European Cooperative Programme for Plant Genetic Resources
ECP/GR

Julius Kühn-Institut

A population genetic study of *Vitis vinifera* L. subsp. *sylvestris* Gmelin based on 2923 individuals from 20 countries

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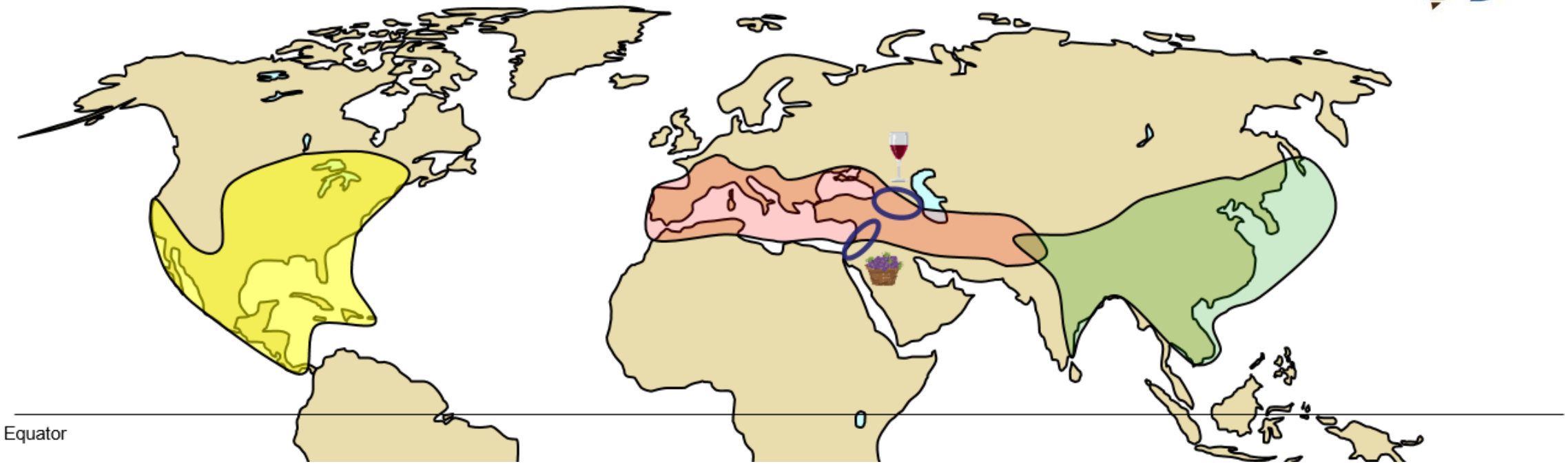
Natural habitats of wild grapes



American wild grapes (~20 species)

Vitis vinifera L. (1 species)

Asian wild grapes (~40 species)

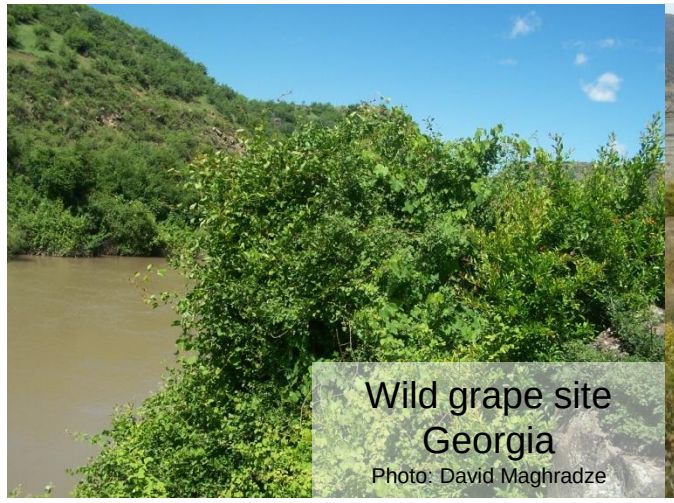
Domestication centre (~8000-12000 years ago)

- *Vitis vinifera* subsp. *sylvestris* (European wild grapevine)
  Vitis vinifera subsp. *sativa* (cultivated grapevines)

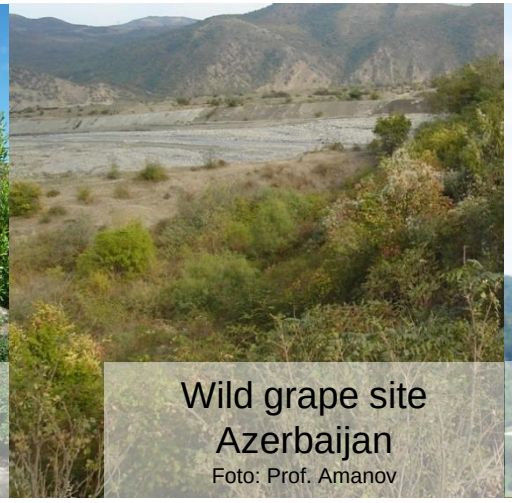
Vitis vinifera L. subsp. *sylvestris* Gmelin

