



# **Accademia Italiana della Vite e del Vino**

*Dozza 20 Giugno 2009*

## **Nuovi metodi di analisi dei polifenoli**

*prof. Andrea Versari*

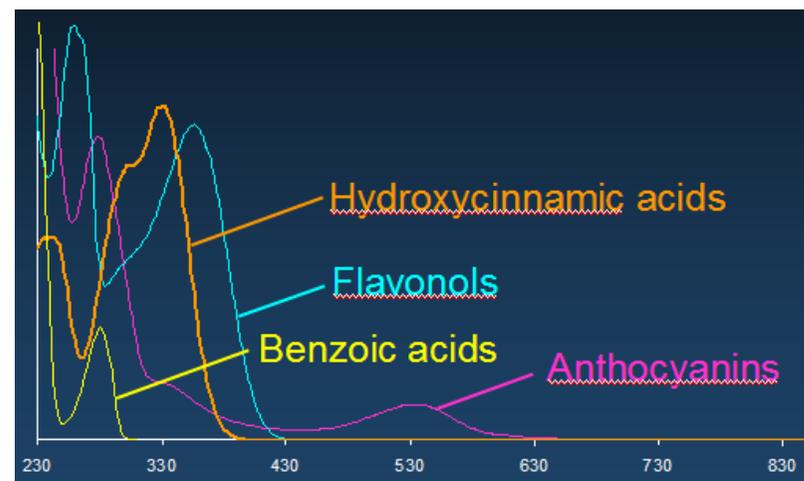
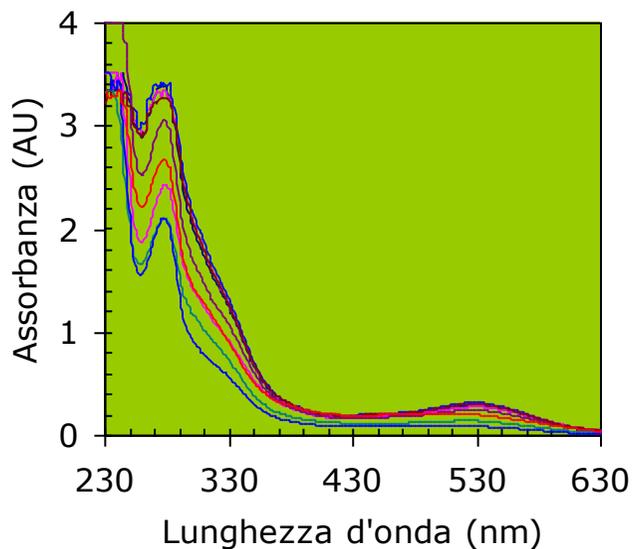
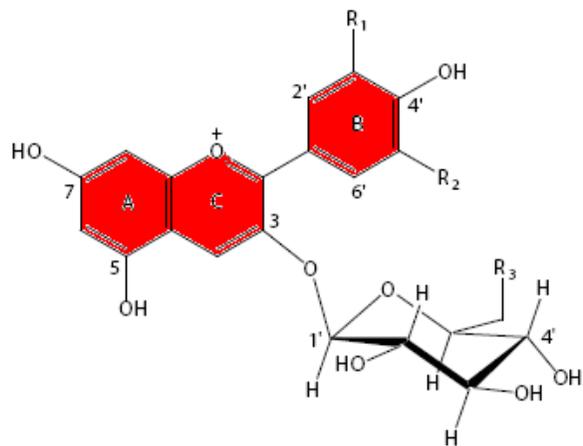
- **Introduzione:** Il colore dei vini rossi  
Il metodo 'classico' di analisi
- **Risultati:** Analisi HPLC dei pigmenti polimerici  
Analisi FTIR del colore dei vini rossi
- **Conclusioni**

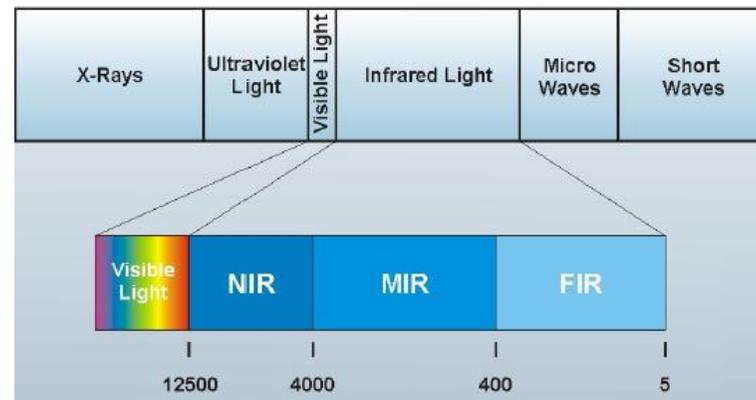
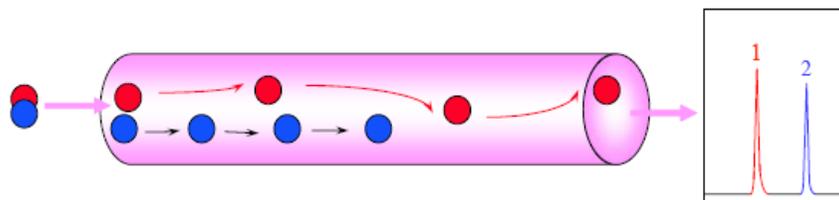


