fondazione banfi

SANGUIS JOVIS

CLIMA, VITE, CANTINA, MERCATO
Come sarà il Sangiovese del futuro?

PROGRAMMA

10 - 14 SETTEMBRE 2018

SUMMER SCHOOL SANGUIS JOVIS

II° edizione

MARTEDÌ 11 SETTEMBRE

Climate Change e terra. L'impatto del cambiamento climatico sulle caratteristiche dei suoli e sulle malattie della vite.

Il climate change e la terra: i meccanismi di adattamento della vite. Prof. Osvaldo Failla

Essere adatti

e

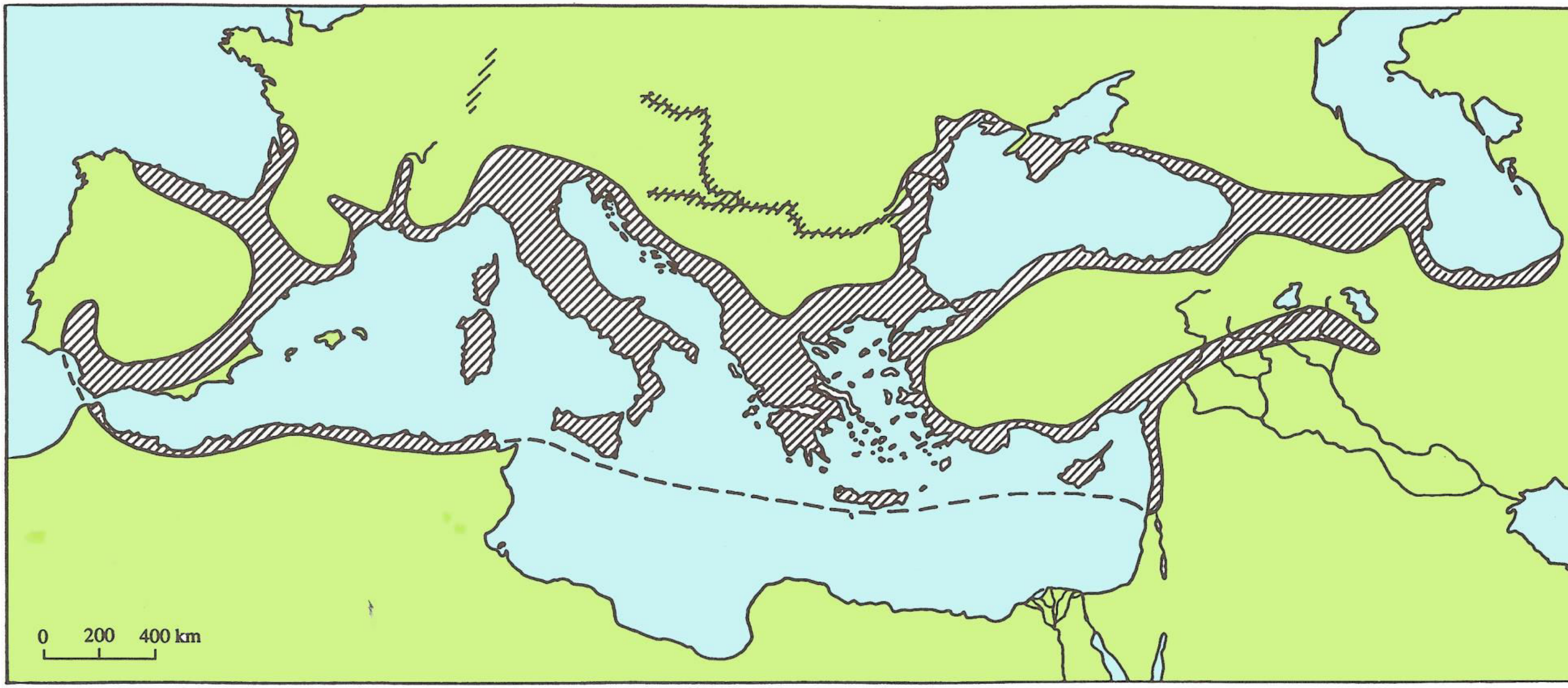
adattarsi

La plasticità fenotipica

e

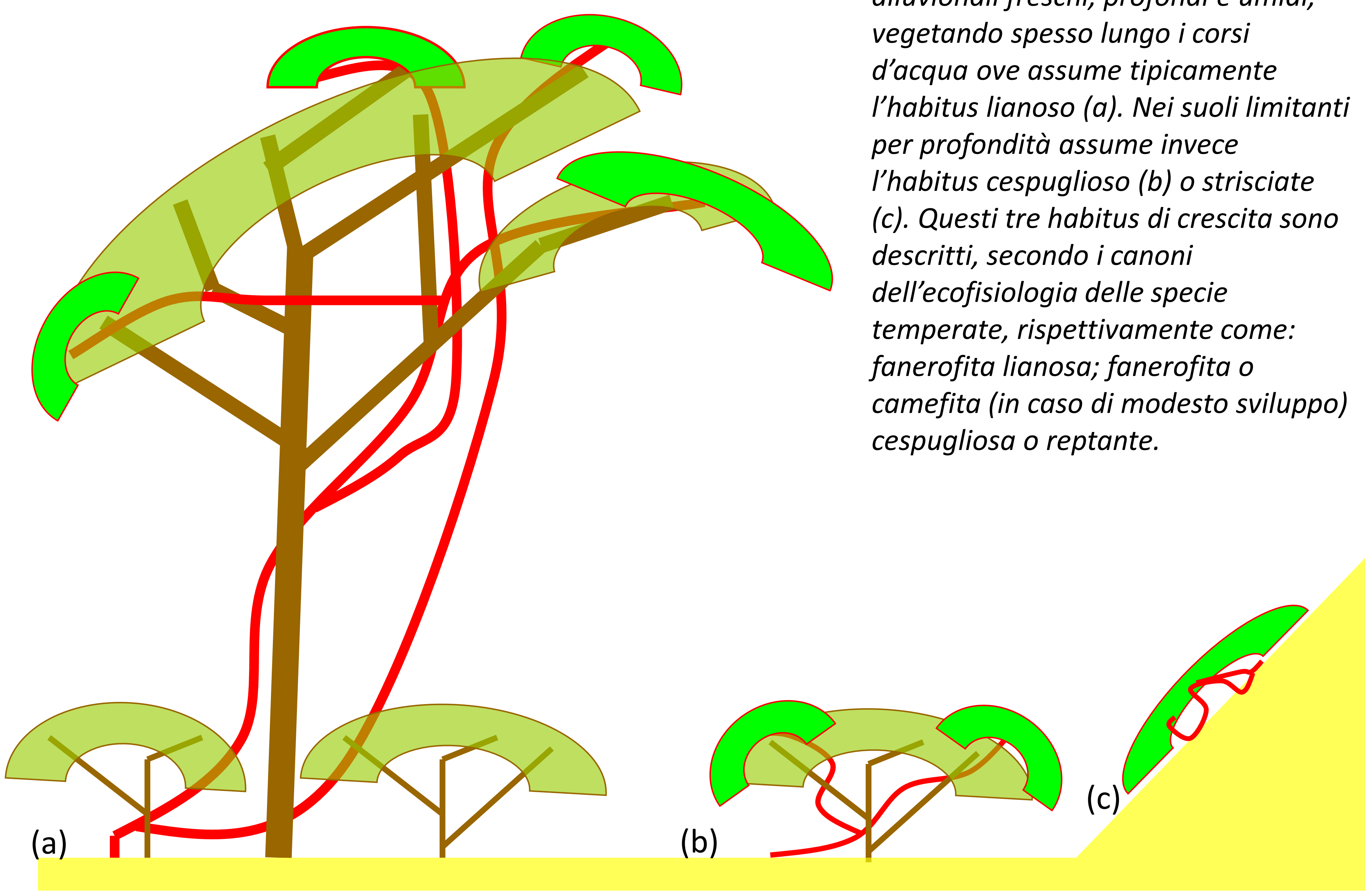
l'adattamento all'ambiente

The distribution range of wild grapevine (*Vitis vinifera* ssp. *silvestris*)



Mediterranean, sub-Mediterranean and Caucasian floristic regions with a dilatation toward the Pontic and Caspian ones

… and Central Asia



La vite in natura è una specie ripariale, predilige cioè i suoli alluvionali freschi, profondi e umidi, vegetando spesso lungo i corsi d'acqua ove assume tipicamente l'habitus lianoso (a). Nei suoli limitanti per profondità assume invece l'habitus cespuglioso (b) o strisciate (c). Questi tre habitus di crescita sono descritti, secondo i canoni dell'ecofisiologia delle specie temperate, rispettivamente come: fanerofita lianosa; fanerofita o camefita (in caso di modesto sviluppo) cespugliosa o reptante.

Ecologically adaptable from warm to cool winter (low chill requirement, quite good frost resistant)

Prudent in the spring sprouting (suitable to Mediterranean climate)

Liana responsiveness to water, light and thermal availability (able to grow vegetatively - and to develop - also with relatively low light intensity and temperature; unable to ripe fruit in the same conditions)

Tending to have a summer rest fruit before ripening (suitable to Mediterranean climate).

