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Research Article

**SCREENING OF BIOACTIVE PHYTOCOMPOUNDS IN THE  
METHANOLIC EXTRACT OF FRESH AND WET  
PHOTOSYNTHETIC LEAFLESS STEM OF *SARCOSTEMMA  
VIMINALEA* BY FTIR ANALYSIS.****Muthiah Chandran**Associate Professor, Department of Zoology, Thiruvalluvar University, Serkadu,  
Vellore-632 115. Email: bothaguruchandran@yahoo.co.in**Abstract:**

*The present investigation was carried to screen the phyto-constituents present in the fresh wet plant of Sarcostemma viminallea by FTIR analysis. The FTIR spectrum obtained for the present study plant Sarcostemma viminallea revealed the presence of different functional groups such as amine salt,  $\alpha,\beta$ -Unsaturated Ketone, alkane, alkane methyl group, aromatic ester, anhydride, and halo compounds. The presence of all these functional groups concluded that the methanolic extract of fresh wet Sarcostemma viminallea has rich potential bioactive compounds to synthesize drugs for various illnesses.*

*Key words: Sarcostemma viminallea, FTIR, phytochemicals, screening*

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**INTRODUCTION:**

Medicinal plants are regarded as significant part of natural wealth and as main source of drug for the health of individual and communities (Antony Sandosh et al, 2013). All the existing medicinal plants considered as serve as vital sources for invention and manufacturing of numerous new traditional and modern drugs as well as valuable therapeutic agents for the beneficial to human beings (Murugan and Mohan, 2014). Today a number of chemicals obtained from plants are used as vital drugs in more countries in the world (Debnath et al, 2006). The quantitative and qualitative evaluation of these naturally occurring bioactive phyto-constituents are considered to be the main step in medicinal plant research (Banso and Adeyemo, 2007). Hence, present study has been programmed to screen the phytochemicals present in the fresh and wet plant of *Sarcostemma viminalis* by FTIR analysis.

**Biology of study plants**

*Sarcostemma viminalis* is highly succulent plant in the milkweed family. The stems are rounded and branches scramble over the ground. It grows well in a dry environment; it can also be grown in a shadier riparian setting where the plant takes on a different appearance. Its flowers are arranged in spherical umbels of green and white and look like a typical asclepiad flower in its structure. Flowers are followed by carrot shaped seed pods. This plant has been used traditionally for medicinal purposes and is also being studied for cancer treatments.

**Classification**

Kingdom: Plantae

Order: Gentianales

Family: Apocynaceae

Genus: *Sarcostemma*

Species: *S. viminalis*

**Names in various languages**

Common name: Leafless Climbing Milkweed, Tamil Name: Kodikalli, English: Rapunzel Plant, Caustic Bush, Caustic Creeper, Caustic Vine, Leafless Milkweed, Afrikaans: Melkbos, Spantoumelkbos, Spantou, Wolfsmelk, Melktou, Ndebele: Ma Belabela, Shona (Chishona): Nyoku-Domba, Sotho (Southern) (Sesotho): Ntlalamela, Swahili (Kiswahili): Utupa-Wa-Pwani, Tsonga (Xitsonga): Nneta, Tswana (Setswana): Morar-Wane, Venda (Tshivenda): Mutungu, Xhosa (Isixhosa): Umbebele, Umbelenele, Zulu (Isizulu): Ingotsha, Hindi: Phok.

**Distribution and Habitat**

This plant species distributed in South Africa, Botswana, Namibia and all inland parts of southern

Africa as far north as Kenya and also India (South India, Bengal), and Burma, in the coastal regions of Australia, China, India, the Philippines, Thailand and New Caledonia. This plant found is usually a member of the subspecies and has only minor differences from the main species, and the flowers are sweet-scented.

