Bangladesh J. Sci. Ind. Res. **42**(3), 347-352, 2007 **Short communication**

Chemical Constituents of Essential Oil of the Leaves of *Eryngium foetidum* from Bangladesh

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Abstracy

The essential oil of leaves of *Eryngium foetidum* from Bangladesh was analyzed by GC-MS. Sixty three compounds have been identified with (E)-2-dodecenal (37.4 %), dodecanoic acid (10.7 %), trans-2-dodecanoic acid (9.7 %), (E)-2-tridecenal, (6.7 %), duraldehyde (5.1 %) and tetradecanal (4.4 %) as the major constituents.

Key words :

Introduction

Eryngium foetidum L. (Apiaceae) is an annual or biannual herb, locally known as Bilati dhaney. It is indigenous to Central America and West Indies and naturalized in Bangladesh and become a commercial crop. It is also cultivated in tropical Africa, South Asia, South Europe and Pacific islands (Wong, *et al.* 1994; Wagner, *et al.* 1999). The leaves are widely used as a substitute of coriander leaves (Ochse and van dan Brink, 1977). It is used in respiratory and stomach disorders and reported to be rich in minerals, proteins and vitamins (Anonymous, 1950 and Martins, *et al.* 2003). The plant contains an essential oil that is responsible for its coriander leaf like aroma contains 2- dodecen-1-al as main constituent (Anonymous, 1950). Koolhaas (1932) analyzed the oil of E. foetidum stem and leaves and reported dodecenal as the main constituent of the oil. (E)-2dodecenal was also reported as main constituents of leaf oil from plants of Vietnam (45.5 %) and Malaysia (59.7%), while it is a minor constituent in the oil from plants of Cuba (Wong, *et al.* 1994; Leclercq *et al.* 1992) and Pino *et al.* 1997) Besides (E)-2dodecenal, oil obtained from the air dried aerial parts was reported to be rich in, (E)-2-tetradecenal and 2,3,6-tetradecenal and 2,3,6-trimethylbenzaldehyde (Martins, *et al.* 2003). The essential oils from the flowers and leaves of Taiwanese plants are reported to contain 9.1 % acid and 90.9 % neutral parts rich in (E)-2-dodecenal (Yeh, 1975).

Bagchi *et al.* (2005) reported trans-2-dodecenal (45.9 %), mesitaldehyde (10.8 %) and dodecanal (9.3 %) as major constituents from the plants domesticated in India. Cardozo *et al.* (2004) reported 2,4,5- trimethyl benzaldehyde (27.7%), (e)-2-dodecenal (27.5%) as major constituents from venezulan oil.

E. foetidium though naturalized has become a commercially important flavouring plant grows mainly in summer season and we have analyzed this oil as a part of our screening program on Aromatic of Bangladesh to evaluate its flavouring constituents.

Materials and Methosd

The leaves of *E. foetidum* were collected from the local market during May 2005 and the oil was isolated by hydrodistillation method for 4 hrs using Clevenger's apparatus. The oil obtained was dried over anhydrous sodium sulphate. A voucher specimen has been preserved in the herbarium of BCSIR Laboratories, Chittagong (Y 1475).

GC-MS analysis

The essential oil from leaves of *E. foetidum* were analyzed by GC-MS electrom impact ionization (EI) method on GC-17A gas chromatograph (Shimadzu) coupled to a GC-MS QP 5050A Mass Spectrometer (Shimadzu); fused silica capillary column (30m x 2.5mm; 0.25 μm film thickness), coated with DB-1 (J&W); colum temperature 100^{O} C (2 min) to 250^{O} C at the rate of 3^{O} C/mim; carrier gas, helium at constant pressure of 100Kpa. Acquisition parameters full scan; scan 40-350 amu. The compounds were identified by comparing with the library data NIST and NIST 147.

Results and Discussion

The essential oil from the leaves of *E. foetidum* naturalized and commercially cultivated in Bangladesh was analyzed by GC-MS. Sixty there compunds have been identified with 2- dodecenal (E) (37.4 %), dodecanoic acid (10.7 %), trans-2-dodecanoic acid (9.7 %), 2-tridecenal, (E) (6.7 %), duraldehyde (5.1 %) and tetradecanal (4.4 %) as the major constituents. Other major constituentws of above 1 % are 2-undercenal (1.7 %), 7-octadecenal (3.7 %), capric acid (1.9 %), caryophyllene oxide (1.2 %), capraldehyde (1.2 %), durylic acid (2.3 %), α-durenol (2 %) and limonene (2 %). Similar reports of precence of (E)-2-dodecenal as major constituent were reported by various authors (Wong, *et al.* 1994; Koolhaas, 1932; Leclercq *et al.* 1992, Pino *et al.* 1997 and Cardozo *et al.*, 2004). In addition Bangladesh oil contains dodecenic acid as next major compound. Cardozo *et al;* (2004) also reported 2,45-tirmethyl benzadehyde (27.7 %) as major compound along with (E)-2-dodecenal. Dodecanonic acid and trans-2-dodecanoic acid were not reported in the oil from S.Tomme e Principe (Martins, *et al.* 2003)