Wild grape site
Germany
Photo: Rudolf Becher

Wild grape site
Germany
Photo: Erika Maul



Wild grape site
Georgia
Photo: David Maghradze



Wild grape site
Azerbaijan
Foto: Prof. Amanov

Wild grape site
Georgia
Photo: David Maghradze

- Perennial, lignifying
- Climbing lianas
- Interfertile genus

From wild grapes to domesticated varieties

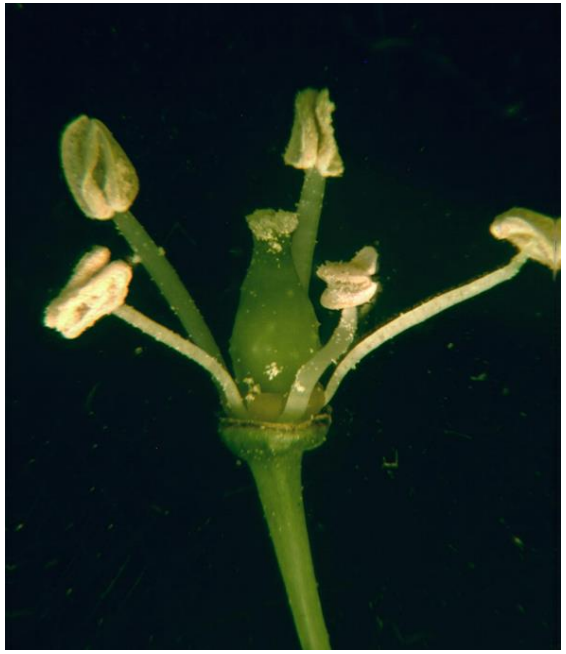
Mutation at the flower sex locus

Wild grapes

♂ ♀

Cultivated varieties

⚥



From wild grapes to domesticated varieties

