Act for change 2019

VINOSCOPY

Economy
In 2050, what kind of world will we be drinking wine in?

Climate change
From doubt to obvious fact

The impact of the climate change on the wine and spirits industry

RESEARCH AND INNOVATION
To adapt wine growing to climate change, research progresses, multidisciplinary approach

SYMPOSIUM VINEXPO
MAY 14TH 2019
BORDEAUX

VINEXPO
THE WORLD OF WINE & SPIRITS
Editorial

Discussing the future at Vinexpo

Christophe Navarre, Chairman of Vinexpo Board

As the historic capital of the world’s leading region fine wine region, Bordeaux has long demonstrated its inventiveness when it comes to serving the interests of the wine industry at large. The Chamber of Commerce and Industry created the first wine trade show Vinexpo in 1981; the academic world linked its research resources to those of research organisations and public and private laboratories to develop the Institute of Vine and Wine Sciences in 2009; and the Cité du Vin was officially opened in 2016 to promote culture, heritage and tourism. The symposium we are organising during Vinexpo 2019 is the first of its kind and further demonstration of this momentum. It revolves around a theme, climate change, which impacts every stakeholder in the wine arena.

Vinexpo’s strength is its ability to bring them all together on this occasion and introduce them to international authorities from across the continents. This thought process is not restricted to the sole effects of temperature increases or the relentless occurrence of weather hazards in vineyards, but spans the entire ecosystem - insects, diseases and weather events - and even embraces the marketing environment, from new geographical competition to adapting to 21st-century consumption trends, with less sugar and lower alcohol, when maturation conditions tend to take them in the opposite direction.

This diversity of views exemplifies the spirit of openness that drives this event, both today and for future exhibitions. After going global, with events in Hong Kong, Shanghai and New York, and heading for Paris in 2020, Vinexpo, through this Symposium is laying the foundations for an international centre of expertise and dialogue, true to its genetic make-up. Although the scientific and academic literature is extensively documented and shared via social media, nothing is more effective than the convergence of expertise and knowledge, sharing forward planning and communicating face to face at an event like the one Bordeaux is offering you today.

Act for Change

SYMPHONY VINEXPO

The ambition of New Aquitaine

Alain Rousset, Chairman of the New Aquitaine Regional Council

Climate change is prompting increased urgency as scientific reports become more and more alarming. As the scale of disruption escalates and its consequences increasingly become part of our daily lives, it seemed of paramount importance to me that the New Aquitaine regional council be the preferred partner of this Symposium on the impact of climate change on the wine industry.

Through the work carried out by the multidisciplinary research team “Acclimatre”, under the guidance of climatologist Hervé le Treut, New Aquitaine is seeking to anticipate the consequences of climate change on the region. The requisite adaptation of human and economic activities implies raising awareness before operational solutions can be adopted.

This Symposium focuses this ambition on one area, wine, which is extremely relevant to many regions and has a major economic impact. Due to increased evapotranspiration; more violent and frequent extreme weather events; and longer and more intense periods of drought, agriculture and therefore viticulture, will be very strongly impacted in a future that starts now. In fact, it has a pivotal role to play in reducing its production of greenhouse gases, storing carbon (soils, hedges, etc.) and generating renewable energy.

You will already have realised that there are numerous, complex and global issues involved. Will wine regions manage to retain their characteristics? Will we see the emergence of new wine regions, or the relocation of others? Should we be concerned about a possible change in grape health with the arrival of new diseases or pests? Will changes in grape varieties need to be considered? Will water become a limiting factor? These are just a few of the issues at stake...

These questions are global and VINEXPO, as the genuine hub of the wine community, is the ideal place to reflect on and discuss them. The purpose of this event is to promote available knowledge in order to take stock of the situation scientifically. By disseminating knowledge to a wide audience and highlighting experiences, everyone should be able to subscribe to the situation and the challenges from all perspectives: from vineyard management to winemaking, and from evolving vineyards to economic aspects.

In my opinion, this global vision and thought process is essential if we are to initiate the systemic changes and adaptations needed to anticipate the future weather patterns in our regions.
Europe
Vines are the leading agricultural sector in Europe by value, producing 61% of the world’s volumes.

- **France**: Leading exporter country by value.
- **Spain**: Leading exporter country by volume.
- **United Kingdom**: Britain’s area under vine is expected to increase from 2,500 to 18,000 hectares by 2040. It doubled between 2006 and 2016.
- **Italy**: Europe’s leading wine producer by volume.
- **Germany**: The world’s leading importer of wine by volume.

