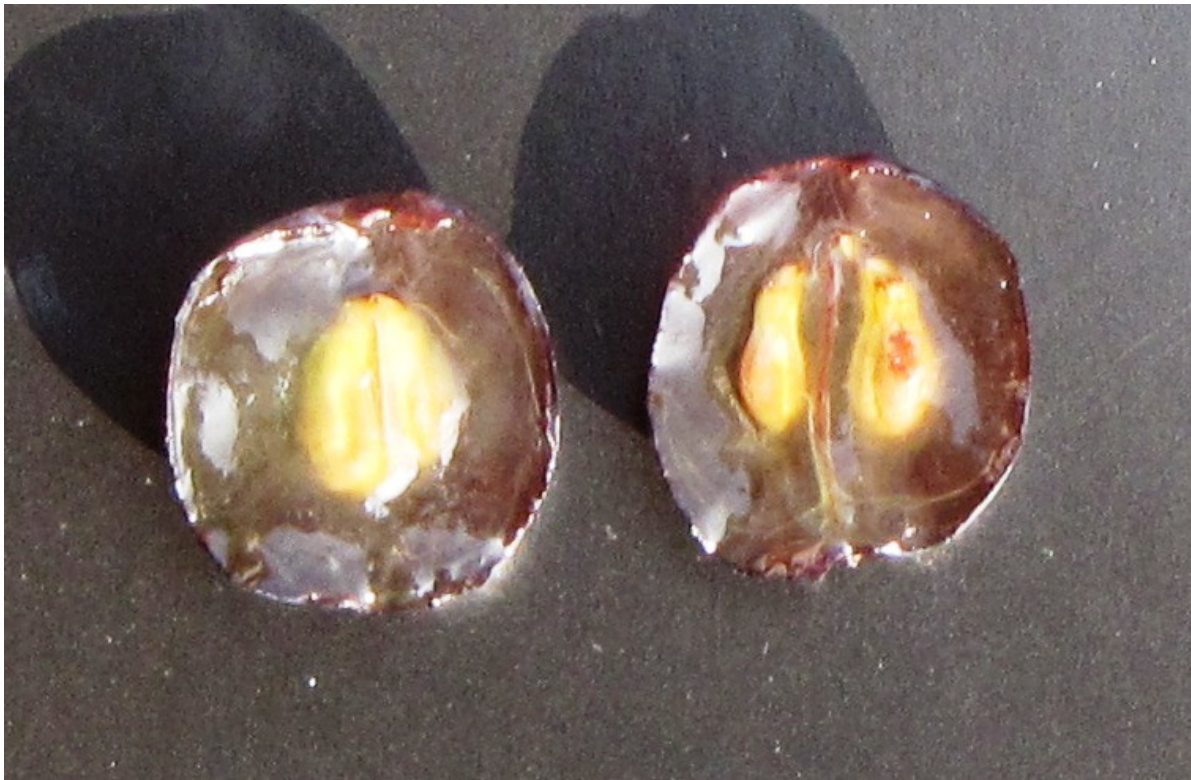
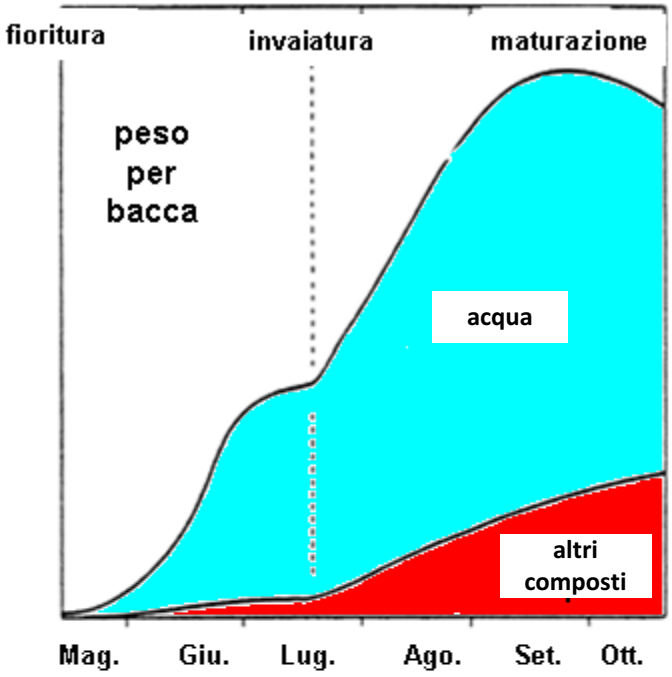
fondazione banfi
SANGUIS JOVIS

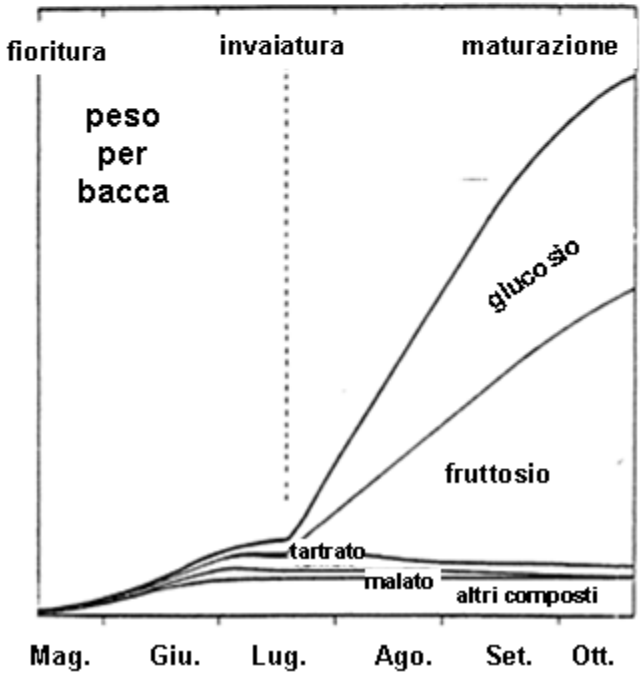
PROGRAMMA
25-29 SETTEMBRE 2017
SUMMER SCHOOL
SANGUIS JOVIS

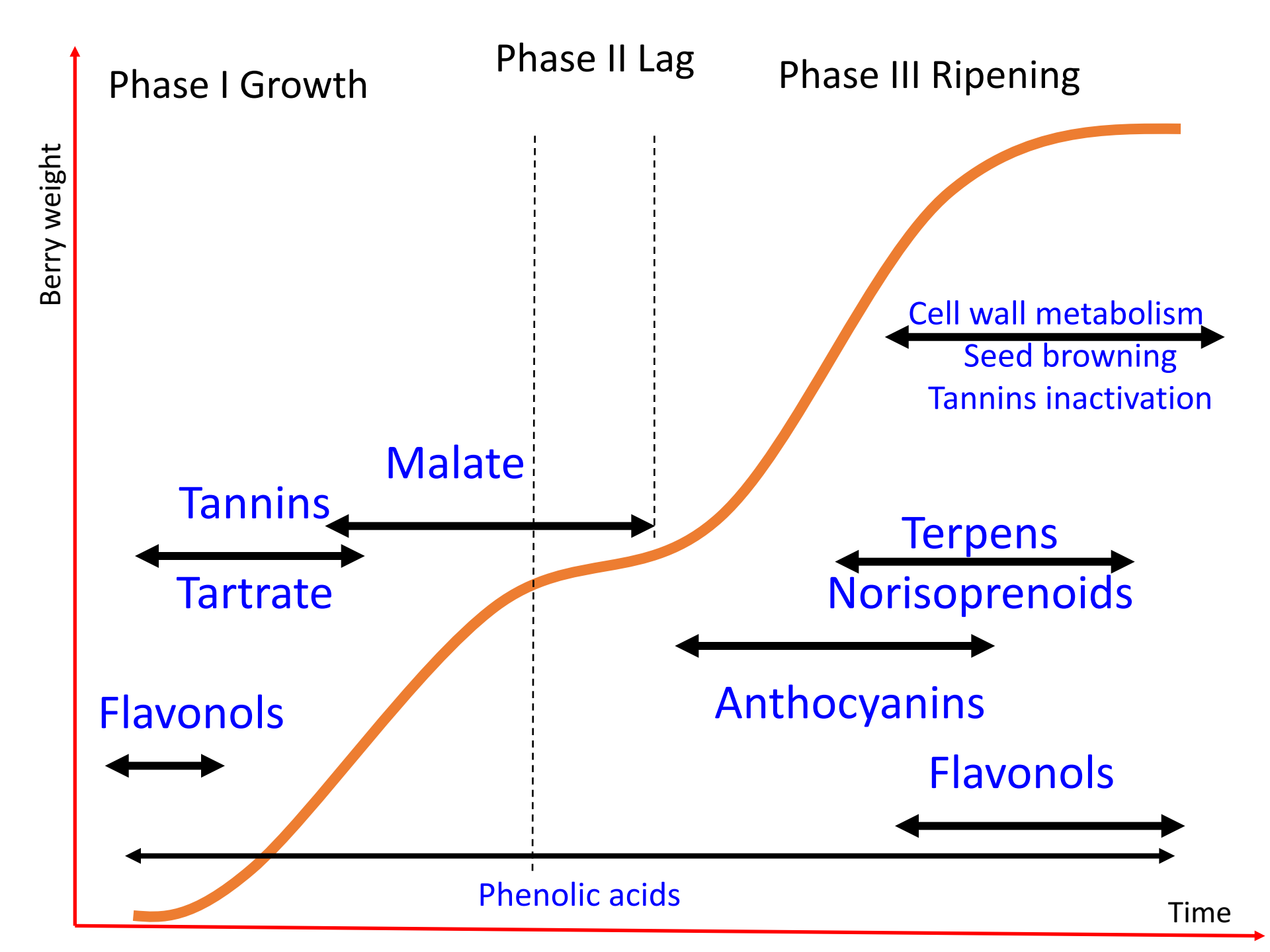
MATTINA

I processi di maturazione della bacca del Sangiovese e le influenze del *terroir*. *Prof. Osvaldo Failla*




fioritura
invaiatura
maturazione
peso per bacca
acqua
altri composti
Mag.
Giu.
Lug.
Ago.
Set.
Ott.


fioritura
invaiatura
maturazione
peso per bacca
glucosio
fruttosio
tartrato
malato
altri composti
Mag.
Giu.
Lug.
Ago.
Set.
Ott.


