

**GC-MS ANALYSIS OF PETROLEUM ETHER AND METHANOL EXTRACTS  
OF *SOLANUM VIRGINIANUM* L LEAVES****S. SUNDAR <sup>\*1</sup> AND Y. JUSTIN KOIL PILLAI <sup>2</sup>**<sup>\*1</sup>Research Scholar, Faculty of Bio-Engineering, Sathyabama University, Chennai, Tamilnadu-600119, India.<sup>2</sup>Department of Botany, St' Joseph's College (Autonomous), Tiruchirappalli, Tamilnadu- 620002, India.**ABSTRACT**

The aim of the study was to investigate the phytoconstituents present in petroleum ether and methanolic extract of *Solanum virginianum* L leaves by Gas Chromatography & Mass Spectroscopic method. In the GC-MS analysis, five phytochemical components were identified in the petroleum ether extract and seven phytochemical components were identified in the methanolic extract of *Solanum virginianum* L. GC-MS analysis of *Solanum virginianum* L petroleum ether extract revealed the existence of the major compounds such as Aspidospermidin-17-ol, 1-acetyl-19,21-epoxy-15,16-dimethoxy (Retention time 11.58), L-(+)-Ascorbic acid 2, 6-dihexadecanoate (Retention time 15.38), Estra-1,3,5 (10)-trien-17-ol (Retention time 18.77) and the chemical constituents were identified in methanolic extract are N,N'-Dibenzylidene-3,3'-dichlorobenzidine (Retention time 9.42), 16-Allopregnen, 3a,7a,11a-triol-20-one, triacetate (Retention time 14.27). This type of GC-MS analysis is the first step towards understanding the nature of active principles in this plant.

**KEYWORDS:** GC-MS analysis, Phytochemicals, *Solanum virginianum* L, Methanolic extract.**S. SUNDAR**Research Scholar, Faculty of Bio-Engineering, Sathyabama University,  
Chennai, Tamilnadu-600119, India.

## INTRODUCTION

*Solanum virginianum* L (Linnaeus) Family: Solanaceae commonly known as the Thorny Nightshade, Yellow Berried Nightshade. It is an annual herb with a life span of about 4 months and is distributed throughout India and Pakistan. It is an erect, 50-70 cm tall, copiously armed with sturdy, needle like broad based prickles 0.5-2 cm × 0.5-1.5 mm. Leaves are unequal paired, leaf blade ovate-oblong, lobes unequal, apex acute. It is found in Southeast Asia, Malaya and tropical Australia and widely distributed throughout India. All parts of the plant are used in medicine<sup>1</sup>. Its root is one of the Dasamula (ten roots), a reputed Ayurvedic decoction prescribed by the physicians for the management of arthritis and as an anti-inflammatory agent<sup>2</sup>, antipyretic activity, wound healing activity, anti bronchitis, anti flatulent activity, and kidney stone removing<sup>3</sup>. The leaves were made into a paste and mixed with turmeric powder and applied to itch and ringworm. Paste of the leaves is applied to painful joints to relieve pains. Leaf juice with black pepper and honey is taken in empty stomach for a week to cure cough and tonsillitis. Flowers fried in ghee are chewed every day to cure asthma<sup>4</sup>. Dried leaves mixed with calcium carbonate are smoked in the treatment of haemorrhoids<sup>5</sup>. Fruit juice is useful in sore throat and rheumatism. Ripened fruits made into paste mixed with *Hibiscus rosa-sinensis* flower and applied for hair fall in the patches & hair tonic. Root powder is mixed with a curd and it is taken once a day up to 7 days for kidney stone<sup>6</sup>. It is also used to relieve the pain<sup>7</sup>. *Solanum virginianum* L has a number of medicinal importance and routinely used in rural areas. To find out the active constituents present in this valuable plant is the primary step towards to prove the medicinal uses. However, there are no reports on phytochemical analysis of leaf extract of *Solanum virginianum* L. Hence, this is an attempt on phytochemical analysis of leaf extract by GC-MS method. GC-MS is one of the best techniques to identify the bioactive constituents of long chain hydrocarbons, alcohols, ester and acids. To explore the medicinal importance of *Solanum virginianum* L was screened primarily for the

phytochemicals present in it and was analyzed by GC-MS.

## MATERIALS AND METHODS

### **Authentication of Plant Material**

Different parts of *Solanum virginianum* including root, stem, leaves and flowers, were collected from a locality in Hyderabad (Andhra Pradesh). The sample was authenticated by the Botanical Survey of India (BSI), Ministry of environmental & forests, Zoological survey of India campus, Hyderabad and voucher No-BSI/DRC/12-13/Tech/115.