Enlargement of clusters and berries

Wild grapes

rather small with loose clusters

Cultivated varieties

wide range

From wild grapes to domesticated varieties

Mutation at the berry color locus

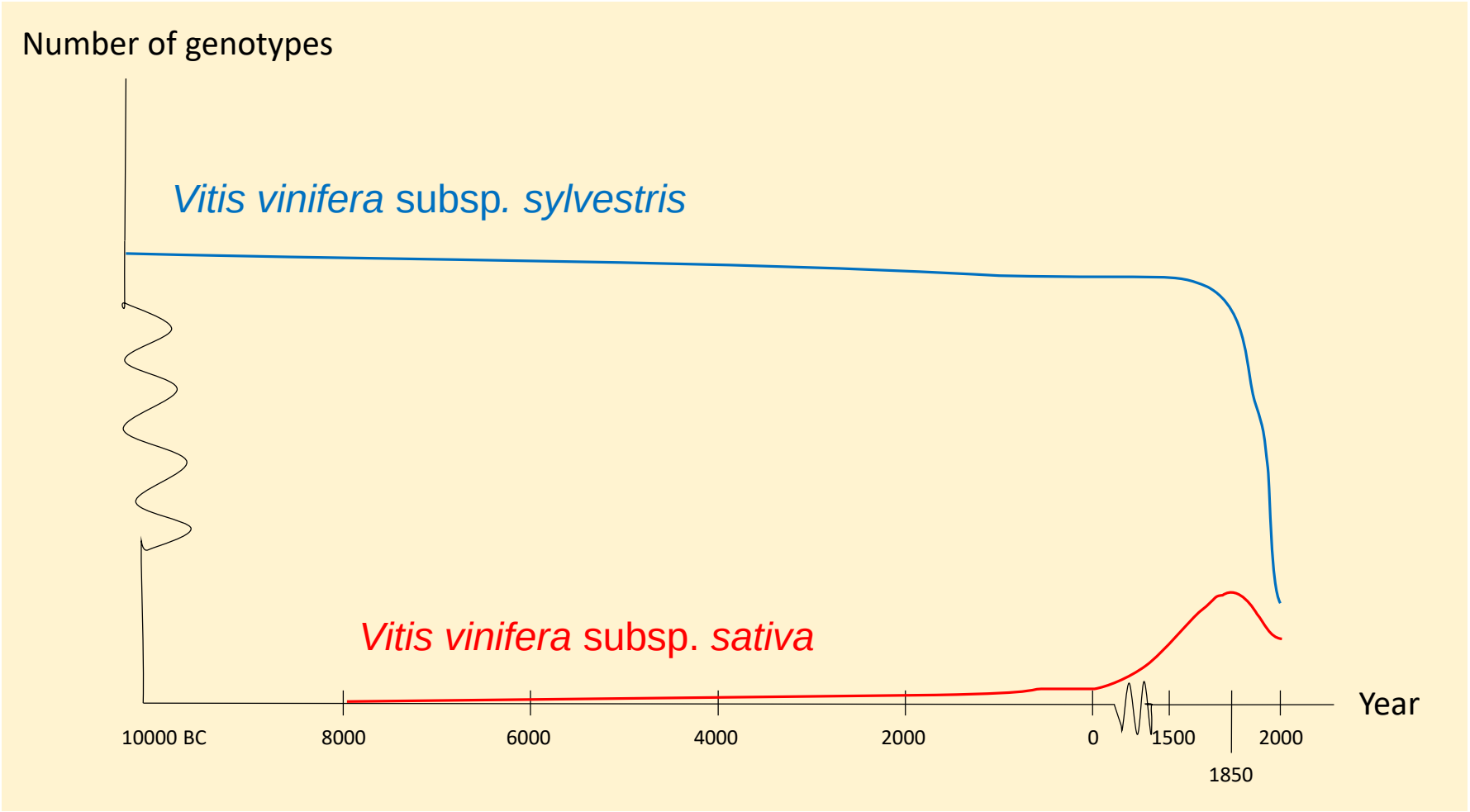
Wild grapes

blue/black, homozygous

Cultivated varieties

various colors from green/yellow to blue/black

Diversity and gene erosion

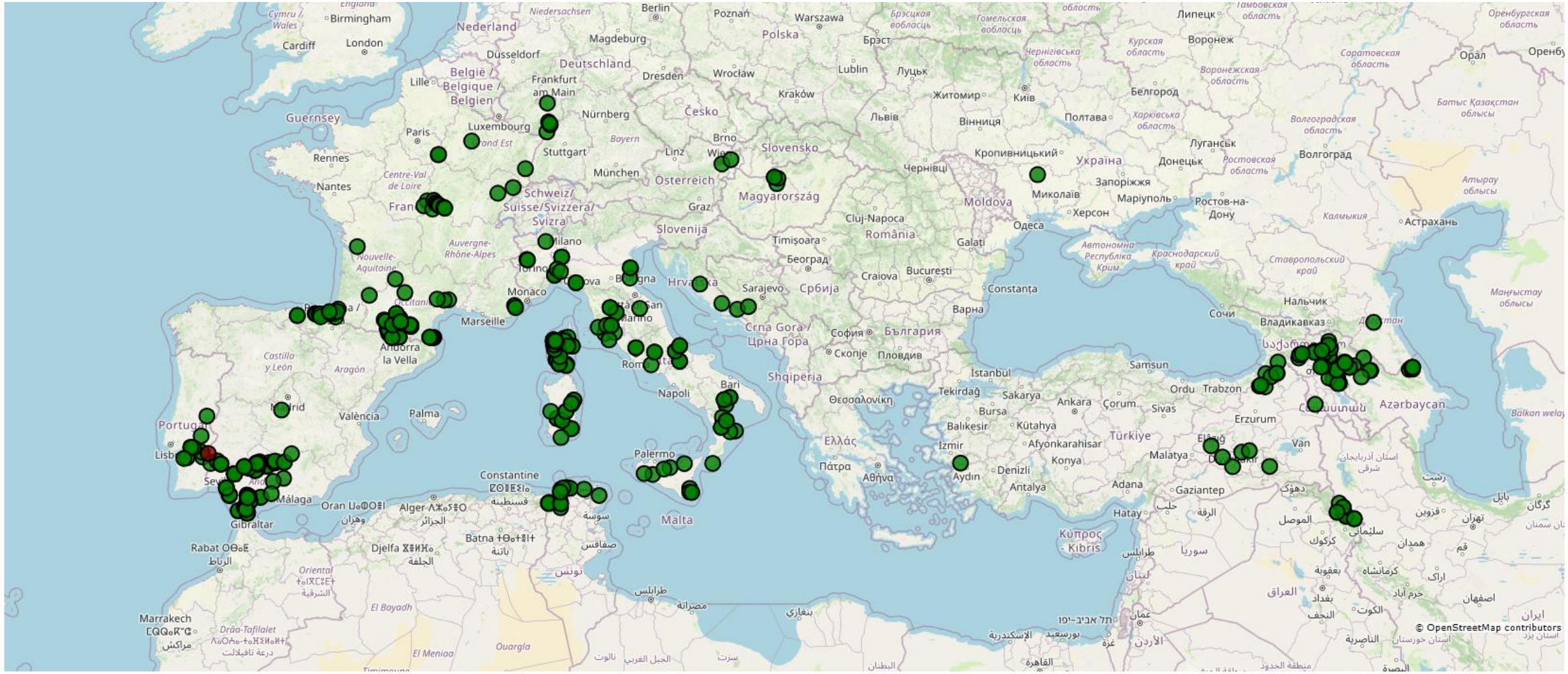


- Civilization measures, environmental disasters, consolidation of land etc.
  →Loss of habitats and biodiversity

