

Free anthocyanins of wine, an analysis to differentiate Swiss grape varieties

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Introduction

The concentration and the type of free anthocyanins in red wine depend on several factors, like grape variety, maturity, terroir or winemaking procedure. In spite of these variations, the free anthocyanin profile can serve as a marker to classify wines by grape varieties used. However, the influence of other factors than the grape variety on the profile is not well known. The aim of this work was to measure the anthocyanin profile of the main red grape varieties cultivated in Switzerland and to study the influence of terroir and clonal differences on the anthocyanin's composition.

Materials and methods

Grapes (Pinot noir, Gamay, Gamaret, Merlot, Cornalin, Humagne rouge and Galotta) were produced in the different region of Switzerland and were treated using the same winemaking procedure in the winery of Agroscope. 106 young wines (<6 months) were analyzed. The total content of free anthocyanins was measured by the method of Puissant-Leon. The anthocyanin profile was determined by HPLC-UV (Fig.1) according to the method published by OIV in 2007.

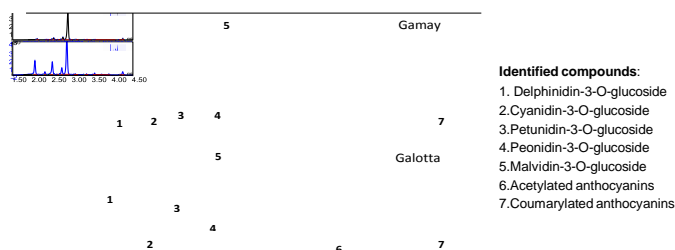


Figure 1: Chromatograms of free anthocyanins in young wines.

Anthocyanin profiles of vine varieties

As in all varieties of *Vitis vinifera*, malvidin-3-glucosid was the most abundant anthocyanin (48-82%) found in wines, followed by petunidin- (5-15%), peonidin- (5-14%), delphinidin- (2-16%) and cyanidin-3-glucoside (0.1-3%). The acetylated (0-5%) and coumarylated (0-6%) forms of anthocyanins were quantified as groups.

The total content of free anthocyanin was found between 200 mg/L and 1300 mg/L (Fig.2). The varieties Gamaret and Galotta, outcome of the selection program of Agroscope, contain more anthocyanin than traditional varieties.

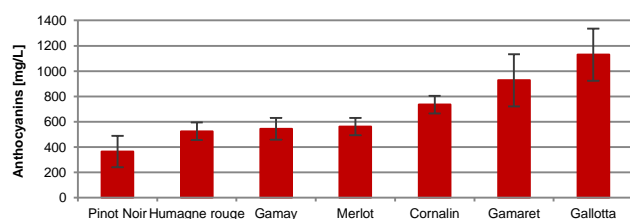


Figure 2: Total content of free anthocyanins in young wines, measured by the method of Puissant-Leon.

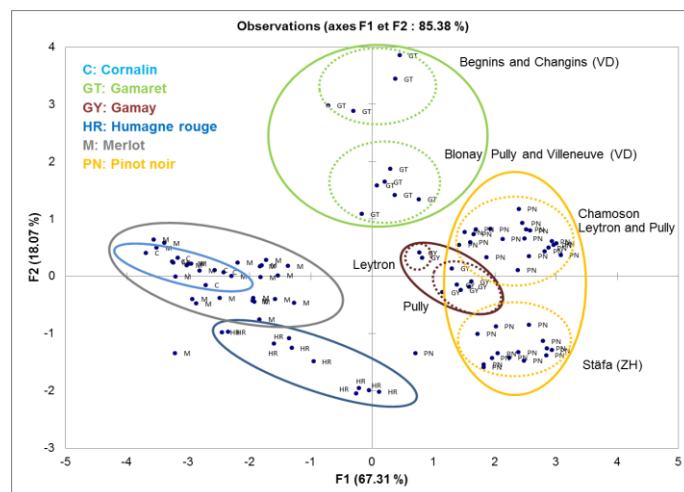


Figure 3: Principal component analyses (PCA) of the results of anthocyanin profiles of young wines, without the variety Galotta.

Classification of varieties by chemometric method

Anthocyanin profiles were used successfully to differentiate wines according to grape variety, except Merlot and Cornalin (Fig.3). Galotta formed an isolated group on the axe F1 (-20).

The PCA analyses of wines shows that the terroir could affect the anthocyanin's composition of wine (Gamaret, Gamay, Pinot noir). In the case of Pinot noir, this effect is more important than the effect of clonal diversity.

Furthermore special viticultural practices, like raising, could influence already the profile of anthocyanins. (Table 1).

An other important factor is the age of the wine. Wines older than one year could not be correctly classified.

	1	2	3	4	5	6	7
Classic (7)	7,6 (1,2)	1,4 (0,4)	10,9 (1,4)	9,1 (1,4)	63,9 (3,4)	2,1 (0,3)	5,0 (0,4)
Raising (6)	12,3 (0,8)	1,8 (0,2)	11,9 (0,4)	11,8 (0,5)	57,9 (1,9)	1,4 (0,1)	2,9 (0,3)

Table 1: Anthocyanin profiles of Merlot wines, produced from classical viticultural practice (7) and raising (6). Mean value and (STD) of each anthocyanin (1-7) corresponding to the chromatogram, given in percentage.

Conclusion

Free anthocyanin profiles can be used for the qualitative differentiation of young Swiss wines, according to the grape varieties. However some varieties (Merlot, Cornalin) can't be distinguished. Additional factors have an important effect on the profile and can disturb classification: age of wine and special viticultural practices. This fact reveals a serious limitation of this technique for wine identification.