



## PHARMACOGNOSTICAL PHYTOCHEMICAL SCREENING OF *ANDROGRAPHIS PANICULATA* (ACANTHACEAE)

R.RAMASUBRAMANIA RAJA\*<sup>1</sup> AND P.SHANMUGA PANDIYAN<sup>2</sup>

<sup>1</sup>Research Scholar, PRIST University, Thanjavur

<sup>2</sup>Principal, Rao's college of Pharmacy, Nellore, Andhra Pradesh

### ABSTRACT

*Andrographis paniculata* is a plant that has been effectively used in traditional Asian medicines for centuries. It's perceived "blood purifying" property results in its use in diseases where blood "abnormalities" are considered causes of disease, such as skin eruptions, boils, scabies, and chronic undetermined fevers. *A. paniculata* has been reported as having antibacterial, antifungal, antiviral, choleric, hypoglycemic, hypocholesterolemic, and adaptogenic effects. In the Unani system of medicine, it is considered aperients, anti-inflammatory, emollient, astringent, diuretic, emmenagogue, gastric and liver tonic, carminative, antihelmintic, and antipyretic..In present study was macroscopical, microscopy, physiochemical parameters (extractive values, crude fibre content , ash values, foreign organic matter), fluorescent analysis, plant cell inclusions reported. The ethanolic plant extraction was carried out by using soxhlet apparatus. The extract was screened for phytochemical properties by using colour reaction test.

**KEYWORDS:** *Andrographis paniculata*, antifungal, macroscopical, microscopy, soxhlet apparatus



**\*R.RAMASUBRAMANIA RAJA**  
Research Scholar, PRIST University, Thanjavur

\*Corresponding author

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## INTRODUCTION



Figure 1  
*Andrographis paniculata*<sup>8</sup>

**Scientific classification**<sup>(6, 7)</sup>

**Kingdom:** Plantae,  
**Subkingdom:** Viridiplanta  
**Infrakingdom:** Streptophyta  
**Superdevison:** Embryophyta  
**Devison:** Tracheophyta  
**Class:** Magnoliopsida  
**Superorder:** Asteranae  
**Order:** Lamiales  
**Family:** Acanthaceae  
**Species:** *Andrographis paniculata*

**Genus:** *Andrographis*

**Vernacular names**<sup>10</sup>

**Hindi:** Kalmegh, Kiryat, Mahatit,  
**Gujrati:** Kiriyaata, Olikiriyat  
**Marathi:** OlenKirayat,  
**Canarese:** Nelabevugida  
**Sanskrit:** Bhuinimb, Kirata, Mahateet  
**Malyalam:** Nilaveppu, Kiriyaata,  
**Telugu:** NelaVemu  
**Tamil:** Nilavempui

It is an erect branched annual, 0.3-0.9 meters high, branches sharply quadrangular winged in the upper part; leaf - lanceolate, acute, undulate, pale beneath; Flowers small, solitary distant, in axillary or terminal racemes or panicles, bracts lanceolate; Corolla - 2 lipped, upper lip 2-toothed, lower 2 lobed, rose coloured; Flowers - Capsule, linear - oblong, acute at both ends; Seeds many, rugosely pitted, yellowish brown. Flowering time in India is November - December.<sup>11</sup>

**Distribution**

Kalmegh is an annual herb found through India, specially in dense forests. It is under cultivation in many states of India.

**Cultivation**

In India, it is cultivated as rainy season (Kharif) crop. Any soil having fair amount of organic matter is suitable for commercial cultivation of this crop. About 400 gms. seed are sufficient for one hectare. The spacing is maintained 30 × 15 cm. No major insect and disease infestation has been reported. The plants at flowering stage (90–120 days after sowing) is cut at the base leaving 10–15 cm stem for plant regeneration. About 50–60 days after first harvest, final harvest is performed. In Indian condition, the yield varies between 2000–2500 Kg dry herb per hectare.

**Medicinal Properties**

According to Ayurveda the plant is bitter, acrid, cooling, laxative, vulnerary, antipyretic, antiperiodic, anti-inflammatory, expectorant, depurative, soporific, anthelmintic, digestive and useful in hyperdispsia, buring sensation, wounds, ulcers, chronic fever, malarial and intermittent fevers, inflammations, cough, bronchitis,

skin diseases, leprosy, colic, flatulence, diarrhoea, dysentery, haemorrhoids etc. Kalmegh is also a reputed Homoeopathic drug. In Bengal (India), household medicine known as "Alui" is prepared from fresh leaves and is given to children suffering from stomach complaints. Recent experimental finding indicated that Kalmegh is having antityphoid and antibiotic properties. It has been proved to be hepatoprotective drug.

