



CLIMATE CHANGE How the Bordeaux vineyards are planning ahead

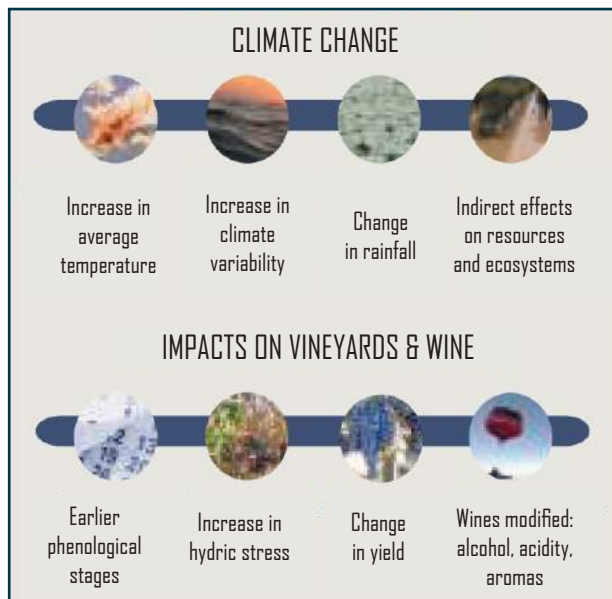


The quality of a wine is particularly dependent on the climate and the environment regarding the notions of vintage and the importance of terroir. In the Bordeaux region, as in other French regions, winegrowers have already observed certain effects of climate change:

- Increase in average temperatures with a continued, pronounced vintage effect.
- Shorter vine growing cycle
- Earlier ripening and harvesting (approx. 20 days over the past 30 years)

Although the effects are currently still favourable for the quality of Bordeaux wines, the perspective of seeing the temperature rise 1° or 2°C will have a substantial impact on their profiles.

Fortunately, Bordeaux wines have several strategies for adapting: oenological and agricultural practices, as well as plant material adaptation. However, the Bordeaux region is already innovating and making sure to plan ahead in order to continue offering consumers aromatic, balanced wines of quality.



Focus on 3 efforts in the Bordeaux vineyards

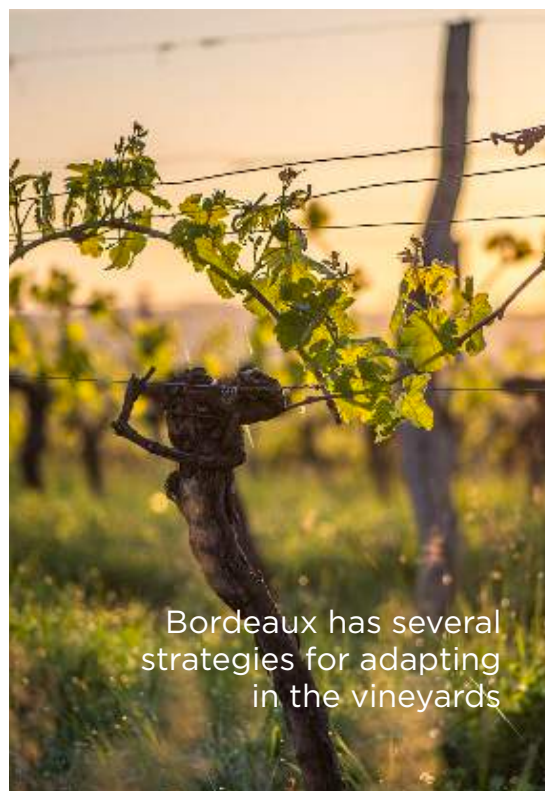
- Adapting
- Planning ahead
- Reducing

TODAY

Adapting practices

The strategies for adapting come into play for every vintage or at the time of each planting:

- Delay pruning date
- Increase vine trunk height to reduce leaf area
- Limit leaf thinning to protect grapes from sun
- Choose later-ripening varieties and rootstocks that are more resistant to water stress
- Rethink plot sites
- Adapt harvesting date and harvest at night
- Reduce plant density



Adapting plant material

The choice of plant material involves the production tool for several decades. That choice, which is strictly regulated, is a result of analysing several criteria in a changing context (climate change, input reduction, grape variety creation and diversification, market expectations) and with respect for wine typicity.