Phase I Growth
Phase II Lag
Phase III Ripening
Berry weight
Cell wall metabolism
Seed browning
Tannins inactivation
Malate
Tannins
Tartrate
Terpens
Norisoprenoids
Anthocyanins
Flavonols
Flavonols
Phenolic acids
Time

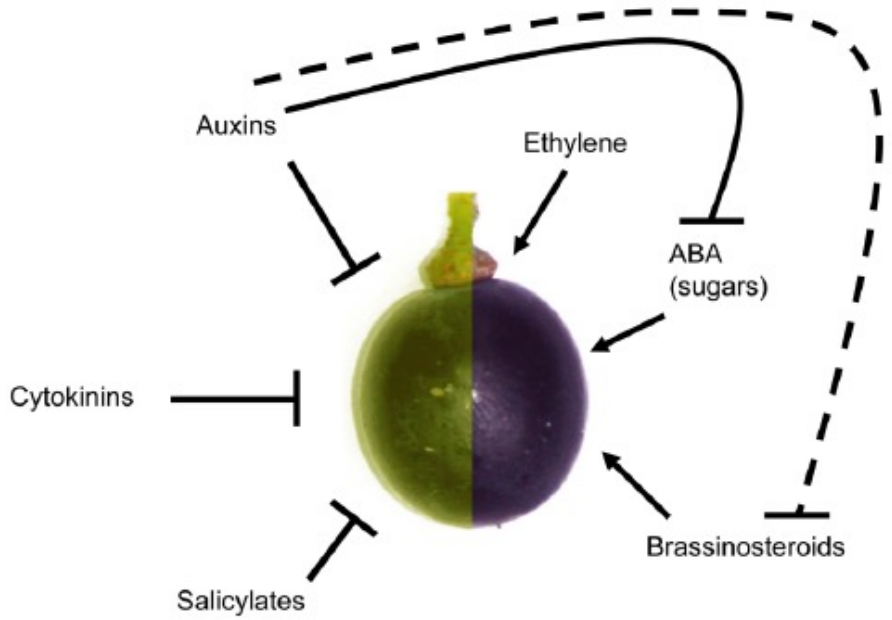


Figure 4: Schematic representation of the proposed influence of various hormones on grape berry ripening. The arrows represent a positive effect on ripening and the barred lines indicate an inhibitory effect. The dotted line indicates a speculative interaction between auxins and BRs.

Products of the:

primary metabolism

secondary metabolism

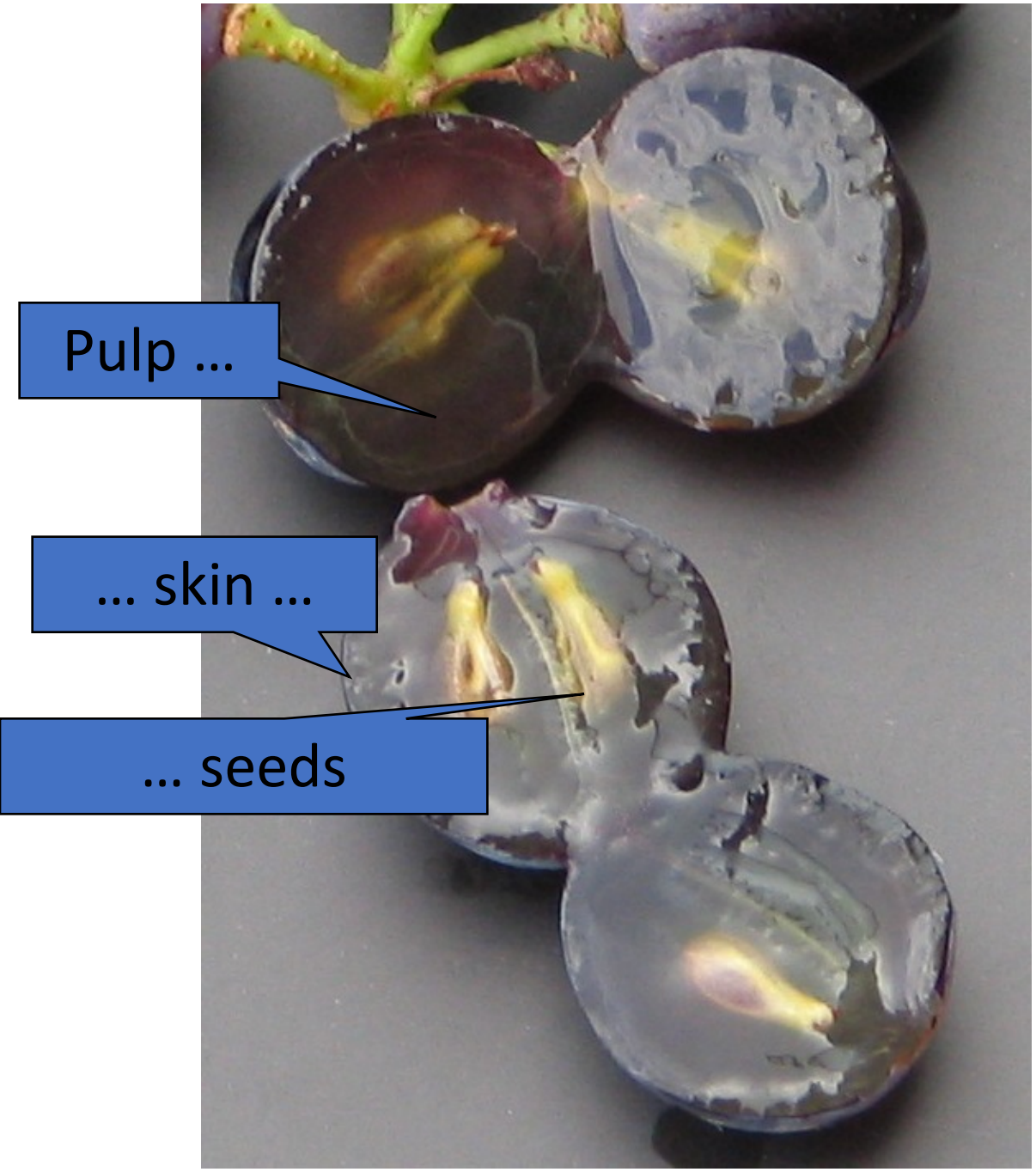
desired molecules

undesired molecules

sugars, acidity

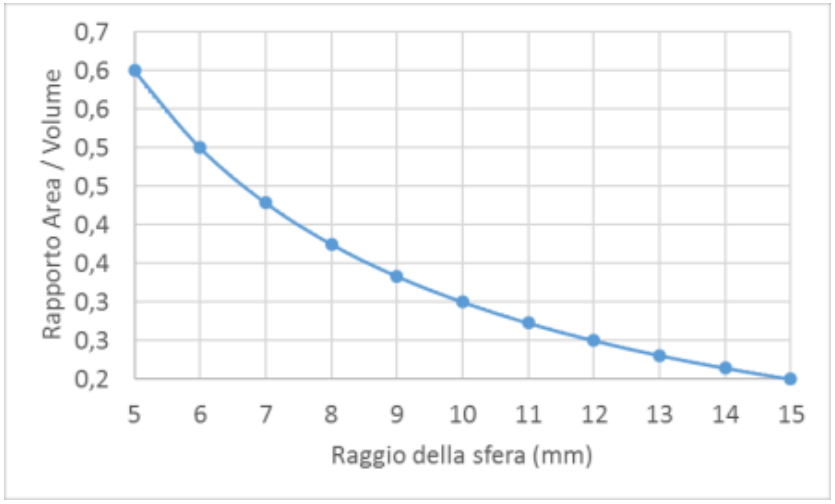
color, velvety and puckering
astringency, bitterness, body

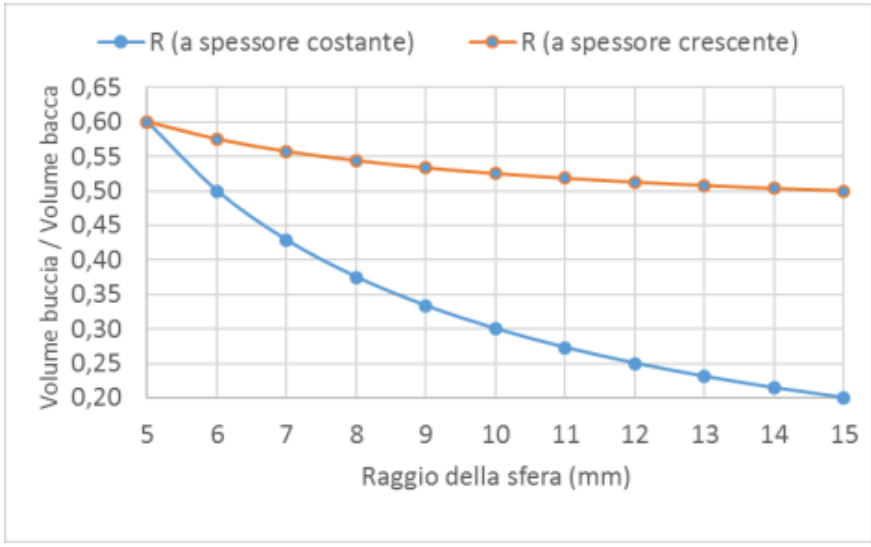
primary volatiles (terpens, norisoprenoids, phenols, 6C alcohols and aldeids)

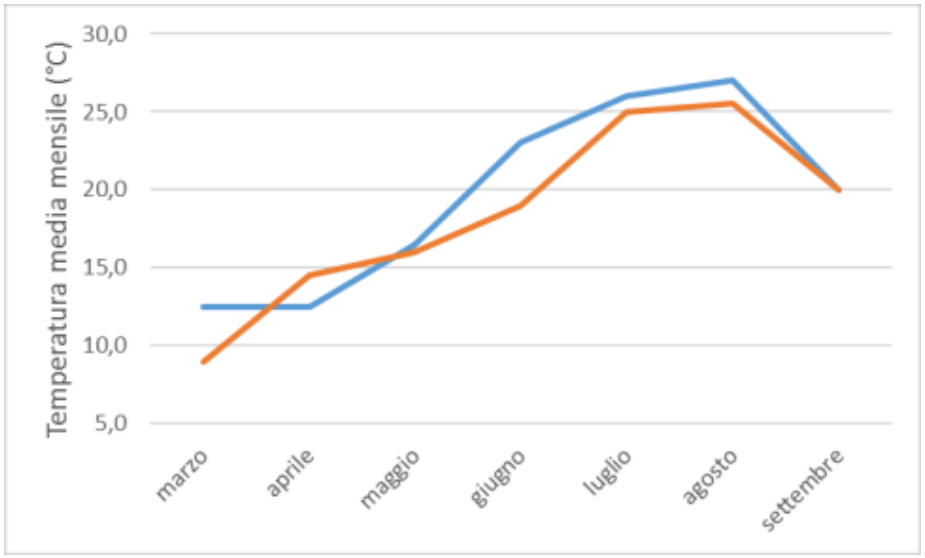


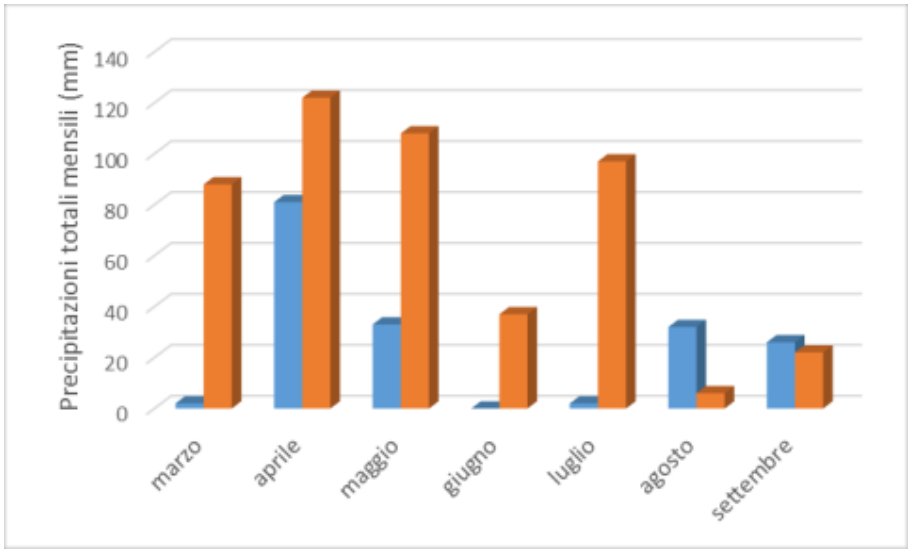
Berry development (Skin Pulp ratio)

