Determine the Chemical Composition Present in Coriander, (*Coriandrum sativum*). by GC/MC technique

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ABSTRACT

Plants are a valuable source of a wide range of natural products (secondary metabolites) [1]. Secondary metabolites are chemicals or compounds present in plants that are not involved in the primary biochemical processes of plant growth and reproduction. Plant secondary metabolites however are known to play a crucial role in plant protection from insect predation or grazing by herbivores and adaptation of plants to their environment [2,3]. The secondary metabolites are biosynthesized from primary metabolites by several pathways such as shikimic acid, tricarboxylic acid cycle and malonic acid pathways [3]. These plant materials or compounds fall into the category of saponins, tannins, lignins, volatile oils, alkaloids to mention a few [2]. Discoveries in plant secondary metabolites state that different biosynthetic pathways are responsible for diversity of classes or/and groups of plant components for example. 29,000 terpenes resulting from isopentenyl diphosphate (IPP), 12,000 alkaloids from (amino acid) and 8,000 phenolics produced by shikimate or acetate malonate pathway. IPP modification pathway leads to a series of monoterpene compounds, mainly, (-) limonene, (-) isopiperitenone, (+) isomenthone, (-) –menthol [4], It has been confirmed that the above compounds belong to the monoterpene groups that play important protective role in the plant kingdom. Limonene and menthol are two well - known monoterpenes, which serve as defenses against insects and other organisms feeding on plants [4]. The biosynthetic pathways of different terpene groups from plants. During this process, IPP and DMAPP are converted to give diverse groups of terpenes that play important role in plant

protection. [4,5]. These components have complex and unique structures, resulting from both biotic and abiotic stress enhanced conditions, are stored in specific cells and/or organs of the plant, and often accumulate in vacuoles. [5]

Keywords: ***Coriandrum Sativum:*** **Extraction: Filtration: Evaporation: GC/MS technique**

Introduction

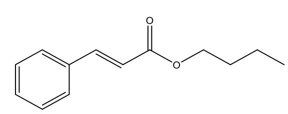
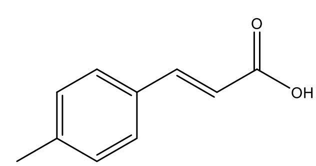
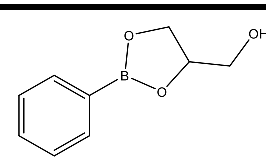
Coriandrum sativum also called cilantro or Chinese parsley**,** feathery annual plant of the parsley family. (Apiaceous) [6]. The plant produces a slender hollow stem 30 to 60 mm (1 to 2.5 inches) high with fragrant bipinnate leaves. [9] The small flowers are [10] pink or whitish and are borne in umbel clusters. [11] The fruit is a small dry schizocarp consisting of two semiglobular fruits joined on the commissural, or inner, sides, giving the appearance of a single, smooth, nearly globular fruit about 5 mm (0.2 inch) in diameter. The yellowish brown fruits have a mild fragrance and taste similar to a combination of lemon peel and sage. The seeds contain from 0.1 to 1 percent essential oil; its principal component is coriandrol. Parts of which are used as both an herb and a spice. Native to the Mediterranean and Middle East regions. [7] The plant is widely cultivated in many places worldwide for its culinary uses. Its dry fruits and seeds, which are known as coriander, are used to flavour many foods, particularly sausages. [8] Curries, Scandinavian pastries, liqueurs, and confectionery, such as English comfits. Its delicate young leaves, known as cilantro, are widely used in Latin American, Indian, and Chinese dishes. Coriander seeds are primarily used to disguise unpleasant-tasting medicine because of their aromatic taste and characteristic odor. The seed is a stimulant and carminative, and in the past, it was considered an aphrodisiac. Extracts from coriander have been reported to improve glucose utilization, as shown by glucose tolerance tests. The seeds contain about 1% volatile oil [11]. The alcohol d-linalool is responsible for the aroma of coriander, and a content 60% is desirable-α-pinene, β-pinene and α terpinene, geraniol, borneol, decylaldehyde, and acetic acid are other constituents of the oil.