**Asia**

- **China**: Home to the second largest area under vine in the world for the number of hectares farmed - 75% of vineyard area is planted to a single grape variety, Cabernet-Sauvignon.
- **Hong Kong**: Purchasing 10 million bottles worth €327 million, Hong Kong is the leading importer of Bordeaux wine, in 2018.

**Americas**

- **United States**: The country’s wine production increased by 2.6% between 2016 and 2017, reaching 10.8 million hectares.
- **Argentina**: ‘Malbec country’, is the leading South American producer. Over the past few years, Chile has also become one of the world’s largest producer countries.
- **Chile**: 90% of the country’s production is exported, i.e. 9.8 million hectares.

**Australia**

- **Australia**: The 5th largest wine producer in the world in 2017. Australian wines represent 5.4% of the market. 70% of the wine is purchased in supermarkets.

**South Africa**

- **South Africa**: The country’s wine production increased by 2.6% between 2016 and 2017, reaching 10.8 million hectares.
Climate

Mission: Meet the objectives of COP 21

“Only take into consideration irrefutable arguments, certainties”, warns Michel Jarraud, Secretary General Emeritus of the World Meteorological Organisation. There is no need to engage in alarmism, claims the scientist, figures provided by global organisations offer sufficient demonstration of the major trends in climate change on our planet.

The publication in September 2018 of the latest report by the IPCC* leaves no doubt about the development of greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, etc.). Consolidated data for 2017 shows that CO₂ emissions exceeded the 40 billion tonne threshold, up 1.6%. These emissions, mainly produced by human activities (industry, agriculture, energy, transport, etc.), are the main causes of global warming, preventing the redistribution of solar radiation into the atmosphere. The damage is already at an advanced stage because the COP 21 in Paris set a global warming target of 1.5 to 2°C by 2100. Strong action is taken quickly to reduce emissions. "The deadline may seem a long way off, but it is not as children born today will be 80 years old at the end of the century. They will experience this situation", says Michel Jarraud. "In fact, we are already experiencing hot weather. Of the eleven years with the highest temperatures observed since global weather data became available in the middle of the 19th century”, continues Jarraud, “ten of them are in the last ten years; the eleventh was 1997. And the four years of highest temperatures were from 2015 to 2018. And the so-called "cold" years since the beginning of the 21st century would all have been close to the heat records of the last century. To have a chance of meeting the objective set in Paris at COP 21, a maximum upper limit must be reached for greenhouse gas emissions, and in particular CO₂ emissions, by 2030. "Carbon neutral" status must then be achieved long before 2050; i.e. the balance between the amount of CO₂ emitted and the amount that the Earth can capture must then be achieved. The reduction in emissions and minimise the extent of climate change. This involves avoiding a situation that we will not be able to manage.

Adaptation, to manage what cannot be avoided, with funding for research and assistance to developing countries, including through technology transfer. Technologies to extract (and store) significant amounts of CO₂ from the atmosphere will need to be developed and the "price of carbon" will need to be factored into economic scenarios. But it should be made clear that managing this global threat can only be the result of cooperation amongst all countries and multiple disciplines. There is urgent need for brave decisions.

Are there any good indicators that you consider underutilised to measure the effects of climate change on vines? Winegrowers, who are particularly sensitive to weather hazards, have long been demanding and meticulous users of specific weather information. However, anthropogenic climate change poses new challenges and new products and indicators need to be developed: transformation of possible scenarios, including those established by the IPCC, into specific information for winegrowers and seasonal forecasts, to name a few.

Do you think we should put a price, a tax on carbon? Most certainly! Regardless of how this is done, it is essential to take into account the cost of CO₂, methane and other greenhouse gas emissions. This is of course a significant element of awareness, but beyond that, it is also about having the right economic parameters and levers for action. Lastly, it is a question of ethics.

A 3-question interview...

Considering the issues at stake, do you feel that the resources made available to meteorologists are sufficient? Although the quality of forecasting and weather and climate services has improved dramatically in recent decades, the resources available do not allow all the potential benefits to be fully realized. Multiple studies of the benefit-cost ratios of investment in weather services show that these ratios frequently exceed 10:1. In both developed and developing countries. This is also true for climate services. Increasing these investments would save more lives and contribute effectively to greater sustainability.

