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Relevant compounds of brazilian chardonnay wines and sparkling wines unveiled using Comprehensive Two-dimensional Gas Chromatography

Juliane Elisa Welke[1,2], Karine Primieri Nicolli[1], Fernando Pulgati[4], Mauro Zanus[3], Cláudia Alcaraz Zini[1]

[1]*Instituto de Química, Universidade Federal do Rio Grande do Sul,UFRGS, Brazil*

[2]*Instituto de Ciência e Tecnologia de Alimentos, UFRGS, Brazil*

[3]*Embrapa Uva e Vinho, Brazil*

[4]*Instituto de Matemática,UFRGS, Brazil - *E-mail: claudialcaraz@gmail.com*

Varietal wines and sparkling wines of the Serra Gaúcha (Brazil) have been pointed for their high level of freshness, very fine aromas, and good acidity.This region has reached historical levels of quality in 2013 and their share in the market presents a growing trend, as well as its good image inside and outside the country.Chardonnay is one of the varieties used for fine wine and sparkling wine production and despite the superior quality of these wines, not much is known regarding the their chemical characteristics. Volatile compounds are of key importance for wine acceptance by the consumer and consequently a broader knowledge on this regard is a relevant issue. This work employed HS-SPME, comprehensive two-dimensional gas chromatography with time-of-flight mass spectrometric detector (GC × GC/TOFMS),statistical tools, andodor activity values (OAV) for the analysis of volatile compounds of Chardonnay wine, base wine and sparkling wines of Serra Gaúcha. The main differences between base and sparkling wines were found with the help of Fisher ratio, resulting in 119 chosen analytes. PCA explained 93.1% of the total variance related to the selected 78 compounds. Some of the representative compounds that contributed the most to the differences observed among base and sparkling wines were: C13-norisoprenoids (TDN, vitispirane and β-damascenone), esters (laurate, 2-hydroxybutanoate, decanoate, 2-hydroxypropanoate, pentanoate ethyl esters), etc. On the other side, some acids, aldehydes, ketones and alcohols have been reported as a negative contribution to wine aroma. GC×GC/TOFMS provided separation of twentycompounds that co-eluted in the first dimension that may be important to wine aroma, due to its higher selectivity and also due to spectral deconvolution.A quantitative analysis of the volatile components of a Chardonnay wine was also acomplished taking into account only the compounds with higher and representative OAV.This approach reduced the number of target compounds to 47 volatiles that were considered more relevant to aroma.Both approaches (statistical tools and OAV determination) reached a reduced number of meaninful target compounds (with positive or deleterious impact), providing simpler strategies of data treatment related to quality control of products and winemaking process improvement. Whenever relevant compounds coelute in 1D, GC × GC/TOFMS may provide extra resolution or, alternatively, a 1D specific stationary phase may be chosen for a few important compounds to be selected. In any case, GC × GC/TOFMS highlights the path to be chosen.

Key words: Comprehensive two-dimensional gas chromatography, wine volatiles, Chardonnay, sparkling wines, quantitative analysis, GC × GC/TOFMS

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