## Polifenoli, Colore e Qualità

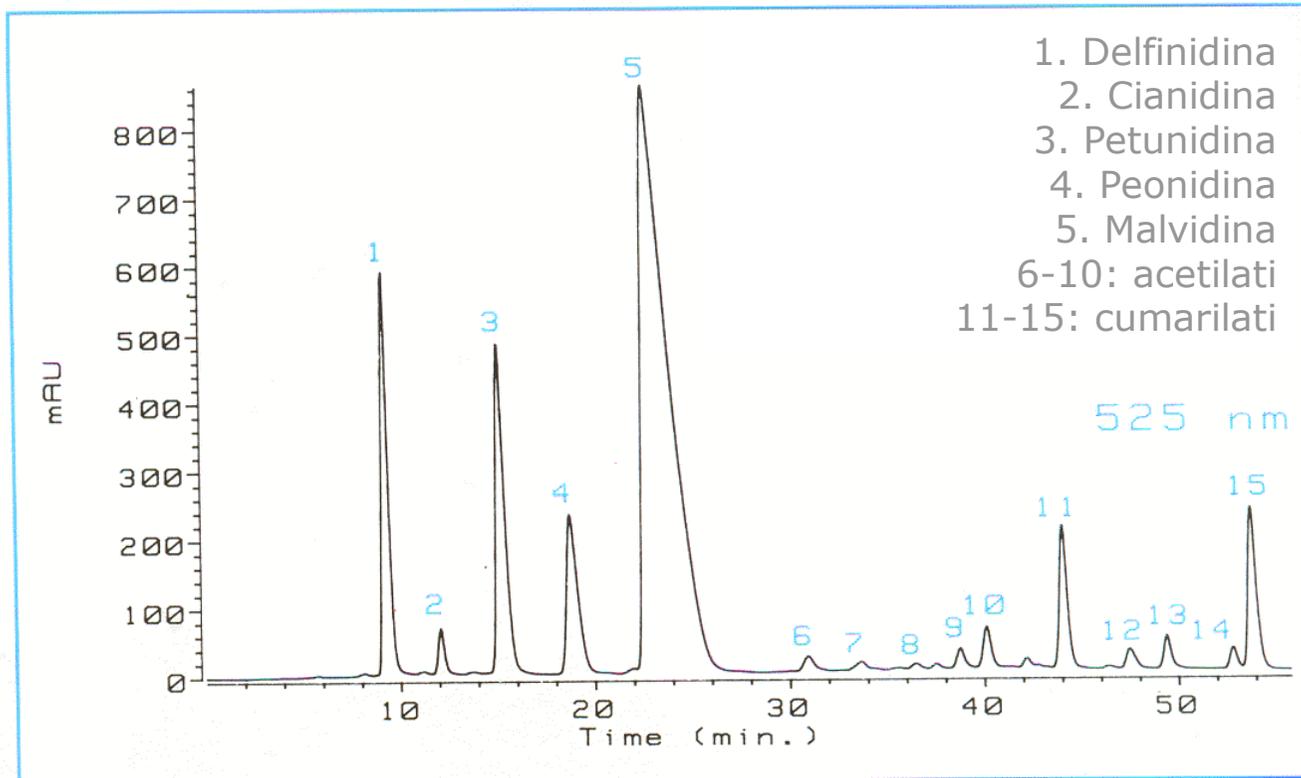
*'Appearance is an important feature of wine, and a wine's color, along with clarity, is a good indicator of its past history, condition, and probable present and future quality. The colors of most wines are almost wholly the result of their content of various phenolic substances'* (V. Singleton in "Phenolic Substances in Grape and Wine, and their Significance" 1969).