Objectives

- Determination of genetic diversity within and between *sylvestris* populations
- Decipher genetic relationships between these groups
- Infer bottle necks and genetic drift
- Preservation of the ancestors of cultivated grapevines

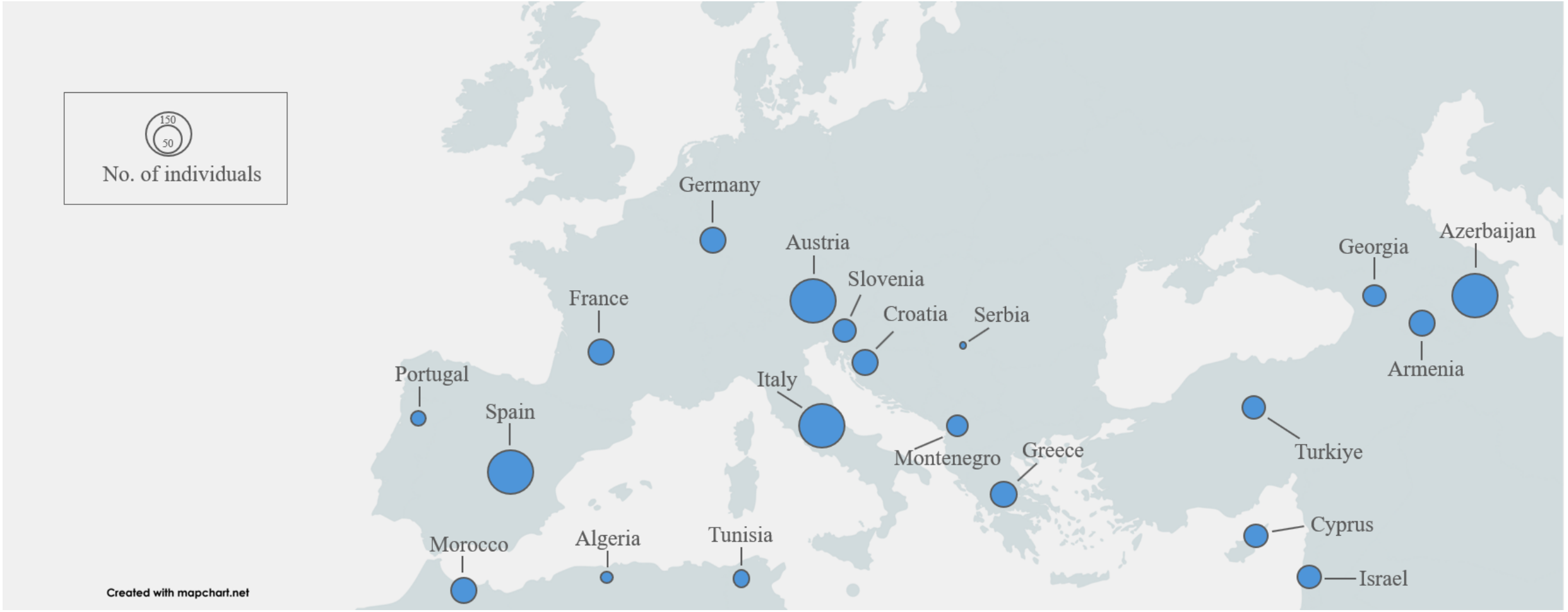
The European *Vitis* Database (www.eu-vitis.de)
Natural *Vitis sylvestris* populations