Grapevine auto-ecology

Temperate deciduous woody liana

Low chilling requirement (ca. 200 C.U. / 7 consecutive days Tm < 10°C)

Late spring sprouting (high thermal requirement)

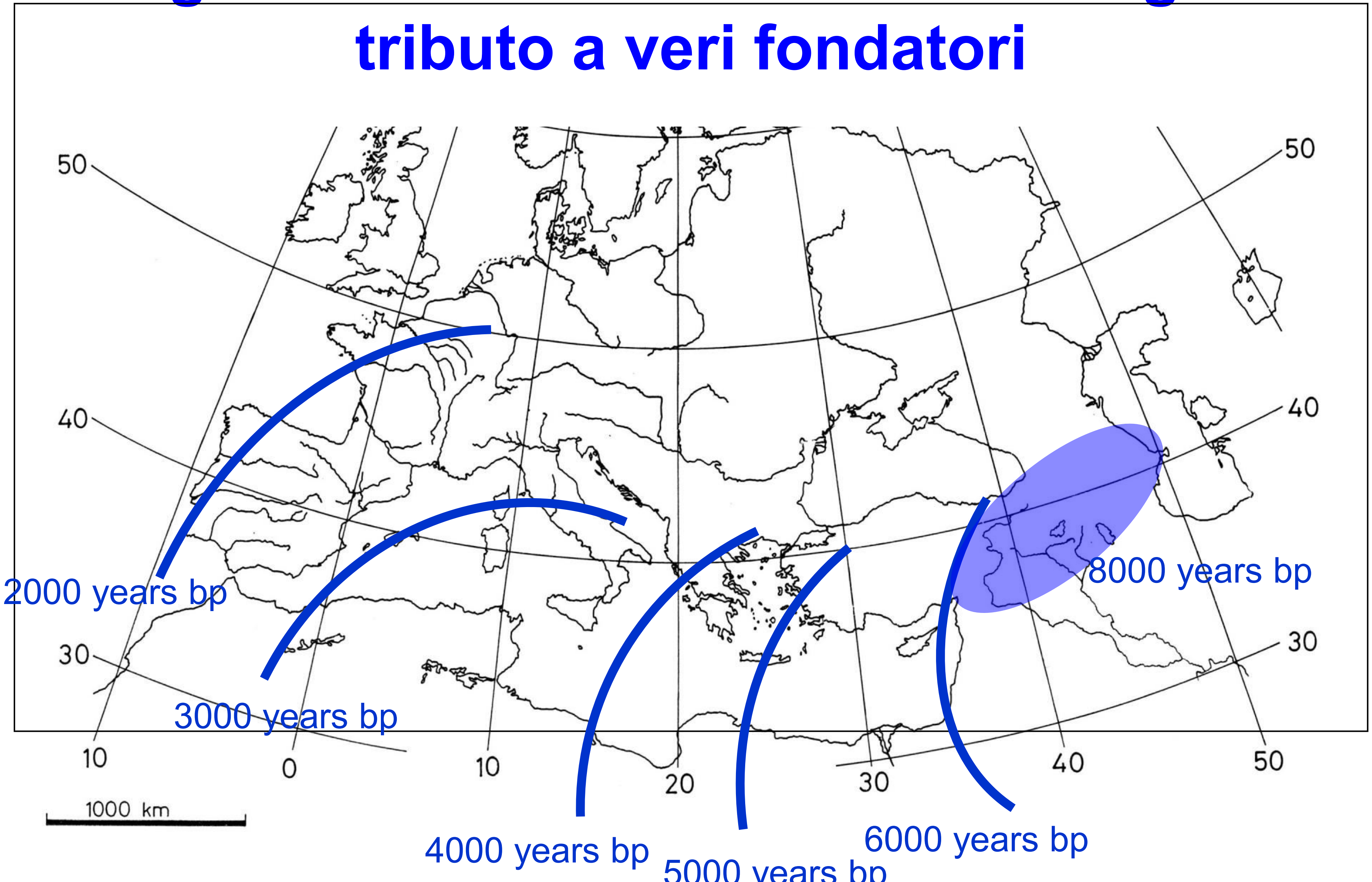
Late flowering time (late spring)

Medium (80 days) to long (150 days) phase of fruit growth and ripening

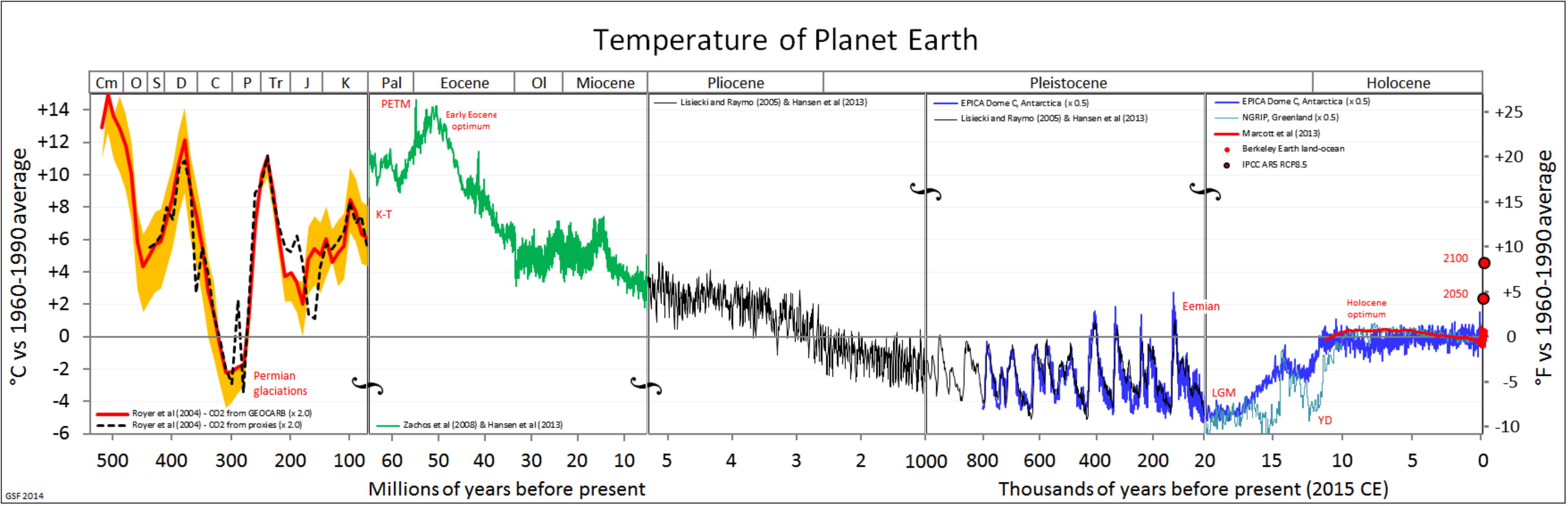
High thermal and light requirements for floral bud differentiation

High thermal requirement for fruit ripening

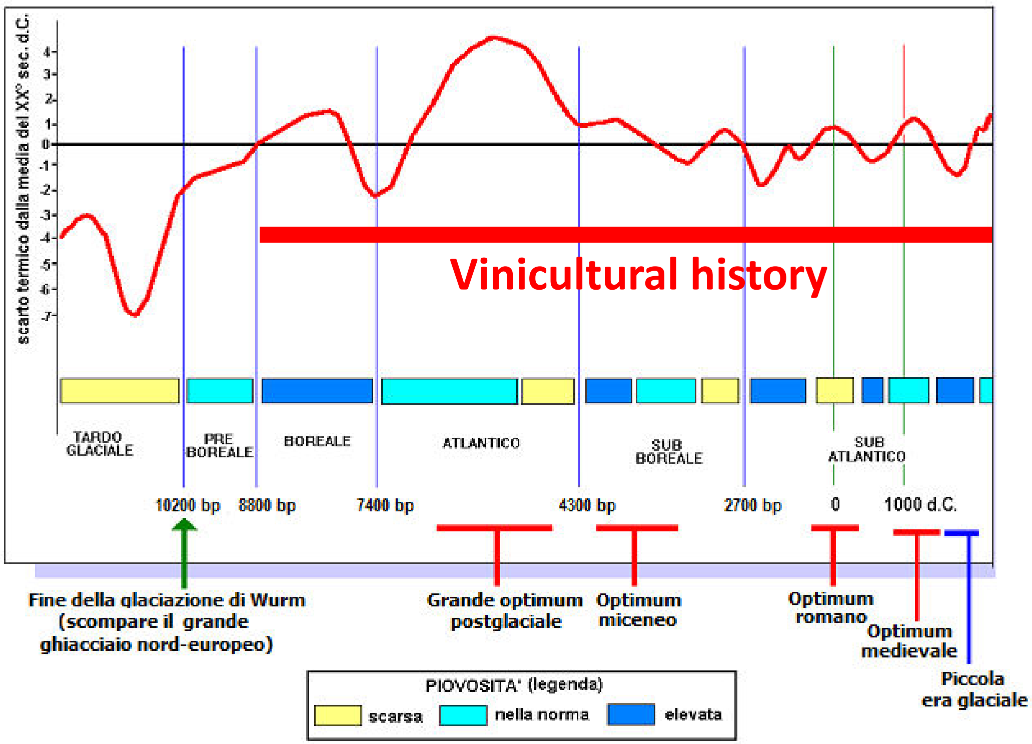
L'origine della viticoltura e dell'enologia: un tributo a veri fondatori



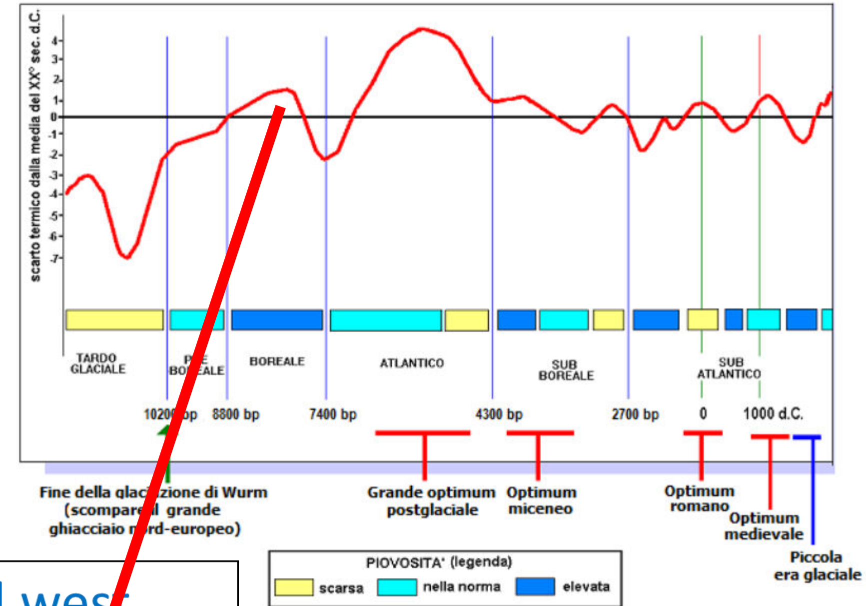
Cronologia della diffusione della viti-enologia da est ad ovest



