A step forward to unravel the uniqueness of Australian Cabernet Sauvignon aroma


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Introduction

Australian Cabernet Sauvignon wines are often appreciated for distinctive fruit aromas and specific elegant herbal attributes such as “eucalyptus”, “mint”, “bay leaf” and “oiled herbs.” While the occurrence of eucalyptus character in Australian red wines has been associated with the presence of 1,8-cineole (eucalyptol) [1], the origin of these typical herbaceous notes remains poorly understood.

1,4-cineole, a compound with very similar structure and odor to 1,8-cineole, has been recently identified in Australian red wines [2] but quantitative data and sensory characterisation have not been reported. This work investigated the contribution of 1,4-cineole and 1,8-cineole to Cabernet Sauvignon wine aromas.

1,4-cineole occurrence in red wines

A range of commercial Australian red wines (104 in total), comprising of 51 Cabernet Sauvignon (mean age 3.5 years), 4 Cabernet Sauvignon/Merlot blends (mean age 7 years), 27 Shiraz (mean age 3.5 years) and 22 Pinot Noir wines (mean age 5 years) were purchased. The wines originated from different Australian regions, including important regions for Cabernet Sauvignon wine production: Coonawarra, Margaret River, Barossa and the McLaren Vale. Twenty-six commercial French wines, predominantly Cabernet Sauvignon/Merlot blends (mean age 6.5 years) from the Bordeaux region, were also analysed.

CULTIVAR EFFECT ON CINEOLES CONCENTRATION

Table 1: Mean concentration (μg/L) of 1,4-cineole and 1,8-cineole in Australian Cabernet Sauvignon, Shiraz, Pinot Noir. One-way ANOVA was used to compare data. Means followed by different letters in a row are significantly different (p < 0.05) (Table 1).

Method development

A method for quantifying 1,4-cineole and 1,8-cineole by HS-SPME-GC-MS was developed in combination of previously published method for wine volatiles [1,3]. The method was validated with a limit of quantification for 1,4-cineole and 1,8-cineole calculated at 4 and 10 ngl, respectively using octan-2-ol as internal standard.

Regionality

Significant variations in 1,4-cineole concentrations were observed between Cabernet Sauvignon wines from different Australian regions, despite similar varietal being analysed. The wines that originated from Margaret River exhibited higher concentrations of 1,4-cineole than wines from Barossa, McLaren Vale and to a lesser extent Coonawarra regions.

The average concentration of 1,4-cineole was 2.4-fold lower in the French wines in comparison to Australian Cabernet Sauvignon wines (single variety wines and blends) despite the greater age of French wines. This regional difference increases considering wine age (Figure 4).

The potential contribution of 1,4-cineole and 1,8-cineole to the regional typicality of Australian Cabernet Sauvignon wine was investigated by comparison of Coonawarra and Margaret River wines using a sorting method. Wines were grouped according to their geographic origin (Figure 5) with Coonawarra wines associated with 1,8-cineole and attributes such as “eucalyptus”, “bay leaf”, “licorice” and “black cherry”. Margaret River wines were more associated to the 1,4-cineole:1,8-cineole ratio, IBMP and descriptors such as “hay”, “forest floor”, “capsicum”, “red fruit” and “blackcurrant”.

These results demonstrate that cineole isomers may be valuable aromatic contributors to Australian Cabernet Sauvignon wine typicality and potential markers of regionality.