**The effect on phenolic, aromatic and sensorial composition of wine of a pre-fermentative technique: cold liquid stabulation**

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Composition and final quality of wines depend on several factors, particularly to the ability to fully exploit the qualitative potential of grape. Innovative oenological practices and different winemaking techniques are frequently used, during the wine production processes, to modify the phenolic profile and to increase the extraction of volatile components (VOCs).

**L’effetto sulla composizione fenolica, aromatica e sensoriale del vino di una tecnica pre-fermentativa: La stabulazione liquida a freddo**

La composizione e la qualità finale di un vino dipendono da diversi fattori. In particolare dalla capacità di sfruttare al meglio il potenziale qualitativo dell’uva a disposizione. Pratiche enologiche innovative e l’utilizzo di diverse tecniche di vinificazione durante il processo produttivo sono spesso utilizzate per migliorare il profilo fenolico e per aumentare l’estrazione dei composti volatili (VOCs).

**Key words**: pre-fermentative technique, phenolic compounds, volatiles compounds, antioxidant power

1. **Introduction**

In accordance with the PhD project (De Paolis, 2022) previously described, this study shows the preliminary results of the activities concerning the application of the cold liquid stabulation (CLS), an innovative productive process in white winemaking, applied on Arneis and Cortese grape. CLS plans to leave musts, after pressing, on their lees, kept suspended, at a low temperature (0-8°C) for a variable time (Philipp *et al*., 2022; Seabroock *et al*., 2018). The aim is the improvement of the phenolic, colour, and antioxidant features of the produced wines, as well as increasing the extraction of volatile compounds from grape skins and pulp during the process.

1. **Materials and Methods**

Two white musts, from Italian grape varieties ‘Arneis’ and ‘Cortese’, after destemming, crushing and pressing, have been maintained on their lees, manually suspended twice a day, at low temperature (4°C). Three periods of stabulation (three replicates each) have been tested: 7, 14 and 21 days and compared to a control without stabulation. At the end of treatment period, musts have been raked and inoculated for the alcoholic fermentation (AF). The evolution of the parameters is been analysed in three different moments (*i.e.* at the end of stabulation, at the end of AF and one month after bottling). The following basic parameters have been investigated: Brix (Brix refractometer Atago palette 0-32 Brix), pH (Inolab 730 calibrated pHmeter, WTW, Weilheim, Germany), total acidity (OIV-MA-AS313-01 method), organic acids, ethanol and glycerol by HPLC (Agilent Technologies, Santa Clara, USA), following the method proposed by Giordano *et al.*, (2009). Total phenolic index (TPI) was evaluated by measuring absorbance at 280 nm of the sample diluted in water as well as the antioxidant capacity (DPPH) (Romanet *et al.* in 2019). CIEL\*a\*b\* parameters were evaluated according to the OIV-MA-AS2-11. Free and glycosylated volatile compounds have been studied through GC-MS analysis (Giacosa *et al*., 2019). Sensory analysis on the wines produced was carried out with a trained panel by a mixed approach of descriptive analysis (DA) and Check-all-that-apply (CATA) strategies.

1. **Results and Discussion** 
   1. **Impact of treatment on chemical-physical parameters**

The CLS has an impact for both varieties on the acidic composition. The low temperature, already after 7 days, affected the content of tartaric acid, lowering significantly the total acidity at the end of stabulation for the Arneis musts and at the end of AF for Cortese. Also, pH had a significative decrease after the treatment, reaching the lowest values after 21 days of stabulation (Tab 1). In the wines analysed after bottling, TPI remained lower in Cortese stabulated samples meanwhile in Arneis the trend changed with higher TPI in the treated samples. DPPH had the same behaviour in Arneis, while in Cortese it was not affected by the stabulation (Tab.2)

**Table 1** Principal base parameters of Arneis and Cortese after treatment

**Table 2** TPI and DPPH values of Arneis and Cortese wines one month after bottling

* 1. **Impact of treatment on sensory analysis and volatile compounds**

Both the Arneis and Cortese wines did not show differences in terms of bitterness, astringency, acidity and body due to the CLS. For Arneis, the control wine had *grapefruit*, *rose* and *lime* as the highest cited descriptors, after 7 days tropical fruits-related descriptors, while after 14 days *apple*, *pear* and *honey* were the most cited. At P21 the more intense descriptors were *lemon* together with floral hints. For Cortese, *green apple* and *pineapple* have been used to describe control and 21-days sample. The descriptors *pear* and *rose* were characterising the P14 and P21 wines, whereas the P07 was different, characterized by *honey* and *peach* notes. Nevertheless, in Cortese an increasing trend for liking for the stabulated wines was found, with P14 and P21 preferred than control. Regarding the volatile composition of wines (Tab. 3), in Arneis control and P07 had higher content of esters and volatile acids. Same for norisoprenoids and volatile phenols, in particular the latter decreased with the increasing of stabulation length. Instead terpenes, higher alcohols, volatile sulphur compounds and benzenoids are higher in the most stabulated. In Cortese wines less variations among samples has been found. Indeed, no significative differences were in esters, higher alcohols, terpenes, volatile acids, norisoprenoids and benzenoids. There are significative decreases, in most stabulated wines, for C6-compounds and volatile sulphur compounds. Meanwhile a higher value of volatile phenols has been registered for the 21-days stabulated sample. These results highlighted a different impact of CLS treatment depending on the variety.

**Table 3** Aromatic composition of Arneis and Cortese wines one month after bottling

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