Ripening processes (physiological pattern vs. stressed pattern)

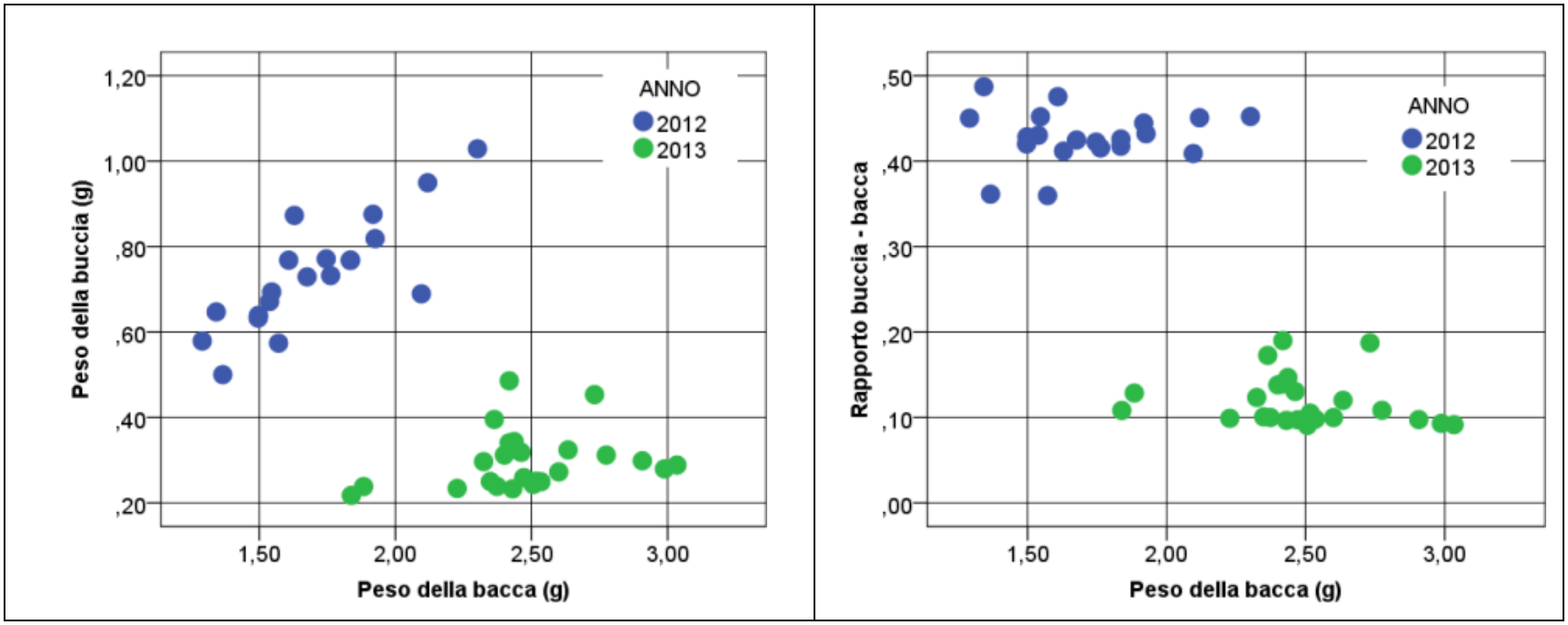

Rapporto Area / Volume
0,7
0,6
0,6
0,5
0,5
0,4
0,4
0,3
0,3
0,2
5 6 7 8 9 10 11 12 13 14 15
Raggio della sfera (mm)

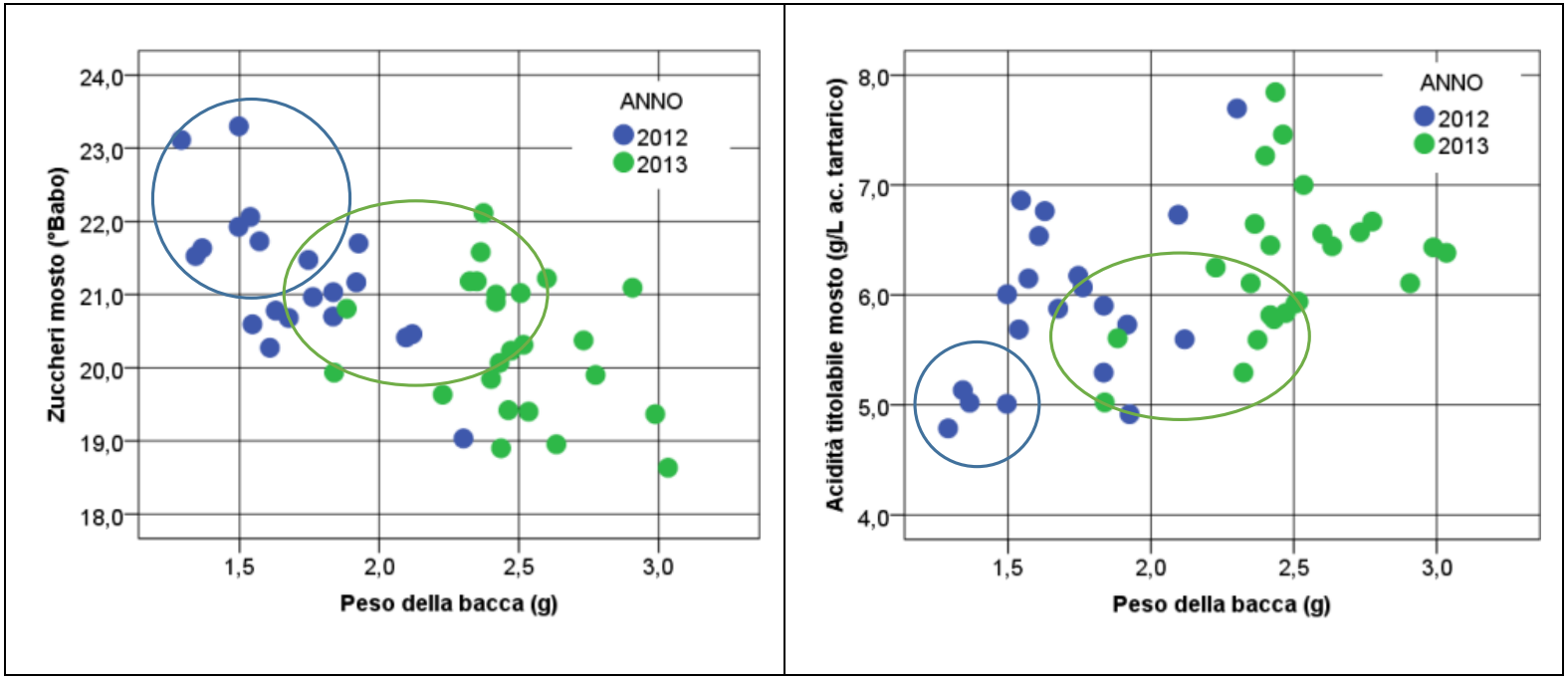

R (a spessore costante)
R (a spessore crescente)
Volume buccia / Volume bacca
0,65
0,60
0,55
0,50
0,45
0,40
0,35
0,30
0,25
0,20
5 6 7 8 9 10 11 12 13 14 15
Raggio della sfera (mm)

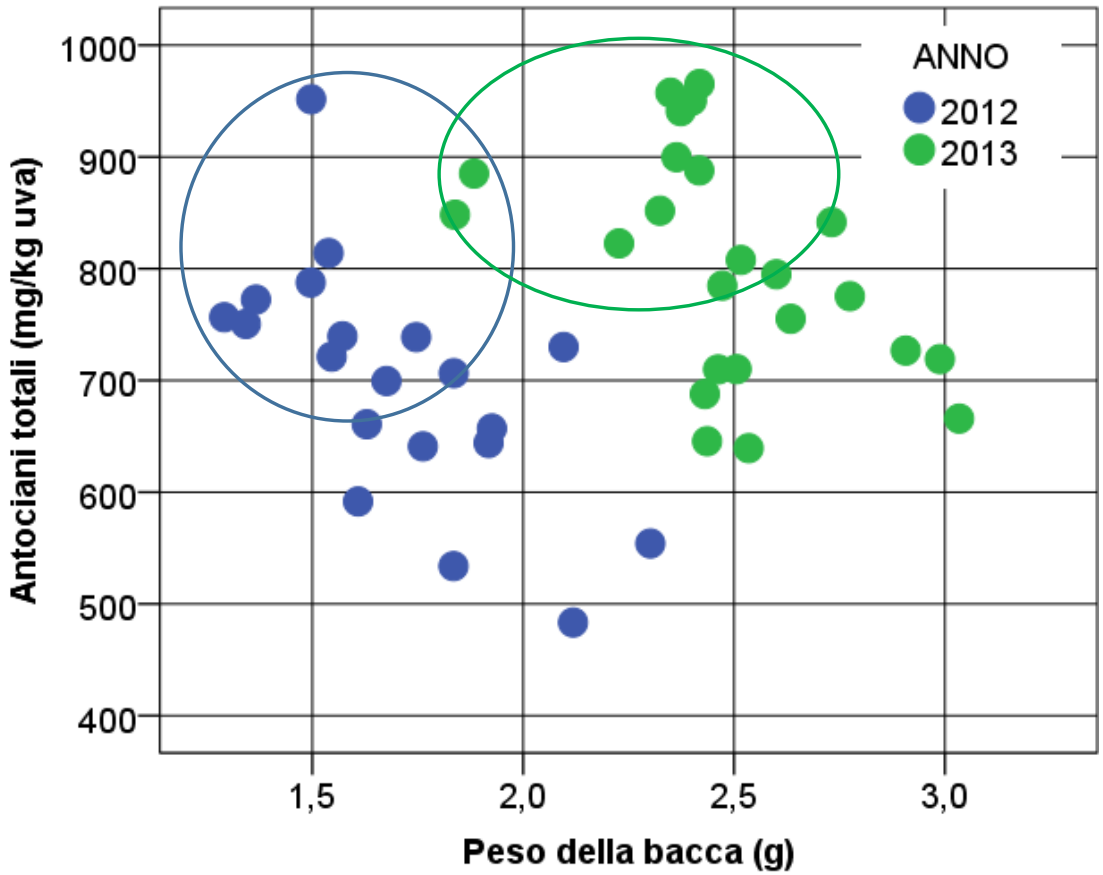




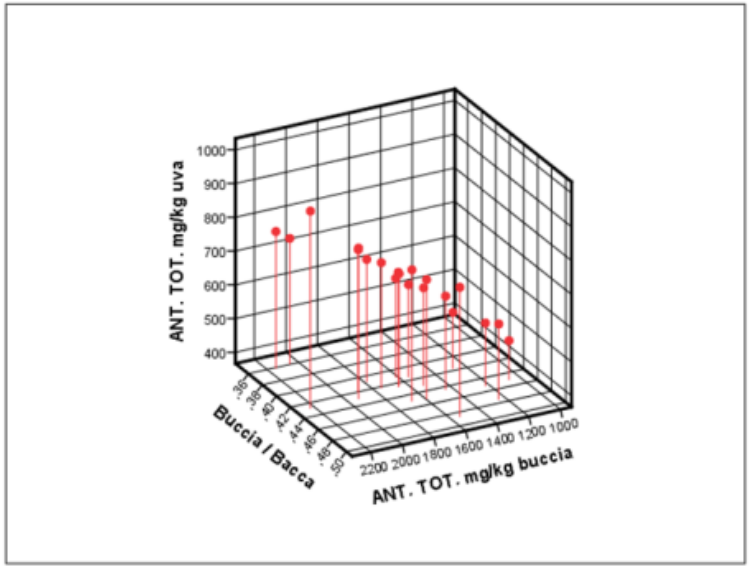
Il **2012 (in azzurro)** è stata un'annata con maggiori risorse termiche e ridotte disponibilità idriche rispetto al **2013 (in arancione)** che si è caratterizzata come un'annata estremamente piovosa da marzo a luglio.


