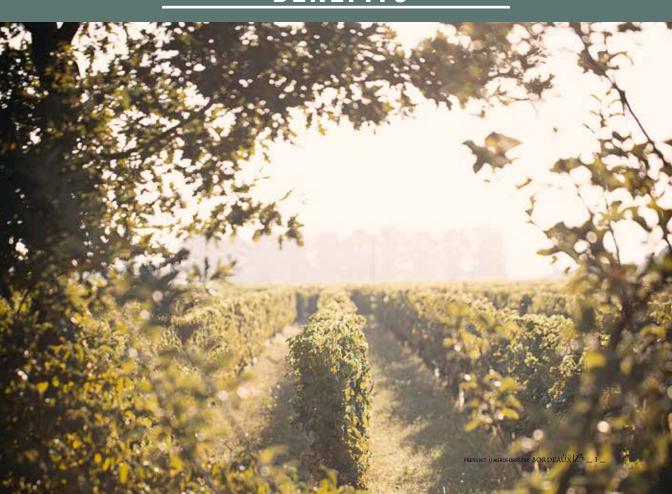
AGROFORESTRY IN THE BORDEAUX VINEYARD AND ITS AGRO-ENVIRONMENTAL BENEFITS



CONTENTS

REDEPLOYMENT OF DIVERSITY IN THE BORDEAUX VINEYARD 3

ADVANTAGES 7

FEARS 11

PORTRAITS

EMBLEMATIC ACTIONS 13



:hâteau Brown _Pessac-Léognan



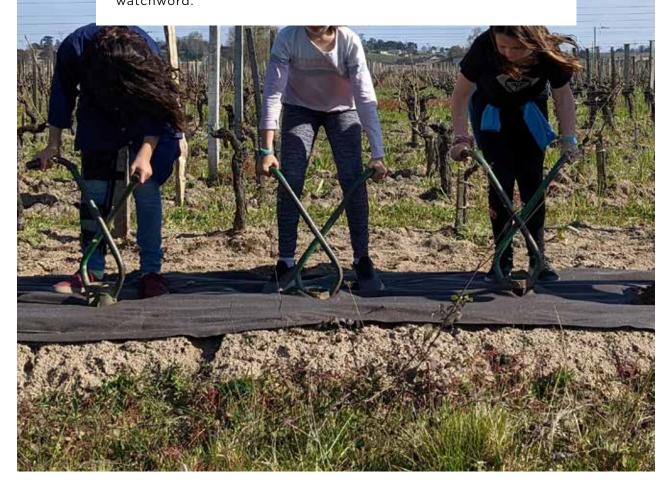
AN AGROFORESTRY
PROJECT CONSISTS
IN CREATING
AN ECOLOGICAL
CORRIDOR BY
PLANTING TREES AND
SHRUBS.

Trees can be planted:

- in the plot: in the row in place of a vine or lined up between the rows.
- around plots: arranged as hedges, in islands or in isolation.

PLANTING TREES AND Agroforestry is often also associated with orchards and vegetable gardens, plant sowing, the presence of animals (especially agropastoralism with sheep) and beehives.

The species planted are local! There is a wide range of field and fruit species to choose from (vineyard peach and cherry trees in particular). While winegrowers usually used to plant a line of trees of the same species, diversity is now more often the watchword.



REDEPLOYMENT IN THE BORDEAUX VINEYARD

REGENERATIVE AGRICULTURE

Agroforestry, based on cooperation between vines and trees, is an essential foundation of agroecology (farming practices based on cooperation with and respect for nature, while incorporating social and economic dimensions).

It contributes to regenerative agriculture in which the health of the soil plays an essential role in the ecosystem: a restored, healthy, fertile and living soil to produce quality grapes.

Beyond its agronomic advantages, the tree-vine model meets many societal demands.