As an example, Merlot, the grape variety emblematic of Bordeaux wine (66% of vineyards in red varieties), currently reaches optimal ripeness, making it possible to produce very great wines. However, in the face of rising temperatures, the early-ripening variety may miss its ideal window of ripeness in the years to come.

A catalogue of grape varieties allowed within AOC

In the Bordeaux wine region, AOC specifications now authorise 6 dark grape varieties* and up to 8 white varieties**. Winegrowers must therefore refer to a catalogue of varieties with different growth cycles and ripening periods spread over time.

Consequently, since the Bordeaux region produces blended wines, winegrowers can diversify their plantings of varieties to subtly lessen the effects of climate change.

The comeback of ancient varieties

Bordeaux winegrowers can now draw on the diversity of these ancient grape varieties, some of which had been gradually forgotten. As both knowledge and the climate undergo changes, some of the varieties that were previously harder to handle are making a comeback in the vineyards. The most emblematic one is Petit Verdot. This late-ripening dark grape variety is making the most of global warming. In 2000, it was planted on 375 hectares, and in 2018, on 1093 hectares, i.e. +191%. In blends, it offers a final, slightly tannic touch to the violet and liquorice notes.



*6 dark varieties: Cabernet Sauvignon, Cabernet franc, Merlot, Malbec, Carmenère, Petit Verdot

**8 white varieties: Sémillon, Sauvignon, Sauvignon gris, Muscadelle, Colombard, Ugni blanc, Merlot blanc, Mauzac

JUNE 2019

Bordeaux: the first French vineyard to introduce new grape varieties 'of interest for adapting to climate change' into its AOC specifications

On June 28, 2019, the union of Bordeaux AOC & Bordeaux Supérieur winemakers held a General Assembly and unanimously approved a list of new grape varieties 'of interest for adapting' to climate change.

The reform is a result of the winemakers' collective determination to integrate eco-friendly measures into their specifications. Bordeaux AOC & Bordeaux Supérieur wines were consequently among the first to include agri-environmental measures, officially adopted (November 2018) by the INAO*, the French wines of origin quality oversight body, and published in the official journal on May 9, 2019.

Experimenting with these new varieties on the scale of an AOC will allow

- winegrowers, from an individual standpoint, to test the new varieties while continuing to produce AOC wines
- and from a collective standpoint, to comprehend the changes, in particular climate-related ones, on a large vineyard area, leading to an informed opinion about the possible mid- and long-term developments.

The seven varieties*:

4 dark varieties: Arinarnoa, Castets, Marselan, Touriga Nacional

3 white varieties: Alvarinho, Lillorila, Petit Manseng

*list subject to final validation by INAO in upcoming months

On July 2, 2019, the Union of Entre-deux-Mers winemakers also introduced these three white grape varieties into its specifications.

How to use these grape varieties of interest for adapting to climate change

Which grape varieties?

- Non-emblematic grape varieties from other winegrowing regions (ex. Syrah, Pinot noir, Chardonnay, etc.)
- Grape varieties already listed in the Official Catalogue of Vine Varieties
- Mixed and Vitis vinifera crossings (between grape varieties of the same species, such as between Merlot and Cabernet). To date, there is a ban on hybrid varieties in European regulations.
- Dark and white varieties

Terms of use

- These varieties 'of interest for adapting to climate change' are listed in the specifications as secondary varieties and are limited to 5% of the planted vineyard area;
- They cannot account for more than 10% of the final blend of any given colour. In accordance with the legal regulations for labelling, indicating these varieties on the product label is not authorised.
- The implementation of this process is subject to a three-party agreement signed by the INAO, the Union and the producer for a 10-year period, renewable once.

