

Viticulture

The background of the slide is a reproduction of Vincent van Gogh's painting 'The Red Vineyards near Arles'. The painting depicts a vast vineyard with rows of grapevines in various stages of growth, rendered in a rich palette of reds, oranges, and yellows. Several figures are visible working in the fields, and a horse-drawn cart is in the distance. The sky is a bright, textured yellow, suggesting a sunny day. The overall style is characteristic of Impressionism, with visible brushstrokes and a focus on light and color.

Introduction

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The Red Vineyards near Arles- Vincent van Gogh

Viticulture - Introduction

Course content

Lecture	Title
1	Introduction
2	Grape Vine Biology – Physiology
3	Grape Vine growth - rootstocks
4	Canopy management – Pruning
5	Grape Vine Enemies
6	Grape Vine Biochemistry – Chemical composition of grapes
7	Grape varieties
8	Inorganic element requirements - Fertilization
9	Climate effects
10	Soil effects
11	Maturation – Harvest – Wine quality

Viticulture - Introduction

What is Viticulture?

It is the applied branch of Plant Biology and
Agricultural Sciences
with the objective to study the
Grape Vine Biology
&
Cultivation Techniques

Viticulture - Introduction

Historical and production data

- Vine biology
- Botanical classification
- Morphology and anatomy of the vine
- Biochemistry and physiology of the vine

Vine growth and cultivation issues

- Soil-climatic elements and their role in viticulture
- Wine products
- Classification of varieties
- Classification of rootstocks

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Viticulture techniques

- Soil cultivation techniques
- Competitive species control
- Soil fertility management
- Canopy shaping
- Vine irrigation
- Grape vine propagation
- Vineyard installation (training systems)
- Characteristics of grapes suitable for winemaking
- Grape harvesting

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Literature

- **Winkler, A.J., Cook, J.A., Kliewer, W.M., Lider, L.A. GENERAL VITICULTURE. University California Press, Berkeley.**
- **Weaver, R.J. GRAPE GROWING. J. Wiley & sons New York**
- **Jackson, R.S. WINE SCIENCE. Principles and Applications. Academic Press, New York.**
- **Mullins, M.G., Bouquet, A. Williams, L.E. BIOLOGY OF GRAPEVINE. Cambridge University Press.**
- **Galet, P. (2000) GENERAL VITICULTURE. (English version) Oenolluremedia France.**

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Historical data

- One of the oldest crops (6,000 BC)
- Mythology

According to Greek mythology, **Staphylos** was the son of Dionysus and Ariadne. In another myth, Staphylos was a shepherd of the king **Oeneas** of Aetolia. As he was grazing his goats, he noticed that one of them, eating a certain fruit constantly, became fatter than the others. He then gathered several and offered them to his king, who prepared a drink he called "**oenos**" (wine), and gave the fruit the name of his shepherd (Staphylos=grape in Greek).



Viticulture - Introduction

Historical data

The vine of Pausanias

<https://www.exploring-greece.gr/en/show/37032/:ftd/KLIMA-PAFSSANIA#.YjXYEnpBxPY>

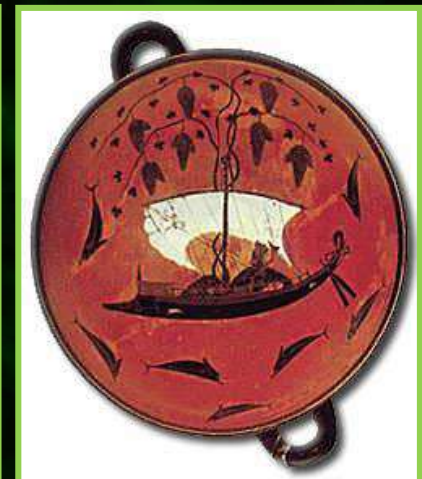
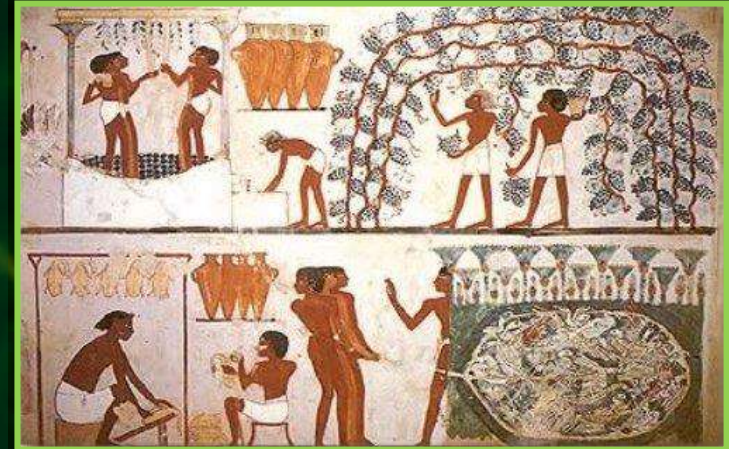