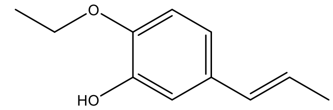
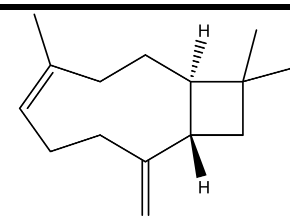
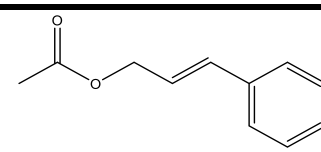
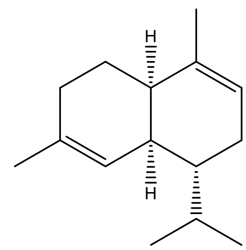
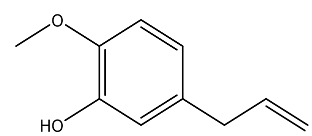
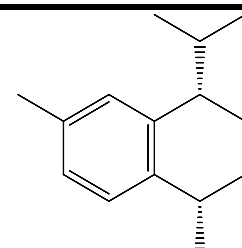
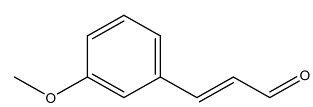
Experiment

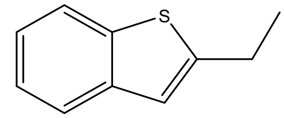
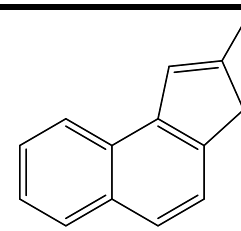
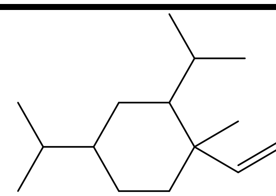
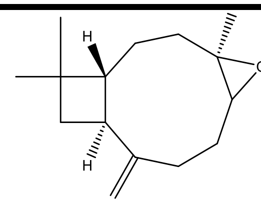
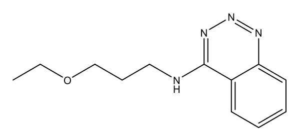
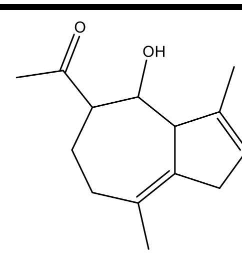
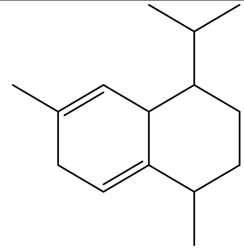
Coriandrum sativum. (200.0 g of plant) was dried in the shade at room temperature 25 ℃ and grinded well, then extracted with equal volumes of Pet.Ether/$CHCl_3$/MeOH (1:1:1) three times at room temperature for 2 weeks. Then, filtration and evaporation of the solvents under reduced pressure by rotary evaporator provided 96.42 g oily residue.

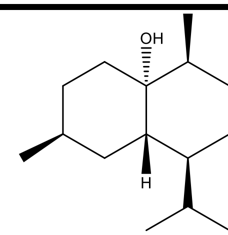
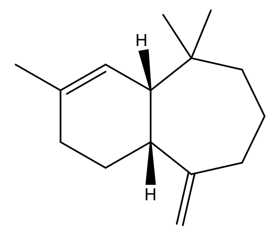
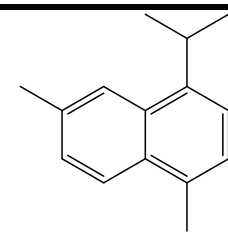
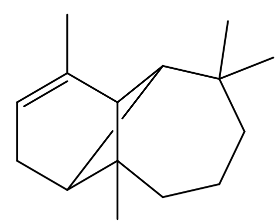
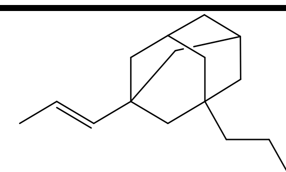
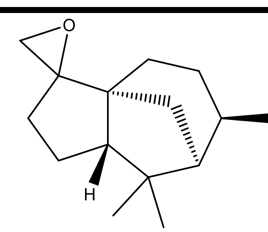
Results and discuss

