

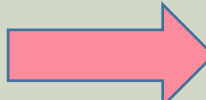
“Vine to wine circle”

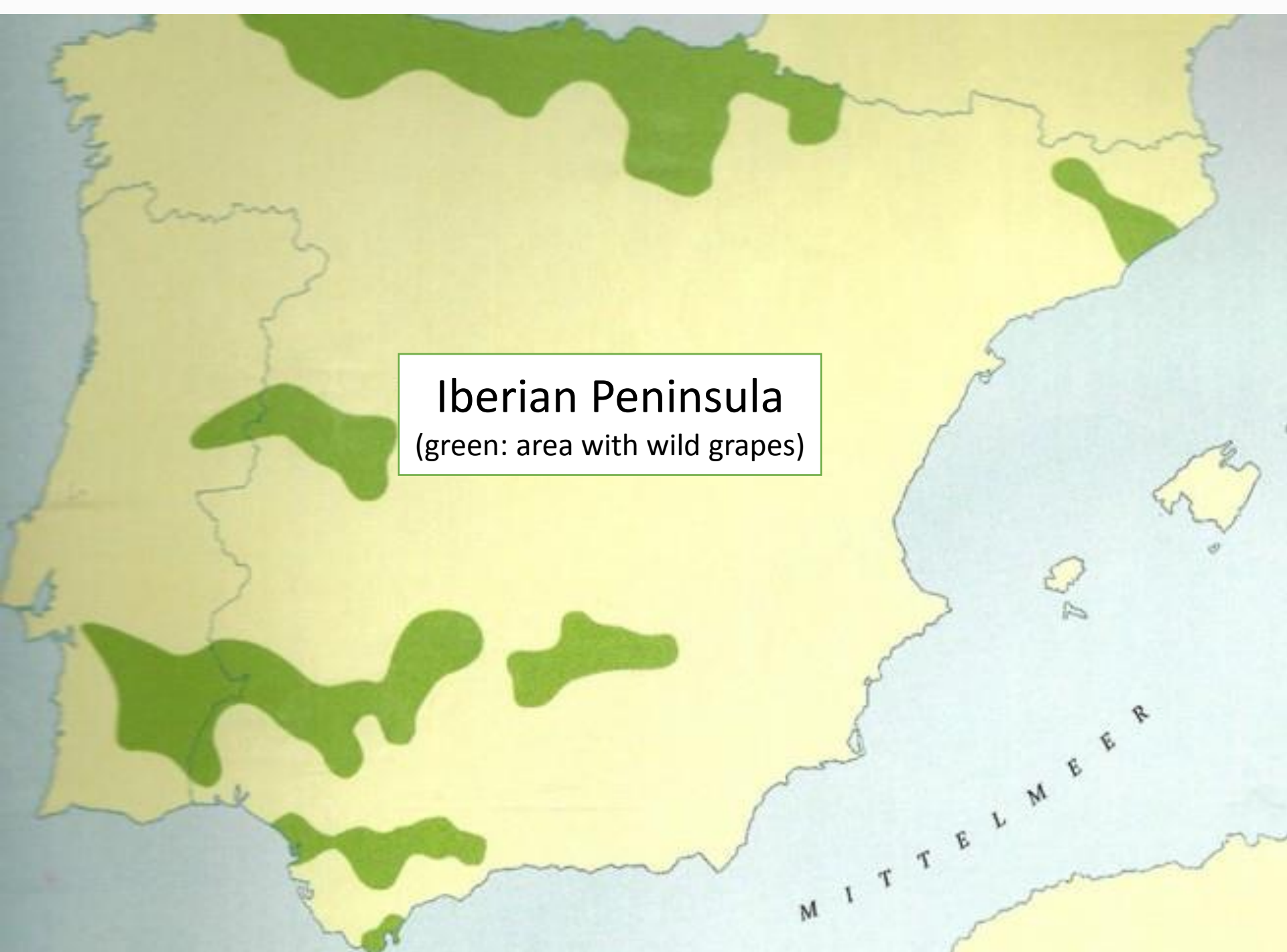
The “old wine world” is able to innovate the “new wine world” by IBERIAN varieties

Each grapevine variety looks for its designated “Terroir”. The extreme **Southern warm climatic** conditions of the Iberian Peninsula also correspond with those in California.



During the ice age the mediterranean areas were protected by the mountains orientated towards the east-west and so the (wild) European vines survived.





Iberian Peninsula
(green: area with wild grapes)

Since the ice age the wild grapevine "*vitis silvestris*" has existed. Until today they have survived on riversides in Iberian Peninsula.

There are archeological finds of pollen and branches that coincide with molecular evidence of the "Chlorplast A".

