Grapevine varietal diversity as mitigation tool for climate change :

Agronomic and oenological potential of 14 foreign varieties grown in Languedoc (France)

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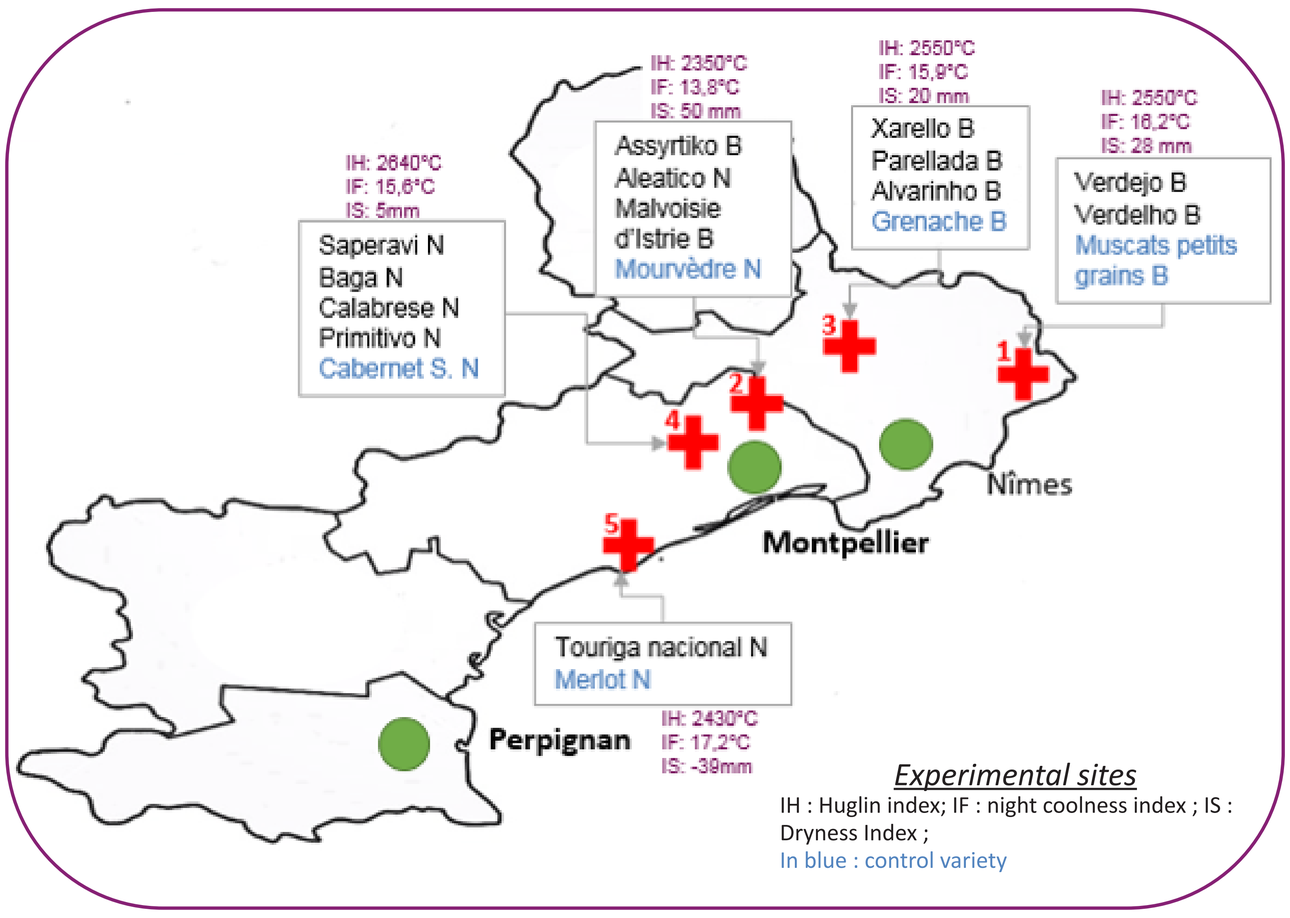
Introduction

14 varieties in 5 different locations planted in commercial Languedoc vineyards were monitored from June to September 2021 on traits related to global climatic warming effects on vines: yield, sensibility to water stress, phenology, yield recovery after spring frost, in comparison with control varieties.