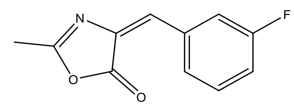
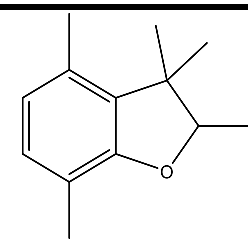
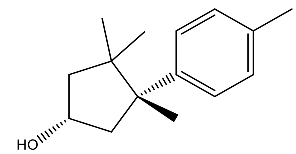
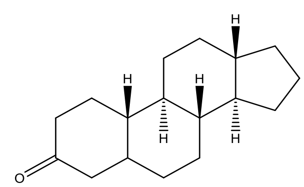
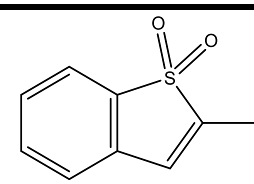
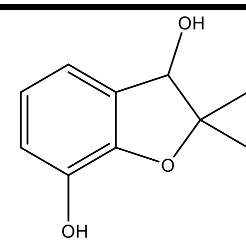
In addition, Pet.Ether. $CHCl_3$: MeOH extract of *Coriandrum sativum* was identified by GC/MS technique, **55** compounds were identified by their analogous reported by NIST library

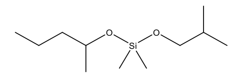
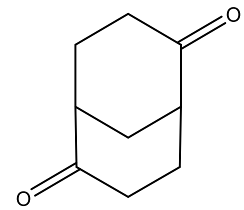
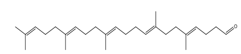
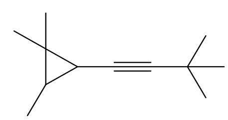
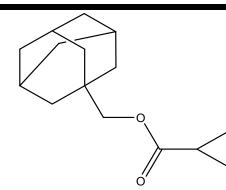
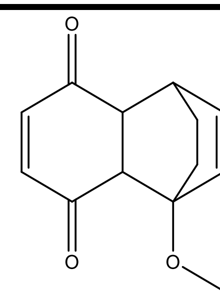
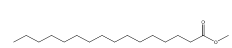
No	Compound Name	Rt	Mol. Wt	Area %	MS-Data	CSBC
1	n-Butyl Cinnamate	5.379	204	0.21	204(8),148(61)1311,131μ+ (100%),103(56),77(36),511 (12),29(8).	
2	p-Methylcinnamic acid	5.447	162	1.95	162 μ+(100), 147(10), 133(66),115(20), 103(20),91(10), 77(6),65(20),5 (12),39(20),27(6).	
3	*1,3,2-Dioxaborolane-4-methanol, 2-phenyl-*	5.482	178	0.62	178(35),147μ+(100),104(35),91(42), 77(14),63(2),43(15),31(9).	

