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RESEARCH ARTICLE

PHYTOCHEMICAL PROFILING OF *WAGATEA SPICATA* USING GC-MS TO REVEAL THE PHARMACOLOGICAL SIGNIFICANCE

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ABSTRACT

Wagatea spicata (WS), a Leguminous flowering shrub has been known for the medicinal action of its bark against skin diseases and roots against pulmonary disorders in Ethnobotanical references (Surange, 1986). 5-20 meters long plant is characterized by the presence of hard, curved, prickles on the stem (Fig 1.1), bipinnately compound leaves (Fig 1.2) and seasonal, reddish yellow, spiked inflorescence (http://www.flowersofindia.net/catalog/slides/Candy%20Corn%20Plant.html). In spite of its easy abundance and medicinal significance, phytochemical profile of the plant was not revealed. In the present work an effort was therefore made to elucidate the phytoconstituents of biological significance present in this plant so as to understand their role in the medicinal properties of the same. In the current study, GCMS analysis of carried out to explicate the phytochemical profile of *Wagatea spicata.* n-Hexadecanoic acid, Octadecanoic acid, τ Sitosterol, Lupeol were identified by GC-MS in the plant.

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INTRODUCTION

Plants have been used by mankind for their food, shelter, clothing and medicine since times immortal. The folklore medicine of India is a rich heritage of the country. Most of these medicines belong to the plant kingdom. However, there is no scientific characterization and documentation of many such plants of ethnobotanical origin in spite of the enormous advancements in analytical field. The present study is an effort to identify and reveal the biologically active phyto-components from one such significant plant, *Wagatea spicata* using quick and accurate modern analytical tools like GC-MS. Surange *et al*., (1987) reported macroscopic and microscopic studies on *W. spicata* Dalzell roots available in the drug markets of Maharashtra. During the above work, Pharmacognostic quality parameters were revealed, however the detailed phytochemical studies were needed; to establish the quality of plant, for its therapeutic use.

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Although chromatographic fingerprints are the most used quality control techniques, these techniques do not reveal the phytochemical profile of the plant. Therefore, it was felt worthwhile to employ GC-MS for analysis of different extracts of *W. spicata* which will not only put emphasis on phytochemical profile but also help in identification of specific phytoconstituents. This leads to recognize the potential use of the plant under study for its pharmacological effectiveness.

MATERIALS AND METHODS

Collection of plant material

The leaves and stem of the plant were collected from Kankeshwar Hills near Alibaug. The plant materials in the form of a herbarium were identified and authenticated by Botanical Survey of India, Pune.

Drying and Pulverization

The collected plant parts were segregated as perishable aerial parts such as bark, leaves and young twigs and entire mature stem.

Fig1. Morphology of *Wagatea spicata* Stem bark (Fig1.1), Leaves (Fig1.2) and Inflorescence (Fig.1.3)

Above plant parts were shade dried for a week and after complete drying, perishable aerial parts were pulverized together using domestic mixer grinder. Considering the hardness, entire stem was broken down into small pieces using a commercial hammer mill followed by pulverization using domestic mixer grinder. The crude plant powders were sieved through 80 micron mesh and preserved in clean airtight glass containers for further analysis. Perishable aerial parts powder was labeled as whole plant powder and entire stem powder was labeled as stem powder.

Extraction

Extraction is a crucial step for assessing the phytochemical profile of the plant. To obtain maximum extraction, two different methods were employed, Maceration and Soxhlet extraction. Ethanol & water were used as solvents for maximum extraction of polar components

Soxhlet extraction

20 g of plant powder was added into 250ml of Ethanol and subjected to semi continuous Soxhlet extraction for 48 hrs at 50^0C. This extract was collected and used for GC-MS analysis.

Aqueous Hot Maceration

10g of plant powder was added to 100ml of D/W and boiled for 14 hours. The concentrated extract was filtered using a Muslin cloth. The filtrate was further concentrated by evaporating to complete dryness in a water bath. 0.5g of the dried residue was reconstituted in 1ml of ethanol and subjected to GC-MS analysis.

Therefore, following four extracts were obtained after Soxhlet's extraction and hot maceration.