### **Preparation of extracts for GC-MS analysis**

The Sample was dried and Pulverized to a powder in a mechanical grinder. Required quantity of the leaf powder of *Solanum virginianum* L was weighted and transferred to a flask, treated with the petroleum ether and methanol separately until the powder was totally immersed, incubated over night and filtered through a Whatman No.41 filter paper. The filtrate is then concentrated to 1ml by bubbling nitrogen gas into the solution and 2µl sample of the solution was employed in GC-MS for analysis of different compounds.

### **GC – MS analysis**

Petroleum ether and methanol extract of *Solanum virginianum* L were analyzed by GC-MS method. GC-MS technique was performed by using GC Shimadzu QP2010 system and gas chromatograph interfaced to a Mass Spectrometer (GC-MS) equipped with Elite-1 fused silica capillary column. Helium gas (99.99%) was used as the carrier gas at a constant flow rate of 1.51ml/min and an injection volume of 2µl was employed (split ratio: 20). Injector temperature was 200°C; Ion-source temperature 200°C. The oven temperature was programmed from 70°C (Isothermal for 2 min.) with an increase of 300°C for 10 min. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds with scan range of 40 -1000 m/z. Total GC running time was 35 min.

### **Identification of components**

Interpretation of mass spectra of GC-MS was done using the database of National Institute

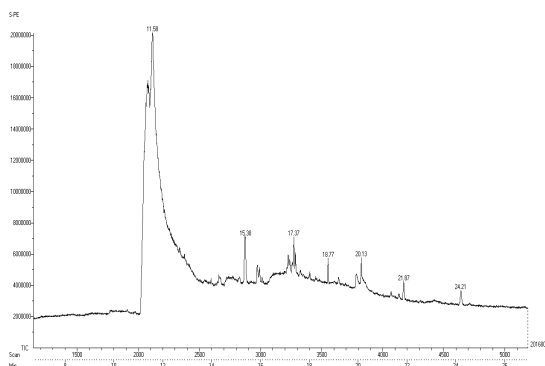
of Standards and Technology (NIST) having over 62,000 patterns. The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST 08 library<sup>8</sup>. The name, mass and structure of the components of the test materials were ascertained.

## RESULTS AND DISCUSSION

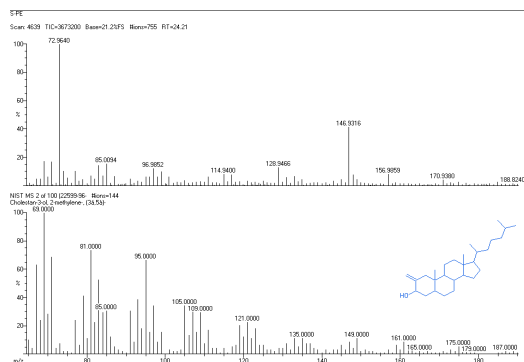
To explore the importance of any medicinal plant the initial step is to screen for its phytochemicals, because it provides a broad idea regarding the nature of compounds present in it. In the present study, the leaves of *Solanum virginianum* L were preliminarily screened for the phytochemicals. The Phytoconstituent present in methanol and the petroleum ether extract of *Solanum virginianum* L was identified by GC-MS analysis (Figure 1 to 14). The active

compounds with their retention time (RT), Molecular formula and Molecular weight (MW) in two extracts of *Solanum virginianum* is presented in Table 1. Previous studies on the phytochemical screening of *aloe vera* L also revealed the presence of Saponin, Tannin, Flavonoids and Terpenoids<sup>9</sup>. This phytochemical screening aids as an initial step for future determination of its activity like antioxidant, anticancer, anti-inflammatory. In a previous report on phytochemical screening of *Strychnos Nux-vomica* revealed the presence of carbohydrate, alkaloid, tannin, steroid, triterpenoid and glycoside in the extract<sup>10</sup>. GC-MS analysis of *Vernoniacinerea* plant methanol extracts revealed the existence of the major compound n-hexadecanoic acid (Retention time 16.26) and 1, 2 benzenedicarboxylic acid disooctyester (Retention time 24.81)<sup>11</sup>

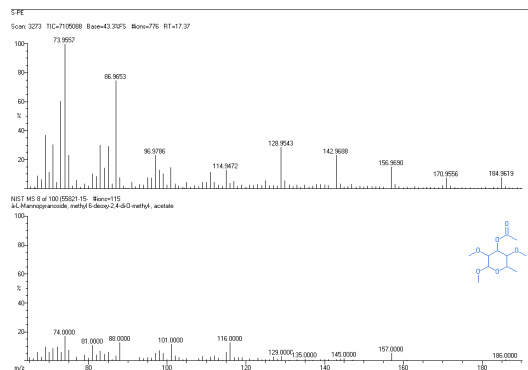
**Figure 1**  
**GC-MS analysis of Petroleum ether extract of *Solanum virginianum* L**