“The Pausanias vine has an age of more than 3,000 years. Its length reaches 100 meters. and has been called a scientific wonder and monument to Nature's beauty. According to legend, it is the spot under which Pausanias sat on his travels from Mantinea. Every month of May it blossoms but it never has any fruit. In his work Arcadia, Pausanias mentions the vine as a curious phenomenon, which means that probably at that time (160 AD) the vine was impressive and very old.”

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Historical data

- **8000 BC. PRECERAMIC PERIOD:**
Emergence of agriculture
- **6000 BC. NEOLITHIC PERIOD:** The first findings of agricultural tools appear in Greece
- **4000-2800 BC.** Systematic cultivation of various species (figs, vine)
- **2000 BC.** The cultivation of vine, wheat, olive, are the main pillars of the Greek economy
- **19TH century.** The accumulated empirical knowledge is transformed into an applied scientific object



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Historical data

- **Paleontology:**

The history of the vine begins in the first half of the Cenozoic era which lasted 70 million years. So the history of the vine goes beyond that of human, who appears in the second half of the Cenozoic era.

- **Older viewpoint:**

The vine first appeared in West Asia, although one can not say with certainty what its place of origin is. Before the time of the great Glacial period (ice age) vineyards existed even in today's polar regions. After the ice age, the vine was limited to areas with a more favorable climate, such as those of Caucasus and Mesopotamia. Thus, according to some researchers, Caucasus, Mesopotamia and Ancient Egypt are the cradles of viticulture and wine.

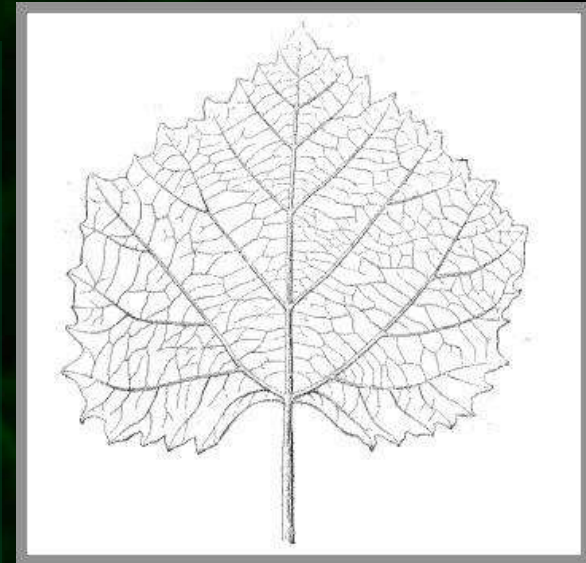
- **Newest opinion:**

Based on fossils dating back 3 million years, Europe is considered to be the place of origin of vine.

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Botanical origin of vine

- Family *Vitaceae*
- The genus *Vitis* appeared 25-5 million years ago
- Most ancient fossil:
Vitis sezannensis (Sezanne, France)



Vitis sezannensis

<https://commons.wikimedia.org/wiki/File:Travertin.JPG>

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Systematic classification of the Vine (taxonomy)

Kingdom	Plantae – plant, plantes, planta, vegetal
Subkingdom	Viridiplantae – green plants
Infrakingdom	Streptophyta – land plants
Superdivision	Embryophyta
Division	Tracheophyta – vascular plants, tracheophytes
Subdivision	Spermatophytina – spermatophytes, seed plants, phanérogames
Class	Magnoliopsida
Superorder	Rosanae
Order	Vitales
Family	Vitaceae – grapes
Genus	Vitis L. – grape
Species	Vitis vinifera L. – wine grape
Variety	Table grapes, Wine grapes, Varieties for special uses, Rootstock varieties