*Intergovernmental Panel on Climate Change
WHEN SCIENCE SUPPORTS
THE INVENTIVENESS
OF THE WINE INDUSTRY

The issue is not whether we will be able to make wine in the future in Bordeaux, Languedoc, the Côtes du Rhône or Provence, but which wine we will be able to make, in which vineyard and for whom. Therefore, which strategies should producers, trading companies and distributors adopt in response to changing consumer tastes, their concern for environmental preservation for the products they consume, and even the challenges of ‘naturalness’, the ins and outs of which they do not always master? Concurrently with this, the wine and cultural heritage of each wine region will need to be safeguarded, while climate change will impose a structural revolution in the specific nature of the wines produced the world over. These scientific equations are being posed by the Institute of Wine and Wine Sciences - the Bordeaux research centre inspired by famous Bordeaux oenologist professeur Denis Dubourdieu and Alain Rousset, chairman of the New Aquitaine region council. ISVV is trying to resolve. Through the European programme VINOVERT, which it has been coordinating since 2016, the ISVV, now headed by Alain Blanchard, is once again demonstrating the uniqueness of its interdisciplinary approach, bringing together agronomists, oenologists, economists and sensory analysis specialists. Its methods include ‘experimental economics’ to establish how consumers actually respond to a product’s supply, with its full range of, often contradictory, characteristics... “This research technique focuses on measuring the willingness to pay for products by ascertaining research technique focuses on measuring the willingness...”

Eric Giraud-Héraud, economist and deputy director in charge of research at the Institute of Vine and Wine Sciences at ISVV. What is the maximum amount that consumers are willing to spend on a wine whose environmental performance aligns with the wishes they express (organic, natural or for any claim or certification) or is made from disease-resistant grape varieties and whose flavour and aroma characteristics they discover during tastings and regular drinking occasions? These are the questions analysed as part of the VINOVERT project. The issue subsequently raised is how to anticipate changing consumer tastes and studying how the supply side can meet them, despite the expected increase in alcoholic strength, a foreseeable decrease in acidity, or even a loss of aromatic complexity and ageing potential...

“There are several factual elements that show that changing demand is headed in the opposite direction to supply and we have also confirmed this in our experimental markets. So aren’t the economic risks more short-term than the agronomic risks we are lagging behind in terms of foresight and that regulations for production methods and the acceptance of innovations do not hinder the requisite adaptation?”, says the ISVV’s research director.

Interview

Jean-Robert Pittet, Permanent Secretary of the Academy of Moral and Political Sciences

“It’s necessary to take into account humanity’s resilience and ability to use its imagination and, beyond that, life in general over the long-term and the diversity of the planet’s environments”.

Jean-Robert Pittet

WINE AND CLIMATE CHANGE

hat is your analysis of today’s view of global warming and its consequences?

Since it is almost impossible today to make reasonably optimistic statements about current climate change, let us simply talk about its effects. Are they necessarily negative, dramatic, even, as the media and now political decision-makers are constantly hammering home, repeating comments by a number of scientists who are generally linked to earth and life sciences and not the humanities? Geographers, archaeologists, historians, agronomists and biologists are much more nuanced in their analyses and prognoses because they know how to take into account humanity’s resilience and ability to use its imagination and, beyond that, life in general over the long-term and the diversity of the planet’s environments.

Do you consider that wine growing has an inherent ability to adapt to changes in its environment?

This particular branch of farming does not stem from a vital necessity, but from spiritual devotion and the expression of cultural identity. It has been adapted to the various climate changes that have occurred over the past 8,000 years, when Vitis vinifera was domesticated and then spread. In doing so, its methods have constantly progressed and therefore so has the quality of its wines. The Little Ice Age (15th-17th century) is a good illustration of this. Northern Europe had learned to grow vines by converting to Christianity in mild climates. When the climate cooled down, it was forced to stop and seek out supplies from the South of the continent. The fragility of wines subjected to long maritime transport made people resourceful: the Dutch invented the sulphur wick to sterilise barrels, and the English fortification using brandy which stabilised wines containing large amounts of residual sugar after fermentation.

As an historian and a geographer, what types of changes do you foresee for the future of vines?