Table I. Essential oil constituents of E. *foetidum leaves*

	Name of compounds	%
1.	Acctophenone, 2,5-dimethyl	0.24
2.	Aromadendrene oxide	0.16
3.	Artimisia Ketone	0.09
4.	Bicyclo [3.1.1]heptane, 2,6,6-trimethyl,	0.06
5.	Camphenol	0.03
6.	Capric acid	1.92
7.	Caryophyllene oxide	1.23
8.	Cedrane	0.27
9.	1-Cetyl alcohol	0.23
10.	Cholestan-3-01, 2-methylene (3B, 5L)	0.25
11.	1,2-Cyclohexanediol, 1-methyl-4-(1-methylethenyl)	0.21
12.	Cyclododecane	0.21
13.	Cyclododecanol	0.23
14.	Cyclohexane, bromo	0.18
15.	Cyclohexene, 3,4-diethenyl-3-methyl	0.05
16.	2-Cyclohexen-1-one,2-methyl-5-(1-methylethenyl)	0.19
17.	Cyclopentanol, 2,4,4-trimethyl	014
18.	Cyclopentanone, 2-(2-Octenyl)	0.25
19.	Capraldehyde	1.23
20.	Daucol	0.66
21.	cis-4-Decenal	0.06
22.	Diphenylethyl	0.08
23.	Dodecanoic acid	10.69
24.	trans-2-Dodecanoic acid	9.73
25.	(E)-2-Dodecenal,	37.35
26.	Dodecyl chloroacetate	0.20
27.	Duraldehyde	5.06
28.	α-Durenol	1.098
29.	Durylic acid	2.27
30.	Eucalyptol	0.06
31.	Hexadecanal	0.23

Table I to Contd.

32.	7-Hexadecenal	0.87
33.	2-Hexen-1-01, 2-ethyl	0.28
34.	1,3,2H-Isobenzofuranone, 4,7-dimethyl	0.24
35.	Isomenthone	0.07
36.	Limonene	2.00
37.	Limonene oxide	0.11
38.	Menthol	0.64
39.	Menthyl acetate	0.06
40.	Myrcene	0.05
41.	Nonanal	0.05
42.	5-Nonanol, 5-Methyl	0.14
43.	2-Nonenoic acid	0.12
44.	7-Octadecenal	3.73
45.	2-Octen-1-01, 3,7-dimethyle, isobutyrate	0.08
46.	Octyl Decanoate	0.06
47.	O-cymene	0.15
48.	Photocitral a	0.14
49.	α-Pinene	0.09
50.	β-Pinene	0.12
51.	α-Pinene oxide	0.11
52.	Pseudocumene	0.05
53.	Sabinene	0.35
54.	Terpinyl acetate	0.08
55.	Tetradecanal	4.37
56.	Tetradecanoic acid	0.49
57.	α-Thujene	0.03
58.	(E)-2-Tridecenal	6.65
59.	2-Tridecenoic acid	0.63
60.	Tridecyl cyclopropanecarboxuylate	0.21
61.	3,4,5-Trimethylphenol	0.12
62.	2,3,6 -Trimethylphenol	0.39
63.	2-Undecenal	1.73

and Venezuela (Cardozo *et al;* 2004). Cuban oil contains hexadecanoic acid as the second most important copound was not detected in our oil. Malaysis and Victnamese oil contants very high amount of (E)-2-dodecenal then the Cuban and Bangladesh oil. It may be cncluded that the leaf oil *E. foetidum* varies with geographical origin. In Bangladesh *E. foetidum* leaves are much used in flavouring curries as a substitute of coriander leaf during the summer seasons. The major compound of the coridader leaf oil was found to be 2-decenoic acid (30.8 %) followed by E-11-tetradecenoic acid (13.4 %) and capric acid (12.7 %) (Chowdhury, *et al.*) Extraction and analysis of the oils of *E. foetidum* from different places of the country is suggested for having any improved strain.

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