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Vitis vinifera L. (άμπελος η οиноφόρος)

- **Genus *Vitis*:**
 - subgenus *Euvitis* → most *Vitis* species such as *Vitis vinifera* L.
 - subgenus *Muscandinia*

- **Development of hybrids by crossing of 2 or more *Vitis* species:**

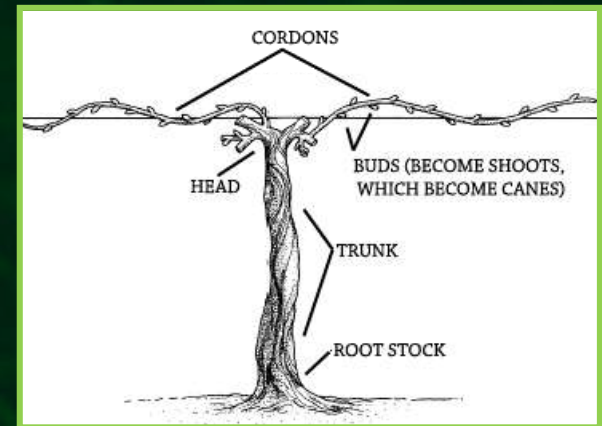
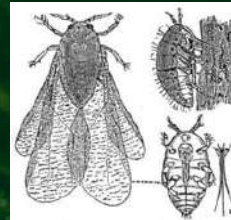
- ✓ Resistant to phylloxera & other diseases

- **Use of other genus rootstocks:**

- ✓ Resistant to phylloxera (American rootstocks)

- ✓ The vine trunks in most cases needs support

- ✓ Adaptation to changing environmental conditions



<https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/vitis>

<https://en.wikipedia.org/wiki/Phylloxera>

<https://www.oiv.int/public/medias/8094/en-oiv-viti-652-2021.pdf>

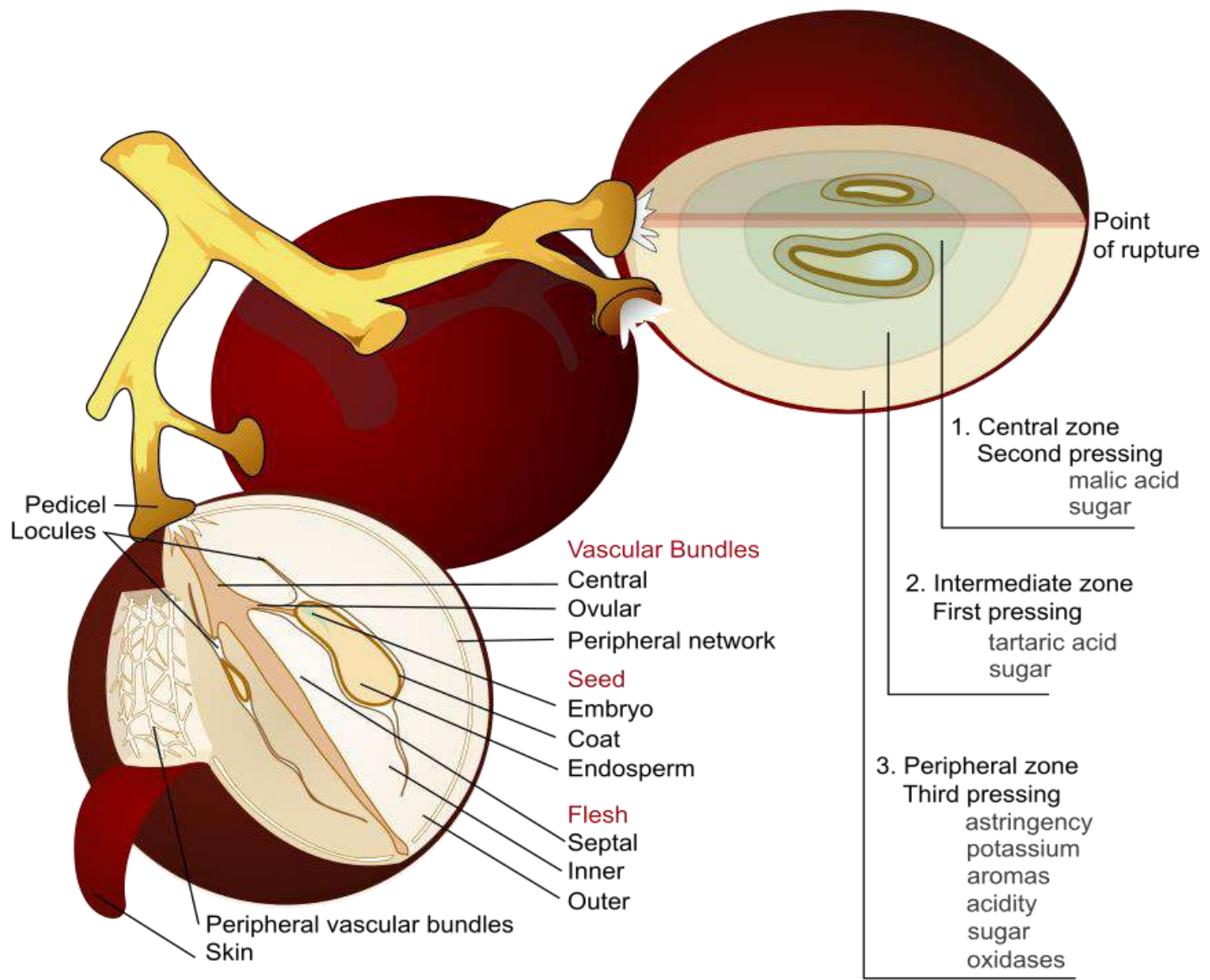
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Grape vine products