New methods have to be devised, and the process is very much underway. Some vineyard sites that are too sunny - southern plains and south-facing slopes - will have to be abandoned in favour of high altitude plantings (the upper valleys of Napa, the edge of the Cévennes, Judaism in Iraq) or North-facing sites (Ventoux, Luberon, Alpilles...). The issue may have to be addressed one day in more northerly regions. The same changes can be considered for grape varieties. Marseanne and Syrah vines in Beaujolais are producing encouraging results. Once the results of these trials have been consolidated, legislation for protected designations of origin will probably have to evolve. On the Japanese island of Hokkaido with its ‘Siberian vines’ only mediocre hybrids were planted until recently, but now white Rhine grape varieties grown by enlightened growers are beginning to produce wines showing great finesse. England is once again seeing the spread of vineyards and the first good wines have emerged. One unmistakable sign of change is that in 2011, Queen Elizabeth had 16,000 Pinot noir, Meunier and Chardonnay vines planted on her Windor estate to produce her own sparkling wine which since 2014 has sold for £35 a bottle. Basically, all is not lost if global warming continues. In fact, never in the long history of wine growing have so many good terroir wines been produced in all latitudes.

“Wine and climate change: what is your analysis of today’s view of global warming and its consequences?”

“‘This research technique focuses on measuring the willingness to pay for products’”

Jean-Robert Pittet
In Australia, the Australia New Zealand Food Standards Code was changed in February 2017 to allow the “limited” addition of water to high sugar must and juice to reduce the risk of problematic fermentation. Until then, only 7% extra water at most could be added during the winemaking process.

Climate impact on Australian wines

The taste of Australian white wines is changing with rising temperatures, becoming richer, riper and sweeter according to winemaker Ross Brown. To retain freshness in their wines and preserve their characteristics, some growers are turning to the island of Tasmania, Australia’s coolest wine region.

On May 10, 2018, Denmark registered its first PDO for “Dons”, its quality sparkling wines mainland. The application for production in central Jutland, the country's protection was filed with the European Union at the end of 2015.

Climate change has caused a sharp decline in the production of barley. Top quality barley used for whisky accounts for 20% of global barley production.

In 2013, UNESCO included the ancient Georgian method of winemaking in traditional kvevris on the list of intangible cultural heritage. These large terracotta amphoras, lined with beeswax, have a capacity of 800 to 3,000 litres.

Reduction in water requirements for production

The Pernod Ricard group, which in 2010 signed the CEO Water Mandate, an initiative launched by the United Nations to safeguard water resources, has reduced the amount of water used per litre of alcohol produced by 17%. Its objective is to achieve a 20% reduction by 2020.

The new Asian platform for wine and spirits

Hong Kong, where import taxes on wines and spirits were abolished in 2008 has become the hub of fine wines in Asia in just a few years. Of the 600,000 hl of wine that were shipped to the region in 2017, more than 50% were re-exported, primarily to mainland China.

Red wine remains a favourite with the Chinese. One of the explanations is that red is a lucky colour in China.

According to the Bordeaux Wine Marketing Board (CIVB), 60% of vineyards in the Bordeaux region are currently committed to an environmental scheme compared with 35% in 2014. The aim is to reach 100% of Bordeaux vineyards.

Cognac is virtually entirely exported and accounts for approximately one quarter of the total value of French wine and spirits exports. China is the leading importer country of Cognac with nearly 26.2 million bottles. But the United States are still the world’s leading buyers with a strong appetite for young Cognacs.

Climate change has caused a sharp decline in the production of barley. Top quality barley used for whisky accounts for 20% of global barley production.

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In France, it is estimated that agricultural activities generally speaking are responsible for nearly 20% of greenhouse gas (GHG) emissions whilst they only account for about 2% of GDP. The priority for scientists is therefore to provide the industry with the ability to promote a farming sector that is neutral in terms of GHG emissions. “Mitigating climate change will not be enough, believes INRA, which is why adaptation is a crucial issue [...] Breakthrough solutions must be devised to develop transformative strategies”.

Participatory approaches
Hence initiatives by the National Institute for Agronomic Research (INRA) through its “metaprogramme” strategy rolled out over the past ten years on major industry issues, or its participation in community mechanisms such as Horizon 2020 (soon to be relaid by a new “package”, Horizon Europe 2021-2027).

“Given the scope of research and the economic importance of viticulture for the European Union, there is important work to be done jointly by scientists, industry members and government officials to develop a comprehensive strategy in areas such as farming, production and marketing”, explains Christian Huyghe, INRA’s scientific director for agriculture.

Launched in 2011, the Adaptation to Climate Change in Agriculture and Forestry (ACCAF) metaprogramme provides support for around 100 INRA research units and mobilises more than 300 researchers to anticipate understanding of the effects of global warming and to consider strategies to mitigate and adapt to the environmental and socio-economic consequences of these changes, particularly in the wine sector. ACCAF implements extremely novel and highly participative approaches to winegrowing, with projects such as Laccave or Oscar (see below).

