

SUPPLEMENATRY MATERIAL

Solid phase microextraction and gas chromatography mass spectrometry analysis of *Zingiber officinale* and *Curcuma longa*

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SPME analysis of *Zingiber officinale* Roscoe and *Curcuma longa* L. were performed by using a DVB /CARB/PDMS fiber. The SPME analysis of *Zingiber officinale* showed that the main components found were camphene (7.27%), geranial (8.37%), α -zingiberene (14.50%), α -farnesene (9.14%), β -bisabolene (6.52%), and β -sesquiphellandrene (9.92%). The SPME analysis of *Curcuma longa* showed that main components were p-cymene (12.96%) and ar-turmerone (12.08%). Other components were β -phellandrene (7.86%), terpinolene (6.97%), ar-curcumene (8.53%), α -zingiberene (8.46%), and β -sesquiphellandrene (7.37%).

Keywords: *Zingiber officinale*; *Curcuma longa*; solid phase microextraction; gas chromatography mass spectrometry.

Experimental

A 50/30- μ m DVB/CAR/PDMS module (57328-U, Supelco, Milan, Italy) was employed to determine VOCs. Pieces of *Zingiber officinale* and *Curcuma longa* were put into a vial. SPME fiber was maintained over the vial for a 0.5 h. Analyses were accomplished with an HP 6890 Plus gas chromatograph equipped with a Phenomenex Zebron ZB-5 MS capillary column (30-m x 0.25-mm i.d. x 0.25 μ m FT) (Agilent, Milan, Italy). An HP 5973 mass selective detector (Agilent) was utilized with helium at 0.8 mL/min as the carrier gas. A splitless injector was maintained at 250 °C and the detector at 230 °C. The oven was held at 40 °C for 2 min, then gradually warmed, 8 °C/min,

up to 250 °C and held for 10 min. Tentatively identification of aroma components was based on mass spectra and NITS 14 library comparison. Single VOC peak was considered as identified when its experimental spectrum matched with a score over 90% that present in the library. The Kovats Retention Index was used to identify the aroma components (Kovats 1958). The identification of some minor components (linalool, camphor, β -pinene, caryophyllene) has been performed by comparison with authentic samples. All the analyses were performed in triplicate.

Table S1. Volatile organic compounds from *Zingiber officinale*.

Table S2. Volatile organic compounds from *Curcuma longa*.

Table S1

Compound	R.T. [min.]	KI	Area [%]
α -Pinene	7.88	937	3.11
Camphene	8.24	952	7.27
β -Pinene	8.77	979	0.69
β -Phellandrene	9.35	1030	0.68
β -Ocimene	9.46	1038	0.10
Eucalyptol	10.09	1046	2.01
γ -Terpinene	10.46	1060	0.10
Linalool	11.27	1099	0.60
Camphor	12.20	1144	0.15
Citronellal	12.29	1153	0.76
<i>endo</i> -Borneol	12.65	1166	0.67
Terpinen-4-ol	12.82	1177	0.79
α -Terpineol	13.08	1189	1.28
Neral	14.07	1240	4.01
Geranial	14.73	1250	8.37
Bornyl acetate	14.90	1285	0.55
δ -Elemene	15.71	1338	0.28
Cyclosativene	16.25	1368	0.55
α -Copaene	16.39	1376	1.53
β -Elemene	16.64	1391	1.70
Caryophyllene	17.14	1405	0.31
γ -Elemene	17.31	1433	1.30
<i>cis</i> - β -Farnesene	17.67	1444	1.72
Alloaromadendrene	17.80	1461	1.03
α -Curcumene	18.18	1483	3.98
α -Zingiberene	18.37	1495	14.50
α -Farnesene	18.53	1508	9.14
β -Bisabolene	18.82	1509	6.52
β -Sesquiphellandrene	19.00	1524	9.92
Elixene	19.49	1530	0.41
β -Eudesmol	20.73	1649	0.12
(<i>E,E</i>)-Farnesal	21.78	1715	0.09
(<i>E,E</i>)-7,11,15-Trimethyl-3-methylene-hexadeca-1,6,10,14-tetraene	24.85	1860	0.03

Table S2

Compound	R.T.[min.]	KI	Area [%]
Toluene	4.37	770	0.06
α -Thujene	7.67	930	0.14
α -Pinene	7.84	937	1.59
α -Fenchene	8.11	951	0.08
β -Pinene	8.75	979	0.21
β -Myrcene	9.07	991	0.50
<i>P</i> -cymene	9.44	1025	12.96
β -Phellandrene	10.02	1030	7.86
Limonene	10.08	1032	2.44
Eucalyptol	10.14	1046	2.06
β -Ocimene	10.26	1049	0.05
γ -Terpinene	10.55	1060	1.81
Terpinolene	11.22	1088	6.97
2,3-Dihydro-2-methylbenzofuran	12.02	1097	0.07
Terpinen-4-ol	12.82	1177	0.16
α -Terpineol	13.07	1189	0.15
Thymol	14.82	1291	0.03
Eugenol	15.99	1357	0.03
α -Copaene	16.35	1376	0.02
<i>trans</i> - α -Bergamotene	16.53	1436	0.13
α -Cedrene	17.03	1444	0.28
α -Caryophyllene	17.20	1454	2.94
<i>ar</i> -curcumene	18.13	1483	8.53
α -Zingiberene	18.41	1495	8.46

β -Bisabolene	18.56	1509	3.15
β -Sesquiphellandrene	18.88	1524	7.37
<i>ar</i> -Turmerone	21.06	1664	12.08
Curlone	21.48	1681	4.32

References

Kovats E 1958. Gas-chromatographische Charakterisierung organischer Verbindungen. Teil 1: Retentions indices aliphatischer Halogenide, Alkohole, Aldehyde und Ketone. *Helv Chim Acta* 41: 1915-1932.