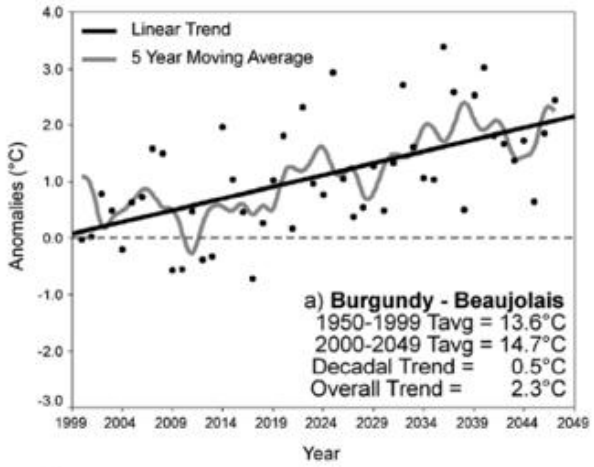
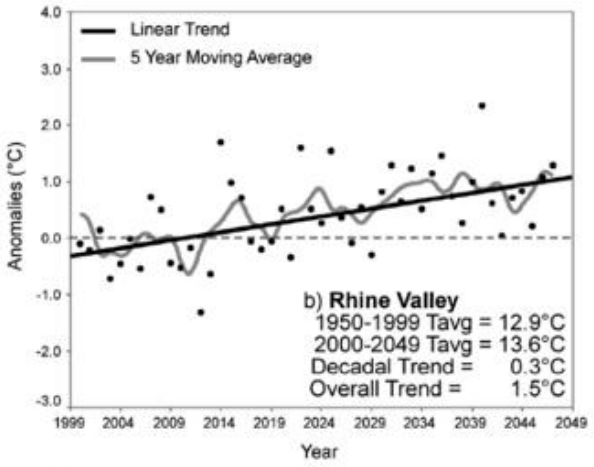
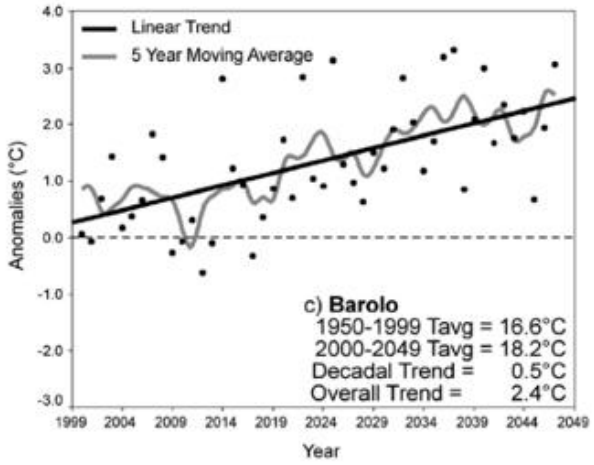
Agrivoltaico in vigneto

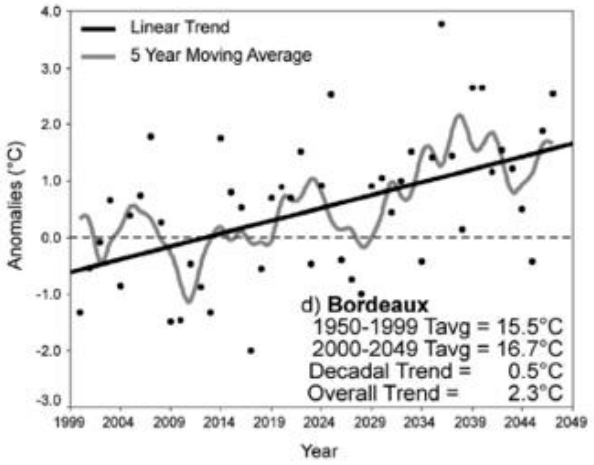
Prof. Paolo Sivilotti – 01 Dicembre 2025

Climate change









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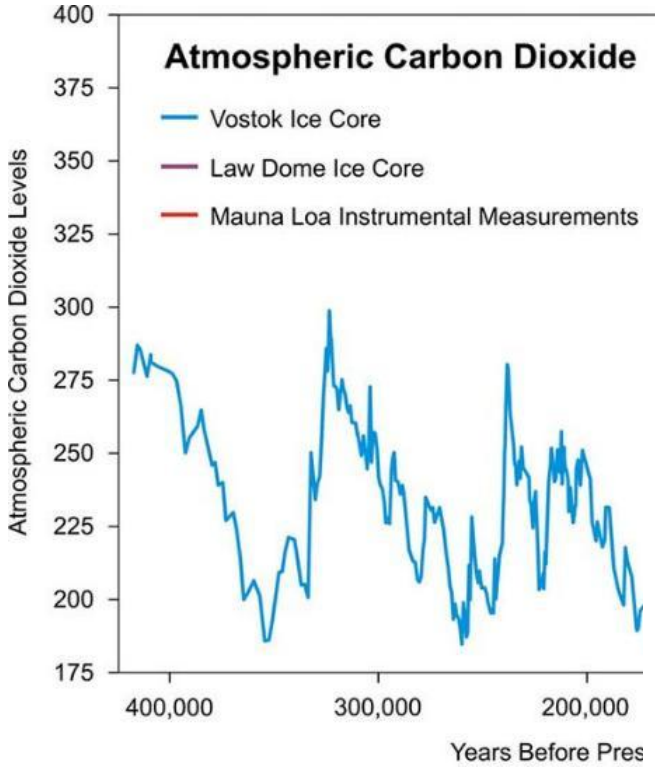
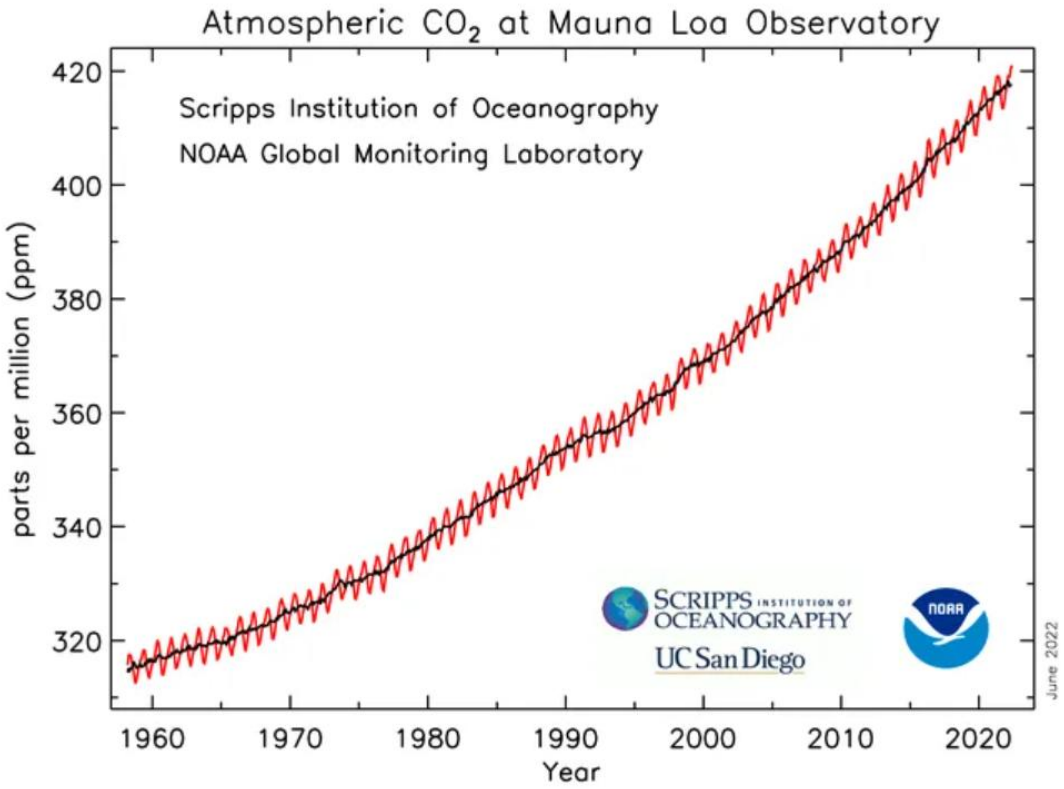
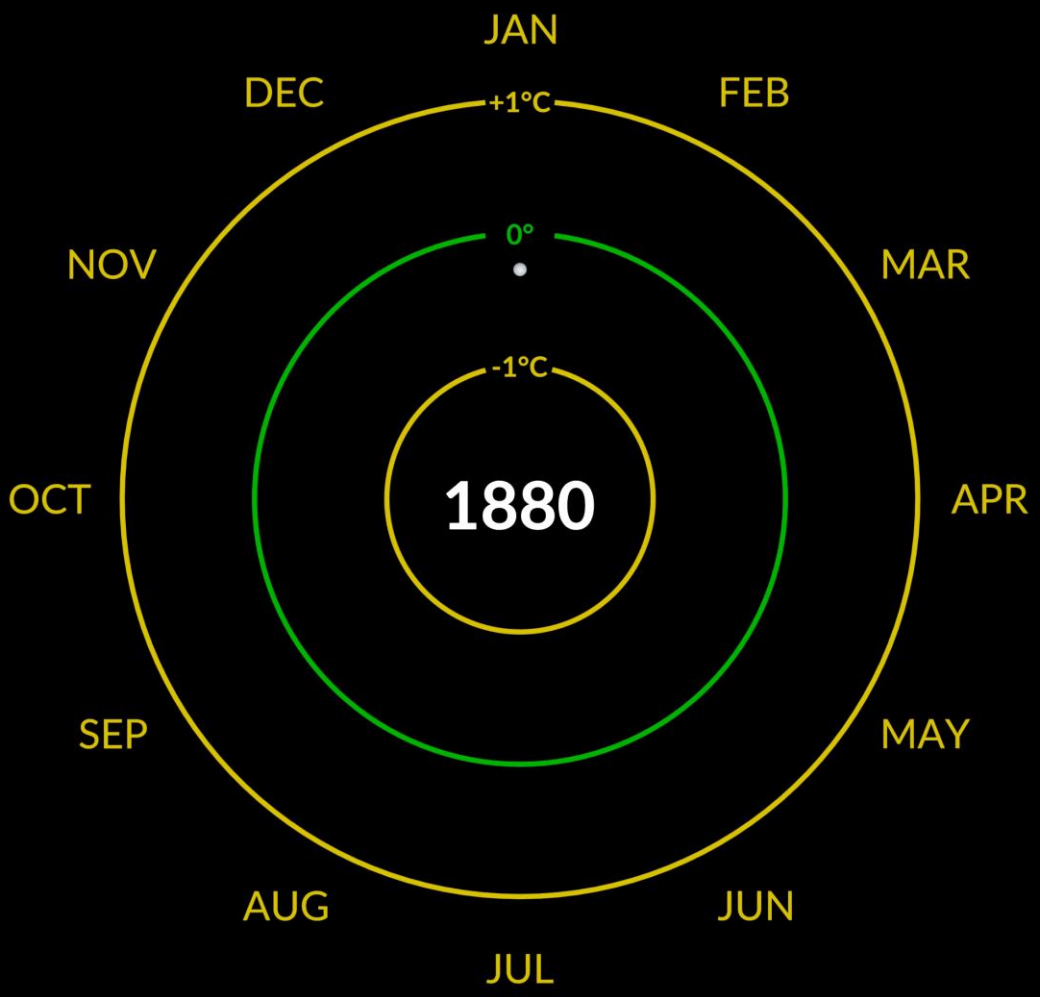
Qualcuno dice che non c'è





