

Lipid constituents from *Artemisia nilagirica* : A GC-MS investigation†

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The lipid constituents of the hexane extract of the leaves of *Artemisia nilagirica* have been investigated using GC-MS analysis. Among the nineteen components, sixteen having chain length ranging between C₉ and C₂₅ have been identified. The principal components are *n*-pentacos-3-ene (28%) and *n*-tetracosane (27%).

In recent years *Artemisia* species have been the subject of intensive studies due to chemical and biological interests.^{1,4} We initiated our phytochemical investigations on two *Artemisia* species, *A. Annu*⁵⁻⁹ and *A. nilagirica*¹⁰. Previous work on *A. nilagirica* reported the occurrence of an insecticidal principle capilline¹¹, a carba sugar, L-2-*O*-methyl-*chiro*-inositol¹⁰ and chemical composition of the essential oil from the leaves¹². Chromatographic fractionation of the hexane soluble concentrate of the leaves which was devoid of essential oil, afforded a lipid fraction, the GC-MS analysis of which is reported herein.

GC analysis showed that the lipid fraction was a mixture of 19 components having retention times (RT) ranging from 26.2 to 100.95 min. Characterization of the individual component was carried out on the basis of MS fragmentation pattern¹³⁻¹⁵ observed in GC-MS data (Table I). The GC peaks eluting at 32.55, 35.3, 45.1, 47.6, 53.85 and 92.6 min corresponded to *n*-alkanes^{13,14} having an odd number of carbon atoms ranging between C₁₁ and C₂₄ and comprised about 32% of the total lipid fraction. The GC peaks appearing at RT 26.2, 42.55 and 91.7 min representing about 28% of lipids were identified as *n*-non-1-ene, cyclopentanodec-5-ene and *n*-pentacos-3-ene, respectively. Rest of the peaks at RT 29.95, 50.45, 57.9, 69.65, 77.3 and 100.95 min constituting about 28% of the total lipid, were identified as isoalkanes. Among isoalkanes, 3-methylalkanes were found to be the major constituents and one each was identified as 2-methylalkane and 2-ethylalkane. The peaks at RT 44.15, 50.1 and 47.6 min representing about 4% of the total lipid could not be identified. The GC-MS analysis thus suggested that *n*-tetracosane and *n*-pentacos-3-ene are the major constituents of the lipid fraction of *A. Nilagirica*. With regard to aliphatic compounds, acetylenic compounds have been so far identified from various *Artemisia* species^{1,16} and the presence

Table I— Constituents of the lipid fraction from hexane extracts of the leaves of *Artemisia nilagirica*.

Peak No.	RT ^a	Area (%)	Fragment ion (Relative abundance)	Identification
1.	26.2	0.22	43(80), 44(100), 55(66), 69(50), 83(34), 97(28), 111(14), 126(5)	Non-1-ene
2.	29.95	0.24	44(80), 57(100), 71(70), 85(22), 99(10), 113(11), 127(4), (M ⁺ - Me)	2-Methylnonane
3.	32.55	0.54	43(99), 57(100), 71(60), 85(27), 99(10), 113(6), 127(2.5), 141(1.2), (M ⁺ - Me)	<i>n</i> -Undecane
4.	35.3	0.61	43(90), 57(100), 71(55), 85(30), 99(9), 113(4), 127(3), 141(2.8), 155(2.2), 169(2), (M ⁺ - Me)	<i>n</i> -Tridecane
5.	40.4	0.97	43(90), 57(100), 71(60), 85(34), 99(10), 113(6.6), 127(3), 141(2.7), 155(2), 169(1.9), 183(1), 197(1.1), (M ⁺ - Me)	<i>n</i> -Pentadecane
6.	42.55	0.3	43(100), 57(87), 69(60), 83(50), 97(49), 111(22.5), 125(10.0), 139(3.1), 207(1), 208(0.4)	Cyclopentanodec-5-ene
7.	44.15	0.4	44(60), 57(40), 77(30), 104(16), 133(17), 149(100), 207(16), 263(22), 264(4)	Unidentified
8.	45.10	1.37	43(90), 57(100), 71(60), 85(35), 99(10), 113(6), 127(4), 141(3), 155(2), 169(1.7), 183(1), 197(1), 211(0.9), 225(0.8), (M ⁺ - Me)	<i>n</i> -Heptadecane

— Contd.

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Table I— Constituents of the lipid fraction from hexane extracts of the leaves of *Artemisia nilagirica* (Contd.)

