Comparing bentonites

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Clarification and stabilization of wines are important processes to prevent turbidity and precipitation issues after bottling. **Bentonite** fining is commonly used by the wine industry as a clarifying agent and is a popular choice due to its low cost, high efficiency and easy handling properties. Disadvantages of the use of bentonite include the low level of compaction leading to wine losses as well as the speculated **change in texture and flavour of a wine**. With many products (with varying formulations) available on the market, the **exact interaction of a specific bentonite product with a unique wine, and its effects on the wine composition are hard to predict**.

In a previous blog post, the effect of bentonite fining on the **volatile thiol** concentration in Sauvignon blanc wines was discussed. Factors such as **vintage, the origin of grapes, the dosage of bentonite and the time of fining** were reported to have a **prominent influence** on the thiol content in the resulting wine.

The **type of bentonite** used also seems to have a significant effect and should not be overlooked. The exact **composition and preparation of the commercial bentonite products differ** and can affect the efficiency of the fining process. A study[1] of the chemical and physical structure of four sodium-based bentonites found notable differences in iron, magnesium, calcium, and sodium ions among the products, as well as differences in their charge density per surface area, swelling potential, and pH. **Small differences in chemical substitution or mineral content can cause large differences in protein binding and bentonite compaction rate**.

The **juice/wine to be fined will also impact the efficiency of the fining process**. Basic parameters such as the ethanol can **change the polarity** of the solution affecting the overall charge on the bentonite particles resulting in a change in fining efficiency. Variation in pH can also affect the fining efficiency. At lower pH, more **hydrogen ions** are present coating the bentonite particles (negatively charged). This leads to less exposed surface area for protein binding. Similarly, bentonite binding sites can also be partially saturated in high **potassium** wines.

A recent study[2] put two commercial bentonite products (different formulations) to the test. The main findings from this study are reported in this blog post.

Materials and Methods

Sauvignon blanc grapes were harvested from the Croatian Uplands wine-growing region. The grapes were processed and fermented to dryness using Lalvin R2™ yeast. Two months after fermentation the protein unstable wines were clarified using two different types of bentonite products:

1) a commercial product consisting of sodium bentonite (Bentogran®, AEB, Italy).
2) a commercial product consisting of sodium-activated bentonite (Majorbenton® C, AEB, Italy)

Each of these products was added to the wines at different dosages:

1) Bentogran® was added at 50, 125 and 200 g/hL
2) Majorbenton® C was added at 100, 200 and 300 g/hL

Results

The six wines originating from fining with the different types of bentonite and dosages were subjected to **chemical and sensory analyses** and the results were compared to that of a **control sample** (no fining).

- As expected, heat stability tests showed **improved stability when fined with either bentonite product**. The control sample as well as the two lowest bentonite dosages from each product was deemed unstable. The higher bentonite dosages of both products showed increased heat stability, showing the effectiveness of the fining treatment at the higher bentonite concentrations.

- **Basic chemical parameters did not show any practical differences** when comparing the control to the bentonite treatments. Small differences in total acidity (slightly higher in the control sample) and pH (slightly higher in the control sample) were reported. However, these differences were minor. There were no differences between any of the bentonite treated wines, therefore the type and dosage of bentonite were not determining factors.

- **Sensory analyses** showed that the wines fined with Bentogran® resembled the control sample more closely compared to the wine fined with Majorbenton® C. The wines fined with Majorbenton® C generally scored lower in “aroma intensity”, “aroma quality”, “aroma persistence”, “taste intensity” and “overall impression”. These findings are impart supported by the fact that the Majorbenton® C samples were lower in several chemical aroma compounds. The lowest dosage Majorbenton® C wine received the lowest aroma quality rating, while also showing the highest concentration in herbaceous C6 compounds. The two wines treated with the two products at the lowest dosages received the lowest “overall impression scores”.

Conclusion

The results from this study **confirm that the type and dosage of bentonite can affect the resulting wine's quality, however, the exact interaction of a given product with a specific wine and the resulting effects are hard to predict**. Therefore, it is important to do bentonite **bench trials** on the final blend of the wine, with all other fining steps and additions completed.

References

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(2) BANDI, L. M.; PUHELEK, I.; JEROMEL, A.; KORENIKA, A. M. J.; ŽULJ, M. M. The Effect of Bentonite Agents on the Aroma Composition of Sauvignon Blanc Wines. *Agriculturae Conspectus Scientificus* **2022**, *87* (1).