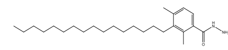
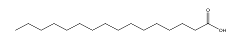
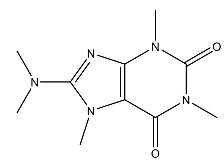
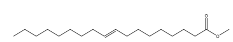
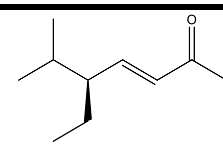
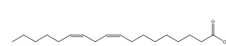
4	Phenol, 2-ethoxy-5-(1-propenyl)-	5.545	178	1.78	178µ+(100),149(56),131 (13),103(12),91(12),77 (13),55(6),43(3).	
5	Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl-8-methylene-,[1R-(1R*,4Z,9S*)]-	5.636	204	1.12	204(7),189(10),175(3),161 (18),147(62),133(40),107(40),93(79),69(83),55(45), 41µ+(100),27(34).	
6	2-Propen-1-ol, 3-phenyl-, acetate	5.814	176	O,25	176(22),134(42),115(95), 92 (35),77(20),63(6),43 µ+(100),27(3).	
7	Naphthalene, 1,2,4a,5,6,8a-hexahydro-4,7-dimethyl-1-(1-methylethyl)-, (1.alpha.,4a.alpha., 8a.alpha.)-	6.334	204	1.22	204(34),189(10),175(2), 161(48),147(10),133(141 19(27),105 µ+(100),91 (38),77(24),55(17),41(53) .	
8	3-Allyl-6-methoxyphenol	6.5	164	2.37	164 µ+(100),149(37),131131(25),115(18),103(26), 77(7),66(7),55(18),39(6), 27 (3).	
9	Naphthalene, 1,2,3,4-tetrahydro-1,6-dimethyl-4-(1-methylethyl)-, (1S-cis)	6.643	202	1.74	202(11),157 µ+(100),144 (5),129(7),105(5),91(4),7 7 (1),43(1),28(4).	
10	3-Methoxycinnamaldehyde	6.769	162	4.3	162 µ+(100),147(15),131(68), 119(34),108(26),91(36) 77(22),65(26),51(22),41(2).	

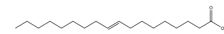
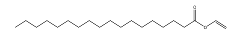
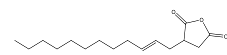
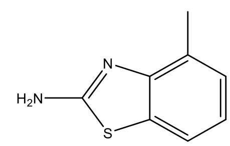
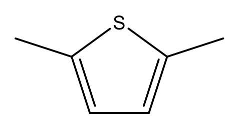
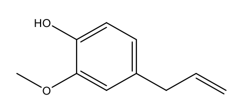
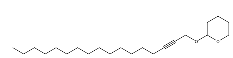
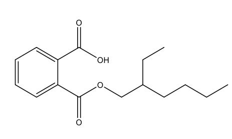
11	Benzo[b]thiophene, 2-ethyl-	6.918	162.1	8.56	162 µ+(100),147(58),135(3) 115(3),103(2),89(3)74(3).	
12	3H-Benz[e]indene, 2-methyl-	7.107	180	0.42	180 µ+(100),165(56),152 (9),139(3),126(2),89(9),7 6 (5),57(1).	
13	Elemene	7.473	204	2.12	204(7),189,(9),161(19),13 6121 µ+(100),107(46),93(71),6 7(34),41(63),27(18).	
14	Caryophyllene oxide	7.547	220	0.95	205(2),191(4),177(7),161(11),135(10),121(15),107(15),93(19),79(46),55(50), 41µ+(100)-	
15	4-[3-Ethoxypropylamino]benzo-1,2,3-triazine	7.6	232	1.2	232(4),203(3),175(28),15 9(4),131(64),104(64),76(3 9), 59(83),41 µ+(100).	
16	Ethanone, 1-(1,3a,4,5,6,7-hexahydro-4-hydroxy-3,8-dimethyl-5-azulenyl)-	7.913	220	3.87	220(2),202(32),159µ+(10 0) 121(59),107(52),91932), 77(16),57(20),43(76).	
17	Naphthalene, 1,2,3,4,4a,7-hexahydro-1,6-dimethyl-4-(1-methylethyl)-	8.125	204.2	1.45	204(27),161(53),147(3),1 33119µ+(100),105(39),91 (23), 69(12),55(16),41(23),27(4).	

