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GCMS Profiling of Some Wild vegetables

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Abstract: *Wild plants have been used as a source of food and medicine since ancient time. Wild leafy vegetables are available luxuriantly in the monsoon and occupy a modest place as a source of macro and micro elements due to their high water content (Sundriyal and Sundriyal, 2004). Wild leafy vegetables have advantages over their exotic counter parts, like they are adapted to local climatic conditions, and are more resistance to insect pests and different diseases*

Keywords: Wild plants have been used as a source of food and medicine since ancient time

I. INTRODUCTION

Wild plants have been used as a source of food and medicine since ancient time. Wild leafy vegetables are available luxuriantly in the monsoon and occupy a modest place as a source of macro and micro elements due to their high water content (Sundriyal and Sundriyal, 2004). Wild leafy vegetables have advantages over their exotic counter parts, like they are adapted to local climatic conditions, and are more resistance to insect pests and different diseases. They grow abundantly in most parts as weeds and hence can be intercropped easily. Most of these vegetables are reported to have a high nutritional potential, medicinal properties and a high yield potential, (Onyango *et al*., 2000). Leafy vegetables are like factories of bioactive compounds, and can be used to treat many bacterial and fungal diseases. Leafy vegetables enhance the flavor and taste of food and also contain a lot of phytochemicals such as phenols, alkaloids, flavonoids, carotenoids and other powerful antioxidants also known as secondary metabolites. These phytochemicals have antifungal as well as antibacterial potential.

II. MATERIALS AND METHODS

Collection of wild vegetable samples was made from Ratnagiri and Sindhudurg districts in Konkan, Maharashtra. Frequent visits were made at different places in the two districts during the whole year. Survey of the study region was made in July 2011 and ended in July 2014. Five Tahsils from Ratnagiri and four tahsils from Sindhudurg visited frequently for this study. 0.2g oven dried powder of vegetable sample was mixed with 20 ml methanol and kept on an electric rotary shaker for 48h in ambient conditions (shaking intensity 150 rpm). The extract was filtered through Whatman No. 1 filter paper, and stored in a glass vial in a refrigerator at 4^0C.GC-MS analysis was carried out using Shimadzu (QP-2010) with non polar 60 M RTX 5MS Column. Helium was used as the carrier gas and the temperature programming was set with initial oven temperature at 40^0C and held for 3 min and the final temperature of the oven was 480^0C with rate at 10^0C [min^{-1}.sup.]. Two µl sample was injected using splitless mode. Mass spectrum was recorded over 35-650 amu range with electron impact ionization energy 70 eV. The total running time for a sample was 45 min.

III. IDENTIFICATION OF COMPONENTS

Identification of mixture components was done using data base of NIST (National Institute of Standards and Technology). The bands of the unknown components were compared with those of known components stored in the NIST library. The retention time, molecular weight, molecular formula and percent amount of individual compounds were recorded.

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IV. RESULTS AND DISCUSSION

The mass spectrum of *C. esculenta* showed eight peaks, out of which n- hexadecanoic acid was the prominent one (47.01%). The mass spectrum of *C. benghalensis* exhibited three peaks. Out of them the one which had a larger percent area was phytol (45.49%). GCMS analysis of leafy vegetables helps to reveal the secondary metabolites in plants which may possess certain bioactivities. Presence of such compounds in food is considered beneficial for general health.

Methanolic extracts of dry powdered samples of vegetables collected during monsoon were employed for biochemical analysis using GCMS. Interpretation of the spectra obtained and identification were done using the database of National institute of Standard and Technology (NIST). Unknown components were compared with the known compounds stored in the NIST Library. The name, molecular wt. and structure of the components found in each sample were recorded.

Twelve compounds were identified in *Amaranthus caudacus* in ethanol extract and phytol was the major constituent (84.97%) (Paranthaman *et al*., 2012).GCMS analysis of *Chenopodium album* in petroleum ether revealed presence of many saturated fatty acids viz. hexadecanoic acid, tetradecanoic acid, nonanoic acid, octadecane, eicosane etc. (Pandey and Gupta, 2014).

