



## Quantitative analysis of selected medicinal plants using ethanol extract

G. Sindhuja<sup>1</sup>, \*Dr. A. Mary Agnes,<sup>2</sup> A.F. Philomina<sup>3</sup>, Yasmin .M<sup>4</sup>

PG & Research department of Zoology, Auxilium college (Autonomous), Affiliated to  
Thiruvalluvar University, Vellore, India  
Email- sindhuravi2131@gmail.com

---

### Abstract

The present study aimed to determine the phytochemical compounds of the *Senna auriculata* flower, *Gymnema sylvestre* leaves, *Eugenia jambolana* seed, and *Cissus quadrangularis* using ethanol extract. Phytochemical analysis showed the presence of alkaloids, flavonoids, phenols, saponins, and tannins. Flavonoid, tannins compounds are very high when compared to others followed by saponins compounds. Compounds derived from plants can be used in biological research. *S. auriculata*, *G. sylvestre*, *Eugenia jambolana* and *Cissus quadrangularis* analysis revealed its vast role as an ideal antibacterial, antioxidant, anti-inflammatory, anti-diabetic, and wound healing agent.

Key words – Quantitative analysis, *Senna auriculata*, *Gymnema sylvestre*, *Cissus quadrangularis* and *Eugenia jambolana*, ethanol extract.

---

### Introduction:

*Senna auriculata* (L), belongs to the family: Leguminosae. It is mostly found in dry areas of India and Sri Lanka. In Sri Lanka, it is common along the sea coast and in the arid zone. The leaves are alternating, stipulating, thin, and hairy, measure 2-2.5cm in length and 1-1.3cm in width. Its flowers are irregular, bisexual, bright yellow, and enormous (almost 5cm across), with glabrous pedicels 2.5cm long. The fruit is a short legume, 7.5-11cm long, 1.5cm broad, flat, thin, and pale brown. Each fruit contains 12-20 seeds in its own cavity. This plant is reported to contain cardiac glycoside (sennapicrin) while the leaves and bark produce anthraquinones and tannins, etc<sup>1</sup>.

In India, various components of the *S. auriculata* plant, including the bark, flowers, leaves, roots, and mixtures of unripe fruits, are combined to make a medicine known as "Avarai Panchaga Choornam." This medicine is used to treat conditions such as high blood sugar, urinary tract infections, conjunctivitis, and ophthalmia<sup>2</sup>. Similarly, the leaves, roots, and flowers of *S. auriculata* have exhibited exoteric and anti-diabetic effects. *Senna* was known to physicians from the very old days and was included in Unani medicine. It is widely used in Indian traditional medicines and flowers are used for diabetes and leaves and flowers to treat skin diseases<sup>3</sup>. The flower and leaf extracts have antidiabetic activity in experimentally induced diabetes rats<sup>4,5</sup>. The present study was analyzed for phytochemical analysis of *Senna auriculata*.

*Gymnema sylvestre*, belongs to the family: Asclepiadaceae (milkweed) Common Name Sanskrit: Meshashringi, madhunashini, Hindi: Gur-mar booti, merasingi, English Name Sugar destroyer and Periploca of wood part used Leaves, root and stem Flower (Pale yellow and bell-shaped) leaves (Narrow tipped elliptic smooth green leaves). *G. sylvestre* is a large, more or less pubescent, woody climber. Leaves are opposite, usually elliptic or ovate (1.25–2.0 inch × 0.5–1.25 inch). Flowers are small, yellow, in umbellate cymes. Follicles are terete, lanceolate, up to 3 inches in length.

The chemical components of the plant are resin, saponins, gymnemasine, gymnemaside, gymnestrogenine and gymnemagenine, stigmaterol, and quercetin. Leaves are reported to contain acidic glycosides, anthraquinones, and their derivatives. *Gymnema*'s medicinal properties are attributed to a class of oleanane-type triterpenoid saponins known as gymnemic acids

*Cissus quadrangularis* L. (Hadjod) belongs to the Vitaceae family is an indigenous medicinal plant of India. It has been prescribed in ancient Ayurvedic texts by Bhava Prakash and Chakra Dutta as a general tonic especially for the fractured patient. The stem of *Cissus quadrangularis* L. is also reputed in Ayurveda as alterative, anthelmintic, dyspeptic, digestive, tonic, analgesic in the eye and ear diseases, in the treatment of irregular menstruation and asthma, and in complaints of back and spine. The plant extracts also exhibit cardiogenic properties in the present study, there are various test that reveals the presence of Alkaloids, Carbohydrates, Glycosides Tannins – phenolic compounds Protein and amino acids Gum and mucilage Flavones and flavonoids Saponins Steroids and sterols<sup>7</sup>.

