Black truffle aroma extraction by supercritical fluids

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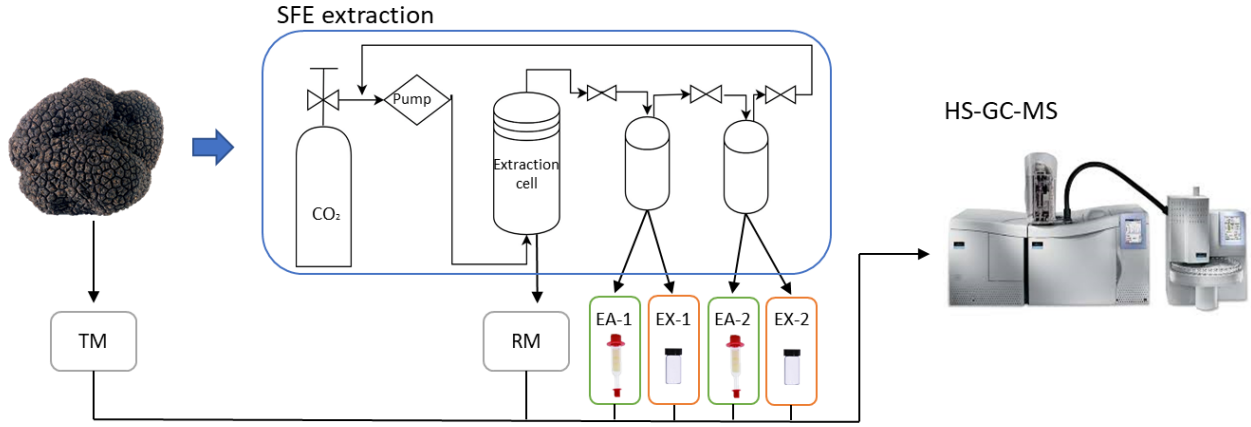
GRAPHICAL ABSTRACT



ABSTRACT

Black truffle (*Tuber melanosporum*) is characterized by its flavor and complex aroma. Nowadays, in the market, it can observe increasingly truffled products. However, these products usually contain artificial aroma (bis(methylthio)methane), that is no present in black truffle aromatic profile. There is still no black truffle natural aroma that successfully mimics its authentic fresh truffle aroma. Supercritical fluid extraction (SFE) is an environmentally friendly technology used mainly to obtain non-polar extracts of interest for the food industry. In addition, SFE has been used to obtain volatile aromatic compounds from different matrix as spices, brandy, plants and cheese.

In this study, aromatic compounds from black truffle were extracted by using SFE-CO_2 as a solvent. The separators were differentiated by pressure (70 and 50 bar). Firstly, an ion-exchange of amberlita (EA) was used for trap volatile compounds during depressurization in each separator. Also, the residual extract (EX) was collected. The different obtained fractions and the residual material (RM) were analyzed by Headspace gas chromatography (HS-GC-MS) and compared to the initial truffle material (TM).

A total of 95 aromatic compounds such as hydrocarbons, alcohols, aldehydes, esters, ketones, benzene derivatives and sulphur compounds were analyzed. The aromatic compounds identified in the obtained extracts and the remaining cakes were studied by means of Principal Component Analysis (PCA), and the plots indicated significant differences in the aroma profiles between extracts and TM. Only 33 compounds were detected in TM, whereas 24, not present in raw material, were identified in the different fractions, which could mean that SFE cause interactions between some compounds or these compounds were below the detection limit.

The ion-exchange of amberlite captured until 7 and 9 aromatic compounds in S1 and S2, respectively, that were no found in EX samples. Propanal-2-methyl, 2-propanone, butanal-2-methyl and butanal-3-methyl were the main compounds in TM and RM. EX-1 was characterized by 2-propanone, butanal-2-methyl and methylpropylformate, and EX-2 by methylpropylformate and some aldehydes as hexanal, pentenal and nonanal. However, EA-1 was principally composed of methylisobutyrate and EA-2 of methylpropylformate. Supercritical CO_2 could extract some key truffle aromatic compounds, and the use of amberlite allows for capturing different aromatic compounds.