

Study of the volatile compounds that have an impact in truffle aroma.

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Introduction

T. magnatum



T. magnatum, (Conservas Carvi, 2018).

- Tòfona del *Piamonte* or *Tartufo* blanc.
- Grows in the *Piamonte* area.
- Season september - november.
- Very exclusive.
- Very high price reaches 3500 €/kg.

CoV detected: (2-butanone, 3-methylbutanal, 3-methylbutanal, 2-methyl-1-butanol, 2-methylbutanal, 1-octen-3-ol, 2-octanone, 3-octanone, n-octanal, 1-octen-3-one, hexanal, nonanal, DMDS, DMS, BMTM, Methyl(methylthio)methyldisulfide, 1-methoxy-3-methylbenzene, 1,4-dimethylbenzene, Limonene, acetaldehyde).

T. melanosporum



T. melanosporum, (Conservas Carvi, 2018).

- Tòfona negra del *Périgord* ò tòfona d'hivern.
- Grows in sothern Europe forests.
- Season november - march.
- Most apreciated black truffle due to its complex aroma.
- High price, in between 800 - 1600 €/kg

CoV detected: (2-butanone, 2-butanol, 3-methylbutanal, 3-methyl-1-butanol, 2-methyl-1-butanol, 2,3 Butanedione, 2-methyl-2-butenal, 2-methylbutanal, 1-octen-3-ol, 3-octanone, 3-octanol, 1-octen-3-one, hexanal, nonanal, DMDS, DMS, Methyl(methylthio)methyldisulfide, 1-methoxy-3-methylbenzene, 1,4-dimethylbenzene, phenol, p-cresol, acetaldehyde).

T. aestivum



T. aestivum, (Conservas Carvi, 2018).

- Tòfona d'estiu o tòfona de st Joan.
- Grows in almost every european country, less demanding.
- Season may - august.
- Though highly apreciated is less valuavle than the others.
- Much moderated price. 1/10 of *T magnatum*'s

CoV detected: (2-butanone, 2-butanol, 3-methylbutanal, 3-methyl-1-butanol, 2-methyl-1-butanol, 2,3 Butanedione, 2-methyl-2-butenal, 2-methylbutanal, 1-octen-3-ol, 2-octanone, 3-octanone, 3-octanol, n-octanal, 1-octen-3-one, hexanal, nonanal, DMDS, DMS, 1-methoxy-3-methylbenzene, 1,4-dimethylbenzene, phenol, acetaldehyde).

Tables of results

Components orgànics volàtils en <i>T.magnatum</i> <i>T.melanosporum</i> i <i>T.aestivum</i>			
CoV	<i>Tuber magnatum</i>	<i>Tuber melanosporum</i>	<i>Tuber aestivum</i>
2-butanol		8,9	2,4,8
3-methyl-1-butanol	2,7	9	4,8
2-methyl-1-butanol	2,7	2,5,8,9	1,2,4,5,8
1-octen-3-ol	1,6,7	2,3,5,8,9	1,2,4,8
3-octanol		8,9	1,8
2-butanone	6	2,8,9	1,2,3,4,8
2,3 Butanedione		3,5	5
2-octanone	1,6		8
3-octanone	2,6	2,8	1,2,4,8
1-octen-3-one	6,7	5	5
3-methylbutanal	6,7	2,8	1,2,4,8
2-methyl-2-butenal		8	4,8
2-methylbutanal	6	8,9	8
hexanal	6,7	8	1,4,8
nonanal	1,6	8	1,4,8
acetaldehyde	7	8	4,8
n-octanal	1,6		1,4,8
dimethyl disulfide (DMDS)	2,6,7	2,3,5,8	2,5,8
Dimethyl sulfide (DMS)	1,2,6,7	3,2,5,8,9	1,2,4,5,8
Bis(methylthio)methane (BMTM)	1,2,6,7		
Methyl(methylthio)methyldisulfide	1,2	2	
Limonene	6,7		
phenol		5,8	4,5,8
p-cresol		7,8,9	
1-methoxy-3-methylbenzene	1,2	2,8	2,4,8
1,4-dimethylbenzene	2	2	1,2,8

Relació entre els numeros i l'article: [1] (Torregiani, E. et al., 2017), [2] (Strojinik, L., et al., 2020), [3] (Culleré, L., et al., 2013), [4] (Díaz, P., et al., 2002), [5] (Culleré, L., et al., 2010), [6] (Pennazza, G., et al., 2013), [7] (Apra, E., et al., 2007), [8] (Díaz, P., et al., 2003), [9] (Pacioni, G., et al., 1990).