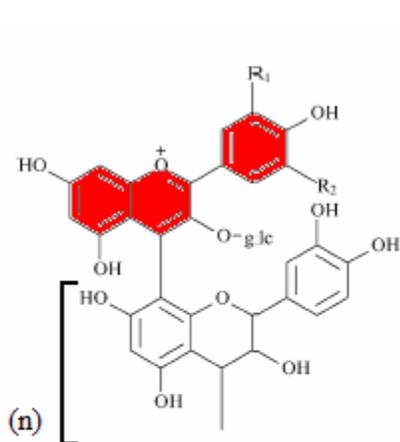


## Vincitore Premio Morsiani Assoenologi 1992

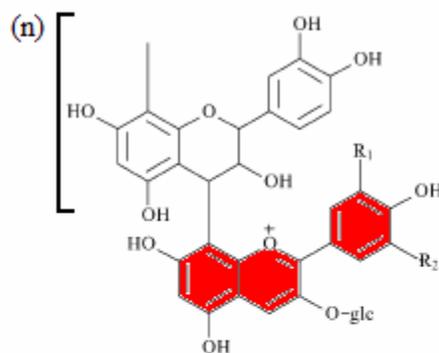
**Fig. 2****Analisi HPLC della frazione degli antociani nel clone Colorino Nipozzano 6**

Baldi A., Romani A. (1992) *Enotecnico* 28, 6, 105-119.

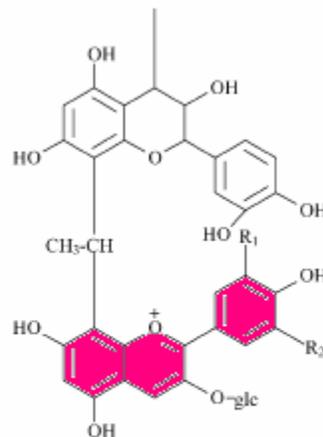




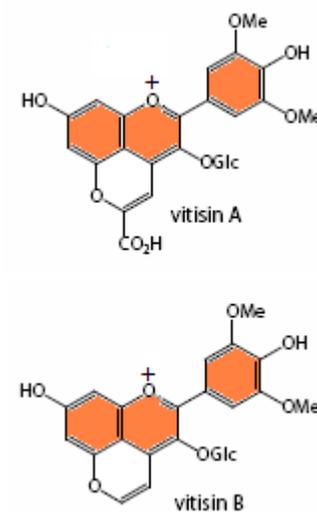
Complesso antociano-tannino  
(A<sup>+</sup>-T)



Complesso tannino-antociano  
(T-A<sup>+</sup>)



Complesso tannino-antociano  
con ponte di acetaldeide



Cesena



Davis, CA

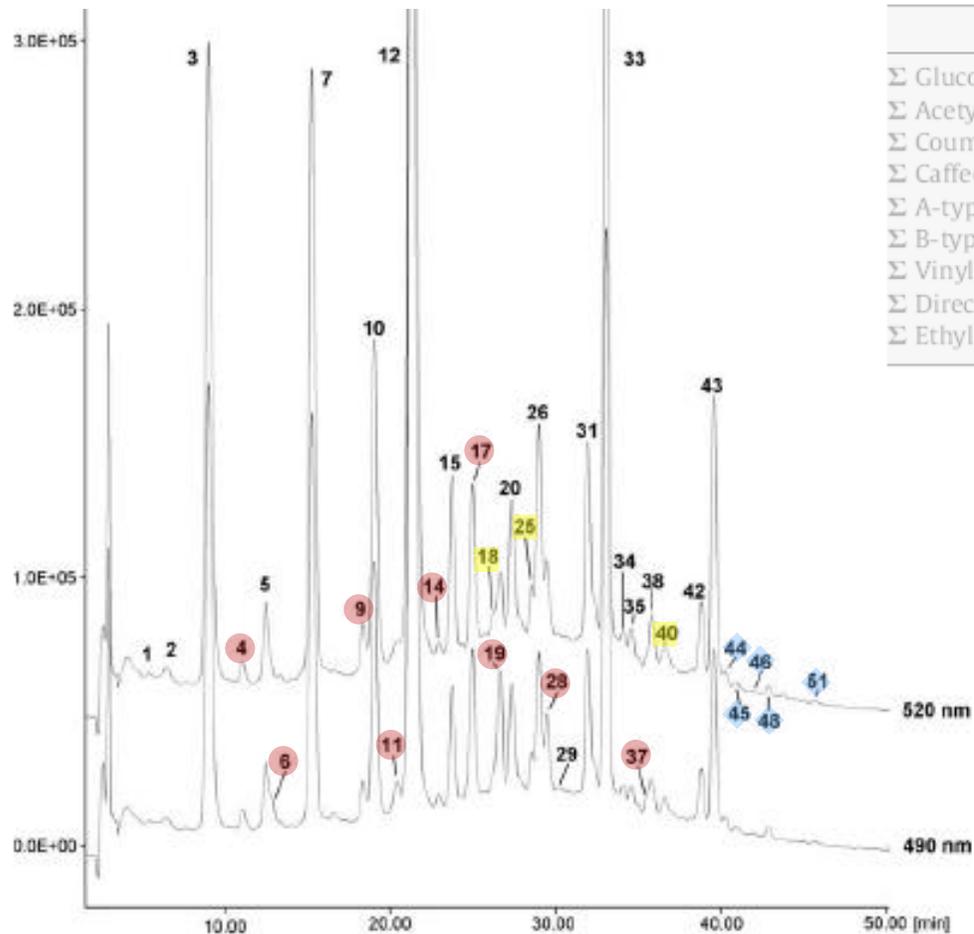


Bologna



Tebano





Mean anthocyanins content (as mg/L)