## MATERIALS AND METHODS

**Plant material**

The plant of *Andrographis paniculata* was collected from Thirumalaisamudram 7km away from Thanjavur (Tamil Nadu) in the month of December 2013. The plants was identified by local people of that village and authenticated by Dr. N.Ravichandran, Asst. Professor, Drug Testing Laboratory, Centre for Advanced research in India System of Medicine, Shanmuga Arts Science Technological Research Academy University Thanjavur, and the Voucher specimen 257 is preserved in laboratory for future reference.

**Chemicals**

All the reagents used were of analytical grade obtained from S.D. fine chemicals, Ltd, and Hi Media, Mumbai.

**Pharmacognostical Screening of Plants**

Macroscopic Characters and Physiochemical Parameters of *Andrographis paniculata* leaf and leaf powder: The Macroscopic evaluation was carried out for shape, size, colour, odour, taste and fracture of the drug. Different physiochemical values such as Ash value, extractive values, loss on drying, foreign organic

matter, Crude fiber content, were determined and reported on Table No: 1

**Preparation of extract from *Andrographis paniculata* leaf powder**

The leaves were dried under shade, powdered and passed through 40meshes and stored in closed vessel for further use. The dried powder material (150g) was subjected to soxhelt extraction with ethanol for continuous hot extraction for 24 hours. The extracts were concentrated under reduced pressure to obtain the extracts solid residues. The percentage value of extract was 27(%w/w).

**Phytochemical evaluation of ethanolic leaf extracts of *Andrographis paniculata***

The ethanolic extract of *Andrographis paniculata* (Leaf) was subjected to preliminary Phytochemical tests followed by the methods of Harbone (1998), and Trease and Evans (1983) and the phyto constituents reported in table no: 2<sup>1, 2, 3)</sup>

**Fluorescence analysis study of *Andrographis paniculata* leaves powder**

Fluorescence analysis study of powdered drug material with different reagents was carried out to observe the colour reactions reported on the table No: 3.

**Study of Plant cell inclusions**

Plant cell inclusions study of powdered drug material with different reagents was carried out to observe the colour reactions reported on table 4.

**General chemical and Micro chemical Tests:**

General chemical and Micro chemical tests of powdered drug material with different reagents was carried out to observe the colour reactions to identify the compound reported on the table 5.<sup>4</sup>

**Leaf constants**

Vein Islet number, vein termination number, stomatal number and stomatal index was carried out to observe microscopically reported on table 6.

**RESULTS**

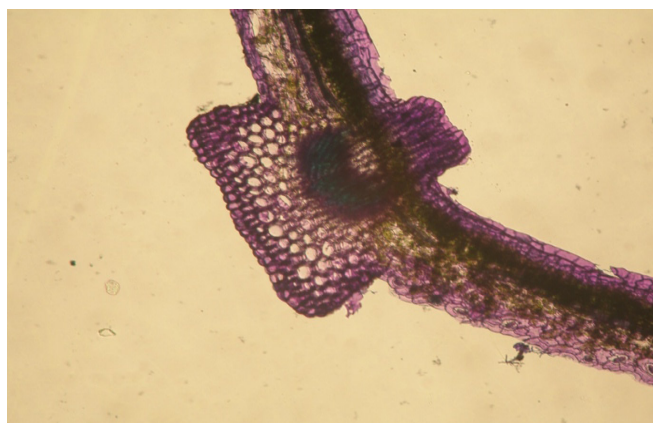


**Figure 2**  
***Andrographis paniculata***<sup>9</sup>

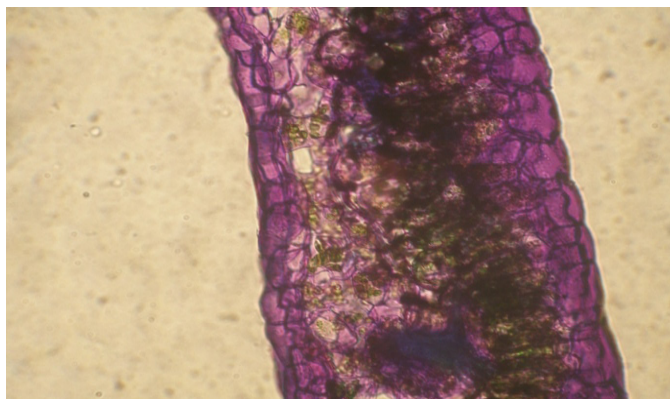
Colour - Leaves are dark green, Odour-odourless, Taste-Intensely bitter, Size of leaves-7X25cm, Shape-lanceolate and petiolate and with entire margin and

acuminate apex. The venation of leaf is unicostate reticulate and midrib is ventrally grooved.