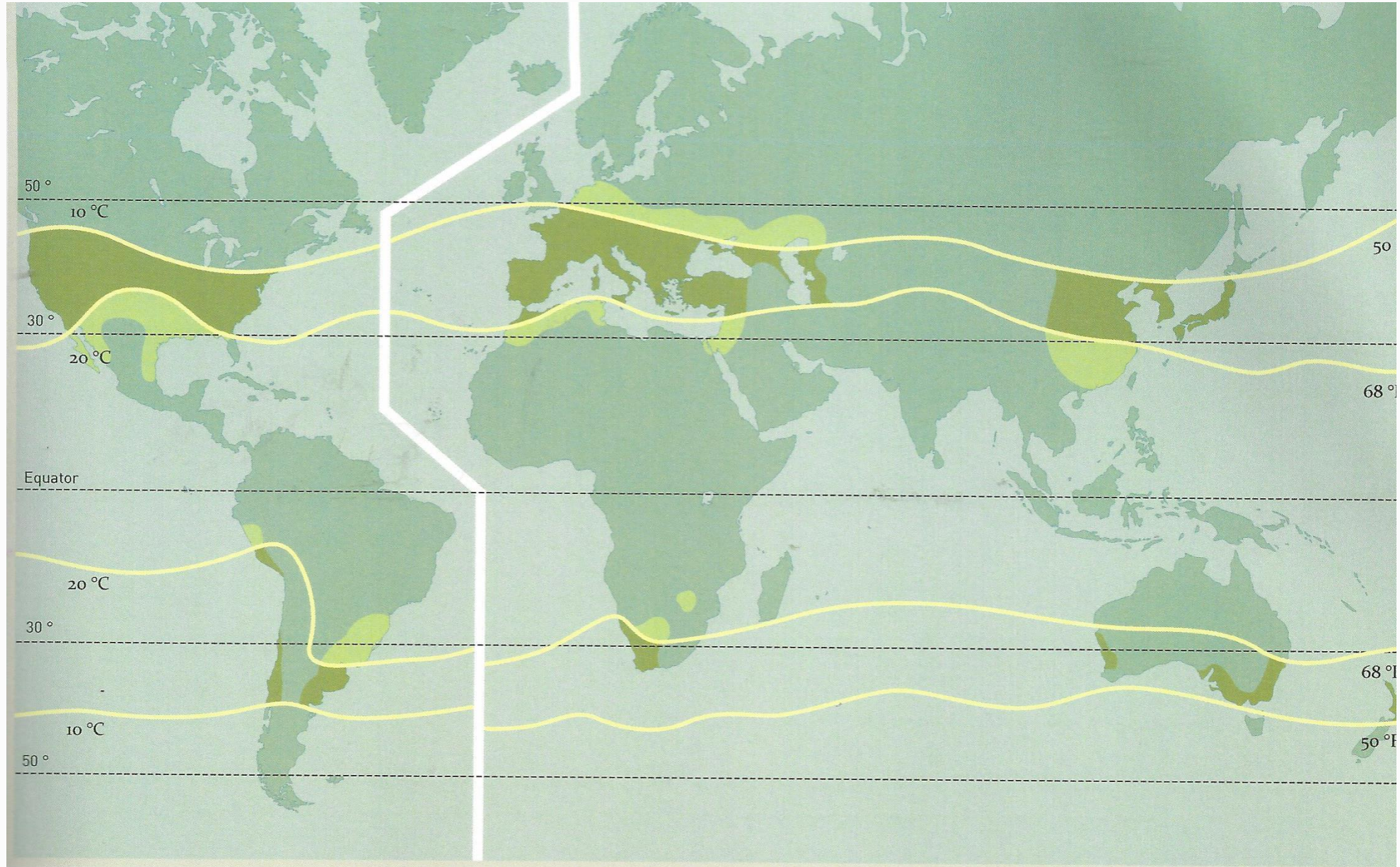
This is prove of an individual Iberian gene center.

For thousands of years,
humans have improved
the grapevine by
continuous selection.

Portuguese scientists proved
that the monoic variety
Marufo, corresponds with the
wild population of *Vitis*
silvestris at Castelo Branco.



Grapevine production in isoclimatic zones

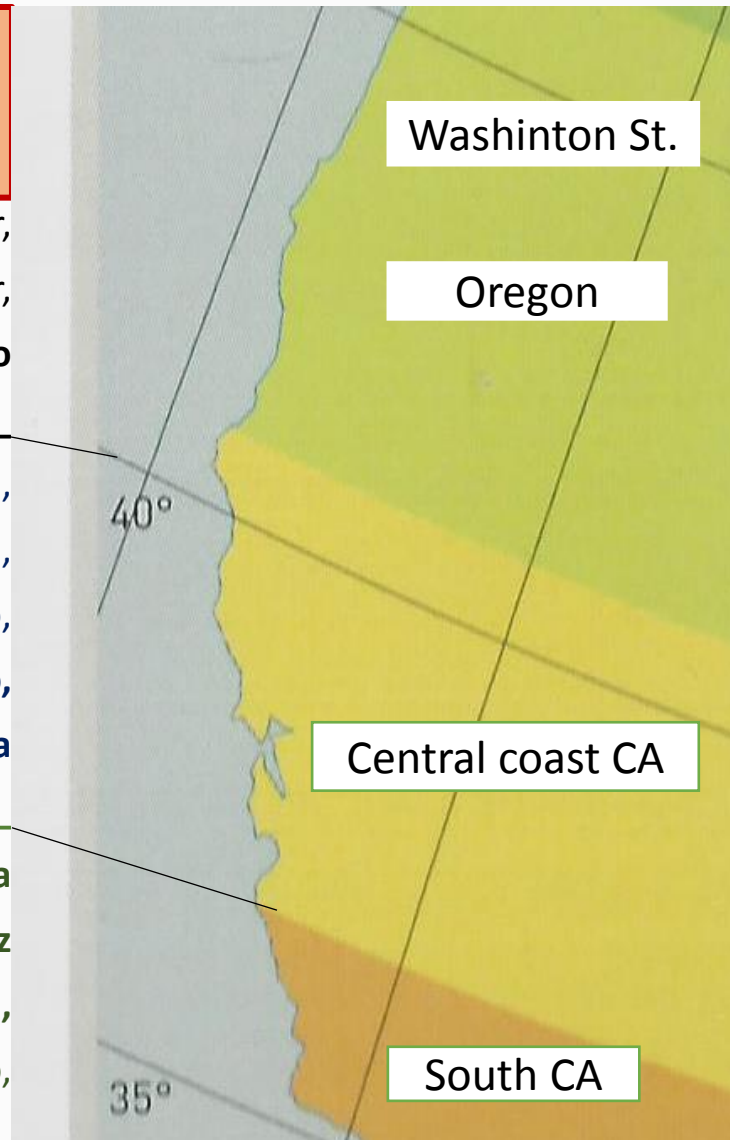


Grapevine varieties adapted to latitude

Riesling, Traminer,
Silvaner,
Pinot Noir, **Loureiro**

Sauvignon-blanc, Chardonnay, Syrah,
Sangiovese, Cabernet Sauvignon,
Merlot, **Tempranillo**,
Albarinho Tourigas, Arinto, Gouveio,
Verdelho, Viosinho, Tinta Barroca

Garnacha
Zinfandel, **Antão Vaz**
Nebbiolo, **Monastrell**,
Graciano,



Equivalency in “old wine world”

Germany +
Northern France

France
+ Italy

Portuguese coast

South of Iberia
+ South of Italy

1981-Viveiros PLANSEL

Grapevine breeding and plant-production for indigenous Iberian grapevine varieties



PLANSEL grapevines have officially been recognized as certified plant-material in:

Portugal
Germany
Italy

California

New Zealand
Australia

In 1969 Jorge Böhm was the major importer of Portuguese wine to Germany. Yet, there was an obstacle: quality wines were only available in small volume.



