

CORK QUALITY COUNCIL RESEARCH PROJECT – ADDITIONAL REPORT

STUDY ON ETHANOL CONTENT OF WINES FOR CORK SOAKS

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1) Introduction

The goal of this study was to determine the most effective alcohol levels in wines used for soak tests.

TCA is known to be very soluble in ethanol. In earlier work, we demonstrated that TCA extraction from corks during soak tests seemed to be increased by using wines with high ethanol levels.

On the other hand, TCA volatility could be decreased in wines with elevated ethanol concentrations. TCA chemical analysis by SPME, and sensory evaluation, depend on the concentration of TCA in the wine's headspace and consequently may lose sensitivity with a significant decrease in volatility.

2) Soak Tests Using Wines at Varying Ethanol Levels

Experiment: Individual corks with known releasable TCA (see previous reports) were soaked in a dry white wine with ethanol adjusted to different levels. TCA was analyzed in the soaks by GC/MS-SPME. TCA concentrations in the soaks, (quantified with an internal deuterated TCA standard), were compared to actual recovered TCA,

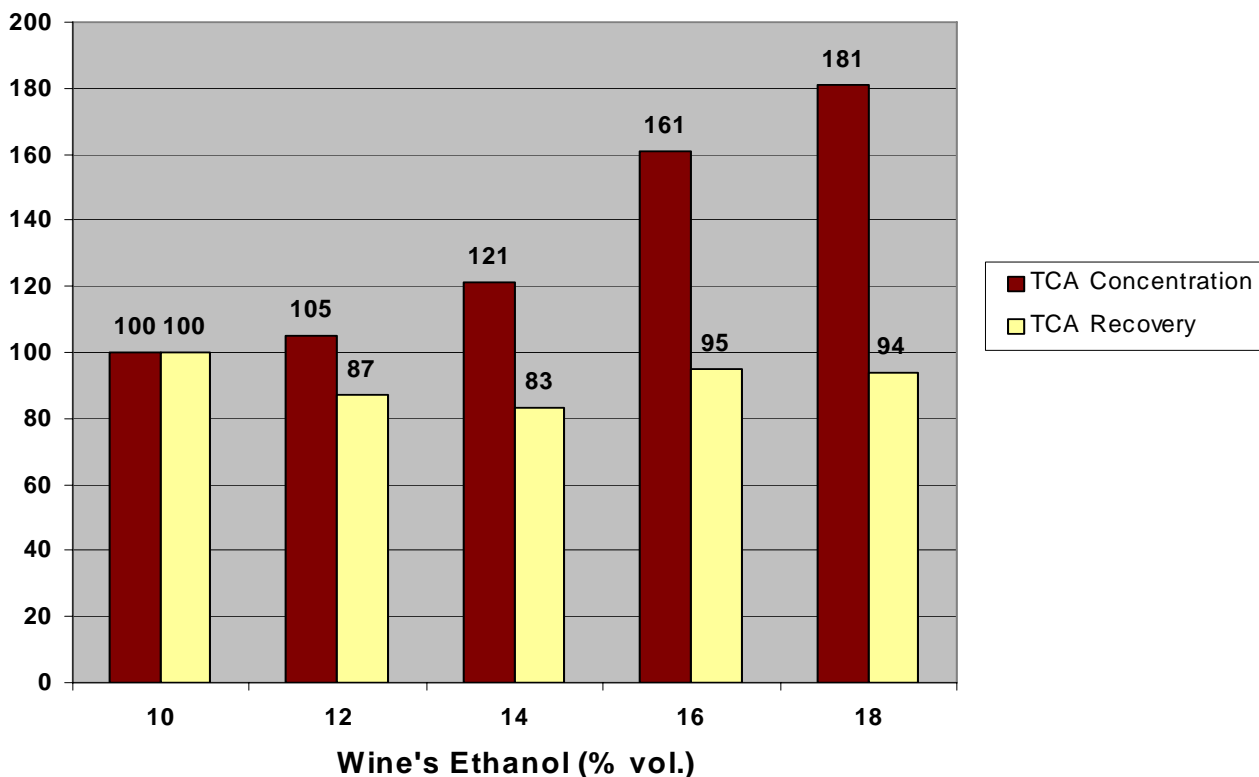


Figure 1: TCA concentration in cork soaks versus TCA recovery. Individual corks soaked 24 hours in 50 mL, mean of 5 replicates for each ethanol level. Data is expressed as a percent of the 10% ethanol treatment.

