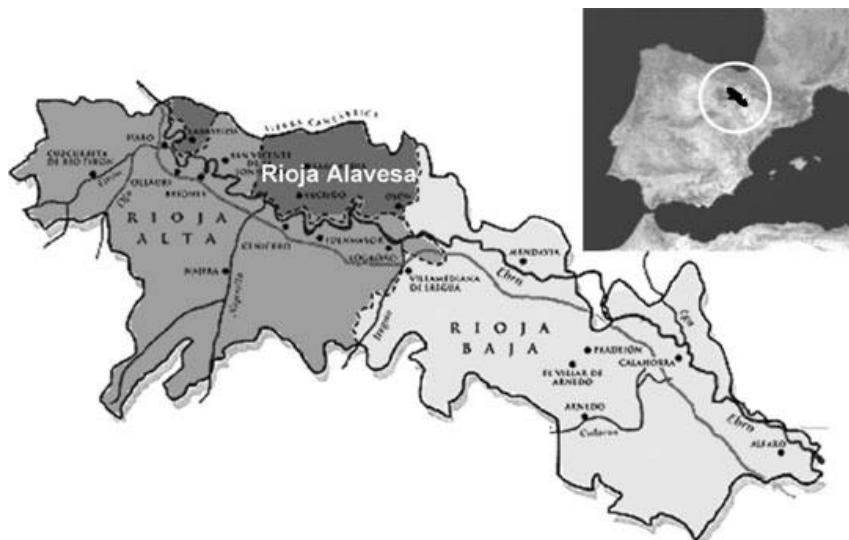


Effect of winemaking process and addition of white grapes on the sensory and physicochemical characteristics of young red wines

By: I. Etaio, F. Elortondo, M. Albisu, E. Gaston, M. Ojeda and P. Schlich

In: Australian Journal of Grape and Wine Research. 14:211-222. 2008

- Cluster *destemming* followed by grape *crushing* is the most extensively used method worldwide to produce red wine. But before the Bordeaux method of destemming was introduced in Spain's Rioja region in late 1700's, wine was often made by *carbonic maceration*. It is still a common method today in some parts of Rioja - like Rioja Alavesa.
- **Carbonic maceration** (CM) consists of placing whole grapes in a closed tank under a CO₂ atmosphere. This triggers an "*anaerobic fermentation*" which allows for various enzymatic reactions to occur inside the grapes, and for compounds to diffuse from the skins into the pulp. However, as the current authors emphasize, the CM practiced in Rioja uses open tanks, CO₂ is not added, and no effort is made to try to maintain as many berries intact as possible. Therefore, the carbonic maceration used in Rioja –and in the rest of this study- is not a strict CM. This is in addition to the fact that a certain degree of "*alcoholic fermentation*" by yeast always occurs at the bottom of every carbonic fermentation tank due to the inevitable breakage of many of the berries.
- Besides CM, another interesting practice in Rioja is the **addition of a small amount of white grapes** (<15%) to the red tanks. This presumably increases acidity and enhances the floral and fruity notes.



- But what is the true impact on the final wine of *CM* and of *white grape addition*? To find out, these authors collected 19 wines from the 2005 vintage produced by various Rioja wineries with or without *CM*, and with or without the addition of white grapes. To avoid added variability due to differences in stabilization, clarification or filtration practices, wineries were instructed to simply decant the wines after fermentation.

The white grape added was Viura, in percentages that ranged from 5% to 15%. Researchers then conducted *chemical analyses* and *sensory analysis* to allow for comparisons between the wines.

- The **chemical analyses** included basic parameters, as well as *tannins*, *anthocyanins*, *total polyphenol index*, *color hue* or tonality (A420/A520), and *color intensity* (A420+A520+A620).

- The **sensory analysis** was performed by 10 judges selected for their interest and availability, and who had been previously trained. During this training, consisting of 19 sessions lasting 8 months, the panelists agreed on the attributes to be used to describe the nose (*aroma intensity*, *floral*, *tree fruit*, *red berry*, *dark berry*, *herbaceous*, *licorice*, *alcoholic*), the mouth (all of the above, plus *acidity*, *astringency*, *bitterness*, *body*, *balance*, *aromatic persistence*), and the color (*hue* and *intensity*) of the wines. The actual sensory evaluation consisted of 10 sessions in which the 19 wines were evaluated in triplicate, at a rate of 6 wines per session. Panelists rated the intensity of each of the pre-selected attributes in a continuous linear scale from 1 (low intensity) to 7 (high intensity).

- **Effect of carbonic maceration.** 1) Wines with *CM* tended to have higher *ethanol*, and higher *free and total SO₂*. In contrast, destemmed wines tended to have higher levels of *reducing sugars*, *total acidity*, *dry extract*, *glycerol*, and *color intensity*. 2) Of the 24 sensory attributes rated, 6 attributes showed significant differences depending on the winemaking process as follows: *CM* wines were higher in *red berry aroma* and *flavor*, *alcoholic flavor*, and *acidity*; whereas destemmed wines were higher in *licorice* and *tree fruit aroma*.

- **Effect of adding white grapes.** 1) Wines with Viura added had significantly lower *pH*, but interestingly, there were no differences in total acidity. They also had lower *dry extract*, *tannins*, *anthocyanins*, and *total polyphenol index*, which the authors attribute to a dilution effect due to the lower polyphenol levels in white grape skins. [*What about white grapes as potential suppliers of color-enhancing cofactors?*]. 2) Wines with Viura had significantly lower visual color intensity and purple hue. The addition of Viura did not seem to cause any important change to the aroma or flavor attributes. You may want to read the original paper for a discussion on potential causes of the differences observed.

- **Relationship between chemical analyses and sensory analysis.** 1) As expected, color intensity evaluated by the panel was positively correlated with measured color intensity and with polyphenol index, but mainly with anthocyanin level. 2) Ethanol content was positively correlated with alcoholic flavor, but interestingly, not with alcoholic aroma. 3) The panel rating of “acidity” and the total acidity measurements tended to be opposed. This tells the authors that “acid content” is not the only factor determining perception of acidity, and that other factors such as glycerol and sugar could play an important role.

In brief, the authors found many differences between non-strict carbonic maceration wines and wines made after destemming the grapes in the Rioja region of Spain. The most important differences from the winemaking point of view were that *CM* wines had more berry aroma and flavor, and higher acidity perception, whereas destemmed wines had higher tree fruit and licorice aromas, and higher actual measured total acidity, dry extract, density, and measured color intensity. In contrast, the addition of 5 to 15% of Viura grapes to the Tempranillo grapes had much less of an impact, with the exception that wines with Viura were higher in perceived acidity. The study involved only one vintage and the authors admit the results will have to be validated in future vintages.