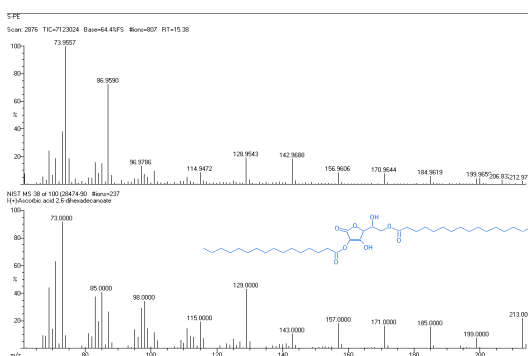
**Figure 2**  
**Cholestan, 3-ol-2-methylene**



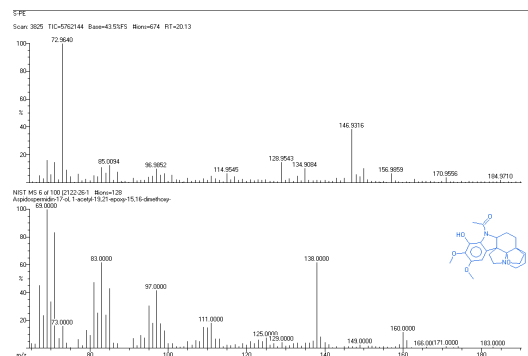
**Figure 3**  
***L*-Mannopyrnoside, methyl 6- deoxy-2, 4-di-o-methyl, acetate**



**Figure 4**  
***L*-(+)-Ascorbic acid 2, 6-dihexadecanoate**

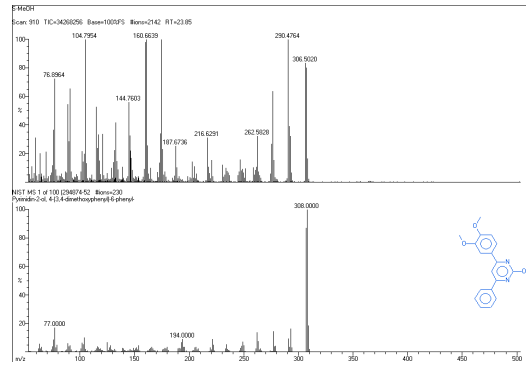


**Figure 5**  
***Aspidospermidin-17-ol, 1-acetyl-19, 21-epoxy-15, 16-dimethoxy***

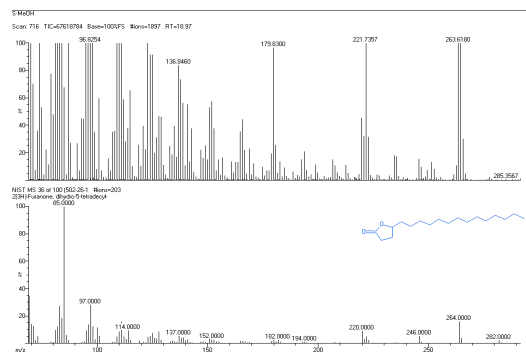




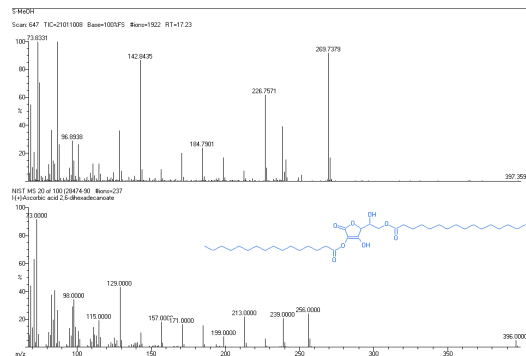
**Figure 9**  
**Pyrimidin-2-ol-4 (3, 4 dimethoxyphenyl) 6-phenyl**



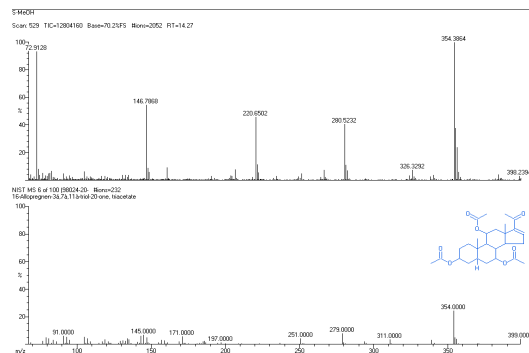
**Figure 10**  
**Furanone, dihydro-5-tetradecyl**



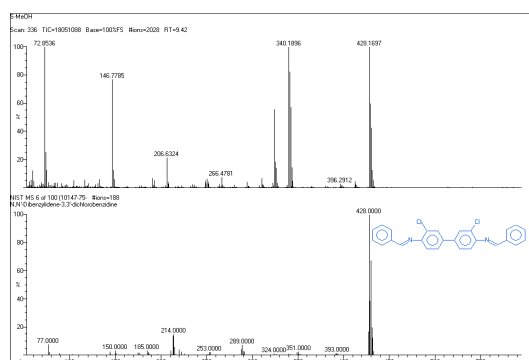
**Figure 11**  
**L-(+)-Ascorbic acid 2, 6-dihexadecanoate**