In 1978 Prof. H. Becker of the *University of Geisenheim* (Germany) analyzed and recognized a lack of any technical improvement of the Portuguese grape varieties.

Jorge Böhm founded the PLANSEL nursery and initiated the selection work based on inter-institutional collaboration.

In the beginning of the 80^{ies} he began with microvinification to characterize varieties, and initiated sanitary selection. In the final years of the 90^{ies} first grape clones were officially certified.

At Quinta da PLANSEL “*Vitis silvestres*” still exist

Female plant of *Vitis silvestris* at varison



Male plant of *Vitis silvestris* at flowering



Collaboration with University of Évora: Prof. C. de Rosário from the experimental winery in MITRA did an internship at the Univ. of Geisenheim to enable technological transfer to Portugal



Collaboration with the governmental institute of plant diseases (EAN):

PLANSEL succeeded to select clones free of 10 viroses. Infected clones became sanitized.



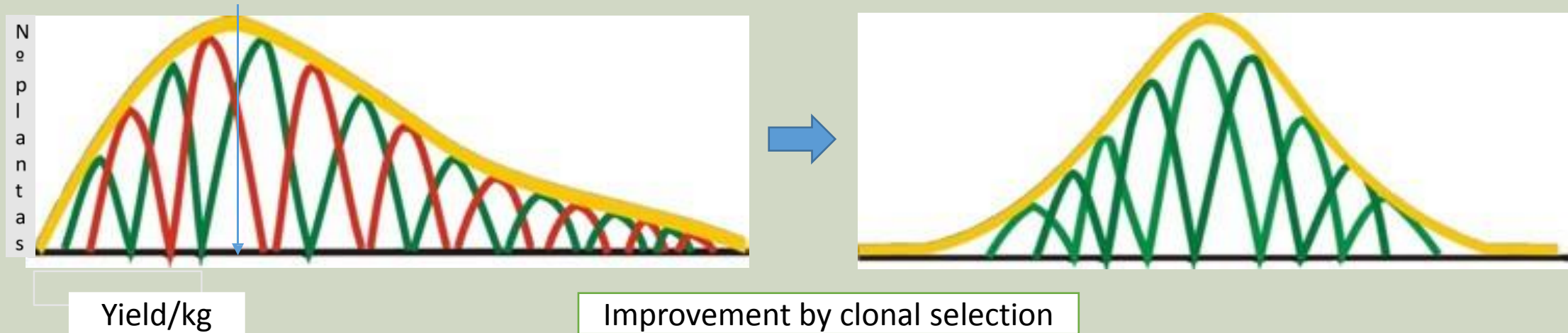
Corky bark virus



Fleck virus

Sanitary tests were released by woody and green indexing, ELISA and PCR.

There was scientific collaboration with the mathematics department of "Universidade Nova de Lisboa".



Statistic performance of grapevine population before clonal selection

Statistic performance of a selected virus-free clone: higher and homogenous production.

With the help of institutions in the USA (Cornell and Davis), France (INRA and ENTAV), Germany (Geisenheim and Geilweiler Hof), Italy (Univers. Bari) and Portugal (ICAAM, ITQB e INIAV) JBP enabled transfer of new technologies.



Green grafting



*In vitro
Micropropagation
meristem-cluture
and somatic
embryogenesis.*

An exclusive partnership
between *PLANSEL* and the
SUNRIDGE Nursery
in Bakersfield, USA, for
(FPS approved)
certified varieties





Iberian Clonal Selections

Variety	Cert	Color	P10/Classic	Variety	Cert	Color	P10/Classic
Alvarinho 639	Yes	White	Classic	Prieto Picudo 584	Yes	Black	Classic
Aragonez 224	Yes	Black	Classic	Tinta Barroca 310	Yes	Black	Classic
Aragonez 232	Yes	Black	Classic	Tinta Barroca 371	Yes	Black	P10 2017 & Classic
Arinto 962	Yes	White	Classic	Tinta Caida 707	Yes	Black	Classic
Castelao 74	Yes	Black	Classic	Touriga Franca 313	Yes	Black	Classic
Fernao Pires 12	Yes	Black	Classic	Touriga Nacional 301	Yes	Black	Classic
Gouveio 268	Yes	White	Classic	Touriga Nacional 302	Yes	Black	Classic
Graciano 572	Yes	Black	Classic	Touriga Nacional 308	Yes	Black	Classic
Graciano 573	Yes	Black	Classic	Trincadeira 46	Yes	Black	Classic
Graciano 592	Yes	Black	Classic	Trincadeira 109	Yes	Black	P10 2017 & Classic
Loureiro 666	Yes	White	Classic	Trincadeira 735	Yes	Black	Classic
Macabeo 568	Yes	White	Classic	Verdejo 598	Yes	White	Classic
Monastrel 571	Yes	Black	Classic	Viosinho 289	Yes	White	Classic

More detailed technical informations: www/vinetowinecircle.com; →studied varieties

Alvarinho

Origin: Grapevine variety from the north of west of Iberian Peninsula

Synonyms: Albariño

Area cultivated: 7.000 ha (in Iberia)

Pruning weight: 1.800-2.000 kg/ha

Yield: 6.000-10.000 kg/ha

Shoot attitude (habit): Long, some plagiotropic

Tolerant to: Sun and wind

Sensitive to: Drought stress, downy and powdery mildew

Bunch size: Small to very small

Soil preference: Granite and slate, light soils

Rootstock preference: SO4, 196-17. P1103

Wine type: Table wine of highest quality, flowery, hints of orchards and tropical fruits, the wine gives an unusually rich and multi-faceted overall impression



Best variety for
quality white
wine in warm
climate
with cold nights
Central Coast

Antão Vaz

not yet released

Origin: Very warm climate of Southern Portugal (Vidigueira area)

Synonyms: Unknown

Area cultivated: 1.000 ha (increasing)

Pruning weight: 2-2.5 t/ha

Yield: 6.000-10.000 t/ha (until very high)

Shoot attitude (habit): Semi-upright, some plagiotropic.

