

# SPECTRAL AND BIOLOGICAL STUDIES IN THOOTHUVALAI LEAF EXTRACT

J.L. JEBISHA, A. JEENA PEARL, A. JENI

Department of Chemistry & Research centre, Scott Christian College (Autonomous), Nagercoil.

## ABSTRACT

Medicinal plants are used by 80% of the world population as the only available medicines especially in developing countries. Medicinal plants from a large group of economically important plants that provide the basic raw materials for indigenous pharmaceuticals. It is estimated that there are 2,50,000 to 5,00,000 species of plant species are believed to exist on earth. India, owing to its vast green forests, rivers and hills, with its richness of biodiversity can be considered as the paradise of medicinal plants. *Solanum trilobatum* Linn (Family: Solanaceae) is one of the important medicinal plant, more commonly available in Southern India. *Solanum trilobatum* is an extensively used Indian traditional medicine to cure various human ailments. It was distributed throughout the southern parts of India. *S. trilobatum* is reported to cure numerous diseases viz., tuberculosis, respiratory problems and bronchial asthma. physico chemical analysis showed the presence of moisture content and percentage of total ash, acid and water insoluble ash, phytochemical screening showed the presence of phenols, terpenoids, tannins, reducing sugars, alkaloids, saponins, flavonoids, and xanthoproteins. The antibacterial and antifungal studies showed that the ethanol extract of *solanum trilobatum* has the maximum zone of inhibition than the chloroform extract. The antioxidant studies explain that the ethanol extract was effective against DPPH and antidiabetic activity is also proved. The basic radicals present are bismuth, zinc, barium, calcium, magnesium, and ammonium. The result of fluorescent analysis shows characteristic coloration of the leaf extract. UV and FT-IR spectral analysis gives the characteristic peaks which shows the presence of various functional groups.

**KEYWORDS:-***Solanum trilobatum*, bioactive compounds, antibacterial activity, antifungal activity, anti oxidant activity, antidiabetic activity , phytochemical screening, UV, FT-IR spectra.

## INTRODUCTION

Nature has a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine. Even now, approximately 80% of the third world population is almost entirely dependent on traditional medicines for maintaining general health and combating many diseases [1]. Herbal medicine is the foundation for about 75–80% of the World population, mainly targeting primary health care for in the developing countries because of better cultural acceptability, compatibility with human body and lesser side effects. Medicinal plants are used by 80% of the world population as the only available medicines especially in developing countries [2]. Medicinal plants from a large group of economically important plants that provide the basic raw materials for indigenous pharmaceuticals. It is estimated that there are 2, 50,000 to 5, 00,000 species of

plant species are believed to exist on earth. India, owing to its vast green forests, rivers and hills, with its richness of biodiversity can be considered as the paradise of medicinal plants [3]. Phytochemicals are chemical compounds that occur naturally in plants. Thousands of plants varieties used in folklore medicine have been studied for treatment of cancer, diabetes, arthritis, infectious diseases etc [4]. The alkaloids present in the medicinal plants are very effective. They cure many diseases. Plants are playing an important role in the health of millions of people's life in India. Phyto pharmaceuticals are an inexhaustible reservoir of chemotherapeutics to treat many ailments such as cold, fever, diarrhea, psychic problems, birth control and dental hygiene throughout the world [5]. Natural compounds isolated from various parts of the plant such as leaves, fruits, stem, roots, seeds have been shown to possess excellent medicinal value [6].

### **BOTANICAL DESCRIPTION:**

*Solanum trilobatum* Linn has its place to the family Solanaeace, the nightshade plant originates below the order of Solanales, with 102 genera in addition nearly around 2500 species [7]. It is a thorny creeper with bluish white flower and grows as climbing under a shrub. [8]. The plant having much branched sharp scandent bushes [9]. The leaves are deltoid, trilobed or wedge-shaped by means of irregularly lobed [10]. Flowers are purplish-blue, in cymes. Berry is globose, pink or crimson *Solanum trilobatum* is used as herbal remedy for asthma, blood vomiting, reducing blood glucose level and bilious matter phlegmatic rheumatism and different types of leprosy [11]. This herbal plant is used as medicine for asthma, vomiting of blood and bilious matter, phlegmatic rheumatism, several kinds of leprosy. It is also antibacterial, antifungal, antimutagenic and anti tumorous [12].