Selvi and Baskar (2012) carried out GCMS profiling of leafy vegetable *Sauropus androgynus* (star goose berry, katuk, sweet leaf) from South India, and reported nine compounds in ethanolic extract. The major compound was 2 (1H) naphthalenone, 3,5,6,7,8, 8a-hexahydro-4, 8a-dimethyl-6- (1- methyl ethylene), with peak area percentage of 41.17. They also found a high percentage of azulene (36.20%).

Total nine compounds were recorded in acetone extract of *Acalypha alnifolia,* a leafy vegetable of Coimbatore. Thiophene, tetrahydro 2- methyl, myo-inositol, 4-C- methyl and alpha -D- xylofuranoside, methyl-o methyl had a high concentration (Revati *et al*., 2010). Moonjit and Himaja (2014) carried out GCMS analysis of *Ipomea eriocarpa,* a leafy vegetable of Assam (Kolmow) and revealed the presence of eleven phytoconstituents in petroleum ether extract and nine in ethanolic extract. Sixteen peaks were identified from the chromatograph of methanolic leaf extract of *Moringa oleifera* and the compound present in highest percentage was 9- octadecanoic acid (20.89%) (Aja *et al*., 2014). The GCMS analysis of methanol extract of *Brassica oleracea* var. *capitata* from Korea represented 44 organic compounds where caffeic acid, oxygenated mono, di and triterpenes and mono and sesqueterpene hydrocarbons were present as the major compounds (Hossain and Rehman, 2011). Phenanthrene, anthracene, oxalic acid, naphthalene, β -pinene, 2 octen- 3-ol, 3 octamol and 3, 4 dihydroxymedelic acid were also reported by these workers.

Table 1 : Chemical composition of *Colocasia esculenta*

No.	Name of compounds	RT min.	Molecular formula	Molecular weight	Percent Composition
1	1-Butanamine, 2-methyl-N-(2-methylbutylidene)- $$ N-(2-Methylbutylidene)-2-methylbutylamine $	8.044	$C_{10}H_{21}N$	155	2.73%
2	Piperidine, 2,3-dimethyl- $$ 2,3-Dimethylpiperidine $$ Nonafin (free base) $$ 2,3-Lupetidine $$	8.207	$C_7H_{15}N$	113	2.73%
3	Unknown	8.402			5.57%
4	Cyclopentane, 1-acetyl-1,2-epoxy- $$	8.766	$C_7H_{10}O_2$	126	11.20%
5	Decanoic acid, methyl ester	21.046		186	8.45%
6	n-Hexadecanoic acid	21.398	$C_{16}H_{32}O_2$	256	**47.10%**
7	9,12-Octadecadienoic acid, methyl ester $$	22.790	$C_{19}H_{34}O_2$	294	7.04%
8	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)- $$ Linolenic acid, methyl ester $$ Methyl all-cis-9,12,15-octadecatrienoate	22.867	$C_{19}H_{32}O_2$	292	15.19%

