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**A comparative pharmacognostical evaluation of two *Artemisia* species found in Nilgiris biosphere.**

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**J.Suresh., K.Elango., S.P.Dhanabal.,  
N.Paramakrishnan., B.Suresh.**

Department of Pharmacognosy  
and Pharmacoglogy,  
JSS College of Pharmacy,  
Rocklands, Ootacamund - 643001,  
Tamilnadu.

**Abstract**

*Artemisia pallens* Wall. ex DC commonly known as "Davana" in Kannada and *Artemisia abrotanum* Linn. known as "Southernwood" (Asteraceae) are aromatic herbs, erect in habit, upto 60 cm tall, leaves are very small, much divided, bluish green. These plants find use in traditional systems of medicine viz., anthelmintic, tonic and antipyretic properties. Since, these species have not been scientifically evaluated; the present study was aimed to bring these plants under a suitable pharmacognostical scheme.

**Introduction**

India is one of the richest sources of medicinal & aromatic plants. The

wealth of India is stored in enormous amount of natural flora, which has been gifted to her. Endowed with a diversity of agro climatic condition, India is virtually a bioethical garden of the world. India possess different ecosystem ranging from temperate in Himalayas to tropical in South India, dry in central India to humid & wet in Assam & Kerala, thus providing conditions favorable for growth of different medicinal & aromatic plants. The medicinal plant based drugs have the added advantage of being simple, effective & offering a broad spectrum of activity with an emphasis on the preventive actions of drugs. Because of these factors, the demand for plant-based medicines (phytomedicine & phytopharmaceuticals) is increasing worldwide.

*Artemisia pallens* and *Artemisia abrotanum* are found in Nilgiri hills, and have been used by the tribal people for various ailments. There is not much work done on these species, hence, the present study aims at comparison of anatomical characters and physicochemical constants of these potential species for the proper identification and authentication of the four different species which would be useful for the future investigators.

## Experimental

### Materials and methods :

The aerial parts of *Artemisia abrotanum* was collected from Cinchona village, Ootacamund, The Nilgiris, India. The aerial parts of *Artemisia pallens* was collected from Dindigul, Tamil Nadu, India. The plant species were identified and authenticated by comparing with the voucher specimen by a botanist at the Survey of Medicinal Plants and collection unit, Government Arts College, Ootacamund.

### 1. *Artemisia abrotanum* Linn (Asteraceae)

**Synonym :** Southernwood, Lad's love

### **Ethno medical information :**

Southernwood was traditionally considered as an antiseptic, astringent, emmenagogue, expectorant, febrifuge, stomachic, stimulant, tonic, anti-inflammatory, vermifuge, spasmolytic and used for treating upper respiratory tract disease. Infusions make a bitter tonic which strengthens and supports

digestive functions by increasing secretions in the stomach and intestines. It has also been used against cancer, cough, fever and tumors.<sup>1-3</sup>

### 2. *Artemisia pallens* Wall. (Asteraceae) **Synonym :** Davana, Davanam

**Regional names :** Kan : Davana, Tel: Davanamu Tam: Marikkoluntu

### **Ethno medical information :**

*Artemisia pallens* has been widely used in Indian folk medicine for the treatment of Diabetes mellitus. This plant is accredited with anthelmintic, antipyretic and tonic properties. It is also considered a good fodder. The oil possesses antispasmodic, antibacterial, antifungal and stimulant properties.<sup>4-7</sup>

### **Histological characters :**

**Sectioning:** The paraffin embedded specimens were sectioned with the help of Rotary Microtome. The thickness of the sections were 10 - 12  $\mu$ m. The sections were dewaxed and were stained with Toluidine blue. Since Toluidine blue is a polychromatic stain, the staining results were remarkably good; and some cytochemical reactions were also obtained. The dye rendered pink color to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc., wherever necessary sections also stained with safranin and fast-green and iodine (for starch).