Σ Glucosides  
 Σ Acetylglucosides  
 Σ Coumaroylglucosides  
 Σ Caffeoylglucosides  
 Σ A-type Vitisins ●  
 Σ B-type Vitisins ●  
 Σ Vinylphenol adducts ◆  
 Σ Direct Condensation adducts ■  
 Σ Ethyl-bridged adducts ■

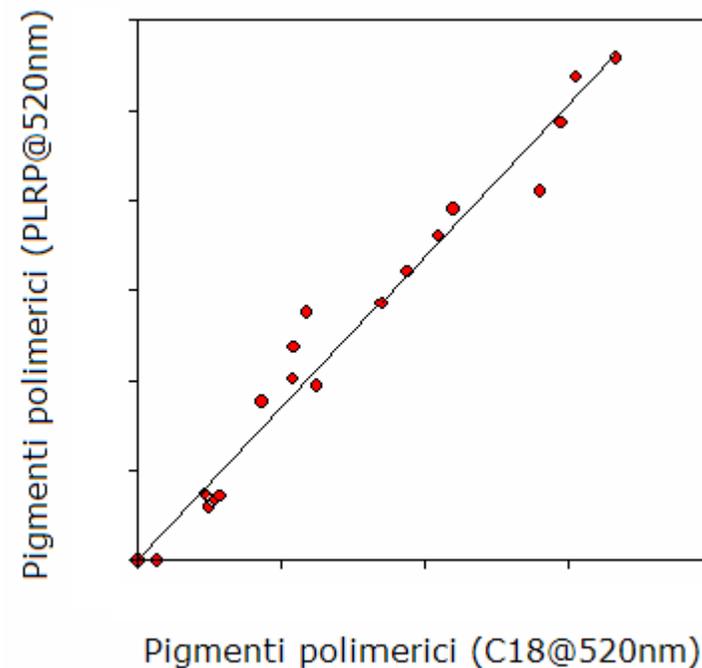
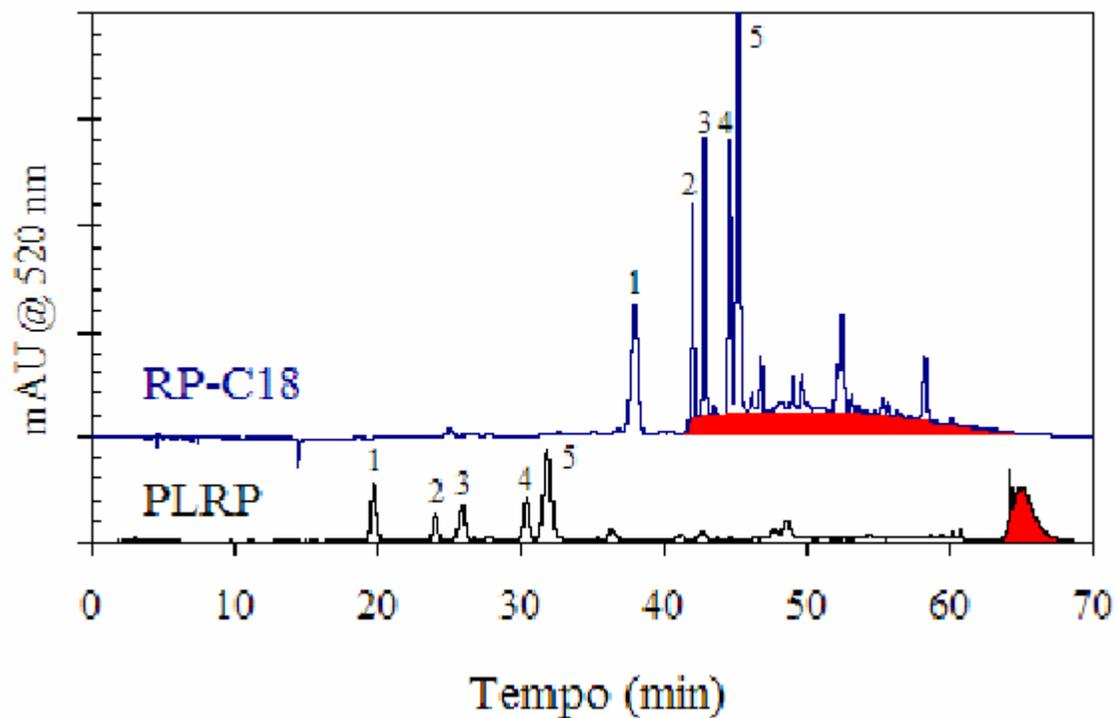