- 1. TABLE GRAPES**
- 2. DRIED GRAPES / RAISINS / CURRANTS**
- 3. WINE**
- 4. DISTILLATES/SPIRITS**
- 5. GRAPE JUICE**
- 6. CONCENTRATED MUSTS**
- 7. ACETIC ACID**
- 8. OTHER PRODUCTS**

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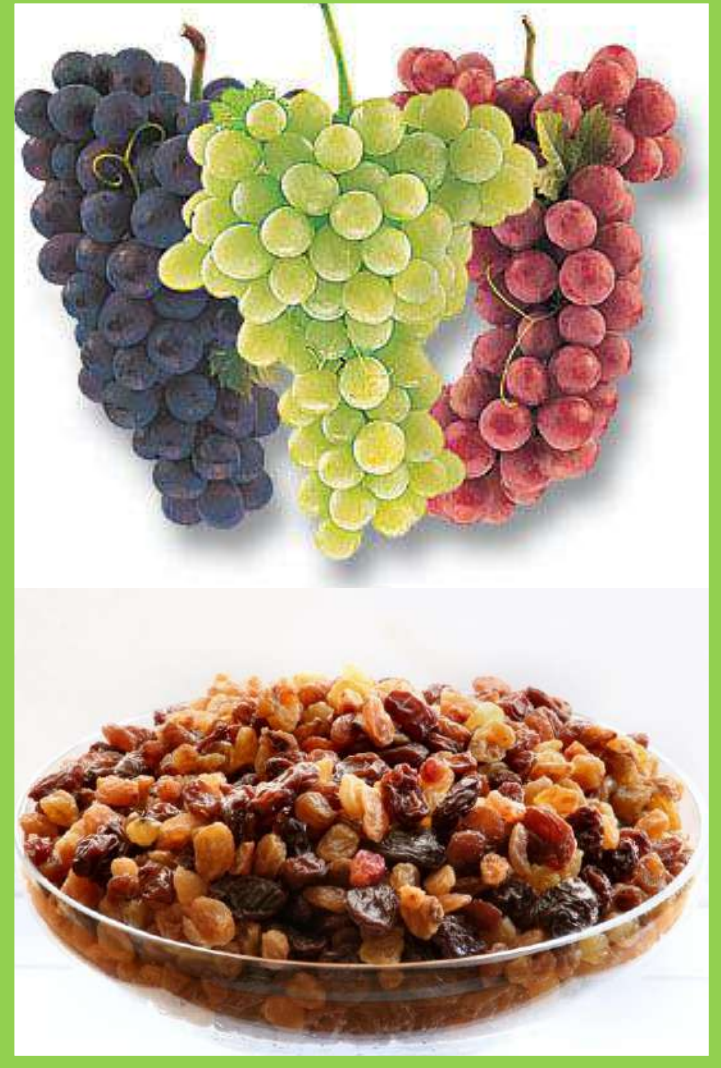
GRAPES: distribution of constituents in the berries