- Bark, Leaves, Twig (whole plant) Ethanolic Soxhlet extract,
- Bark, Leaves, Twig (whole plant) Aqueous, Hot Macerated extract,
- Stem, Ethanolic Soxhlet extract,
- Stem, Aqueous, Hot macerated Extract.

GC-MS Analysis

To obtain the Phytochemical profiling of the plant, all the four samples were individually injected on GC-MS 2010 system. The system details are provided in Table 1. The components of the samples were comprehended by Spectral comparison with the compounds enlisted in the NIST Library for GC-MS.

Table 1. Instrument Details

GC-MS 2010 system	Shimadzu Analytical Pvt.Ltd.
Column	RTX-5MS
Carrier Gas	Helium gas
Mass detector	GCMS-QP2010 Ultra
Column oven temperature	200°C.
Library Details	NIST(National Institute Standard and Technique) 8 AND NIST 8S library

RESULTS AND DISCUSSIONS

The prime objective of the current work was to elucidate phytochemical profile of *Wagatea spicata* using GC-MS. Therefore, the Total Ion Chromatograms of all the four extracts and the detailed Peak reports containing the names of the phytochemical components identified by GC-MS along with their Retention times, Peak Areas and Peak Heights have been tabulated in figures and tables 2,3,4,5 for the extracts 1,2,3,4 respectively.

DISCUSSION

Table 2 reveal the phytochemical profile of *Wagatea spicata* thus helping in the scientific characterization of a rare plant with Ethanobotanical significance (Surange, 1986).