Caracterització dels CoV de la tòfona			
CoV	Nota olfactiva	Potència	Dilució recomanada
3-methylbutanal	Greixós, xocolata, prèsec	Molt alta	0.100%
acetaldehyde	Èter, afruitat, aldehyd, punyent	Molt alta	0.100%
dimethyl disulfide (DMDS)	Sulfurós, verdura, ceba, col	Molt alta	0.100%
Dimethyl sulfide (DMS)	Sulfurós, ceba, tomàquet, blat de moro, col	Molt alta	0.100%
Bis(methylthio)methane (BMTM)	Sulfurós, bolet, picant, all, verd	Molt alta	0.100%
Methyl(methylthio)methyldisulfide	Sulfurós, ceba	Molt alta	0.100%
phenol	Fenòlic, goma, plàstic	Molt alta	0.100%
p-cresol	Fenòlic, narcís, animal, mimosa	Molt alta	0.100%
2-butanone	Afruitat, cetona, alcanfor	Alta	1.00%
2,3 Butanedione	Mantega, dolç, punyent, cremós, caramel	Alta	1.00%
1-octen-3-one	Terrós, herbàci, rànci, brut, bolet	Alta	1.00%
2-methyl-2-butenal	Verd, punyent, anís, fruit sec	Alta	1.00%
2-methylbutanal	Xocolata, cafè, fruits secs, cacau, rànci	Alta	1.00%
hexanal	Verd, gespa, aldehyd, fresc, dolç, afruitat	Alta	1.00%
n-octanal	Aldehyd, cera, cítric, taronja, greixós	Alta	1.00%
nonanal	Aldehyd, cera, rosa, fresc, pell de taronja	Alta	10.00%
1-octen-3-ol	Bolets, terrós, oliós, fong, umami	Alta	10.00%
2-butanol	Albercoc dolç	Mitja	10.00%
3-methyl-1-butanol	Fermentat, alcohòlic, whiskey, plàtan	Mitja	10.00%
2-methyl-1-butanol	Rostit, ceba, vi, whiskey, afruitat	Mitja	10.00%
3-octanol	Terrós, herbàci, fusta, menta, cítric, bolet	Mitja	10.00%
2-octanone	Terrós, herbàci, fusta, natural	Mitja	10.00%
3-octanone	Herbàci, dolç, bolet, farigola, fresc	Mitja	10.00%
Limonene	Terpenic, pi, herbàci, pebre	Mitja	-
1-methoxy-3-methylbenzene	Floral, narcís	Mitja	10.00%
1,4-dimethylbenzene	Característic	-	-

Nota olfactiva, potència i dilució recomanada extreta de thegoodscentcompany.com

Objectives

- Determine which CoV are in *T. magnatum*, *T. melanosporum* i *T. aestivum*
- Classify and compare found CoV.
- Find if there are characteristic CoV that can help us combat truffle fraud.
- Determine the impact of each CoV by measuring its odorant potency.
- Analyze the aromatic notes of found CoV.
- Compare natural CoV profiles with artificial truffle aromas present in several food products and find bad practices when formulating them.

Discussion & conclusions

- *Alcohols*, *ketones*, *aldehydes*, *sulfurous compounds* and others (*terpenoids*, *phenols* and benzene derivates) were found in this study.
- Characteristic compounds were found in *T. melanosporum* (*p-cresol*) and *T. magnatum* (*limonene*).
- 8 high potency CoV were found in this study, compounds that have a higher impacts in the final aromatic profile.
- Aromatic notes were found to be very heterogenic, thus truffle aroma is a quite complex sum of his parts.
- Bad practices were confirmed to occur in several artificial truffle aromas, for example BMTM.
- Analyzing CoV in truffles has diferent utilities such as fighting truffle fraud and finding an aromatic solution in comercial truffle flavour formulation.