NMR profiling of grape musts from some italian regions

With wine fraud, being a widespread problem [1], the need for more sophisticated and precise analytical methods of its detection remains ever persistent. Nuclear magnetic resonance (NMR) spectroscopy has been widely used for analysis of wine in recent years [2,3], but wine musts were much less studied; in fact, only one paper dealt with the NMR spectra of actual musts [4]. Difficulties arise mostly because grape musts are “live” objects, which undergo rapid fermentation at room temperature, if not inhibited either by freezing or chemical preservative; but even such measures are not sufficient to halt it completely [5]. We have investigated over 300 samples of grape must from 17 of 20 different Italian regions using 1H NMR spectroscopy with water signal suppression, postprocessing in the MatLab software with dynamic alignment [6] and optimized binning [7] to alleviate the effect of fermentation on the chemical shifts of mobile protons. After that, multivariate statistics was performed with techniques such as PCA, PLS-DA and OPLS-DA with respect to various group parameters such as regions, vitivinicultural zones, harvest periods and grape varieties. Advantages and drawbacks of each method were addressed.

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