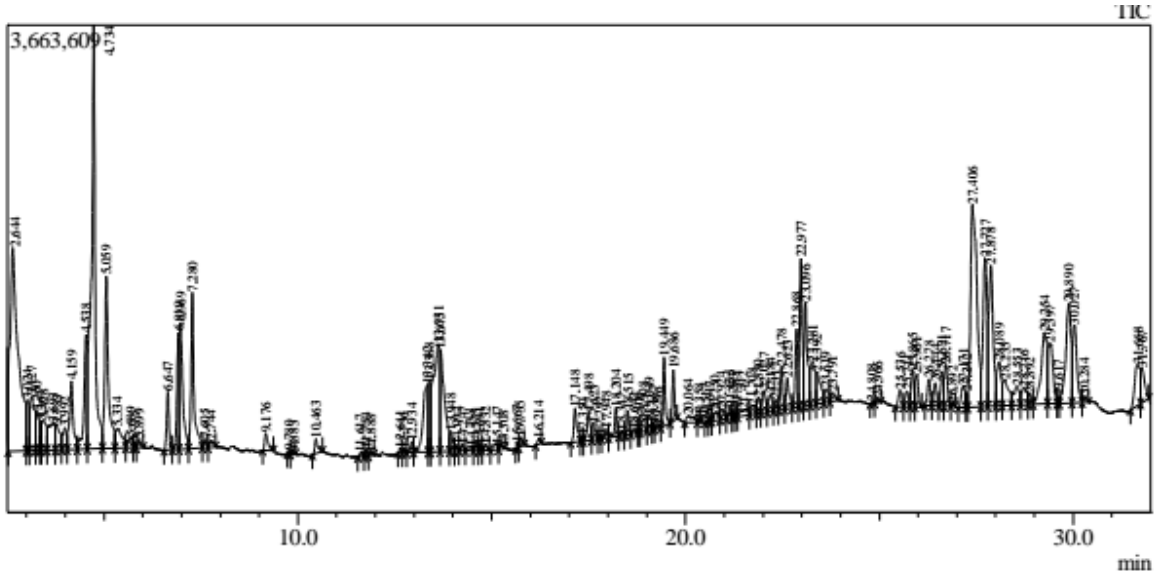

Fig. 2. Total Ion chromatogram for Extract I

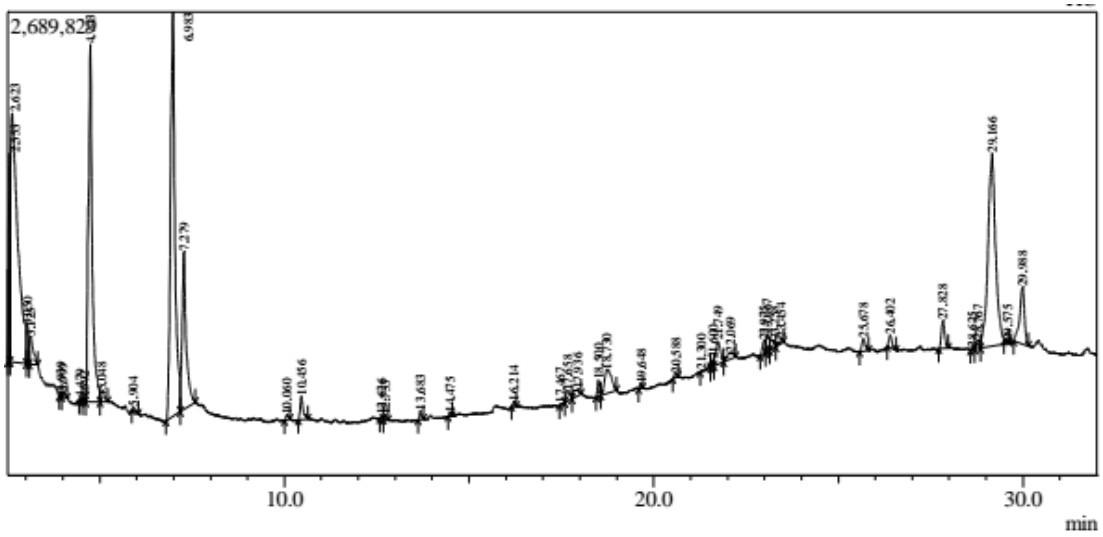

Fig. 3. Total Ion chromatogram for Extract II

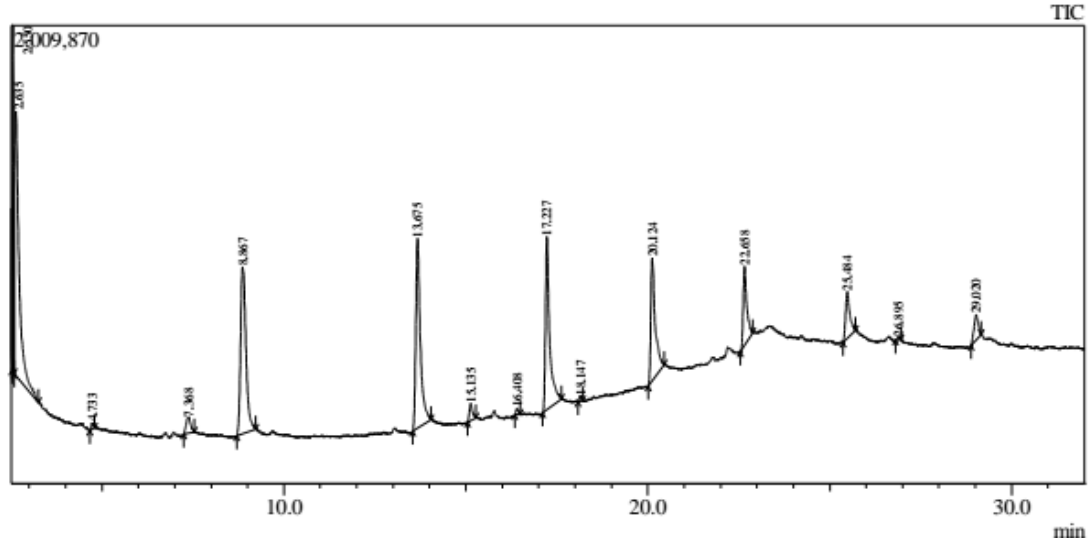

Fig. 4. Total Ion chromatogram for Extract III

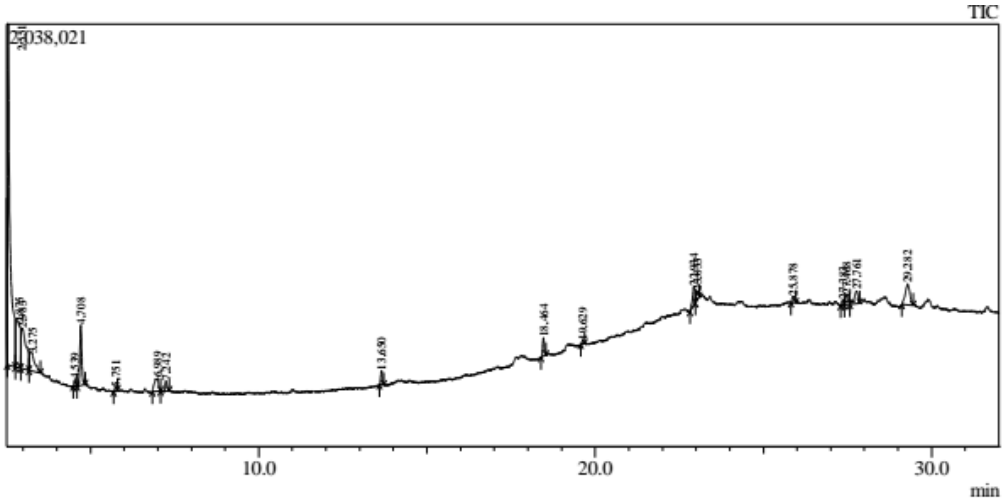

Fig. 5 Total Ion chromatogram for Extract IV

Table 2. Phytochemical components as detected by NIST Library in Extract I (Hits 1-28)

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Name
1	2.553	3885546	3.94	1211602	.alpha.,.beta.-D-Glucopyranoside, 1-deoxy-1-undecylt
2	2.623	19419565	19.68	1447183	2-O-Methyl-D-mannopyranosa
3	3.050	1080039	1.09	219154	Tetradecanoic acid
4	3.125	1013632	1.03	160367	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol
5	3.939	72002	0.07	25436	Phthalic acid, butyl tetradecyl ester
6	3.999	132423	0.13	28935	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) es
7	4.479	62165	0.06	19895	Corymbolone
8	4.592	60866	0.06	9103	1,19-Eicosadiene
9	4.743	15340929	15.54	2075990	n-Hexadecanoic acid