Peso della buccia (g)
1,20
1,00
,80
,60
,40
,20
1,50
2,00
2,50
3,00
Peso della bacca (g)
ANNO
2012
2013
Rapporto buccia - bacca
,50
,40
,30
,20
,10
,00
1,50
2,00
2,50
3,00
Peso della bacca (g)
ANNO
2012
2013

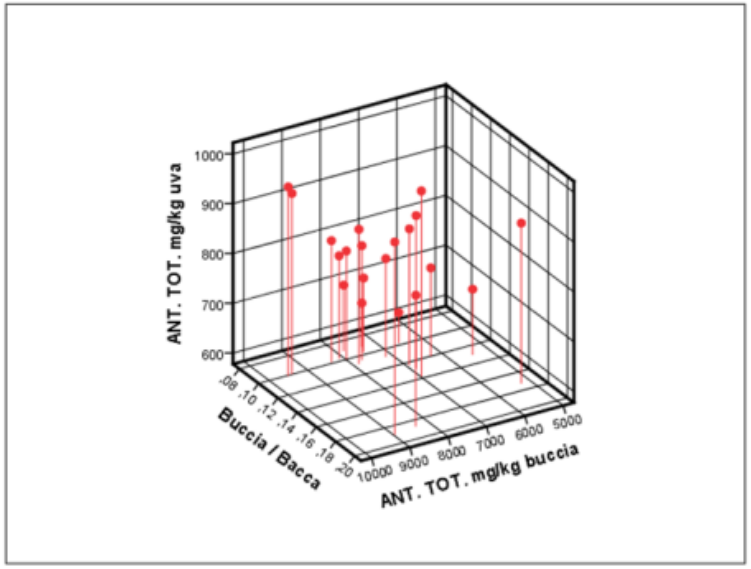

Zuccheri mosto (°Babo)
24,0
23,0
22,0
21,0
20,0
19,0
18,0
1,5
2,0
2,5
3,0
Peso della bacca (g)
ANNO
2012
2013
Acidità titolabile mosto (g/L ac. tartarico)
8,0
7,0
6,0
5,0
4,0
1,5
2,0
2,5
3,0
Peso della bacca (g)
ANNO
2012
2013


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)

ANNO: 2012



ANNO: 2013



Coefficienti[a]

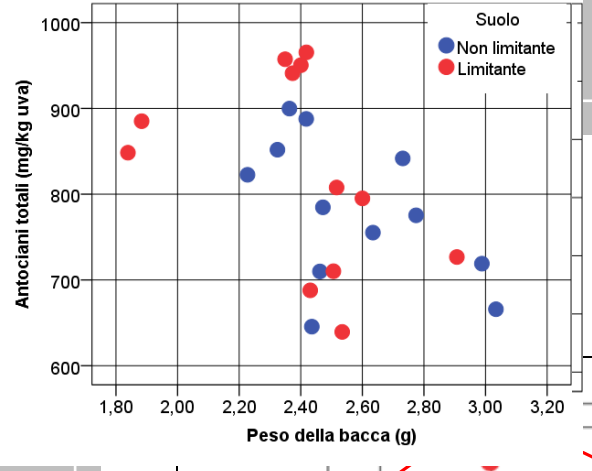
ANNO	Modello		Coefficienti non standardizzati B	Coefficienti non standardizzati Deviazione standard Errore	Coefficienti standardizzati Beta	t	Sig.
2012	1	(Costante)	-761,971	50,671		-15,038	,000
		Buccia / Bacca	1772,350	92,604	,516	19,139	,000
		ANT.TOT. mg/kg buccia	,425	,009	1,229	45,623	,000
2013	1	(Costante)	280,525	141,123		1,988	,063
		Buccia / Bacca	1790,449	560,720	,563	3,193	,005
		ANT.TOT. mg/kg buccia	,043	,015	,502	2,846	,011

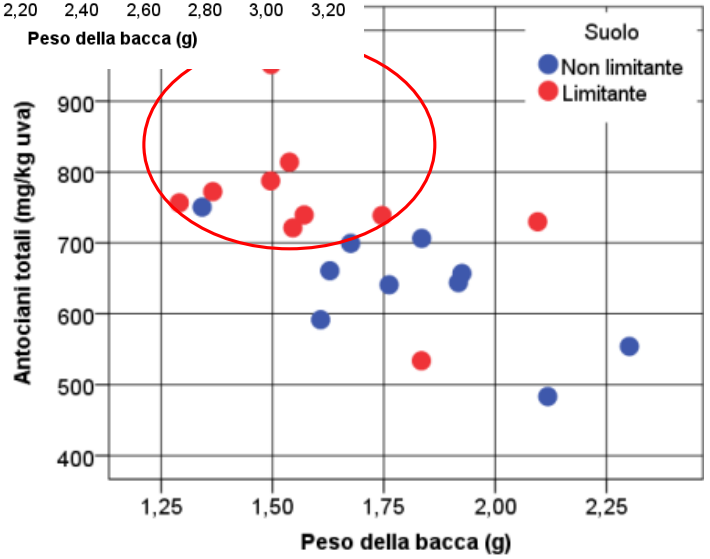
a. Variabile dipendente: ANT.TOT.mgkguva_mean_mean

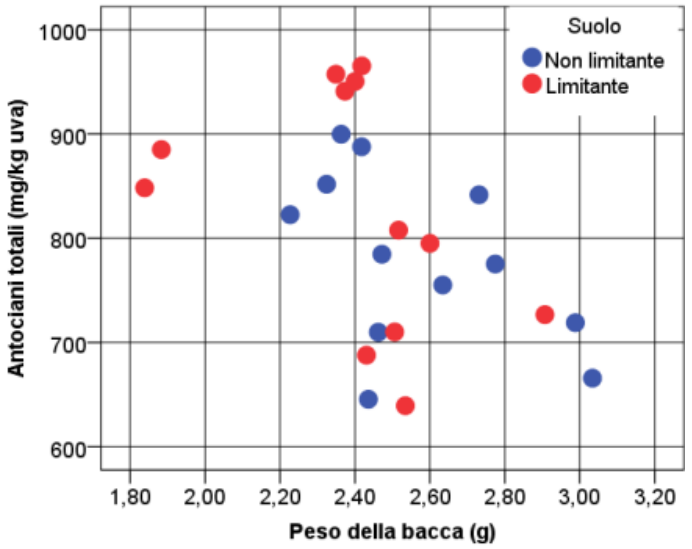
Riepilogo del modello

ANNO	Modello	R	R-quadrato	R-quadrato corretto	Deviazione standard Errore della stima
2012	1	,996[a]	,992	,991	9,85488
2013	1	,695[a]	,483	,422	74,34424

a. Predittori: (Costante), ANT.TOT.mgkgbuccia_mean_mean, BuBa_mean_mean


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)
Suolo
Non limitante
Limitante


Antociani totali (mg/kg uva)
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)
Suolo
Non limitante
Limitante

J. Agric. Food Chem. 2008, 56, 1376–1386

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Table 4. Human Taste Recognition Thresholds of Compounds Isolated from Red Wine

compound[a] (no.)	taste threshold[b] for astringency µmol/L	astringency mg/L	bitterness µmol/L	bitterness mg/L
Velvety Astringent Compounds				
dihydrokaempferol-3-*O*-α-L-rha*p* (**18**)	4.8	2.1	nd	nd
dihydroquercitin-3-*O*-α-L-rha*p* (**13**)	3.7	1.7	nd	nd
isorhamnetin-3-*O*-β-D-glc*p* (**17**)	2.4	1.1	nd	nd
quercetin-3-*O*-β-D-glcA*p* (**12**)	2.0	1.0	nd	nd
quercetin-3-*O*-β-D-gal*p* (**22**)	0.4	0.2	nd	nd
syringetin-3-*O*-β-D-glc*p* (**15**)	0.2	0.1	nd	nd
Puckering Astringent Compounds				
vanillic acid (**11**)	315	53	nd	nd
gallic acid (**1**)	292	50	nd	nd
syringic acid (**4**)	263	52	nd	nd
protocatechuic acid (**2**)	206	32	nd	nd
p-coumaric acid (**8**)	139	23	nd	nd
ferulic acid	67	13	nd	nd
caffeic acid (**3**)	72	13	nd	nd
(*E*)-caftaric acid (**16**)	16	5	nd	nd
(*Z*)/(*E*)-aconitic acid (**27**)[c]	0.5	0.1	nd	nd
polymeric fraction (>5 kDa)		22	nd	nd
Bitter and Astringent Compounds				
(−)-epicatechin (**26**)	930	270	930	270
(+)-catechin (**23**)	410	119	1000	290
procyanidin C1 (**7**)	300	260	400	347
caffeic acid ethyl ester (**19**)	277	58	1100	229
procyanidin B1 (**24**)	240	139	400	231
procyanidin B3 (**25**)	200	116	500	289
procyanidin B2 (**5**)	190	110	485	280
gallic acid ethyl ester (**6**)	185	37	2200	438
p-coumaric acid ethyl ester (**10**)	143	27	715	137
vanillic acid ethyl ester (**20**)	125	25	1500	294
ferulic acid ethyl ester (**9**)	67	15	710	158
protocatechuic acid ethyl ester (**14**)	49	9	1000	182
syringic acid ethyl ester (**21**)	18	4	576	130

[a] The structures of the compounds are displayed in **Figure 3.** [b] Taste threshold concentrations were determined in bottled water by means of a triangle test for bitterness and by means of the half-tongue test for astringency. [c] Taste threshold for sour is 500 µmol/L.

