SFE extraction of aromatic and lipid compounds from shiitake mushroom (*Lentinula edodes*)

Eva Tejedor-Calvo [1,2*], Diego Morales [1], Pedro Marco [2], Alejandro Ruiz [1], Cristina Soler-Rivas [1]

[1] Department of Production and Characterization of Novel Foods, CIAL – Institute of Food Science Research (UAM+CSIC). Madrid, Spain

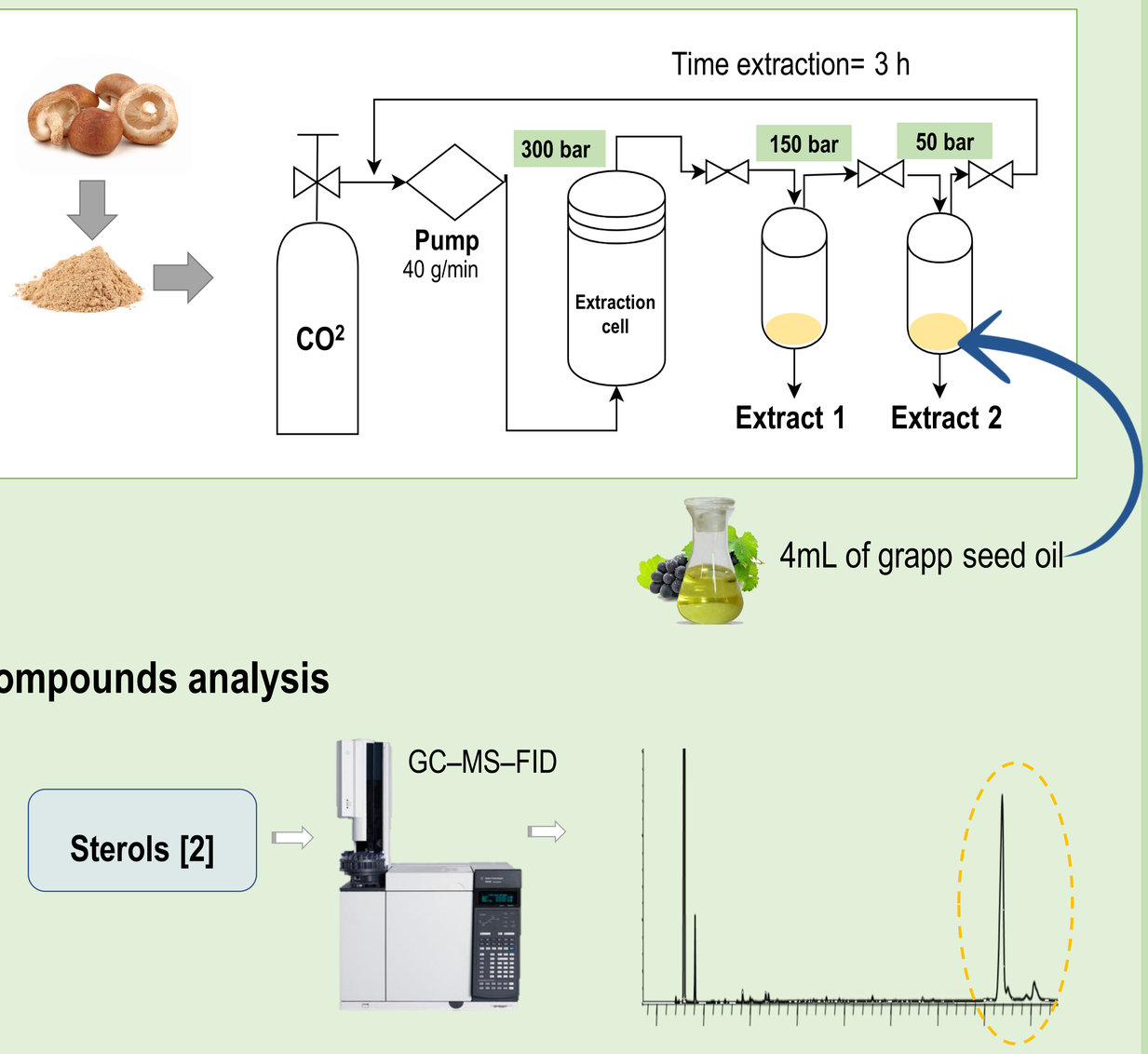
[2] Forest Resources Department Agrifood Research and Technology Centre of Aragon (CITA), Agrifood Institute of Aragon- IA2 (CITA- Zaragoza University). Zaragoza, Spain.

