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ESSENTIAL OIL FROM INFLORESCENCE OF *SPILANTHES CALVA* D.C.

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Abstract

Seven components have been identified including caryophyllene oxide (24.14%), caryophyllene (22.19%), limonene (21.79%) and myrcene (9.02%), as significantly dominating compounds of essential oil from inflorescences of *Spilanthes calva* DC. from Bangladesh investigated by gas chromatography mass spectrometry.

Spilanthes calva D.C. belonging to the family Asteraceae is an important medicinal plant with rich source of therapeutic constituents. *S. calva* is native to South America. It is an annual, spreading plant with bicoloured, red/gold flower buds. The roots, flower heads and whole aerial part yield a compound known as spilanthol which is a powerful stimulant, sialogogue and local anesthetic. Tincture of flowers relieves toothache and is useful in affections of throat and paralysis of the tongue (Ghani 2003). Caryophyllene oxide, an oxygenated terpenoid, is well-known as preservative in food, drugs and cosmetics. The high concentration of caryophyllene oxide and caryophyllene in inflorescence oil makes it potentially useful for diuretic activity (Ratnasooriya *et al.* 2004), antioxidant activity (Kawaree *et al.* 2008), antifungal properties (Sabitha and Murty 2006), antimycotic activity and anti-microbial properties (Rai and Acharya 1999). Besides oil of *S. calva* has been reported in folk medicine in the treatment of inflammation, toothache, skin diseases, purgative, diuretic, lithotriptic and dysentery. The oil contains monoterpenes, non-volatile sesquiterpenoids and saponins (Krishnaswami *et al.* 1975, Mukharya *et al.* 1986). The plant contains α- and β-amyrin esters and sitosterol glucoside (Krishnaswami *et al*. 1975). The essential oil of fresh plant of *S. calva* from southern India was investigated by GC and GC/MS and more than 45 components have been identified including (E)-2-hexenol, 2-tridecanone, germacrene D. hexanol, β-caryophyllene and (Z)-3-hexenol as significantly dominating compounds (Jirovetz *et al.* 2005). The present study is about GC-MS analysis of essential oil components of *S. calva* inflorescence.

S. calva plants were collected from campus of BCSIR Laboratory, Chittagong during October 2007. Samples of inflorescences were harvested from healthy, well-grown plants. Freshly harvested inflorescences (250 gm.) were grounded in a blender. The grounded inflorescences were subjected to hydrodistillation using a modified Clevenger-type glass apparatus for 4 h for isolation of oils. The oil sample was stored at 0°C in air-tight containers after drying them over anhydrous sodium sulfate and filtered before subjected to GC-MS analysis.

The essential oil from inflorescences of *S. calva* was analyzed by GC-MS electron impact ionization (EI) method on GC-17A gas chromatograph (Shimadzu) coupled to a GC-MS QP 5050A Mass Spectrometer (Shimadzu); fused silica capillary column (30 m × 2.5 mm; 0.25 μm film thickness), coated with DB-5 ms (J&W); column temperature 100^{o}C (2 min) to 250^{o}C at the rate of 3^{o}C/min; carrier gas, helium at constant pressure of 90 Kpa. Acquisition parameters full scan; scan range 40 - 350 amu.

Compound identification was done by comparing the NIST (National Institute of Standards and Technology-Chemistry web book) library data of the peaks with those

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reported in literature. Percentage composition was computed from GC peak areas on DB-5 ms column without applying correction factors.

The constituents of *S. calva* of essential oil from inflorescences are listed in Table 1 according to their elution order on the fused silica capillary column. The chromatogram of the oil indicated 7 peaks. The oil yield was found to be 0.70 % (v/w) of fresh weight. Seven compounds were identified by GC-MS. Result obtained showed that the oil was a complex mixture of numerous

Table 1. Constituents of inflorescence essential oil from *Spilanthes calva.*

Constituents	Per cent
Caryophyllene oxide	24.14
Caryophyllene	22.19
Limonene	21.79
Myrcene	9.02
Sabinene	8.15
β-cis-ocimene	7.52
β-pinene	7.17

compounds, many of which were present in trace amounts but rich in caryophyllene oxide, caryophyllene, limonene, myrcene, sabinene, β-cis-ocimene and β-pinene. It is worth mentioning here that there is great variation in the chemical composition of inflorescences oils. A comparison of oil composition of the present study with those reported from different places in the world show differences in the percentage content of some of the major and minor constituents. On the basis of findings of the present investigation it may be said that *S. calva*, growing widely in Bangladesh, may be utilized as a source for the isolation of natural caryophyllene oxide and caryophyllene respectively.

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