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Research Article

**ANALYSIS OF PHYTOCOMPOUNDS IN THE METHANOLIC
EXTRACTS OF PLANT *SPHAERANTHUS INDICUS*
USING FT-IR****Muthiah Chandran**Associate Professor, Department of Zoology, Thiruvalluvar University
Serkadu, Vellore-632 115.**Abstract**

The plant Sphaeranthus indicus is well known medicinal plant which is widely distributed throughout the state Tamilnadu. It is a weed plant mostly growing vigorously in all types of paddy field after harvesting. It contains a peculiar and spicy smell. In rural areas this plants are used as fish and crab trap as well as medicine to treat the worms in the intestine and treat mental illness. Hence, in the present study, the methanolic extract prepared from the seeds of these plant were analyzed by using FTIR to evaluate the phytochemicals. The obtained results showed 10 major peaks which indicates the presence of bioactive compounds such as amines, aliphatic compounds, amides, carboxylic acid salts, urea, alkenes, secondary amides and phenols.

Key words; *Sphaeranthus indicus, FTIR analysis, phytochemicals, piles*

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INTRODUCTION:

Botanical survey estimated the identification of 250,000 to 350,000 plant species over the planet. Among these, approximately 35,000 species have been used in different communities of world for the treatment of various ailments (Khan, *et al.*, 2014; Jin-Ming, *et al.*, 2003 and Khan, *et al.*, 2014). Traditional plant based medicines for primary healthcare need is followed in underdeveloped countries of about 80% of world's population (WHO) (2003). Till date, more than 1000 compounds of natural origin have been launched and the same number of compounds is in the phase III clinical trials or registration stage of drug development (Butler, 2004 and Hendry, 1989). The plant *Sphaeranthus indicus* is traditionally used to cure various diseases in rural India. Roots and seeds are used as stomachic and anthelmintic (Said, 1956). Leaf juice is boiled with milk and sugar-candy and prescribed for cough. The juice of the plant is styptic and said to be useful in liver and gastric disorders (Chadha, 1976). The powder of this plant is given orally and applied topically to cure piles and skin diseases (Kirtikar and Basu, 1935., Nayak *et al.*, 2004 and Muthu *et al.*, 2006). Decoction of leaves is used by the tribes, for the treatment of jaundice (Wabale and Petkar 2005). All these medicinal properties of the plants may be due to the presence of some important phyto-constituents. Hence the present study has been programmed to evaluate the bioactive phytocompounds in plant *Sphaeranthus indicus* by FTIR analysis.

MATERIALS AND METHOD:

The plant leaves of *sphaeranthus indicus* were mainly collected from the Thiruvalluvar university campus garden, sekkadu, vellore -632115. The collected plant leaves were spread on newspaper under shade at room temperature. They were exposed to air until completely dried. The leaves were turned over at least twice a day. This process permits rapid and uniform drying of leaves. Thereafter, the dried leaves were ground well. 25gms of fine powder of *sphaeranthus indicus* was suspended in adequate amount of methanol and stirred magnetically at room temperature for 1 h and then filtered through Whatman no-1 filter paper. The filtrate was transferred to open petri plate and leave it for two days at room temperature. The solvent present in filtrate was evaporated completely. The excess moisture in the greenish filtrate was removed under reduced pressure to afford a sticky solid.

Biology of study:

Sphaeranthus indicus (Linn) belongs to the family Asteraceae is commonly known as East Indian globe thistle. It is a much branched and strongly scented

annual plants grow up to 1-2 feet height. The stem of this plant is cylindrical in shape with toothed wings. Leaves are greenish brown in colour, sessile, 2-7cm length and 1.5cm width, alternately arranged obovate-oblong with narrowed base, serrate, dorsoventral with abundant trichomes. Trichomes are thick thick walled and are three to four celled. The leaves showed midrib with 3 to 4 collateral vascular bundles. The flowers of this plant are bisexual. Each flower is having purple coloured head with 8-15 tiny flowers and pale- purple stamen. The female flowers occupied on the outer region of head. The flowering period for this plant is October to April. The root of this plant is made by a typical brown coloured metaderm tissue on its outer side.