Irrigation attitude: Risk of excessive yields

Tolerant to: Intensive sun, some to downy and powdery mildew

Sensitive to: Excessive water retention in the soil, susceptible to esca and eutypia, low susceptibility to downy and powdery mildew

Bunch size: Large (and loose)

Soil preference: Deep, dry but fertile soils with good drainage

Wine type: Stable against oxidation, clear light lemony color, fine and complex aroma with bouquet of ripe tropical fruit, good aging potential, ideal variety for areas with high temperatures



Suitable for
warm - hot
climate
Central Valley

Arinto

Origin: All over Portugal (likes the Atlantic)

Synonyms: Pedernão (clearly distinct from Riesling)

Area cultivated: 7.000 ha

Pruning weight: 1.800-3.000 kg/ha

Yield: 10-15 t/ha

Shoot attitude (habit): Semi-upright, some plagiotropic

Sensitive to: Wind before flowering, soil with poor water retention, to downy and powdery mildew, excoriosis and bunch rot

Bunch size: Large to very large

Soil preference: Acid or calcarian rich well drained soils, moderate climates preference

Rootstock preference: All, but it is important to achieve a balance of vegetation and fruit

Wine type: Very high quality, clear lemony yellow, mineral notes, aging with aroma reminiscent of honey with fruity acidity, considered as pilot variety in Portugal



High quality attained in regions with cool nights like the **Central Coast** (= Riesling for warm climate)

Castelão

Origin: South of Portugal, today wildly scattered across the country

Synonyms: Periquita, João de Santarem, Castelão Francês

Area cultivated: 20.000 ha

Pruning weight: 1.2-2.2 kg/plant

Yield: High, over 20 t/ha

Shoot attitude (habit): Upright

Tolerant to: Most biotic and abiotic stress, very robust variety

Sensitive to: Bunch rot (botrytis)

Bunch size: Large (350-450g) in warm zones, in maritime regions 613-675 g

Soil preference: All, but variable results as regards quality; for high quality deep soils (podzol or pleistocene sandy soil)

Rootstock preference: P1103, SO4, Ru 140

Wine type: Garnet red color, pronounced fruity aroma of blackcurrent and forest fruits, should be drunk early



Fernão Pires

Origin: Central Portugal

Synonyms: Maria Gomes

Area cultivated: 20.000 ha (increasing)

Pruning weight: 600-1.000 kg/ha

Yield: 8-18 t/ha

Shoot attitude (habit): Very plagiotropic/drooping (new upright selections from PLANSEL exist)

Sensitive to: Powdery mildew and drought stress

Bunch size: Medium to large

Soil preference: Deep well-drained soils (podzol, alluvial or pleistocene sandy soil)

Rootstock preference: SO4, 5BB, P1103, R110

Wine type: Depends on terroir, Atlantic influence produces very elegant aromatic aromas, fruity citrus flavors to orange blossom, continental conditions produce supersaturating aroma with a lack of aging potential



Garnacha Tinta

Origin: North-east of Spain (already known in the Medieval period during Islamic the occupation)

Synonyms: Grenache (France)

Area cultivated: 80.000 ha (in Spain)

Pruning weight: Very high

Yield: 10-20 t/ha

Shoot attitude (habit): Upright

Tolerant to: Very resistant to drought stress, some to downy mildew

Sensitive to: Powdery mildew and botrytis

Bunch size: Medium to large

Soil preference: Suited to all types

Rootstock preference: SO4, risk of coulure with P1103

Wine type: High in alcohol, garnet red coloration, with a range from light aromatic notes to those of ripe red fruits, of médium acidity, with a simple structure, or one of medium complexity



Gouveio/Godello

Origin: Mentioned in Ancient Roman documents from Bierzo (north-west of Spain)

Synonyms: Godelho (formerly Verdelho)

Area cultivated: 3.000 ha (increasing)