In the 1960s and 1970s, increasing specialisation in viticulture (with the abandonment of mixed farming) and mechanisation of vineyard work (tractors and agricultural machinery between the rows of vines) often led to the

THE PRESENCE OF TREES IN THE VINEYARDS IS AN ANCIENT PRACTICE:

- high training (from Antiquity): the trees served as stakes for the vines
- "joualles": plots planted with both vines and fruit trees and sufficient space between the rows to allow vegetables and cereals to be grown.

Trees and shrubs were also of practical use to the winegrower: wicker to tie the vines, chestnut or acacia to make stakes and poles.

disappearance of these crop combinations. As knowledge has progressed, monoculture has shown its limitations.

Today, increased awareness is leading the Bordeaux vineyard to act in a different way: Bordeaux is blending and merging into a global ecosystem. The redeployment of trees and hedges in the vineyard is under way.

Replanting trees on a vineyard or farm seems like common sense, but agroforestry remains an innovation that has still not been fully explored.

To go further: IFV - Agroforestry and viticulture www.vignevin.com/wp-content/uploads/2019/03/1811 ESOPE IFV Brochure Agroforesterie web100 DPI VF-1. pdf

INRAE - Vitiforest - https://hal.inrae.fr/hal03209987/document



ADVANTAGES

OF AGROFORESTRY IN THE BORDEAUX VINEYARD

AGROFORESTRY REQUIRES THE WINEGROWER TO ADOPT A LONG-TERM VISION AND PRACTICES. THE TREE PRODUCES, PROTECTS AND LANDSCAPES.



#Vignobles Bardet_Saint-Emilion grand cru
#Agro-pastoralism in Bordeaux

TREES PLAY A PROTECTIVE ROLE FOR INTERCROPS AND ANIMALS: WINDBREAK EFFECT, SHELTER FROM THE SUN AND RAIN, SOIL FIXATION, STIMULATION OF SOIL MICROFAUNA AND MICROFLORA, AUXILIARY FAUNA.

ARBRES ET PAYSAGE EN GIRONDE ASSOCIATION

REDUCED DRIFT OF CROP SPRAYS

CONTRIBUTION TO THE DEVELOPMENT AND BEAUTY OF THE LANDSCAPE

CLIMATE MITIGATION

CONTRIBUTION
TO A BETTER
AGRONOMIC
ECOSYSTEM

GROWTH OF BIODIVERSITY

A LINK WITH THE LOCAL POPULATION

ADDITIONAL INCOME FOR THE WINEGROWER

GROWTH OF BIODIVERSITY

A range of local tree species, with different flowering and fruiting times, promotes the development of biodiversity. These new vegetation layers provide *shelter and cover* for insects, spiders, bees, birds, reptiles and small fauna, including bats, which are beneficial for the control of vineyard pests. Many R&D projects are under way to measure the impact of agroforestry on populations of beneficial organisms and those that are harmful to the vine (pests). By encouraging the development of microorganisms, trees also contribute to soil quality (fertility, sustainability and resilience).

CLIMATE MITIGATION CARBON SEQUESTRATION

By sequestering carbon, trees contribute to reducing the impact of climate change.

99% of the tree's solid matter comes from atmospheric CO2: trees are excellent carbon sinks.

For example, a mature ash tree sequesters about 3kg of CO2 each year.

Source: ASSOCIATION FRANCAISE d'AGROFORESTERIE

CREATION OF A MICRO-CLIMATE

Trees create a particularly favourable micro-climate (particularly beneficial in the summer, with the increasing frequency of heatwaves). They regulate heat variations throughout the year, limiting the drop in temperature when it is windy and cold and reducing the temperature in hot weather through the shade and humidity they create.

A LINK WITH THE LOCAL POPULATION

Tree planting is also carried out in partnership with local associations in the form of citizen initiatives as a way of bringing together local communities (winegrowers, employees, local residents).

The Gironde verte programme, created by the CIVB in 1992 and supported by the French Ministry of Education, is a local winesector educational initiative aimed at teachers and their pupils. Kits (students' notebooks, field trips, etc.) are provided to raise children's awareness of agroforestry and their knowledge of biodiversity and the life of the soil on a wine estate.

www.gironde-verte.com

"Since the early 2000s, teachers, researchers and students from Bordeaux Sciences Agro have helped us to understand the principles of 'soil selffertility'. On recently acquired plots, we no longer use fertiliser or compost, only fresh organic matter."