*Syzygium cumini* (syn. *Eugenia jambolana*, *Syzygium jambolana*, *Eugenia cumini*, *Syzygium jambos*), commonly known as jamun in India, is an evergreen tree distributed throughout the Indian subcontinent, Southeast Asia and East Africa. It is mainly utilised as a fruit producer and for its timber. Medicinally, the fruit is reported to have antidiabetic, antihyperlipidaemic, antioxidant, antiulcer, hepatoprotective, antiallergic, antiarthritic, antimicrobial, anti-inflammatory, antifertility, antipyretic, antiplaque, radioprotective, neuropsychopharmacological, nephroprotective and antidiarrhoeal activities. Among these beneficial physiological effects, the antidiabetic property of *S. cumini* has the most promising nutraceutical value. The health-beneficial effects of *S. cumini* are mainly attributed to various phytoconstituents such as tannins, alkaloids, steroids, flavonoids, terpenoids, fatty acids, phenols, minerals, carbohydrates and vitamins present in the fruit. Srivastava<sup>6</sup>.

## 2. Material and methods:

### 2.1. Selected plants and collection:

*Gymnema sylvestre* leaves, *Senna auriculata* flower, *Cissus quadrangularis* stem and *Eugenia jambolana* seed were collected from the Vellore district. Samples were shade dried and powdered for further analysis. The powdered plant materials were dissolved in ethanol extract for 42 hrs. in the conical flask. Then the extracts were filtered by using filter paper. The filtrates were used for further analysis. The quantitative analyses of the extracts were analyzed. Secondary metabolites were present in the sample. The amount of alkaloids, flavonoids, saponins, tannins, terpenoids, steroids, glycosides, and phenolic were estimated.

### 2.2. Quantitative Determination of Alkaloid

Quantitative analysis of the alkaloid, Acetic acid in ethanol and concentrated ammonium hydroxide were used to create an alkaloid. The supernatant was removed, and the precipitates

were washed with 20 cm of three volumes of 0.1M ammonium Hydroxide before being filtered using gem filter paper that was 12.5 cm in thickness.

The residue was dried in an oven and weighed. The percentages of alkaloids were maintained in table 1.

Formula- % of alkaloids = Weight of Alkaloids/ Weight of Sample X 100

### 2.3. Quantitative determination of Flavonoids:

Flavonoid determination was performed using 80% methanol added to a 2.50 g sample and maintained at room temperature for 24 hours. The supernatants were discarded, and the remaining solvent the precipitates were re-extracted with ethanol three times. The solutions were then filtered and dried in a water bath. The percentage of flavonoids was calculated as the Results mentioned in table 1.

Formula- % of Flavonoids = Weight of Flavonoids / Weight of Sample X 100

### 2.4. Quantitative determination of Total Phenolic Compound:

The total phenolic compound was measured using the Folin-Ciocalteu UV spectrophotometer technique. After 90 minutes at 30°C, absorbance was measured at 550 nm for test and reference solutions. Total phenolic component content was expressed as mg of GAE/gm of extract.

### 2.5. Quantitative determination of Total Tannins Content:

The tannin content of GAE extract was measured by plotting a standard graph (gallic acid - 1 mg/ml) and quantified in mg per gram of extract. In the test tubes, 1 mL of 1mg/mL was taken and the volume was brought up to 1 mL with distilled water and water for the blank.

### 2.6. Quantitative determination of Total Saponins Content:

The extract was heated in a water bath for 4 hours continuously at 55°C and then filtered and re-extracted with the 20% ethyl alcohol. After evaporation, the samples are dried in the oven to a constant weight, and values are expressed as mg/g of extract.

## 3. Result and discussion:

Phytochemical analysis of *Gymnema sylvestre*, *Cissus quadrangularis*, *Senna auriculata* and *Gymnema sylvestre* was carried out on the flower and leaves to determine the levels of alkaloids, flavonoids, tannins, phenols, and saponins.