Pruning weight: 2.4-3.5 t/ha

Yield: 8-12 t/ha

Shoot attitude (habit): Semi-upright

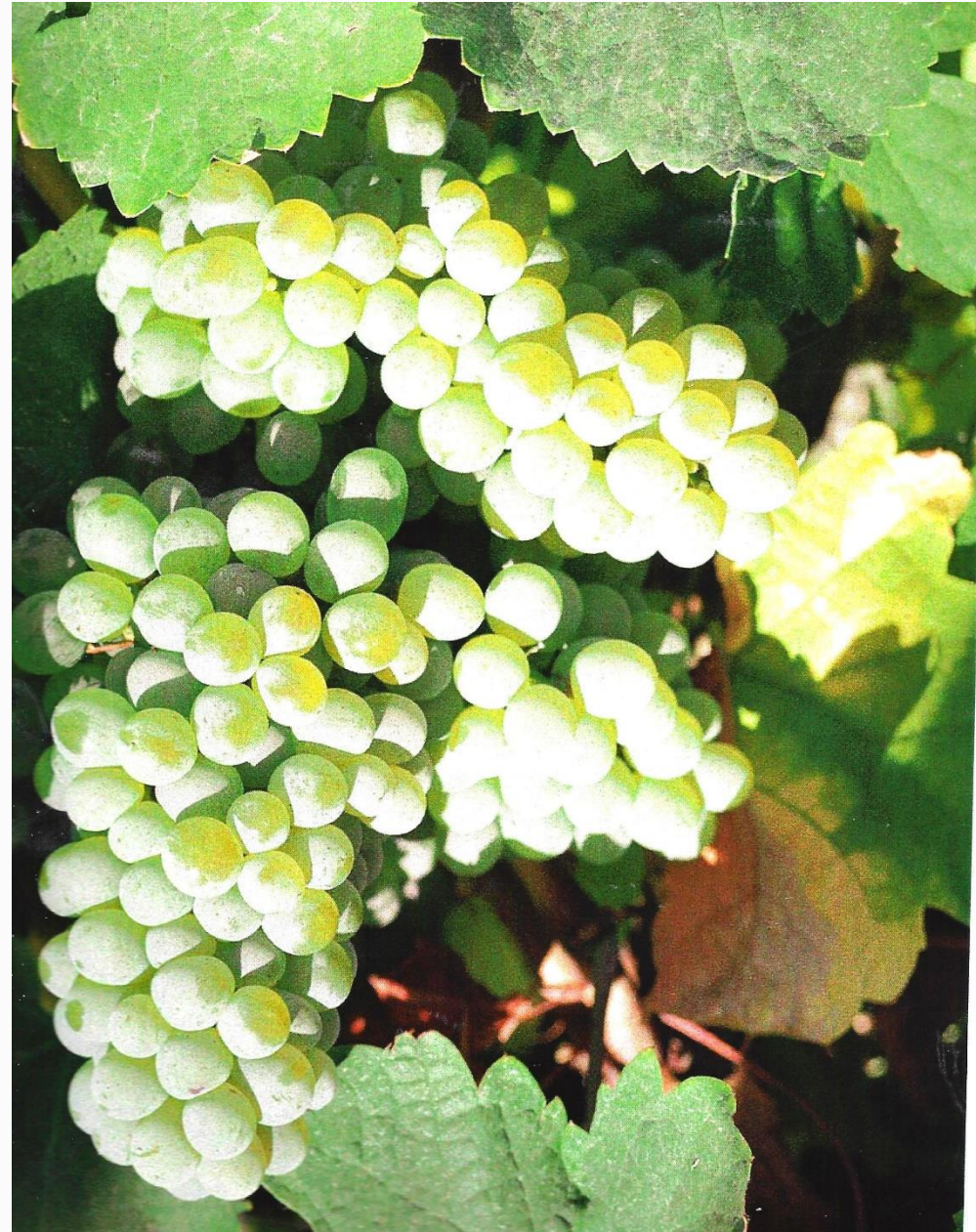
Sensitive to: Powdery and downy mildew as well as botrytis

Bunch size: Medium to small, compact

Soil preference: Dry, acidic and alkaline soils with irrigation

Rootstock preference: 420 A; R110, 161-40

Wine type: Lemony colored, fresh and lively acidity, high alcohol content, with rich, noble and elegant aromatic flavors, good aging potential



Graciano/Tinta Miuda

Origin: Presumably Ancient Rome or Northern Spain (Rioja)

Synonyms: Many regional denominations exist in Spain and Portugal

Area cultivated: 1.200 ha (in Spain and Portugal)

Pruning weight: 1.200-1.800 kg/ha

Yield: 8-15 t/ha

Shoot attitude (habit): Semi-upright

Tolerant to: Some to powdery and downy mildew and anthracnose

Sensitive to: Botrytis and eriophyses

Soil preference: Fertile calcarian soils (in continental climate), even likes very high temperatures

Rootstock preference: Very compatible with common rootstocks, preferably with short growth cycles

Climate: Adapts well to very hot climate and dryness resulting in the grapes having the tendency to pass as raisins (produces **Amarone-wine-type**)

Wine type: An adequate terroir produces strong coloration, develops a remarkable bouquet in the bottle, has a very good aging potential



Of great interest for the **Central Valley** (warm/hot areas)

Loureiro

Origin: North of Portugal

Synonyms: The variety has many regional synonyms

Area cultivated: 6.000 ha (limited to the North)

Pruning weight: 1.000-2.500 kg/ha

Yield: 10-20.000 kg/ha

Shoot attitude (habit): Semi-upright, long

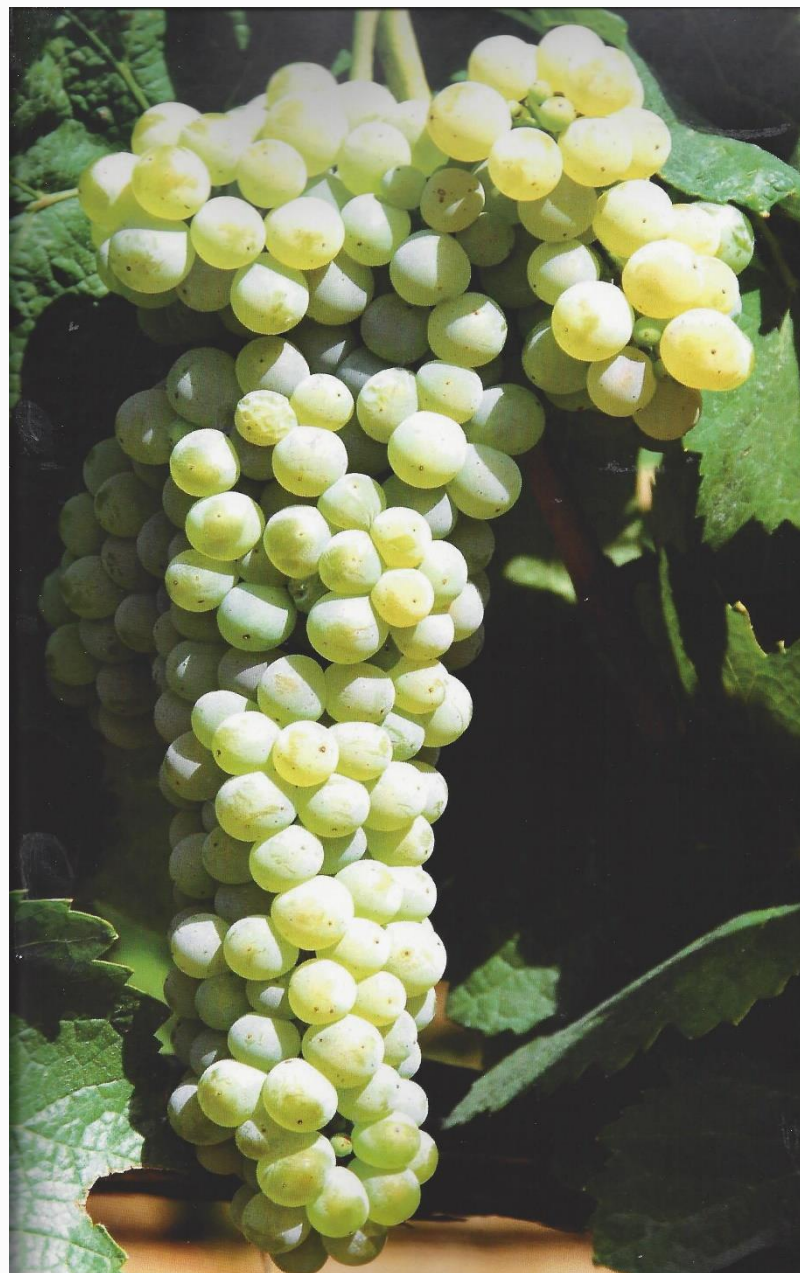
Sensitive to: Powdery mildew, exoclorosis, botrytis, intensive sun and drought