Names in different Indian languages

Sanskrit: Mahamundi, Mundi shravani, Tapasvini, Hapusa; Hindi: Gorakhmudi, mundi; Bengali: Chagunadi, Ghorkmudi; Gujarati: Bodiokalara, Mundi, Dorakhmudi; Telugu: Boddatarupu, Boddasoramu; Tamil: kottakaranthai; Malayalam: Adakkamaniyan, Attakkam, Mirangani; Oriya: Murisa, Buikadamba, Bokashungi; Punjabi: Ghundi, Khamadrus, Mundibuti; Santal: Belaunja; Undari: Mundi Urdu: Kamdaryus.

Classification

Kingdom: Plantae
Division: Phanerogamae
Sub division: Angiospermae
Class: Dicotyledonae
Sub class: Gamopetalae
Order: Asterales
Family: Asteraceae
Genus: *Sphaeranthus*
Species: *indicus*

Phytocompounds isolated from *Sphaeranthus indicus*

The following phyto-compounds such as sesquiterpene lactone, 7-hydroxyeudesm-4-en-6,12-olide, and a sesquiterpene acid, 2-hydroxycostic acid, β -eudesmol and ilicic acid, 7-hydroxyeudesmanolides, sesquiterpenoids, cryptomeridiol, 4-epicryptomeridiol, Eudesmanolids such as 11 α ,13-dihydro-3 α ,7 α -, sterol glycoside, the β -D-glucoside of (24S)-24-ethylcholesta-4,22-dien-3- β -ol, flavanoid C-glycoside, namely, 5-hydroxy-7-methoxy-6-C-glycosylflavone isolated from dihydroxy-4,5-epoxy-6 β ,7-eudesmanolide, 11 α ,13-dihydro-7 α -acetoxy-3 β -hydroxy-6 β ,7-eudesm-4-enolide and 3-keto- β -eudesmol, bicyclic sesquiterpene lactone, methyl chavicol, d-cadinene, α -ionone, p-methoxycinnamaldehyde, α -terpinene, citral, geraniol, geranyl acetate, β -ionone, oscimene,

eugenol, sphaeranthene, sphaeranthol, estragole, Inducisene, alkaloid sphaeranthine, Carbohydrates like arabinose, Carbohydrates such as arabinose, galactose, glucose, fructose, lactose, maltose, raffinose and rhamnose, isoflavone glycoside, 5,4'-dimethoxy-3'-prenylbiochanin 7-O- β -d-galactoside, Eudesmenolide type of sesquiterpene glycoside, sphaeranthanolide, frullanolide, 11-alpha-13-dihydro: 3, alpha-7-alpha-dihydroxy: frullanolide, 11-alpha-13-dihydro, sphaeranthus peptide alkaloids, stigmasterol and β -sitosterol.[20] A flavone glycoside, 7-hydroxy-3',4',[5 6-tetramethoxy-flavone 7-O- β -d-(1-4)-diglucoside were isolated from various parts of *Sphaeranthus indicus*.

Medicinal values

The medicinal values of *Sphaeranthus indicus* were identified to cure many diseases such as asthma, anemia, bronchitis, cough, diabetic, dysentery, epilepsy, fever, gastropathy, hemicranias, insanity, indigestion, jaundice, leprosy, leukoderma, tuberculous, vomiting, spleen disease, pain in the uterus and vagina urinary discharges, pain in the rectum, looseness of the breast, scabies and ringworm diseases, and mental illness and act as anti-hyperglycemic, antioxidant, anti-inflammatory, anxiolytic, bronchodilatory, hepatoprotective, hypotensive, hypolipidemic and neuroleptic.