Quantitative analysis of phytochemical compounds of *Senna auriculata*, *Gymnema sylvestre*, *Cissus quadrangularis* and *Eugenia jambolana* in ethanolic extract reveals the presence of Alkaloids, Flavonoids, Phenols, Saponins and Tannins. This study was made to determine the total phenolic alkaloid flavonoid content.

In *Senna auriculata* flowers extract of Flavonoids, Tannins and Saponins are high when compared to other compounds. Flavonoids and saponins present in ethanol extract have been reported for antidiabetic and antibacterial activity<sup>8</sup>. The ethanol extract of *Senna auriculata* flower possesses antidiabetic agents such as flavonoids and phenolic acids and it also demonstrated considerable antibacterial activity against specific human bacterial infections and In vitro antioxidant, anti-inflammatory, and anti-diabetic effects<sup>9</sup>. The antidiabetic effect of the extract is potentially due to the presence of phytochemicals like Phenols, Steroids, saponins, flavonoids, terpenoids, and glycosides<sup>9</sup>.

According to the results of this study, *Eugenia jambolana* seed extract also has Flavonoids and Saponins are high when compared to other compounds and are effective in antibacterial, antifungal, and antidiabetic activity. The ethanol extraction of seed *Eugenia*

*jambolana* contains various bioactive compounds including flavonoids, terpenes and anthocyanins with a range of pharmacological activities, e.g. antimicrobial, anticancer, hepatoprotective, anti-inflammatory, free radical, scavenging and antidiabetic effects<sup>11</sup>.

In *Gymnema sylvestre* leaves extract alkaloids and flavonoids are high when compared to other compounds. Secondary compounds play an important role in a plant's defence mechanism through cytotoxicity towards the pathogens, which could be beneficial as antimicrobial medicines for human beings<sup>12</sup>. Phenolic and flavonoids compounds of the leaves extract have natural antioxidant activity and several biological activities including anti-diabetic, anthelmintic, analgesic, anti-inflammatory, antimicrobial and anti-allergic properties<sup>13</sup>.

In *Cissus quadrangularis* stem extract flavonoids and alkaloids are high when compared to other compounds. phenols and saponins are low when compared to other plant extracts. Recent investigations have demonstrated that flavonoids contribute in a great way to antioxidant activity.

The alkaloids were considered heterocyclic nitrogen atoms. The alkaloid in the *Cissus quadrangularis* stem is one of the largest phytochemical groups of compounds that have a variety of medicinal properties such as it was used as a pain killer for many kinds of diseases<sup>14</sup>. The stem of *Cissus quadrangularis* was rich in Flavonoids and it also has antidiabetic activity. This type of flavonoid has the ability to inhibit the enzyme which regulates the glucose level in the blood<sup>15</sup>.

A higher content of total alkaloids, saponins and flavonoids was found in the ethanolic extract compared with other compounds. Our current study of spectrophotometric analysis to quantify phytochemicals revealed that phenols, tannins, alkaloids, flavonoids and steroids are present in high amounts in ethanol extract.

### Conclusion:

*Senna auriculata*, *Gymnema sylvestre*, *Eugenia jambolana* and *Cissus quadrangularis* are traditional medicinal herbs used to cure various diseases. The phytochemical contents of ethanol extracts were investigated in this study. This plant is a highly rich source of minerals that are necessary for the human body's functioning, and further research is needed to explore the plant's ability to treat various disorders.

### References:

- [1] Altemimi, A.; Lakhssassi, N.; Baharlouei, A.; Watson, D.; Lightfoot, D. Phytochemicals: Extraction, Isolation, and Identification of Bioactive Compounds from Plant Extracts. *Plants* **2017**, *6* (4), 42. <https://doi.org/10.3390/plants6040042>.
- [2] Deshpande, A. D.; Harris-Hayes, M.; Schootman, M. Epidemiology of Diabetes and Diabetes-Related Complications. *Physical Therapy* **2008**, *88* (11), 1254–1264. <https://doi.org/10.2522/ptj.20080020>.
- [3] Ragupathy, S.; Newmaster, S. G. Valorizing the “Iruilas” Traditional Knowledge of Medicinal Plants in the Kodiakkarai Reserve Forest, India. *Journal of Ethnobiology and Ethnomedicine* **2009**, *5* (1). <https://doi.org/10.1186/1746-4269-5-10>.
- [4] Latha, M.; Pari, L. Antihyperglycaemic Effect of Cassia Auriculata in Experimental Diabetes and Its Effects on Key Metabolic Enzymes Involved in Carbohydrate