Bunch size: Very large in moisty soils, medium when dry

Soil preference: Deep soil of moderate fertility and adequate humidity

Rootstock preference: SO4, 196/7, 101-14, adapts well to the majority of rootstocks

Wine type: Young green wine (Vinho Verde), high in acidity, intense aromas of acacia blossom, orange and peach, well-balanced, lasting finish, no aging potential



Macabeo

Origin: Northern Spain (Ebro Valley)

Synonyms: Viura

Area cultivated: 34.000 ha

Pruning weight: High

Yield: 12-30 t/ha

Shoot attitude (habit): Upright

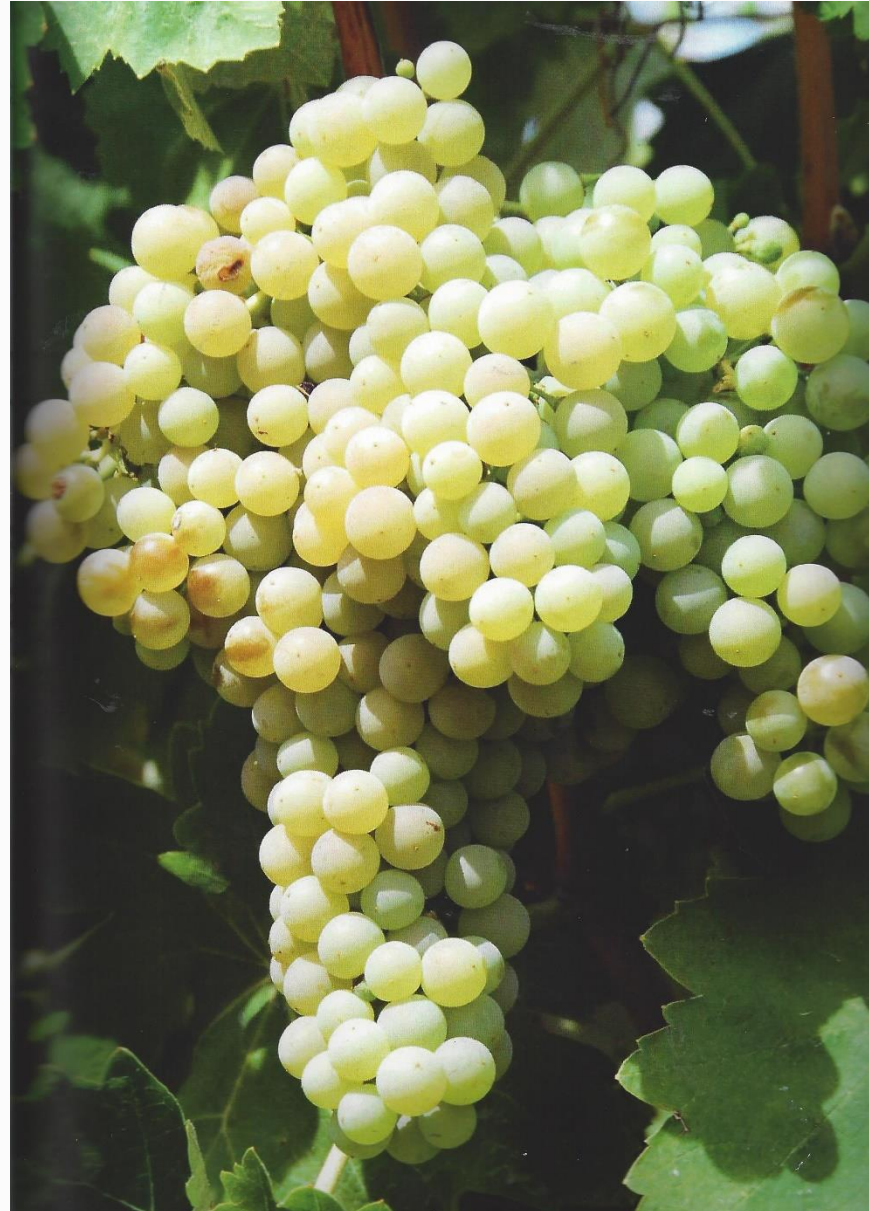
Sensitive to: Wind break, cool, wet or very dry soils, botrytis, powdery mildew, bacterial necrosis

Bunch size: Large to very high

Soil preference: Light calcareous soils and slopes

Rootstock preference: All, risk of rot with SO4 and 41B

Wine type: Basic blend for Cava and still wine, pale yellow color with green tones, sharp aromas, light and fresh with notes of wild flowers and bitter almond, slightly floral finish



