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SHORT COMMUNICATION

Analysis of the essential oil of *Ferula communis* L. from Constantine, Algeria

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Abstract: The essential oil obtained by hydrodistillation of fresh aerial parts of *Ferula communis* L. (Apiaceae), growing in Constantine (North Eastern Algerian), was analyzed by GC and GC/MS. Eighteen compounds were characterized representing 93.3% of the essential oil mainly represented by myrcene (52.5 %), α-pinene (20.9%) and, β -Phellandrene (7.7%). β -Phellandrene seems to be exclusive to the present essential oil as a main component.

Keywords: *Ferula communis* L.; Apiaceae; essential oil; myrcene; α –pinene; β -Phellandrene.

Introduction

The genus *Ferula* (Apiaceae), comprising more than 170 species, occurring from central Asia westward throughout the Mediterranean region to northern Africa (Pimenov et al. 1993), is represented by five species in the Algerian Flora from which two are endemic (Quezel and Santa 1963). *Ferula* species possess, various activities *e.g* sedative, anti-spasmodic, anti-microbial, anti-rheumatic and anti-diabetic (Asili et al. 2009; Ghasemi et al. 2005; Habibi et al. 2006). In continuation of our works on Apiaceae essential oils studies (Boudiar et al. 2011; Boutaghane et al. 2004; Daroui et al. 2010; Labed et al. 2011; Vérité et al. 2004) we report here the chemical composition of fresh aerial parts of *Ferula communis* L. essential oil, collected at Constantine (North Eastern Algerian). It's interesting to mention that there is only one report on *Ferula communis* essential oil, it concerns the subspecies *glauca* growing in Italy (Maggi et al. 2009).

Material and methods

Plant material

Fresh aerial parts of *Ferula communis* L. were collected in May 2010 from Constantine (North Eastern Algeria). A voucher specimen was deposited at the herbarium of Mentouri-University, Constantine, Algeria (LOST Fc/05/10).

Essential Oil extraction

The hydrodistillation of fresh aerial parts (100 g) of *F. communis* L. for 3 h in a Clevenger-type apparatus, according to the British Pharmacopoeia, yielded a yellow essential.

Gas Chromatography-Mass spectrometry

Gas Chromatography analysis was performed on a Shimadzu GC17A gas chromatograph equipped with a cross-linked DB5-MS column (40 m × 0.18 mm, film thickness 0.18 µm). The oven temperature was programmed as isothermal at 60°C for 5 min, then raised to 275°C at 5°C/min and held at this temperature for 5 min. Helium was used as the carrier gas at a rate of 1 ml/min. GC/MS was performed using a Shimadzu QP5050 mass selective detector. Operating conditions were the same as for the analytical GC. The MS operating parameters were as follows: ionization potential, 70 ev; ionization current, 2 A; ion source temperature, 200ºC; resolution, 1000. scan time, 5 s; scan mass range, 40–400 u; split ratio, 1:10.

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Identification of components

Essential oil components were identified based on their retention indices (determined with reference to a homologous series of normal alkanes), and by comparison of their mass spectral fragmentation patterns with those reported in the literature (Adams 2007; Mc Lafferty and Stauffer 1991) and with authentic compounds.

Results and discussion

Hydrodistillation of fresh aerial parts of *F. communis* L. collected at Constantine (North Eastern Algerian) furnished 0.8% of a yellowish essential oil. 18 compounds, representing 93.3% of the essential oil were identified. Table 1 shows the percentage composition of this characterized by the prevalence of myrcene (52.5 %) as for the reported essential oil of *F. oopoda* (Karim et al. 1979), which has been found to contain myrcene as the major component of mature seeds, immature seeds and leaves oil (30.3, 34.4, 31.5%), respectively as well as the reported essential oil of the flowers of *F. communis* ssp *glauca* (13.6%) (Maggi et al. 2009). The present essential oil is also characterized by the presence of α -pinene (20.9%) which seems to be a main component of the essential oils of *F. communis* ssp *glauca* (leaves and flowers, respectively) (Maggi et al. 2009), *F. lycia* (Kose et al. 2010), *F. badrakema* (Asili et al. 2009), *F. szovitsiana* (Dehghan et al. 2009), *F. ovina* (Ghannadi et al. 2002), *F. gummosa* (gum and latex) (Ghannadi and Amree 2002), *F. gummosa* (fruits) (Sayyah et al. 2001), *F. flabelliloba* (Rustaiyan, et al. 2001a), *F. stenocarpa* (Rustaiyan, et al. 2001b), *F. jaesekheana* (collected in May) (Kapahi et al. 1985), *F. jaesekheana* (collected in July) (Kapahi et al. 1985), and *F. penninervis* (Goryaev et al. 1968) (11.7, 24.2, 59.9, 10.9, 8.0, 8.2, 5.7, 18.3, 10.0, 48.8, 9.5, 30.0, 4.7%, respectively). It's interesting to note that the composition of the present essential oil is similar to that of *F. communis* ssp. *glauca* (Maggi et al. 2009) with the main presence of α -pinene (20.9, 11.7-24.2%), myrcene (52.5, 4.2-13.6%) and germacrene D (4.2, 5.7-14.2%) but β -Phellandrene (7.7%), seems to be exclusive to the present essential oil as a main component.

Table 1: Chemical composition of *Ferula communis* L. essential oil.

No	Compounds[a]	RI[b]	Percentage composition
1.	α -Thujene	930	0.8
2.	α -Pinene	939	20.9
3.	Camphene	954	0.1
4.	β -Pinene	979	0.1
5.	Myrcene	991	52.5
6.	*p*-Cymene	1025	0.1
7.	Limonene	1029	1.4
8.	β -Phellandrene	1030	7.7
9.	Fenchone	1087	0.1
10.	Linalool	1097	0.4
11.	Verbenol	1141	0.1
12.	α -Copaene	1377	0.2
13.	*trans*-Caryophyllene	1419	0.2
14.	Germacrene D	1485	4.2
15.	δ-Cadinene	1523	0.2
16.	β -Guaiene	1503	0.2
17.	α -Cadinol	1654	0.2
18.	Leden alcohol	1569	0.1
19.	3,5-Dimethoxystilbene	2223	4.1
	Identified compounds	Total	93.3

[a]Compounds listed in order of their RI. RI[b] (retention index) measured relative to n-alkanes (C_6-C_{24}) on the non-polar DB5-MS column.

Conclusion

The essential oil of *Ferula communis* L., collected at Djebel El Ouahch- Constantine (North Eastern Algerian), is mainly characterized by the presence of myrcene, α -pinene, and β -phellandrene. α -Pinene, reported as a main component of most studied *Ferula* species, could be considered as a chemotype of *Ferula* genus but β-Phellandrene (7.7%), seems to be exclusive to the present essential oil as a major component.

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