Retention times and identification criteria for the anthocyanins found in MCWs

#	tR	Compound*	λ Max
1	6.49	Pn-3-glc(epi)catechin	535
2	7.54	Mv-3-glc(epi)catechin	539
3	9.60	Df-3-glc	525, 345
4	11.50	A-type vitisin of Df-3-glc	511, 367
5	12.85	Cn-3-glc	519
6	13.10	B-type vitisin of Df-3-glc	490
7	15.60	Pt-3-glc	527, 347
8	15.81	A-type vitisin of Cn-3-glc	507, 367
9	18.77	A-type vitisin of Pt-3-glc	519, 371
10	19.46	Pn-3-glc	519
11	20.82	B-type vitisin of Pt-3-glc	493
12	21.25	Mv-3-glc	527, 346
13	22.76	Pt-3-glc-ethyl(epi)catechin	538,452
14	23.45	A-type vitisin of Pn-3-glc	503
15	24.12	Df-3-acetylglc	527
16	24.70	Pt-3-glc-ethyl(epi)catechin	540,444
17	25.40	A-type vitisin of Mv-3-glc (Vitisin A)	513, 367
18	26.65	Mv-3-glc-ethyl(epi)catechin	542, 440
19	27.08	B-type vitisin of Mv-3-glc (Vitisin B)	490, 356
20	27.55	Cn-3-acetylglc	521
21	27.80	A-type vitisin of Mv-3-acetylglc	516, 371
22	27.96	Mv-3-glc-ethyl(epi)catechin	-
23	28.50	Pn-3-glc-ethyl(epi)catechin	-
24	28.57	Pt-3-glc-ethyl(epi)catechin	-
25	29.12	Mv-3-glc-ethyl(epi)catechin	542
26	29.56	Pt-3-acetylglc	528, 346
27	30.15	Mv-3-glc-ethyl(epi)catechin	537
28	30.20	B-type vitisin of Mv-3-acetylglc	498
29	31.00	Acetone derivative of Mv-3-glc	480
30	32.65	Df-3-coumaroylglc	532
31	32.80	Pn-3-acetylglc	521
32	33.24	A-type vitisin of Mv-3-coumaroylglc	518, 367
33	34.05	Mv-3-acetylglc	531
35	35.62	Cn-3-coumaroylglc	520
36	36.11	Mv-3-caffeoylglc	534
37	36.48	A-type vitisin of Mv-3-coumaroylglc	495
38	36.82	Pt-3-coumaroylglc	533
39	37.65	Mv-3-glc-4-vinyl(epi)catechin	508
40	38.07	Mv-3-coumaroylglc-ethyl(epi)catechin	554
41	39.37	Mv-3-acetylglc-ethyl(epi)catechin	550
42	39.98	Pn-3-coumaroylglc	522
43	40.53	Mv-3-coumaroylglc	533
44	41.17	Mv-3-glc-4-vinylcatechol (Pinotin A)	510
45	41.56	Mv-3-glc-4-vinyl(epi)catechin	505
46	43.17	Pn-3-glc-4-vinylphenol	501
47	43.81	Mv-3-acetylglc-4-vinylcatechol	513
48	44.17	Mv-3-glc-4-vinylphenol	504, 413
49	45.83	Mv-3-glc-4-vinylguaiacol	514
50	46.38	Mv-3-coumaroylglc-4-vinylcatechol	504
51	47.04	Mv-3-acetylglc-4-vinylphenol	507, 410
52	49.06	Pn-3-coumaroylglc-4-vinylphenol	484
53	49.66	Mv-3-coumaroylglc-4-vinylphenol	504

