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Lipid composition of *Desmostachya bipinnata* rootstock

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ABSTRACT

Desmostachya bipinnata (Linn.) Stapf. syn. Eragrostis cynosuroides Beauv. It is a member of Poaceae family. Medicinally useful part of the plant, rootstock was subjected to phytochemical studies. The early benzene fractions (1-15 and 16-31) were subjected to GC-MS analysis. The spectra showed separation of fifty one and forty three peaks respectively.

Keywords: Kusa; Darbhaipul; diuretic; asthma

INTRODUCTION

Desmostachya bipinnata (Linn.) Stapf. is known as Kusa in Sanskrit, Darbhaipul in Tamil and Sacrificial Grass in English. It is distributed in plains of Asian countries viz., India, Afghanistan, Burma, China, India, Iran, Iraq, Israel, Pakistan, Saudi Arabia, Thailand, Vietnam, Yemen and African countries, viz., Algeria, Chad, Egypt, Eritrea, Ethiopia, Libya, Mauritania, Somalia, Sudan, and Tunisia [1-4]. The plant is used as diuretic [5,6]; stimulant, used in menorrhagia [6]; epistaxis, calculus, skin diseases [7]; dysentery [6,8,9]. Root is given to treat irregular menses [10]; asthma and jaundice [9]; abdominal and colic pain [11]; gargle for gummosis and toothache [12]. Phytochemicals from the category of coumarins, flavonoids and their glucosides, xanthene and sesquiterpenoids, sugars and amino acids were reported from the plant [1317].

MATERIALS AND METHODS

PLANT MATERIAL

The plant material was collected from Dharmapuri district in Tamil Nadu during the flowering month of August 2011 and was authenticated by Dr. R. Chelladurai, Botanist, Survey of Medicinal Plants Unit, Palayamkottai. Voucher specimen of the plant (ACC. No. 7320) has been deposited in the Pharmacognosy department of Siddha Central Research Institute, Arumbakkam, Chennai-106.

EXTRACTION AND FRACTIONATION

The rootstocks were shade dried and coarsely powdered in a hammer mill. The powdered plant material (5 kg) was twice extracted with ethanol by cold percolation (48 h) method. The ethanol extract was filtered, concentrated on a water bath and finally dried in vacuum. The total alcohol extract (48 g) was subjected to column chromatography over silica gel (100-200 mesh). The early benzene fractions 1-15 and 16-31 after isolation of compounds 1 & 2 (yet to be identified), their respective mother liquor fractions were analyzed by GC-MS and 51and 43 compounds were identified by comparison with library data.

OPERATING CONDITIONS OF GC-MS

GC-MS-QP 2010 (Shimadzu) with VF-5ms column coated with dimethylsiloxane of film thickness 0.25 µm was used. Column length was 30 m and internal diameter was 0.25 mm. Column oven temperature was programmed at 70˚C and the injector temperature was kept at 240˚. The split injection mode with a Split Ratio of 10 and linear velocity flow control mode were followed. The column flow was maintained at 1.51 ml/min and Helium was the carrier gas. 1 µl of the sample was injected. The temperature was programmed as 30^{o}–70^{o} (hold time 2 mins; 10^{o}/min); 70^{o}-150^{o} (hold time 5 mins; 5^{o}/ min); 150^{o}-325^{o}(hold time, 13 mins; 20^{o}/ min) and flame ionization detector was used.

Ion source temperature of MS was programmed at 200°C and the interface temperature was kept at 240°C. The range of scanning was from 40 to 1000 m/z. The ionization mode was EI (-70eV) and the scanning speed was 2000. MS time was from 5 min to 38 min. NIST08s, WILEY8 and FAME were the MS Library software used.