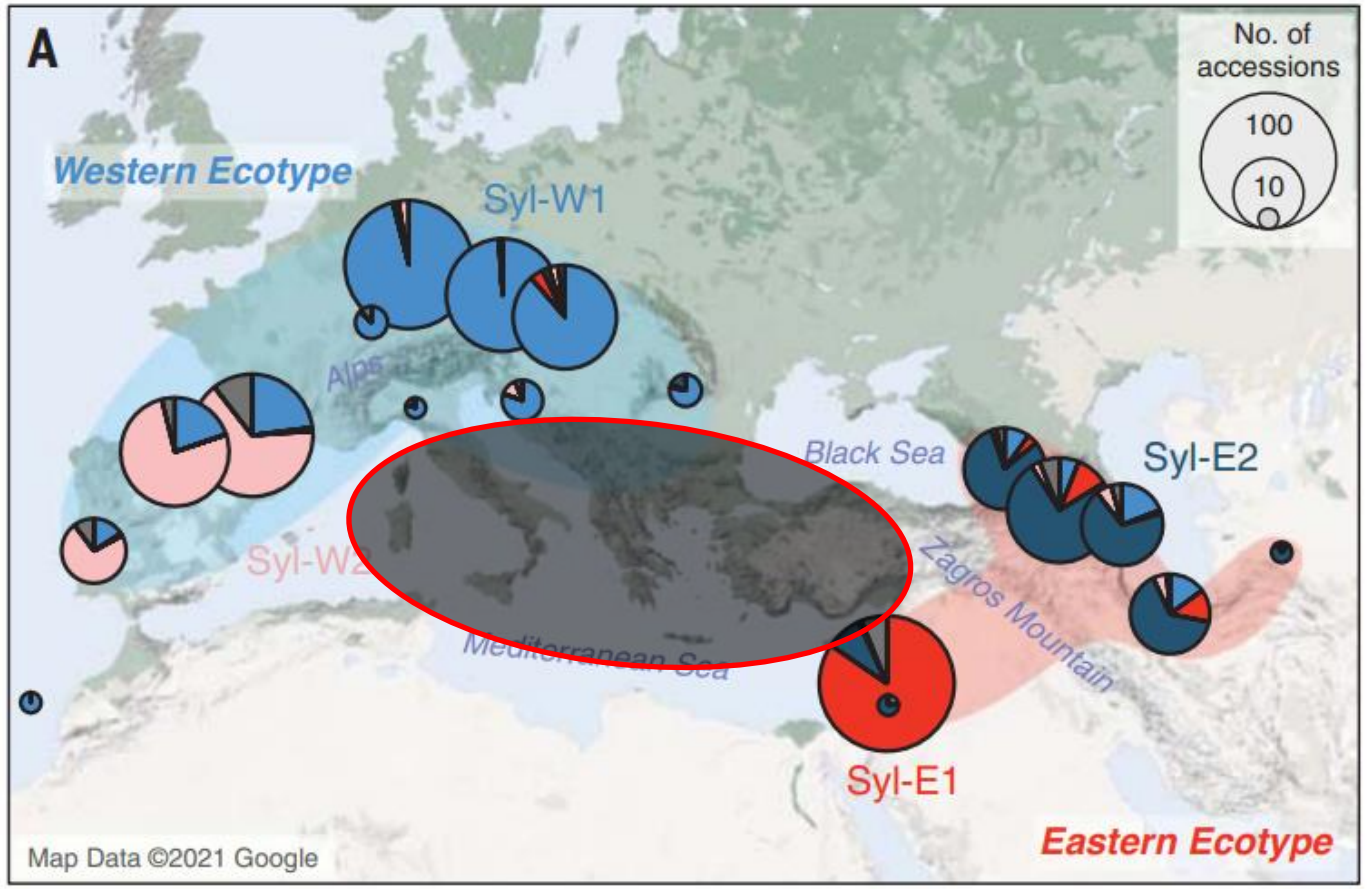
Data collection – 20 SSR markers

Country	Pop-nr	Sample Size	Source / Remark	Published
Algeria	1	8	V. Laucou	no
Armenia	2	183	134+49 samples; Margaryan2021; Riaz2018	yes
Austria	3	350	177+173 samples; Danube; E. Maul & F. Röckel	no
Azerbaijan	4	346	292+54 samples; Riaz2018; CostFA1003	partly
Croatia	5	161	109+52 samples; Zdunic2020+Riaz2018; G. Zdunic	partly
Cyprus	6	93	S. Savvides, E. Maul & F. Röckel	no
France	7	115	V. Laucou (Dong2022; André2017; Barnaud2010)	yes
Georgia	8	81	30+51 samples; Riaz2018; Imazio2013	yes
Germany	9	100	Ketsch; E. Maul & F. Röckel	no
Greece	10	111	G. Merkouropoulos & F. Röckel	no
Italy	11	378	15+144+98+121 samples; A. Schneider; G. de Lorenzis & G. Pelissetti; Emanuelli2013; deMichele 2019	partly
Israel	12	127	Drori2017 & Rahimi2021	yes
Montenegro	13	55	J. Tello (Maras2020)	yes
Morocco	14	107	V. Laucou	no
Portugal	15	27	J. Cunha & F.Baeta	no
Serbia	16	3	D. Ivanisevic & F. Röckel	no
Slovenia	17	89	Perko2024	yes
Spain	18	468	192+134+142 samples; deAndres2011; J. Tello; G. Munoz	partly
Tunisia	19	63	30+33 samples; J. Tello (Ghaffari2013); V. Laucou	partly
Turkiye	20	58	I. Uzun & E. Maul	no
Total		2923		