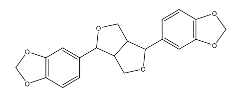
18	Cadinol	8.56	222.2	2.35	222(4),204(7),189(8),161(50),135(7),121(34),95(48), 79(31),58(21),43µ+(100).	
19	1H-Benzocycloheptene, 2,4a,5,6,7,8,9,9a-octahydro-3,5,5-trimethyl-9-methylene-, (4aS-cis)-	8.663	204	1.31	204(51),189(44),175(7), 161(41),134(38),191(51), 93µ+(100),79(57),55(38), 11 (62),27(15).	
20	Naphthalene, 1,6-dimethyl-4-(1-methylethyl)	8.823	198	1.93	198(46),183µ+(100),168 (27),153(14),128(2),99(78), 83(4),41(78).	
21	Tricyclo[5.4.0.0(2,8)]undec-9-ene, 2,6,6,9-tetramethyl-	8.898	204	1.51	204(21),189(11),175(2),161 (24),147(8),133(43),119µ+(100),105(52),91(35) 69(15),55(15),41(15),27 (2).	
22	1-Propyl-3-(propen-1-yl)adamantine	9.05	218.2	1.13	218(28),175 µ+(100),162 (7),149(7),135(22),119(32), 93(35)79(30),55(45).	
23	cedrene epoxide	9.212	220.2	0.72	220(19),205(7),177(33), 149(86),123(42),107(43), 91(36),69(43),41 µ+(100), 26(33).	

24	4-(3-Fluorobenzylidene)-2-methyl-5-oxazolone	9.37	205	1.29	205(17),177(7),135(11),120107(9),81(2),57(2),43 μ+(100).	
25	2,3,3,4,7-Pentamethyl-2,3-dihydro-benzofuran	9.596	190.2	0.49	190(34),175 μ+(100),160(12),147(22),133(1),119(10),105(3),91(8),77(3),63(1), 43(7),27(2).	
26	Cyclopentanol, 3,3,4-trimethyl-4-p-tolyl-, (R,R)-(+)-	9.81	218	0.89	218(36),200(15),185(16), 162 (40),147(81),119 μ+(100),91 (36),71(38),56(31),41(69) ,26 (25).	
27	Tetrahydroionone	10.08	196.2	0.67	196(13),181(6),163(13),138 (19),123(42),109(19),95(34), 82(40),69(19),55(30),43 μ+(100.	
28	2-Methylthianaphthene-1,1 dioxide	10.24	180	0.95	180(33),137μ+(100,121(52), 109(22),89(5),77(5),63(22), 51(12).	
29	3,7-Benzofurandiol, 2,3-dihydro-2,2-dimethyl-	10.35	180	1.56	180(25),162(6),151(31),137μ+(100),123(13),109(6),91 (18),77(5),65(13),53(6),41(12).	
30	7-Hexadecenal, (Z)-	10.99	238.2	0.65	238(2),220(15),163(3),138(16),121(37),98(50),82(44), 55 μ+(100).	

31	Silane, dimethyl(2-pentyloxy)isobutoxy-	11.33	218	1.4	203(26),175 μ+(100),145(8), 131(34),117(2),103(8),89(7), 75(44),59(2),43(2).	
32	Bicyclo(3.3.1)nonane-2,6-dione	11.51	152.1	0.4	152(91),137(4),124(31),10995(31),82(43),67(35),55μ+(100),39(25),27(23).	
33	Docosa-2,6,10,14,18-pentaen-22-al, 2,6,10,15,18-pentamethyl-, all-trans	11.65	384.3	0.65	384(1),315(2),192(3),137(14), 111(18),69 μ+(100),41(40).	
34	2-(3,3-Dimethyl-but-1-ynyl)-1,1,3-trimethyl-cyclopropane	11.9	164.2	2.21	164(41),149(37),134(11), 121 (48),107(68),91(58),77(68), 65(58),55(4),41 μ+(100).	
35	Cyclopropanecarboxylic acid, (adamantanyl-1)methyl ester	12.5	234.2	128	235μ+(100),93(8),69(4),41(3).	
36	1,4-Ethanonaphthalene-5,8-dione, 1,4,4a,8a-tetrahydro-1-methoxy-	13.44	218	0.61	190(4),110μ+(100),82(25),54 (8),39(3).	
37	Hexadecanoic acid, methyl ester	14.35	270	0.9	270(12),227(11),185(5), 143(20),115(3),97(8), 74μ+(100),43(43).	