**Transverse section of Leaf *Andrographis paniculata***



**Figure 3**  
***T.S of Andrographis paniculata (Mid rib)***



**Figure 4**  
**T.S of *Andrographis paniculata* (Lamina)**

The T.S. of leaf midrib consists of epidermis, cortex and vascular bundle. The epidermis made up of single rows, short ovoid cells and the outer cell wall contains cuticle. The cortex consists of 4-5 rows in abaxial side but in adaxial 3 rows of short, ovoid parenchymatous cells, the cortex cells contain the rectangular prism type of calcium oxalate crystals. The vascular bundles is crescent shaped consists of xylem, cambium and phloem. The xylem cells are surrounded by 3 rows of phloem cells and 2 rows cambium cells. The lamina consists of single rows of elongated cells and the outer cell was contains cuticle. The palisade cells are single

rows, elongated with chloroplasts and arranged without intercellular space. The spongy parenchyma cells are 2-3 rows elongated with intercellular space. The bundle sheath xylem cells are spiral thickening. The epidermal cells of the leaf having diacytic type of stomata.

#### **Physiochemical Parameters**

The extractive value was highest in water and was recorded to be 29%w/w, and Methanol soluble extractive value was about 18.0 %w/w .The different ash values and the different physiochemical parameters were screened and are presented in the table.

**Table 1**  
**Physiochemical Parameters of *Andrographis paniculata* leaf Powder**

S.No	Parameters	<i>Andrographis paniculata</i>
1.	Hexane Soluble extractive	10%
2.	Pet ether Soluble extractive	4%
3.	Chloroform Soluble extractive	6%
4.	Acetone soluble extractive	7%
5.	Ethanol soluble extractive	20%
6.	Ethyl acetate soluble extractive	9%
7.	Methanol soluble extractive	18%
8.	Water soluble extractive	29%
9.	Foreign organic matter	2%
10.	Loss on drying	3%
11.	Crude fibre content	21%
12.	Total Ash	5%
13.	Acid insoluble ash	2%
14.	Sulphated ash	12%
15.	Water Soluble ash	1%

**Table 2**  
**Preliminary phyto chemical Analysis of ethanolic leaf extracts of *Andrographis paniculata***

S.No	Phytoconstituents	<i>Andrographis paniculata</i>
1.	Alkaloids	+
2.	Aminoacids	+
3.	Anthraquinones	-
4.	Carbohydrates	+
5.	Flavonoids	+
6.	Phenolic groups	+
7.	Saponins	+
8.	Steroids	+
9.	Tannins	+

+ = Present    - = Absent

**Table 3**  
**Fluorescence analysis study of**  
***Andrographis paniculata* leaves powder**

S.No	Sample	Colour in Day light	Colour in UV
1.	Powder	Pale green	Dark green
2.	Powder + 0.1N Sodium Hydroxide	Dark green	Pale green
3.	Powder + Acetic anhydride	Dark green	Pale green
4.	Powder + 0.1N Hydrochloric acid	Pale green	Dark green
5.	Powder + water	Pale green	Dark green

**Table 4**  
**Study of Plant cell inclusions *Andrographis paniculata***

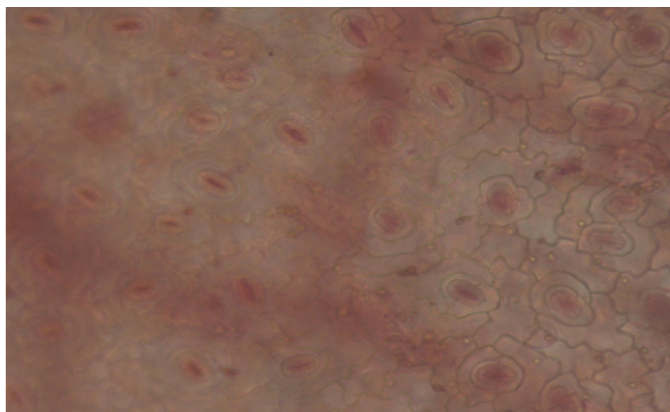
S.No	Test	Result	Colour
1.	Cellulose	+	Pale yellow
2.	Lignin	+	Deep blue
3.	Suberin	+	Deep yellow
4.	Chitin	+	Violet
5.	Starch	+	Blue
6.	Mucilage	+	Pink
7.	Proteins	+	Brick red
8.	Alkaloids	+	Reddish brown
9.	Tannins	+	Bluish black
10.	Calcium oxalate	+	Needle shaped crystals
11.	Calcium carbonate	+	Needle shaped crystals