### **SCOPE OF THE WORK**

Aim and Objective of the present investigation is to perform a systematic pharmacognostical determination such as, Moisture Content, Total Ash, Acid Insoluble Ash, Residue On Ignition, Phytochemical analysis, Basic radicals, Antibacterial activity, Antifungal activity, Antioxidant activity, Antidiabetic activity, UV spectroscopy, IR spectroscopy, Fluorescent study.

### **MATERIALS AND METHODS**

#### **SAMPLE COLLECTION:**

The fresh leaves of *solanum trilobatum* was collected. The collected plant material, were shade dried for about a week and grinded in the form of powder.

#### **Preparation of plant extract:**

The dried plant leaves were powdered and extracted (10g) exclusively with 50 ml each of Chloroform and ethanol in a soxhlet extractor for 4 hrs. The extracts were concentrated to dryness under reduced pressure and controlled temperature (40-50°C). All the extracts were preserved in a refrigerator until further use.

## Result and Discussion

### Physicochemical studies:-

Moisture content	23.017g
Acid insoluble ash	50.6166%
Water insoluble ash	14.750%
Percentage of ash	81.08%

The physicochemical studies shows that the moisture content of the leaf and also the ash content present in it . The dried and powdered leaf was green in colour and has a bitter taste in nature. The leaf powder has a strong odor. Physicochemical parameters like loss on drying, ash values, acid insoluble ash and water soluble ash are given in Table

### Phytochemical test:-

COMPOUNDS	ETHANOL EXTRACT	CHLOROFORM EXTRACT
Alkaloids	+	+
Terpenoids	+	+
Flavonoids	-	+
Tannins	+	+
Steroids	-	-
Saponins	+	+
Phenols	+	+
proteins	++	+
xanthoproteins	-	+
Anthocyanin	+	-
Reducing sugar	-	+

Basic radicals	Inference
Lead	-
Bismuth	-
Copper	-
Zinc	+
Cadmium	-
Iron	+
Cobalt	-
Manganese	-
Nickel	-
Ammonium	+

The phytochemical analysis of leaf extract shows the presence of various bioactive compounds such as phenol, terpenoids, tannins, carbohydrates, alkaloids, saponins, flavonoids and xanthoproteins.

Qualitative analysis of basic radicals gives the list of basic radicals present in the thoothuvilai leaf extract.

The basic radicals present are bismuth, zinc, barium, calcium, magnesium and ammonium.

### Anti bacterial Activity

Anti bacterial activity of leaf extract against bacterial microbes pseudomonas aeruginosa and staph aureus. The antibacterial studies showed that the chloroform extract of the Adathoda vasica leaf has the maximum microbial activity than the ethanol extract.

#### Showing Zone of Inhibition of Thoothuvilai

Name of organism	Zone of inhibition		
	Ethanol extract	Chloroform extract	Control (amikacin)
Pseudomonas aeruginosa	11mm	11mm	22mm
Staph aureus	10mm	11mm	26mm



### Anti fungal activity

The antifungal studies explain that the ethanol extract shows the maximum zone of inhibition than chloroform extract of Thoothuvilai leaves.

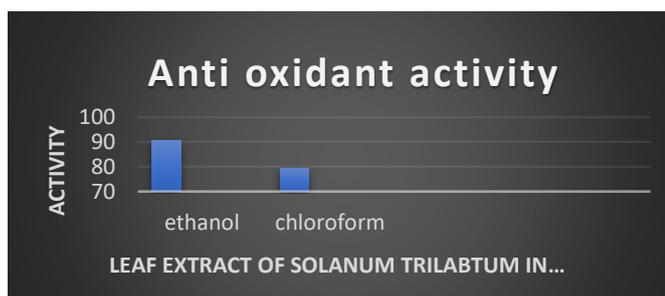
Name of organism	Zone of inhibition		
	Ethanol extract	Chloroform extract	Control (nystatin)
Candida albicans	14mm	11mm	23mm
Aspergillus niger	10mm	13mm	14mm



### Anti Oxidant activity

Antioxidant studies explain that the ethanol extract was proved to be effective against DPPH than the chloroform extract.