Anticipating future changes
“We must prepare an entire sector, from producer to consumer, to adapt to the emergence of very clear, well-identified phenomena, such as the advance of harvest dates, the increase in temperatures, the scarcity of water resources and the pressure of new pests, even if not all of them are quantified. Although they cannot be precisely quantified, climate models predict a frequent increase in major climatic hazards such as late spring frosts or hail storms”, continues Christian Huyghe. “Findings need to be shared in order to envisage the operating systems of tomorrow. Are the new varieties of disease-resistant grape varieties we are working on competitive? How willing are consumers to accept new flavours? What developments should be promoted for each stage of wine production, both in terms of vineyard management and in the winery?” These are some of the questions we need to answer”.

Similarly, by comparing the way in which wine production and consumption will evolve, the work of the winegrower can be linked to customer demand. “There is active collaboration between industry members and researchers,” says Christian Huyghe. “A broad collective dynamic for change is taking shape around major challenges such as climate change and the reduction in pesticides”.

Research and innovation
INRA

A collective dynamic for change

Of all the economic activities challenged by the threat of global warming, everything related to agriculture is expected to be particularly affected. In fact, you could say in two ways - through the consequences of the greenhouse effect, from temperature increases to weather events, but also for its direct or indirect contribution to emissions.

Insight from LACCAVE
The first phase of the LACCAVE programme ended in a kind of “Great Debate”, bringing together over 500 wine professionals in meetings held in seven French wine regions between the end of 2011 and March 2018. This is not the only unique feature of the research initiative launched by INRA in 2011 to study the effects of climate change. “We wanted to have a systemic vision of adaptation for the entire wine sector”, says Nathalie Ollat, agricultural engineer at INRA Bordeaux and programme coordinator. “This is why the Laccave project took a multidisciplinary approach, bringing together agronomists, geneticists, sociologists, economists, oenologists and climatologists for instance”. Around a hundred researchers, engineers and technicians from nine disciplines, 22 research teams and 12 partner organisations took part. Their mission was to design adaptation solutions and build scenarios for the future of the vine and wine sector on a national, regional and individual vineyard basis by 2050, based on an average temperature increase of 2° compared to the pre-industrial era. As the research progresses, four options are being presented to the industry to make it react and develop a strategy for the future:

• “Conservative”, where priority is given to cultural assets and reference to appelations, grape varieties and vineyard sites, at the risk of more uncertain production conditions in terms of quantity and quality;
• “Innovative”, where innovation is maximised to ensure production of wines with a profile similar to that of early 21st century wines in the same areas;
• “Mobile”, where new planting sites, less exposed to drought and temperature increases, are sought out and can produce wines close to those of the 21st century;
• “Liberati”, where freedom is granted in terms of location, regulations and innovations, potentially leading to the development of more technological wines by new players.

A second phase of the programme – Laccave 2.21 – was launched in 2018 to propose practical tools for implementing a reasoned approach to adapting wine growing to climate change.

www6.inra.fr/laccave

Oscar is in the Resistance
The National Observatory for the Deployment of Disease-Resistant Varieties - codenamed OSCAR - was created in January 2017 by INRA and the French Institute of Vine and Wine (INRAE) to monitor, in the field, the performance of grape varieties developed in France and Europe as regards resistance to downy or powdery mildews. Vines from these varieties, either temporarily or permanently called “secondary” diseases will not appear”. At the same time, their variety are maintained over time, that diseases will not bypass resistance and that systems of tomorrow. Are the new varieties of disease-resistant grape varieties we are working on competitive? How willing are consumers to accept new flavours? What developments should be promoted for each stage of wine production, both in terms of vineyard management and in the winery?”. These are some of the questions we need to answer”.

Using this type of grape variety could reduce crop protection treatments by up to 90%. However, their development in real operating conditions beyond laboratory experimentation needs to be monitored. “Vines are planted for 50 or 60 years and varieties cannot be changed regularly”, says Laurent Dallère, coordinator of the observatory. “We must ensure that their characteristics are maintained over time, that diseases will not bypass resistance and that other so-called “secondary” diseases will not appear”. At the same time, their deployment must be supported by optimising vineyard management of the new varieties - hence the purpose of the participative approach by farmers who share data and methods.

www.observatoire-cepages-resistants.fr
Research abroad

Spain

Fernando Martinez de Toda Fernandez, ICV (Instituto de Ciencias de la Vid y del Vino)