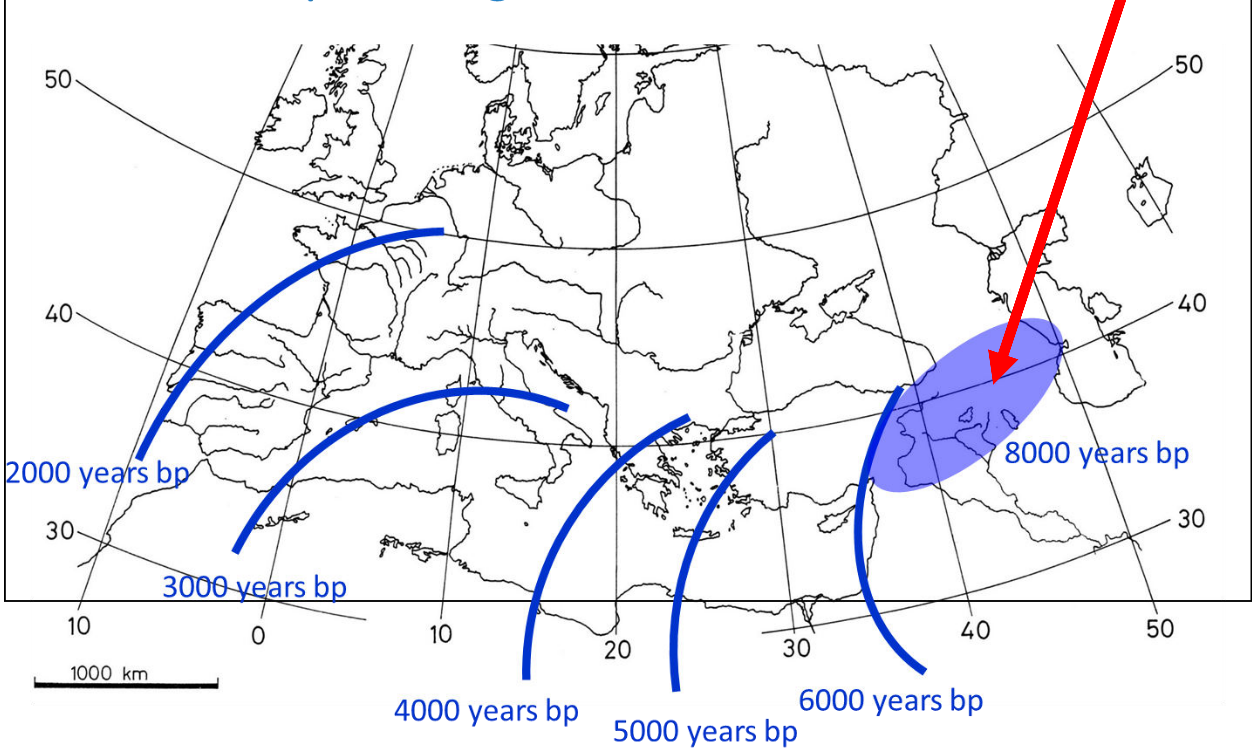
During its long history, viticulture had to adapt to several climate changes within a wide range of geographical conditions.



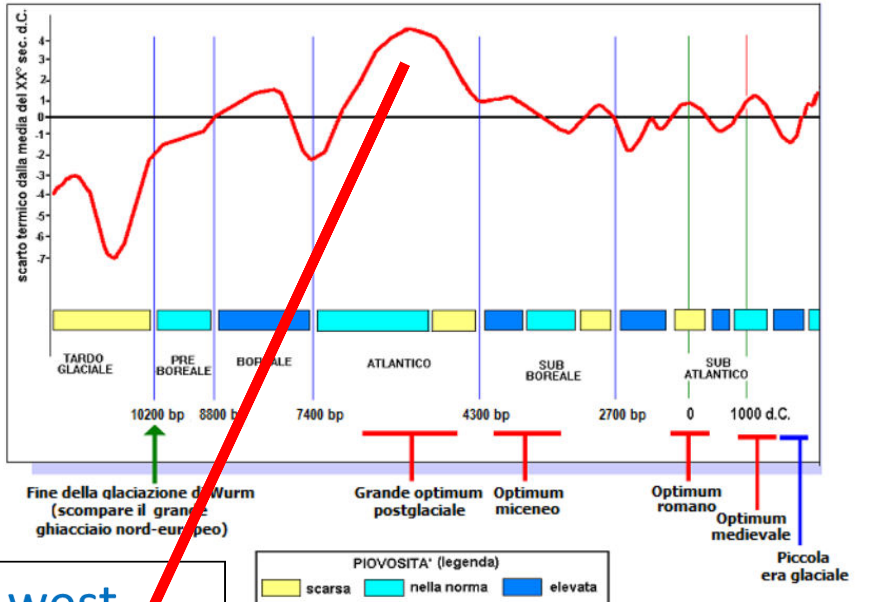
Viniculture origin and primary domestication of the grapevines took place during the boreal phase, warm and humid.