**Plant Morphology**

This plant is a vigorous succulent that grows in dry and wet land just like shrubs up to several metres, sometimes stifling them. If it has nothing to climb on, it becomes a shrub itself. It is a leafless plant consisting of smooth cylindrical green stems, pencil-shaped, usually 5–10 mm in diameter. The lower base stems have a corky bark. As mentioned above, all parts of the plant exude a milky latex when damaged. Contact with the latex should be avoided. The star-shaped flowers arise in clusters from the nodes, and have five yellowish sepals curving upwards around less conspicuous white flower parts. The fruits are follicles like a pair of horns, brown when ripe, opening to release soft hairy seeds.

**Medicinal Properties**

The aerial parts and the roots are widely used for medicinal purposes, although in most areas they are used with caution because of their toxicity. In some regions, however, the toxicity is considered low, or varying with the season. The bitter latex is applied to warts, wounds, burns and skin infections. The latex is further used as ear drops to treat earache, eye drops to treat conjunctivitis and is applied to carious teeth and to wounds to keep flies away. The latex in water is taken as an emetic. A stem or root decoction is commonly taken to treat diarrhoea and stomach problems, as well as intestinal worms, oedema, scabies and venereal diseases. An infusion of the stems or latex is taken as a galactagogue, or given as an enema for this purpose. Dried and powdered latex is applied to scarifications as a galactagogue. In India the latex is recorded as being used as a milk-substitute. In Burkina Faso a twig decoction is taken to treat vertigo. In East Africa the twigs are used as toothbrush to treat toothache and caries. In Kenya an infusion of the stems and roots is taken in soup or milk as a tonic. In Angola a root infusion is taken to treat anaemia with oedema. In Mozambique a root infusion is taken to treat tuberculosis. In Madagascar a stem decoction is taken to treat malaria. In Réunion a stem decoction, together with all parts of *Physalis peruviana* L., is taken to treat chronic cystitis, diarrhoea, excessive menstruation or lack of menstruation. The liquid from crushed stems in water is taken to stop vomiting of blood. On the Seychelles a decoction of the aerial parts, mixed with leaves of

Eucalyptus citriodora Hook, is taken to treat contagious diseases. In Mauritius a stem infusion is taken as a diuretic in urinary infections. In South Africa and Madagascar a stem decoction is taken to treat uterine haemorrhage. In Kenya and Tanzania the latex is used as a fish-poison. The latex may cause dermatitis and oedema. A decoction of the stems and the latex is also given to cows as a galactagogue. An infusion of the stems is given to dogs to expel worms and to chickens to treat gastro-intestinal problems. The flowers produce much nectar and are visited by bees, butterflies and flies, and in Ethiopia also by sunbirds. In Tamil Nadu, rural peoples are using this plant to treat sever tonsil problem in human being.

#### MATERIALS AND METHOD:

*Sarcostemma viminalia* is a shrub like (small trees with 5-8 feet height) leafless succulent plant consisting of smooth cylindrical green photosynthetic pencil-shaped stems. The branches of this plant are just look like multi fingered hands. These finger like photosynthetic parts were cut into small pieces, during cutting process they secrete small amount of milk like sap. All these pieces were packed inside the thimble of the soxhlet extraction unit. The adequate amount of methanol was filled in the bottom of the soxhlet apparatus. The heat was applied on the bottom flask with the help of electric burner. The extract obtained was dried first under room temperature and then with the help of vacuum desiccator to remove moisture content completely and taken to FTIR analysis. 10mg of the dried extract powder was encapsulated in 100mg of KBr pellet, in order to prepare translucent sample discs. The powdered sample of each extracts was loaded in FTIR spectroscope (Shimadzu, Japan), with a Scan range from 400 to 4000 cm<sup>-1</sup> with a resolution of 4 cm<sup>-1</sup>. The spectra obtained for the extracts was analyzed and interpreted with a chart for characteristics infrared absorption frequencies of organic functional groups and carbonyl containing functional groups.