Sample sizes by country



Genetic groups – Dong *et al.* 2023

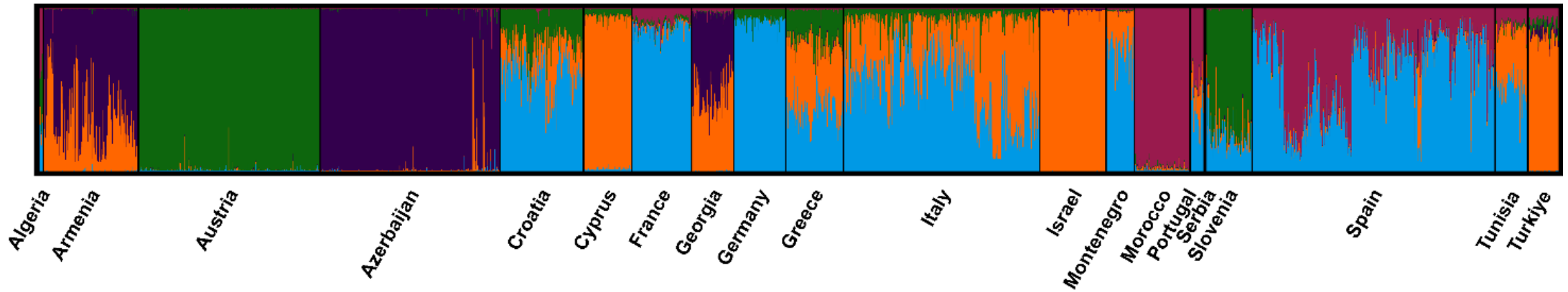


No data

- Best results for four genetic groups

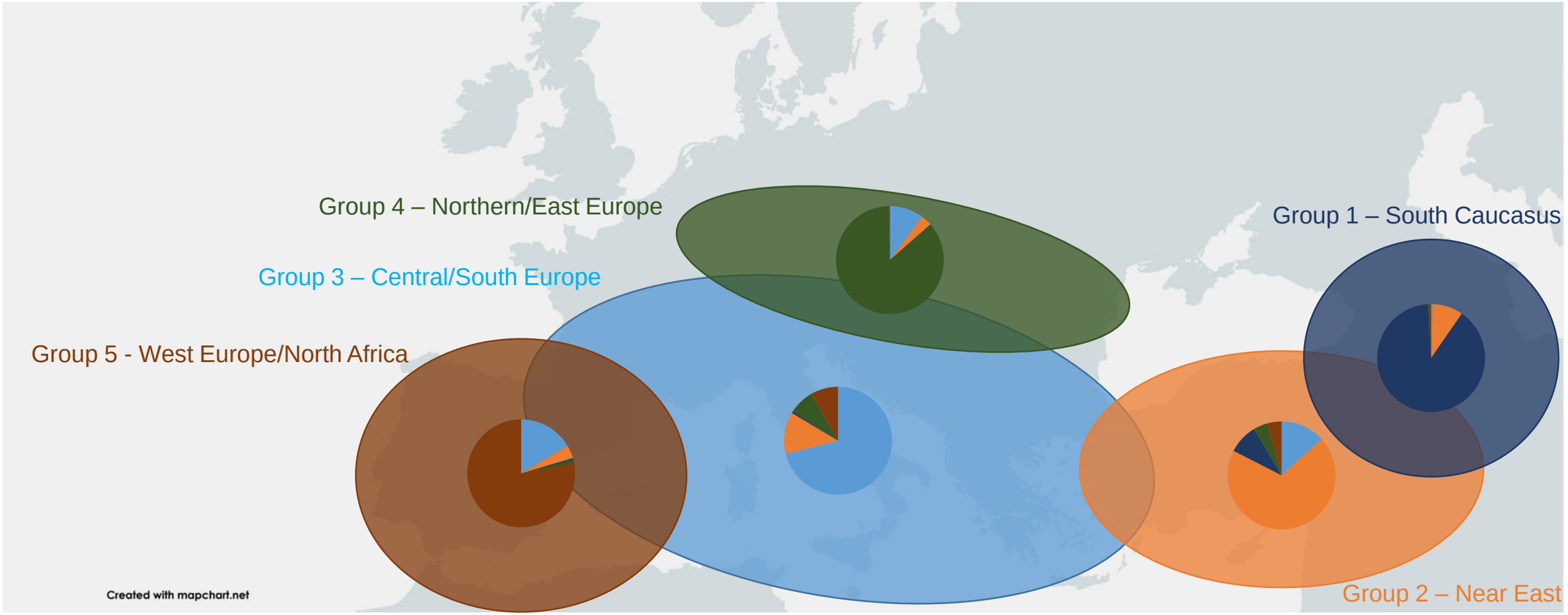
Genetic groups - Structure

K=5



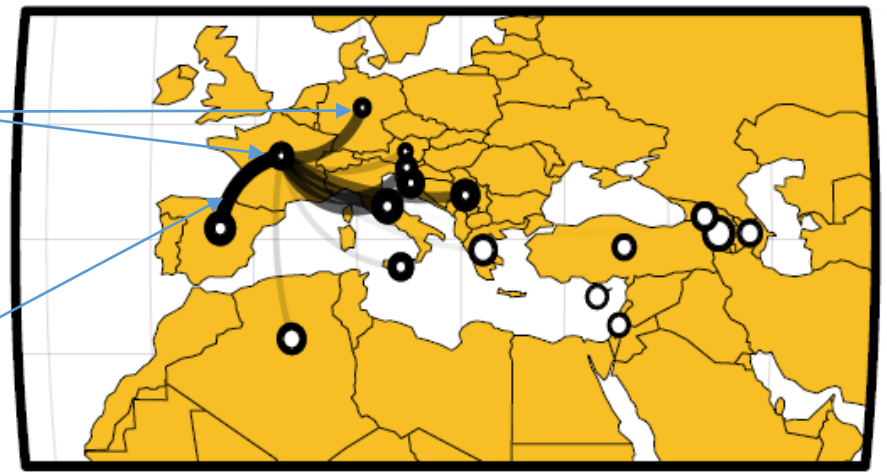
- Great geographical representation

Genetic groups



Remixture

France

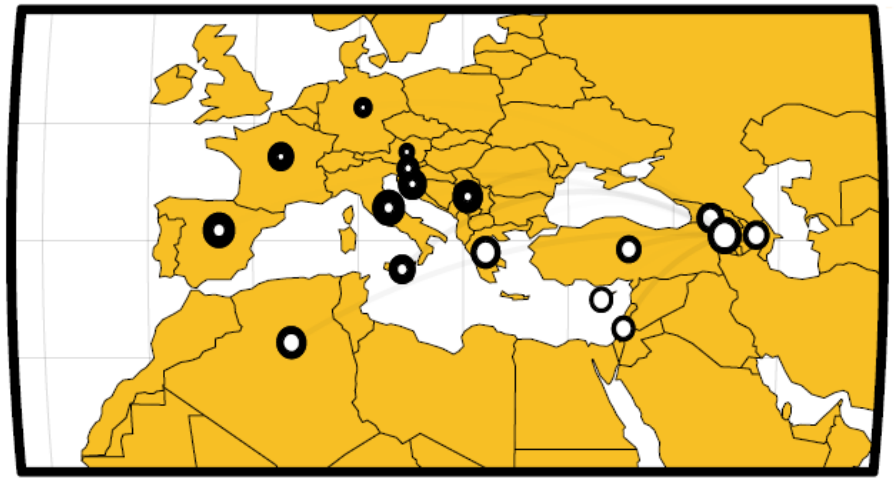


More shared, less unique regional diversity