10	5.048	476418	0.48	63556	Hexadecanoic acid, ethyl ester
11	5.904	84423	0.09	21149	Heptadecanoic acid
12	6.983	20136808	20.40	2345424	Oleic Acid
13	7.279	6885081	6.98	915147	Octadecanoic acid
14	10.060	146804	0.15	30955	Cyclopentadecanone, 2-hydroxy-
15	10.456	749659	0.76	136532	Eicosanoic acid
16	12.626	78859	0.08	22153	Behenic alcohol
17	12.733	95040	0.10	23716	Hexadecane, 1-iodo-
18	13.683	203239	0.21	55448	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) est
19	14.475	68501	0.07	20720	Tetracosane
20	16.214	100310	0.10	28142	Tetracosane
21	17.467	1153	0.00	6100	Octadecanoic acid
22	17.658	436920	0.44	60815	Sakuranin
23	17.936	469438	0.48	40788	Nonacosane
24	18.500	367840	0.37	95560	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-h
25	18.730	1843733	1.87	139264	3,7,11,15-Tetramethyl-2-hexadecen-1-ol
26	19.648	94050	0.10	26559	Hexatriacontane
27	20.588	111683	0.11	24521	N-Benzhydrylidene-1-(2,4,6-trimethylphenyl)ethylam
28	21.300	117687	0.12	8688	Tetracosane

Table 3. Phytochemical components as detected by NIST Library in Extract I (Hits 29-59)