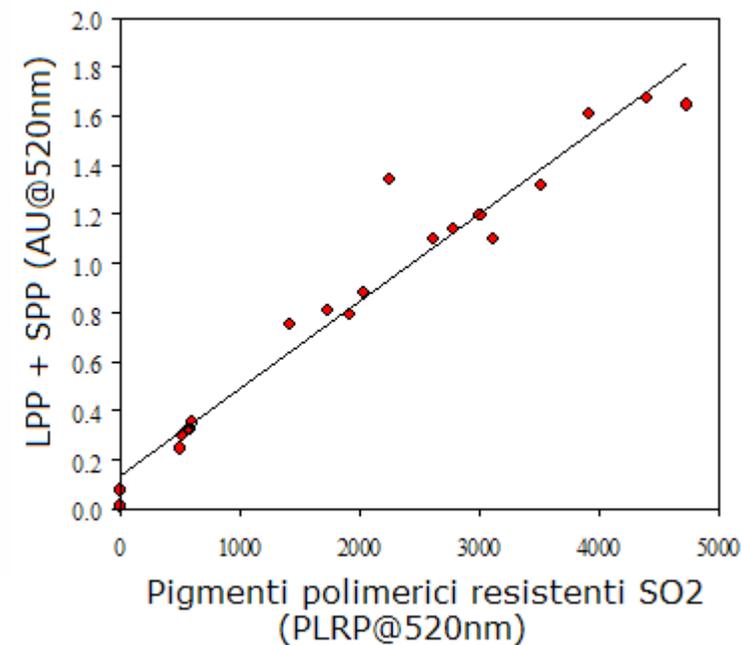
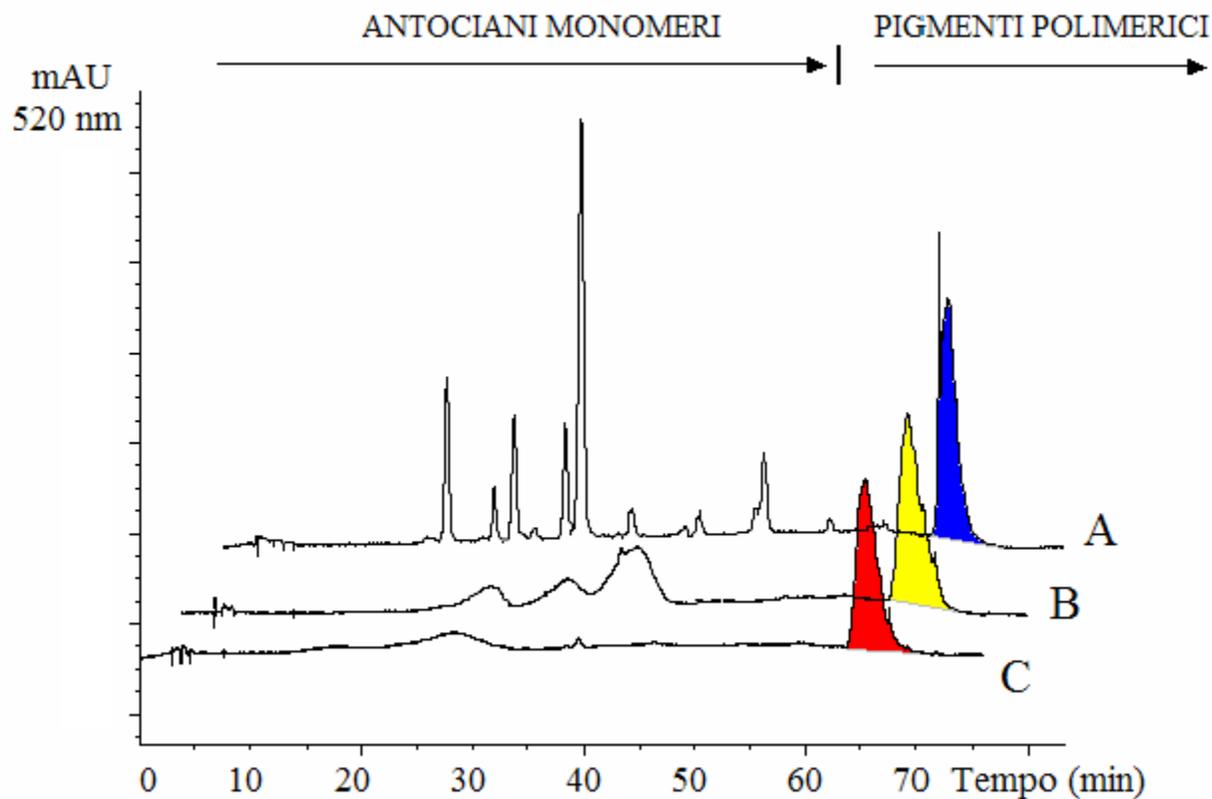
Chinnici et al. (2009) Food Chemistry 113, 651–657