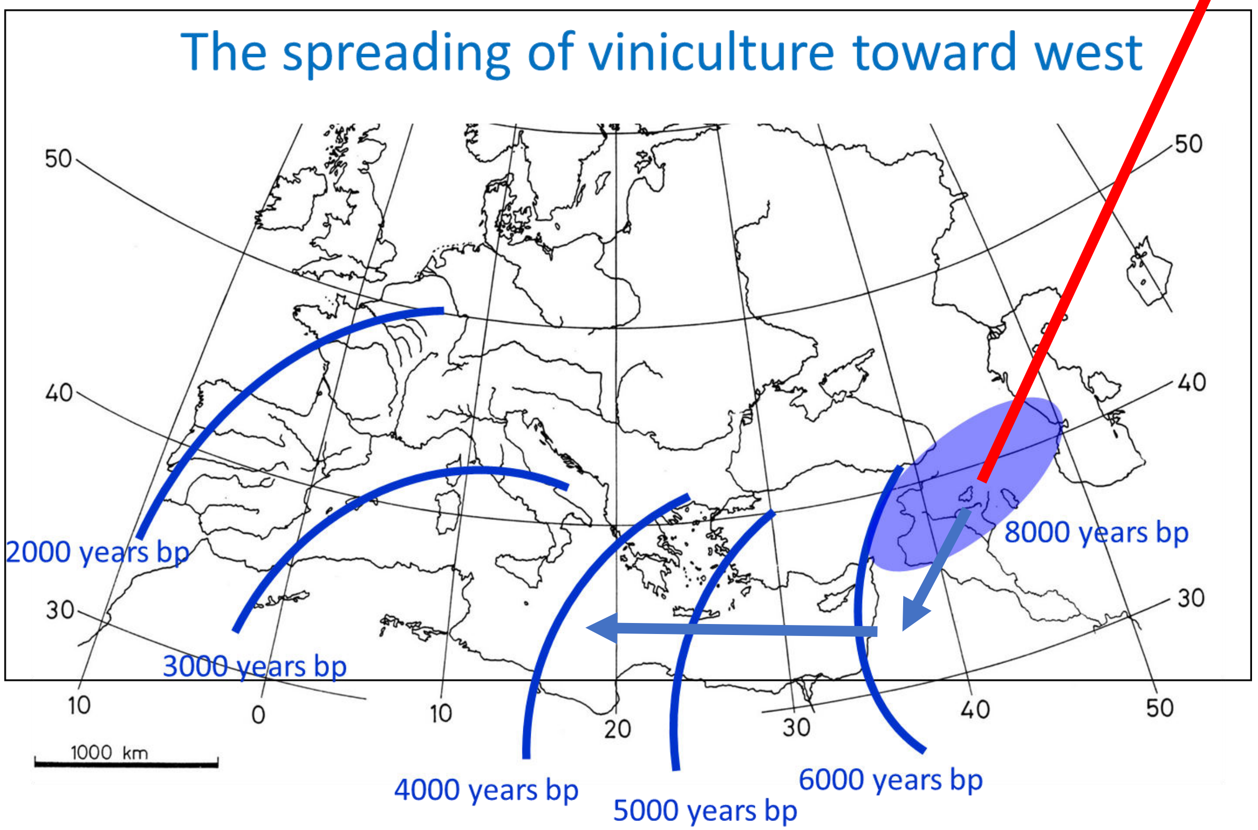


The spreading of viniculture toward west

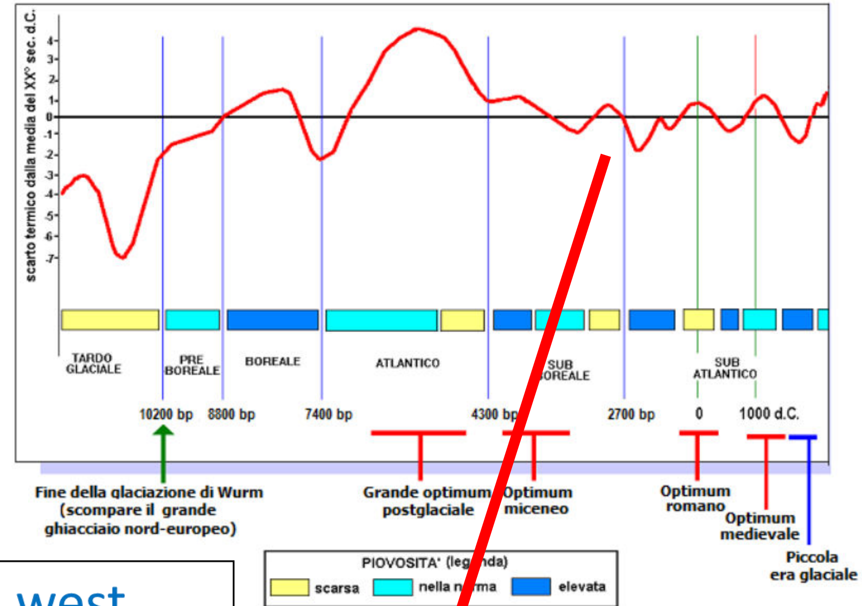


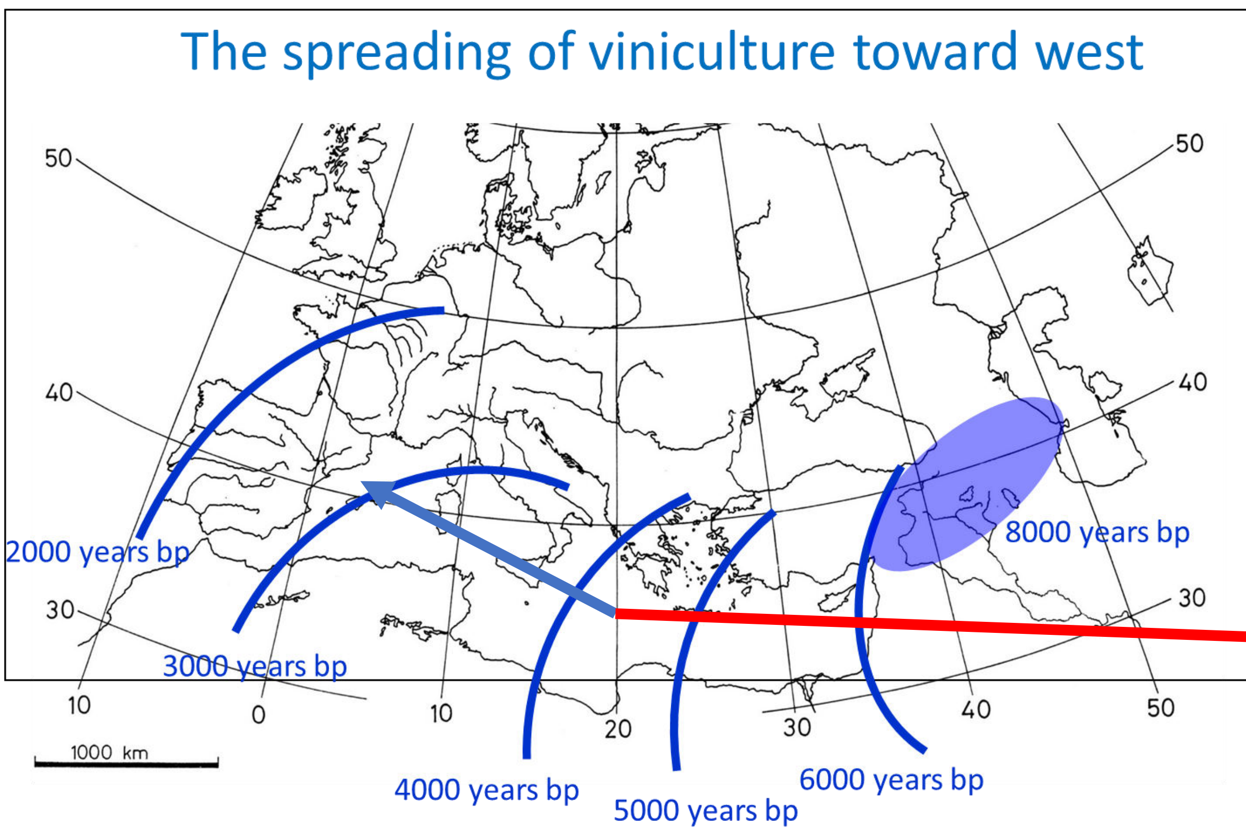
The spreading of viniculture outside the Caucasian regions toward south and west took place during the post glacial climatic optimum, very warm and humid.



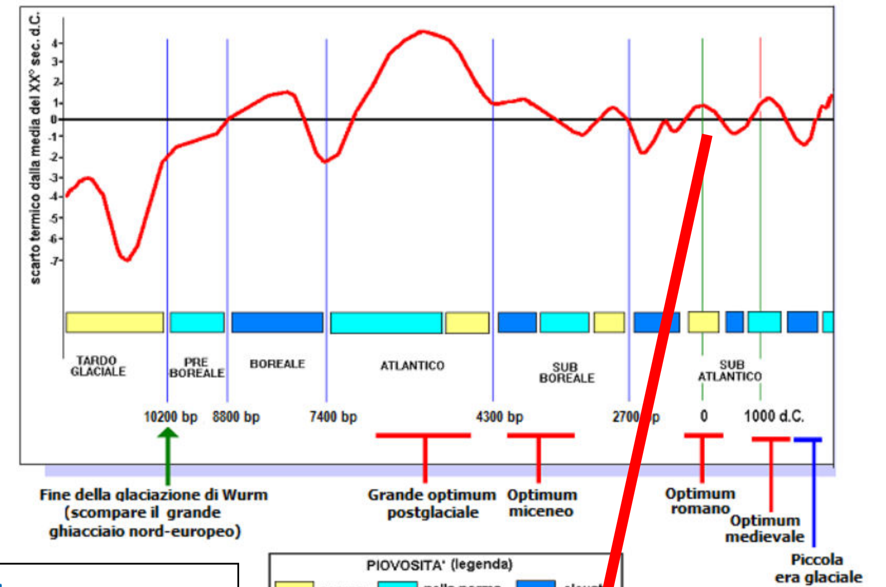


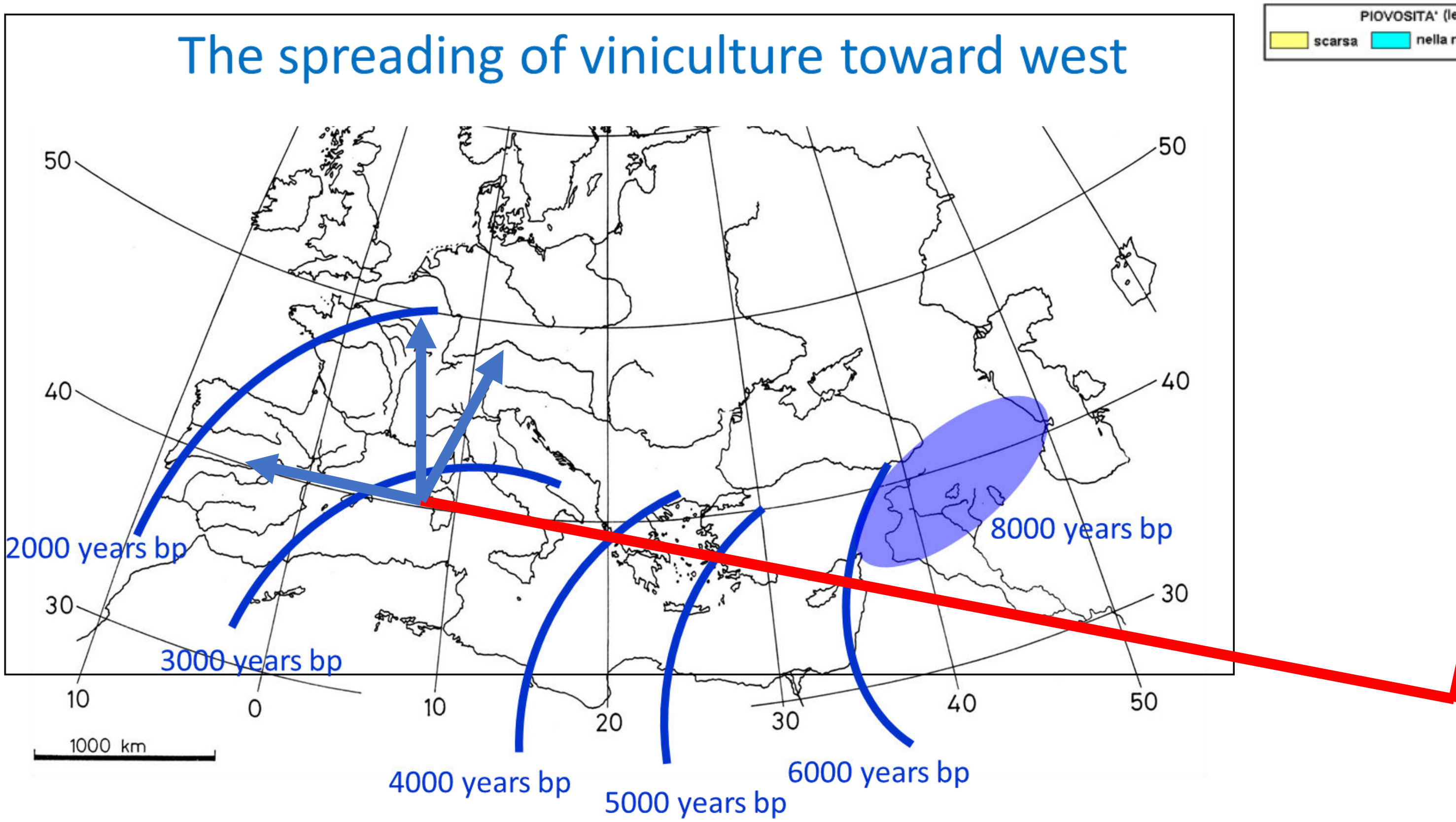
The further spreading of viniculture toward the central Mediterranean basin continued in the post boreal phase characterized by a cool and dry and by a warmer and humid phases



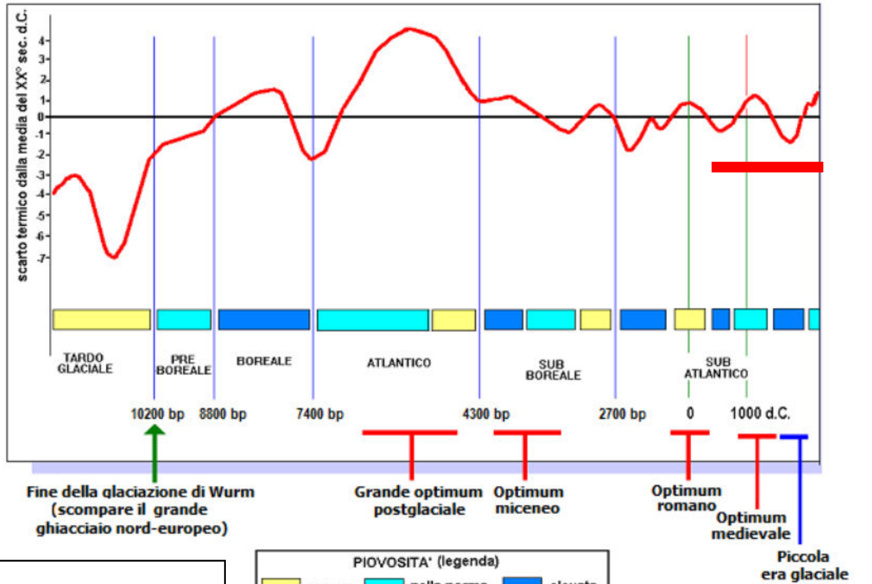


The diffusion of viniculture in the Old World was completed during the Roman climatic optimum: warm and dry.