Monastrell

Origin: Warm areas of Spain

Synonyms: Mouvedre; many others in France, Spain, Italy

Area cultivated: 63.000 ha

Pruning weight: Medium

Yield: Big differences between clones: 6-18 t/ha

Shoot attitude (habit): Upright

Sensitive to: Highly sensitive to downy mildew and sour rot, less to excoriosis and botrytis as well as powdery mildew, risk of shoot breaking when windy, very sensitive to drought

Bunch size: Medium

Soil preference: Very sensitive to lack of magnesium and potassium in the soils

Rootstock preference: No information found

Wine type: Attains highest oenological potential when harvested at full maturity, strongly pigmented wine with well-structured tannins, aromas of dark fruits, excellent variety for quality wine and blends



Well-suited
to
warm/hot
climate

Prieto Picudo

Origin: Spain (Castile and Leon)

Synonym: None

Area cultivated: 6.000 ha

Pruning weight: Medium to low

Yield: 5-10 t/ha

Shoot attitude (habit): Semi-upright, plagiotropic tendency

Sensitive to: Certain tolerance to biotic and abiotic stress

Bunch size: Medium

Soil preference: Open, deep, well drained soils

Rootstock preference: No detailed information available

Wine type: Very high quality elementary variety wine, cherry colored with violet tones, very aromatic with notes of wild fruits, black pepper, high acidity, sustained palate with retro-nasal aromas



Tempranillo - Aragonês

Origin: Spain, possibly Austria

Synonym: Tinta Roriz, Censibel, Tinta do País (and many others)

Area cultivated: Spain 220.000 ha, Portugal 25.000 ha
It is actually the most planted grape variety world-wide.

Pruning weight: 2.000-3.000 kg/ha

Yield: Varies with different soil, climate and clone; 8-18 t/ha

Shoot attitude (habit): Upright to semi-upright

Tolerant to: Drought

Sensitive to: Lack of potassium, boron, zinc and magnesium, very vulnerable to powdery mildew, medium to powdery mildew, excoriosis and botrytis, problems with trunk diseases, leaves fall off in extreme heat

Bunch size: Medium 200-500 g (depends on clone and climate)

Soil preference: Deep soils with good drainage, too much water leads to delay in ripening and reduced quality

Rootstock preference: 1103 P, 196-17 (high yield), R110

Wine type: With strict yield control it is possible to produce one of best wines of Iberia, aroma of plums and forest fruits, rich in tannins, develops new complexity with aging



World-wide
most planted
grape variety

Tinta Barroca

Origin: North of Portugal (Douro Valley)

Synonyms: None

Area cultivated: 7.000 ha

Pruning weight: High

Yield: 8-16.000 t/ha

Shoot attitude (habit): Semi-upright, some plagiotropic

Sensitive to: Water stress, very sensitive to downy and powdery mildew, moderately to botrytis and excoriosis

Bunch size: Large but not compact, 250-500 g

Soil preference: Deep and fertile soils, likes high altitude

Climate preference: Warm with cold nights

Rootstock preference: All rootstocks, requires the right balance between soil and yield

Wine type: With strict yield control excellent quality can be produced, delicate access to nose, tannic and fine, floral, feminine aroma with very good aging potential, with high yields a less pronounced quality is produced



Very well-suited
to warm climate
with cold nights

Touriga Franca

Origin: North of Portugal (Douro Valley)

Synonyms: None

Area cultivated: 15.000 ha

Pruning weight: 2.000-3.000 kg/ha

Yield: 8-6 t/ha

Shoot attitude (habit): Upright

Sensitive to: Robust variety, some to powdery mildew

Bunch size: Medium, 200-350 g

Soil preference: Deep fertile and humid soils

Rootstock preference: Almost all, requires the right balance between soil and yield

Wine type: Very intensive aroma, prominent floral notes and some citrus fruits in the nose, excellent balance between tannins and fruits, full-bodied in the mouth



Grape variety produces high quality in warm climate with cold nights

Touriga Nacional

Origin: Northern Portugal

Synonym: Touriga

Area cultivated: 10.000 ha (increasing)

Pruning weight: 1.750-3.500 kg/ha

Yield: 5-15 t/ha (high variability with clone and terroir)

Shoot attitude (habit): Plagiotropic

Sensitive to: Leaves are sensitive to drought, very vulnerable to excoriosis, moderately sensitive to powdery and downy mildew

Bunch size: Small, 100-250 g

Soil preference: All soils, except very fertils and humids.

Rootstock preference: Performance better with lower vigor

Wine type: Premium quality, with highest oenological potential, one of the strongest aromas of all varieties, aromas of dark red forest fruits, with some fruity notes, high aging potential with delightful perfume, assonant to cistus



Elite quality variety
for warm climate
with cold nights

Trincadeira

Origin: Central Portugal

Synonyms: Mortagua, Espadeiro and many others regional denominations

Area cultivated: 16.000 ha

Pruning weight: Very high, 4-5 t/ha

Yield: 12-20 t/ha

Shoot attitude (habit): Semi-upright, some long and drooping

Sensitive to: Robust foliage, very sensitive berry skin, easily detachable, very vulnerable to botrytis, moderately to downy and powdery mildew

Bunch size: Medium to large, 200-400g

Soil preference: Sandy, dry and marginally fertile soils

Rootstock preference: Low vigor, R110, 41B, 420A, 3309C

Wine type: Excellent quality wine when the berries are healthy, intensive garnet red, smooth in the mouth, notes of ripe plums, some grassy, peppery aromas, while aging it develops a complex stewed fruit aroma



Verdejo

Origin: Spain, Castilian plateau (700m ASL)

Synonyms: None

Area cultivated: 11.000 ha

Pruning weight: Medium to high

Yield: 9-18 t/ha

Shoot attitude (habit): Semi-upright, some plangiotropic

Sensitive to: Spring frost, all cryptogamic diseases

Bunch size: Medium

Soil preference: Dry, calcareous soil, prefers high altitude

Rootstock preference: 1103 P and So4

Wine type: Straw yellowy color, with light green notes, initial aroma is fruity, then floral with grassy notes and a hint of acidity, strong body with high glycerol content, long-lasting taste with diverse fruity notes