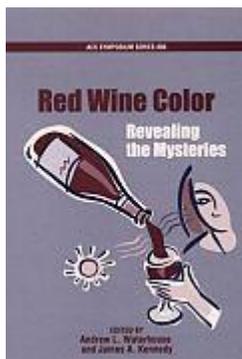
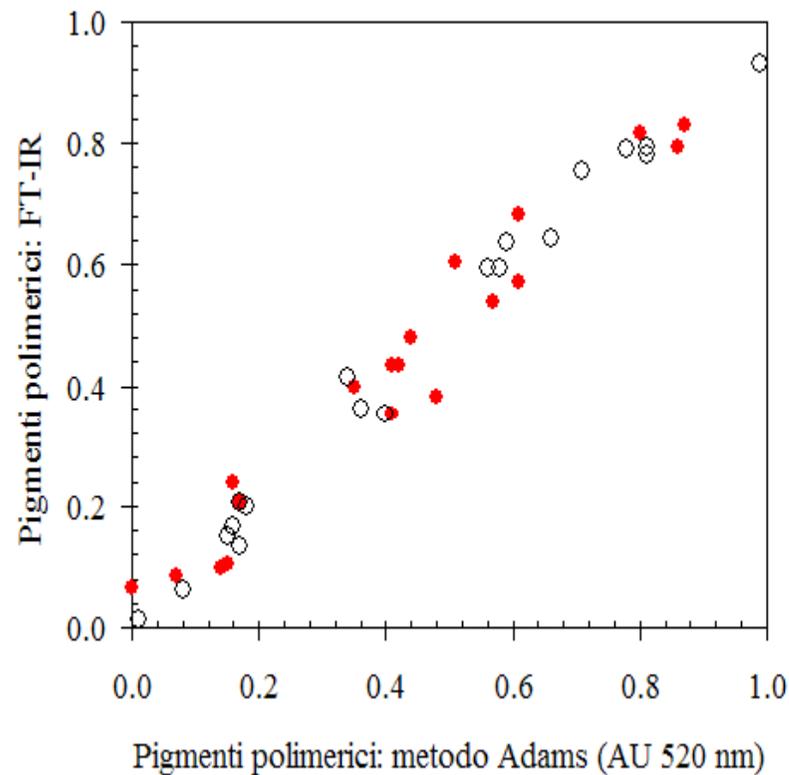
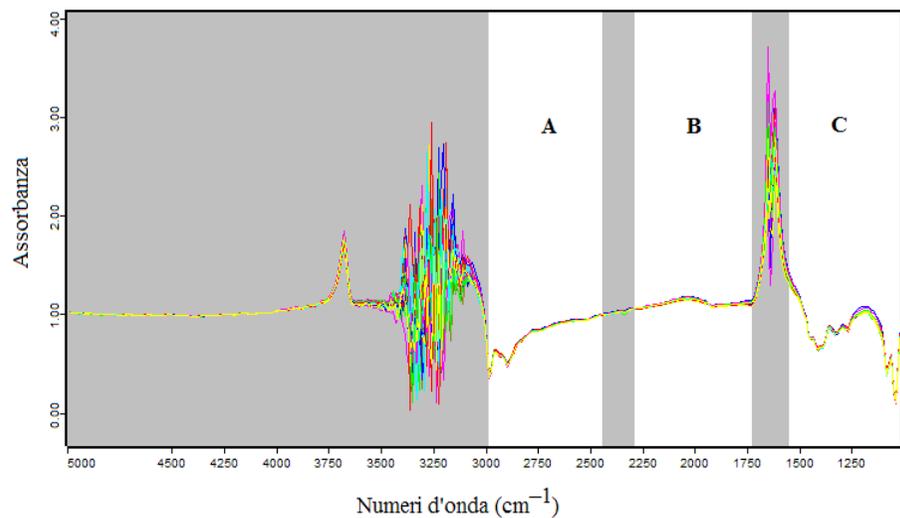
*Versari et al. (2008) Food Chemistry 106, 1, 397–402*