Peak#	R.Time	Area	Area%	Height	Name
29	11.754	230854	0.09	51312	Behenic alcohol
30	11.888	112070	0.05	26405	Heneicosane
31	12.641	123740	0.05	31564	n-Tetracosanol-1
32	12.736	85250	0.03	20457	Nonacosane
33	12.934	320726	0.13	80605	1,2-Benzenedicarboxy
34	13.342	4536189	1.85	502406	Friedelan-3-one
35	13.388	2089933	0.85	538966	Friedelan-3-one
36	13.631	9442216	3.84	807581	Friedelan-3-one
37	13.675	5996797	2.44	760445	1,2-Benzenedicarboxy
38	13.948	740720	0.30	152787	Docosanoic acid
39	14.092	206089	0.08	43745	Hexadecanoic acid, 1-
40	14.247	305780	0.12	54633	Eicosanoic acid, 2,3-h
41	14.458	242781	0.10	33711	Pentadecanoic acid, et
42	14.575	267018	0.11	37769	Oleyl Alcohol
43	14.691	196406	0.08	47005	Hexadecanoic acid, 1-
44	14.832	235616	0.10	47406	Eicosanoic acid, 2,3-h
45	15.147	398158	0.16	43686	
46	15.308	178280	0.07	9365	
47	15.667	171646	0.07	48502	4-Methoxy-4',5'-methy
48	15.735	393144	0.16	69602	1-Octacosanol
49	16.214	171784	0.07	37834	Octacosyl trifluoroace
50	17.148	1488117	0.61	257038	Tetracosanoic acid
51	17.350	177487	0.07	40891	
52	17.498	1313799	0.53	220374	Tetracosanoic acid
53	17.623	771567	0.31	131094	Docosanoic acid, ethy
54	17.792	192693	0.08	33740	
55	17.948	388773	0.16	70523	Docosanoic acid, ethy
56	18.204	966811	0.39	223365	Squalene
57	18.347	155553	0.06	38350	Octadecanal
58	18.515	663096	0.27	184734	Squalene
59	18.642	172479	0.07	30154	Octadecanal

Table 4. Phytochemical components as detected by NIST Library in Extract I (Hits 60-85)

60	18.800	56443	0.02	17229	
61	18.908	883235	0.36	89514	3,7,11,15-Tetramethyl-
62	19.049	712006	0.29	114748	Octadecanal
63	19.167	137366	0.06	44973	
64	19.296	118142	0.05	26552	Cyclohexanol, 2-(1-met
65	19.449	2153645	0.88	516908	1-Octacosanol
66	19.686	1516665	0.62	390128	1-Octacosanol
67	20.064	594512	0.24	47441	
68	20.358	52423	0.02	13948	
69	20.517	50260	0.02	7198	
70	20.617	85310	0.03	21266	
71	20.750	621564	0.25	62622	Hexacosanoic acid
72	20.924	596373	0.24	73491	Hexacosanoic acid
73	21.155	443019	0.18	81369	Docosanoic acid, ethyl
74	21.233	188585	0.08	46391	
75	21.311	314622	0.13	70601	Docosanoic acid, ethyl
76	21.492	852942	0.35	47755	
77	21.708	694610	0.28	69205	
78	21.880	635281	0.26	124301	Octadecanal
79	22.027	1003321	0.41	165555	Oxirane, hexadecyl-
80	22.184	889167	0.36	129547	1-Undecene, 11,11-diet
81	22.317	442788	0.18	78926	Decane, 1,1-diethoxy-
82	22.478	1501419	0.61	329179	Cholest-22-ene-21-ol, 3
83	22.623	1339548	0.55	233216	Tetrapentacontane, 1,54
84	22.868	2561952	1.04	592211	Tetracosane
85	22.977	5564874	2.27	1116191	Hexacosyl heptafluorob

Table 5. Phytochemical components as detected by NIST Library in Extract I (Hits 86-119)