VIGNOBLES BARDET
Philippe and Alice Bardet in VIGNONET

CONTRIBUTION TO A BETTER AGRONOMIC ECOSYSTEM

- Trees, especially their dead leaves in autumn, are a source of organic matter (nutrients).
- The tree's roots decompact the soil.
- Trees promote mycorrhizal association, contributing to plant nutrition and growth.

ADDITIONAL INCOME

Trees can be a complementary economic resource (fruit for some species, timber, fuelwood, soil mulching using ground branches).

REDUCED DRIFT OF CROP SPRAYS

Creating hedges between vineyard plots and houses forms an effective physical barrier.

CONTRIBUTION TO DEVELOPMENT AND BEAUTY OF THE LANDSCAPE

The presence of trees embellishes the landscape enjoyed by local residents, winegrowers and wine tourists.



We want to demonstrate and promote viticulture that is committed to the benefits of a healthy vineyard, biodiversity, landscape restructuring and positive societal impact.

DOMAINE EMILE GRELIER Benoît VINET in Lapouyade



#Château Brown _ Pessac-Léognan

AND THE IMPACT ON THE WINE?

Many winegrowers mention an "added freshness" in the wine from plots where agroforestry is practised. So far, few studies have been carried out in this area. VITI FOREST, a study led by INRAE (the French Research Institute for Agriculture, Food and the Environment), tends to confirm this impression. The study shows that "the vines that were exposed to the lowest maximum temperatures during the period from flowering to harvest coincide with the highest yields in the plot and the highest acidities. This relatively higher acidity seems to be linked to high concentrations of malic acid, indicating more gradual ripening." These higher acidities could thus explain this perception of freshness. These are initial results that need to be confirmed by other scientific work currently in progress. But in the face of climate change, agroforestry remains an interesting option for slowing down early ripening of the grapes and thus favouring their aromatic maturity.



THE FEARS

SURROUNDING AGROFORESTRY

AGROFORESTRY REMAINS AN INNOVATION THAT HAS STILL NOT BEEN FULLY EXPLORED. EXPERIENCE IN THE FIELD AND SCIENCE ARE GRADUALLY HELPING US TO UNDERSTAND THE RISKS AND THE MISTAKES TO BE AVOIDED.

LIGHT

Trees can be pruned or trimmed to reduce shade and leaf-surface wetness, as this humidity may encourage fungal diseases.

ADDITIONAL COSTS?

- o Financial investment:
- purchase of plants (1 sapling costs between €15 and €20 depending on the size and species);
- work by external service providers for upkeep or specific arboricultural work;
- purchase of suitable agricultural equipment;
- o Acquisition of knowledge, skills and knowhow on tree and shrub management.
- o Changes in practice and technical procedures that may require staff training.