INTRODUCTION

Shiitake (*Lentinula edodes*) is a very popular mushroom in the Asiatic cuisine. It is used in many food products as flavor enhancer because of its aromatic and non-aromatic compounds including more than 60 volatile compounds, certain lipids, amino acids as well as nucleotides [1]. Supercritical fluid extraction (SFE) is an environmentally friendly technology used to obtain high-added value extracts of interest for the food industry, such as essential oils and aromatic compounds. In this study, sterols and aromatic compounds from shiitake mushroom were extracted by an SFE plant using CO_2 as solvent. Addition of **grape seed oil** in the separators was tested as a trap for aromatic compounds in order to reduce volatile losses during the depressurization needed to collect the extracts.

MATERIALS AND METHODS

Supercritical Fluid Extraction



Compounds analysis

RESULTS

Shiitake powder contained 16.27 mg/g of total sterols and most of them were extracted when submitted to SFE (Table 1). Fractions obtained from the separators including oil showed higher amount of sterols than those recovered without oil addition (89.4 and 57.3 mg/g (S1+S2)), respectively).

Table 1. Sterols content (mg/g) after SFE extraction. S1: separator 1; S2: separator 2

Sample	Ergosterol	Ergosta-5,8-dien-3-ol, (3β)-	Ergost-7-en-3-ol, (3β)-	Total Sterols
Shiitake powder	7.5 ± 1.0	2.4 ± 0.1	6.4 ± 0.2	16.3 ± 1.3
Residue	5.8 ± 0.5	n.d.	n.d.	5.8 ± 0.5
Residue (oil)	4.4 ± 0.3	n.d.	n.d.	4.4 ± 0.3
S1	13.4 ± 0.5	1.7 ± 0.1	4.3 ± 0.2	19.4 ± 0.8
S1-oil	20.2 ± 0.6	4.4 ± 0.2	7.0 ± 0.1	31.6 ± 0.9
S2	22.2 ± 0.9	7.3 ± 0.2	8.4 ± 0.2	37.9 ± 1.3
S2-oil	35.3 ± 1.2	9.1 ± 0.3	14.0 ± 0.2	58.3 ± 1.8

The aromatic compounds identified in the obtained extracts and the remaining residues were studied by Principal Component Analysis (PCA) (Fig.1). The plots indicated 2 clear groups, showing large differences in the aroma profiles between the extracts using oil and the rest of samples: shiitake powder, residues and extracts without oil. Ethyl-2-methyl-butanoate, 3-methyl-butanal and 2- were mainly detected in shiitake powder and remained in the residue. However, the SFE extracts contained many other compounds but particularly metylpropylformate, hexanal, 2-pentenol, 2-octen-4-ona and acetaldehyde were major contributors to S1-oil and ethanol, acetic acid and 3,4-dimethoxytoluene to S2-oil aroma

