Use of supercritical CO_2 to obtain enriched flavouring fractions from black truffle

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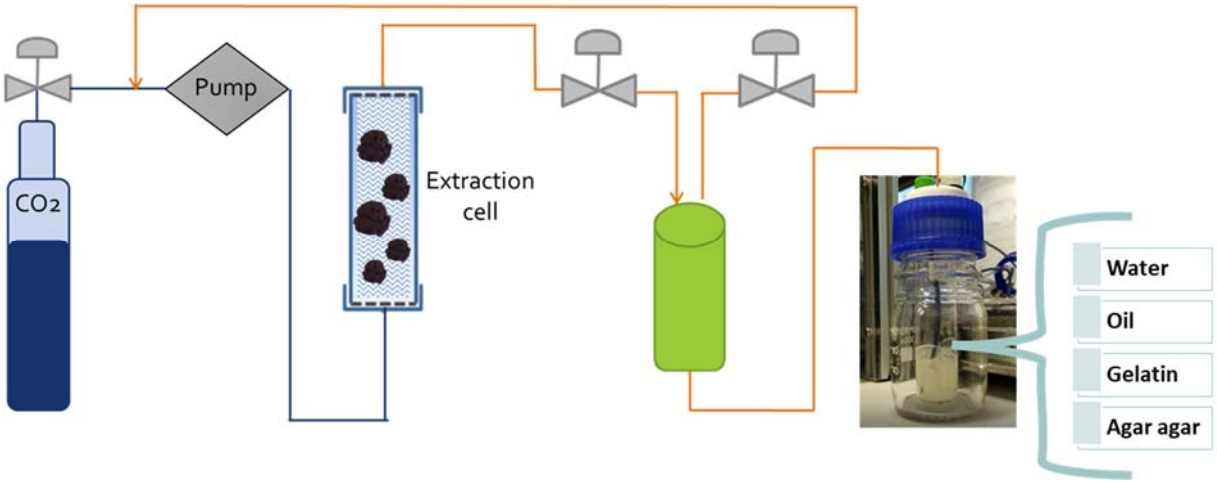
GRAPHICAL ABSTRACT



ABSTRACT

Truffles are a well-known worldwide product mainly appreciated for their unique aroma, which is composed of more than 50 volatile compounds. In the recent years, popularity of truffle products has highly increased in restaurants and supermarkets. Usually the artificial aroma, 2,4-dithiapentane or bis(methylthio)methane, is used as added aroma. however this molecule is not present in the black truffle [1]. To this day, no one has accomplished to find the aromatic extract that evokes the real smell of truffles to use it as food flavoring.

Recently, a new methodology to obtain aromatic compounds from truffles using supercritical CO_2 has been described by our research group [2]. In our studies, parameters like time, pressure and flow rate were optimized, and the addition of grapeseed oil into the separators as a trapping material was studied. This extraction method showed that oil matrix improved trapping some key truffle aromatic compounds such as 2,3-butanodione, 2-methyl-1-butanol, octanal and dimethyl disulphide. Furthermore, olfactometry study helped to detected key aromatic compounds in the truffle extracts.

Apart from aromatic compounds, it is known that some lipidic compounds, such as fatty acids and sterols, are related with truffle aroma and can contribute with flavour attributes.

In that sense, increase their extraction yield might enhance the flavouring properties, as well as the aromatic compounds. For that, after developing the extraction methodology, more improvements were made. Some trapping materials (oil, gelatin, water and agar-agar) were added to the methodology in order to enhance the flavouring compounds retention. In that case anelectrospray ionization quadruple time-of-flight mass spectrometry (UHPSFC/ESI-QTOF-MS) was used to detected more than 30 lipidic compounds. Among them ergosterol, brassicasterol, ergosta-7,22-dienol, oleic and linoleic acid were found in the extracts in high quantities. Also, the use of trapping material allowed capturing higher range of sterols in truffle extracts. This new method has been applied for different truffles species (*Tuber aestium, Tuber indicum and Terfezia claveryi*) with positive results.

According to the current truffle categorization (UNECE Standard FFV-53) [3], only physical aspects were considered to evaluate truffle quality. Therefore, the non-classified truffles, mainly because damage or small size, are categorized as low quality and achieve minor prizes. So, it is a potential source of chemical and aromatic compounds that can be revalorized. For the first time, these truffles were used to obtain a natural enriched fraction with flavouring properties.

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[3] UNECE Standard FFV-53 recomendation, 2017.