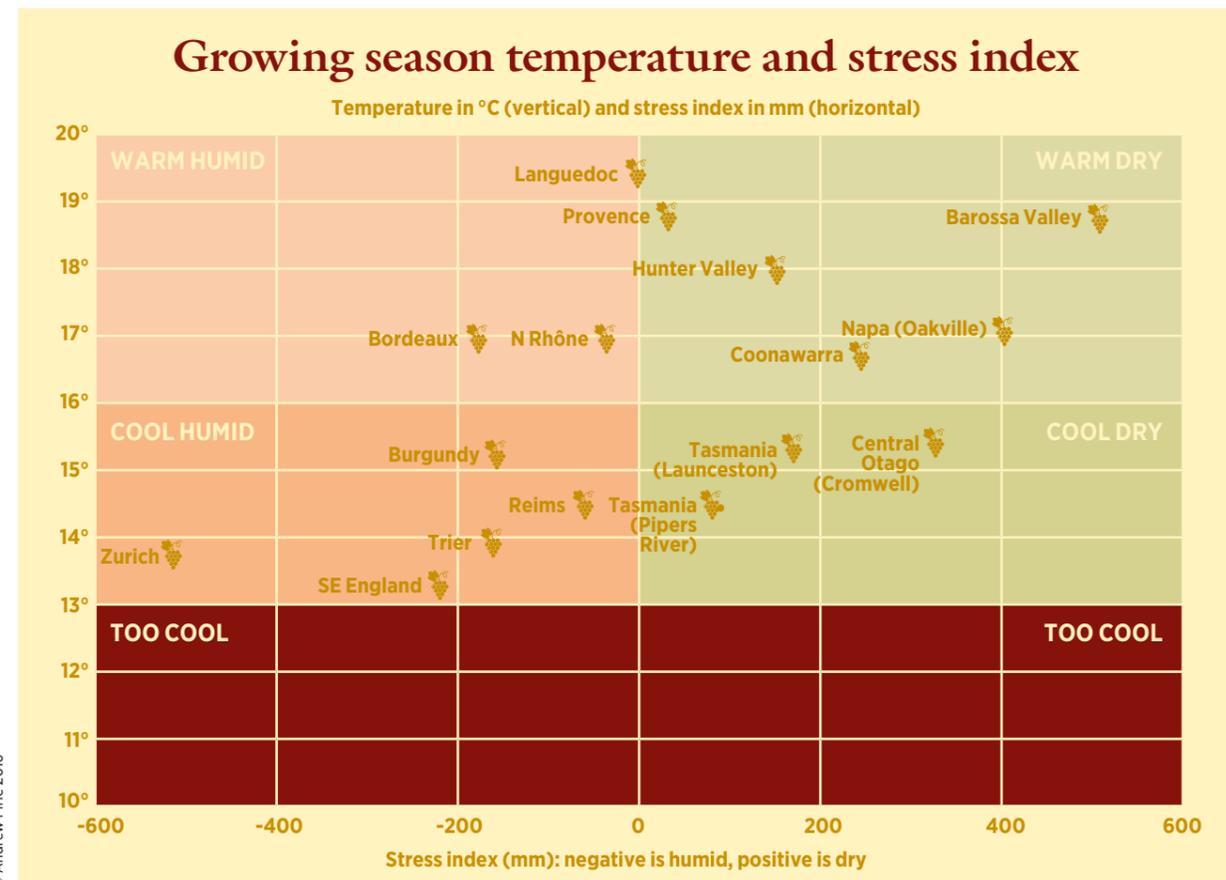


Above: soft soils at the Puligny-Montrachet vineyards of Olivier Leflaive in relatively cool, humid Burgundy

Left: Langmeil's The Freedom 1843 Shiraz vineyard in the Barossa Valley – one of the warmest and the driest regions on Pirie's temperature and stress index chart, far left

Tyson Stelzer is the author of 15 books on wine, and was named International Wine & Spirits Communicator of the Year 2015

Photographs: Barossa Grape & Wine Association, Serge Chapuis



Andrew Pirie's scatter plot of growing season temperature and stress index (mm of moisture) shows the predominance of classical European regions in humid areas and a small selection of New World regions notable for their dry summer conditions. Pirie says that humidity has recently been proven to change wine aromas, tannins and style, even at the same seasonal temperature.

The same hormone stops shoot growth and causes leaves to fall off. 'It can be assumed that correctly stressed vines will make the best wine, because the vine's energy is directed at fruit ripening rather than growth,' Pirie explains.

The drainage factor

Soil has long been accepted as a vital element of terroir, but Pirie suggests it is not so much the mineral nature of the soil that is key but its drainage and ability to hydrate the vine.

'The French have a big theory about the active calcium and the minerals in the soil influencing the style of the wine, but I believe that's wrong,' he proposes. According to Université de Bordeaux professor Gérard Seguin, it's the drainage that is the key.