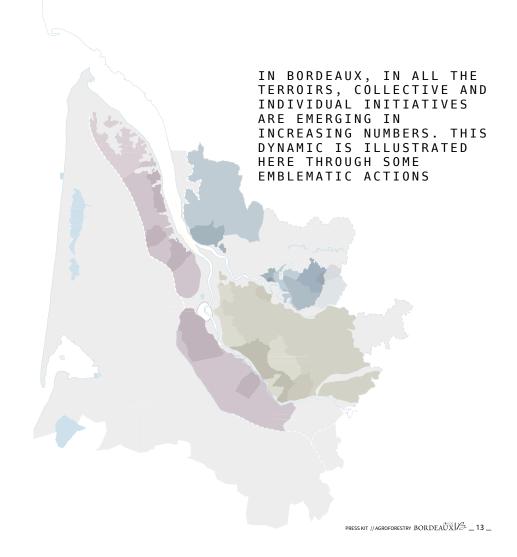


#Château d'Esther_Bordeaux Supérieur

ILLUSTRATIONS THROUGH SOME

PLAYERS COMMITTED

TO THE DEPLOYMENT OF AGROFORESTRY



ENCOURAGING THE PLANTING OF HEDGES AND TREES IN VINEYARD PLOTS WITH **ARBRES ET PAYSAGE EN GIRONDE**

This association works to promote the hedgerow and its reintroduction into farming systems. In partnership with Bordeaux Wine professional bodies, the Nouvelle-Aquitaine region, the Gironde department, Bordeaux Métropole and Bordeaux winegrowers, the association carries out 5 actions:

1. DIAGNOSIS OF WINE ESTATES

Studies and advice to winegrowers on the planting of hedges at the edge of plots: selection of plants, mulching, protection of plantations, etc.

2. PLANTING HEDGES ALONG DITCHES

Each year, the association enables the planting of 35,000 plants in the Gironde, 20,000 of them on wine estates, i.e. approximately 20 linear kilometres of hedge per year.

3. MAPPING HEDGES IN THE GIRONDE REGION Using the Bordeaux wines G/S, a collective vineyard mapping tool, it will be possible to locate ecological corridors, which will help to optimise future planting.

4. THE SEARCH FOR SEED COLLECTION SITES

Seed collection takes place in the autumn, throughout the region. For the moment, 54% of the plants delivered are of local origin from these seed collections (i.e. 26 different *local species*). Prospecting for collection sites is being stepped up, to increase the number of species offered while ensuring the local origin of the species planted.

5. ENVIRONMENTAL STUDIES FOR BETTER DITCH MANAGEMENT

Like hedges, watercourses, ditches, streams, marshes, etc., all structure the landscape and can contribute

to water quality. The association supports winegrowers in the management of these ditches.





BIG NATURE 2,000 TREES ALREADY PLANTED IN THE GIRONDE

Since 2022, the "BIG Ensemble" association has been running a tree planting programme in the Bordeaux vineyards called BIG Nature, in collaboration with agroforestry professionals.

BIG ENSEMBLE is a local collective convinced that the only way to live together better will be through large-scale mobilisation of citizens, in connection with regional players.

This collective focuses on simple objectives: working together, thinking big, building on successful experience and focusing its actions in the regions at a human scale.

The association relied on the help of several players* to set up "collaborative" plantings of an average of 500 trees over half a day. These plantations are carried out with the help of groups of young

Target: to plant 100,000 trees in the Gironde by 2023, 300,000 by 2024.

people from local associations (Jeunes Cap Solidaires, Burdigala) or from neighbouring schools (high schools or activity centres) and also students.

For this first planting season, 4 wine estates are involved: Château Haut-Rian (Rions), Château La Peyruche and Château Laurétan (Langoiran) and Clos Floridène (Pujols).

These initiatives are financed 50% by the property and 50% by grants or private funding collected by AFAF* or the BIG association.

* Communauté de Communes Convergence Garonne, Syndicat des vins Cadillac Côtes de Bordeaux, Arbres et Paysages 33, Association Française d'Agroforesterie - AFAF.





#bordeauxfamilies

BORDEAUX FAMILIES

Cooperative cellar



COMMUNE:

Sauveterre-de-Guyenne VINEYARD AREA: 5,000 hectares

"We are working to create a landscape favourable to biodiversity by creating corridors for wildlife, planting melliferous species for bees, managing ditches with vegetation, limiting soilerosionandattracting beneficial organisms for the vine. We want to contribute to restoring environmental balance and improving our vineyard landscapes." Philippe Cazaux, president of the co-op

708 TREES PLANTED IN 2020 AND 2021

SPECIES: Hawthorn, hornbeam, medlar, quince, dogwood, apple, hazel, field maple, ash, walnut, willow, spindle, blackthorn

AND ALSO... 15 beehives

www.bordeauxfamilies.fr

"We have transformed the landscape and encouraged the return of biodiversity to the vineyard. We still have ideas for more vertical integration! Shaping a new landscape is a fine mark to leave behind."