https://storieminerali.it/curva-keeling/

Qualcuno dice che non c’è



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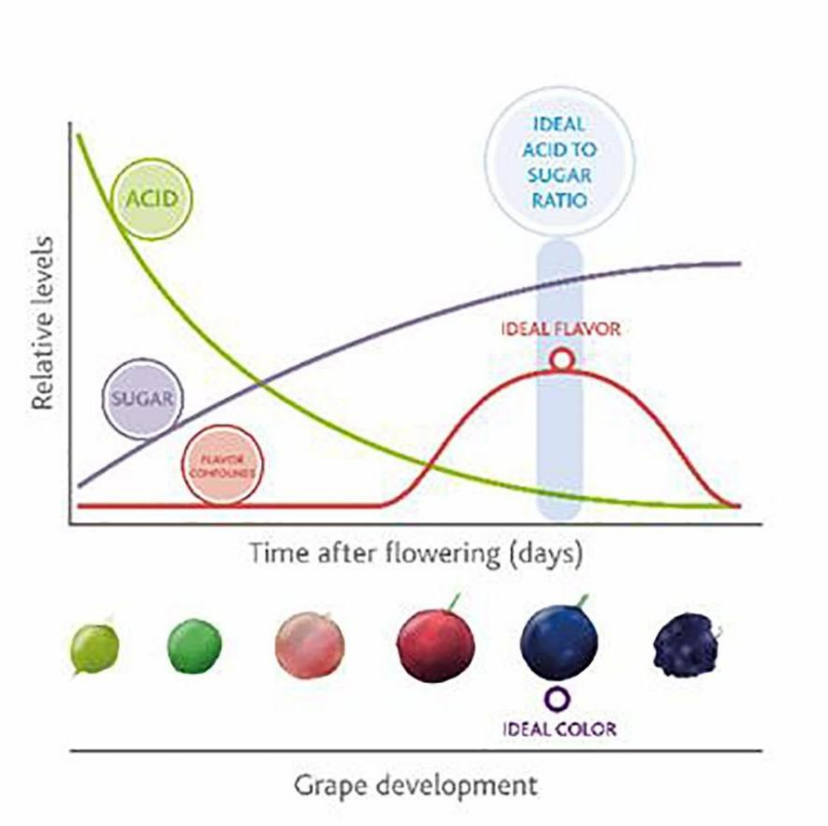
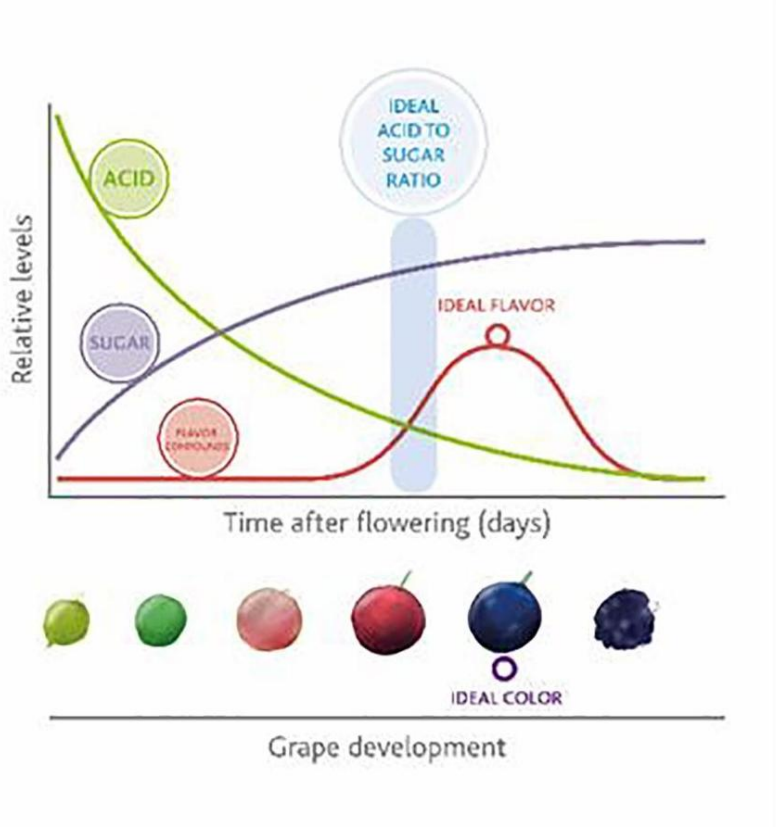
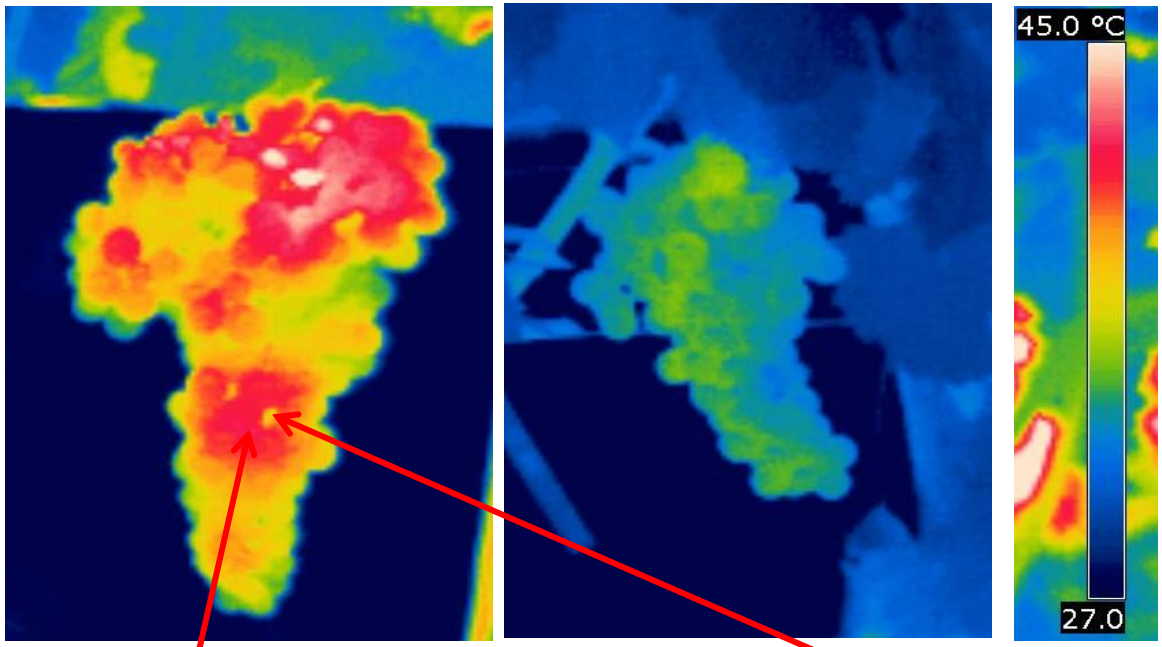
Maturazioni disaccoppiate