RESULTS AND DISCUSSION

GC-MS chromatogram of the fraction 1-15 showed 51 peaks (Fig. 1) and that of 16-32 showed 43 peaks (Fig. 2). In the 1-15 fractions totally 30 compounds were identified (Table 1) and 21 compounds were not identified or their similarity index was less than 80 percent. Similarly in the 16-32 fraction totally 29 compounds were identified (Table 2) and 14 compounds identity based on similarity index was below 80 % and not considered as identified. Though both the fractions contains many compounds commonly, there are some compounds which are specific to that fraction. For example, linoleic acid, linoleic acid ethyl ester, oleic acid, oleic acid ether ester, myristic acid ethyl ester, palmitic acid ethyl ester, diethyl phthalate, etc are present in both fractions. However, 2-methoxy-4-formylphenol (vanillin), elemicin, zierone and ρ-hydroxy cinnamic acid ethyl ester are present in fraction 16-32 only. Vanillin and ρ-hydroxy cinnamic acid ethyl ester are biogenetically related compounds and are important. In the fraction 1-15, linoleic acid ethyl ester (20.92%), palmitic acid ethyl ester (18.33%) oleic acid ethyl ester (14.07%) and other identified compounds were contributing less than 5% individually. In the fraction 16-32, ρ-hydroxycinnamic acid ethyl ester (16.25%), palmitic acid (15.07%), palmitic acid ethyl ester (9.18%), linoleic acid (6.56%), oleic acid (6.48%), linoleic acid ethyl ester (7.55%), oleic acid ethyl ester (4.47%) and 2-methoxy-4-formylphenol (vanillin) are the major compounds identified. Stearic acid ethyl ester (2.17%) is present only in the fraction 16-32.