The first plots planted with the new varieties are expected in the 2020/2021 season.



*INAO: French Institute of Origin and Quality

Portrait of 7 varieties of interest for adapting to climate change introduced into AOC specifications

The dark varieties

Arinarnoa

Bred by INRA in 1956

The result of a cross between Tannat and Cabernet Sauvignon, Arinarnoa is known for its steady production. It is resistant to grey rot. It adapts well to climate changes, producing low sugar levels and good acidity. Wines are well-structured, colourful and tannic with complex, persistent aromas.

Castets

Origin: Southwestern France, possibly in Gironde

This historical and long-forgotten Bordeaux grape variety is less susceptible to grey rot, oidium and especially powdery mildew, hence its indisputable environmental interest.

Wines are colourful and suitable for ageing.

Marselan

Origin: INRA 1961

A cross between Cabernet Sauvignon and Grenache, this late-ripening variety is at lower risk of suffering from spring frost and follows a conventional pattern with respect to harvesting dates for the

Bordeaux vineyards. It is adapted to climate changes and has proven to be less susceptible to grey rot, oidium and mites. Wines are high quality, colourful, distinctive, and suitable for ageing.

Touriga Nacional

Origin : Portugal

A very late-ripening variety, Touriga Nacional is less at risk of suffering from spring frost, allowing later harvesting and adapts to climate changes. It is not particularly susceptible to most fungal diseases, except for grapevine dead arm. Wines are of excellent quality, complex, aromatic, full-bodied, structured, colourful and suitable for ageing.



The white varieties

Alvarinho

The pronounced aromatic qualities of the Alvarinho grape variety can be used to make up for the loss of flavour usually caused by hot weather. Its ability to adapt to climatic events makes it less susceptible to grey rot.

Its average potential in sugar provides subtle, aromatic wines with good acidity.

Liliorila

Like Alvarinho, the pronounced aromatic qualities of Liliorila can be used to make up for the loss of flavour usually caused by hot weather. A cross between Baroque and Chardonnay, it is less

susceptible to grey rot. Wines are flowery, powerful and aromatic.

Petit Manseng

Origin: Pyrénées-Atlantique

This late-ripening variety is very resistant to grey rot. It has been recognized for its aromatic qualities, allowing the natural elaboration of sweet white wines of high quality with nicely-sustained aromas.

TOMORROW

Planning ahead through research

Research work was first funded by the CIVB in 2003 and the first thesis on climatology in the Bordeaux vineyards presented in 2007. Since then, climate change has been an underlying theme in the CIVB's research priorities. It can be broken down into three areas:

- Climate
- Oenological impacts
- Plant material

In all, nearly €2 million have been invested in research in those areas over the past 10 years.

FOCUS on research related to plant material: VitAdapt and GreffAdapt

*Institute of Vine and Wine Sciences

Conducted by the ISVV*, two projects underway include an in-situ study of the behaviour and ability of the vines to adapt in the face of global warming and within the context of the climate in the Bordeaux vineyards.

VitAdapt: an experimental plot set up in Bordeaux in 2007 and planted with 52 French and foreign varieties (*vitis vinifera*). It is aimed at:

- Measuring possible changes in quantity of grapes over time

- Studying the behaviour of Bordeaux grape varieties in a context of climate change

- Studying the possibilities of adaptation and the qualitative potential of these grape varieties that are poorly known in Bordeaux.

- Recording and archiving observation data regarding these grape varieties

- Establishing a chronology of ripening «earliness» for several of these grape varieties and quantifying their physiological response to drought.

To find out more, click here (video with English subtitles) <https://bit.ly/2RxSBL9>



Plot 52, examples of varieties planted: Castets, Marselan, Arinarnoa, Saint-Macaire and Fer servadou, for reds; Petit Manseng and Lillorila, for whites

The 7 grape varieties introduced into the Bordeaux AOC & Bordeaux Supérieur specifications are being experimented on this plot.



