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Interactions between wine volatile compounds and grape and wine matrix components influence aroma compound headspace partitioning.

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A full-factorial design was used to assess the matrix effects of ethanol, glucose, glycerol, catechin, and proline on the volatile partitioning of 20 volatile compounds considered to play a role in wine aroma. Analysis of variance showed that the two-way interactions of ethanol and glucose, ethanol and glycerol, and glycerol and catechin significantly influenced headspace partitioning of volatiles. Experiments were conducted to observe the effect of varied ethanol and glucose concentrations on headspace partitioning of a constant concentration of volatiles. Analysis of variance and linear regression analysis showed that the presence of glucose increased the concentration of volatiles in the headspace, whereas increasing ethanol concentration was negatively correlated with headspace partitioning of volatiles. A subsequent study assessed the effect of diluting white and red wines with water and ethanol. It was again observed that increased ethanol concentration significantly reduced the relative abundance of volatile compounds in the sample headspace. This study investigates some of the complex matrix interactions of the major components of grape and wine that influence volatile compound headspace partitioning. The magnitude of each matrix-volatile interaction was ethanol > glucose > glycerol > catechin, whereas proline showed no apparent interaction. The results clearly identify that increasing ethanol concentrations significantly reduce the headspace concentration of volatile aroma compounds, which may contribute to explaining recent sensory research observations that indicate ethanol can suppress the fruit aroma attributes in wine.

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