- Metabolism. *Clinical and Experimental Pharmacology and Physiology* **2003**, *30* (1-2), 38–43. <https://doi.org/10.1046/j.1440-1681.2003.03785.x>.
- [5] P. Uma Devi; S. Selvi; S. Suja; K. Selvam; P. Chinnaswamy. Antidiabetic and Hypolipidemic Effect of Cassia Auriculata in Alloxan Induced Diabetic Rats. *International Journal of Pharmacology* **2006**, *2* (6), 601–607. <https://doi.org/10.3923/ijp.2006.601.607>.
- [6] Teware, K.; Singh, P.; Mehta<sup>3</sup>, R. Phytochemical Extraction and Analysis of Medicinally Important Plant Cissus Quadrangularis L. (Hadjod). *Biomedical & Pharmacology Journal* **2011**, *4* (1), 175–179. <https://doi.org/10.13005/bpj/277>.
- [7] Srivastava, S.; Chandra, D. Pharmacological Potentials Of Syzygium Cumini: A Review. *Journal of the Science of Food and Agriculture* **2013**, *93* (9), 2084–2093. <https://doi.org/10.1002/jsfa.6111>.
- [8] Raja, D. K.; Jeganathan, N. S.; Manavalan, R. In Vitro Antimicrobial Activity and Phytochemical Analysis of Cassia Auriculata Linn. *International Current Pharmaceutical Journal* **2013**, *2* (6), 105–108. <https://doi.org/10.3329/icpj.v2i6.14869>.
- [9] Prasathkumar, M.; Raja, K.; Vasanth, K.; Khusro, A.; Sadhasivam, S.; Sahibzada, M. U. K.; Gawwad, M. R. A.; Al Farraj, D. A.; Elshikh, M. S. Phytochemical Screening and in Vitro Antibacterial, Antioxidant, Anti-Inflammatory, Anti-Diabetic, and Wound Healing Attributes of Senna Auriculata (L.) Roxb. Leaves. *Arabian Journal of Chemistry* **2021**, *14* (9), 103345. <https://doi.org/10.1016/j.arabjc.2021.103345>.
- [10] Palani, V.; Shanmugasundaram, M.; Maluventhen, V.; Chinnaraj, S.; Liu, W.; Balasubramanian, B.; Arumugam, M. Phytoconstituents and Their Potential Antimicrobial, Antioxidant and Mosquito Larvicidal Activities of Goniothalamus Wightii Hook. F. & Thomson. *Arabian Journal for Science and Engineering* **2020**, *45* (6), 4541–4555. <https://doi.org/10.1007/s13369-020-04507-5>.
- [11] Baliga, M. S.; Fernandes, S.; Thilakchand, K. R.; D'souza, P.; Rao, S. Scientific Validation of the Antidiabetic Effects of Syzygium Jambolanum DC (Black Plum), a Traditional Medicinal Plant of India. *The Journal of Alternative and Complementary Medicine* **2013**, *19* (3), 191–197. <https://doi.org/10.1089/acm.2011.0752>.
- [12] Chodiseti, B.; Rao, K.; Giri, A. Phytochemical Analysis Of Gymnema Sylvestre and Evaluation of Its Antimicrobial Activity. *Natural Product Research* **2013**, *27* (6), 583–587. <https://doi.org/10.1080/14786419.2012.676548>.
- [13] Oyedemi, S. O.; Oyedemi, B. O.; Arowosegbe, S.; Afolayan, A. J. Phytochemicals Analysis and Medicinal Potentials of Hydroalcoholic Extract from Curtisia Dentata (Burm.f) C.A. Sm Stem Bark. *International Journal of Molecular Sciences* **2012**, *13* (5), 6189–6203. <https://doi.org/10.3390/ijms13056189>.
- [14] Kam, P. C. A.; Liew, S. Traditional Chinese Herbal Medicine and Anaesthesia. *Anaesthesia* **2002**, *57* (11), 1083–1089. <https://doi.org/10.1046/j.1365-2044.2002.02823.x>.

- [15] Anwar, F.; Latif, S.; Ashraf, M.; Gilani, A. H. *Moringa Oleifera*: A Food Plant with Multiple Medicinal Uses. *Phytotherapy Research* **2006**, *21* (1), 17–25. <https://doi.org/10.1002/ptr.2023>.