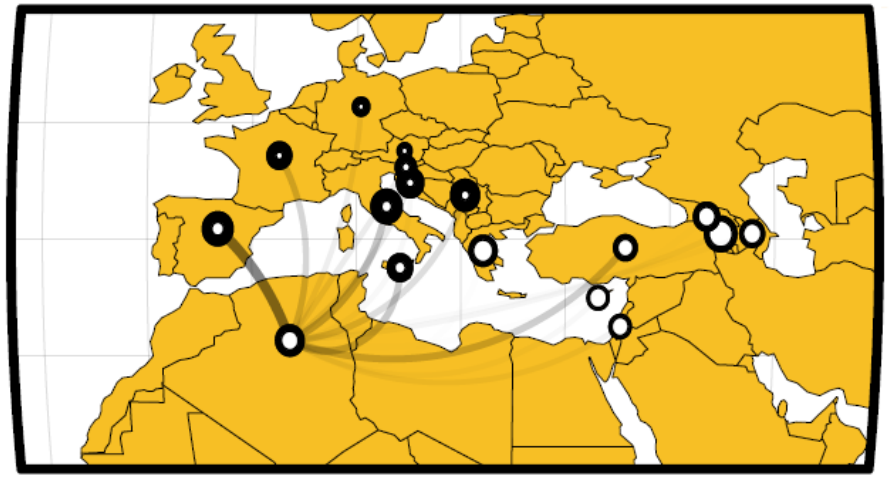
Significant overlap, especially between neighbouring regions

1) European regions share diversity a lot
2) In contrast, there is surprisingly little sharing among middle-eastern regions, and much unique diversity in each region's pool.
3) The small amount of overlap between west and eastern diversity pools is contributed to most Mediterranean regions: African countries, Italy, Turkey etc.