#### RESULTS AND DISCUSSION:

Plants produce bioactive molecules in a diverse range making them a rich source of different types of medicines (Kala, *et al.* 2011, Jeeva *et al.*, 2012, Joselin, *et al.* 2012). In the present study, the FTIR spectra of methanol extract of *Sarcostemma viminalia* photosynthetic stem like leaf parts

showed 11 peaks. The peak at 605.72 cm<sup>-1</sup> revealed the presence of halo Compound (C-Cl stretching), at 923.68 cm<sup>-1</sup> and C=C bending (strong), 1047.02 cm<sup>-1</sup> and CO-O-CO stretching (strong), 1286.49 cm<sup>-1</sup> and C-O stretching (strong), 1377 cm<sup>-1</sup> and C-H bending (medium), 1519.56 cm<sup>-1</sup> and N-O stretching (strong), 1617.27 cm<sup>-1</sup> and C=C stretching (strong) indicates the presence of Alkene (Ynylidene), Anhydride, Aromatic Ester, Alkane (Methyl Group), Nitro Compound and  $\alpha,\beta$ -Unsaturated Ketone respectively. The peak at 2336.49 cm<sup>-1</sup> (O=C=O stretching strong), and , 2854.69 cm<sup>-1</sup> (N-H stretching -strong)), 2938.78 cm<sup>-1</sup> (O-H stretching -weak) and 3412.12 cm<sup>-1</sup> (N-H stretching -medium) revealed the presence of carbon dioxide, amine salt, alcohol and primary amine. Ester is an organic functional group that forms many sweet-smelling compounds. The chemical structure of an ester is represented by the general formula, R-CO-OR', where a central carbon atom that has two bonds to an oxygen atom (the carbonyl group), C=O, a single bond to another carbon atom represented by R, and a single bond to an oxygen atom connected to a carbon atom represented by R'. The R and R' groups can be the same or different. If the R and R' groups are bonded to each other, they form a ring and constitute a cyclic ester or lactone. Certain volatile esters are used as solvents for lacquers, paints, and varnishes, for this purpose, large quantities of ethyl acetate and butyl acetate are commercially produced. Waxes secreted by animals and plants are esters formed from long-chain carboxylic acids and long-chain alcohols. Alkenes are mainly used to industrial Importance. Alkenes find many diverse applications in industry. They are used as starting materials in the syntheses of alcohols, plastics, laquers, detergents, and fuels. Ethene is the most important organic feed stock in the chemical industry. Cycloalkenes are perhaps among the most important organic substances for biological and industrial purposes because they are used in the production of molecules essential to a broad spectrum of applications. The amines that the human body is composed of (amino acids), humans have found a range of other uses for amines. Medicines based on amines such as Morphine and Demerol are commonly used as analgesics – medicines that relieve pain. Amines such as Novocaine are commonly used as anesthetics. The presence of OH group of alcohol may be due to the solvent used in the extraction procedure.

**Table 1. FTIR peak values and relevant functional groups of methanol extracts of *Sarcostemma viminalis***

S. No	Peak Value absorption (cm <sup>-1</sup> )	Bonds	Functional group
1	605.72	C-Cl stretching	Halo Compound
2	923.68	C=C bending(strong)	Alkene(Yinylidene)
3	1047.02	CO-O-COStretching,(strong)	Anhydride
4	1286.49	C-O stretching (strong)	Aromatic Ester
5	1377	C-H bending (medium)	Alkane (Methyl Group)
6	1519.56	N-O Stretching (strong)	Nitro Compound
7	1617.27	C=C Stretching (strong)	$\alpha,\beta$ -Unsaturated Ketone
8	2336.49	O=C=O Stretching strong	Carbon dioxide
9	2854.69	N-H stretching (strong)	Amine salt
10	2938.78	O-H Stretching (weak)	Alcohol
11	3412.12	N-H stretching (medium)	Primary Amine

**Figure.1: FTIR pattern of methanol extract of leaf of *Sarcostemma viminalis***

**Photo-1. The plant *Solanum surratence* with leaves and flowers**



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