Bordeaux has been investing in research for over 10 years

GreffAdapt : Experimental plot of 55 rootstock genotypes including 30 authorised in France and 25 foreign ones. All 55 rootstocks were grafted with 5 emblematic varieties from French vineyards (Cabernet Sauvignon, Grenache, Pinot noir, Syrah and Ugni blanc). The aim is to determine the agronomical qualities of the rootstocks, and in particular how they adapt to water stress.

To find out more, click here (video in French) <https://bit.ly/2QmuQkD>

Other examples

> **HEATBERRY** (INRA, Bordeaux University)

Impact of climate change on the phenology and quality of Bordeaux wines, with reproduction of a warmer climate using solar panels

> **MESOClimat du Libournaise** (INRA, Bordeaux Science Agro)

Impact of local climate on a limited geographic area with a network of sensors. The differences observed (2°C on yearly average) demonstrate that the choice of plot location (orientation, altitude, etc.) is an important parameter for adaptation.

> **NEWVINE** (IFV, INRA Colmar, INRA Bordeaux)

Programme whose priority is to create new varieties with Bordeaux typicity and resistant to the main fungal diseases (powdery mildew and oidium) but integrating the required adaptation to climate change.

TODAY

Climate Plan for Bordeaux wines

In 2008, the Bordeaux wine industry assessed its Carbon Footprint for the first time.

= 840 000 tons CO₂eq.

with 3 main emitters

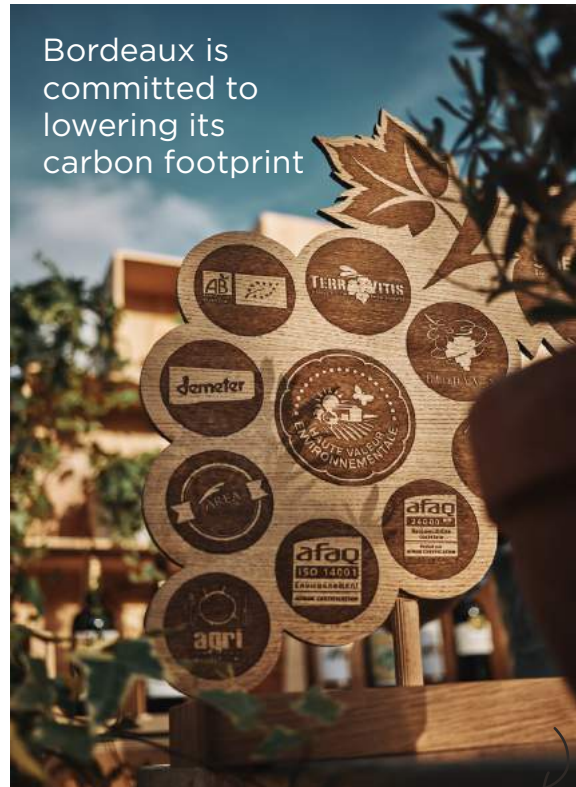
- 36% = incoming materials (plastic, glass, oenological products, etc.)
- 20.5% = freight (road, sea, etc.)
- 13.2% = energy

Based on these findings, the wine industry committed to reducing its greenhouse gas emissions (GHG) via **the Climate Plan 2020 for Bordeaux wines.**

In 2013, a new carbon footprint assessment measured the initial efforts.

= 770,000 tons CO₂eq.

i.e. a 9% decrease in the wine trade's footprint over 5 years, despite substantial export activity and numerous energy-consuming investments, focused on quality.



Bordeaux is committed to lowering its carbon footprint

Climate Plan 2020

- 20% overall reduction of greenhouse gas emissions
- 20% energy conservation
- +20% creation of renewable energy
- 20% water conservation

In 2016, to accelerate the initiative, all the stakeholders* were involved. After identifying exemplary hands-on practices, the Climate Plan 2020 roadmap was spread to the entire wine trade. Priority actions were selected and described in recommendations for concrete action to be implemented in the field. Examples: • Generalise use of lighter-weight glass bottles for equivalent range • Expand composting of vine shoots and effluents • Develop actions of shared waste collection and recycling • Encourage rainwater collection

Since 2017, 15 recommandations for action have been sent out to the entire wine trade.