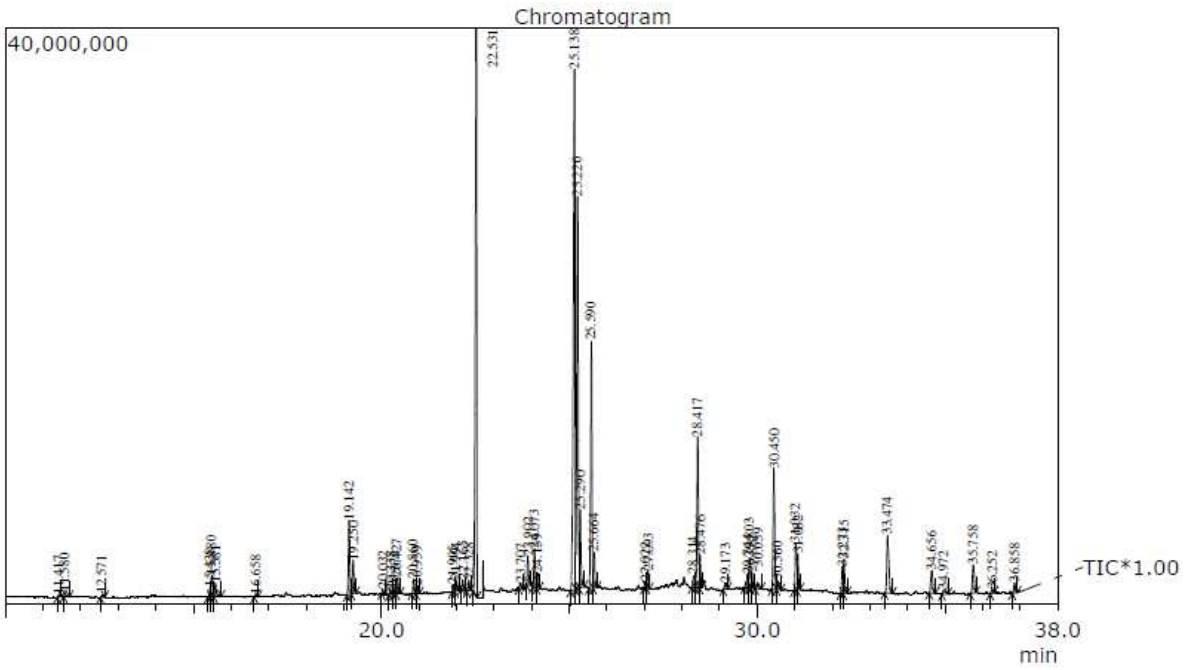

Figure 1. GC-MS profile of fractions 1-15 of *D. bipinnata* rootstock

Table 1. GC-MS chromatogram of Fraction 1-15

Peak	RT (min)	Area %	Name of the Compound	SI
1.	11.417	0.08	Tetradecene	95
2.	11.580	0.14	Tetradecane	97
3.	12.571	0.07	Octylcyclohexane	95
4.	15.438	0.26	Octadecene	95
5.	15.480	0.79	Phthalic acid, diethyl ester	92
6.	15.581	0.55	Hexadecane	96
7.	16.658	0.07	Nonylhexane	91
8.	19.142	2.43	Myristic acid, ethyl ester	94
9.	19.250	1.05	Octadecane	98
10.	20.032	0.12	6,10,14-Trimethyl-2-pentadecanone	94
11.	20.238	0.14	Not identified	
12.	20.374	0.12	Not identified	
13.	20.427	0.49	Phthalic acid, diisobutyl ester	96
14.	20.860	0.47	Pentadecanoic acid, ethyl ester	96
15.	20.959	0.24	Nonadecane	96
16.	21.905	0.23	Not identified	94
17.	21.994	0.31	Not identified	
18.	22.165	0.32	Ethyl 9-hexadecanoate	92
19.	22.328	0.32	Not identified	
20.	22.531	18.33	Palmitic acid, ethyl ester	94
21.	23.707	0.21	Palmitoleic acid, ethyl ester	95
22.	23.902	0.96	Octadecanol	97
23.	24.073	1.22	Heptadecanoic acid, ethyl ester	95
24.	24.159	0.45	Heneicosane	95
25.	25.138	20.92	Linoleic acid, ethyl ester	92
26.	25.220	14.07	Oleic acid, ethyl ester	96
27.	25.290	2.64	Not identified	
28.	25.590	7.94	Not identified	
29.	25.664	1.14	Tetracosane	98
30.	27.022	0.15	Not identified	
31.	27.093	0.47	Not identified	
32.	28.314	0.40	Not identified	
33.	28.417	5.10	Not identified	96
34.	28.476	0.85	Pentacosane	96
35.	29.173	0.29	Not identified	
36.	29.744	0.56	Not identified	
37.	29.803	1.01	Not identified	
38.	29.862	0.49	Not identified	
39.	30.039	0.25	Not identified	
40.	30.450	3.67	Not identified	
41.	30.560	0.32	Not identified	
42.	31.032	1.55	Not identified	
43.	31.082	1.10	Hexatriacontane	95
44.	32.273	0.89	Not identified	
45.	32.315	1.04	Triacontane	95
46.	33.474	2.74	Tetracosanoic acid, ethyl ester	92
47.	34.656	1.04	Tetracontane	92
48.	34.972	0.23	Not identified	
49.	35.758	1.27	Docosanoic acid, ethyl ester	83
50.	36.252	0.15	Triacontanediol	88
51.	36.858	0.35	n-Tetratriacontane	94

