Quality of Merlot wines from terraced vineyards and vineyards in alluvial plains in Vipava Valley, Slovenia (PDO)

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AIM:

Several factors influence style and quality of wine and among the most important are environmental factors and vineyard soil.

The aim of this study was to evaluate the quality of Merlot wines produced from grapes grown on skeletal and dry soils of terraced vineyards and deep loamy soils of the alluvial plains of Vipava Valley, a warm climate wine growing region in Slovenia.

Figure 1: Deep loamy soils of alluvial plains (left) and skeletal flysch soils of terraced vineyards (right).

METHODS:

- In vineyards on terraces (n = 5) and alluvium plains (n = 5), viticulture parameters (number of buds, number of clusters and leaf area on each vine) were uniformed in 2019 and 2020[1].

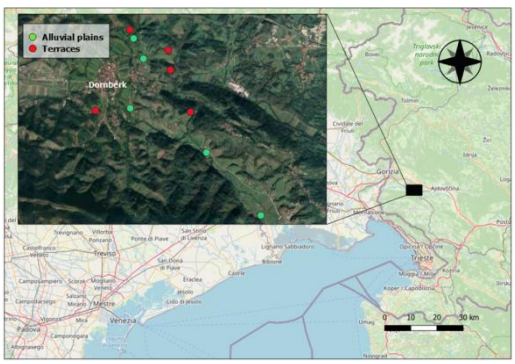

Figure 2: Map of the study area in Vipava Valley in Slovenia.

- Stem water potential (SWP) was measured 4 times during the season[2].
- Grapes were sampled (5 kg in triplicates for vineyard) at the time of maturity and microvinificated.
- Total phenols (TP), total anthocyanins (TA), high (HMWP) and low molecular weight (LMWP) proanthocyanidins (PAS) in wines were determined spectrophotometrically[1,3].
- Structural characteristics of PAs in wines (mean degree of polymerisation (mDP), percentage of galloylaton (%G) and percentage of prodelphinidins (%P)) were determined by UHPLC-DAD-MS/MS[1,3].
- Esters were analysed by GC-MS[4] and higher alcohols by GC-FID[5].

RESULTS:

- SWP was more negative on terraces (Fig. 3).

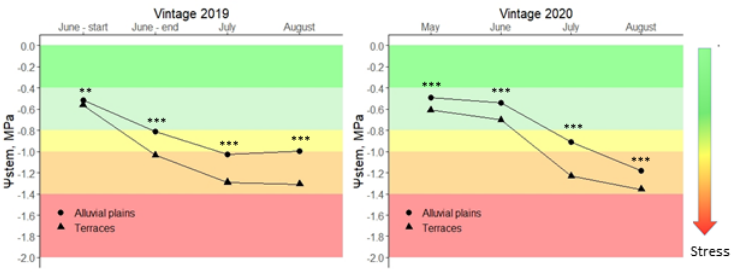

Figure 3: The difference in the stem water potential (Ψstem, MPa) from terraces and alluvial plains, measured four times during the growing season of the vine. Data compared with *t*-test, (***, p <0.001).

- According to darker seed color, grapes from terraces showed advanced ripening in comparison to the grapes grown in alluvial plains.
- Wines from terraces had higher concentrations of TA, TP, HMWP, ash and total dry extract in comparison to wines from alluvial plains and PAs reported higher %G (Fig. 4).
- In general, higher concentrations of higher alcohols and lower concentrations of esters were detected in wines from terraces (Table 1).

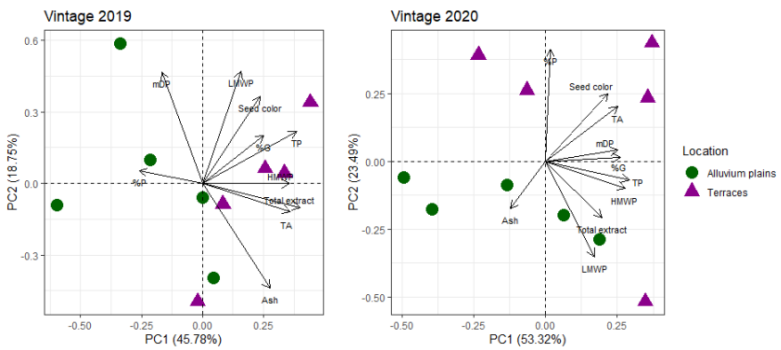

Figure 4: Principal component analysis (PCA) of Merlot wines from the seasons 2019 and 2020. Parameters used in the analysis: seed color, HMWP, LMWP, TP, TA, mDP, %G, %P.

Table 1: Statistically significant volatile compounds in the vintages 2019 and 2020 for terraces and alluvial plains. Data compared with *t*-test (ns, not significant; ., 0,05<p<0.1 (marginally significant); *, p < 0.05; **, p < 0.01; ***, p < 0.001).

		2019			2020		
		Alluvial plains	Terraces	Sign F.	Alluvial plains	Terraces	Sign F.
HIGHER ALCOHOLS (mg/L)	1-propanol	29.49	43.49	***	38.85	43.2	**
	1-butanol	1.08	1.39	**	1.264	1.42	.
	2-methyl butanol	77.63	84.76	.	81.78	89.62	.
ESTERS (mg/L)	Ethyl butanoate	0.09	0.07	*	0.08	0.08	ns
	Ethyl dodecanoate	3.16	2.8	.	0.06	0.05	ns
	Ethyl hexadecanoate	0.03	0.04	.	2.50	1.83	ns
	Ethyl oktaonat	0.16	0.13	***	0.06	0.03	*
ALDEHYDES (mg/L)	Benzaldehyde	0.01	0.01	ns	0.12	0.06	*
C6 COMPOUNDS (mg/L)	1-Hexanol	1.55	1.63	ns	1.55	1.29	.
	cis-3-Hexen-1-ol	0.01	0.01	ns	0.03	0.02	*

CONCLUSIONS:

- Vines on terraces had a higher water deficit than those on alluvial plains.
- Merlot wines from terraces had higher polyphenol concentration, tannins showed higher galloylation, and they differed in aromatic profile from wines from alluvial plains.

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