Peak#	R.Time	Area	Area%	Height	Name
86	23.096	4560849	1.86	779848	1-Heptacosanol
87	23.281	3008741	1.22	322918	
88	23.392	1762286	0.72	240307	Octadecanal
89	23.619	788605	0.32	100138	.alpha.-Tocopherol-.bet
90	23.791	449240	0.18	66458	.alpha.-Tocopherol-.bet
91	24.808	71952	0.03	19652	Hexadecane, 1-iodo-
92	24.966	134827	0.05	29054	n-Tetracosanol-1
93	25.536	800178	0.33	126260	Ergost-5-en-3-ol, (3.bet
94	25.711	750604	0.31	119899	Ergost-5-en-3-ol, (3.bet
95	25.865	1527472	0.62	273752	Octadecanal
96	25.961	1291643	0.53	243088	Octadecanal
97	26.278	1099348	0.45	198950	Stigmasterol
98	26.444	1029352	0.42	173980	Stigmasterol
99	26.621	1376737	0.56	260233	Z-2-Octadecen-1-ol
100	26.717	1761733	0.72	307216	Z-2-Octadecen-1-ol
101	26.892	87189	0.04	20471	
102	27.171	1080034	0.44	157698	Hexatriacontane
103	27.242	325441	0.13	118428	Tetracosane
104	27.406	16977903	6.91	1523613	1-Triacontanol
105	27.727	7834508	3.19	1115689	.gamma.-Sitosterol
106	27.878	8375082	3.41	1061400	.gamma.-Sitosterol
107	28.089	2640989	1.07	331652	4,4,6a,6b,8a,11,11,14b
108	28.235	2001515	0.81	196192	1,4-Dimethyl-8-isoprop
109	28.553	1518464	0.62	143648	.alpha.-Amyrin
110	28.716	1270191	0.52	131160	.alpha.-Amyrin
111	28.892	445110	0.18	74019	
112	29.254	5719878	2.33	536881	Lup-20(29)-en-3-one
113	29.397	4102998	1.67	460490	Lup-20(29)-en-3-one
114	29.617	173824	0.07	48640	
115	29.890	7007451	2.85	753615	Lupeol
116	30.027	4615518	1.88	582434	Lupeol
117	30.284	262666	0.11	44908	1-Naphthalenepropanol
118	31.668	2875164	1.17	304642	Stigmast-4-en-3-one
119	31.767	1926941	0.78	265244	Stigmast-4-en-3-one
		245684082	100.00	33951843	

119 components were detected in the Ethanolic Soxhlet extract of the whole Plant powder of which 101 phytoconstituents were identified by GCMS,NIST Library (Table 2-5).19 components were detected in the Ethanolic Soxhlet extract of the stem and all of them were identified by by GCMS(Figure 10).43 components were detected in the Ethanolic Soxhlet extract of the stem and all of them were identified by the by GCMS (Table 6).15 components were detected and identified from the aqueous, Hot macerated extract of the stem (Table 7, 8).

From Table 10 it can be elucidated that,

n-Hexadecanoic acid (Palmitic acid) is a common component in all the extracts but is observed maximum in the Ethanolic Soxhlet Extract of the Whole plant. Anti-fungal action of this component [Aparna *et al*., 2012] explains the use of this plant in treatment of skin diseases. The anti-inflammatory activity [Aparna *et al*., 2012] of Palmitic acid points out the potential of this plant to be used as a component of medicated oil singly or synergistically for management of Rheumatic disorders.

Table 6. Phytochemical components as detected by NIST Library in Extract II (Total Hits 1-19)

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Name
1	2.551	8680501	45.60	1644072	4-Trifluoromethylbenzoic acid, octadecyl ester
2	2.875	2025175	10.64	211279	Carbon dioxide
3	2.983	1950907	10.25	193219	dl-Alanyl-dl-norleucine
4	3.275	969096	5.09	79298	2-Aminononadecane
5	4.539	120981	0.64	33241	cis-9-Hexadecenoic acid
6	4.708	1187404	6.24	291216	n-Hexadecanoic acid
7	5.751	70008	0.37	19274	cis-10-Heptadecenoic acid
8	6.989	554108	2.91	61731	Oleic Acid
9	7.242	192789	1.01	50881	Octadecanoic acid
10	13.650	235636	1.24	70118	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl
11	18.464	313208	1.65	89358	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,
12	19.629	55646	0.29	16190	17-Pentatriacontene
13	22.934	497592	2.61	91410	Tetracosane
14	23.033	227211	1.19	42773	1-Pentacosanol
15	25.878	130885	0.69	30119	14-Octadecenal
16	27.383	134978	0.71	25457	1-Triacontanol
17	27.468	318744	1.67	49290	D-Friedoolean-14-en-3-one
18	27.761	450514	2.37	60732	.gamma.-Sitosterol
19	29.282	920613	4.84	100925	Lupeol
		19035996	100.00	3160583	

Table 7. Phytochemical components as detected by NIST Library in Extract III (Hits 1-28)