Orosensory-Directed Identification of Astringent Mouthfeel and Bitter-Tasting Compounds in Red Wine

JAN CARLOS HUFNAGEL[†] AND THOMAS HOFMANN*[,#]

ANTHOCYANS

FLAVANOLS

Red wines 100-600 mg/L

White wines 1-3 mg/L

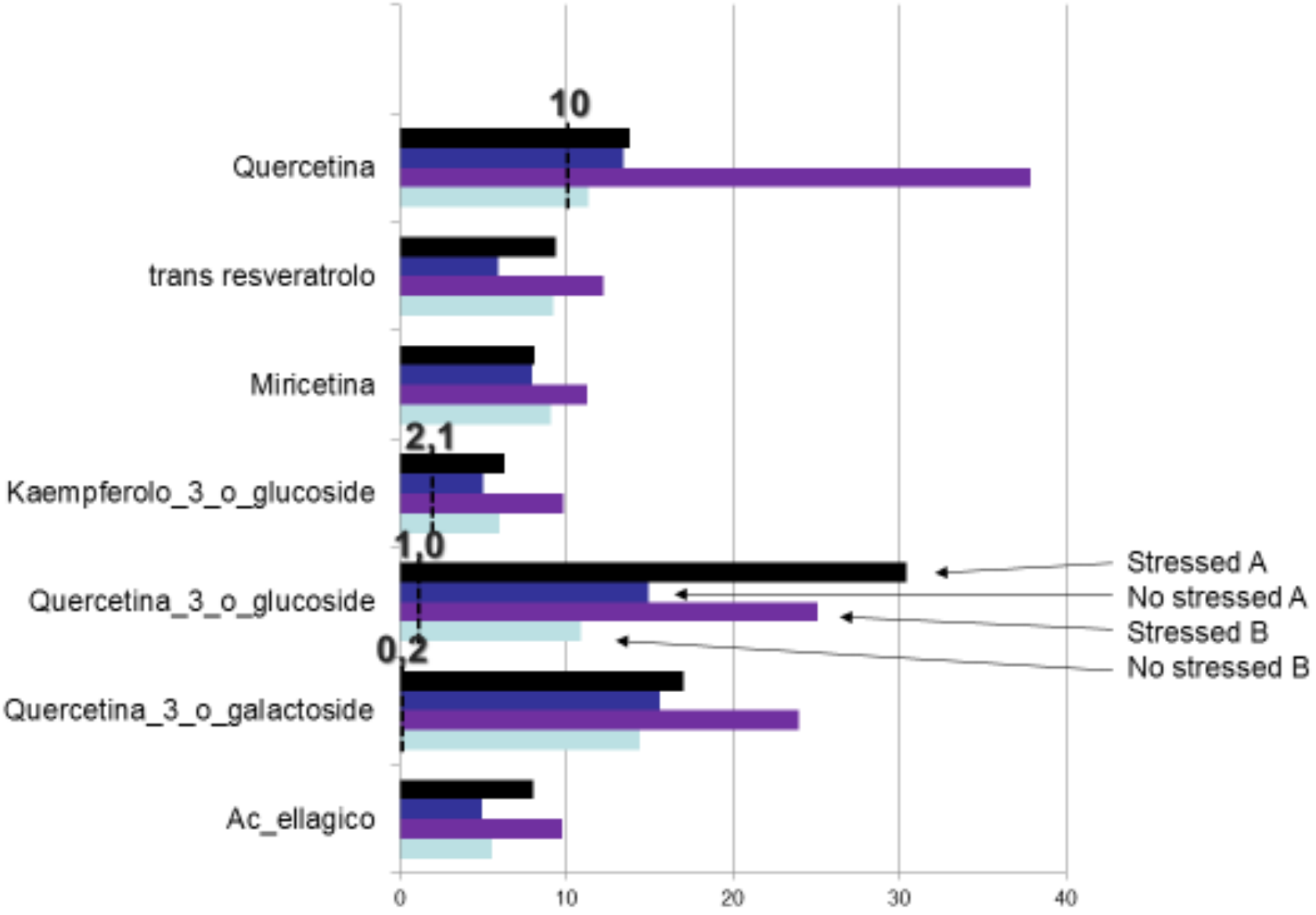
TANNINS (PROANTOCYANIDIN AND FLAVANOLS)

PHENOLIC ACIDS AND DERIVATES

Red wines 100-200 mg/L

White wines 10-20 mg/L

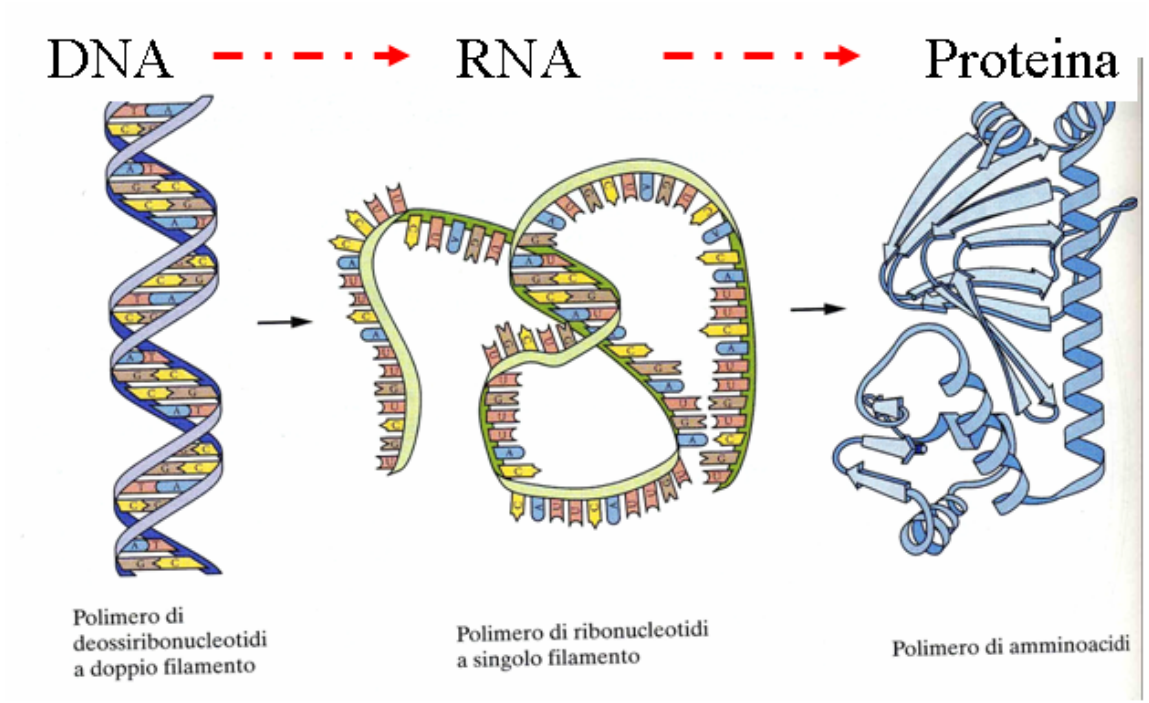
Sangiovese wines

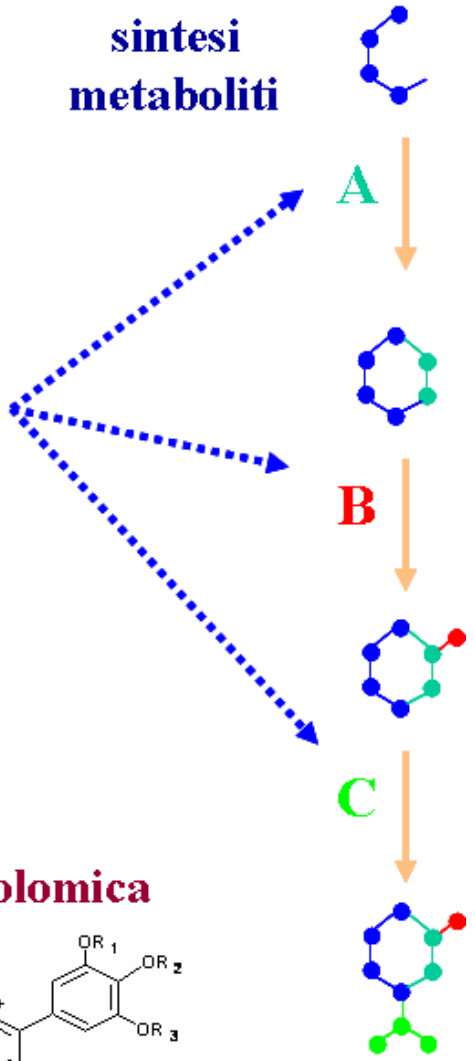


Sintesi RNA (Trascrizione)

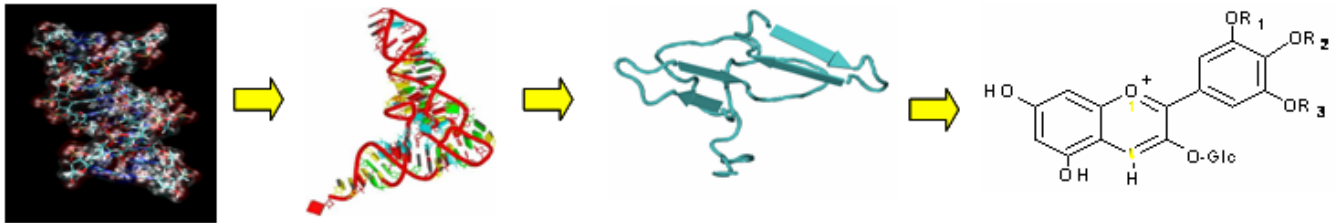
Sintesi proteine (Traduzione)