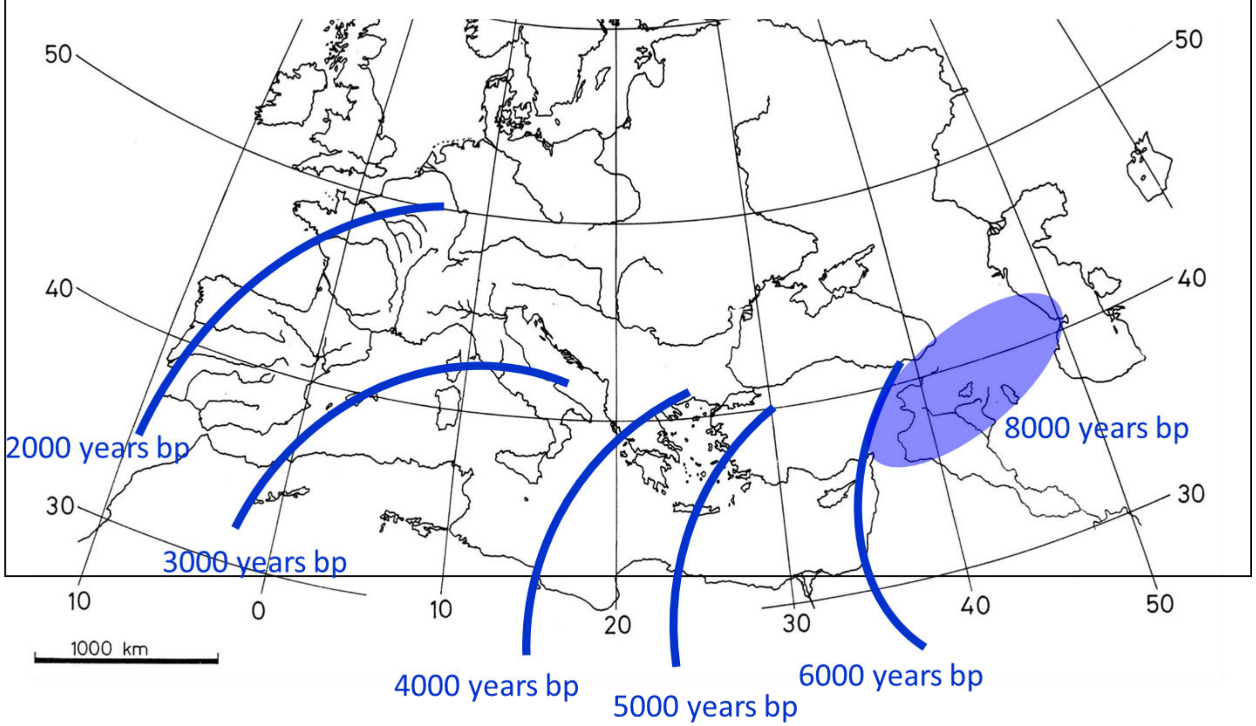


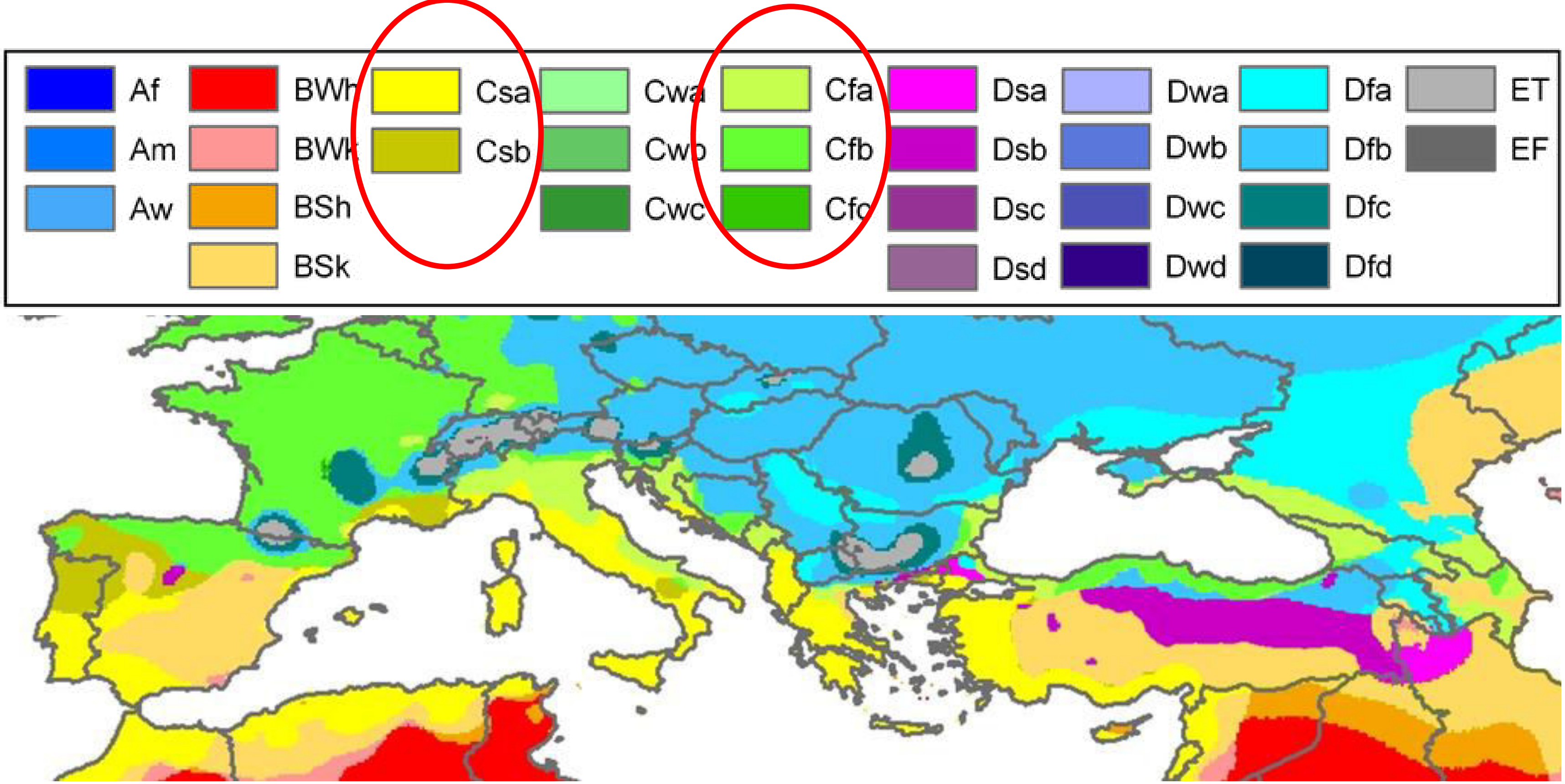


Afterwards cooler and warmer periods characterized the European climate including: the Medieval optimum and the little glacial age.

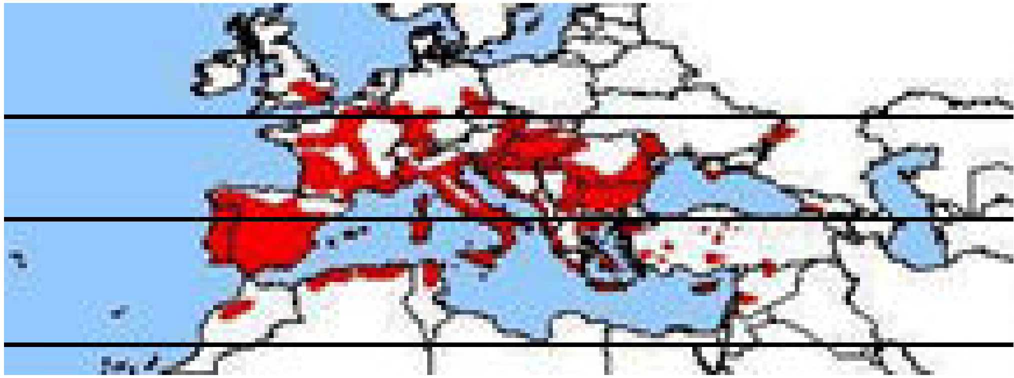


The spreading of viniculture toward west



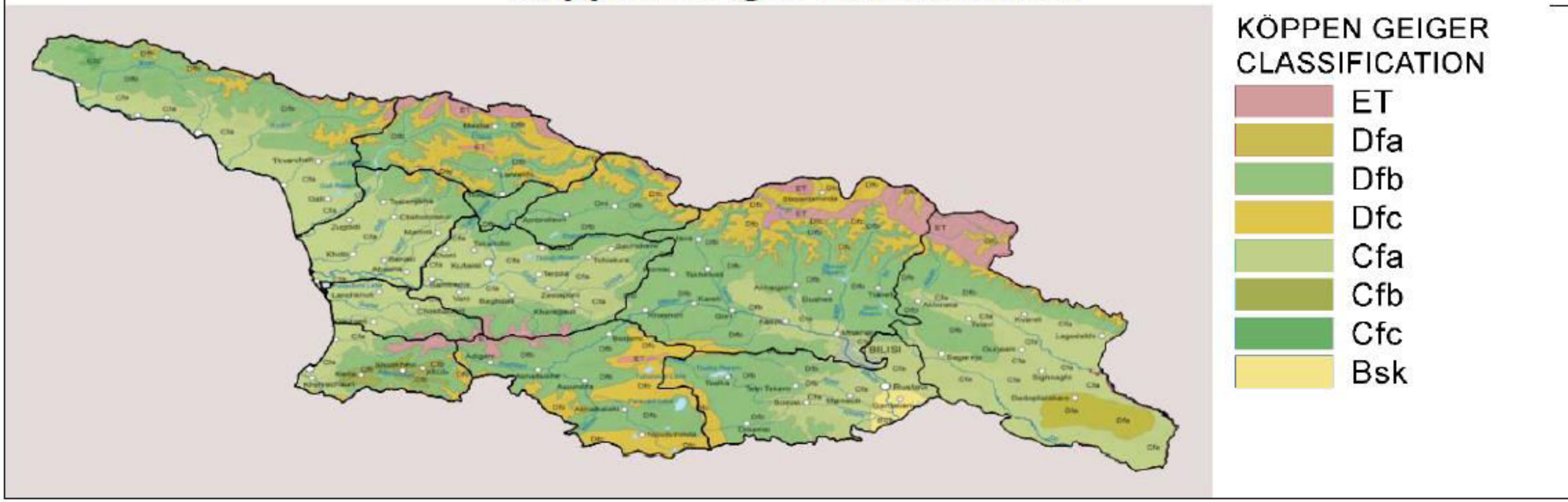


Range of viticulture



in Europe is mainly cultivated in Köppen – Geiger Cs (summer dry) and Cf (fully humid) climates.

