

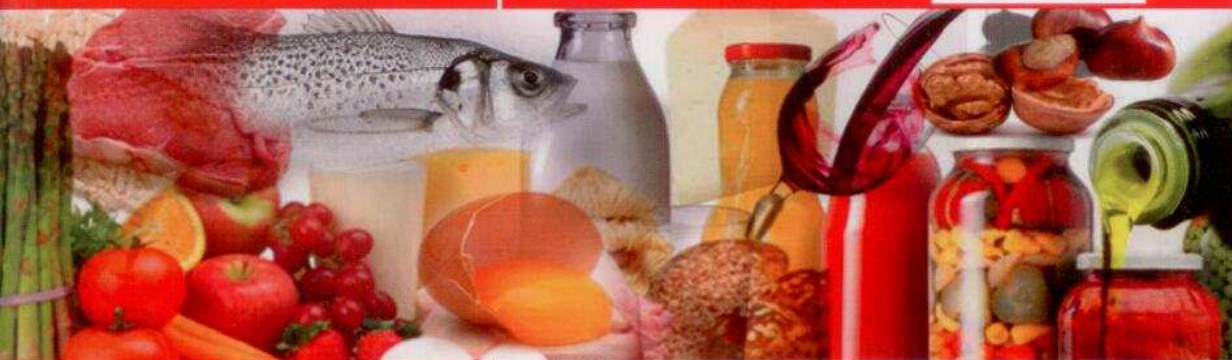
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CHIMALI



2014



**Florence**

**6th-10th July 2014**

**Social Sciences**

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## OC 27 Using Stable Isotope Ratio Analysis to Verify the Authenticity of "Passito" wine

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The term "passito" generally refers to Italian wines (such as Passito di Pantelleria, Vin Santo, Sagrantino or Recioto) made from withered grapes using ancient and traditional winemaking procedures. The price of this product is very high and for this reason passito wines often fall victim to counterfeiting [1]. Since 1987 isotopic methods have been recognised as a good weapon for combating frauds, such as wine chaptalization, watering down and mislabelling.

As reported by Rossmann et al. 1999 [2], the different isotopic ratios (in particular  $\delta^{18}\text{O}$ ) go through isotopic fractionation, which causes a variation in the isotopic value, as a result of stress factors such as evaporation occurring during the withering period and the stable isotope exchange of berry water with the air's water vapour [3,4].

In this study we monitored the effect of the grape's withering process on the variability of the  $(\text{D}/\text{H})_{\text{I}}$ ,  $(\text{D}/\text{H})_{\text{II}}$  and  $\delta^{13}\text{C}$  of wine ethanol and the  $\delta^{18}\text{O}$  of wine water. The production of PDO Erbaluce di Caluso Passito at five different vineyards in Piedmont (Italy) was considered in 2 successive years. We found that the isotopic parameters  $(\text{D}/\text{H})_{\text{I}}$ ,  $(\text{D}/\text{H})_{\text{II}}$  and  $\delta^{13}\text{C}$  of ethanol did not change during the withering period, whereas the  $\delta^{18}\text{O}$  of water and ethanol tended to decrease.

Moreover, samples of 21 different traditional Italian passito wines taken at different ripening stages were taken into account to evaluate the effect of alternative types of withering on the  $\delta^{18}\text{O}$  of water. There was a decrease in  $\delta^{18}\text{O}$  in the case of "passiti" produced in north-eastern Italy using postharvest drying of the grapes in dedicated fruit drying rooms whether ventilated or not, during autumn-winter. For passiti produced in southern Italy where the main technique involves withering on the plant (plein-air),  $\delta^{18}\text{O}$  tended to increase.

[1] Censis & Ministry of Economic Development, Italy, (2012) Dimensions, features and further information on counterfeiting - Final report 2012

[2] Rossmann, A., Reniero F., Moussa, I., Schmidt, H.L., Versini, G. & Merle M.H. (1999). *Z Lebensm Unters Forsch* 208: 400–407.

[3] Hermann, A. & Voerkelius, S. (2008) *Am J Enol Vitic* 59, 2: 194-199.

[4] Ingraham, N. & Caldwell, E. (1999) *J Geophys Res* 104: 2185–2194.