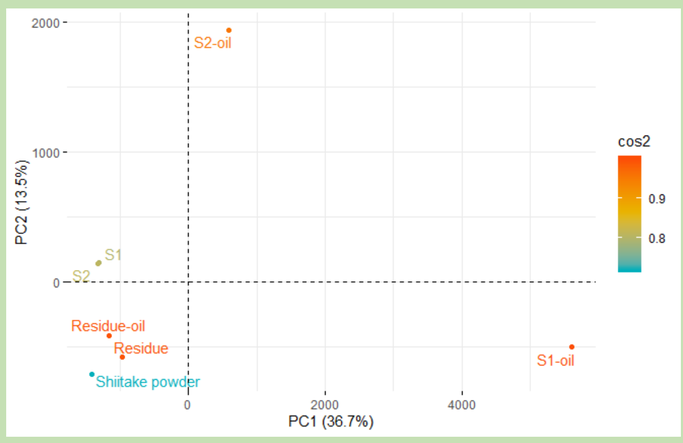


Fig. 1a. PCA score plot for aroma variation among SFE samples. Sample color indicates the plotting quality for the samples (cos2).

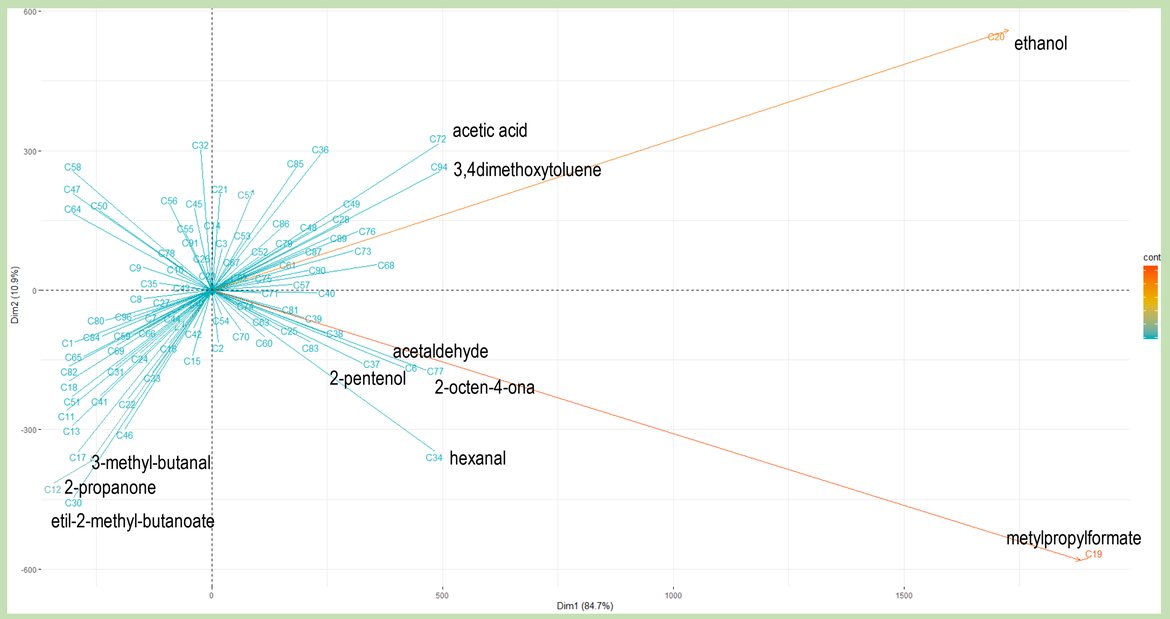


Fig. 1b. PCA loading plot for aromatic compounds detected by HS-GC-MS. The first PCA component (horizontal axis) explains 84.7 % of the variation in the SFE samples, and the second PCA component (vertical axis) explains 10.9 %. Arrow color indicates the contribution of a compound to the PCA components (contrib).

CONCLUSION

Addition of grapeseed oil into the separators during the supercritical fluid extractions of lipid compounds from Shiitake enhanced the sterol content and aromatic composition of the obtained extracts. The oily matrix might enhance the recovery of the aromatic fraction by trapping them avoiding their release into the air during the depressurization process needed to collect the extracts.

ACKNOWLEDGEMENTS

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Contact: etejedorc@aragon.es (Eva Tejedor)