38	16-Hexadecanoyl hydrazide	16.136	270	3.47	239(4),85(4),57(20),32µ+ (100).	
39	n-Hexadecanoic acid	16.26	256.2	1.21	256(15),213(15),185(13), 157 (13),129(45),101(22),83(26), 60µ+(100).	
40	8-Dimethylamino-1,3,7-trimethyl-3,7-dihydropurine-2,6-dione	17.93	237	0.30	237µ+(100),222(56),208(9), 193(4),179(33),165(4),151(33),137(16),125(9),96(15),82(68),67(20),53(7).	
41	1-Heneicosyl formate	18.22	340.3	0.20	294(6),266(2),196(12),167(2) 139(6),111(43),83(90), 57µ+(100).	
42	9-Octadecenoic acid, methyl ester, (E)-	19.93	296	1.9	296(6),264(59),222(29)180(24),158(15),137(18),111(42), 83(88),55 µ+(100),29(17).	
43	n-Heptadecanol-1	20.3	256.355	0.68	238(43),210(9),167(4),139 (14),111(52),83(99),43µ+ (100),).	
44	(R,S)-5-Ethyl-6-methyl-3E-hepten-2-one	21.03	154.19	0.5	154(4),139(3),125(9),111 (31),97(42),84(4),69(20), 55(23),43µ+(100).	
45	9,12-Octadecadienoic acid (Z,Z)-	21.9	280.2	3.7	280(5),150(4),123(11),95(63),67µ+(100),41(55).	

46	9-Octadecenoic acid, (E)-	21.99	283	1.43	283(16),264(37),223(5),180161(1),138(5),111(31),83 (68),55µ+(100),29(26).	
47	Octadecanoic acid, ethenyl ester	23	310	0.54	267µ+(100),239(15),109(12), 85(27),57(62),29(12).	
48	5-Undecyne	26.6	152.2	1.67	152(2),132(1),123(16),109 (22),95(61),81(88),67µ+(100),54(98),41(47),29(22).	
49	2-Dodecen-1-yl(-)succinic anhydride	26.8	266.2	0.52	237(2),209(5),191(3),167 149(10),123(26),97(40),69 (88),41µ+(100).	
50	2-Benzothiazolamine, 4-methyl-	27.4	164	3.53	164µ+(100),136(14), 121(14),105(13),82(13), 69(14),51(13),39(13),2712).	
51	Thiophene, 2,5-dimethyl	28.6	112	0.84	111µ+(100),97(63),77(18), 67(9),59(20),45(17),37(10) 27(8).,	
52	Eugenol	34.19	164.1	0.81	164µ+(100),149(30).131(20), 103(20),91(15),77(21),55(20),39(10),27(5),15(1).	
53	2H-Pyran, 2-(2-heptadecynyloxy)tetrahydro-	34.98	336	0.42	135(6.49),111(38),85(84), 55µ+(100), 29(31).	
54	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester	35.37	278.2	0.17	279(5),108(32),149µ+(100),113(11) 83(3),57(32),29(3).	

55	2,6-Bis(3,4-methylenedioxyphenyl)-3,7-dioxabicyclo(3.3.0) octane	36.23	354	0.63	(62),323(6),232(2),203(26),178(16),149149µ+(100),122(33),77(6),53(18),28(10).	

الملخص العربي

في هذا العمل تم تجفيف أجزاء نبات الكسبرة(200.0 جم) في الظل عند درجة حرارة الغرفة (22) درجة مئوية وطحنها جيدًا، كذلك تم عمل استخلاص كيميائي بكميات متساوية من Pet.Ether / $CHCl_3$ / MeOH (3 × 1 لتر) في درجة حرارة الغرفة لمدة أسبوعين. بعد ذلك تم عمل تبخير للمذيبات المذكورة تحت ضغط منخفض بواسطة المبخر الدوار حيث تم الحصول على 96.42 جم من المستخلص الخام لنبات الكسبرة. تم عمل وصف لهذه المستخلص باستخدام تقنية GC/MS والتي من خلالها تم التعرف علي (55) مركب وكما مبينة في الجداول.

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