“With nearly one million hectares, Spain has the largest area under vine in the world, half of which is planted in hot, dry areas. We therefore have a great deal of experience with these weather conditions, all the more so because vineyard irrigation was banned for most of the 20th century. We have a broad basis of scientific and technical knowledge in this field that allows us to work on adapting vineyards to high temperatures and not only to the effects of global warming. Due to the extreme weather conditions our winegrowing is subjected to, combined with its long-standing history, our vines have extensive genetic diversity, both the varieties themselves and the ability of the same variety to adapt to different biotopes. Significant resources have been committed by public research bodies and private stakeholders, through the creation of the Wine Technology Platform (AEI) in 2012. It is estimated that the Spanish wine industry has invested more than 170 million euros per year over the past five years in R&D topics, representing more than 12% of food and beverage sector spending. My research in recent years has focused on delaying grape ripening, which is one of the most effective strategies for mitigating the adverse effects of high temperatures and global warming. We have several objectives: to delay ripening in certain plots in order to align them with others or, conversely, to separate harvest dates for vineyards if necessary; to achieve ripening under cooler thermal conditions and improve the quality of the grapes and the wine, particularly in terms of acidity, aromas and phenolic maturation; and to produce wines with lower alcohol content. These qualities are particularly important in hot areas.”

Australia

Dr Dan Johnson, AWRI (Australian Wine Research Institute)

“Australia is the driest continent on the planet, except for Antarctica. Climate issues have long been the subject of debate in a country that suffered a period of no rainfall in the 1990s known as the “Millennium Drought”. We have been using the term “climate change” for more than 30 years, but ironically the implementation of a national climate change policy is so complicated that it costs heads of government their place. However, “sustainability” programmes have been launched at industry level and in particular by wine companies. The high level of coordination between public and private stakeholders, both at regional and national level, and between universities and an institute created by the industry such as AWRI, is noteworthy. One of the main threats to the Australian wine industry is the availability of water, as many producer regions use irrigation. Precipitation models and geography are changing to the detriment of some regions whose shortfalls cannot be compensated for since water is not a product that can be transported over long distances. Research on irrigation techniques and strategies is one of the strong points of our country’s R&D, as is work on clones and rootstocks that optimise water usage or are less sensitive to drought or resistant to saline solutions. Some winegrowers have also noticed that significant diurnal temperature variations are detrimental to the vine’s phenology. They have even pointed to a similar trend in the ripening calendar and the logistical problems that this may pose in terms of harvesting, pressing or maturation. Overall, there is much to be learned about the effects of climate change on the development of grapevine diseases and pests.”

China

Dr Sha Li, Botanical Institute of the Chinese Academy of Science

The Chinese authorities have been concerned for more than fifteen years about the effects of global warming on all of our country’s activities. Vine and wine growing is a young and fast moving industry in China, and adapting to climate change is one of the components of our research in this area. Of our four main lines of research, two are specifically focused on developing tolerance to the effects of global warming in Chinese vine production and improving the quality of grapes to produce premium wines. The other two focus on the consequences of global warming on abiotic factors related to environmental conditions (temperature, humidity, salinity, etc.) and resistance to those related to living organisms. The most difficult factors to manage are the low temperatures and dry climate during winter and early spring in most wine regions such as northern China (Hebei and Shandong) and northwest China (Ningxia and Xinjiang). The vines are buried there for several months to remain in a damp environment, with the risks that this entails from a health perspective. In my laboratory at the Institute of Botany of the Chinese Academy of Science, we have developed vine varieties, particularly for the production of red wines, which avoid burying vines. They are therefore more resistant to disease and less costly to grow. China’s continental climate also leads to a rapid increase in spring temperatures and high temperatures in summer, which means that berries have to develop over a short space of time. To some extent, climatic changes could benefit our vineyards. In arid and semi-arid regions, the availability of water, particularly for irrigation, will be an issue, especially as soil salinisation is observed in some vineyards where drip irrigation is used.”
In 2050, what kind of world will we be drinking wine in?

In this exclusive study carried out for the 1st Vinexpo Symposium, Patrice Geoffron, Director of the Energy-Climate team at Paris-Dauphine University, analyses the potential economic consequences of climate change on the wine industry from an international perspective. Here are some excerpts from his research.

R

R
eilience – a long-standing feature of wine growing

Over the millennia, wine growing has amply demonstrated its resilience and unrivalled capacity for adaptation among farming activities, considering both the diversity of production and the countries covered today (about 70 countries, over 7.4 million hectares, according to OIV).

But the threats of climate change in our century pose a different kind challenge, one that is unprecedented in the long global history of wine because it will test the world’s socio-economic order and not just the balance of wine production.