sintesi metaboliti



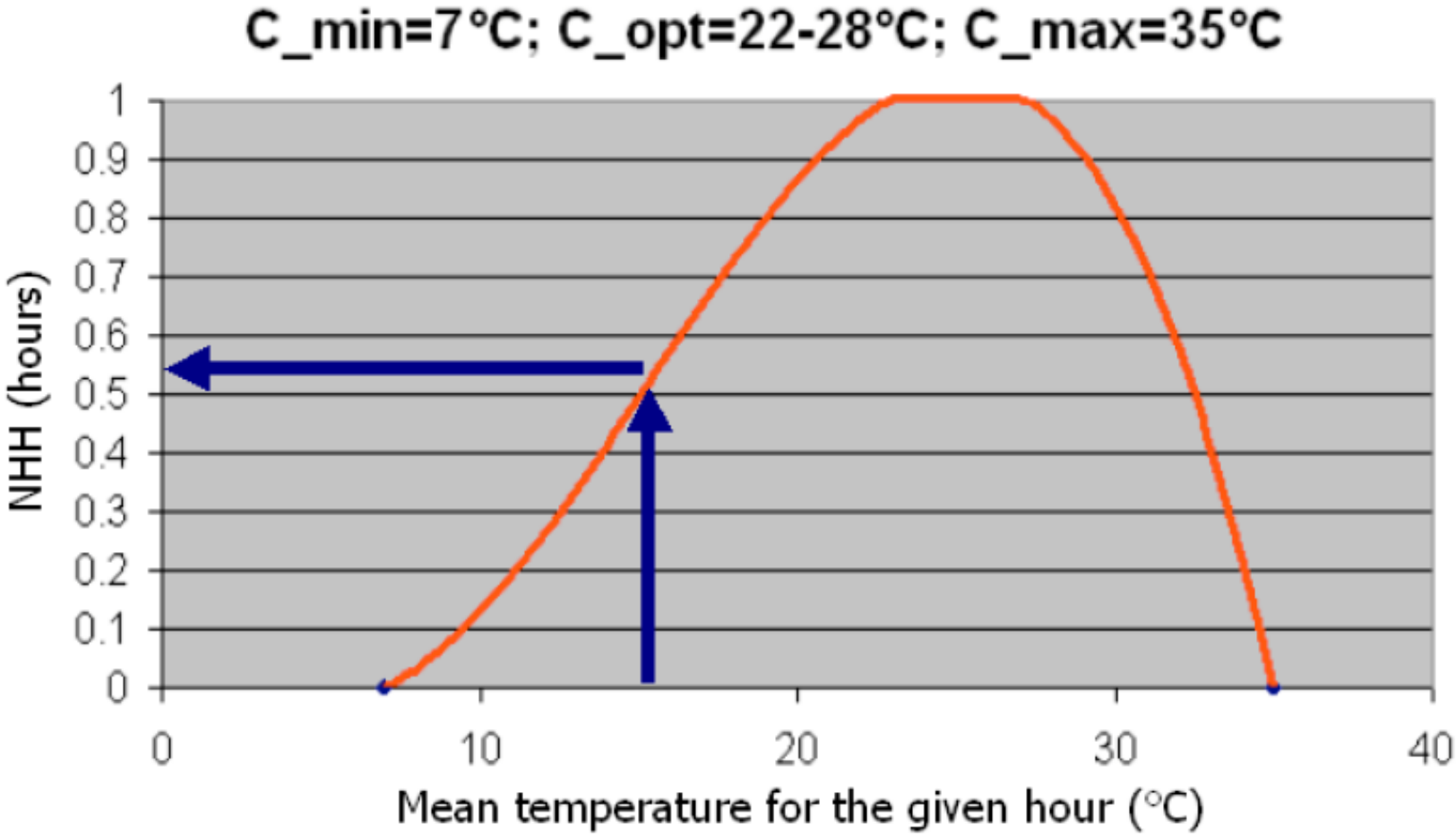


Genomica **Trascrittomica** **Proteomica** **Metabolomica**

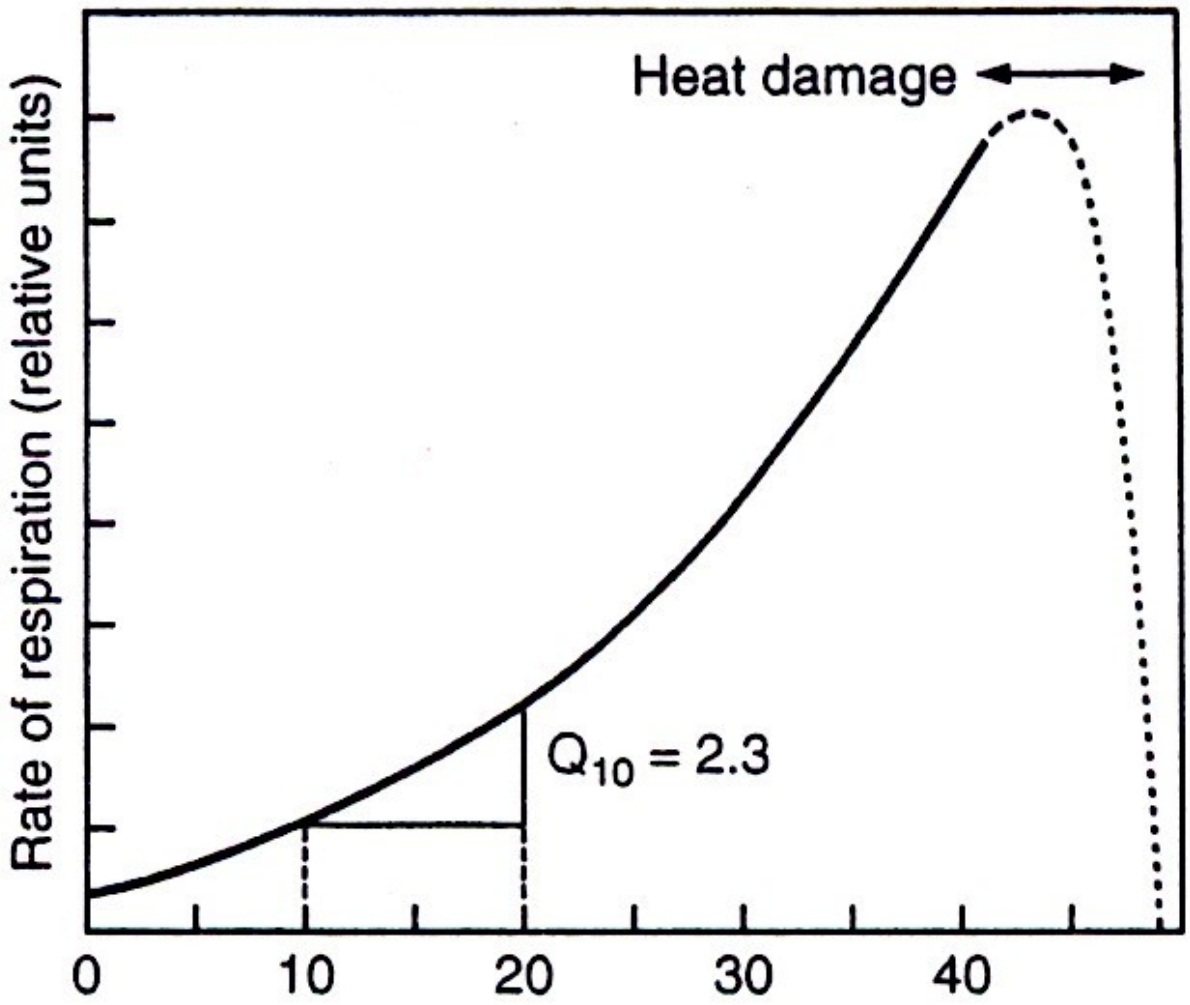


DNA **RNA** **Proteine** **Prodotti del metabolismo**

Bunch microclimate and berry metabolism

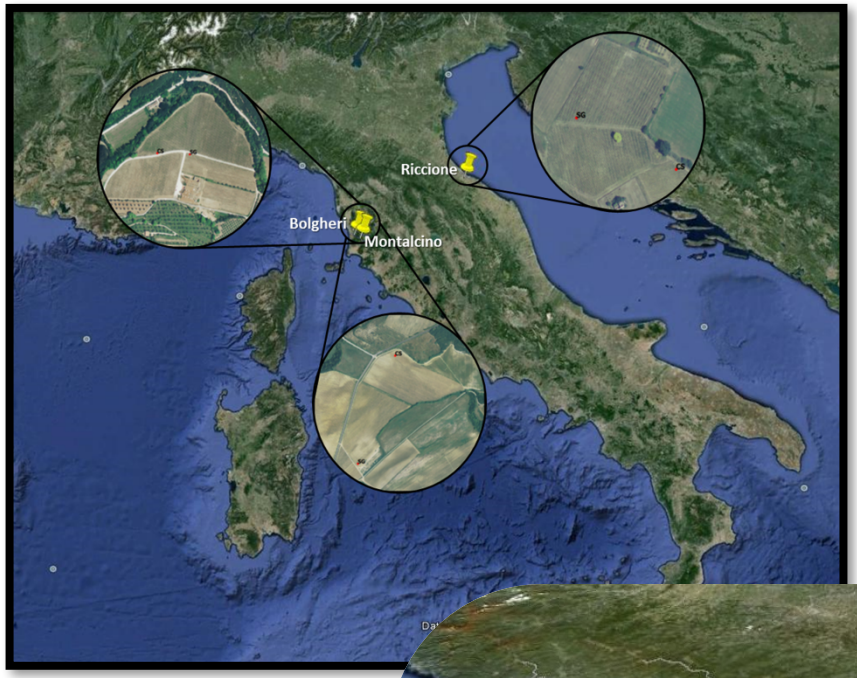


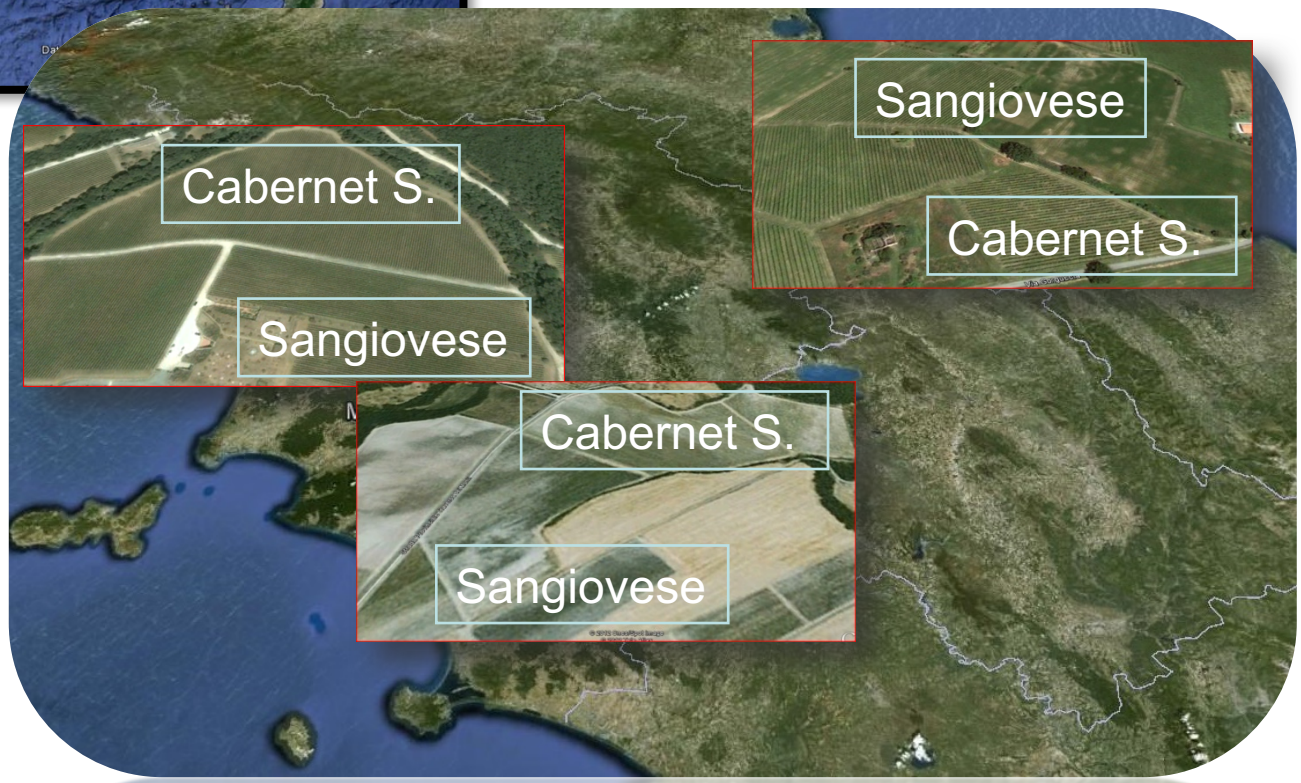
Bunch microclimate and berry metabolism



The Vineyards

- 2 Genotypes
- 3 Central Italy Areas
- Adjacent Vineyards per each Area

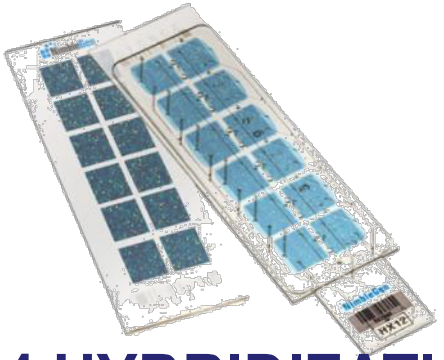




The Experimental Plan

	Bolgheri Litoral Tuscany	Montalcino Apennine Tuscany	Romagna Foothill Area
Sangiovese			
Cabernet Sauvignon			