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Name
1	2.553	3885546	3.94	1211602	.alpha.,.beta.-D-Glucopyranoside, 1-deoxy-1-undecyl
2	2.623	19419565	19.68	1447183	2-O-Methyl-D-mannopyranosa
3	3.050	1080039	1.09	219154	Tetradecanoic acid
4	3.125	1013632	1.03	160367	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol
5	3.939	72002	0.07	25436	Phthalic acid, butyl tetradecyl ester
6	3.999	132423	0.13	28935	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) es
7	4.479	62165	0.06	19895	Corymbolone
8	4.592	60866	0.06	9103	1,19-Eicosadiene
9	4.743	15340929	15.54	2075990	n-Hexadecanoic acid
10	5.048	476418	0.48	63556	Hexadecanoic acid, ethyl ester
11	5.904	84423	0.09	21149	Heptadecanoic acid
12	6.983	20136808	20.40	2345424	Oleic Acid
13	7.279	6885081	6.98	915147	Octadecanoic acid
14	10.060	146804	0.15	30955	Cyclopentadecanone, 2-hydroxy-
15	10.456	749659	0.76	136532	Eicosanoic acid
16	12.626	78859	0.08	22153	Behenic alcohol
17	12.733	95040	0.10	23716	Hexadecane, 1-iodo-
18	13.683	203239	0.21	55448	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) est
19	14.475	68501	0.07	20720	Tetracosane
20	16.214	100310	0.10	28142	Tetracosane
21	17.467	1153	0.00	6100	Octadecanoic acid
22	17.658	436920	0.44	60815	Sakuranin
23	17.936	469438	0.48	40788	Nonacosane
24	18.500	367840	0.37	95560	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-H
25	18.730	1843733	1.87	139264	3,7,11,15-Tetramethyl-2-hexadecen-1-ol
26	19.648	94050	0.10	26559	Hexatriacontane
27	20.588	111683	0.11	24521	N-Benzhydrylidene-1-(2,4,6-trimethylphenyl)ethylam
28	21.300	117687	0.12	8688	Tetracosane

Table 8. Phytochemical components as detected by NIST Library in Extract III (Hits 29-43)

Peak#	R.Time	Area	Area%	Height	Name
29	21.600	222878	0.23	39773	Spiro[7H-benz[e]indene-7,1'-[2]cyclopentene]-4',9(
30	21.749	1195465	1.21	131703	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-
31	22.069	498614	0.51	38833	Pentacyclo[19.3.1.1(3,7).1(9,13).1(15,19)]octacosa
32	22.975	429490	0.44	71636	Tetracosane
33	23.067	575194	0.58	100468	1-Pentacosanol
34	23.258	410739	0.42	37797	Cyclodecasiloxane, eicosamethyl-
35	23.454	179861	0.18	28625	Cholesterol
36	25.678	468128	0.47	72665	Ergost-5-en-3-ol, (3.beta.)-
37	26.402	424134	0.43	74246	Stigmasterol
38	27.828	1045878	1.06	163740	.gamma.-Sitosterol
39	28.625	90291	0.09	12800	Tetracosamethyl-cyclododecasiloxane
40	28.767	389878	0.40	46901	9,19-Cyclolanostan-3-ol, 24-methylene-, (3.beta.)-
41	29.166	16179888	16.39	1121223	3,7,11,15-Tetramethyl-2-hexadecen-1-ol
42	29.575	23827	0.02	7948	5-(1-Isopropenyl-4,5-dimethylbicyclo[4.3.0]nonan-
43	29.988	3023471	3.06	331975	Lupeol
		98692549	100.00	11543235	

Table 9. Phytochemical components as detected by NIST Library in Extract IV (Total Hits 1-15)

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Name
1	2.550	4779724	10.41	1517818	1-Chloroeicosane
2	2.635	9559058	20.81	1158702	N,N-Dimethylformamide trimethylene acetal
3	4.733	110209	0.24	27218	n-Hexadecanoic acid
4	7.368	603133	1.31	71187	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) e
5	8.867	7319879	15.94	733299	Cyclodecasiloxane, eicosamethyl-
6	13.675	7283524	15.86	831849	Tetracosamethyl-cyclododecasiloxane
7	15.135	446812	0.97	74637	13-Docosenamide, (Z)-
8	16.408	120373	0.26	27963	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23
9	17.227	6132537	13.35	760039	Tetracosamethyl-cyclododecasiloxane
10	18.147	99464	0.22	23323	Hexatriacontane
11	20.124	4339984	9.45	538292	Tetracosamethyl-cyclododecasiloxane
12	22.658	2475866	5.39	346947	Tetracosamethyl-cyclododecasiloxane
13	25.484	1679209	3.66	204676	Tetracosamethyl-cyclododecasiloxane
14	26.895	61756	0.13	13284	.gamma.-Sitosterol
15	29.020	913953	1.99	112287	Tetracosamethyl-cyclododecasiloxane
		45925481	100.00	6441521	