Verdelho

not yet released

Origin: Portuguese archipelagos in the Atlantic Ocean (Madeira and Azores)

Synonyms: None

Area cultivated: 20 ha

Pruning weight: 2.000-3.000 kg/ha

Yield: 8-14 t/ha

Shoot attitude (habit): Semi-upright, some plagiotropic

Sensitive to: Robust variety, low susceptibility to downy and powdery mildew, moderately susceptible to botrytis

Bunch size: Small

Soil preference: Deep, moderately humid soils

Rootstock preference: No incompatibility found

Wine type: Fresh and aromatic wine, with an aroma evocative of exotic fruits, citrine in color, sustained mouth, good accents when mature, suitable as a smooth table wine, dessert wine as well as a dry table wine



Viosinho

Origin: Portugal (Douro Valley)

Synonyms: None

Area cultivated: 200 ha (increasing)

Pruning weight: Low (800g/ha)

Yield: 8-16.000 kg/ha

Shoot attitude (habit): Upright

Sensitive to: Susceptible to downy mildew and botrytis, moderately to powdery mildew

Bunch size: Small to mdium

Soil preference: Dry, fertile, well drained soils

Rootstock preference: Very compatible with traditional rootstocks with low vigor

Wine type: Very high quality, noble still wine, good aromatic intensity, evocative of the scent of chamonille and plums creating a fruity bouquet of some complexity, well-rounded in the mouth with medium acidity

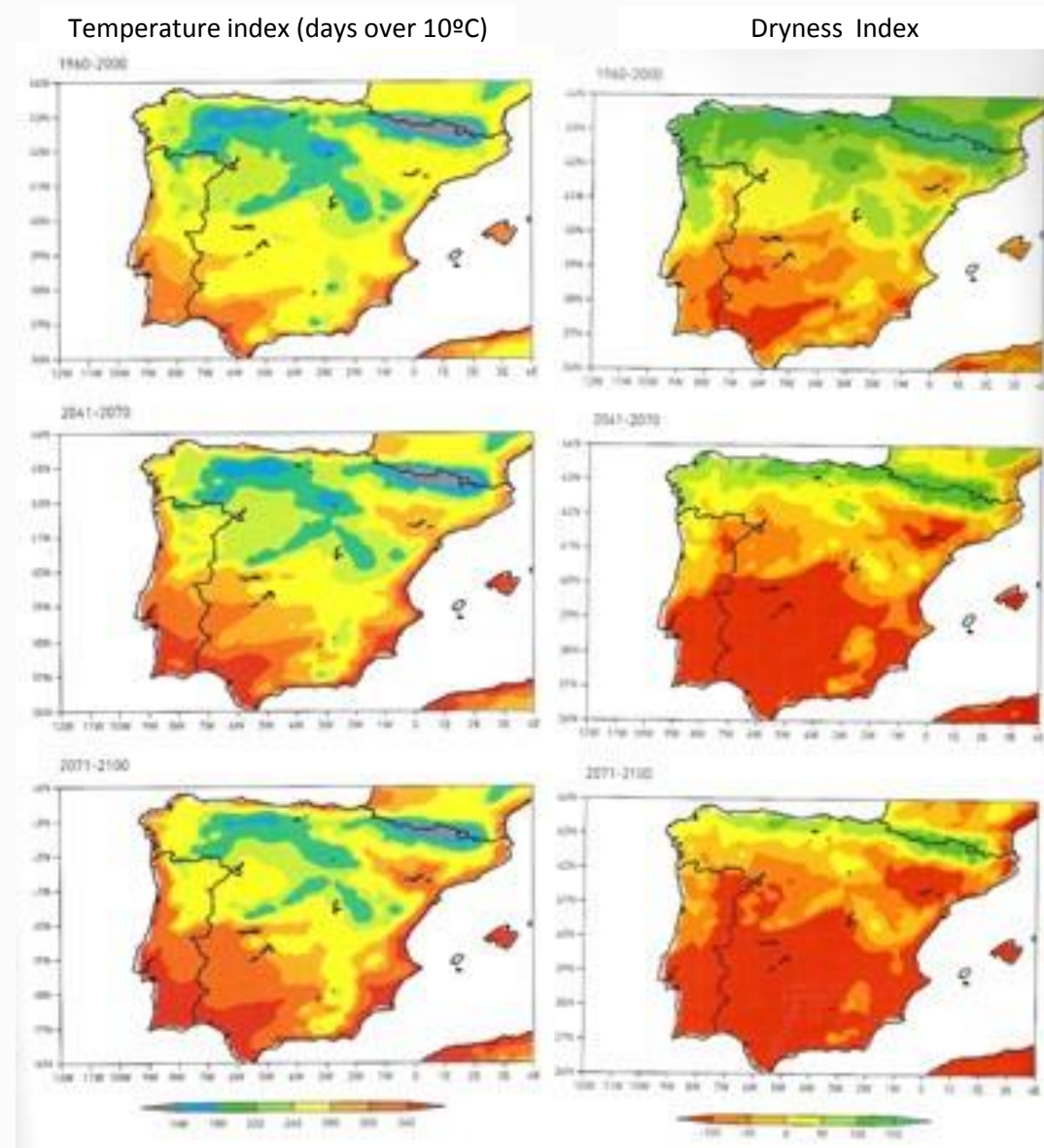


Challenge of climate change: Example of how the *Terroir* in Iberia will change in the future

In the past millennia *Vitis vinifera* has survived many severe crisis due to climate change.

The Ancient Greek **Procopios of Caesarea 536/7** already referred to the “little glacial period” of the years **536/7** in writings. Between the years 1570-1630, 1675-1717 as well as in 1883 after the eruption of Krakatoa Europe suffered under heavy snow falls. However, during the Middle Ages (950-1100 A.D.) there was a period with very hot climate.

Now it is predicted that there will be an increase of $2.2 - 5.1^{\circ}\text{C}$, a reduction of precipitation of 4-27% and a drastic increase of CO_2 .





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(JBP-Vitis)

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