کارگاه های آموزشی مرکز اطلاعات علمی جهاد دانشگاهی

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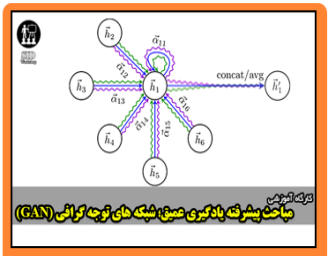

مباحث پیشرفته یادگیری عمیق؛
شبکه های توجه گرافی
(Graph Attention Networks)

VOLATILE CONSTITUENTS OF *PHLOMIS OLIVIERI* BENTH.

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ABSTRACT

The chemical composition of the essential oil of *Phlomis olivieri* Benth growing wild in Iran was examined by GC/MS. The oil contains over thirty-nine components. The major components are hexahydrofarnesyl acetone (13.3%), spathulenol (11.4%), germacrene-D (9.7%), β-caryophylene (6.9%) and caryophyllene oxide (5.3%). As a result of this investigation the oil of *Ph. olivieri* is characterized by a high content of sesquiterpenes and only trace amounts of monoterpenes.

Key words: *Phlomis olivieri*, Lamiaceae, Hexahydrofarnesyl acetone, Spathulenol

INTRODUCTION

The genus *Phlomis* (Lamiaceae) comprises approximately 17 species indigenous in Iran (1,2). *Phlomis olivieri* Benth. "Goosh bareh in Persian", is an Iranian endemic species distributed in northern, western and central parts of the country. While chemical composition of some *Phlomis* species has been reported (3-22), to the best of our knowledge, *Ph. olivieri* has not been the subject of any research. This paper describes the first investigation on this plant.

MATERIAL AND METHODS

Plant Material:

Aerial parts of *Ph. olivieri* at full flowering stage were collected from Dehbid-Semirom (near Isfahan) in May 1998 at an altitude of 2700m.The plant was identified at the Botany Department of the Faculty of Sciences , Isfahan University, Isfahan, Iran and a voucher specimen has been deposited in the Faculty of Pharmacy, Isfahan University of Medical Sciences, Isfahan, Iran .

Isolation of the Oil:

The essential oil was obtained by hydrodistillation for 4h according to the *British Pharmacopoeia* (23). The oil was subsequently dried over anhydrous sodium sulfate.

GC/MS Analyses:

The oil was analyzed on a Hewlett-Packard 6890 mass selective detector coupled with a Hewlett-Packard 6890 gas chromatograph, equipped with a HP-5MS capillary column (30m × 0.25mm; film thickness 0.25 μm). The oven temperature was programmed from 60°C to 280°C at 4°C/min. The carrier gas was helium with a flow rate of 2mL/min. Injector temperature was 280°C.

The MS operating parameters were: ionization voltage of 70ev; ion source temperature of 200°C. Identification of components of the oil was based on retention indices relative to *n*-alkanes and computer matching with the WILEY275.L library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (24,25). The relative percentage of the oil constituents was calculated from the GC peak areas.

RESULT AND DISCUSSSION

The aerial parts of *Ph. olivieri* yielded 0.3% of a clear yellowish essential oil with a strong aromatic odor. Thirty-nine components were detected in the volatile oil of *Ph. olivieri*; of which thirty compound representing 79.6% of the essential oil were characterized. The identified components and their percentage are given in Table I, where the components are listed in order of their elution on the HP-5MS column. The major components are hexahydrofarnesyl acetone (13.3%), spathulenol (11.4%), germacrene-D (9.7%), β-caryophylene (6.9%) and caryophyllene oxide (5.3%). The oil contained two oxygenated hydrocarbon (2.5%), two oxygenated monoterpenes (1.2%), 18 sesquiterpene hydrocarbons (36.1%) and eight oxygenated sesquiterpenes (39.8%). As it can be concluded from table, the oil of *Ph. olivieri* is characterized by a high content of sesquiterpenes (75.9%) and only a trace amount of monoterpenes.

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Table 1. Percentage composition of the oil of *Phlomis olivieri* Benth.

NO.	Compound	Percentage	RI
1	1- Octen -3-ol	0.3	978
2	Linalool	0.8	1095
3	Thymol	0.4	1291
4	Unidentified	0.5	1322
5	α-Copaene	0.4	1373
6	β-Borbunene	1.5	1383
7	β-Cubebene	0.4	1388
8	β-Elemene	1.2	1390
9	β-Caryophyllene	6.9	1419
10	β-Gurjunene	0.8	1429
11	γ-Elemene	0.7	1432
12	α-Humulene	2.2	1451
13	*trans*-β-Farnesene	2.5	1456
14	α-Aromadendrene	2.5	1460
15	9-*epi*-*trans*-Caryophyllene	1.3	1467
16	γ-Muurolene	0.6	1476
17	Germacrene-D	9.7	1481
18	β-Selinene	1.9	1485
19	Bicyclogermacrene	1.2	1495
20	*trans*-α-Farnesene	0.7	1509
21	γ-Cadinene	0.5	1512
22	σ-Cadinene	1.1	1522
23	*trans*-Nerolidol	0.8	1564
24	*Cis*-3-Hexenylbenzoate	2.2	1570
25	Spatulenol	11.4	1578
26	Caryophyllene oxide	5.3	1582
27	β-Copaen-4-ol	1.6	1587
28	4(14)-Salvialen-1-on	2.7	1591
29	Unidentified	1.3	1605
30	Unidentified	2.5	1609
31	Unidentified	1.2	1614
32	epi-α-Cadinol	0.2	1637
33	Unidentified	1.9	1642
34	Unidentified	1.5	1646
35	α-Cadinol	4.5	1650
36	Unidentified	1.6	1667
37	Unidentified	1.1	1673
38	Unidentified	5.0	1680
39	Hexahydrofarnesyl acetone	13.3	1838

RI= Retention indices on HP-5MS capillary column

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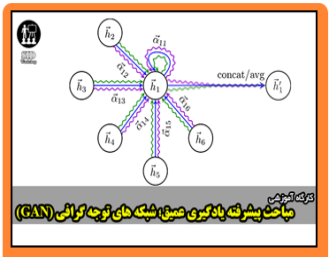

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