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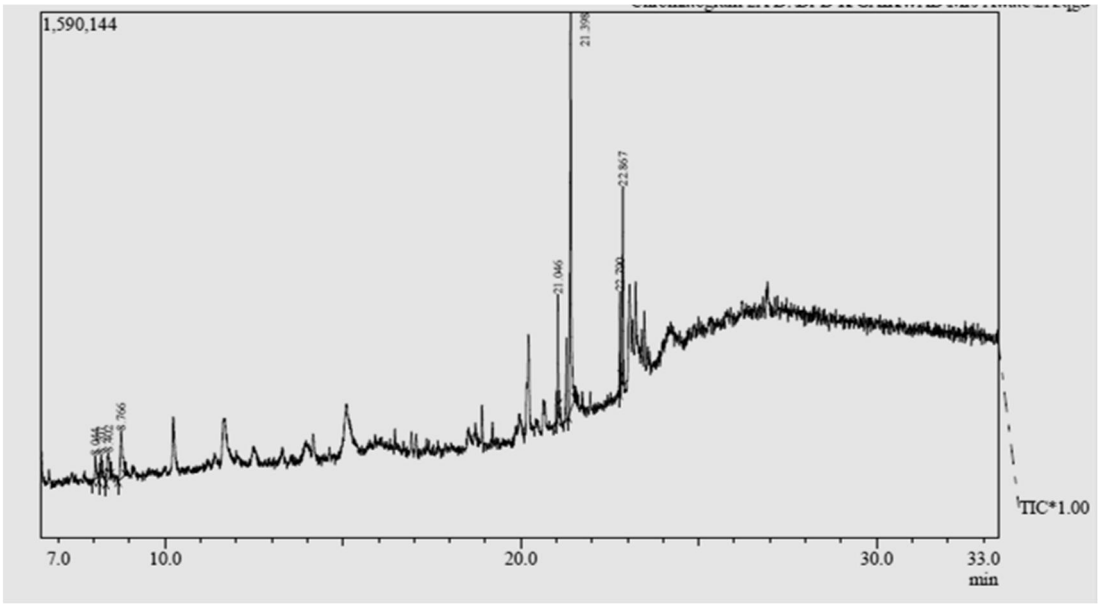

Fig.1: GC-MS profile of *Colocasia esculenta*

Table 2: Chemical composition of *Commelina benghalensis*

No.	Name of compounds	RT min.	Molecular formula	Molecular weight	Percent Composition
1	Unknown	23.686			38.89%
2	n-Hexadecanoic acid	30.349	$C_{16}H_{32}O_2$	256	15.63.%
3	Phytol	32.269	$C_{20}H_{40}O$	296	**45.49%**

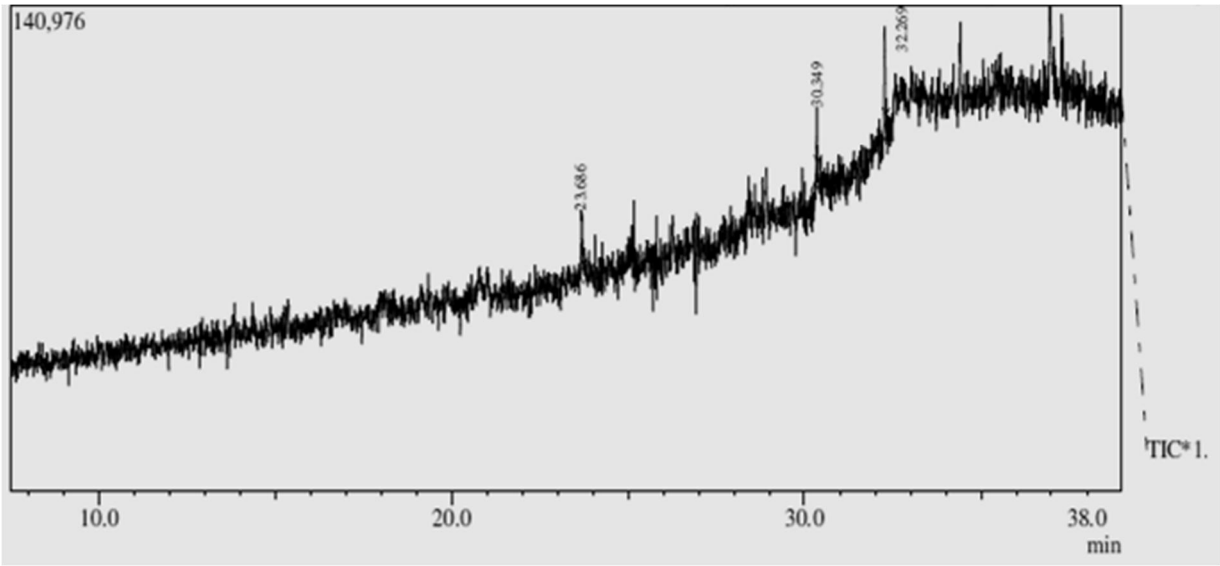

Fig.2. GC-MS profile of *Commelina benghalensis*

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