Jean-Baptiste Cordonnier, winegrower

CHÂTEAU ANTHONIC

commune: Moulis-en-Médoc aoc: Moulis-en-Médoc vineyard area: 28 hectares

BETWEEN 400 AND 500 TREES IN THE PLOTS SINCE

2010 AND 3 KM OF HEDGES

SPECIES: around twenty local species

www.chateauanthonic.com







#chateau_anthonic



CHÂTEAU BROWN



COMMUNE: Léognan AOC: Pessac-Léognan VINEYARD AREA: 31 hectares

"We have 7 hectares of woodland on the estate, most of it planted with hundred-year-old oak trees, yet they are on very good terroir. I've never even questioned it, it's obvious to me that these trees should be kept, protected and certainly not cut down to plant vines. The oaks are there, and they will remain there for many years to come."

Jean-Christophe Mau, director





"Château Carsin is not just a wine estate, it is a farm. Healthy biodiversity is at the heart of our

business and as a winegrower, I look after the vines and the cellars. but every weekend I spend my time in my vegetable garden and with my animals. In creating richer biodiversity, there are no problems or negative points, even the small

Nea Berglund, winegrower

steps count."

400 FRUIT TREES PLANTED AND 3 KM OF HEDGES SINCE 2009

SPECIES: hawthorn, holm oak, mock privet, medlar, myrobolan plum, field maple, arbutus, European spindle, hazel, etc.

AND ALSO ... a hen house and 4 beehives, bat shelters and nesting boxes for tits

www.chateau-brown.com





#chateaucarsin

CHÂTEAU CARSIN



COMMUNE: Rions AGC: Bordeaux Blanc, Cadillac Côtes de Bordeaux, Cadillac VINEYARD AREA: 18 hectares

MORE THAN A HUNDRED TREES PLANTED

SPECIES: apples, pears, blackcurrants, blueberries, cherries, walnuts, hazelnuts, apricots, peaches, lemons, plums. AND ALSO ... a hen house, a draught horse, a pony and a beehive www.carsin.com

CHÂTEAU CRABITEY



VIGNOBLES DE BUTLER

COMMUNE: Portets
ACC: Graves
VINEYARD AREA: 40 hectares

900 TREES PLANTED SINCE 2017 AND 900 METRES OF HEDGES

SPECIES: hornbeam, hawthorn, medlar, dogwood, blackthorn, European spindle, field maple

www.instagram.com/chateau.crabitey/



"We are committed to preserving and encouraging the development of biodiversity on the estate. We want to create more ecological corridors, and in particular a green belt around the estate. We are going to continue and persevere in working towards greater ecological diversity, in particular by developing an orchard, located very close to the beehives installed by a partner beekeeper."

Arnaud de Butler, winegrower



CHÂTEAU

D'ARCHE



COMMUNE: Sauternes
AOC: Sauternes
VINEYARD AREA: 72 hectares

2011 TREES PLANTED IN 2021 AND 2.11 KM OF HEDGES

SPECIES PLANTED: Crab apple, medlar, arbutus, field maple, hornbeam, dogwood, broom, common juniper, European spindle, hawthorn

www.chateau-arche.fr

"The Château wants to maximise biodiversity to create an ecological networkwithinthevineyard plots that contributes to the movement of species. The diversity of species planted will encourage various beneficial organisms, useful in controlling vine pests and contributing to the preservation of the landscape."