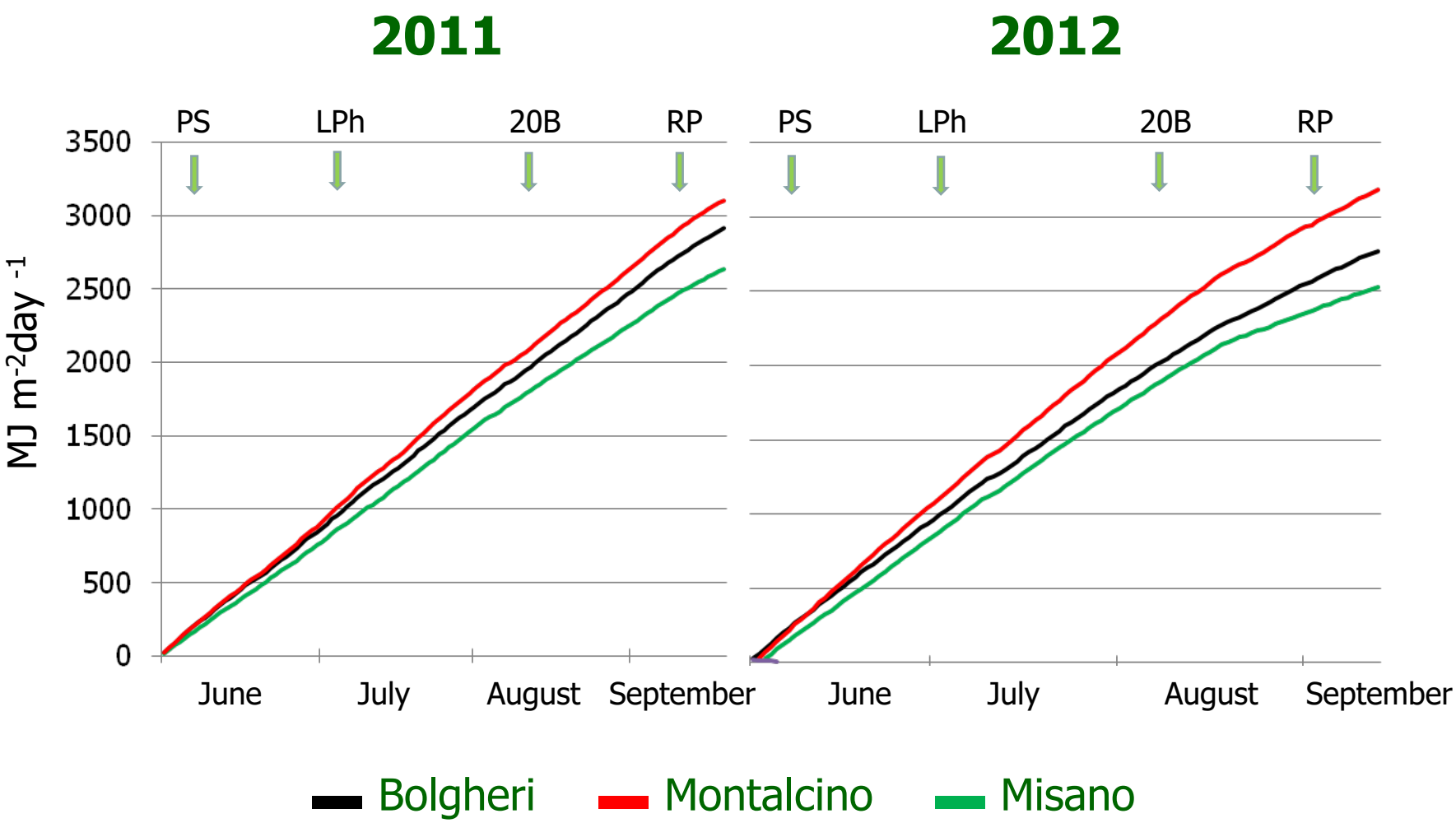
- 3 Biological Replicates
- 2011 and 2012



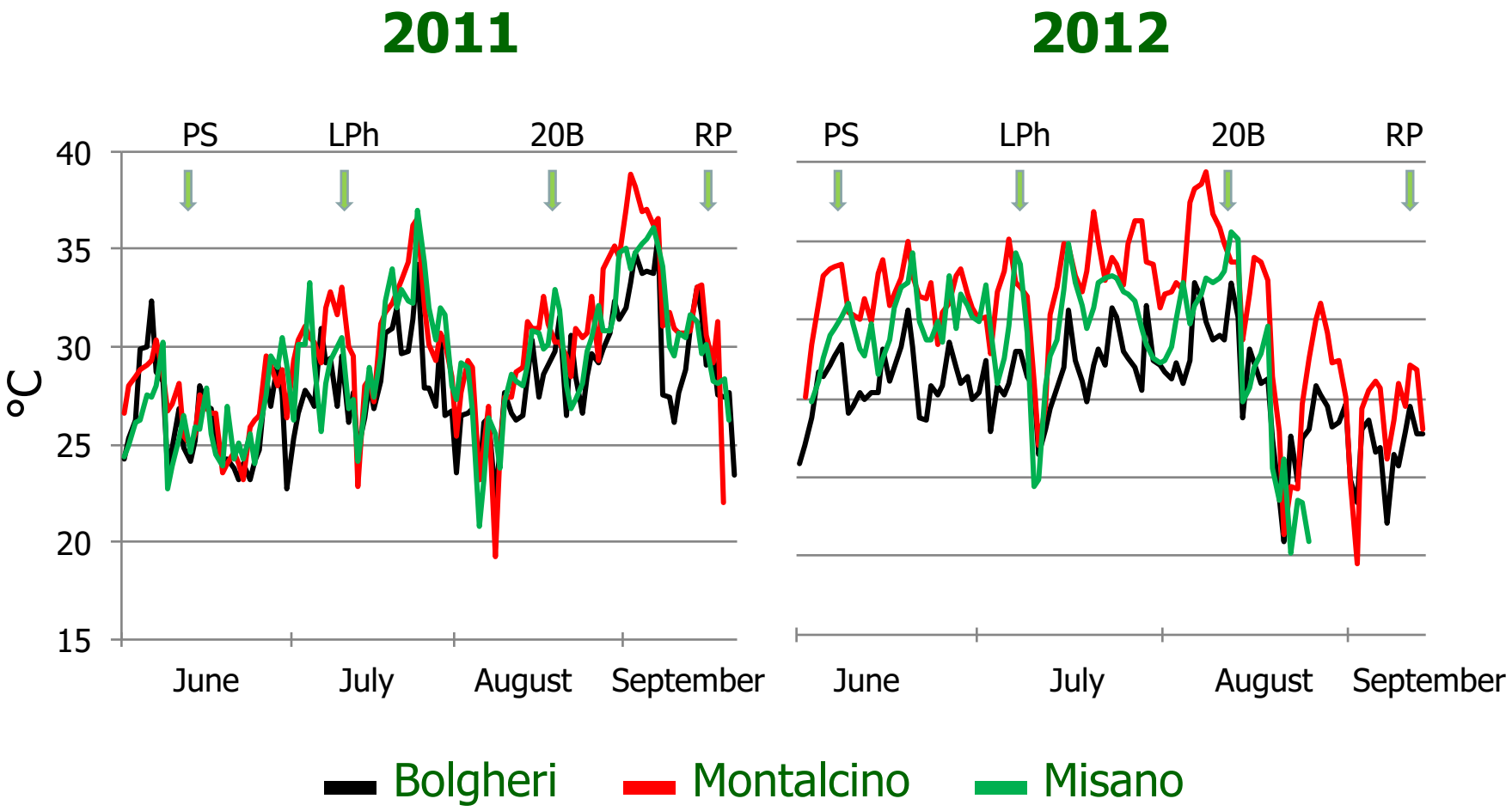
144 HYBRIDIZATIONS

Pea Size	Pre-Veraison	Mid-Ripening	Ripe
			
BBCH 75	BBCH 79	BBCH 83	BBCH 89

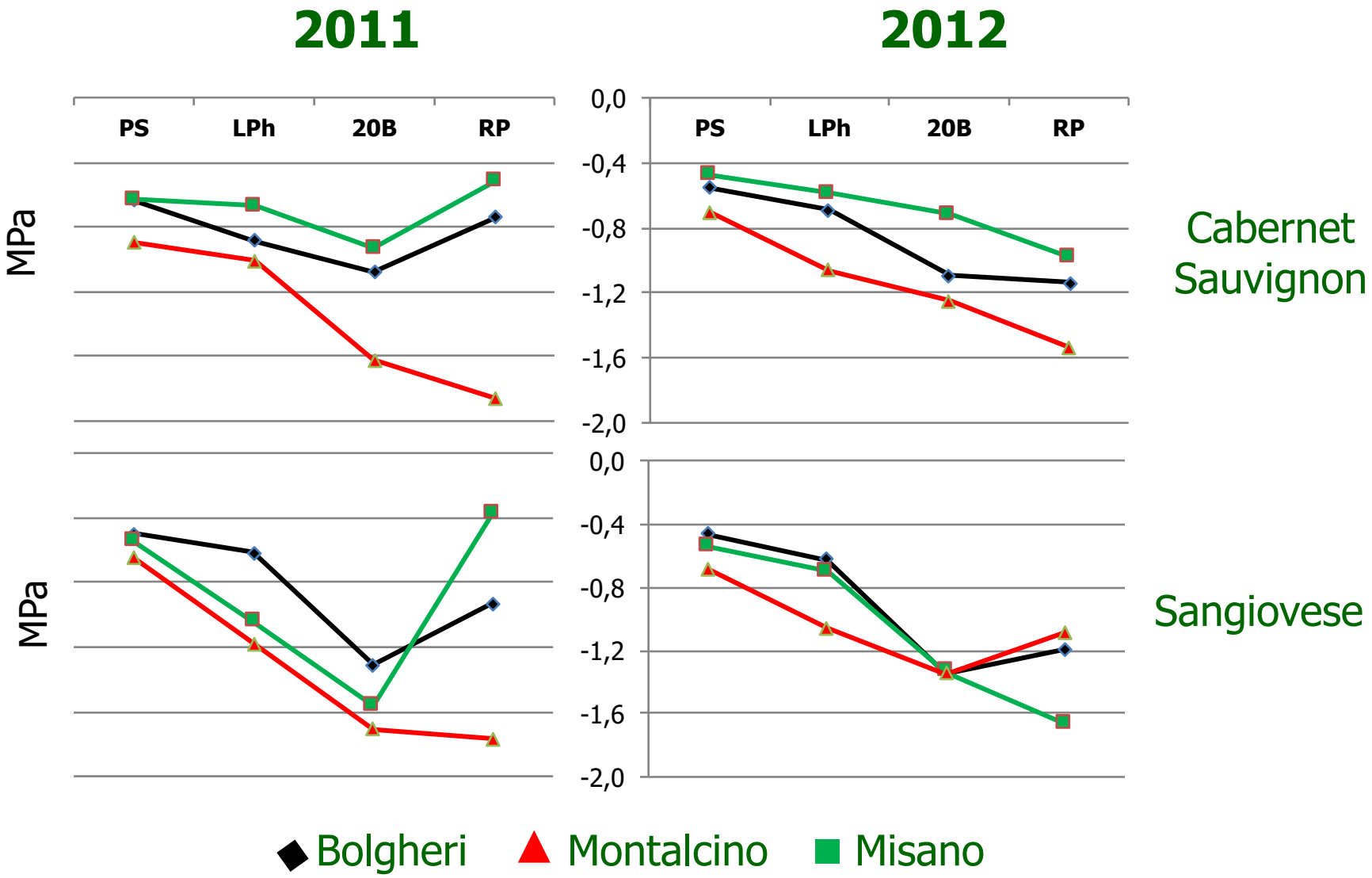
Summation of Estimated Global Solar Radiation