9.	47.60	1.70	43(83), 57(100), 71(60), 85(37), 99(13), 113(7), 127(4.5), 141(2.7), 155(2), 169(1.7), 183(1.3), 197(1), 211(0.9), 225(0.8), 239(0.5), 253(0.4), (M ⁺ - Me)	<i>n</i> -Nonadecane
10.	50.10	0.19	44(100), 57(17.5), 69(15), 73(13), 81(6), 97(5), 114(4), 133(4.5), 147(5), 191(5.5), 207(18), 208(5), 209(6), 281(12),	Unidentified
11.	50.45	2.20	43(74), 57(100), 71(65), 85(36), 99(12), 113(7), 127(4), 155(3), 169(1), 183(1), 197(0.9), 211(0.9), 225(0.9), 239(0.8), 281(1), 295(0.8), (M ⁺ - Me)	3-Ethylcosane
12.	53.85	1.45	43(76), 57(100), 71(60), 85(39), 99(12.5), 113(7.5), 127(3.2), 155(2.8), 169(2), 183(1.8), 197(1), 225(1), 281(1.8), (M ⁺ - Me)	<i>n</i> -Heneicosane
13.	57.90	2.88	43(82), 57(100), 71(60), 85(40), 99(15), 113(8), 127(5), 141(2), 155(1.8), 169(1.5), 183(1.4), 197(1.4), 211(1.2), 225(1.0), 239(1.0), 253(0.9), 267(0.8), 281(0.6), 323(0.7), (M ⁺ - Me)	3-Methyltricosane
14.	69.95	12.78	43(72), 57(100), 71(60), 85(40), 99(14), 113(9), 127(5), 141(4), 155(2.7), 169(0.4), 183(1.6), 197(1.3), 211(1.2), 225(0.8), 253(0.7), 267(0.6), 281(0.6), 295(0.37), 304(0.35), 323(0.35), 338(0.33)	12-Methyltricosane
15.	47.60	2.09	43(95), 57(100), 69(54), 83(56), 97(55), 111(27), 125(13), 139(6), 153(3.6), 167(2.4), 181(2), 195(1.3), 209(1.0), 223(0.5), 251(0.6),	Unidentified
16.	77.30	5.58	43(82), 57(100), 71(64), 85(40), 99(20), 113(12), 127(5), 141(3), 155(2.6), 169(2), 183(1.8), 197(1.6), 211(1.5), 225(1.4), 239(1.3), 253(1.3), 267(1.3), 281(1.5), 295(1.3), 309(0.7), (M ⁺ - Me)	3-Methyldocosane
17.	91.70	27.86	43(70), 55(98), 57(100), 71(60), 85(30), 99(12), 113(8), 127(6), 141(4), 155(2.5), 169(2), 183(1.4), 197(1), 211(0.9), 225(0.8), 239(0.7), 253(0.6), 267(0.6), 281(0.5), 295(0.4), 309(0.4), 323(0.3), 338(0.3)	<i>n</i> -Pentacos-3-ene
18.	92.60	26.79	43(70), 57(100), 71(68), 85(45), 99(18), 113(12), 127(7), 141(5), 155(3.6), 169(3), 183(2.5), 197(1.5), 211(1.2), 225(1), 239(0.9), 253(0.7), 267(0.6), 281(0.6), 295(0.5), 309(0.4), 323(0.3), 338(0.3), 350(0.2)	<i>n</i> -Tetracosane
19.	100.95	5.9	43(73), 57(100), 71(65), 85(40), 99(13), 127(6), 141(4), 155(2.7), 169(2.1), 183(1.7), 197(1.4), 211(1), 225(0.7), 239(0.7), 253(0.6), 267(0.6), 281(0.7), 295(0.3), 323(0.32), 338(0.3)	2-Methyltricosane

^a Retention time (in minutes).

of keto and alcoholic derivatives of isoalkanes have been recently reported from *A. annua*¹⁷.

Experimental Section

The leaves (4.0 kg) of *A. nilagirica*, collected from CIMAP field station, Pantnagar (UP) were shadow dried and extracted with hexane. The hexane extract was concentrated (12 g) and chromatographed over silica gel with hexane. The fractions 1-10 (250 mL each) yielded a low melting (50°C) white material showing a single spot on TLC which was subjected to GC-MS analysis on a Shimadzu 24-QP-2000 GC-MS system at

ionization energy 70 eV and temperature ion source 250°C on GC column.

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