

Isomers of 3-hexenol as varietal markers for assessment of wine origin

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A significant part of compounds present in wines having 6 carbon atoms, the C₆ compounds, may derive from grape polyunsaturated fatty acids (primarily originated from membrane lipids), namely linoleic and linolenic acids, through a cascade of biochemical reactions collectively known as lipoxygenase pathway. This biochemical pathway, which is stimulated by tissue damage during harvesting, transport, pressing and crushing, involves a series of enzymes that oxidize and cleave polyunsaturated fatty acids to yield aldehydes, which are subsequently reduced to alcohols, which can, in turn, be esterified to produce esters.

As the C₆ compounds derive from grape varietal precursors, the polyunsaturated fatty acids, they could hypothetically contribute to judge wine origin and affiliation. Two C₆ alcohols, (*E*)-3-hexenol and (*Z*)-3-hexenol, have been referred as the most important as the (*E*)/(*Z*) ratio can act as an indicator of the variety of origin.

The aim of this work was to quantify the two isomers of 3-hexenol, and then the (*E*)/(*Z*) ratio, in monovarietal wines with Appellation of Origin *Vinhos Verdes*, in order to make possible assaying the grape variety which is at their origin. In this context, a number of wines made from 6 white and 4 red grape varieties, coming from distinct “terroirs” and producers, having different ages, were analyzed by GC-MS, after solvent extraction.

The results show that it is possible to differentiate clearly wines made from the two principal white varieties, *Loureiro* and *Alvarinho*; (*E*) isomer is always much higher for *Loureiro* wines while (*Z*) isomer prevail, slightly, for *Alvarinho*'s. Wines produced from other four white varieties (*Trajadura*, *Avesso*, *Pedernã* and *Azal*) were studied, but the diminished number of samples analyzed have not permitted, until now, reliable results; however, *Trajadura* wines seem to have a similar behavior of *Alvarinho*'s.

Wines produced from red grape varieties (*Amaral*, *Vinhão* and *Espadeiro*) were not so fully studied, because monovarietal red wines are lesser usual than the white's; however, for *Amaral*, (*E*)-3-hexenol seem to be the predominant isomer.

This preliminary study indicate that it is possible to discriminate monovarietal wines, produced at *Vinhos Verdes* Demarcated Region, using the ratio of 3-hexenol isomers, (E)/(Z); however, to fully distinguish two or more wines having identical ratio values, it will be necessary to complement the results with the isomers concentration and/or with the concentration of a third compound.

The influence of grape origin and/or technological procedures on the (E)/(Z) ratio might be object of a deeper study in the future.