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RAISINS

- Dried grapes with a high content of sugars, with small and unseeded berries
- Energy 334 kcal / 100 g
- Sugars 60-68%
- Produced by natural or artificial drying (sun dried or at industrial drying stations)



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- **WINE**: product of the alcoholic fermentation of grape juice (must)
- **DISTILLATES**: wine distillation products
- **CONCENTRATED MUSTS**: used for the fortification of weak grape musts for winemaking musts
- **ACID ACID/VINEGAR**: a product of the acetous fermentation (microbailly induced oxidation) of wine
- **OTHER PRODUCTS**: tartaric acid, vine leaves, grape seed oil, syrups, etc.



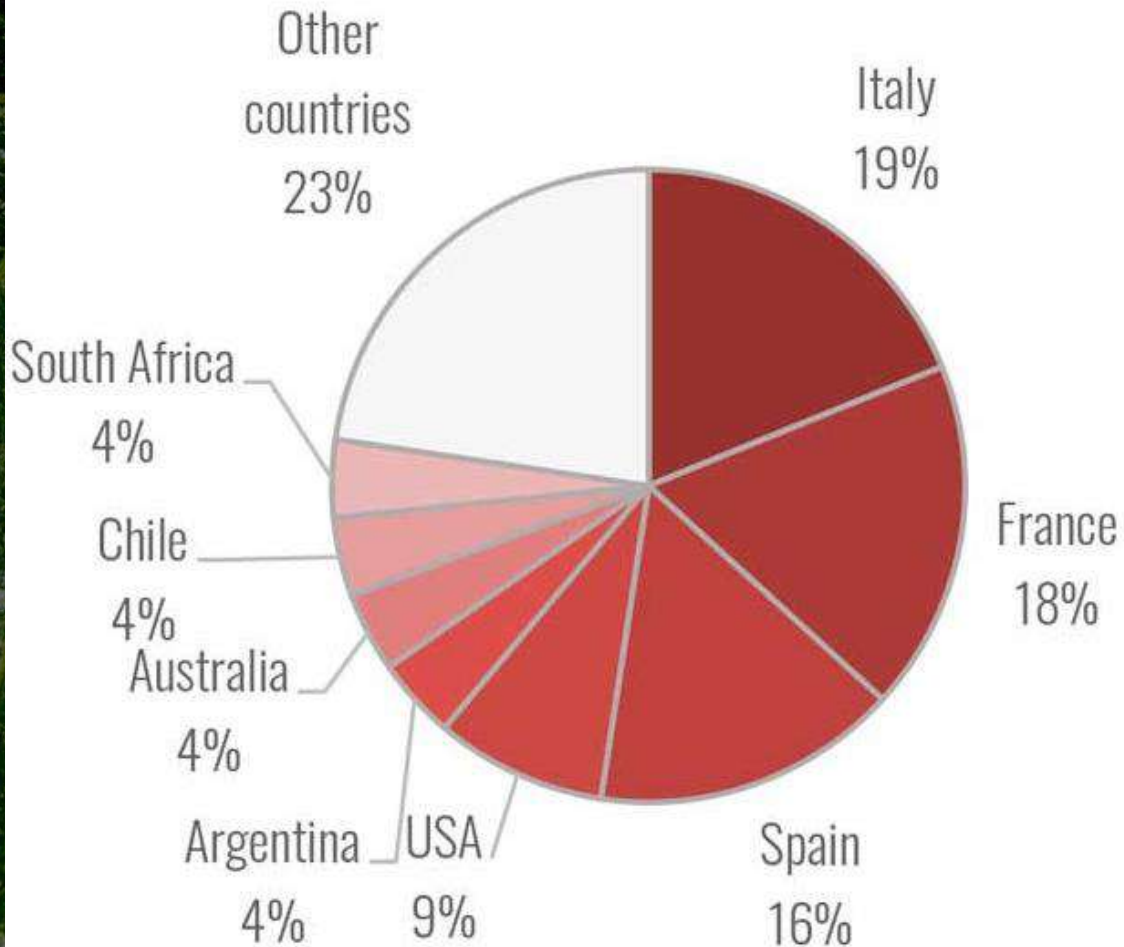
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PARAMETERS that affect national / local viticulture