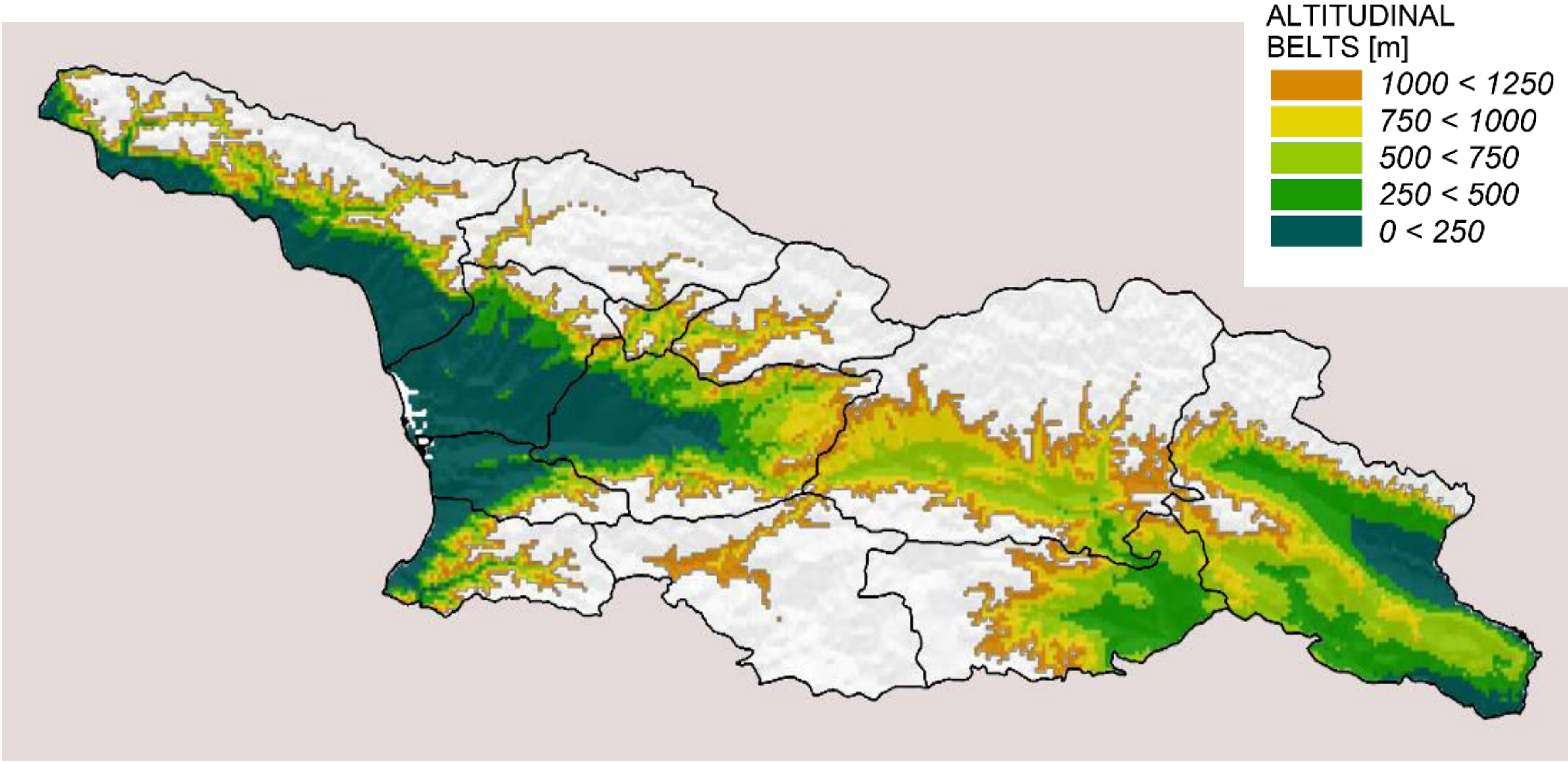
Köppen Geiger Classification

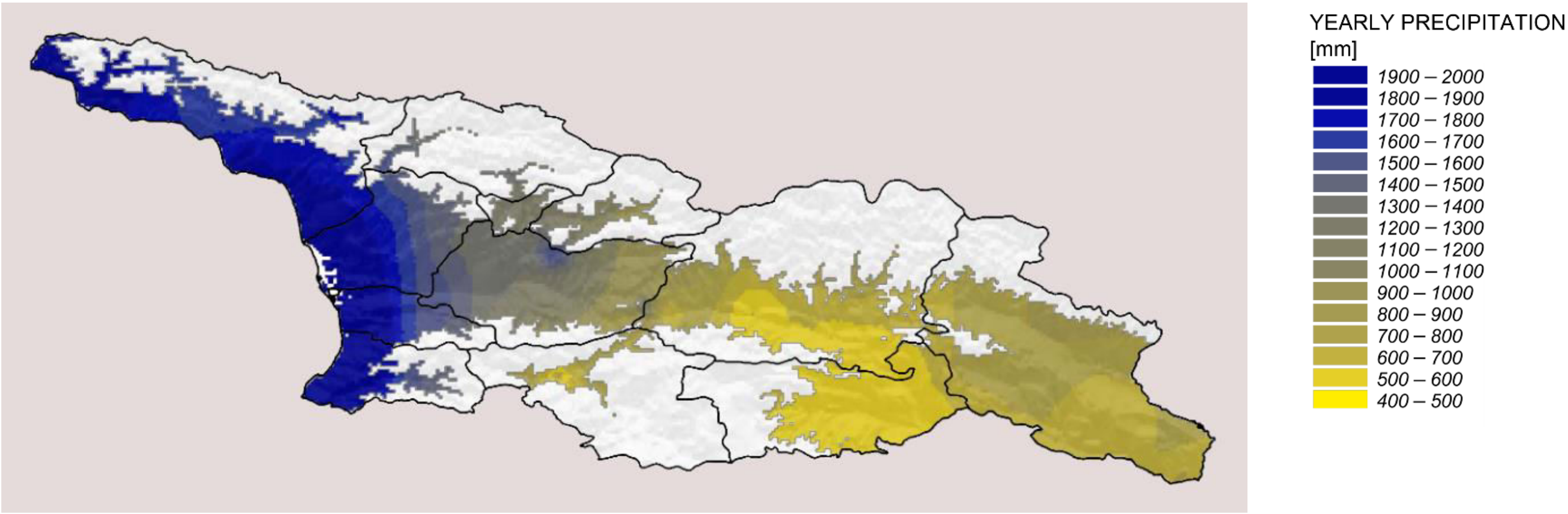


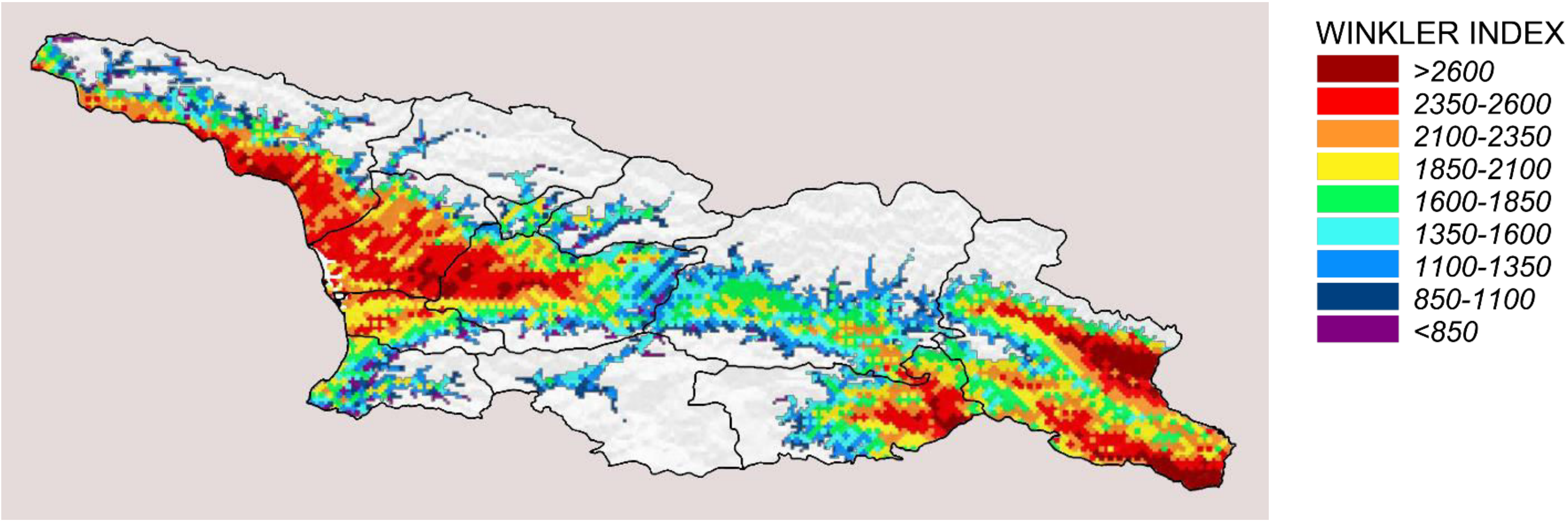
Köppen Geiger Classification (1974-2013)

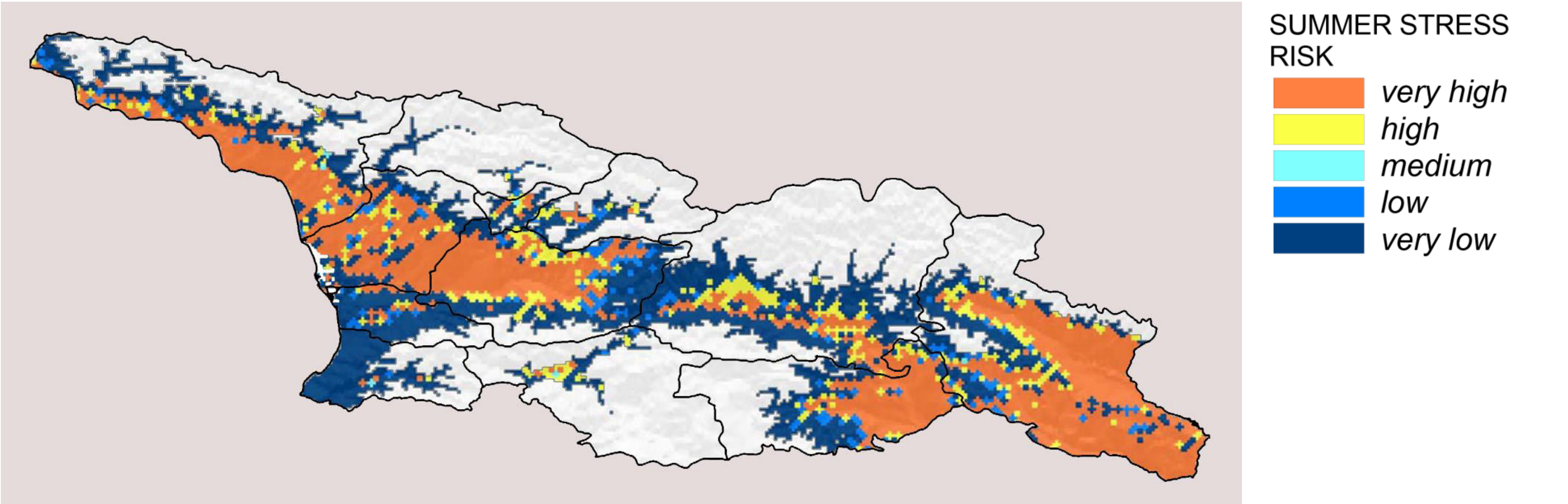
The Köppen Geiger Climate Classification System is one of the most widely used systems for classifying the world's climates. Its is based on the annual and monthly averages of temperature and precipitation (Köppen, 1936, Geiger, 1954) and classifies the Georgian areas in the following types:

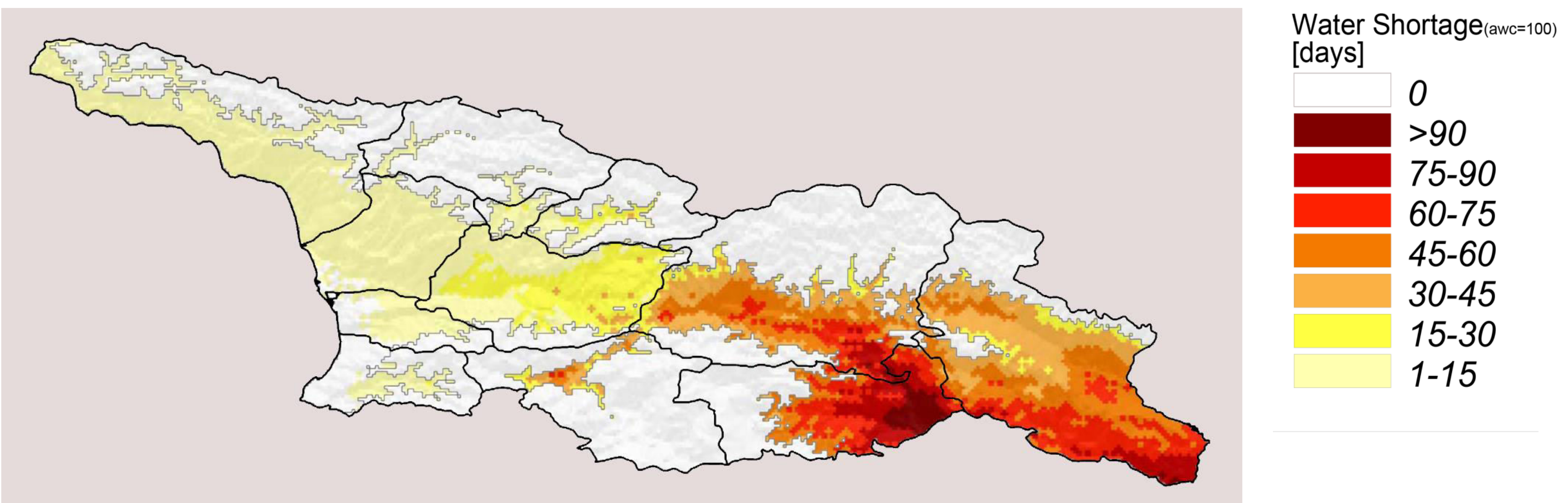
- ET – Polar and Alpine climate
- Dfa – Continental fully humid climate with a hot summer
- Dfb - Continental fully humid climate with a warm summer
- Dfc - Continental fully humid climate with a cool summer
- Cfa – Warm temperature fully humid climate with a hot summer
- Cfb - Warm temperature fully humid climate with a warm summer
- Cfc - Warm temperature fully humid climate with a cool summer
- Bsk – Arid steppe cold climate


ALTITUDINAL
BELTS [m]
1000 < 1250
750 < 1000
500 < 750
250 < 500
0 < 250


YEARLY PRECIPITATION
[mm]
1900 – 2000
1800 – 1900
1700 – 1800
1600 – 1700
1500 – 1600
1400 – 1500
1300 – 1400
1200 – 1300
1100 – 1200
1000 – 1100
900 – 1000
800 – 900
700 – 800
600 – 700
500 – 600
400 – 500


WINKLER INDEX
>2600
2350-2600
2100-2350
1850-2100
1600-1850
1350-1600
1100-1350
850-1100
<850


SUMMER STRESS RISK
very high
high
medium
low
very low


Water Shortage(awc=100) [days]
0
>90
75-90
60-75
45-60
30-45
15-30
1-15

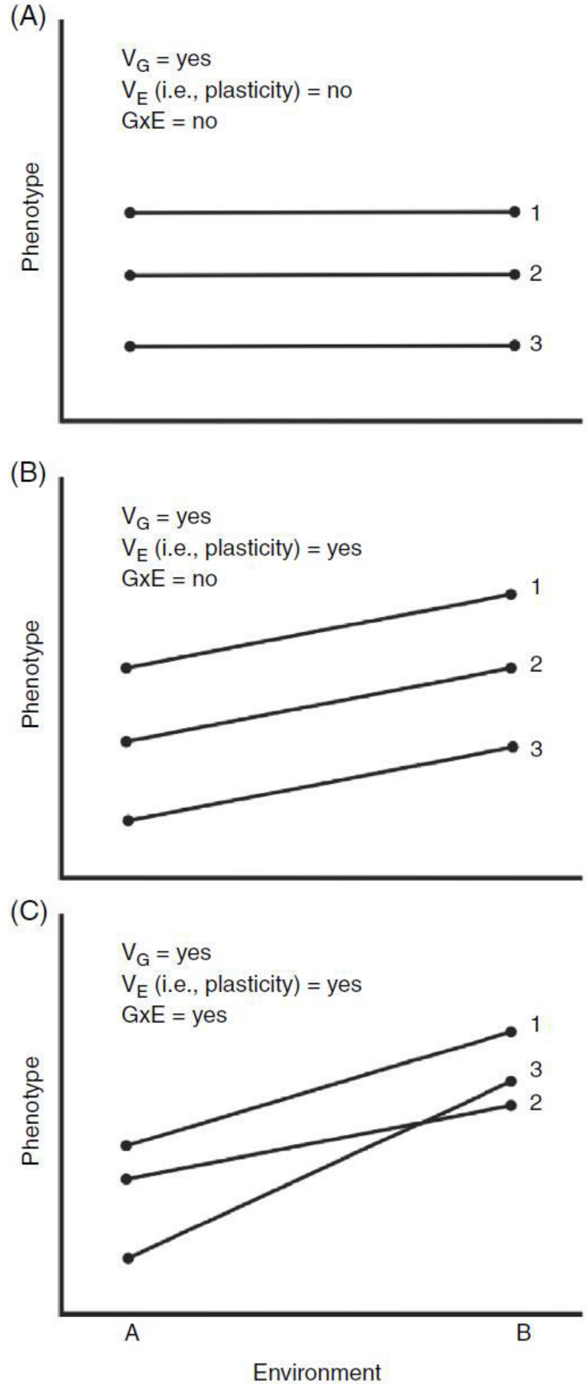

(A)
V_G = yes
V_E (i.e., plasticity) = no
GxE = no
Phenotype
1
2
3
(B)
V_G = yes
V_E (i.e., plasticity) = yes
GxE = no
Phenotype
1
2
3
(C)
V_G = yes
V_E (i.e., plasticity) = yes
GxE = yes
Phenotype
1
3
2
A
B
Environment

Table 1 Selected Definitions of "Phenotypic Plasticity," Associated Terms, and More Specific Terminology

Definitions of "phenotypic plasticity"	Source (page number)
"All types of environmentally induced phenotypic variation"	Stearns (166) (p. 436)
"Alteration of organismal form by changes in the environment"	Pigliucci and Schlichting (127) (p. 21)
"The property of a given genotype to produce different phenotypes in response to distinct environmental conditions"	Pigliucci (122) (p. 1)
"Is any change in an organism's characteristics in response to an environmental signal"	Schlichting and Smith (146) (p. 190)
"The ability of an organism to react to an internal or external environmental input with a change in form, state, movement, or rate of activity"	West-Eberhard (181) (p. 34)
"Environment-dependent phenotype expression"	DeWitt and Scheiner (38) (p. 1)
"Ability of a single individual to develop into more than one phenotype"	Gilbert and Epel (61) (p. 6)
Associated terms	
Canalization: "The stability of a particular developmental trajectory in the face of random, but not persistent and predictable, environmental changes"	Pigliucci and Schlichting (127) (p. 83)
Developmental instability: "The within-environment phenotypic variance for a given genotype"	DeWitt et al. (39) (p. 79)
Developmental noise: "Random fluctuations that arise during development that alter the phenotypic product of development"	DeWitt and Scheiner (38) (p. 5)
Homeostasis: "Physiological canalization stemming from plasticity in other physiological, morphological, and behavioral traits."	Woods (190) (p. 656)
Specific terminology for phenotypic plasticity	
Phenotypic flexibility: "Reversible changes in individual phenotypes comprising flexible responses to changing tasks"	Piersma and Lindstrom (119) (p. 135)
Acclimation and acclimatization: "The adjustments of physiological traits to ambient environmental conditions in the laboratory and the field, respectively"	Piersma andDrent (118) (p. 228)
Developmental plasticity: "Environmental factors can influence development by acting at any time after formation of the zygote, or in some cases even before (e.g., maternal effects acting on the unfertilized egg)."..." Whenever they act, the consequences of environmental effects are often termed developmental or phenotypic plasticity."	Garland and Kelly (56) (p. 2345)
Polyphenism: "The ability of one genotype to produce two or more discrete phenotypes in response to an environmental signal"	Stearns (166) (p. 438)

Note: In a few cases, words have been rearranged for purposes of clarity and consistency, but the meaning has not been altered.

Kelly, S. a., Panhuis, T. M., & Stoehr, A. M. (2012). Phenotypic plasticity: Molecular mechanisms and adaptive significance. *Comprehensive Physiology*, *2*(2), 1417–1439. doi:10.1002/cphy.c110008

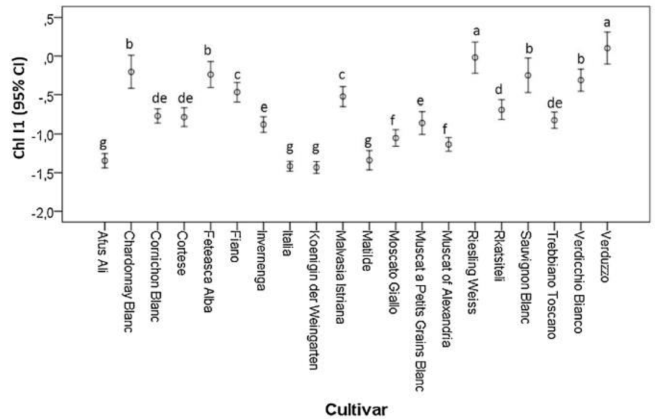


Fig. 2. Varietal chlorophyll content mean values of the control samples in the three phenological stages. 95% Confidence interval bars are reported; different letters indicate statistically different concentrations obtained by comparing averages with a LSD value of 0.155.