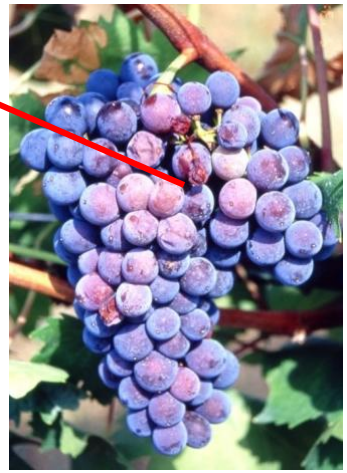




Ubeda C., Hornedo-Ortega R., Cerezo A.B., Garcia-Parrilla M.C., Troncoso A.M. (2020). *Food Chemistry* **314**:126222

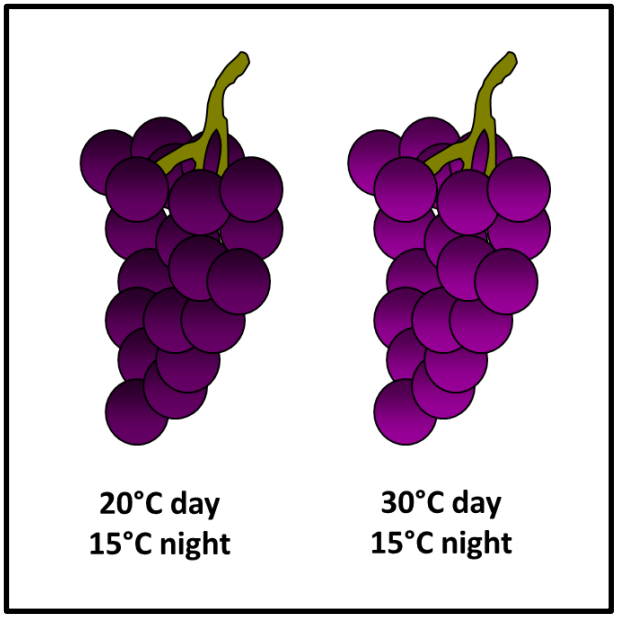
temperatura dei grappoli

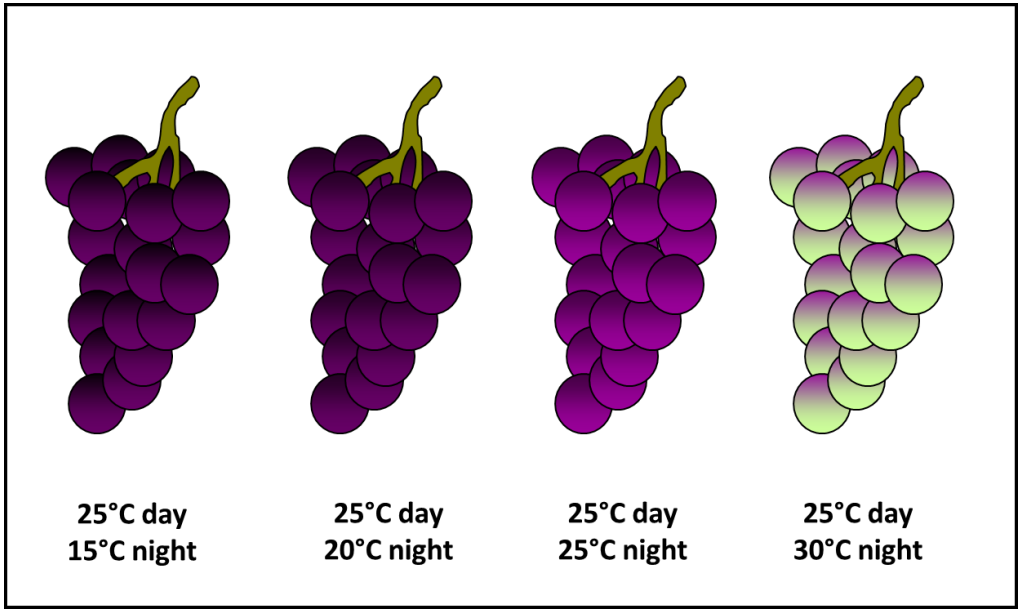




T° > 35°C
riduzione di antociani,
acidità e aromi varietali

Temperatura dei grappoli e antociani





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Winkler, A.J., Cook, J.A., Kliewer, W.M., Lider, L.A., 1974. General Viticulture. University of California Press, Berkeley, Los Angeles and London.

