

Effects of the Pacific Ocean and the El Niño-Southern Oscillation on Chilean Wine

In September of 2011, I was fortunate enough to go on a study trip to Chile, courtesy of Vina Santa Rita. This report explores the effects of the Pacific Ocean on Chilean wine.

Chile is located on the western edge of South America, cut off from Argentina by the Andes and isolated from Bolivia and Peru by the Atacama desert. To the south are the sub Antarctic ice fields of Tierra del Fuego. This isolation has meant that Chile is phylloxera free. Chile spans 4,350km north to south, but is on average only 180km east to west. The ocean therefore has a considerable effect on its climate and consequently its wines.

One of the main influences is to cool the country. For vine growing, Chile is situated at a relatively low latitude, (i.e. near the equator), with most vines located between 30° and 40° latitude. The northern hemisphere equivalent would be from central Spain to Western Sahara – but the mean annual temperature is considerably lower than this northern hemisphere equivalent. For example, Santiago is at 33° latitude and has a mean January temperature of 20.8°C; whereas Meknes in Morocco, also at 33° latitude, has a mean July temperature of 25.3°C.

The reason for this relatively low temperature is the cold Humboldt current, which flows up from the Antarctic, hits the Chilean coast, and cools the surrounding atmosphere. The current is caused by trade winds, blowing east to west across the Pacific, i.e. away from Chile and towards Australia. These winds displace the sea water around Chile and thus allow cold water from the Antarctic to be drawn up. A range of mountains, (up to 1000m in altitude), running parallel to the coast, and valleys in this coastal mountain range, exaggerate

or minimise the current's effects. Fogs, rolling off the ocean and travelling inland along river valleys, are common in Chile. The Humboldt current cools the air over the ocean, water vapour condenses into fog, and onshore breezes blow the fog into the valleys.

Another significant effect of the Pacific is to lower the amount of rain falling on Chile. The cooler air temperature means less water vapour is held in the atmosphere and consequently less rain falls. The direction of the trade winds – away from Chile – also helps ensure lower rainfall.

Chile is often cited as having perfect conditions for viticulture. The low latitude means vines receive plenty of intense overhead sunshine, ensuring full sugar and physiological ripeness. The low rainfall minimises fungal diseases, with snow melt from the Andes providing ample water for irrigation. Any morning fogs are burnt away by the sunshine, meaning low prevalence of fungal disease.

One of the areas most influenced by the Pacific is the Leyda Valley, part of the San Antonio region, and is the area closest to the coast, being only 5.5km away. Santa Rita's San Juan de Huinca vineyard is typical of the area. It falls into Winkler area number I, (the coolest), and has 1100 accumulated degree-days. The area is further cooled by ocean breezes. In contrast, the Alto Maipo region, which is inland, near the Andes, has 1440 accumulated degree days. This coolness in Leyda means frost is a perennial problem. The vines are planted on slopes so that there are no pockets of still air where frost can form. All slopes can be used, regardless of the direction they face, because aspect is not so important in a site of low latitude: the overhead sun ensures that the grapes ripen fully.

Rainfall in Leyda is low at 471mm per annum (Bordeaux averages over 800mm), and

because a vine needs about 700mm to survive, the vineyards are irrigated. In this cool area ripening is long and slow, leading to a concentration of aromas and flavours. For this reason grape varieties with a short cycle are preferred, such as sauvignon blanc, chardonnay and pinot noir. The Santa Rita Medalla Real sauvignon blanc shows the quintessential characteristics of a wine from this area. It has naturally high acidity and pure fruit flavours – in this case gooseberry and orange blossom – and the finish is smoky and with a mineral note.

The area of Apalta, approximately 60km from the ocean, illustrates the effects of a coastal range valley on a wine region. It is in the Colchagua wine region, the greater part of which experiences little ocean influence due to the coastal range acting as a barrier. The Tinguirica river valley, however, funnels cool air from the ocean into Apalta, and the surrounding mountains act to trap the air. This onshore breeze is most prevalent during summer afternoons. In the mornings, the vineyards experience temperatures more commonly associated with inland Colchagua, i.e. relatively high at 30-32°C. Later in the day, when the breeze picks up, the temperature falls by several degrees, and at night reaches a minimum of 11°C. Vineyards in Chile are typically at their hottest mid-afternoon, when the soil and surrounding mountains have warmed up and are radiating heat back onto the vines, but here in Apalta due to the afternoon breeze the hottest time of the day is noon.

The high diurnal temperature range in Apalta ensures full anthocyanin synthesis and consequently good colour in the wine. The cool ocean breeze also means slower and more balanced ripening.