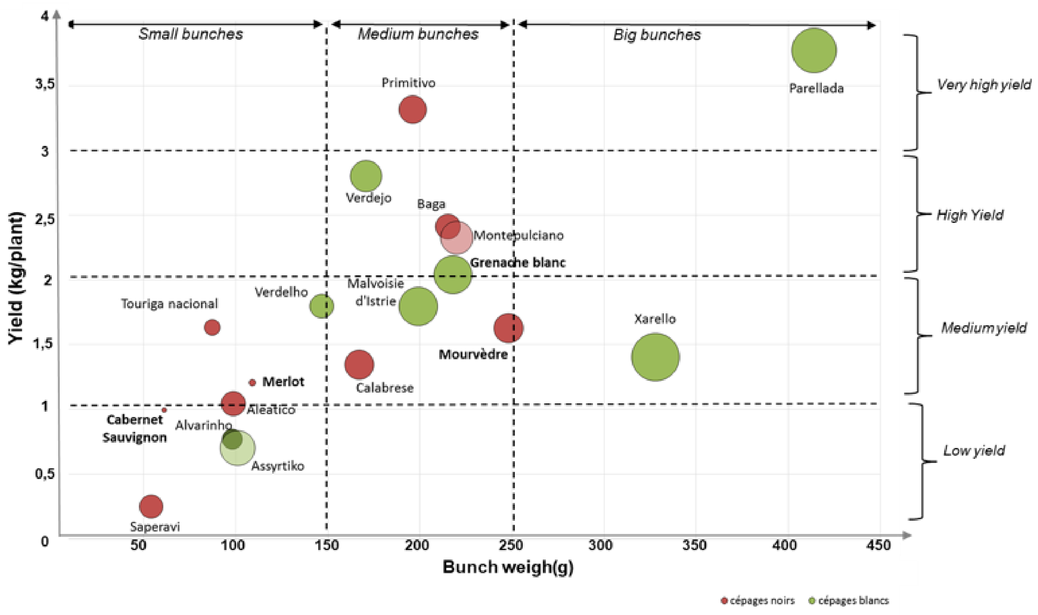


Experimental sites

IH : Huglin index; IF : night coolness index ; IS : Dryness Index ;
In blue : control variety

Yield components at harvest of the varieties

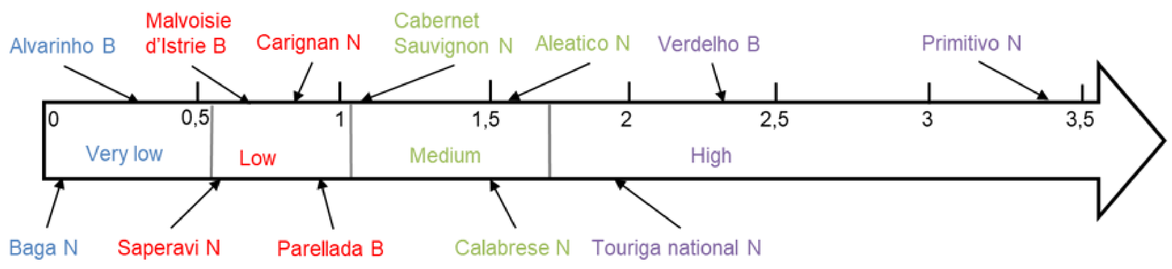
The berry weight is proportional to the circle diameter (Cabernet sauvignon 0,85 g, Xarello :3,35 g)
Bunch size according to Boursiquot et al[1].



Parellada B, Primitivo N and Verdejo are highly productive. Assyrtiko, Alvarinho and Saperavi require a long spur pruning because of their low fertility.

Secondary fertility: number of flowers on secondary buds (lateral and basal buds)

(number of flowers per bud on 10 shoots)



Some varieties such as Primitivo N, Verdelho B have a very high secondary fertility : in case of spring frost, they can partially recover the lost bunches.

