PERCEPTIVE INTERACTIONS AND WINE TYPICAL FRUITY AROMA•

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1. INTRODUCTION

In wine, most of volatiles are present at lower or similar levels to their individual perception thresholds. Considering possible perceptive interactions among them, it is difficult to determine accurately their contribution to the global aroma (Barbe *et al*., 2008)

Considering the difficulties in wine aroma reconstitution from only "key compounds", we developed aromatic reconstitution from wine fractions instead of pure compounds, mainly in order to prioritize the role of these different fractions in relation to the global wine aroma. For this, we developed a methodology to prepare aromatic reconstitutions from fractions of a wine organic extract and we assessed these reconstitutions both in wine model solution and in de-aromatized wine.

2. MATERIALS AND METHODS

2.1. Wine Samples

This study was carried out with 2 fruity Merlot red wines (2008 vintage) evaluated by three trained judges.

2.2. Preparation of wine extracts

500 ml of wine was extracted successively using 80, 80, and 50 ml of dichloromethane, with magnetic stirring (500 rpm) for 5 min each and separated in a funnel for 5 min. The organic phases were collected, dried over hydrous sodium sulfate and concentrated to obtain 1.3 ml of wine extract.

2.3. HPLC Assays

Reverse-phase (RP) HPLC was performed according to Pineau et *al.,*(2008). All the fractions obtained (25) in dilute alcohol solution were directly evaluated by three trained judges, in order to select aromas of interest and realize the aromatic reconstitutions (Pineau *et al*., 2007).

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2.4. Sensory analyses

They were performed by a 27 trained judges panel that evaluated wine and total and partial aromatic reconstitutions from HPLC fractions (both in model and de-aromatized wine [ethanol 12 %, pH~3.5, free SO_2 30 mg L^{-1}]). For each sample, a triangular test was performed. Sensory profiles concerning red, black, fresh and jammy fruit aromas of each sample were evaluated with an intensity scale test.

2.5. Statistical analysis

Data were analyzed by analysis of variance (ANOVA) using Statistica V.7 (Statsoft Inc., Tulsa, USA).

3. RESULTS AND DISCUSSION

3.1. Olfactive description of wines and fractions obtained by HPLC.

Two red fruity Merlot wines fractionated on C18 column (tab. 1) show a very good conservation of aroma characteristics between wines and fractions.

Tab.1 - Olfactive description of wines and corresponding fractions.

	WINE 1	**WINE 2**
	Fresh fruity aromas (strawberry, cherry, blackberry). Milky aromas, banana	**Red fruity aromas (cherry, strawberry). Black fruity aromas (blackcurrant). Light woody notes**
3	Strawberry, milky	Caramel
4	Strawberry, milky, banana	Light caramel
5	Strawberry, milky, banana	Light caramel, cheese, butyric
15	Fresh fruits	Fresh fruits
16	Fruity (red fresh fruits: cherry - citrus fruits)	Fruity (fresh fruits)
17	Fruity (fresh fruits: citrus fruits)	Light fruity (red fruity)
18	Fruity (black fruits-blackberry)	Very intense fruity (red fruity: cherry)
19	Fruity (black fruits-blackcurrant) + intense banana	Fruity (fresh black currant)
20	Fruity (fresh black currant)	Fruity (liquor blackcurrant)
21	Fresh fruity – clear	Fruity (black fruits - light blackcurrant) + spicy

3.2. Fraction selection

The first results suggested the importance of fractions 15 to 21 with fruity notes and 3 to 5 which seemed to have an indirect aromatic impact. The role of these various fractions was evaluated by the 27 judges panel.

3.3. Triangular tests

In triangular tests more than 80 % of judges succeeded in recognizing the wine from aromatic reconstitutions and even the total one. That showed that it was not possible to reproduce exactly wine aroma using this technique. Later on, we evaluated fruity descriptors intensities.

3.4. Sensory profiles

In wine model solution, we observed that, using fractions with fruity notes, it was possible to obtain aromatic reconstitution showing red and fresh fruity intensity notes statistically similar to the corresponding wine. However, black and jammy fruit intensities were significantly lower when compared to those of wine (tab. 2).

Tab. 2 - Mean intensities of some aromatic descriptors of AR in wine model solutions.

Descriptors	Samples*		
	AR Fractions 15 to 21	AR Fractions 1 to 25	Wine
Red fruits	2,60 a	3,04 a	3,48 a
Black fruits	1,76 a	3,04 b	4,04 b
Fresh fruits	3,04 a	2,76 a	3,04 a
Jammy fruits	1,52 a	2,72 ab	3,04 b

* ANOVA Fraction effect on aromatic intensity; values with different letters within each row are significantly different (Duncan'sTest, $p \leq 0.05$). AR= aromatic reconstitutions.

3.5. Interactions

Particular interactions were also explored in de-aromatized wine. Concerning fresh fruity aroma, an additive effect was observed due to fractions with the least intense fruity note (16 to 17) and a masking effect was perceived due to fractions with caramel and lactic aroma (3 to 5) (tab. 3).

Tab.3 - Mean intensities of some aromatic descriptors of AR in de-aromatized wine.

Descriptors	Samples*			
	AR Fractions 15 to 21	AR Fractions 1 to 25	AR Fractions 15 to 21 and 3 to 5	Wine
Red fruits	2,55 ab	2,22 a	3,33 b	3,61 b
Black fruits	2,27 ab	2,05 a	2,11 a	3,16 b
Fresh fruits	2,14 a	4,42 b	2,14 a	2,92 a
Jammy fruits	1,77 a	1,33 a	2,16 a	3,16 b

* ANOVA Fraction effect on aromatic intensity; values with different letters within each row are significantly different (Duncan'sTest, $p \leq 0.05$). AR= aromatic reconstitutions.

4. CONCLUSION

The present work demonstrated that the red fresh fruity aroma could be reconstituted from wine extract fractions derived by HPLC. Moreover the existence of particular perceptive interactions in the expression of fruity aroma was highlighted. The future study is focused on the instrumental analysis of the aromatic fractions of interest.

Abstract

In this study we developed a methodology to prepare aromatic reconstitutions from fractions of a wine organic extract and we assessed these reconstitutions both in wine model solution and in de-aromatized wine. Two fruity Merlot red wines (2008 vintage) were used and sensory analysis was performed by a panel of 27 judges. It was not possible to reproduce global wine aroma using the reconstitution technique. Sensory profiles of each fraction were determined and it was possible to obtain aromatic reconstitutions having aromatic intensities statistically similar to the corresponding wine. The existence of particular perceptive interactions in the expression of fruity aroma was highlighted.

Literature cited

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