Caolino

6% riflessa

100 %
Luce incidente

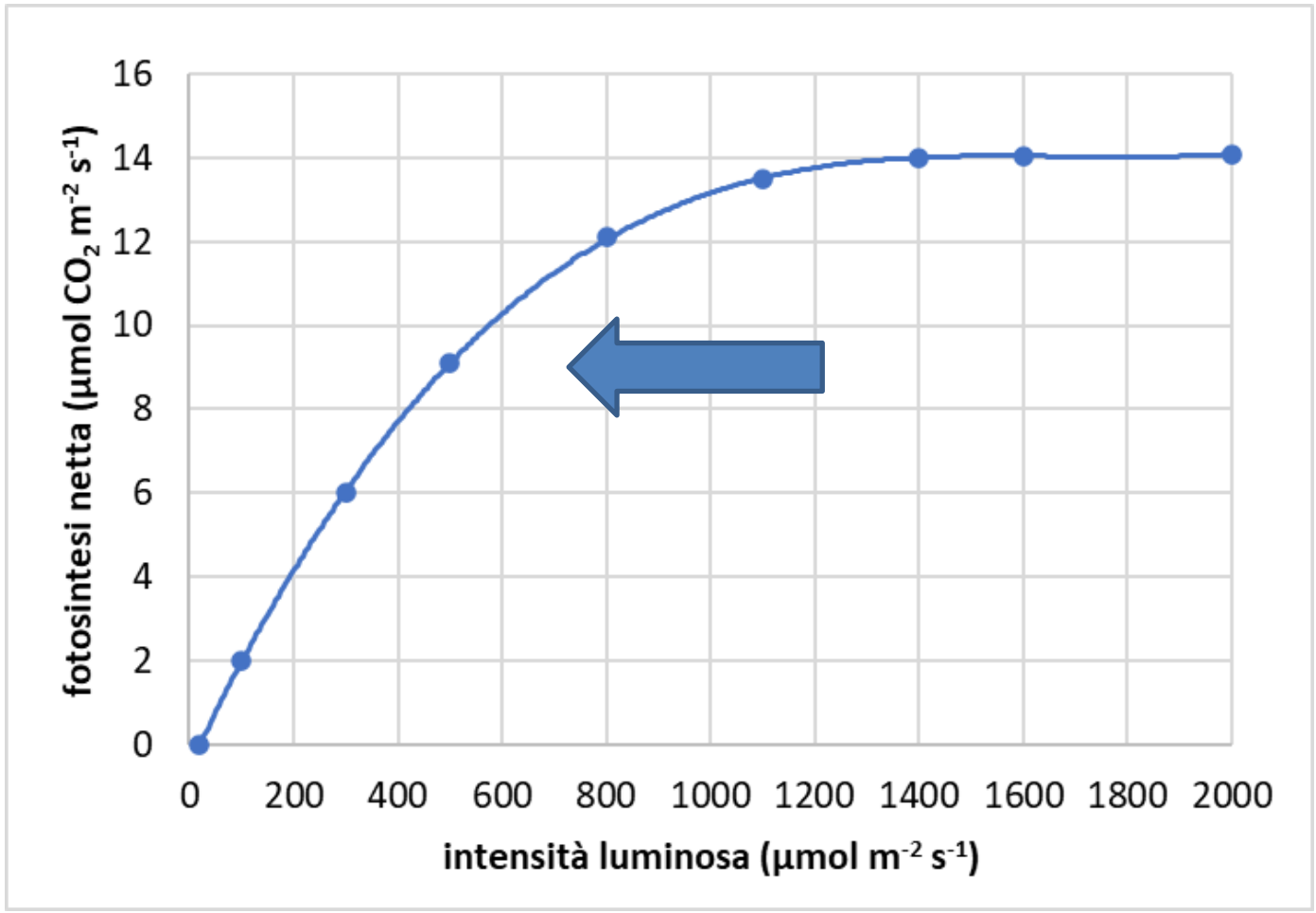
85-90% assorbita

Reti

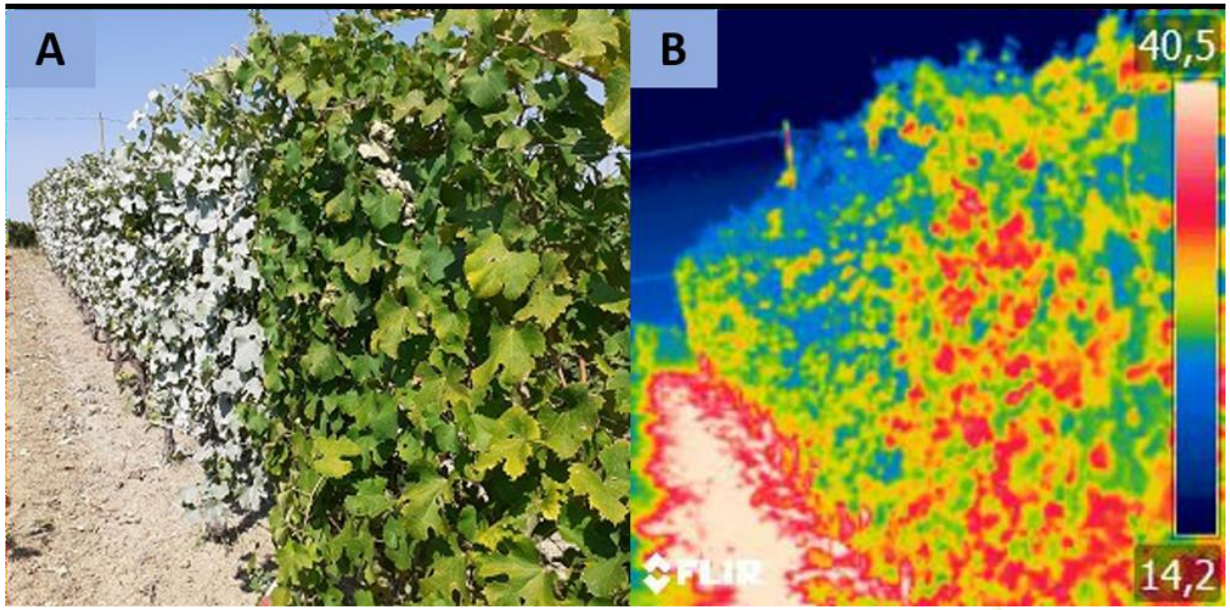
Pannelli AV

4-9% trasmessa

Fotosintesi e luce



Caolino – Zeolite



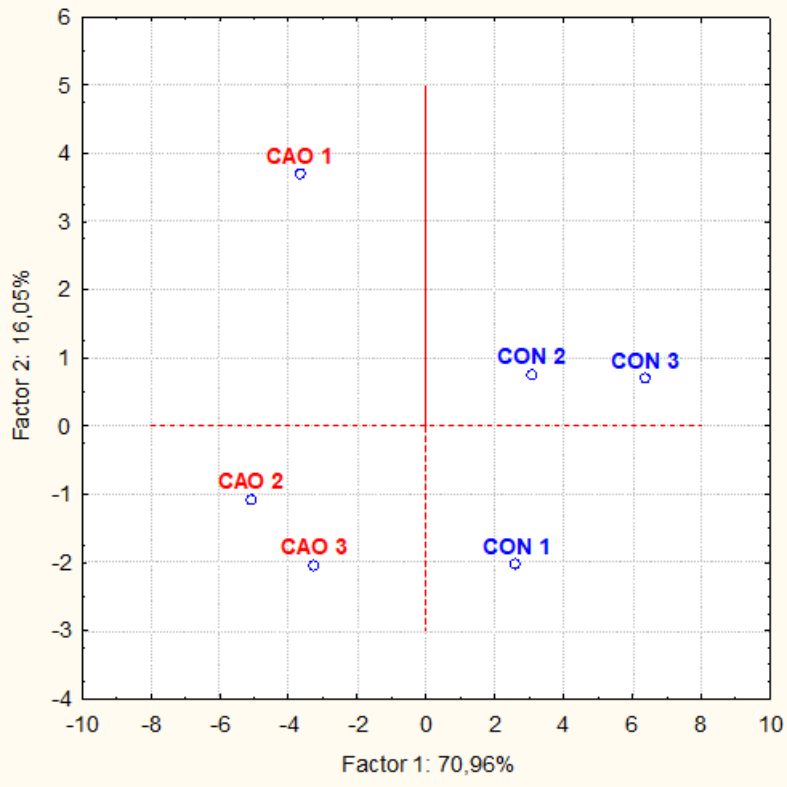
Valentini G., Pastore C., Allegro G., Muzzi E., Seghetti L. & Filippetti I. (2021). *Agronomy*, **11**:1035.

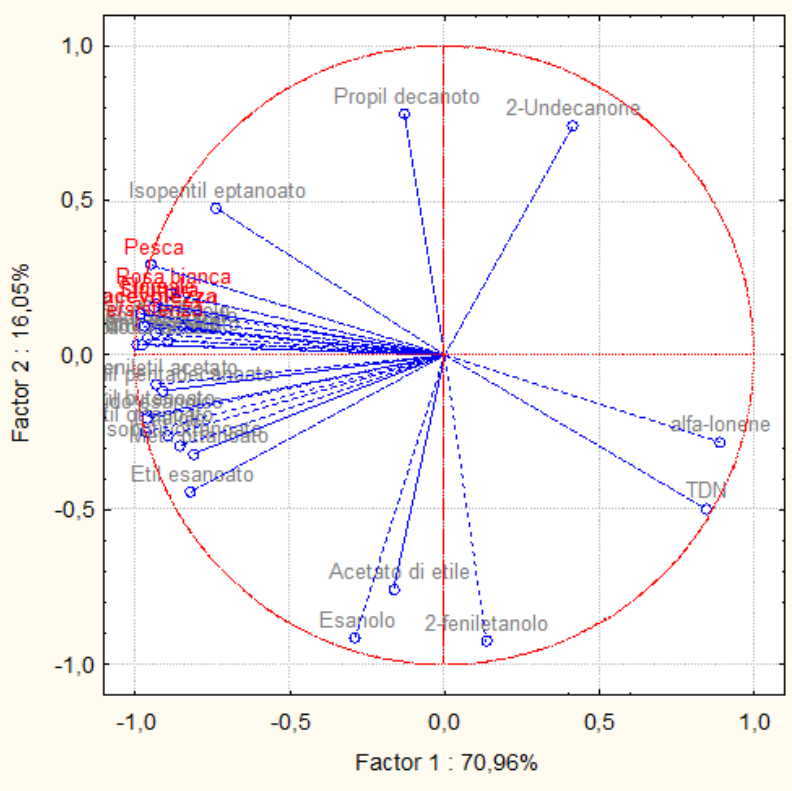
Traminer 2020-21

Mulino delle Tolle
AZIENDA AGRICOLA

Bomben P. (2021). *BSc thesis*. University of Udine, Italy

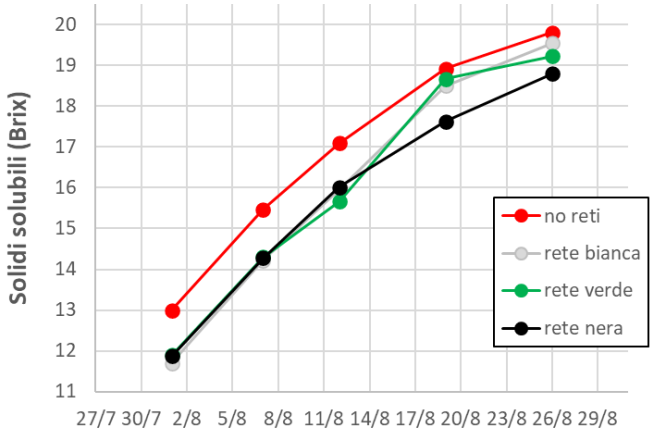
Caolino – scottature

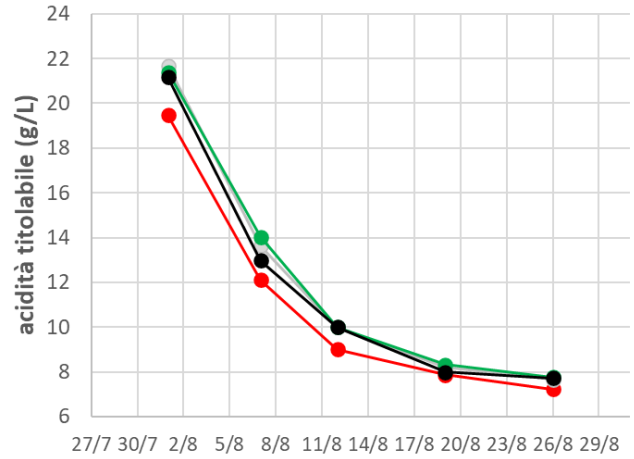




Bomben P. (2021). *BSc thesis*. University of Udine, Italy

Reti ombreggianti





MASÜT DA RIVE

Agrivoltaico

ostacoli alla meccanizzazione

< evapotraspirazione < irrigazione

ripensare alla forma di allevamento

GDC ?