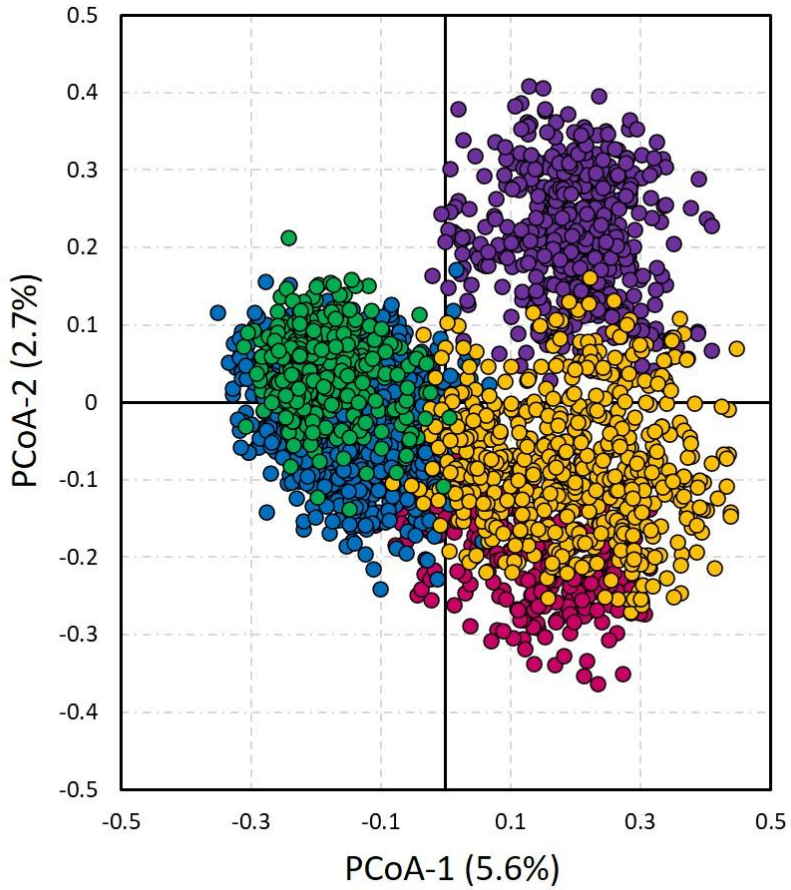
Armenia

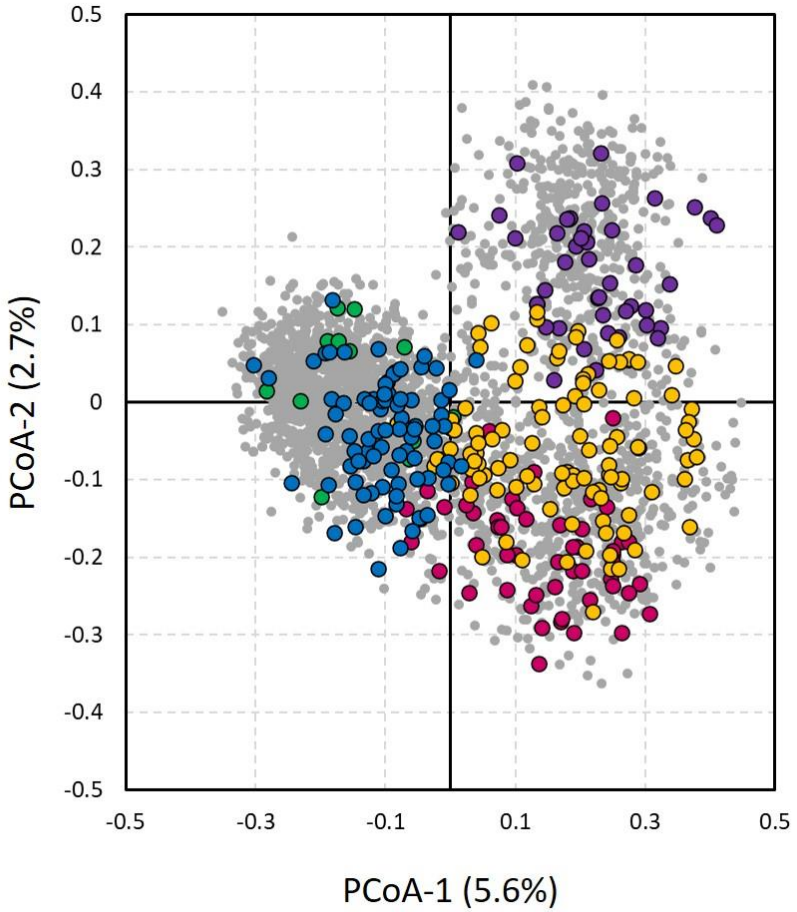


Algeria_Morocco_Tunisia



Core collection for preservation





- 300 individuals well distributed across all 5 groups

Summary

- Natural habitats of *Vitis sylvestris* are severely under threat
- Population sizes decline steady

- Natural *Vitis sylvestris* populations seem to seperate in five genetic groups
- European populations share diversity a lot
- Near/Middle Eastern regions share less diversity with a unique gene pool
- A core collection of 300 individuals for preservation was calculated

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THANK YOU

Kristine Margaryan, Georgios Merkouropoulos, Valérie Laucou, Gabriella De Lorenzis, Javier Tello, Goran Zdunic, Maite de Andrés, Francisco Baeta, Jorge Cunha, Osvaldo Failla, Maria Stella Grando, Javier Ibáñez, Thierry Lacombe, Luka Marinov, Gregorio Munoz, Giacomo Pellissetti, Savvas Savvides, Anna Schneider, Dimitrios Taskos, Ibrahim Uzun, Dragoslav Ivanisevic, Edi Maletic, Andrej Perko, Mark Timothy Rabanus-Wallace, Stanko Vrisic, Reinhard Töpfer & Erika Maul