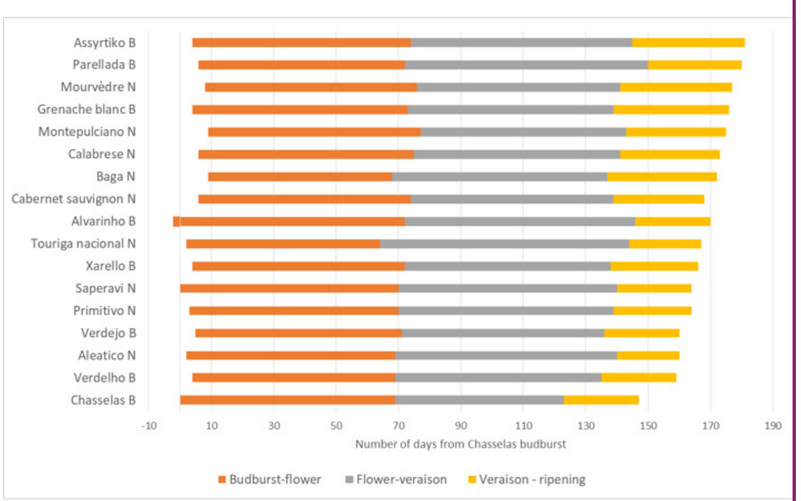
Comparison of 3 index of water stress sensibility of the varieties :
1) Leaf damage frequency at veraison (Fj = Nb of damaged leaves on the 6 basal leaves/nb of shoots – on 10 plants), 2) δ¹³C on juices[2] 3) leaf stem potential at veraison[3] (Ψt MPa), on sites 2, 3 et 4.

Site	Variety	Leaf damages Fj	δ C13	Stem potential (MPa)
2	Cabernet Sauv. N	0,14		-1,39
	Baga N	0,12	-23,85	-1,1
	Calabrese N	0,07	-23,74	-0,95
	Primitivo N	0,05	-24,04	-1,29
	Saperavi N	0,22	-25,76	-1,33
3	Grenache B			-0,65
	Alvarinho B		-24,52	-0,78
	Parellada B		-25,77	-0,96
	Xarello B		-26,64	-0,71
4	Mourvèdre N	0,29		-1,13
	Aleatico N	0,53	-24,03	-1,19
	Assyrtiko B	0,76	-23,84	-0,92
	Malvasia istriana B	0,08	-25,24	-0,9

In a same site, the differences in stem water potential are low. Some varieties, such as BagaN, Calabrese N, Assyrtiko B or Malvasia istriana B present a significatively lower water stress at veraison compared to the control variety, but the differences are not very important. Furthermore, some varieties such as Assyrtiko B present higher values of stem potential (meaning lower stress), but higher damages on leaves. No variety can be considered as resistant to water stress.

Main phenological stages at Vassal collection (Marseillan, France, 34)4 of the different varieties

Reference budburst date : Chasselas



There are little differences in budburst dates (-2 to +9 days compared to Chasselas) and flowering dates (13 days of amplitude). The main differences appear between flowering and veraison (26 days amplitude) and between veraison and maturity (17 days amplitude). The maturity periods vary from the 2nd to the 4th maturity period according to Pulliat classification (12 to 34 days after Chasselas according to varieties).

Conclusion

2021 was a quite fresh year, with a relatilively medium water deficit in comparaison with the 15 previous years. In these conditions, the differences of water potential were low. Some varieties had no better datas than the control Grenache B, a local variety adapted to drought, on one site. On other sites, some varieties showed a slightly better resilience to water stress, but not what could be called a resistance.
The behaviour in case of high temperatures could not be assessed.
The berry analysis showed important and interesting differences in malic acid levels.
No variety present the perfect profil: water stress adaptation, yield recovery in case of spring frost, resistance to diseases (Assyrtiko which has the best behavious concerning water and temperature stress is very sensitive to downy mildew)

Bibliography

1 Boursiquot J.M, Dessup M., Rennes C. (1995). Distribution des principaux caractères phénologiques, agronomiques et technologiques chez Vitis vinifera. Vitis, 34, 31-35.
3 Protocole de mesures https://www.vignevin-occitanie.com/fiches-pratiques/mesure-du-potentiel-hydrique-foliaire-de-tige/ (13/06/2021)
2 Gaudillère J.P., Van Leeuwen C., Trégoat O. (2001). Évaluation du régime hydrique de la vigne à partir du rapport isotopique 13C/12C. OENO One 35 (4): 195.
4 Centre de Ressources Biologiques de la Vigne, Collection de Vassal-Montpellier, INRAE, 34340 Marseillan-plage. https://www6.montpellier.inrae.fr/vassal/

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