Agrivoltaico

frontiers | Frontiers in Horticulture

TYPE Original Research
PUBLISHED 05 December 2024
DOI 10.3389/fhort.2024.1473072

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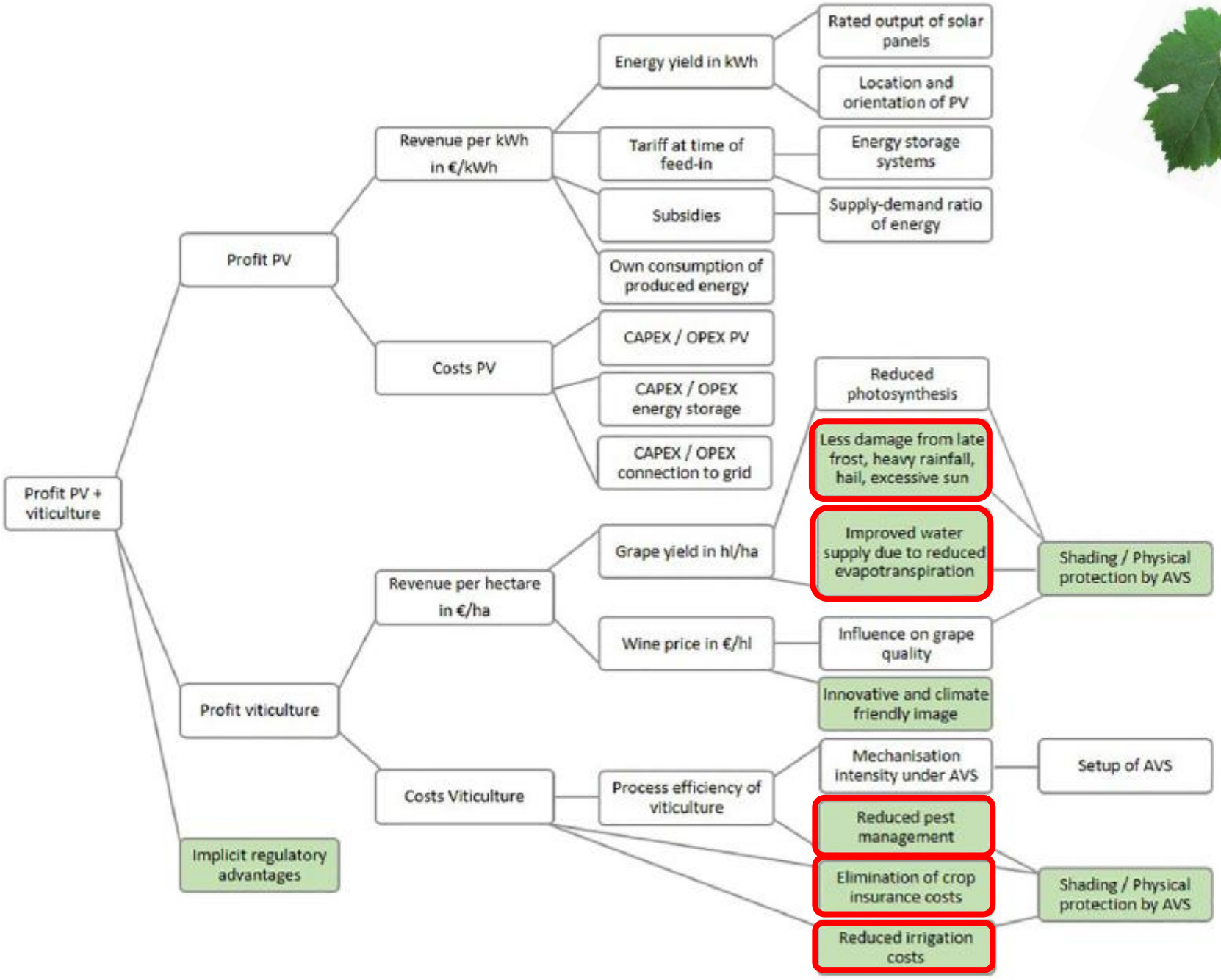
RECEIVED 30 July 2024

Assessing the economic performance of agrivoltaic systems in vineyards – framework development, simulated scenarios and directions for future research

Larissa Strub[1*], Maximilian Wittke[2], Max Trommsdorff[2,3], Manfred Stoll[4], Claudia Kammann[5] and Simone Loose[1]

Strub L., Wittke M., Trommsdorff M., Stoll M., Kamman C., Loose S. (2024). *Front. Plant Sci.*


Profit PV + viticulture
Profit PV
Revenue per kWh in €/kWh
Energy yield in kWh
Rated output of solar panels
Location and orientation of PV
Tariff at time of feed-in
Energy storage systems
Subsidies
Supply-demand ratio of energy
Own consumption of produced energy
Costs PV
CAPEX / OPEX PV
CAPEX / OPEX energy storage
CAPEX / OPEX connection to grid
Profit viticulture
Revenue per hectare in €/ha
Grape yield in hl/ha
Reduced photosynthesis
Less damage from late frost, heavy rainfall, hail, excessive sun
Improved water supply due to reduced evapotranspiration
Wine price in €/hl
Influence on grape quality
Innovative and climate friendly image
Shading / Physical protection by AVS
Costs Viticulture
Process efficiency of viticulture
Mechanisation intensity under AVS
Setup of AVS
Reduced pest management
Elimination of crop insurance costs
Reduced irrigation costs
Shading / Physical protection by AVS
Implicit regulatory advantages

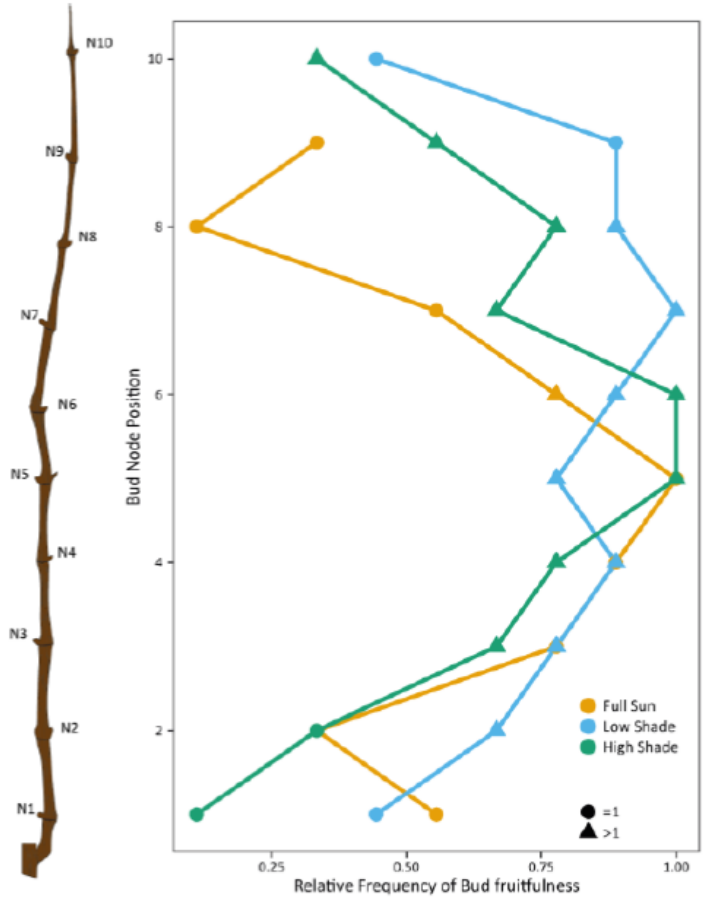
horticulturae

MDPI

Article

Exploring the Grape Agrivoltaic System: Climate Modulation and Vine Benefits in the Puglia Region, Southeastern Italy

Andrea Magarelli, Andrea Mazzeo and Giuseppe Ferrara *



Scientia Horticulturae 308 (2023) 111595

Contents lists available at ScienceDirect

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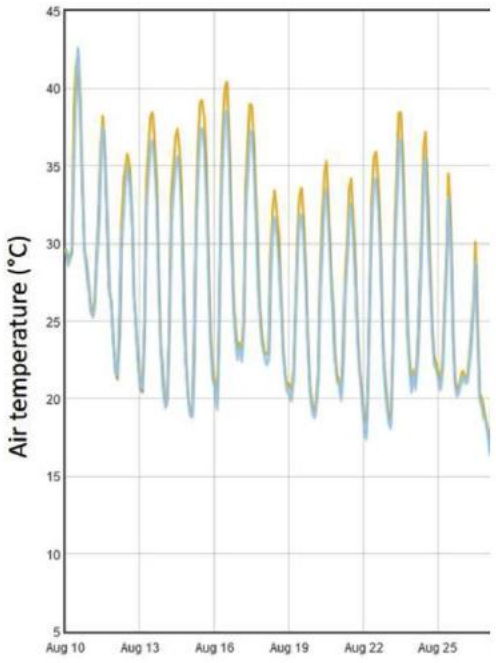
journal homepage: www.elsevier.com/locate/scihorti

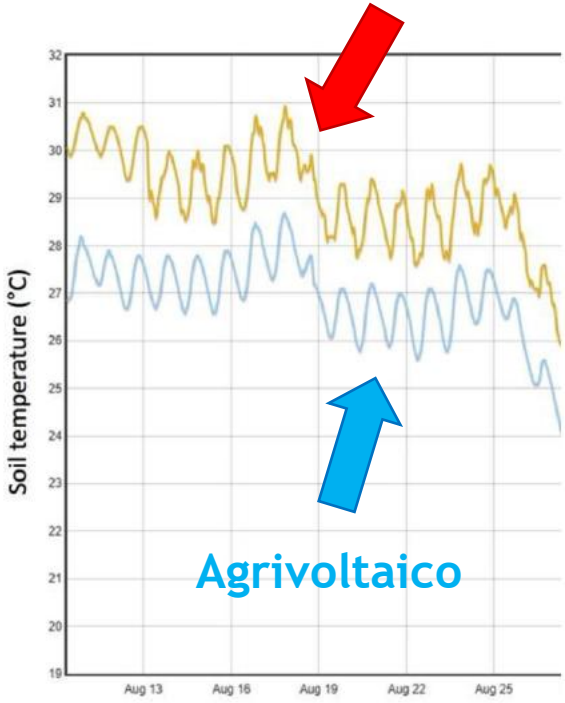
Effect of shading determined by photovoltaic panels installed above the vines on the performance of cv. Corvina (*Vitis vinifera* L.)