The main grape varieties found in Apalta are cabernet sauvignon, semillon, merlot and carmenere, i.e. those grapes that require heat to ripen. Apalta is especially good for Carmenere, because this grape needs a long time to ripen fully. Santa Rita's Pehuen

Carmenere illustrates this perfectly. The grapes for this wine come from seventy year old vines growing in the Santa Emea vineyard, Apalta. The colour is a deep ruby, and the tannins are soft and ripe due to the long ripening period. The high diurnal temperature range gives the wine acidity and elegance.

The ocean influences Chilean wine, and therefore changes in the ocean will show up as vintage variations. The El Niño Southern Oscillation refers to the quasiperiodic changes in air pressure in the east and west Pacific. Normally, high pressure near Chile causes the trade winds to flow away from South America and towards Australia. During an El Niño period, the normal displacement of the ocean water towards Australia lessens and cold water is no longer drawn up from the Antarctic. Consequently the water near Chile increases in temperature, with a knock on effect on the surrounding atmosphere and the amount of water vapour in the air. The overall effect is to make Chile hotter and wetter, and this typically means a vintage of poorer quality.

The most recent El Niño was in 2009. According to Juan José Bernales, the manager at Santa Rita's Santa Emea vineyard in Apalta, 1100 mm of rain fell that year, when typically it would receive 600mm per annum. Vigour was difficult to control and so was yield. The wet conditions increased the risk of fungal diseases and there was the danger of harvest rain diluting the must. Even though the overall temperature was hotter, the rain led to short periods in the vineyard when the grapes were damp and cold. This affected ripening, and made the decision when to harvest more difficult.

La Niña is the opposite of El Niño and often occurs after an El Niño period. The normal high

pressure over the east Pacific increases even more and trade winds strengthen. Chile becomes cooler and drier. Currently, (October 2011), the country is experiencing a La Niña occurrence, which initially formed in 2010. The Santa Emea vineyard has received one third less rainfall this year than normal, and in 2010 only received 200mm. With regard to viticulture, the coolness has meant that the vine's growth cycle has been delayed by two weeks. There are advantages associated with a La Niña period. The lower temperatures cause lower yields and fruit of better quality. In 2010 frost damaged nearly 50% of the vines, but the lower yield meant an excellent vintage for quality. Further advantages are that drier weather means less clouds, more sunshine and less rot. The sunshine means the fruit achieves full ripeness, the ripening slowed by the overall coolness.

The preferred conditions for viticulturists are neither La Niña nor El Niño. With neither of the two, frost does not lead to loss of yield, nor does increased rain cause fungal diseases and damage quality.

La Niña or El Niño events normally last nine to twenty-four months. Over the last two hundred years an El Niño or La Niña event has occurred on average once every five years. In the last thirty years, however, the number of events has increased to about three per decade, with El Niño events increasing and La Niña events decreasing. Therefore overall weather conditions have become less favourable for wine making. The increase in frequency could be due to climate change. If events continue to remain frequent, then producers will need to take more account of the El Niño Southern Oscillation when planning new vineyards.

As has been seen, the Pacific ocean has a great influence on Chile's climate and consequently

on its viticulture and wine. The trend is for more El Niño events and therefore more difficult vintages. Chile's geography, however, means a huge variety of new sites and terroirs are available for planting, and so whatever the future holds, it should continue to produce reliable and excellent quality wine.

Sources

Rodrigo Alcalde, Unique Chile Tours, personal interviews, 5/09/2011-9/09/2011

Maria Cecilia Pino, Marketing and Winemaking, Santa Rita, personal interview, 9/09/2011

Juan Carlos Munita, Marketing, Santa Rita, personal interviews, 7/09/2011-9/09/2011

Edouardo Muñoz, Vineyard Manager, San Juan de Huinca vineyard, personal interview, 5/09/2011

Julio Cornejo, Vineyard Manager, Santa Ines Vineyard, personal interview, 5/09/2011

Juan José Bernales, Vineyard Manager, Santa Emea vineyard, personal interview, 7/09/2011

Vicente Ugalde, Vineyard Manager, Pumanque vineyard, personal interview, 7/09/2011

Santa Rita's 'Valles de Chile' CD

Santa Rita's 'Wine Valleys' leaflet

Robinson, Jancis (2006), 'Oxford Companion to Wine', Oxford University Press

Johnson and Robinson (2001), 'The world atlas of wine', Mitchell Beazley, London

<http://en.wikipedia.org>

www.winesofchile.org