For studying the stomatal morphology, venation pattern and trichome

distribution, Para dermal sections (sections taken parallel to the surface of leaf) as well as clearing of leaf with 5% sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid were prepared. Glycerin mounted temporary preparations were made for macerated/cleared materials.<sup>8-12</sup>

**Photomicrographs :** Microscopic descriptions of tissue are supplemented with micrographs wherever necessary.

Photographs of different magnification were taken with Nikon Labphot 2 microscopic unit. For normal observations bright field was used. For the study of crystals, starch grains, and lignified cells, polarized light was employed. Since these structures have refringent property, under polarized light they appear bright against dark background. Magnifications of the Figures are indicated by the scale-bars.<sup>13-17</sup>

### Artemisia Pallens



Fig-1 species of Artemisia pallens

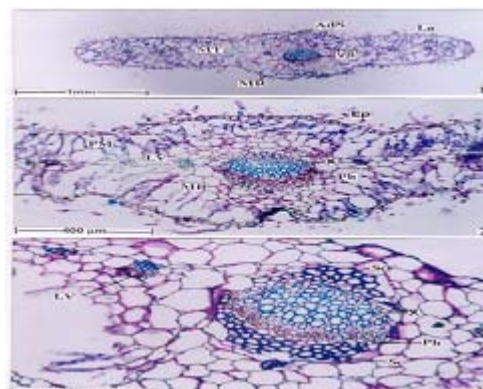


Fig: 2: Anatomy of the leaf

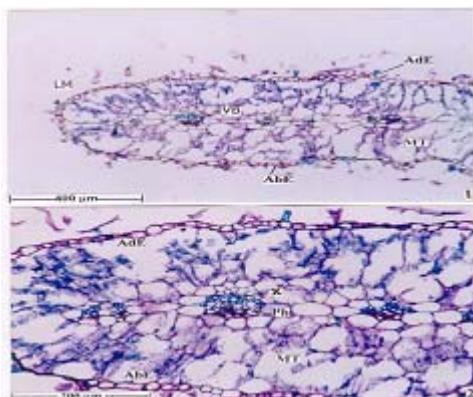


Fig. 3: Anatomy of the lateral vein with leaf margin

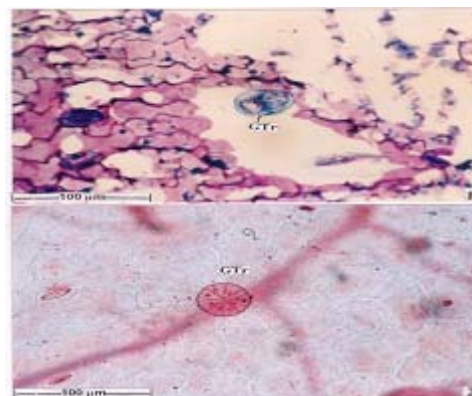


Fig. 4: Trichome Morphology in surface view