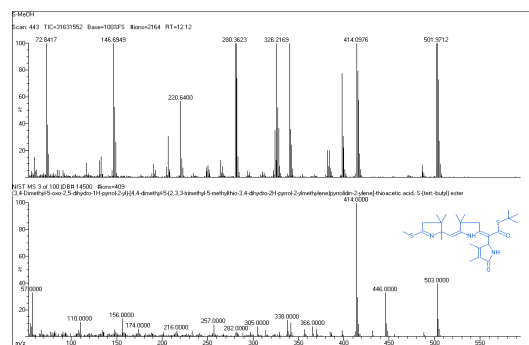
**Figure 12**  
**16-Allopregnen, 3a, 7a, 11a-triol-20-one, triacetate**



**Figure 13**  
**N, N'Dibenzylidene-3, 3'-dichlorobenzidine**



**Figure 14**  
**3, 4-dimethyl-5oxo-2,5 – dihydro-1H-pyrrol-2-yl) (4, 4-dimethyl 5(2, 3, 3.trimethyl-5-methylthio-3, 4-dihydro-2H-pyrrol-2-ylmethylene) pyrrolidin-2-ylene, thioacetic acid, S-(tert.-butyl) ester**



**Table 1**  
**Phytochemicals identified in the Petroleum Ether and Methanol leaf**  
**Extract of *Solanum virginianum* L by GC-MS.**

S. No.	Retention Time (RT)	Compound Name	Molecular formula	Molecular weight (gm/mol)
<b>Phytochemicals identified in the Petroleum ether leaf extract of <i>Solanum virginianum</i> L by GC-MS</b>				
1	18.77	Estra-1,3,5(10)-trien-17-ol	C <sub>27</sub> H <sub>26</sub> O <sub>2</sub>	310.42
2	11.58	Aspidospermidin-17-ol, 1-acetyl-19,21-epoxy-15,16-dimethoxy	C <sub>23</sub> H <sub>30</sub> N <sub>2</sub> O <sub>5</sub>	414.49
3	15.38	L-(+)-Ascorbic acid 2, 6-dihexadecanoate	C <sub>38</sub> H <sub>68</sub> O <sub>8</sub>	652.94
4	17.37	L-Mannopyrnoside, methyl 6- deoxy-2,4-di-o-methyl -, acetate	C <sub>11</sub> H <sub>21</sub> O <sub>7</sub>	265.24
5	21.87	Cholestan, 3-ol-2-methylene	C <sub>28</sub> H <sub>48</sub> O	400.01
<b>Phytochemicals identified in the Methanol leaf extract of <i>Solanum virginianum</i> L by GC-MS</b>				
6	12.12	3,4-dimethyl-5oxo-2-5 – dihydro-1H-pyrrol-2-yl)(4,4-dimethyl-5(2,3,3-trimethyl-5-methylthio-3,4-dihydro-2H-pyrrol-2-ylmethylene)pyrrolidin-2-ylene,thioacetic acid, S-(tert.-butyl) ester	C <sub>26</sub> H <sub>41</sub> S <sub>2</sub> N <sub>3</sub> O <sub>2</sub>	491.75
7	9.42	N,N'Dibenzylidene-3,3'-dichlorobenzidine	C <sub>26</sub> H <sub>18</sub> Cl <sub>2</sub> N <sub>2</sub>	429.34
8	14.27	16-Allopregnen,3a,7a,11a-triol-20-one, triacetate	C <sub>27</sub> H <sub>38</sub> O <sub>7</sub>	474.58
9	17.23	L-(+)-Ascorbic acid 2, 6-dihexadecanoate	C <sub>38</sub> H <sub>68</sub> O <sub>8</sub>	652.94
10	18.97	Furanone,dihydro-5-tetradecyl	C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>	282.46
11	23.85	Pyrimidin-2-ol-4(3,4-dimethoxyphenyl)6-phenyl	C <sub>18</sub> H <sub>21</sub> N <sub>2</sub> O <sub>3</sub>	313.41
12	25.22	2-cyclohexen-1-one, 3-methoxy-2(2,4,5-trimethoxyphenyl)	C <sub>16</sub> H <sub>20</sub> O <sub>5</sub>	292.32

## CONCLUSION

Twelve compounds were identified in methanol and petroleum ether extracts of *Solanum virginianum*. L. Thus the plant studied can be used as a potential source of new useful drugs. The Phytochemical characterization of the extracts, the isolation of responsible bioactive compounds and their biological activity are necessary for future studies.

## CONFLICT OF INTEREST

Conflict of interest declared none.

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