

# Phytochemical, GC-MS analysis and Antibacterial activity of a Medicinal Plant *Acalypha indica*

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**Abstract:** *Acalypha indica* distributed in the southern part of India particularly in Tamilnadu and it has potential medicinal properties and used as diuretic, anthelmintic and for respiratory problems such as bronchitis, asthma and pneumonia. The present work was designed to investigate the preliminary phytochemical, antibacterial and GCMS analysis of ethanol extract of the plant. Phytochemical screening of leaves extract revealed the presence of alkaloids, tannins, steroids, saponins flavanoids, glycosides and phenolic compounds. The ethanol extract of leaves was found to exhibit activity against *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Six compounds were identified by GCMS analysis. Findings from current study support the use of *Acalypha indica* in traditional medicine for treatment of various bacterial infections and can be used as multi resistant drug in future.

**Key words:** *Acalypha indica*, Phytochemicals, GCMS, Antibacterial.

## INTRODUCTION

*Acalypha indica* it is a common annual herb, found mostly in the backyards of houses and waste places throughout the plains of India. Plants are emetic, expectorant, laxative and diuretic; useful in bronchitis, pneumonia, asthma and pulmonary tuberculosis. Leaves are laxative and antiparasiticide; ground with common salt or quicklime or lime juice applied externally in scabies. Leaf paste with lime juice prescribed for ringworm. Leaf juice is emetic for children. A decoction of the leaves is given in earache. Powder of the dry leaves is given to children to expell worms; also given in the form of decoction with little garlic. In homoeopathy, the plant is used in severe cough associated with bleeding from lungs, haemoptysis

and incipient phthisis. The plant contains kaempferol, a cyanogenetic glucoside, a base, triacetoneamine and an alkaloid, acalyphine. It also contains the amide, acalyphamide and some other amides, 2-methylantraquinone, tri-O-methyl ellagic acid and  $\beta$ -sitosterol,  $\beta$ -sitosterol,  $\beta$ -sitosterol glucoside, stigmaterol, n-octacosanol, quinine, tannin, resin and essential oil [1]. The plant is traditionally used as an expectorant against asthma and pneumonia, and also as an emetic, emmenagogue and anthelmintic [2]. *Acalypha indica* contains acalyphine which is used in the treatment of sore gums [3]. The plant is reported to have a post-coital antifertility effect [2], anti-venom properties [4], wound healing effects [5], antioxidant activities [6], anti-inflammatory effects [7],

acaricidal effects[8], diuretic effects[9] and anti bacterial activities [10]. Till now, the investigation of phytocomponents by GCMS has not been done on *Acalypha indica*. In the present study, the ethanol extract of *Acalypha indica* were evaluated for GCMS analysis.

#### **MATERIALS AND METHODS:**

**Plant:** *Acalypha indica* collected from south part of India was taken for the study. The collected leaves were washed thoroughly with tap water followed with distilled water for the removal of dust and soil particles. The leaves were shade dried and used for extraction.

**Preparation of Plant Extract:** 78g of *Acalypha indica* leaves were first defatted using petroleum ether and extracted with 700ml of 80% ethanol using Soxhlet apparatus. The extraction was carried out for 8 hours and the extract was thereafter concentrated by evaporation in a rota-vacuum, the work was

carried out at the Department of Chemistry, PRIST University, Vallam, Thanjavur, Tamil Nadu.

#### **GC Programme:**

Column: Elite-5MS (5% Diphenyl / 95% Dimethyl poly siloxane), 30 x 0.25mm x 0.25mm df  
Equipment: GC Clarus 500 Perkin Elmer, Carrier gas: 1ml per min, Split: 10:1, Detector: Mass detector Turbo mass gold- Perkin Elmer, Software: Turbo mass 5.2, Sample injected: 3ml

#### **Oven temperature Programme:**

110° C -2 min hold , Up to 200° C at the rate of 10 °C/min-No hold, Up to 280°C at the rate of 5°C/min-9 min hold, Injector temperature 250°C, Total GC running time 36 min

#### **MS Programme:**

Library used NIST Version-Year 2005, Inlet line temperature 200°C, Source temperature 200°C  
Electron energy:70 eV, Mass scan (m/z): 45-450,Solvent Delay: 0-2 min, Total MS running time: 36 min.



**ACALYPHA INDICA**

**Test for Alkaloids (Meyer's Test)**

The extract of *Acalypha indica* was evaporated to dryness and the residue was heated on a boiling water bath with 2% Hydrochloric acid. After cooling, the mixture was filtered and treated with a few drops of Meyer's reagent [11]. The samples were then observed for the presence of turbidity or yellow precipitation [12].

**Test for Tannins**

To 0.5 ml of extract solution, 1 ml of water and 1-2 drops of ferric chloride solution was added. Blue colour was observed for gallic tannins and green black for catecholic tannins [13].

**Test for Tripenoid and Steroid**

4 mg of extract was treated with 0.5 ml of acetic anhydride and 0.5 ml of chloroform. Then concentrated solution of sulphuric acid was added slowly and red violet colour was observed for terpenoid and green bluish colour for steroids [11].