**Table 5**  
**General Chemical and Micro chemical tests**  
**for Leaf powder of *Andrographis paniculata***

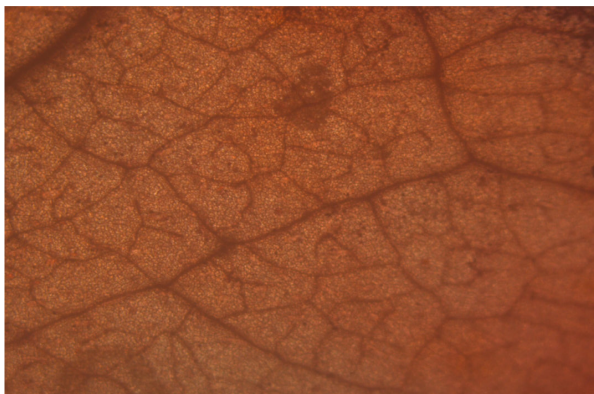
S.No	Test	Results
1.	Test with water /aqueous extract	+
2.	Test For Tannins	+
3.	Test for Anthra quinine	-
4.	Test for Mucilage	+
5.	Test for Carbohydrate	+
6.	Test for alkaloids	+

**Table 6**  
**Leaf constants of *Andrographis paniculata***

S.No	Parameters	Results
1.	Vein islets number	60 ±1.01
2.	Vein termination number	39 ±1.06
3.	Stomatal number	56 ± 1.6
4.	Stomatal index	22 ±0.53



**Figure 5**  
***Andrographis paniculata* stomatal number**



**Figure 6**  
***Andrographis paniculata* leaf Vein islet and terminate number**

## DISCUSSIONS

*Andrographis paniculata* has been comprehensively used to take care of a variety of conditions of infectious origin in traditional systems of medicine. Modern research has investigated it for antimicrobial activity against various pathogenic and non-pathogenic bacteria. For instance, Leelarasamee et al.<sup>12</sup> They contain active constituents that are used in the treatment of many human diseases.<sup>13, 14, 15</sup> The plant was screened for its Macroscopic, Microscopic, Physiochemical parameter, Florescence analysis, General and microchemical analysis for crude powder and Plant cell inclusions showed that they all within limit. Extraction was carried out by using soxhlet apparatus. The extractive values are determined by using the chemicals in order of polarity wise. The extractive value was highest in water and was recorded to be 29%w/w, and methanol soluble extractive value was about 18 %w/w. The lowest value non polar solvent pet ether 4%w/w, and hexane like 10%w/w. The different ash values like total ash 5%w/w, Acid insoluble ash 2%w/w, and sulphated ash 12%ww/w. The *Andrographis paniculata* leaf powder reported the potential fluorescent property with different chemical reagents. Alkaloids, mucilage and tannins identified the general chemical and micro chemical analysis. Ethanolic extract was

made by using soxhlet apparatus; finally get the ethanolic extract was tested with chemical reagents colour reaction based. The presence showed the alkaloids, flavonoids, carbohydrates, phenolic compounds, and tannins.

## CONCLUSION

The plant *Andrographis paniculata* was screened for its macroscopic, microscopic, physiochemical parameter, florescence analysis, general and microchemical analysis for crude powder and plant cell inclusions. Extraction was carried out by using soxhlet apparatus. The Percentage yield of ethanolic extract is The presence showed the alkaloids, flavonoids, carbohydrates, phenolic compounds, saponins and tannins. Developing countries like India having the percentage of poor people more, to meet with the demand of the poor public, the *Andrographis paniculata* may serve the purpose once the evaluation and detailed studies may over. This work is valuable for other research works.

## CONFLICT OF INTEREST

Conflict of interest declared none.

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