Giuseppe Ferrara [a,*], Maurizio Boselli [b], Marino Palasciano [a], Andrea Mazzeo [a]

[a] Department of Soil, Plant and Food Sciences, University of Bari "Aldo Moro", via G. Amendola 165/A, 70126, Bari, Italy
[b] Former Professor, Department of Biotechnology of the University of Verona, Italy

Controllo





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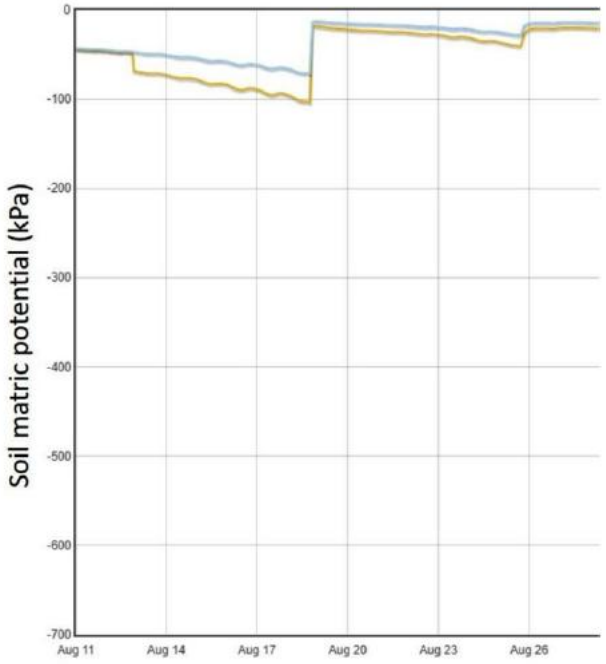

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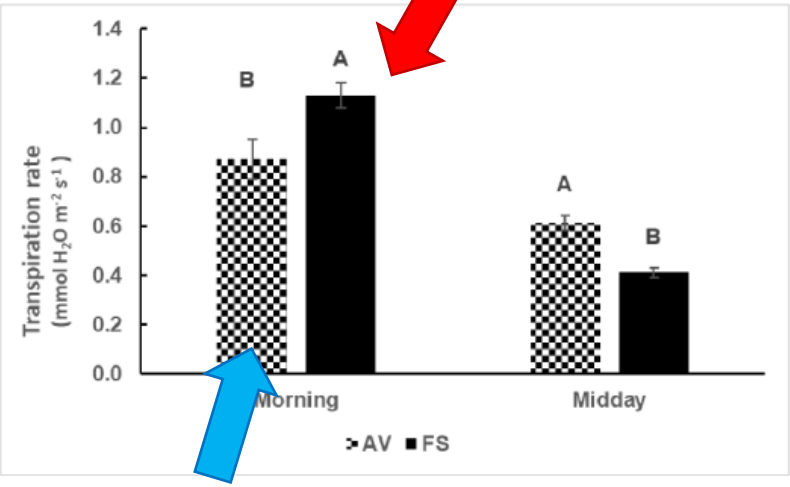

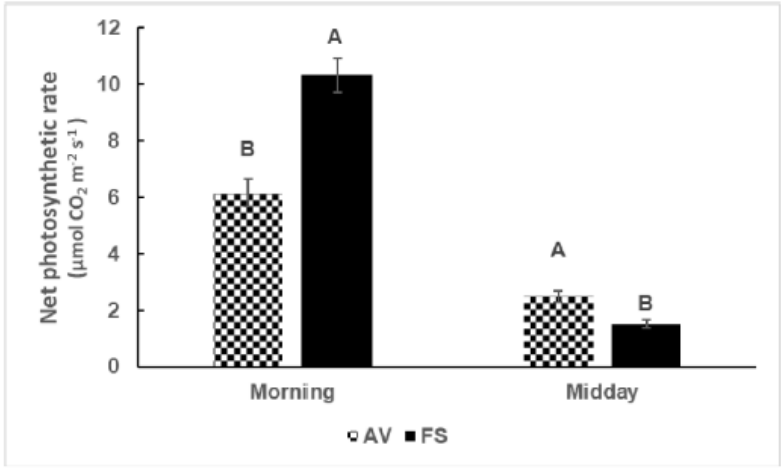

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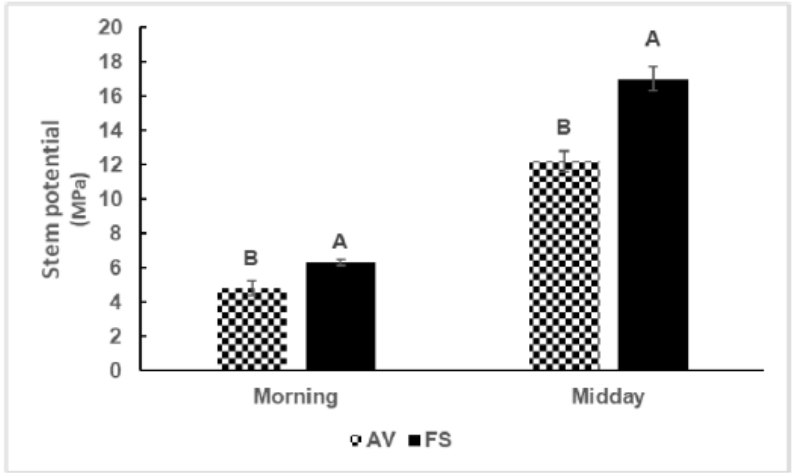


Ferrara G., Boselli M., Palasciano M., Mazzeo A. (2023). *Sci. Hort.* **308**, 111595

Parametri di produzione

	produzione	Fertilità gemme	Peso grappolo	Numero grappoli
2017				
AV	3,42	1,34	320	10,7
CON	3,79	1,28	370	10,2
2018				
AV	3,83	1,33	365	10,5
CON	4,46	1,55	388	11,5
2019				
AV	4,85	1,26	385	12,6
CON	5,66	1,38	410	13,8

Ferrara G., Boselli M., Palasciano M., Mazzeo A. (2023). *Sci. Horti* **308**, 111595

Parametri qualitativi uve

	Solidi solubili (°Brix)	Acidità titolabile	Polifenoli totali (mg/L)	Antociani totali (mg/L)
2017				
AV	19,6	8,58	1471	305
CON	21,5	7,85	2124	542
2018				
AV	20,2	7,15	1223	334
CON	22,6	6,35	1364	362
2019				
AV	19,1	8,70	1254	348
CON	20,8	7,80	1432	322

Ferrara G., Boselli M., Palasciano M., Mazzeo A. (2023). *Sci. Horti* **308**, 111595

Agrivoltaico

Wiley
Australian Journal of Grape and Wine Research
Volume 2025, Article ID 8827979, 23 pages
https://doi.org/10.1155/ajgw/8827979