#chateau.crabitey

CHÂTEAU DES ANNEREAUX

4B

COMMUNE: Lalande-de-Pomerol AOC: Lalande-de-Pomerol and Bordeaux

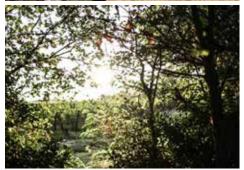
VINEYARD AREA: 25 hectares

2,400 PLANTS, MORE THAN 100 TREES **HEDGE LENGTH: 2,286 METRES**

SPECIES PLANTED: fruit trees (apples, pears, almonds, figs, etc.), medlar, hawthorn, dogwood, etc. AND ALSO ... 765 metres of wild hedges, 60 nesting boxes for bats and tits, 5 beehives, photovoltaic panels

"Organic farming is a step in the right direction, but we need to go beyond that. The monoculture vineyard cannot be an end in itself. To find the perfect balance, it must be supported by an ecosystem in which biodiversity is encouraged." Benjamin Hessel,

winegrower



CHÂTEAU 4 demotor

annereaux.com





HAUT-BAGES LIBÉRAL

COMMUNE: Pauillac AOC: Pauillac and Haut-Médoc VINEYARD AREA: 30 hectares

200 TREES

SPECIES PLANTED: peach, cherry, wild cherry. walnut, Caucasian zelkova, hornbeam, field maple, etc. AND ALSO... 1,000 metres of hedges

"With agroforestry, combined with plant cover and the application of biodynamic preparations, we hope to return to a less monotonous form of cultivation, an improvement in the life of the soil, more earthworms, better water management, the return of more varied fauna, and even more well-balanced vines, less sensitive to climatic hazards and fungal diseases."

Claire Villars Lurton, winegrower





CHÂTEAU CHÂTEAU CHÂTEAU CHÂTEAU

COMMUNE: Saint-Germain-du-Puch
ADC: Entre-Deux-Mers, Bordeaux and
Bordeaux Supérieur
VINEYARD AREA: 44 hectares

"Last year, we started to build this 1.5 hectare educational trail based on beneficial organisms for the vine, by creating an orchard, recreating a pond and planting 200 trees. We did not cut the grass throughout the summer, to re-attract local wildlife. But it is a lot of work, and we are doing it little by little, with our limited resources. Through this 'garden of curiosities' we want to show visitors to Lestrille the interactions between wildlife, nature, and our job as winegrowers." Estelle Roumage, winegrower.





300 TREES PLANTED - 600 METRES OF HEDGES

AND ALSO... A project inspired by Japan: the planting of a Miyawaki forest (named after the Japanese botanist who defined this concept). The principle of a Miyawaki forest is planting trees at very high density. This leads to competition between the plants, which accelerates the growth and height of the trees. In October 2021, the château took a large number of local plants from the area around the château and planted them in islands around the vineyards.

lestrille.com



"We are committed to future generations, so everything we take from nature for the cultivation of the vineyard we give back in terms of biodiversity. When we work on living farming, we have the satisfaction of working towards the agriculture of the future." Sylvie and Marie Courcelle, winegrowers



COMMUNE: La Sauve AOC: Bordeaux and Côtes de Bordeaux VINEYARD AREA: 50 hectares

1 HECTARE OF TRUFFLE OAKS, A HUNDRED FRUIT TREES AND 300 METRES OF HEDGES

SPECIES: maples, willow, linden, acacia, Korean evodia, varnishtree, Judastree, matrimony vine - snowberry - winter-flowering honeysuckle - mint shrub - Caryopteris - Cornelian cherry - Amorpha fruticosa, etc. AND ALSO... 6 beenives

www.thieuley.com www.marieetsylviecourselle.com

DOMAINE ME ÉMILE GRELIER

COMMUNE: Lapouyade

AOC: Bordeaux Supérieur

VINEYARD AREA: 17 hectares

800 TREES PLANTED WITHIN THE PLOTS SINCE 2008

1.2 KM OF HEDGES

SPECIES: 12 different leafy species and 154 fruit varieties.

 $\begin{tabular}{ll} \textbf{AND ALSO}... Trial plots with potatoes between the rows. \end{tabular}$

Study vineyard within the Vitiforest

programme from 2015 to 2017 (INRAe, IFV, VITINOV, CESBIO, Bordeaux Sciences Agro). And in recent years in the VITICHIRO research programme on the impact of bats on the grapevine moth. domaine-emile-grelier.fr

"We are showing that committed viticulture is beneficial to the well-being of the vine and to biodiversity. It allows for restructuring of the landscape, generates a positive societal impact and contributes to the agriculture of the future. These 10 years practising agroforestryhaveconvinced me of the merits of this system."