The question is not only how to select wine-growing techniques and grape varieties, but also the significance of wine in more unstable, even chaotic 21st-century societies.

“The implementation of the Paris Agreement fails, the world could face a 2°C temperature increase as early as 2050 and not in 2000. However, even now, wine growing is subject to risks in many latitudes. And, even in areas that could offer more hospitable climates for wine growing as a result of these changes (farther North or South, depending on the hemisphere, at higher altitudes, etc.), the economic uncertainties brought about by the future climate will in any case pose a threat to this activity.”

A wide range of adaptation strategies

The variety of adaptation tools is extremely broad-ranging, reflecting decades of research and experimentation, particularly since the early 2000s, and includes new rootstocks, changes in the varietal range, a reduction in leaf thinning, de-alcoholisation and acidification. However, it is clear that the costs and economic consequences of these different adaptation methods are disparate, the most drastic involving new production sites and/or new varieties. Radical solutions could thus lead to a move away from traditional production areas (with asset devaluation as a result) and the production of different wines (with commercial costs related to these changes in positioning).

What about demand in 2050?

“The appetite for new ranges of wine amongst consumers born at the beginning of the 21st century (the so-called ‘Millennial’ generation) is unclear at this stage. Millennials seem to show less (or perhaps delayed) interest in wine compared with previous generations (with a notable preference for rose; whose consumption has increased by 30% since the beginning of the century). This trait does not allow them to compensate for declining consumption amongst baby boomers in mature markets. But, as other alcoholic beverages will also be affected by the vagaries of the weather (the effects on barley will affect beer and whisky), this could lead to a major reshuffle.”

The “myth” of future Eldorados

“Although new areas conducive to wine growing are emerging (the south of Great Britain, for example), suggestions of future Eldorados for wine growing deserve to be critically examined, because:

- Traditional regions will adapt concurrently with this (admittingly entailing the transformation of their wines), both of which combined will intensify competition.
- Long-term global demand is uncertain, both in terms of volume and consumer expectations.
- In a more unstable global economy, due to climate change, there is no guarantee that new production areas will become firmly established.”

Wine growing as a “whistleblower”

“The expertise already developed to face this major challenge is extensive and remarkable. All the adaptation efforts that have already been made give wine growing unique legitimacy to act as a ‘whistleblower’, as with the Porto Protocol (established in 2018) for instance, on the reality and speed of climate change.

You advocate a collective response to containing global warming, but is this possible considering the divergent interests between those who see threats and others opportunities?

Wine growing has an experience of adaptation spanning several millennia, but disruptions open up an unknown world. If international action is insufficient, the temperature will rise by 2°C starting in 2050... and not 2100. There will be no islands of wine prosperity in a world subject to extreme climatic events (difficult to insure), economic and geopolitical shocks, migratory waves, etc. Wine growing has legitimacy as a ‘whistleblower’. It is rooted in enough nations to testify to the speed of disruption.

How do you see the future of regulatory systems for designations of origin and geographical indications?

The information is widely shared among the public, businesses and public authorities. And Europe in this respect is a pioneer. But it is not easy to break with two centuries of growth based on fossil fuels (which account for 80% of the world’s footprint). The advantage of wine growing is that it turns threats into reality. Data on harvest dates moving forward or the increase in alcohol content in wines is much more telling to the public than information on the billions of tonnes of CO₂ emissions each year.

A 3-question interview with Patrice Geoffron

Patrice Geoffron, Economics Lecturer at Paris-Dauphine University

You advocate a collective response to containing global warming, but is this possible considering the divergent interests between those who see threats and others opportunities?

“Whistleblower”: it is rooted in enough nations to testify to the speed of disruption.”
When winegrowing gets smart!

**Artificial Intelligence**

- **AI Gaïa technology**, used by Chouette, is able to distinguish the shapes, textures and colours of the details of an image in the same way as the human eye. Captured by drone, the image can help analyse aspects of the vine and detect disease symptoms. Once the drone is connected to its charging station, the images are retrieved and sent to the Chouette cloud for processing.

In Bordeaux, prestigious Grands Crus estates are using drones by Exametrics to help them make wine. The information collected from the sky, images and infrared shots for example are cross-referenced with satellite and weather data so that harvesting can be scheduled depending on the ripeness of the grapes and for individual vineyards. Co-operative wine growers in Buzet (Lot-et-Garonne) also use the devices to monitor their vineyards by iPad. Help analyse aspects of the vine and detect disease symptoms. Once the drone is connected to its charging station, the images are retrieved and sent to the Chouette cloud for processing.