AUSTRALIAN SOCIETY OF VITICULTURE AND OENOLOGY | ASVO

Research Article

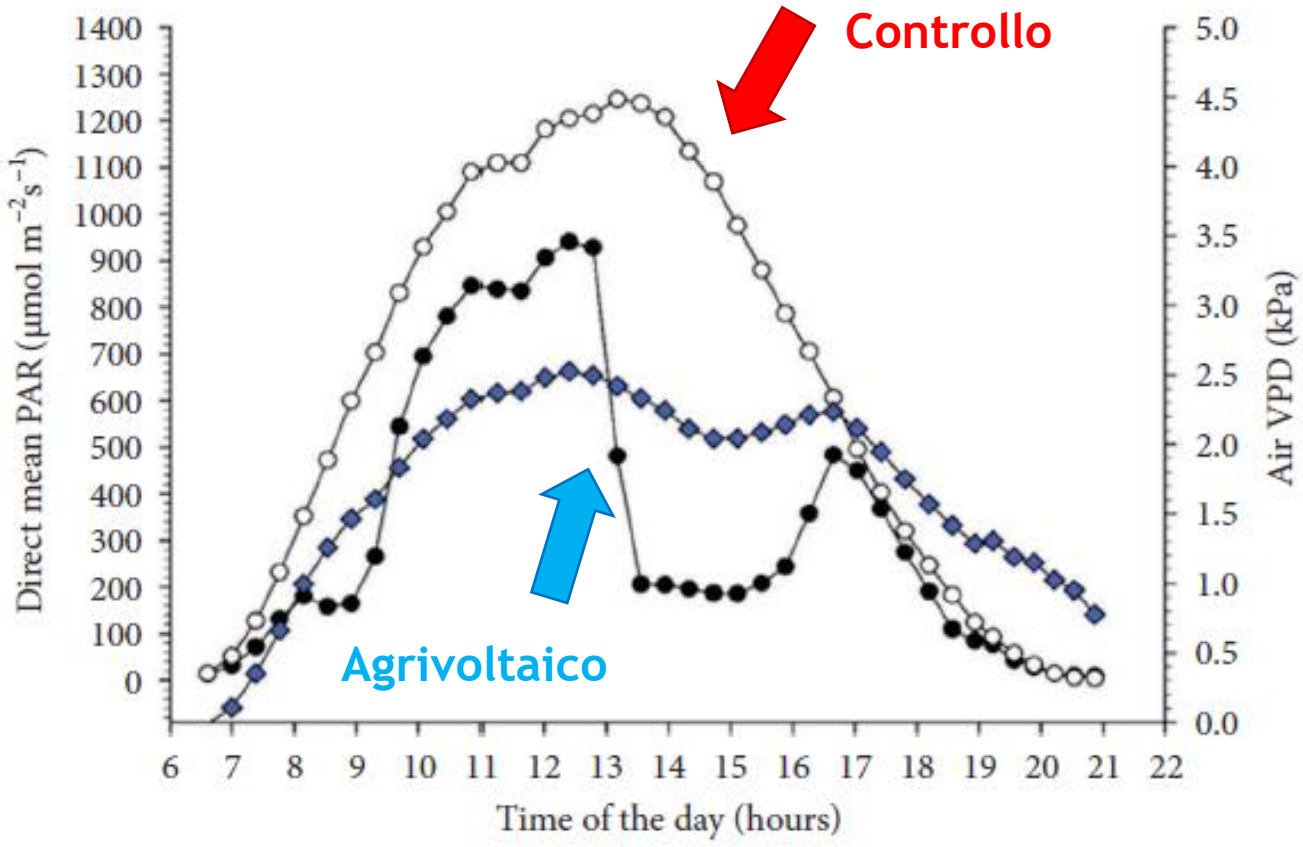
Vine Performance, Single-Leaf and Whole-Canopy Gas Exchange Under Agrivoltaics Cover in Malvasia di Candia Aromatica and Cabernet Sauvignon Grapevines

Paolo Bonini,[1] **Mario Gabrielli**,[2] **Leonardo D'Intino**,[2] **Ilaria Filippetti**,[3] **Gianluca Allegro**,[3] **Daniela Sangiorgio**,[3] **Eugenio Magnanini**,[1] **and Stefano Poni**[1]

Bonini P., Gabrielli M., D'Intino L., Filippetti I., Allegro G., Sangiorgio D., Magnanini E., Poni S. (2025). *Aust. J. Grape Wine Res.* **2025**, 8827979

Intensità luminosa

- 47 % intensità luminosa



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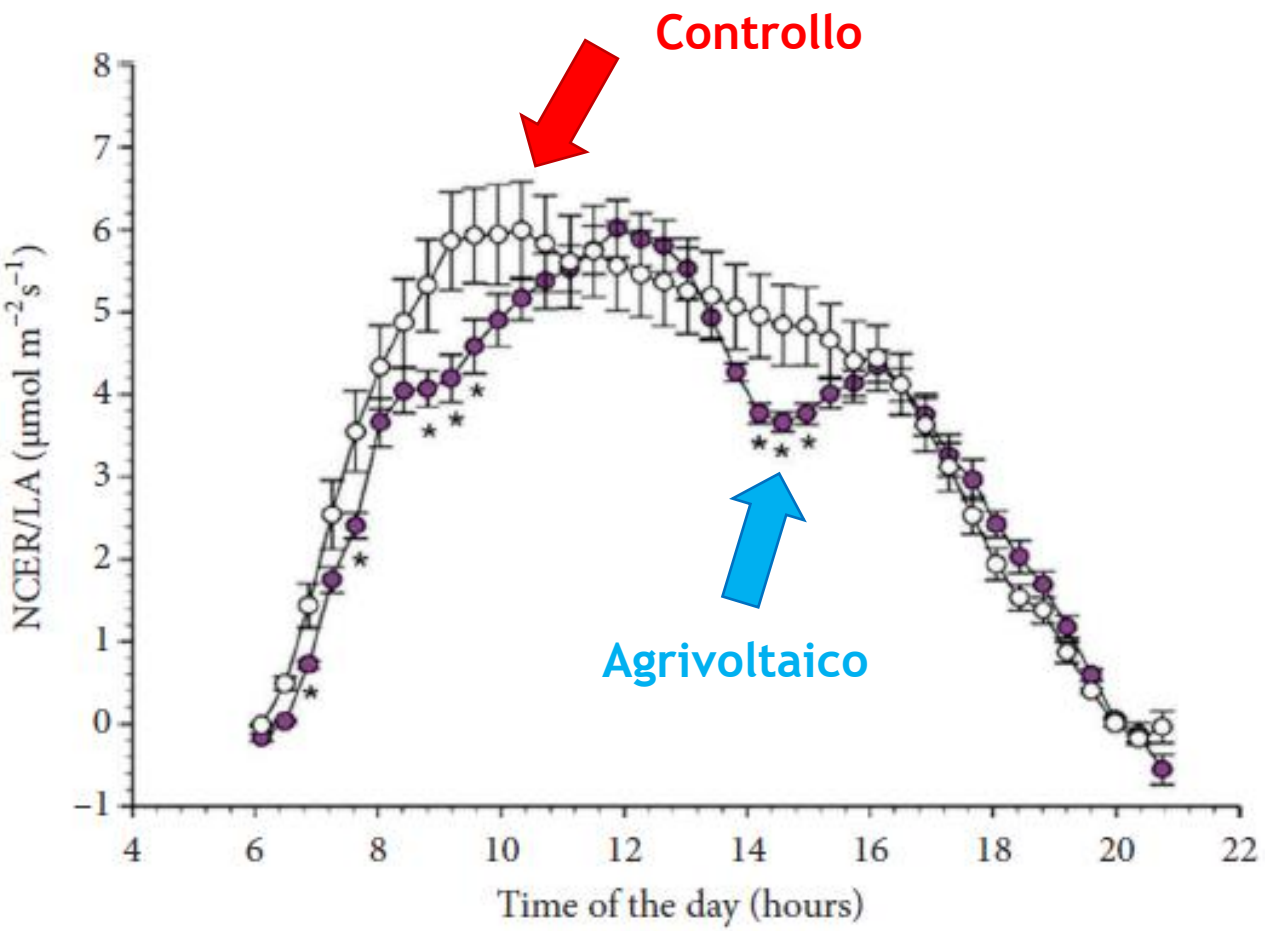
Fotosintesi totale pianta



