

Fatty acid composition of *Dracunculus vulgaris* Schott (*Araceae*) seed oil from Turkey

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Abstract *Dracunculus vulgaris* Schott is only one taxon of the genus *Dracunculus* (*Araceae*) in Turkey. The tubers and the fruits with the seeds of *D. vulgaris* have long been in use for the treatment of rheumatism and hemorrhoids, respectively. The fatty acid composition of *D. vulgaris* seeds have been analyzed as their methyl esters by GC and GC-mass spectrometry. C16:0, C16:1n-7, C18:1n-9, C18:1n-7 (*cis*-vaccenic acid), C18:2n-6 and 13-phenyl tridecanoic acids were found to be the main components in the seed oil.

INTRODUCTION

The genus *Dracunculus* (*Araceae*) is represented with only one taxon (*D. vulgaris* Schott) in Turkey. Having large tuberous roots, spotted leaf sheaths, tall scape (up to 150 cm), deeply pedatisect vigorous leaves, dark reddish purple spadix (up to 60 cm) and spathes (up to 40 cm) *D. vulgaris* grows in mainly in western part of the country. It flowers in May and June and the reddish berry type fruits ripen in July. It is the largest and the most showy wild aroids of Turkey (1). In Turkey *D. vulgaris* has many vernacular names. Among them “yılan bacagi”, “yılan biçagi”, “yılan burçagi”, “yılan kamasi” are in common use. Meanwhile the tubers are used external in the treatment of rheumatism, the fruits with the seeds are used internal in the treatment of hemorrhoids, although the toxic properties of the plant are well known (2).

cis-Vaccenic acid was determined in some different *Umbelliferae* seed oils (3) and also pulp lipids of commonly available fruits (4). 13-Phenyltridecanoic acid in seed lipids of

some Aroids was investigated (5) and we studied the fatty acid composition of *Arum italicum* Miller seed oil in our previous work (6). Occuring the unusual fatty acids and/or high concentrations of the usual fatty acids in the seeds are chemotaxonomically important.

Nobody has investigated the potential chemotherapeutic constituents and also chemotaxonomy of *D. vulgaris* in Turkey until now. Therefore in this study the fatty acid composition of the seed oil was investigated as methyl esters by GC and GC-mass spectrometry. This is the first report on fatty acid composition, 13-phenyltridecanoic acid content and high amounts of *cis*-vaccenic acid of *D. vulgaris* Schott seeds from Turkey.

MATERIALS AND METHODS

Dracunculus vulgaris Schott ripe (mature) fruits were collected and identified in September, 2001 in the region of Gökçeada (Imroz), Çanakkale in Turkey.

Dried and crushed seeds were extracted with petroleum ether (40-60°C) and the seed oil was weighed after the evaporation. Fatty acid methyl esters were prepared with 20% BF₃/MeOH at room temperature for 2 hours following by 78°C for 3 hours (7) and extracted with petroleum ether (40-60°C).

The analysis of fatty acid methyl esters were performed by a gas chromatograph (Shimadzu GC-14 A) on a TC-WAX (GL Sciences Inc.) column (30 m x 0.25 mm i.d., 0.25 µm film thickness) using nitrogen (1 kg/cm²), equipped with a FID (260°C) and a split/splitless injector (250°C, split 1:20). The temperature was programmed from 170-225°C at 1°C min⁻¹ followed by a final hold of 25 min. Identification of the methyl esters were made by comparison of

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retention times of standard fatty acid methyl esters (Applied Science Laboratories Inc. and Sigma Chemical Co.) and a normalization technique was used for quantitation with a computer program Class CR-10 (Shimadzu Co.).

Gas chromatography-mass spectrometric analyses were made by GC-MS equipment (HP 6890 Series GC System) with mass selective detection. A J&W WAX (GL Sciences Inc.) column (30 m x 0.25 mm i.d., 0.25 μm film thickness) was used, and the temperature was programmed from 150-230°C at 2°C min⁻¹ with an initial hold of 4 min and a final hold of 36 min. The carrier gas was helium (1 mL min⁻¹) and the split ratio was 1:50. The injection port was held at 250°C and the detector at 300°C.