- **NEW ALLIES TO SUPPORT THE VINEYARD**

**ITK’s Vintel software** allows progress in vineyard plots to be monitored in real time without sensors and their water status to be managed. The objective is to optimise resources and the quality of the wines.

**Carbon Bee** has developed a hyperspectral image sensor that can quickly detect grapevine diseases such as flavescence dorée. Winegrowers are therefore given an opportunity to treat problems beforehand and thereby avoid uprooting infected plants.

**Oenoview**, a satellite photography technique, enables industry members, via different colour ranges, to observe ripeness levels in grapes and detect deficiencies or diseases.

**E.& J. Gallo Winery in the United States uses Watson, IBM’s artificial intelligence solution for optimising vineyard management, and the amount of water used for watering. The entire vineyard has been divided into a grid of 30 x 30 metre plots, aligned with the Nasa satellite image. An irrigation plan, based on weather data and soil moisture levels, has been applied to each vine block. This high-precision method of irrigation has reduced water consumption by 25% and improved the quality of the grapes by allowing all the berries to ripen at the same speed.

**VITIVOLTAIC**

Pivoting solar panels have been installed above vineyard plots to provide shade for foliage and bunches if necessary by following the movement of the sun or, conversely, to limit night time cooling. The facilities also produce electricity.

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**Sources**: La Tribune, ZME Science, Objetsconnect.com, BpiFrance, Vitisphere, Vignhees

**Australian robotics researchers** are working on the development of small, connected, autonomous machines, operating 24 hours a day, that can help manage vineyards. Driven by on-board devices (cameras, sensors, software) and multiple data (statistics, predictive models, drones), the prototypes can apparently identify the different types of berries, fertilise, and mechanically or chemically treat the vineyards based on very localised needs.
10:00 am
OPENING

Christophe Navarre,
Chairman of Vinexpo Board

Allan Sicel,
President of CIVB

Alain Rousset,
President of the Regional Council of New Aquitaine

THE IMPACT OF CLIMATE CHANGE ON GLOBAL VINEYARDS

Michel Jarraud,
Secretary-General emeritus of the World Meteorological Organization

Climate change: from doubt to obvious fact

Jean-Robert Pitte,
Geographer. Former President of the Sorbonne, President of the Society of Geography and the French Wine Academy Perpetual Secretary of the Academy of Moral and Political Sciences

Wine and climate change

Questions to...

Jeannie Cho Lee,
Master of Wine, critic, writer (Hong Kong)

How does wine tasting evolve with time?

12:00 pm
THE IMPACT OF CLIMATE CHANGE ON VINEYARD MANAGEMENT AND WINEMAKING

Philippe Mauguin,
President of INRA, French National Institute for Agricultural Research

Which vines and which wines for tomorrow?

Brice Lalonde,
Former Minister of the Environment, President of the “Académie de l’eau”, President of the Association “Equilibre des énergies”

Water, wine and vineyard

Questions to...

Dr Dan Johnson,
Managing director of The Australian Wine Research Institute (ADRI, Australia)

DEBATE
How can research and technologies support producers in their evolution and adaptation strategy?

Questions to...

Katie Jackson,
Senior Vice President of Corporate and Social Responsibility (United States)

Pau Roca,
Director General of the OIV, International Organization of vine and wine

Miguel Torres Jr,
President of Bodegas Torres, member of Primum Familiae Vini Institute (Spain)

15:00 pm
THE IMPACT OF CLIMATE CHANGE ON THE WINE ECONOMY

Patrice Geoffron,
Economics Lecturer at Paris-Dauphine University

Presentation of a global foresight study

ROUND TABLE
How do wine producers integrate climate change into their business strategy?

Christian de Boissieu,
Economist, Professor Emeritus of Economics at Paris I Sorbonne

Antonio Amorim,
Chairman and CEO of Corticeira Amorim (Portugal)

Eduardo Chadwick,
CEO Viña Errázuriz (Chile)

Questions to...

Jose Luis Benitez,
CEO FEV (Spanish Federation of Wine)

DEBATE
Who are the winners of climate change? Where are the new Eldorados?

Questions to...

Pedro Ferrer,
Vice-president and CEO of Freixenet (Spain)

Bruno Kessler,
Group chief winemaker, In Vivo Group

Éric Giraud-Héraud,
Economist, Institute of Vine & Wine Science, University of Bordeaux (ISVV)