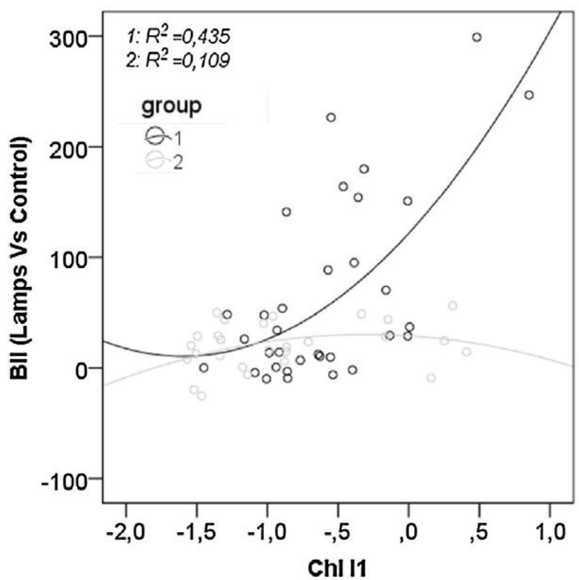


Fig. 6. Correlations between radiative susceptibility (BII) during berry development and varietal control chlorophyll concentration. In group 1 an increase in chlorophyll content results in higher symptom appearance. In group 2 BII values are low and independent of the initial chlorophyll concentrations.

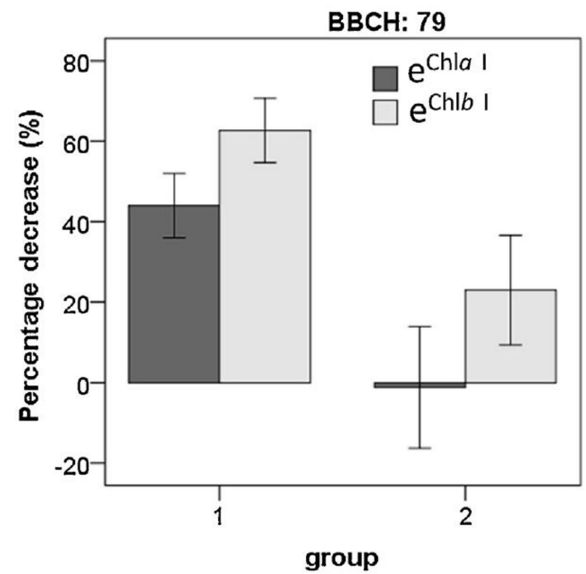
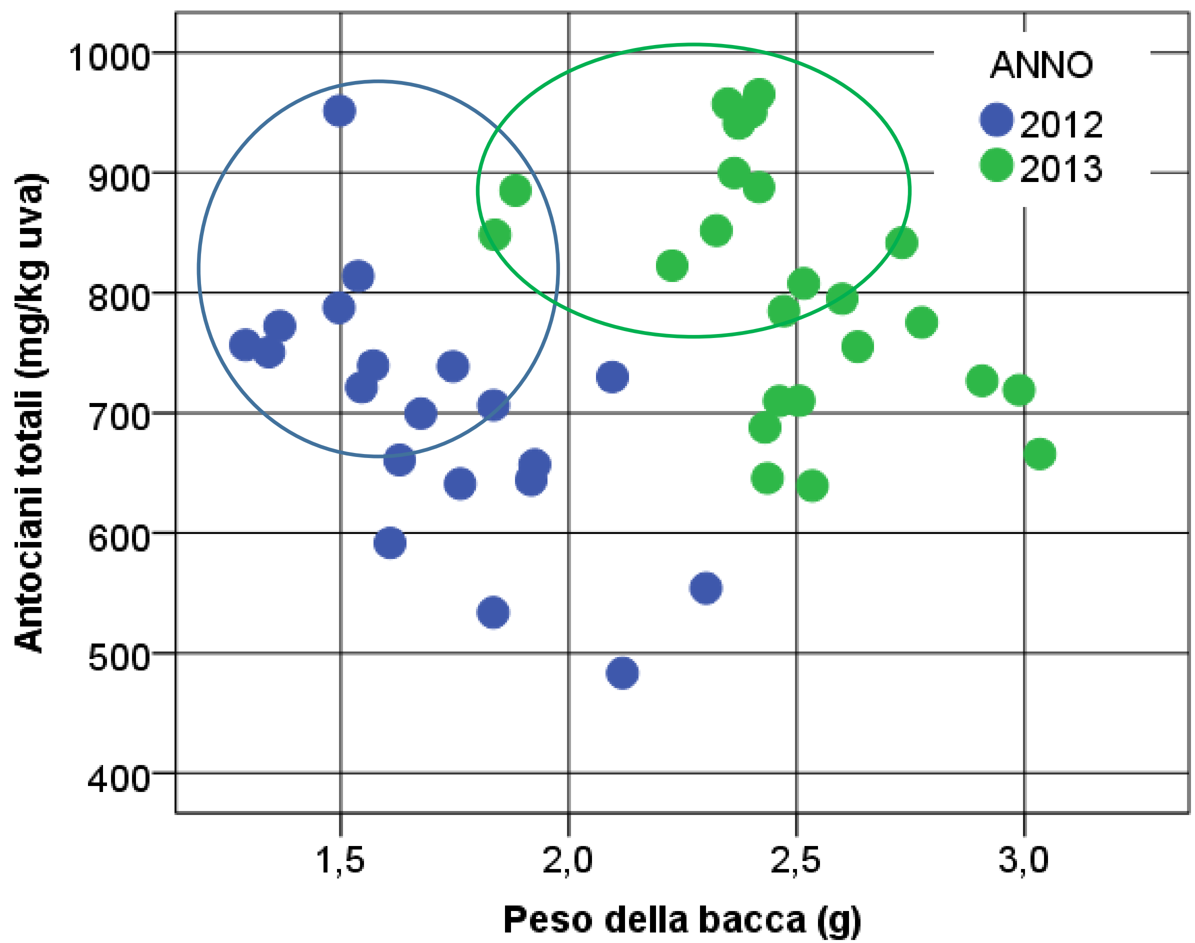
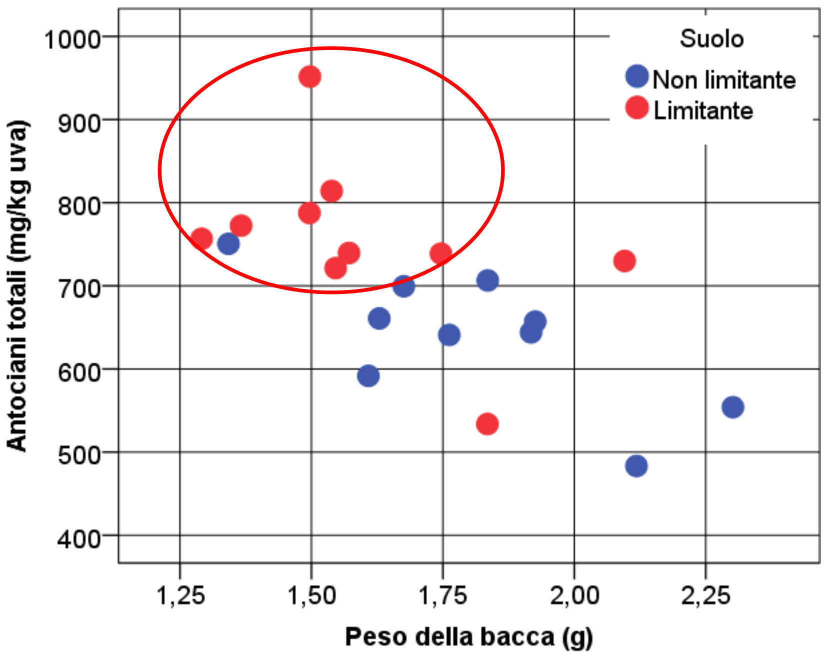


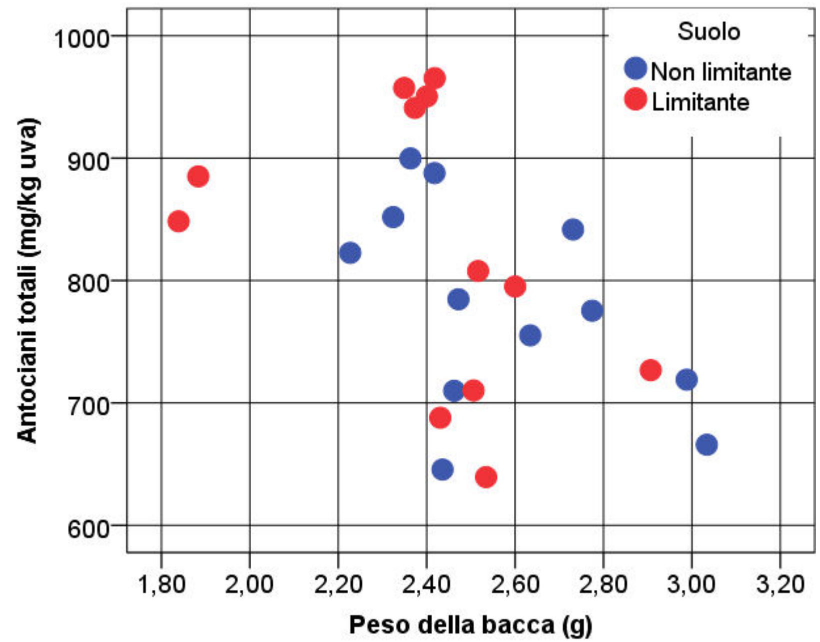
Fig. 7. Chlorophyll *a* and *b* variation caused by light exposure. In general, it is possible to note that chlorophyll *b* underwent a stronger degradation than chlorophyll *a*. 95% confidence interval bars are reported.

RUSTIONI L., MILANI, C., PARISI, S., FAILLA O. 2015 Chlorophyll role in berry sunburn symptoms studied in different grape (Vitis vinifera L.) cultivars. Scientia Horticulturae, 185, 145–150. doi:10.1016/j.scienta.2015.01.029



ANNO
2012
2013
Antociani totali (mg/kg uva)
1000
900
800
700
600
500
400
1,5
2,0
2,5
3,0
Peso della bacca (g)


Suolo
Non limitante
Limitante
Antociani totali (mg/kg uva)
1000
900
800
700
600
500
400
1,25
1,50
1,75
2,00
2,25
Peso della bacca (g)


Suolo
Non limitante
Limitante
Antociani totali (mg/kg uva)
1000
900
800
700
600
1,80
2,00
2,20
2,40
2,60
2,80
3,00
3,20
Peso della bacca (g)