RESULTS AND DISCUSSION

The total lipid content of *Dracunculus vulgaris* Schott seed was found as 1.18±0.02% (n=3) per dry weight. The fatty acid composition of the seed oil was determined by capillary gas chromatography and the results are shown in Table 1.

Table 1: Fatty acid composition of the oil from seeds of *Dracunculus vulgaris* Schott (n=9).

Caprylic acid	C 8:0	0.49±0.02	5.78
Capric acid	C10:0	<0.10	<1.18
Lauric acid	C12:0	0.22±0.02	2.60
Myristic acid	C14:0	0.52±0.02	6.14
Pentadecanoic acid	C15:0	0.43±0.02	5.07
Palmitic acid	C16:0	15.33±0.23	180.89
Palmitoleic acid	C16:1n-7	4.87±0.19	54.47
Heptadecanoic acid	C17:0	0.28±0.03	3.30
Stearic acid	C18:0	3.27±0.04	38.59
Oleic acid	C18:1n-9	18.06±0.11	213.11
<i>cis</i> -Vaccenic acid	C18:1n-7	11.02±0.10	130.04
Linoleic acid	C18:2n-6	23.21±0.08	273.88
Linolenic acid	C18:3n-3	2.07±0.07	24.43
Arachidic acid	C20:0	0.36±0.04	4.25
<i>cis</i> -11-Eicosenoic acid	C20:1n-9	0.15±0.04	1.77
<i>cis</i> -13-Eicosenoic acid	C20:1n-7	0.21±0.04	2.48
<i>cis</i> -11,14-Eicosadienoic acid	C20:2n-6	<0.10	<1.18
Behenic acid	C22:0	1.30±0.04	15.34
Erucic acid	C22:1n-9	0.18±0.04	2.12
<i>cis</i> -15-Docosenoic acid	C22:1n-7	0.51±0.04	6.02
Lignoceric acid	C24:0	0.49±0.05	5.78
13-Phenyltridecanoic acid	13-PTDA	9.47±0.23	111.75
Total amount of saturated fatty acids		22.69	186.30
Total amount of monounsaturated fatty acids		34.79	410.52
Total amount of polyunsaturated fatty acids (included 13-PTDA)		34.75	410.05

* ± standard deviation

There were twentyone fatty acids identified by comparison with the fatty acid methyl ester standards. The structure of the unknown fatty acid was further supported by GC-mass spectrometry. The data indicated that this fatty acid had an aromatic phenyl ring, one carboxyl group and a Mr of 290 and it is called as 13-phenyltridecanoic acid (5,6). The

major fatty acids were palmitic acid (15.33%), oleic acid (18.06%), *cis*-vaccenic acid (11.02%) and linoleic acid (23.21%), followed by palmitoleic acid (4.87%), stearic acid (3.27%) and 13-phenyltridecanoic acid (9.47%). *cis*-Vaccenic acid was determined in some different *Umbelliferae* seed oils (3) and also pulp lipids of commonly available fruits (4). In seed lipids it is generally found in lower concentrations (0.5-2.0%) (7) although its higher amounts in some species (7-9). In this study it was found as 11.02% and this value is very high comparing the general literature findings (7). On the other hand thirteen fatty acids were detected in small quantities (0.15-2.07%) and also two fatty acids (<0.10% for each other). There were 11 saturated fatty acids in the sample. All of them were detected in small quantities (<0.10%-1.30%) except C16:0 (15.33%) and C18:0 (3.27%) and the total percentage was 22.69. Regarding the monounsaturated fatty acids, oleic acid (18.06%) was the predominant fatty acid in them and the total percentage was 34.79. In the polyunsaturated fatty acids, C18:2n-6, C18:3n-3, and 13-phenyltridecanoic acid levels were in the range of 2.07 and 23.21% except C20:2n-6 (<0.10%). The percentage of 13-phenyltridecanoic acid (9.47%) was found a little lower than that of the literature findings (5). Considering the results obtained in this preliminary study, it is noticeable that the seed oil has contained 13-phenyltridecanoic acid and also higher amounts of *cis*-vaccenic acid and it would be interesting to investigate all Turkish Aroids for therapeutic and also chemotaxonomic purposes.

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