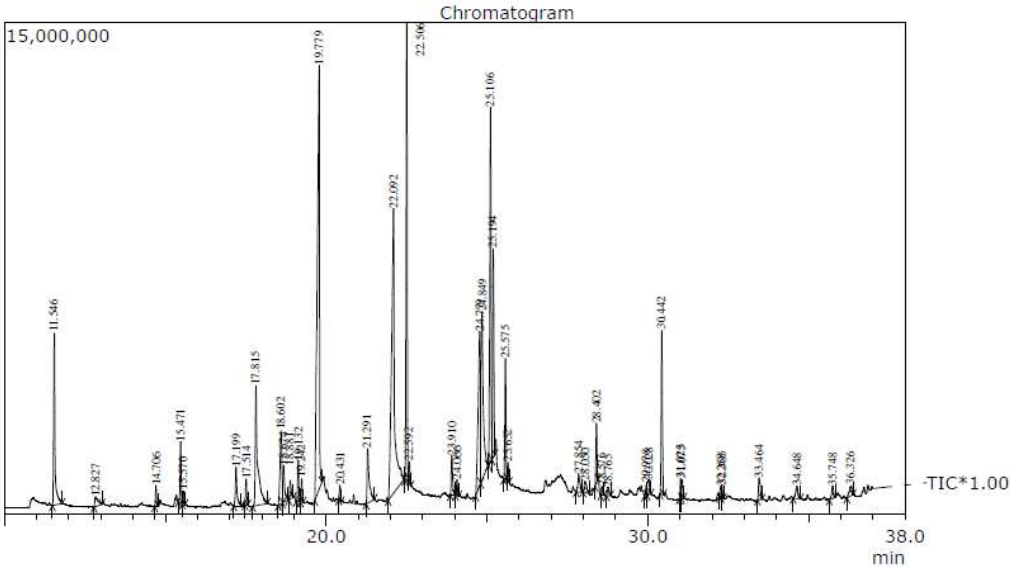

Figure 2. GC-MS profile of fractions 16-32 of *D. bipinnata* rootstock

Table 2. GC-MS chromatogram of Fraction 16-32

Peak	RT (min)	Area %	Name of the Compound	SI
1.	11.546	4.28	2-Methoxy-4-formylphenol (Vanillin)	97
2.	12.827	0.54	Not identified	
3.	14.706	0.38	Elemicin	88
4.	15.471	1.16	Phthalic acid, diethyl ester	96
5.	15.570	0.22	n-Hexadecane	96
6.	17.199	1.11	Not identified	
7.	17.514	0.47	Zierone	87
8.	17.815	5.09	Not identified	
9.	18.602	2.20	Myristic acid	95
10.	18.674	1.09	Benzyl benzoate	97
11.	18.881	0.50	Not identified	
12.	19.132	0.80	Myristic acid, ethyl ester	94
13.	19.242	0.39	Octadecane	98
14.	19.779	16.25	ρ-Hydroxycinnamic acid, ethyl ester	87
15.	20.431	0.29	Phthalic acid, diisobutyl ester	96
16.	21.291	2.07	Not identified	
17.	22.092	15.07	Palmitic acid	93
18.	22.506	9.18	Palmitic acid, ethyl ester	96
19.	22.592	0.28	Eicosane	97
20.	23.910	0.98	Octadecanol	97
21.	24.066	0.31	Heptadecanoic acid, ethyl ester	94
22.	24.779	6.56	Linoleic acid	91
23.	24.849	6.48	Oleic acid	91
24.	25.106	7.55	Linoleic acid, ethyl ester	93
25.	25.194	4.47	Oleic acid, ethyl ester	88
26.	25.575	2.17	Stearic acid, ethyl ester	95
27.	25.652	0.26	n-Pentacosane	96
28.	27.854	0.67	Not identified	
29.	28.050	0.47	Not identified	
30.	28.402	1.11	Not identified	
31.	28.576	0.19	Not identified	
32.	28.765	0.25	Not identified	
33.	29.978	0.29	Not identified	
34.	30.028	0.48	9-Tricosene	
35.	30.442	3.11	1,2-Benzenedicarboxylic acid, mono (2-ethylhexyl) ester	97
36.	31.023	0.41	Not identified	
37.	31.075	0.33	n-Hexacosane	95
38.	32.268	0.21	Not identified	
39.	32.305	0.24	n-Tetracosane	94
40.	33.464	0.71	Tetracosanoic acid, ethyl ester	90
41.	34.648	0.51	n-Pentatriacontane	87
42.	35.748	0.42	Docosanoic acid, ethyl ester	81
43.	36.326	0.45	Not identified	

CONCLUSION

Linoleic acid ethyl ester, palmitic acid ethyl ester, oleic acid ethyl ester, linoleic acid, palmitic acid, oleic acid, ρ-hydroxycinnamic acid ethyl ester, 2-methoxy-4-formylphenol (vanillin) and stearic acid ethyl ester are important compounds identified.

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