**Test for Reducing sugars**

To 0.5 ml of extract solution, 1 ml of water and 5-8 drops of Fehling's solution was added at hot and observed for brick red precipitate.

**Test for Glycoside**

To the solution of the extract in Glacial acetic acid, few drops of Ferric chloride and Concentrated sulphuric acid are added, and observed for reddish brown colouration at the junction of two layers and the bluish green colour in the upper layer [11].

**Test for saponins**

The extract (50mg) was diluted with 20 ml of distilled water and it was agitated in a graduated cylinder for 15 minutes. The formation of 1 cm layer of foam showed the presence of saponins[14].

**Test for Flavonoids**

To 1 ml of the extract, a few drops of dilute sodium hydroxide was added. An intense yellow colour was produced in the plant extract, which become colourless on addition of a few drops of dilute acid indicates the presence of flavonoids[14].

**Test for Phenolic compounds**

The extract is dissolved in distilled water and to this few drops of 1% lead acetate were added a bulky white precipitate was formed, which indicates the presence of phenolic compounds[14].

**RESULTS AND DISCUSSIONS:**

**Table 1. Phytochemical composition of *Acalypha indica***

Phytochemicals	Ethanol extract of <i>Acalypha indica</i>
Alkaloids	+
Tannins	+
Terpenoids	-
Steroids	+
Reducing sugar	-
Aminoacids	-
Saponins	+
Flavanoids	+
Glycosides	+
Phenolic compounds	+

(+) = indicates presence ; (-) = indicates absence

**Identification of Components:**

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained in Table 2.

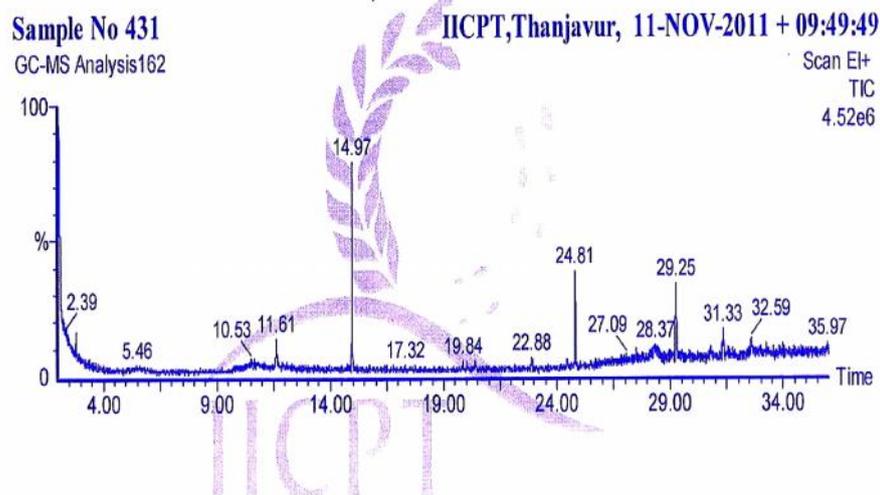
Ethanol extract of *Acalypha indica* was subjected to GC-MS study for identification of medicinal properties, According to the results, the Phytocomponents are screened, and most of the medicinal properties are 1H-Pyrrole-2,5-dione,1-ethenyl-, 3,8-Nanodiene-2-one,(E)-, Proline,3,4-didehydro-, 4-Amino-3-methoxy-pyrazolo[3,4-d]pyrimidine,Propanenitrile,3-(5-diethylamino-1-methoxy-3-pentyloxy)- compounds.

\* Components identified in the *Acalypha indica* Sample  
S.No -431- [GC MS study]

No.	RT	Name of the compound	Molecular formula	MW	Peak Area %
1.	11.61	1H-Pyrrole-2,5-dione, 1-ethenyl-	C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>	123	9.68
2.	14.97	3,8-Nonadien-2-one, (E)-	C <sub>9</sub> H <sub>14</sub> O	138	35.48
3.	24.81	Proline, 3,4-didehydro-	C <sub>5</sub> H <sub>7</sub> NO <sub>2</sub>	113	19.35
4.	29.25	4-Amino-3-methoxypyrazolo[3,4-d]pyrimidine	C <sub>6</sub> H <sub>7</sub> N <sub>5</sub> O	165	25.81
5.	31.33	Propanenitrile, 3-[5-diethylamino-1-methyl-3-pentynyloxy]-	C <sub>13</sub> H <sub>22</sub> N <sub>2</sub> O	222	9.68

Note: \*Parameters tested are not covered under the scope of NABL accreditation

GC-MS Chromatogram of *Acalypha indica*



GCMS Chromatogram of *Acalypha indica*

**Table 2. Antibacterial activity of *Acalypha indica* ethanol extract against bacterial pathogens.**

Compound	Weight of the Compound (µg/ml)	<i>Escherichia coli</i>	<i>Salmonella typhi</i>	<i>Pseudomonas aeruginosa</i>	<i>Staphylococcus aureus</i>
Standard <sup>[15]</sup> Erythromycin	30	29	19	24	20
<i>Acalypha indica</i>	50	17	15	14	5

Analysis of the data in Table 2 shows that the *Acalypha indica* have fairly good antibacterial activity which is however less than that of the activity of the standard *Erythromycin*

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