*Versari et al. (2007) Am. J. Enol. Vitic. 58 (4) 523–525.*

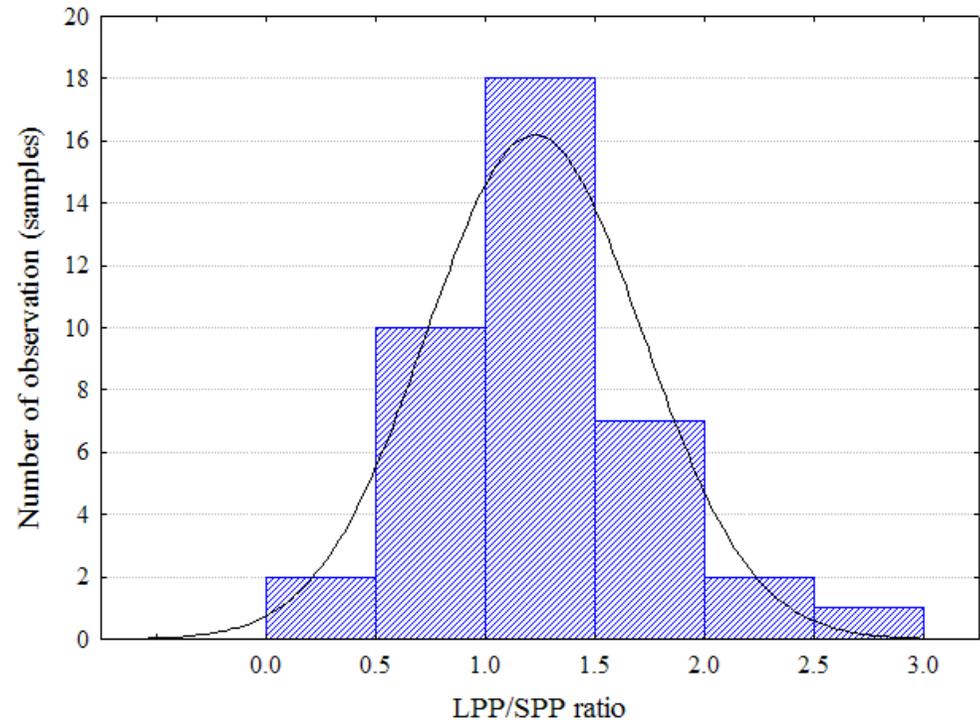




*Versari et al. (2006) It. J. Food Sci. 4, 18, 423–432.*

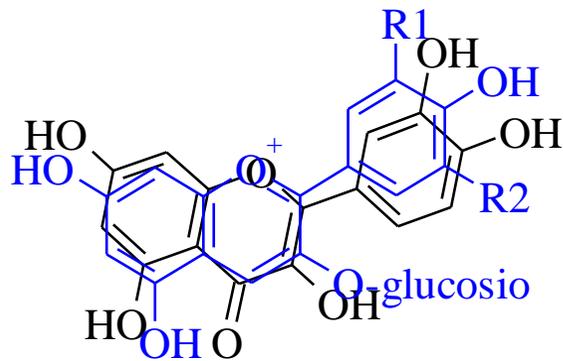
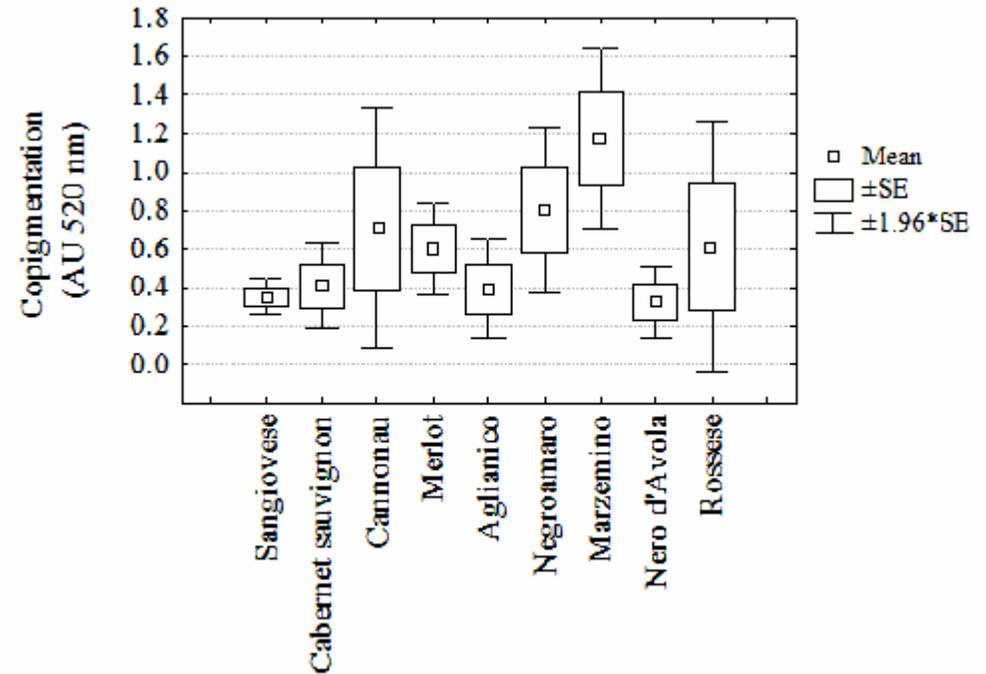


## Sangiovese di Romagna



*Versari et al. (2007) S. Afr. J. Enol. Vitic. 28, 1, 6–10.*



**COPIGMENTAZIONE****124 vini rossi**

Versari et al. (2007) *S. Afr. J. Enol. Vitic.* 28, 1, 6–10.



## Red Wine Color: Revealing the Mysteries

*I problemi analitici posti dalle varie sostanze fenoliche sono numerosi e non del tutto risolti. Le sostanze fenoliche sono importanti per la comprensione delle proprietà e dei fenomeni che accompagnano la vita del vino ... in particolare l'ossidazione, l'invecchiamento e le sue caratteristiche sensoriali (L. Paronetto in "Polifenoli e Tecnica Enologica" 1979).*



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