Benoit Vinet, winegrower





COMMUNE: Langoiran

AOC: Cadillac Côtes de Bordeaux VINEYARD AREA: 20 hectares

350 TREES PLANTED AND 250 METRES OF HEDGES

SPECIES: Service trees, oaks, white mulberries, apricots, walnuts AND ALSO... 20 beehives, organic vegetable garden of 400 m² and fallow land for honey plants

chateau-lapeyruche.com

"Biodiversity is expressed through the fauna that can be seen on the estate: roe deer, wild boar, pheasants, hares and hedgehogs have returned, and also bats in the quarries. We are deeply convincedthatmonoculture (of any kind) and excessive production are models at the end of their life. More sustainable viticulture is possible, and desirable for the environment (fauna. flora), and above all for the people who live and work in these areas. Achieving this means encouraging a return to the balance of the ecosystems in and around the vineyards."

David Sarry, winegrower





#chateaulapeyruch

DOMAINES CORMEIL FIGEAC MAGNAN







COMMUNE: Saint-Émilion AOC: Saint-Émilion Grand Cru VINEYARD AREA: 25 hectares

AGROFORESTRY PROJECT TO PLANT 5.000 TREES

BY 2026. Pilot vineyard of the Association Française d'Agroforesterie (AFAF) with plantations within and outside plots. Creation of jardin des joualles: cocultivation of vines + market garden produce + fruit trees on 1ha.

- planting of 700 specimens in 2021 to provide 460m of hedges and 1 line of trees within the plot
- -plantingin 2022:1,400 specimens planted to provide 370m² of copse and 6.5 ha of lines of trees within the plot

Planting carried out with schoolchildren in partnership with the association "Des Enfants et des Arbres"

SPECIES: Field species with the *Végétal Local* label and fruit trees: apple, pear, plum, cherry.

www.cormeil-figeac.com

"Planting the trees was driven by our love of nature and trees. Beyond the agronomic and agroecological benefits, this project has united the Cormeil-Figeac team around a long-term project. One of the main sources of satisfaction was creating links and raising awareness among the school children who took part in the planting." Victor Moreaud, winegrower



BORDEAUX B

The women, the men

5,300 winegrowers (AOC growers)

- Mostly family businesses (56% individual operators)
- Average size of properties: 20 hectares

300 wine merchants

• More than 2/3 of Bordeaux wine sales and in more than 170 countries.

29 cooperative cellars and 3 unions

- 39% of AOC growers
- 23% of Bordeaux production

77 brokers

The terroirs

108,000 hectares of vines

The geological diversity of the Bordeaux region is an advantage when creating wines with different characters. To the south, the left bank of the Garonne and Gironde has soils made up of gravel, pebbles and sand from the erosion of the Pyrenees and washed down by the rivers. These are warm soils with good drainage. On the right bank, to the north of the Dordogne, quite humid and well-drained limestone soils dominate. Between the Garonne and the Dordogne, the soils are mostly clay, but also humid and cool.

- the largest Appellation d'Origine Contrôlée vineyard
- 1/4 of the area of French AOC wines
- 3 out of 4 farms in the Gironde have vines.

65 Appellations d'Origine Contrôlée (AOC)

More than 75% of the vineyard area had a certified environmental approach in 2022

vs 35% in 2014 and 55% in 2016









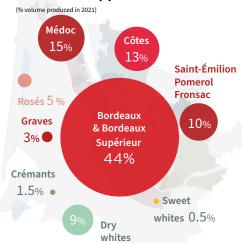




Production

4.7 million hectolitres produced on average, the equivalent of 649 million bottles.

Main families of appellations



Wines of all

colours (volumes produced in 2021 in %)

Red 85% Rosé 4% Dry white 9% Sweet white 1% Crémant 1%