## Tables

**TABLE: 1 Quantitative Analysis of *Senna auriculata*, *Gymnema sylvestre*, *Cissus quadrangularis* and *Eugenia jambolana* Plant Extracts.**

Test Name	Results			
	GS	CQ	EJ	SA
Alkaloids	8.02	3.56	3.02	3.02
Flavonoids	7.08	5.4	4.59	4.71
Phenols	2.04	1.99	2.45	1.48
Saponins	3.02	1.03	4.14	3.57
Tannins	2.94	2.34	3.7	4.1

**TABLE: 2- Quantitative Analysis of Phenolic Compound (GS)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	0.6021	0.6896	0.64585	0.06187184	1.0579763
Conc 2	40	1.0542	1.0842	1.0692	0.0212132	1.4813263
Conc 3	60	1.5147	1.5478	1.53125	0.02340523	1.9433763
Conc 4	80	1.6024	1.6282	1.6153	0.01824335	2.0274263
Conc 5	100	1.6214	1.64324	1.63232	0.01544321	2.0444463

**TABLE: 3 -Quantitative Analysis of Phenolic Compound (CQ)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	0.5478	0.5147	0.53125	0.02340523	0.77970408
Conc 2	40	0.8748	0.8725	0.87365	0.00162635	1.12210408
Conc 3	60	1.247	1.3214	1.2842	0.05260874	1.53265408
Conc 4	80	1.5471	1.5478	1.54745	0.00049497	1.79590408
Conc 5	100	1.7547	1.7457	1.7502	0.00636396	1.99865408

**TABLE: 4- Quantitative Analysis of Phenolic Compound (EJ)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	0.7482	0.7415	0.74485	0.00473762	1.05130015
Conc 2	40	0.9825	0.9447	0.9636	0.02672864	1.27005015
Conc 3	60	1.3541	1.3779	1.366	0.01682914	1.67245015
Conc 4	80	1.7478	1.7741	1.76095	0.01859691	2.06740015
Conc 5	100	2.145	2.1474	2.1462	0.00169706	2.45265015

**Table: 5 -Quantitative Analysis of Phenolic Compound (SA)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	0.414	0.4125	0.41325	0.00106066	0.46606487
Conc 2	40	0.6258	0.6312	0.6285	0.00381838	0.68131487
Conc 3	60	0.8021	0.8036	0.80285	0.00106066	0.85566487
Conc 4	80	1.3474	1.3459	1.34665	0.00106066	1.39946487
Conc 5	100	1.4782	1.3958	1.437	0.0582656	1.48981487

**Table 6- Quantitative Analysis of Tannin Compound (GS)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	1.2452	1.241	1.2431	0.00296985	2.17674247
Conc 2	40	1.4145	1.14125	1.277875	0.19321693	2.21151747
Conc 3	60	1.6521	1.6314	1.64175	0.01463711	2.57539247
Conc 4	80	1.8925	1.8925	1.8925	0	2.82614247
Conc 5	100	2.014	2.0145	2.01425	0.00035355	2.94789247

**Table 7- Quantitative Analysis of Tannin Compound (CQ)**

Concentrations	Conc.	OD1	OD2	Mean OD	SD	Total Amount
Conc 1	20	1.5247	1.5748	1.54975	0.03542605	1.60256487
Conc 2	40	1.6252	1.6254	1.6253	0.00014142	1.67811487
Conc 3	60	1.8241	1.8414	1.83275	0.01223295	1.88556487
Conc 4	80	2.0143	2.0214	2.01785	0.00502046	2.07066487
Conc 5	100	2.2531	2.3214	2.28725	0.04829539	2.34006487

**Table 8- Quantitative Analysis of Tannin Compound (EJ)**

<b>Concentrations</b>	<b>Conc.</b>	<b>OD1</b>	<b>OD2</b>	<b>Mean OD</b>	<b>SD</b>	<b>Total Amount</b>
Conc 1	20	1.6582	1.6258	1.642	0.02291026	3.04830198
Conc 2	40	1.7414	1.7425	1.74195	0.00077782	3.14825198
Conc 3	60	1.9201	1.9102	1.91515	0.00700036	3.32145198
Conc 4	80	2.1401	2.2014	2.17075	0.04334565	3.57705198
Conc 5	100	2.3541	2.3142	2.33415	0.02821356	3.74045198