VOLATILE CONSTITUENTS OF *ELETTARIA CARDAMOMUM* MATON SEED

M. Saleem, S. Mahmud, Z. Parveen, A. Waheed and R. Khanum

PCSIR Laboratories Complex, Lahore-54600

ABSTRACT: The Essential oil of Elettaria cardamomum was analyzed by GC-MS. The principal components (9 No.) constituting 89.64% of the total were identified. Out of these 1:8 cineol was found as a major component (67.088%) whereas other major components were found to be α- terpineol (7.380 %), camphene (6.752%) and α-pinene (4.302%). Nerolidol (1.93%), β- pinene (0.615), linalool (0.769%), apiole (0.507) and 10-methyl anthracene-9-carboxyaldehyde (0.313%) were minor components of the oil.

Key words: Elettaria cardamomum Maton, Essential oil, MS.

INTRODUCTION

Elettaria cardamomum Maton, one of the world's most ancient spices, called "Queen of Spices" belongs to the ginger family (Zingiberaceae) and is the third most expensive spice in the world, after saffron and vanilla. It is found commonly in southern India mainly in Kerala, Tamilnadu and Karnataka, on the shady slopes of the Western Ghats. Today, it is also cultivated in Nepal, Sri Lanka, Guatemala, Mexico, Thailand and Central America (Ravindran and Madhusoodanan, 2002, Telja *et al,* 2006, Narong, 1996 and Susheela, 2007).

It has well established culinary values, and is used in a wide range of sweets and confectionery. It is also an important ingredient of garam masala, a combination spice for many vegetarian and non-vegetarian continental/Arabic dishes. Tea and coffee made with small cardamom are pleasantly aromatic and refreshing (Susheela, 2007).

It has many medicinal properties. It is used as carminative in dyspepsia, flatulence and in gastrointestinal complaints (Hussain *et al* 1988, Usmanghani *et al*, 1997, Adegoke *et al*, 1998, Gurudutt *et al*, 1996 Nasir and Ali, 1974 and Pieribattesti *et al*, 1986). In the form of tincture or powder, cardamoms are used, both in Eastern and Western system of medicine, as a frequent adjunct to other stimulant, bitters and purgative. A decoction of cardamom together with their pericarp and jaggery added is a popular home remedy to relieve giddiness caused by biliousness (Nadkarni, 1976). Its oil is used for sciatica, coughs, abdominal pains, spasm, nervous disorders and retention of urine and also for bites of venomous creatures (James *et al*, 2002). Oil also has antimicrobial, anticarcinogenic, anti-inflammatory and antioxidant activities (Kubo *et al.*, 1991, Vijayan *et al.*, 2002 and Al Tahir *et al.*, 1997).

Oil of *Elettaria cardamomum* Maton is also extensively used as a fragrance component in soaps, cosmetics and perfumes, especially oriental types (Susheela, 2007).

The aim of present study is to determine the essential oil composition of *Elettaria cardamom* Maton due to its wide range use as flavouring agent in beverages, syrups, baking products and in ice creams.

MATERIALS AND METHODS

Extarction of oil: The Elettaria cardamomum seeds were collected from the local market. They were cleaned from extraneous matter. The essential oil was extracted through hydro-distillation by reverse Dean Stark assembly (Sattar, 1989). The steam distillate was removed, dried over anhydrous sodium sulphate and stored at low temperature.

GC-MS analysis: The analysis of the essential oil was carried out on GC-MS of Agilent Technologies, Model 6890N. The oil sample(1μL) was injected to a 30 m × 0.25 mm DB-5 capillary column using helium as carrier gas, oven temperature was maintained at 40 °C for five min, programmed at the rate of 40-140°C at 10°C/min and 150°C for one minute hold. Injector temperature was 40°C and MSD temperature was 280°C. The comparison of fragmentation pattern of the individual components of the oil using MS library helped in the identification and

confirmation of the components.

RESULTS AND DISCUSSION

The main constituents of oil and their relative percentages are summarized in Table-1.

Table-1: Mass spectral data of components of essential oil of *Elettaria cardamomum* Maton seed.

S. #	Components	% age	M/Z Values
1	α-pinene	4.30	M^+(136,16)(121,21)(105,20)(93,100) (77,33)(67,8)(53,7)
2	Camphene	6.752	M^+(136,14)(121,18)(107,6)(93,100)(79,24) (69,28)(53,8)
3	β-pinene	0.61	M^+(136,10)(121,11)(107,7)(93,100)(79,20) (65,8) (53,15)
4	1:8 Cineol	67.08	M^+(154,72)(139,59)(126,11)(121,15)(108,88) (93,71) (81,100) (71,75)(55,47)(65,16)(50,2)
5	Linalool	0.769	M^+(154,1)(136,17)(121,3)(93,37)(81,62) (67,17) (59,100)(55,13)(51,3)
6	α- terpineol	7.380	M^+(154,5)(136,88)(121,99)(107,13)(81,53) (67,29) (59,100)(53,1)
7	Nerolidol	1.93	M^+(204,2)(189,7)(161,29)(136,30)(121,22) (107,55) (93,87)(81,33)(69,100) (55,31)
8	Apiole	0.507	M^+(222,2)(208,16)(204,24)(193,17)(177,100) (161,40) (147,14)(121,43)(105,39) (95,58)(91,40)(77,24)(69,39)(55,24)(51,10)
9	10-methyl anthracene-9-carboxyaldehyde	0.313	M^+(220,59)(205,42)(191,100)(177,24) (159,31) (149,22)(135,42)(121,65)(95,62) (79,31) (69,2 5)(55,23)

GS-MS analysis of essential oil of *Elettaria cardamomum* revealed the presence of 24 compounds, out of which 9 principal components constituting 89.64 % of the total were identified from their fragmentation pattern by mass spectrometry (Table-1). These components were further classified in two fractions; hydrocarbon fraction(13.009%) constituted α-pinene, camphene and β- pinene while 1:8 cineol, linalool, α- terpineol, nerolidol, apiole and 10-methyl anthracene-9-carboxyaldehyde were found as oxygenated fraction(86.990%) of the oil. It was recorded that oxygenated monoterpene 1:8 cineol (eucalyptol) was the major component (67.088%) and it is also reported as major component of cardamom oil in previous studies (Hussain *et al* 1988, Pieribattesti *et al*, 1986 and Marongiu et 2004). α- terpineol (7.380 %), camphene (6.752%) and α-pinene (4.302%) were present in considerable quantity. Nerolidol (1.93%), β-pinene (0.615), linalool (0.769%), apiole (0.507) and 10-methyl anthracene-9-carboxyaldehyde (0.313%) were identified as minor components. The α-pinene, nerolidol and linalool have also been reported in the cardamom oil in previous study (Okugawa *et al*, 1988). 10-methyl anthracene-9-carboxyaldehyde is a newly reported compound in the cardamom oil.

1:8 cineol is a major component of oil. Because of its pleasant spicy aroma and taste, is used in flavorings, fragrances, and cosmetics (Anonymous, 2002). It is also an ingredient in many brands of mouthwash and cough suppressant. Eucalyptol has been demonstrated to be capable of reducing inflammation and pain. It has also been found to be able to kill leukaemic cells (Anonymous, 2002). Therefore it is concluded that cardamom is a rich source of cineol and can be isolated and used for different purposes.

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