The recommandations provide concrete descriptions of an action, its strengths and the means required for implementation (means, partner organisation contacts, etc.)

COMMENT RÉDUIRE MA CONSOMMATION EN GASOIL ET MES ÉMISSIONS DE GES ?

Je fais appel aux CUMA pour mutualiser le matériel

POURQUOI ?

- BÉNÉFICE ÉCONOMIQUE** : Faire appel aux CUMA signifie pouvoir bénéficier de divers matériels et du partage d'expérience entre adhérents. La mutualisation des consommations, actions et services contribue à réduire votre impact sur l'environnement et vos investissements financiers, individuels et collectifs.
- BÉNÉFICE ENVIRONNEMENTAL** : Aujourd'hui 40% des acteurs ont recours aux CUMA, ce qui permet la diminution des consommations des agents, du matériel et de l'entretien (CST) de qualité.
- BÉNÉFICE SOCIÉTAL** : Mutualiser les équipements permet de réduire les coûts de maintenance et d'achat de nouveaux matériels.

COMMENT ?

Mes besoins concernent la viticulture, la viti-vinification, le gestion des effluents, les services disponibles en CUMA sont :

1. Identifier mes besoins en matériel, de façon anticipée
2. Je consulte le CUMA et vérifie la disponibilité de l'équipement ou le moyen agricole de la CUMA que j'utiliserais
3. J'adhère à la CUMA et j'utilise le matériel
4. Je partage mon retour d'expérience sur l'adhésion, la disponibilité, l'usage, les facilités de partage, les factures de matériel, etc.

In 2019, an online tool to measure performance was created

(accessible only by wine trade professionals). In just clicks, winegrowers and négociants can:

- assess their emissions
- compare themselves to the rest of the wine trade in terms of greenhouse gases, water & energy consumption, and renewable energy generation
- create graphs
- get involved in actions to reduce emissions

OBJECTIF PERFORMANCE CLIMAT





ANNEX

Bordeaux Vineyards in figures

- Top employer in Gironde
- Over 55,000 direct and indirect jobs

5,800 winegrowers (harvesting AOC wines)

- Mainly, family-run estates (56% individual growers)
- Average size of estates: 19.1 hectares
- Approx. 5% of the vineyards surface are devoted to *crus classés*.

300 *maisons de négoce*

- Over 2/3 of Bordeaux wines sold
- In over 170 countries

29 wine cooperatives and 3 unions

- 38% of harvests in AOC
- 1/4 of the Bordeaux wine production

72 brokers

111,400 hectares of vineyards

- A mild ocean climate, crossed by the 45th parallel and bathed by the Atlantic Ocean
- 4 out of 5 agricultural operations in Gironde have vineyards.
- 3/4 of Gironde's agricultural production in value
- 1/4 of the surface area in French AOC wines

65 AOC

Appellations d'Origine Contrôlée

- 5.1 million hectolitres produced on average, i.e. the equivalent of 680 million bottles

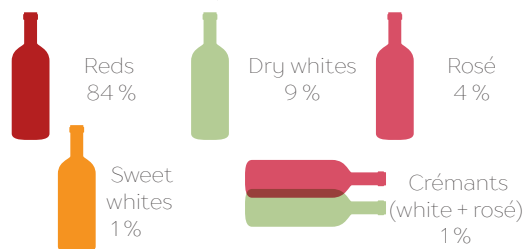
- A range of grape varieties (2018 data)
- 89% of grape varieties for reds:

* 66% Merlot / 22% Cabernet Sauvignon / 9% Cabernet Franc / 3% other varieties

–11% of grape varieties for whites: 46% Sémillon / 46% Sauvignon / 5% Muscadelle / 3% other varieties

- Production in all colours

(VOLUMES PRODUCED IN 2018 IN %)



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