



Largest Wine producers

= 10 million hectolitres, or 10 billion litres

CARTOGRAMS

WINE WORLD

BY BENJAMIN HENNIG

The geography of wine – the product obtained exclusively from the total or partial fermentation of fresh grapes – can be viewed both from the perspective of producers or consumers. This cartogram visually depicts the consumer side of a market that has undergone some major regional shifts over the past decades. It shows the countries of the world resized in proportion to their absolute annual wine consumption in recent years. The

largest absolute consumers are also labelled. The map also indicates those countries' production levels (shown by the bottle infographics).

The world's annual consumption of wine is almost 250 million hectolitres (one hectolitre = 100 litres). That corresponds to the volume of 10,000 Olympic-size swimming pools. The United States accounts for 30 million hectolitres and has, in recent years, become the world's largest market for wine – a position it took over from France in 2013. However, with an annual consumption per capita of around ten litres, the United States has a lower consumption per capita than almost all other wine-producing countries. France, for example, has a per capita consumption level of 48 litres and even Greece and Belgium outdo the States at 26 litres and 28 litres per capita of consumption respectively (South Africa's per capita consumption figures were unavailable at time of going to print).

A relative newcomer in this map is China, which has more than tripled its consumption in just a decade. China is the world's fifth largest market for wine at almost 18 million hectolitres per year. However, the country's annual consumption per capita is still modest at just 1.3 litres.

The world's annual production is around 270 million

hectolitres (varying significantly from one year to another, primarily depending on weather conditions) and wine is produced commercially in more than 70 countries, three of which account for almost half of the world's production: France, Italy and Spain. Vineyards with wine grapes cover an area of around 54,000 square kilometres which equals the size of eight million football fields. Red varieties make up around 60 per cent of the grapes.

The figures for this month's cartogram were produced in collaboration with Morten Scholer using data by the International Organization of Vine and Wine, the World Wine Trade Group and the Wine Institute (California). They reflect the average production and consumption from the years 2011 to 2014.

Benjamin Hennig (@geoviews) is a senior research fellow in the School of Geography and the Environment at the University of Oxford. He is involved in the Worldmapper project and maintains the blog www.viewsoftheworld.net.

For a deeper look at the world of wine production in Bordeaux and how the region's grapes are under threat from climate change, see Saving Bordeaux on page 48.

TREES

DIEBACK FIGHT BACK

A 200-year-old tree named 'Betty' is helping identify genetic tolerance to ash dieback disease

Ash dieback, a fungal disease also called *Hymenoscyphus fraxineus*, has killed off thousands of ash trees in the UK. Thought to have arrived from Denmark, where ash dieback has wiped out 90 per cent of its ashes, it was first reported in Buckinghamshire in 2012. Since then, the disease has made its way across the UK via wind-borne spores, with few areas left unaffected.

Mysteriously, some trees have not been infected – even when they are surrounded by dying specimens, leading scientists to study the genetic markers for these especially tolerant specimens in hopes of finding a cure.

Professor Allan Downie of the John Innes Centre says 'Because the disease was more advanced in Denmark, we used Danish ash leaves to find a genetic pattern associated with low susceptibility.' The question was whether or not the genetic patterns for low susceptibility were the same in UK ash trees: 'UK trees are a little different, we did not know if the Danish genetic markers would work on them.'

This is where 'Betty', a 200-year-old ash tree in Norfolk, comes in. Betty had been observed for some time as having low levels of ash dieback symptoms. When Downie tested its genes for the dieback tolerance markers, Betty met the criteria for low susceptibility. 'Betty is important because it gives us confidence that our genetic predictions are working in UK trees' he says.

Betty is not alone. There are other ashes near to it that also appear to be tolerant to the disease. Downie hopes to figure out what proportion of similarly tolerant trees make up the whole UK population.

'In some regards, [Betty] is symbolic of a small population of tolerant trees that could form the basis for rebuilding the ash population,' says Downie, 'while disease works its way through the susceptible species. What we do not know yet is what proportion of the trees' offspring inherit the tolerant genes. There is quite a lot still to do, but we can now see a way forward using trees that are much less susceptible to the dieback.'