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Short Communication

Volatile Components from the Roots of *Solanum pseudocapsicum*

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ABSTRACT The volatile components obtained by hydrodistillation of *Solanum pseudocapsicum* roots were analyzed by gas chromatography-mass spectrometry. A total of 41 compounds, representing 50% of the oil, were identified. The oil was found to contain fatty acids (26.8%), terpenoids (7.6%), and aldehydes (5.3%) as the major components. The dominant compounds were hexadecanoic acid (24.1%), 2-methoxy-3-isopropylpyrazine (2.8%), and 15-methylhexadecanoic acid (2.1%). Other notable components include β-elemene and δ-elemene. The high proportion of fatty acids in this plant could contribute to its medicinal properties.

KEY WORDS: • ***essential oil composition*** • ***fatty acids*** • ***hexadecanoic acid*** • **Solanum pseudocapsicum** • ***Solanaceae***

INTRODUCTION

SOLANUM PSEUDOCAPSICUM is a poisonous plant used in traditional medicine for the treatment of acute abdominal pain[1] and in the treatment of boils and gonorrhea and as tonic for men.[2] It contains the poisonous compound solanocapsine and other alkaloids that are reported to be fatal to humans and animals.[3,4] Phytomedical investigations have revealed that the plant possesses antiviral, cytotoxic, hepatoprotective, and antitumor properties.[5–8] There is no information in the literature on the volatile components of this plant. In this paper, we report on the chemical composition of the essential oil isolated from its roots as part of our ongoing study on its chemical characterization.

EXPERIMENTAL PROCEDURES

Plant material

The plant material was collected from a natural population in Alice, Eastern Cape Province, South Africa, and a voucher specimen was prepared and deposited in the Griffen Herbarium of the University of Fort Hare (Alice).

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Isolation of the oil

Air-dried roots (250 g) were subjected to hydrodistillation for 3 hours using a Clevenger-type apparatus in accordance with the British pharmacopoeia.

Gas chromatography (GC)-mass spectrometry (MS)

The analysis of the oil was performed using a Hewlett-Packard (Palo Alto, CA) HP5973 mass spectrometer interfaced with an HP-6890 gas chromatograph. The following column and temperature conditions were used: initial temperature 70°C, maximum temperature 325°C, equilibrium time 1.00 minute, ramp 5.0°C/minute, final temperature 240°C; inlet, splitless, initial temperature 220°C, pressure 8.27 psi, purge flow 30 mL/minute, purge time 0.20 minute, gas type helium; column, capillary, model number HP 19091M-433, HP-5 trace analysis 5% phenyl methyl, length 30.0 m, nominal diameter 250.0 μm, film thickness 0.25 μm, initial flow 0.7 mL/minute, initial pressure 8.27 psi, average velocity 32 cm/second, front inlet, outlet mass selective detector; MS, electron ionization method at 70eV. Peaks were analyzed using Hewlett-Packard Enhanced Chem Station G1701 BA version b.01.00 programs for Windows. *n*-Alkanes were run under the same conditions for retention index determinations.

Identification of constituents

Constituents of the oil were identified by comparison of their mass fragmentation (MS) pattern and GC retention

Table 1. Percentage Composition of the Oil of *S. pseudocapsicum*

Compound	*KI*[a]	*Peak area (%)*
1,2,3-Trimethylbenzene	1,001	0.6
2-Methoxy-3-isopropylpyrazine	1,081	2.8
Camphor	1,138	0.6
2-Methoxy-3-isobutylpyrazine	1,177	0.3
Decanal	1,207	0.6
Dodecanol	1,285	0.4
4-Ethylbenzyl alcohol	1,296	0.2
Undecanal	1,328	0.4
2,4-Nonadienal	1,339	0.8
δ-Elemene	1,366	0.8
(*E*)-β-Damascenone	1,424	0.1
β-Elemene	1,433	1.0
β-Caryophyllene	1,467	0.3
γ-Elemene	1,484	0.4
Geranyl acetone	1,507	0.7
9-10-Dehydroisolongifolene	1,519	0.2
Germacrene D	1,544	0.2
epi-Bicyclosesquiphellandrene	1,558	0.3
2-Tridecanone	1,562	0.2
Myristaldehyde	1,580	0.4
Aromadendrene	1,585	0.2
δ-Cadinene	1,597	0.6
2-Butenedioc acid	1,616	0.3
β-Patchoulene	1,630	0.4
Germacrene B	1,640	0.5
Cyclododecane	1,663	0.2
α-Guaiene	1,685	0.3
Tetradecanal	1,709	0.5
Aristol-9-en-3-ol	1,778	0.5
Italicene	1,807	0.4
13-Octadecenal	1,827	0.7
Pentadecanal	1,844	1.5
Octadecanol	1,928	0.3
Tetradecanoic acid	1,990	0.3
Heptadecane	2,057	0.2
Ethyl linoleate	2,065	0.4
Pentadecanal	2,101	0.4
Hexadecanoic acid	2,176	24.1
Dotriacontane	2,303	0.4
15-Methylhexadecanoic acid	2,375	2.1
Phthalic acid	2,741	0.8

[a]Kovats index.

times (retention indices) with those of authentic compounds, published references, and spectral data recorded in the Wiley 275 Mass Spectral Library (Wiley, New York) and associated database.

RESULTS AND DISCUSSION

The volatile colorless oil (0.11% wt/wt) was obtained by hydrodistillation of dried roots and analyzed by GC-MS. A total of 41 out of 51 compounds representing 50.3% of the oil were identified (Table 1). The major constituents were predominated by fatty acids (26.8%), terpenoids (7.6%), and aldehydes (5.3%). The major compounds identified were hexadecanoic acid (24.1%), 2-methoxy-3-isopropylpyrazine (2.8%), 15-methylhexadecanoic acid (2.1%), and pentadecanal (1.5%). Significant terpenoids identified in this oil included β-elemene (1.0%) and δ-elemene (0.8%) as prominent components. Fatty acids are known to be antibiotics.[9] The antifungal and bactericidal properties of fatty acids have been reported.[10–12] The high proportion of fatty acids in this plant could contribute to its medicinal properties.

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