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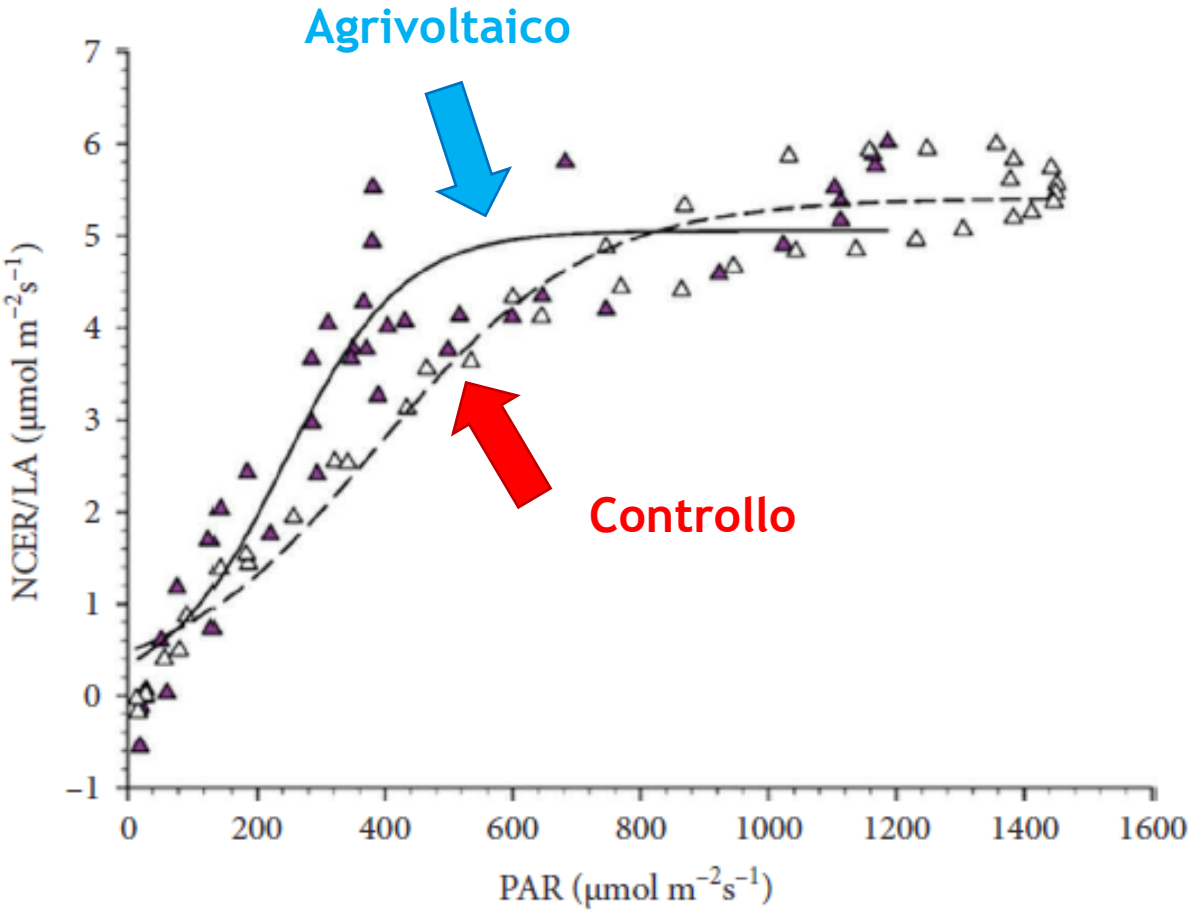
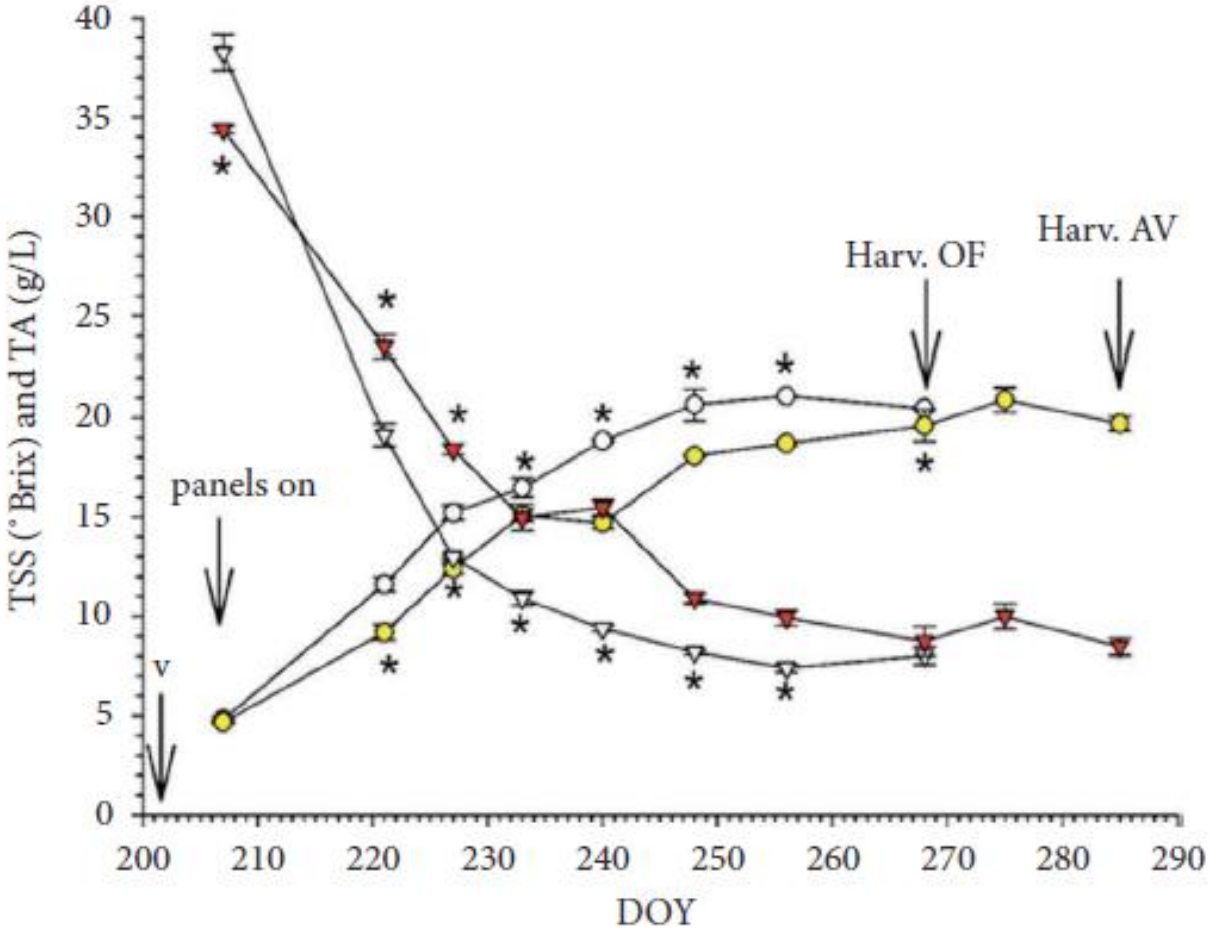


Bonini P., Gabrielli M., D'Intino L., Filippetti I., Allegro G., Sangiorgio D., Magnanini E., Poni S. (2025). *Aust. J. Grape Wine Res.* **2025**, 8827979

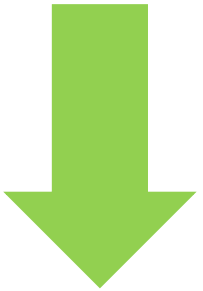
Curve di maturazione



Bonini P., Gabrielli M., D'Intino L., Filippetti I., Allegro G., Sangiorgio D., Magnanini E., Poni S. (2025). *Aust. J. Grape Wine Res.* **2025**, 8827979

L^{-1}) of free-volatile and bound aromatic compounds of Malvasia di Candia aromatica wines.

Free-volatile compounds	Chemical class	MC–OF	MC–AV
Ethyl butyrate	Ester	44.91	44.18
4-Methyl-1-pentanol	Higher alcohols	**10.89**	**5.36**
Ethyl 2-methylbutyrate	Ester	0.56	0.39
Ethyl isovalerate	Ester	2.95	2.51
3-Methyl-1-pentanol	Higher alcohol	**23.83**	**17.92**
1-Hexanol	C_6 alcohol	511.61	518.87
Isoamyl acetate	Ester	**1558.45**	**657.19**
1-Heptanol	Higher alcohol	9.07	9.95
3-Methylpentyl acetate	Ester	0.91	0.32
Ethyl hexanoate	Ester	**356.60**	**223.25**
Hexyl acetate	Ester	**38.83**	**4.66**
D-Limonene	Monoterpene	**1.91**	**1.59**
Ethyl 2-hydroxy-4-methylpentanoate	Ester	**31.95**	**24.08**
Isoamyl lactate	Ester	**12.49**	**7.95**
trans-Linalool oxide (furanoid)	Monoterpene	**8.36**	**5.95**
1-Octanol. 2.7-dimethyl-	Monoterpene	8.53	9.02
cis-Linalyl oxide (furanoid)	Monoterpene	**3.61**	**1.19**
Hotrienol	Monoterpene	**5.59**	**3.94**
Linalool	Monoterpene	**152.00**	**90.89**
Diethyl succinate	Ester	**65.66**	**49.97**
trans-linalool oxide (pyranoid)	Monoterpene	**38.83**	**18.96**
Ethyl octanoate	Ester	**481.73**	**302.09**
2,6-Dimethyl-3,7-octadiene-2,6-diol	Monoterpene	**202.36**	**168.67**
α-Terpineol	Monoterpene	**42.52**	**26.20**
2.4-Dimethylbenzaldehyde	Aldehyde	11.93	13.53
Citronellol	Monoterpene	17.89	27.39
trans-3-Hexenyl butyrate	Ester	9.29	3.03
Phenethyl acetate	Ester	**447.08**	**169.16**
Ethyl 3-hydroxyoctanoate	Ester	4.48	4.73
2,6-Dimethyl 2,6-octadiene	Monoterpene	2.09	1.73
β-Damascenone	Norisoprenoids	9.87	8.73
Ethyl decanoate	Ester	**101.94**	**47.16**
Ethyl phenyllactate	Ester	**105.67**	**81.87**
Ethyl dodecanoate	Ester	15.66	3.86
δ-Decalactone	Lactones	2.53	2.43
Nerolidol	Monoterpene	6.61	8.63



Riassumendo

- ↓ luce e quindi fotosintesi
- ↓ Produzione (fertilità?? Allegagione???)
- ↓ Accumulo di zuccheri
- ↑ Degradazione acido malico
- ↓ Polifenoli e antociani
- ↓ Composti aromatici

Grazie per l'attenzione