- **HISTORIC:** ancient / recent geopolitical events (war, conquest, colonization, migration, etc.), changes in the varietal composition of vineyards, philosophical / social considerations on alcohol consumption, etc.
- **CLIMATIC:** humidity, temperature, wind conditions, orientation, sunshine & sea breeze effects, etc.
- **BIOLOGICAL:** wealth of local varieties

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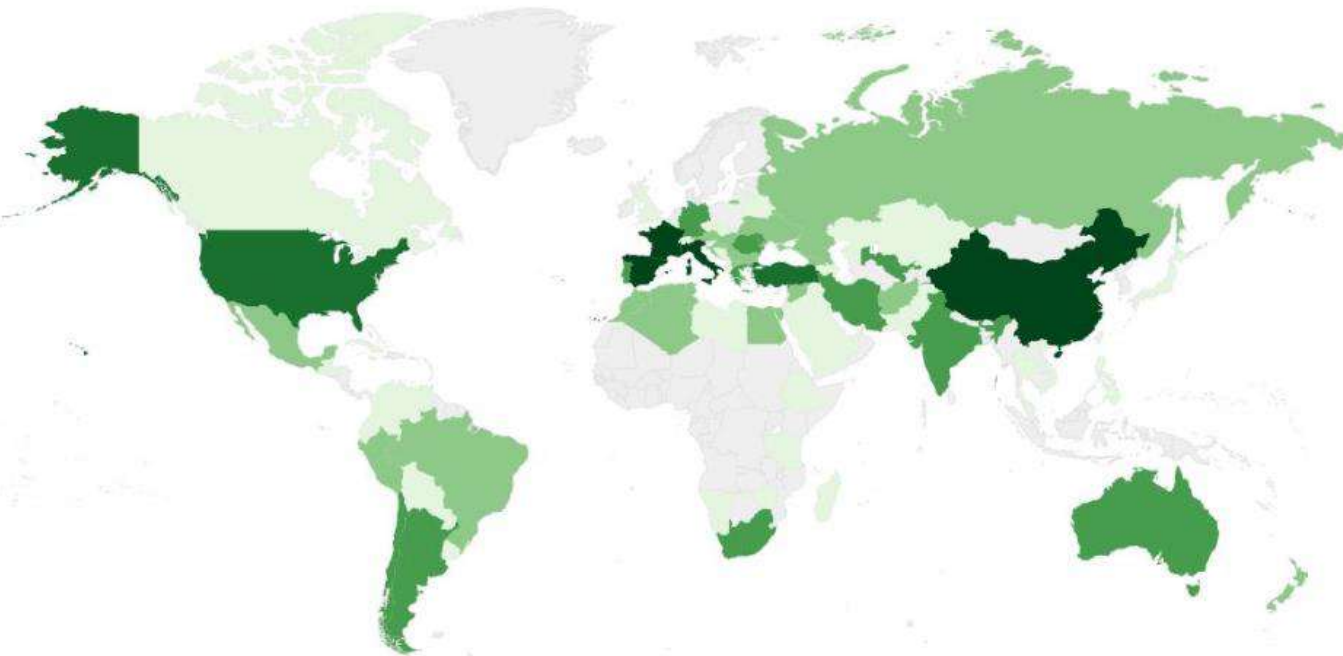
Breakdown of wine production in 2020



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World vineyard distribution in 2020