Daily maximum temperature

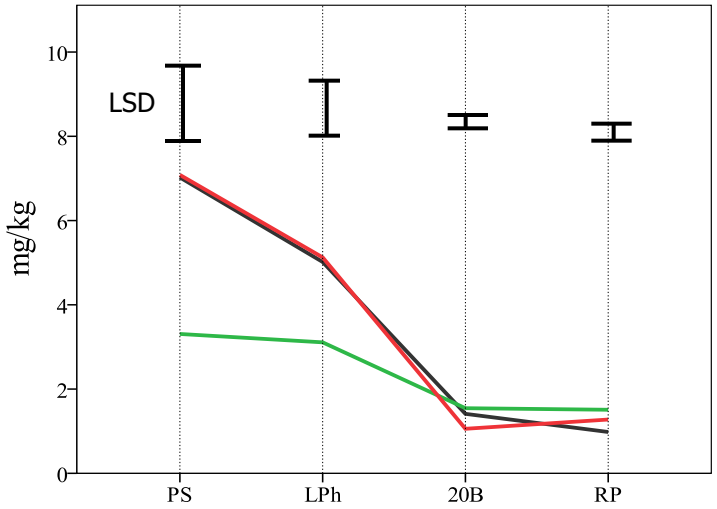


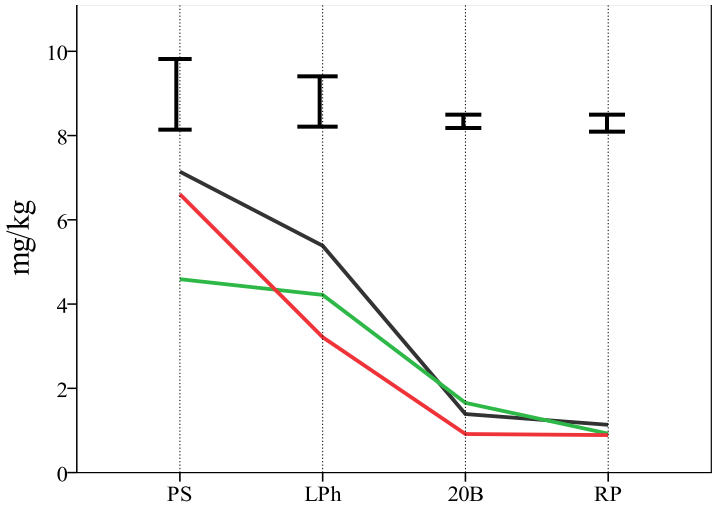
Midday Stem Water Potential



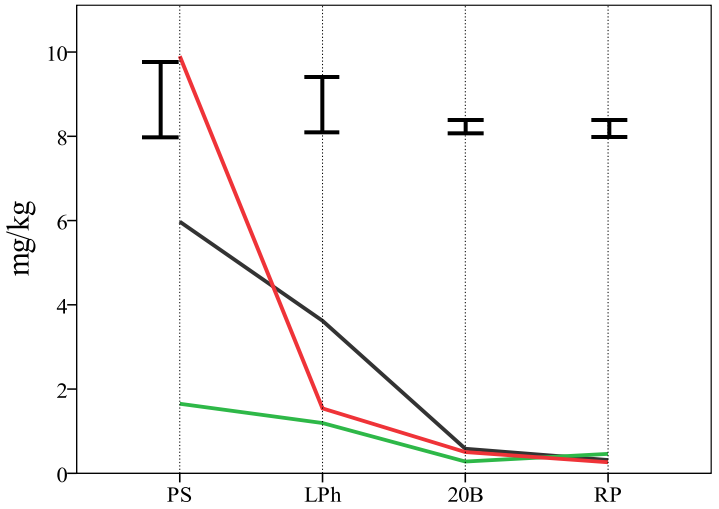
Total Carotenoids

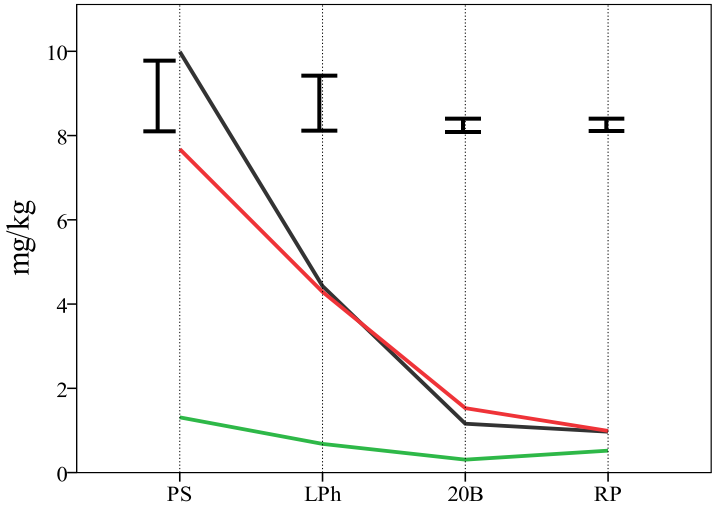
2011





2012

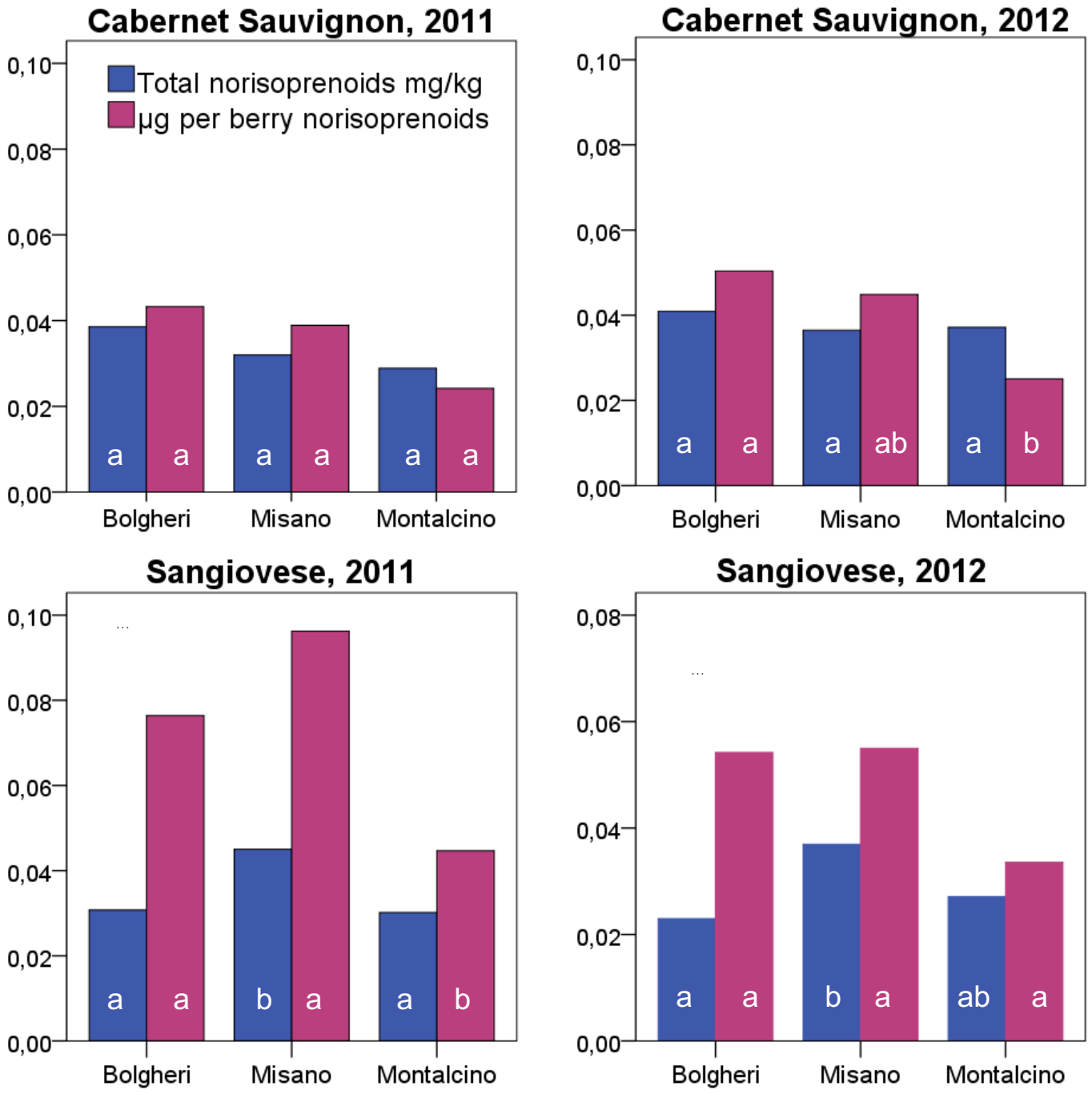




Cabernet Sauvignon

Sangiovese

Bolgheri Montalcino Misano


Cabernet Sauvignon, 2011
Total norisoprenoids mg/kg
µg per berry norisoprenoids
0,10
0,08
0,06
0,04
0,02
0,00
a a a a a a
Bolgheri Misano Montalcino
Cabernet Sauvignon, 2012
0,10
0,08
0,06
0,04
0,02
0,00
a a a ab a b
Bolgheri Misano Montalcino
Sangiovese, 2011
0,10
0,08
0,06
0,04
0,02
0,00
a a b a a b
Bolgheri Misano Montalcino
Sangiovese, 2012
0,08
0,06
0,04
0,02
0,00
a a b a ab a
Bolgheri Misano Montalcino