TCA dissolution in wine was increased at higher alcohol levels. Compared to the 10% control, the soak with 14% ethanol extracted 20% more TCA and the soak with 18% ethanol extracted 80% more TCA.

Despite the higher TCA concentrations in soaks with higher alcohol levels, the TCA recovery in the corresponding soak's headspace remained fairly constant.

2) Determination of TCA in Wine's Headspace at Varying Ethanol Levels

Experiment: Wines with ethanol adjusted to different levels were spiked with the same quantity of TCA. TCA was then analyzed in the headspace.

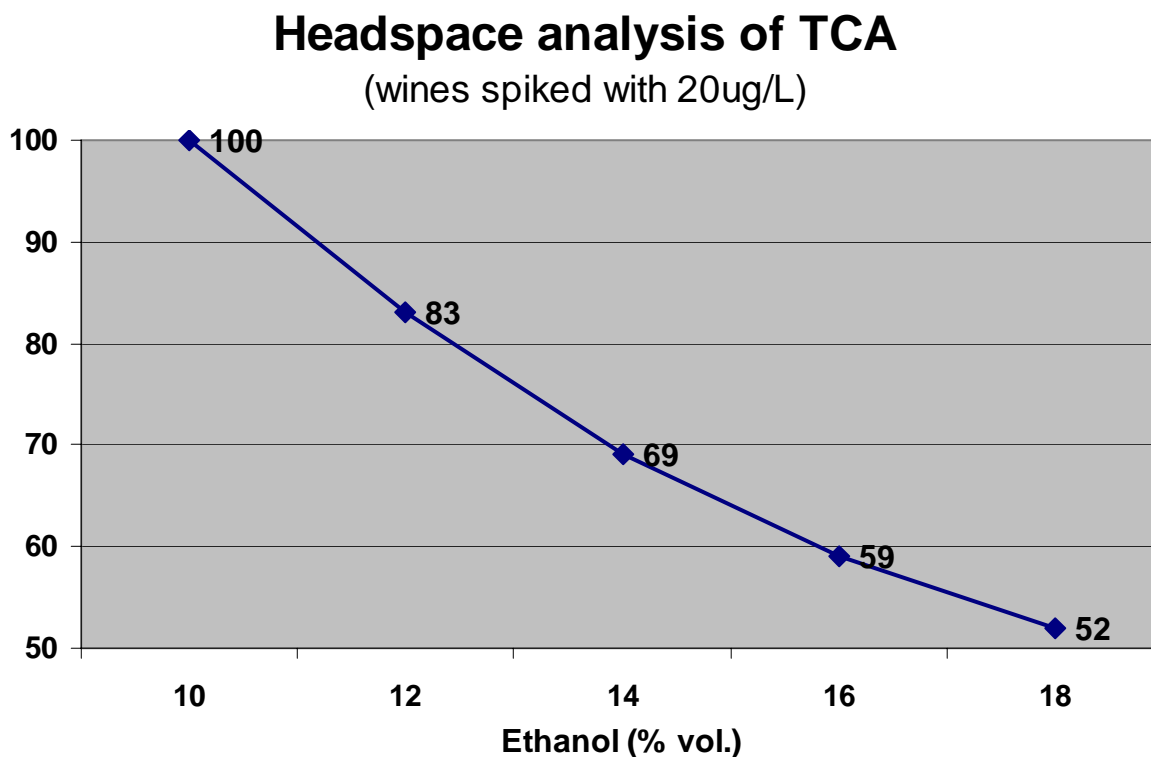


Figure 2: TCA recovery in wine headspace. Wines were spiked with 20 ug/L TCA. Data shown is the mean of 3 replicates for each ethanol level. Data is expressed as a percent of the 10% ethanol treatment

TCA recovered from a wine's headspace decreased dramatically at higher ethanol levels. Compared to the 10% treatment, 30% less TCA was recovered in the 14% ethanol treatment and 50% less in 18% ethanol treatment.

3) Conclusions

The opposing effects of increased TCA extraction and loss of TCA volatility at high ethanol levels tend to cancel each other. As a result, there is no improvement in TCA analysis of soaks at higher ethanol levels. This same effect is likely to hold for sensory analysis as well.

Performance of cork soak evaluations, either based on sensory or chemical analysis, are not likely to be improved by the use of wines with alcoholic strength greater than 10%.