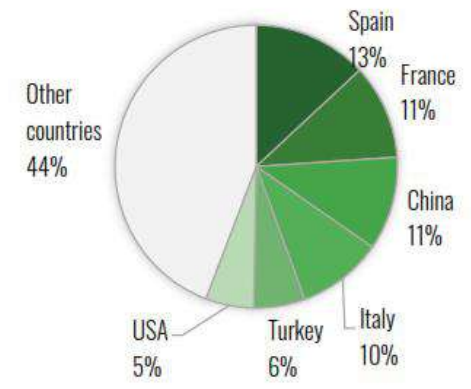


Area under vines in ha

Lightest green	< 20 000
Light green	from 20 000 to 100 000
Medium green	from 100 000 to 250 000
Dark green	from 250 000 to 500 000
Darkest green	from 500 000 to 1 000 000

Top 6 vine-growing countries represent 56% of the world vineyard surface area in 2020

Breakdown of vineyard surface area in 2020



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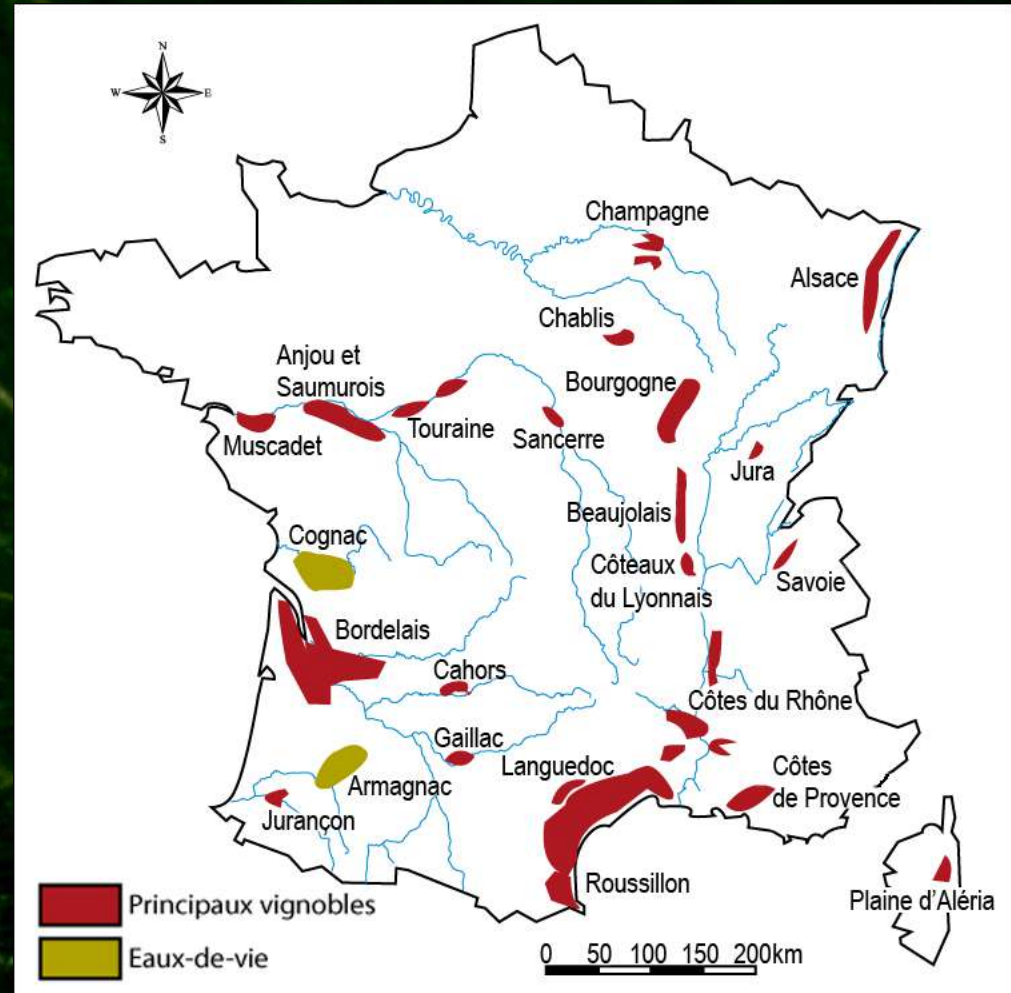
Quality wines produced in specified regions

V.Q.P.R.D. - *Vin de Qualité Produit dans des Régions Déterminées*

In Greece: Appellation of Origin of Superior Quality (OPAP)

High quality wines deriving from specific:

- Locations
- Grape varieties
- Production methods



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Thank you!

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