EXTRACTS	IC50(µg/ml)
	DPPH
Chloroform	79.2±2.8
Ethanol	90.5±1.6



### Antidiabetic activity

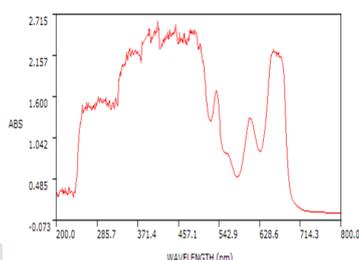
Antidiabetic activity proved that the amylase activity of thoothuvilai shows better activity with that of ethanol extract than that of chloroform extract.

Concentration of ethanol extract (µg/ml)	Inhibition of amylase activity (%)	Concentration of chloroform extract(µg/ml)	Inhibition of amylase activity (%)
10	19	10	11
20	23	20	18
40	34	40	22
80	39	80	26
160	41	160	32
320	46	320	36
640	49	640	38

### UV Spectroscopy

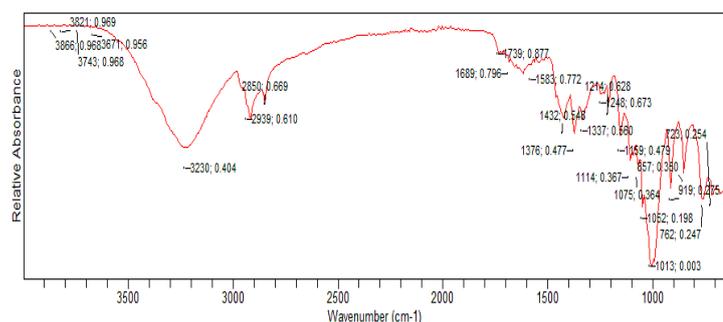
UV spectra shows the maximum peak at 659.6nm. It is used to find out the different analytes present in the leaf extract.

Wavelength (λ)	ABS
659.6	2.214
267.2	1.512
609.2	1.313
359.6	2.241
416	2.514



### FTIR Analysis

FT-IR studies was also used to analyse the various functional group [resent in the leaf extract such as C-H stretching of acetyl group, C=O stretching of saturated aldehydes, C=C stretching due to alkenes, C-H stretching due to cycloalkanes, C-C deformation due to meta disubstituted groups , C-H deformation due to methyl group and C-F stretching.



## Flourescent study

The result of fluorescent analysis of leaf extract shows characteristic coloration in treatment with various chemical reagents such as  $\text{FeCl}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{NaOH}$ ,  $\text{Hcl}$  and water.



## SUMMARY AND CONCLUSION

There are many reports on the spectral and biological characteristics of leaf extract of *Solanum trilobatum*. The present work was focused on the phytochemical, anti-microbial, and spectral characteristics of leaf extract. The phytochemical analysis of leaf extract of *Solanum trilobatum* showed the presence of various bioactive compounds such as phenol, terpenoids, tannins, carbohydrates, alkaloids, saponins, flavonoids and xanthoproteins. The physicochemical studies showed that the moisture content of the leaf and also the ash content present in it. The antibacterial studies showed that the chloroform extract of *Solanum trilobatum* has the maximum microbial activity than the ethanol extract. The antifungal studies explain that the ethanol extract shows the maximum zone of inhibition than chloroform extract of *Solanum trilobatum* leaves. Antioxidant studies explain that the ethanol extract was proved to be effective against DPPH than the chloroform extract. Antidiabetic activity proved that the amylase activity of *Solanum trilobatum* shows better activity with that of ethanol extract than that of chloroform extract. Qualitative analysis of basic radicals gives the list of basic radicals present in the *Solanum trilobatum* leaf extract. The basic radicals present are bismuth, zinc, barium, calcium, magnesium and ammonium. The result of fluorescent analysis of leaf extract shows characteristic coloration in treatment with various chemical reagents such as  $\text{FeCl}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{NaOH}$ ,  $\text{Hcl}$  and water. UV spectra shows the maximum peak at 659.6nm. It is used to find out the different analytes present in the leaf extract. FT-IR studies was also used to analyse the various functional group present in the leaf extract such as C-H stretching of acetyl group, C=O stretching of saturated aldehydes, C=C stretching due to alkenes, C-H stretching due to cycloalkanes, C-C deformation due to meta disubstituted groups, C-H deformation due to methyl group and C-F stretching.

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