Table 10. List of biologically significant components identified from the tested extracts of *Wagatea spicata*

S.No	Name of the component	Rt	Mol. Formula	Mol. Wt.	Area(AU)				Biological Activity
					Sample 1	Sample 2	Sample 3	Sample 4	
1.	n-Hexadecanoic acid	≈4.7min	$C_{16}H_{32}O_2$	256	22276740	1187404	15340929	110209	Anti-inflammatory, Antifungal, Antioxidant (Aparna, 2013)
2.	Octadecanoic acid	≈7.2min	$C_{18}H_{36}O_2$	284	6271461	192789	6885081	--	Antifungal, Anti bacterial, Anti tumor (Akpuaka et al., 2014)
3.	Γ Sitosterol	≈27min	$C_{29}H_{50}O$	414	8375082	450514	1045878	61756	Antibacterial, Antifungal, Antioxidant, Anti diabetic, Anti viral (Venkata Raman et al., 2012)
4.	Lupeol	≈29min	$C_{30}H_{50}O$	426	4615518	920613	3023471	--	Anti-inflammatory, Anticancer (Mohammad Saleem, 2009)

Octadecanoic acid (Stearic acid): was found to be present in all extracts except the aqueous extract of stem by Hot Maceration. This could be due to the lesser content of the component in the stem and its preferable solubility in a relatively non polar solvent like ethanol [Rudi Heryanto, 2007]. Antibacterial, Antifungal [Akpuaka *et al*., 2013] activity of this component could synergistically function with Palmitic acid in acting as a cure for skin infections.

Γ Sitosterol: is present in the whole plant extract as well the only stem extract. But the content of the component is greater in the whole plant than in the stem alone. The anti microbial, antiviral activity (Venkata Raman *et al*., 2012) of this component thus explains the use of the bark (a component of the whole plant powder) for treating skin diseases as per the Traditional medicinal system. Ethanolic Soxhlet extraction gives maximum yield of Γ Sitosterol from this plant. This can help in using the aerial parts of the plant for therapeutic purposes without uprooting the plant.

Lupeol: was found to be present in both the whole plant extracts with a greater extraction by the Ethanolic Soxhlet Extraction.

It was also found to be present in the Ethanolic Soxhlet extract of the stem but not in the aqueous stem extract prepared by hot maceration.This could be attributed to the lesser content of Lupeol in the stem and the preferable solubility of the component in organic solvent like Ethanol (like Stearic acid)

Lupeol is well known for its anti-inflammatory activity (Mohammad Saleem, 2009) thus justifying the role of this plant in treatment of skin diseases as well as pulmonary tuberculosis which involves inflammation of the respiratory tract.

Ethanolic Soxhlet extraction can be said to be the best method of extraction of phytoconstituents from the plant parts of *Wagatea spicata*. The whole plant Ethanolic Soxhlet extract was also found to contain Squalene which is component of the skin and a common ingredient of topical formulations (Zih-Rou Huang *et al*., 2009). The plant therefore seems to have a promising effect as a skin protecting agent when developed into a formulation. Components like α amyrene (detected in Ethanolic Soxhlet extract of the plant) and γ sitosterol (detected in all the four extracts) throw light on the anti

diabetic potential of this plant (Venkata Raman *et al*., 2012; Singh *et al*., 2009).

Conclusion

Thus the above study was a quick method of revealing and documenting the phytochemical profile of *Wagatea spicata*, a rare plant with a view to experimentally understand, explain and document the ethnomedical importance associated with the plant. This plant has been traditionally used in the form of its roots to cure pulmonary disorders. However in the above analysis the potential of other aerial parts of the same plant has also been brought to the fore with an environment friendly motive.

Future Prospects

The biological activities of all the components detected in the plant *Wagatea spicata* can be studied in-vivo to determine a maximum recommended starting dose for first in human clinical trials.

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