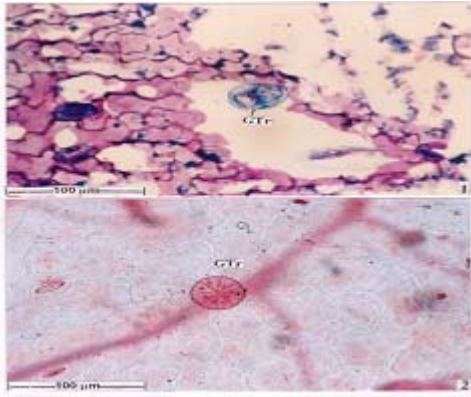


Fig: 5. Structure of trichome

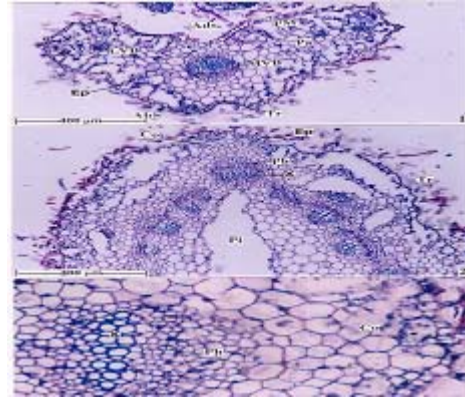


Fig. 6. Anatomy of the petiole and stem

### Artemisia Abrotanum



Fig-1 species of Artemisia abrotanum

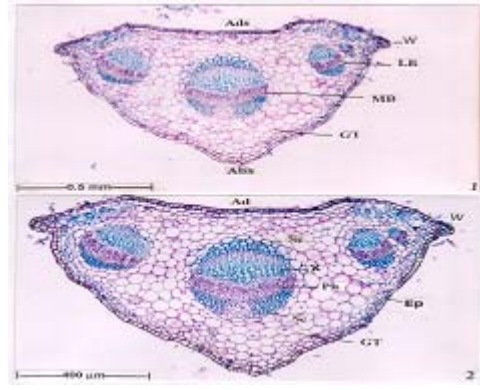


Fig:2 Cross – sectional features of the petiole

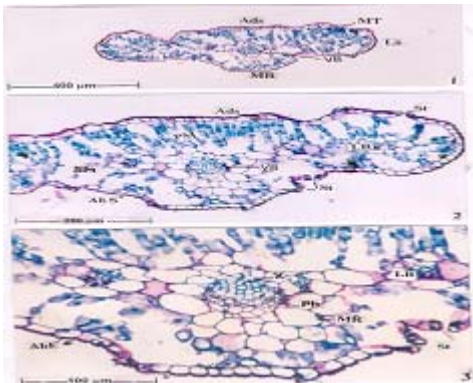


Fig: 3: Anatomy of the leaf

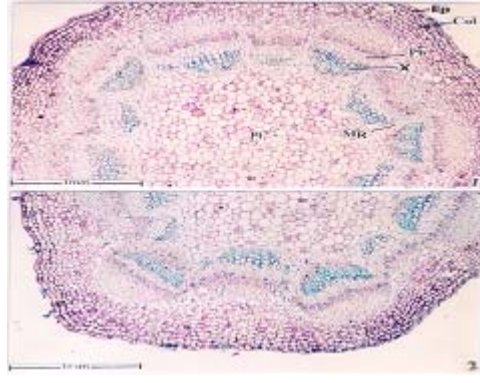


Fig: 4: Anatomy of the stem—ground plane

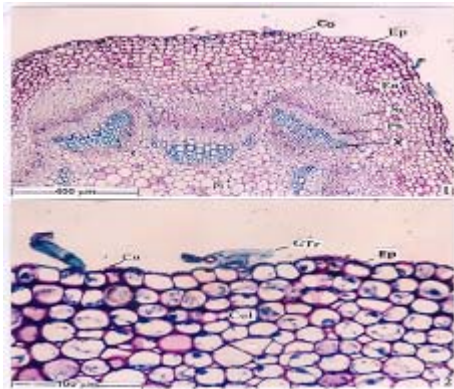


Fig: 5. T.S of stem

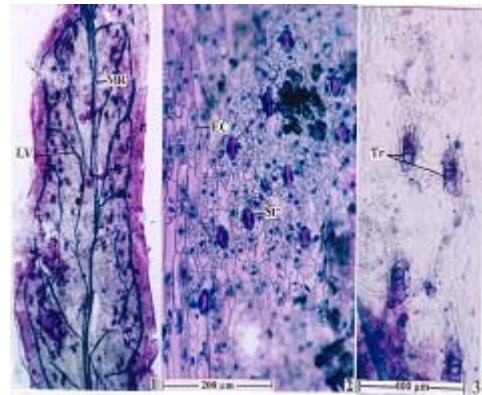


Fig: 6: Structure of cleared lamina.

**Artemisia pallens**

**LEGENDS FOR FIGURES**

**Fig : 2 : Anatomy of the leaf: fig.2.1 T.S. of entire view: Fig.2.2 T.S. of midrib enlarged**

**Fig.2.3 Midrib vascular bundle enlarged.**

(Ads – Adaxial side; Ep – Epidermis; La – Lamina; Lv – Lateral vein MR – Midrib; MT – Mesophyll tissue; Ph – Phloem; SC – Sclerenchyma; VB – Vascular bundle; X – xylem)

**Fig. 3: Anatomy of the lateral vein with leaf margin : Fig.3.1 T.S. of leaf margin.Fig.3.2 T.S. of lateral vein enlarged**

(Abe – Abaxial epidermis; Ade – Adaxial epidermis; LM – Leaf margin; MT – Mesophyll tissue; Ph – