Is there a wine-producing country that is not claiming a first in this area? Perhaps one of the first is the New Zealand Wine Company in Marlborough. The company claims to have estimated its carbon emissions and has reduced them where possible, offsetting the balance through regeneration of native forest. The programme was certified by the New Zealand programme of Land Care. One wonders how these programmes would fare without forestry offsets.

Carbon-neutral wineries – every country has one. Forgive the pun, but carbon-neutral wineries seem to be “flavour of the month”.

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Using DNA to build better Chardonnay

Claims by molecular biologists that they are about to improve wine quality abound in the popular press. One of the more recent has been from two professors of the University of British Columbia, Stephen Lund and Joerg Bohlmann, who are studying volatile organic compounds that give wines their flavour. Their aim is to understand how berry flavours are determined by the interplay of grapes’ genetic makeup with environmental factors such as light, water, and nutrients. In other words, they seek God’s understanding.

They hope to come up with handheld tools that could be taken into the vineyard and used to detect the presence of certain proteins in the grapes. Unlike some of their colleagues in molecular biology, they have been careful not to raise expectations about what they can achieve. They also claim to be aware of consumer concerns about genetically modified grapes.

New vine pests threaten California

As if the glassy-winged sharpshooter and concern over Pierce’s disease weren’t enough, Napa’s wine industry is now on the lookout for the western grapeleaf skeletonizer moth. An adult male was found in a trap on Mount Veeder Road in August, and further traps have been set to see whether this was an isolated incident or a wider problem. The insect is already established in other parts of California and causes damage by consuming leaves and fruit, which allows secondary infections.

In March 2007, the presence of the light-brown apple moth (LBAM), Epiphyas postvittana, was confirmed in California by the USDA. This is the first time this pest has been detected in the continental United States. Since then, the insect has been found in nine counties throughout the state, including Napa Valley. Strict quarantine regulations have been imposed, and US$15 million has been pledged to help fight this class A pest. The insect is a leafroller-type moth, native to Australia, where it is generally considered the most significant insect pest in Australian vineyards and a major threat to the wine industry.

Grapevine

- The grapevine genome has been sequenced by a joint French-Italian project – only the fourth plant species to be sequenced, and the first for a fruit crop. The grapevine was selected both because of its important place in the cultural heritage of humanity, dating back to the Neolithic period, and its economic importance as the world’s most valuable horticultural crop.
Go higher, go cool!
One company taking the threat of climate change seriously is Torres in Spain. Torres decided to grow cool-climate grapes such as Pinot Noir in the foothills of the Pyrenees, the mountains that divide Spain and France, and the first vineyards have been planted near the town of Tremp. Now Torres is wondering about this region’s potential in the context of climate change.

Another Spanish company, Pago del Vicario of Ciudad Real, has also recently invested in high-altitude, cool-climate vineyards in the Sierra Nevada mountains south of Granada. These could be the highest vineyards in Europe. Again the initial planting will be to cool-climate grapes, but who knows what might happen in the future?

Smoke gets in your eyes – and your wine
Over the past few seasons, Australian vintners have struggled with bushfires, which some commentators say are a feature of climate change. There is no doubt that the present drought in parts of Australia is exceptionally severe. Drought is linked to bushfires, particularly in the northeast of Victoria, and some vineyards were covered in smoke haze for several months.

The resulting wines were tainted, and scientists from the Australian Wine Research Institute have identified the responsible compounds in smoke. Further studies are needed to determine the concentration of these compounds in smoke and critical times during the year when smoke can taint the vines. One aspect of this is that vintners are becoming more nervous about industrial developments in wine regions.

Ladybird, ladybird, please fly away home!
Asian ladybirds may yet cause wine problems in Europe. Over the past five years, the insects have been found in Ontario and parts of the northeastern United States, where they caused problems by tainting wine with a peanut-butter-like aroma. The bugs exude methoxypyrazines when disturbed, tainting the grape juice and, subsequently, the wine.

This pest is also in Europe and has spread to the UK. In the Vaud region of western Switzerland near Lake Geneva, two major Asian-ladybird infestations were discovered, prompting fears for the region’s wine harvest.

Phytoplasma blues
The first case of grapevine yellows disease Bois Noir has been discovered in Canada in a batch of imported Grenache vines from France. The infected vines have been destroyed and the industry put on a state of high alert.

In Austria, Scaphoideus titanus was recently recorded. This leafhopper can carry the phytoplasma that causes Flavescence Dorée, though as yet
it is not a vector of the disease. Researchers are concerned that there is no climatic limitation on disease spread into south Germany and north Austria, with South Styria particularly at risk.

**Phylloxera in Australia**

To date, 83 different genotypes of phylloxera have been found in Australian vineyards, and the Phylloxera Board wants more vines planted on resistant rootstocks to prevent potential devastation. However, with over 20 different rootstocks available to Australian growers, it is vital to assess performance against different strains of the pest; research is beginning to look at this.

In one trial, the impact of three phylloxera lineages was assessed under glasshouse conditions on two rootstocks (Ramsey and Schwarzmann) and compared with self-grafted *Vitis vinifera*, which unsurprisingly showed least resistance to phylloxera genotypes. The G4 strain was significantly more virulent on *Vitis vinifera* than the G20 strain after 10 weeks of infestation, while both rootstocks performed equally well. A new control area in Victoria has been declared to protect the viticulture industry in the Bendigo/Heathcote region from the pest. Phylloxera has also now been found in Martinborough in New Zealand’s North Island, where around 25 per cent of the vines are on own roots and will have to be replanted.

**Eucalyptus taint in Australian red wines**

In a paper presented to the Australian Wine Industry Technical Conference in August 2007 by a team of French and Australian scientists, it was argued that the presence of eucalyptus trees near vineyards was the cause of eucalyptus flavour taints in wine. The offending compound is 1,8 cineole, known as eucalyptol. Experiments have shown its presence in wine from vineyards with eucalyptus trees nearby. Such an effect has long been rumoured in California, where eucalyptus trees are also abundant.

**Nitrogen and TDN**

It seems that increased levels of nitrogen fertilization lead to lower levels of TDN (trimethyl-dihydronaphthalene, an important component of the kerosene-like aroma in Riesling), according to German research looking at various fertilizer treatments carried out over several vintages. Other aromatic compounds, including actinidol (important in aged bouquet) and β-damascenone (intensely fruity), tended to increase with increasing fertilization. Increasing nitrogen fertilization also increased the likelihood for wines to exhibit UTA (untypical ageing off-flavours), and this was related to increased aminoacetophenone concentrations, which have been identified as playing a causal role.
Opinion:
The effects of climate change

“Wine styles are defined by regions and variety.” Such a simple statement, but it lies at the heart of the contemporary world wine sector. These factors essentially define the geographical origin of wine and its sense of place, so important in marketing and wine appreciation.

The principal defining effect of region is that of climate, especially temperature. Differences in temperature conditions determine wine-style differences between regions – an effect far greater and more universal than, for example, soils. To give an analogy, if Burgundy had the temperature conditions of Bordeaux, it could not grow quality Pinot Noir and would be well suited to ultra-premium Cabernet Sauvignon production.

By this example I mean to emphasize that grape composition and wine style are greatly affected by temperature conditions in the region where the grapes are grown. This has led to the geographical spread of wine regions and variety use around the world. Even a casual glance at a map of the world’s wine regions will show these as discrete, and many have reputations for wine excellence for certain varieties.

Over the past two years there has been an extraordinary shift in public awareness about the issue of climate change. This has largely been due to the efforts of Al Gore and the International Panel for Climate Change, both rewarded with the Nobel Peace Prize in 2007. The climate-change issue was a major factor in deciding a government change in Australia’s

Grapevine

- In January 2007, the EU and INRA launched GrapeGen06, a Europe-wide programme that will run to December 2010. Seventeen countries are participating in the research, which is aimed at long-term preservation of Vitis genetic resources for future generations. It will particularly seek to protect old, rare, or neglected autochthonous (indigenous) grape varieties, as well as germplasm from wild Vitis sylvestris.

- Climate change in Burgundy since the 14th century has been tracked in research published in leading science journal Nature. The researchers used village records to study harvest dates from 1370 to 2003. Parallels have been found for the warm summers of the 1990s in periods around the 1520s, and also from the 1630s to the 1680s. However, the exceptional heat of 2003 seems to be unique.
November 2007 elections. And now, finally, parts of the wine business are taking notice. At some meetings, winemakers with little awareness of the gravity of the situation give reassuring words: one even suggested that “canopy management and rootstock change can overcome global warming”. Sorry – this is a nonsense!

I recall giving a paper at the 1988 OIV Congress in Luxembourg on impacts of climate change. Some members of the audience laughed when I suggested that in the future Grenache may be the preferred variety in Bordeaux, but we may yet see that by 2050.

Given the projected increase in temperature, the wine world as we know it will be exceedingly disrupted. In a nutshell, the present reputations that regions have for wine style and variety will inexorably change. No doubt this gradual change will be denied by many, but as time progresses and summer temperatures continue to rise on average, even the most determined diehard will be forced to admit that things have changed, and are changing. Cold regions will become cool; cool regions will become warm; warm regions will become hot; and hot regions will become very hot and may even cease to exist as wine-producing regions.

There are more implications beyond wine style and quality. Pests and diseases will change, some with dramatic implications. Already the deadly phytoplasma disease Bois Noir is moving northwards into south Germany and north Austria, as warmer temperatures encourage the migration of the insect that spreads the disease. Pierce’s disease in America is known to be contained in places by temperature, so its impact will spread. Some scientists predict an increase in summer rainfall in some regions, which will cause more fungal disease. There are also predictions of increased drought. Australia is presently suffering the most serious drought in recorded history since European occupation, with dramatic effects on wine production.

My fear is principally for European producers. They have generally failed to realize that their strict regulations have inhibited their ability to compete with the New World and have thus lost market share; in a similar way, their inflexibility may inhibit their opportunity to respond to climate change. Clever wine regions should now be developing production and marketing strategies for 25, 50, and 75 years down the track. The old adage of turning a challenge into an opportunity is appropriate here.

Some wine regions will be more affected than others. Europe will fare badly compared to the southern hemisphere because there is more ocean in the southern hemisphere. Iberia and southern France will be most affected, and Tasmania, southwest Australia, New Zealand, and Chile/Argentina will be least affected. Chile is the best-located country of all to combat climate change; water supply will generally be unaffected, and
vineyards can be easily relocated to the west, near cool, ocean-current coastal influences, to the east up the Andes foothills, and to the south away from the equator.

Those of you who are lucky enough to have extensive wine collections may well see them change in value. I wonder how long it will be before wine commentators start to classify wine-production periods as “classic”, “post-classic”, and “new style”. Will wines from famous regions in the 1980s be regarded as more precious because they are more like the wine styles that made the regions famous over the past 150 years or so? How many covet the 2003 French vintage as typical? That hot vintage in France was a taste of the future.

To finish on a political note, wine lovers should be foremost in our societies in urging governments to begin the process of combating climate change. For those of us who love our wines as they are, this may be our best hope — and based on the results of the 2007 Bali conference, it is apparent that American wine lovers have the most work to do.

Grapevine

- **Botrytis bunch rot** continues to cause significant crop losses, especially in humid regions, so researchers at Cornell University are studying its biology and control. It seems that humid conditions at flowering can cause latent infections that may develop later in the season, particularly on humid soils. Experiments on Pinot Noir found that more open bunches (deliberately pruned to be similar to the Mariafeld clone) are important in helping air circulation and avoiding disease development, implying that bunch form is a key factor in disease resistance.

- **INRA researchers** have developed techniques for detecting aroma precursors in grapes before harvest. These odourless compounds are difficult to detect in the field but are essential because they are transformed into varietal aromas during winemaking. The technique uses infrared spectroscopy to detect glycosides and has been tested on four varieties (Chardonnay, Muscadet, Riesling, and Gewurztraminer). This should allow growers to make better decisions on picking time.

- **Leaf plucking** has almost become a mantra in the pursuit of full ripeness, but it seems that fruit quality may be at risk when fruit is overexposed to sunlight or when too many leaves are removed from the fruit zone. Sparser canopies can leave sensitive varieties like Cabernet Sauvignon, Grenache, Merlot, and Sangiovese vulnerable to sunburn. Research shows that only 10 per cent of full sunlight is required for full colour development in the fruit, while higher exposure to solar radiation brings the risk of fruit heating up and loss of anthocyanins.