Photo- 1. The plant *Sphaeranthus indicus* with leaves and flowers



RESULTS AND DISCUSSION:

The methanol extract of *Sphaeranthus indicus* was analyzed by using mid-infrared approximately 4000-400 cm⁻¹ (2.5- 25 μ m) to study the fundamental vibration and associated rotational spectrum. The ME of *Sphaeranthus indicus* showed a peak value at 416.15 are assigned as C—N—C bend of amine group, peak value at 667.86 is attributed to the C—O—H bending indicates the presence of alcohols group, peak value at 1040.12, 1361.27, 1406.6, 1599.48, 1676.64, 23.60-41, 2876.37 and 3698.53 attributed to the C-N-C bond, C-O-H bond, C-O stretch, CH₃ sym determination, C-N stretch (Amide III band) —C- antisym stretch, C=O stretch, P-H stretch, CH antisym, and OH stretch due to the presence of primary alcohol, aliphatic compounds, carboxylic acid salts, urea, alkenes, secondary amides, phosphines, CH₃ and CH₂ aliphatic

compounds and phenols. Due to the presence of above mentioned phytochemicals in the *Sphaeranthus indicus* it is used in hemicranias, jaundice, leprosy, diabetes, fever, pectoralgia, cough, gastropathy, hernia, hemorrhoids, helminthiasis, dyspepsia, skin diseases and nerve tonic (Chopra, et al, 1956 and Ambavade, 2006). Pharmacological activities such as immunomodulatory (Bafna and Mishra, 2004), antimicrobial (Dubey et al, 2000 and Singh et al, 1988), antibacterial (Mahajan et al, 1999 and Garg and Kasera, 1983), anxiolytic (Ambavade et al, 2006), wound healing action (Sadaf, 2006) were reported on this plant. Phytoconstituents isolated from this plant are eudesmanolides (Pujar et al, 2000), isoflavonoids (Yadava and Kumar, 1999), 7-hydroxy eudesmanolides (Rojatkar and Nagasampagi, 1992), sterol glycoside (Singh et al, 1988), essential oil (cadiene, ocimene, citral, p-

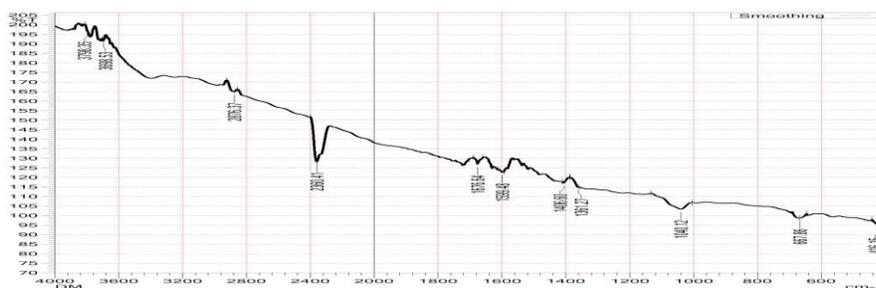
methoxycinnamaldehyde, geraniol, eugenol and geranyl acetate) (Lodha,2003) and eudesmanolides

(Shekhani et al,1991)

Table. 1 Peak value, band type and functional group for FTIR Spectra of methanol extract of *Sphearanthus indicus*.

S. No.	Peak Intensity	Name of the Group	Structure
1.	416.15	C—N—C in amines	C—N—C bend
2.	667.86	C—OH in alcohols	C—O—H bending
3.	1040.12	CH ₂ —O—H in primary alcohols	C—O stretch
4.	1361.27	CH ₃ in aliphatic compounds	CH ₃ sym deformation
5.	1406.6	C—N in primary amides	C—N stretch (Amide III band)
6.	1599.48	COO ⁻ in carboxylic acid salts	—C— antisym stretch
7.	1676.64	C=O in ureas (or) C=C in alkenes, etc. (or) C=O in secondary amides	C=O stretch; broad band C=C stretch C=O stretch (Amide I band)
8.	2360.41	—PH in phosphines	P—H stretch; sharp in peak
9.	2876.37	—CH ₃ and —CH ₂ — in aliphatic compounds	CH antisym and sym stretching
10.	3698.53	—OH in alcohols and phenols	OH stretch (dil soln)

Figure. 1 FTIR pattern of *Sphearanthus indicus*



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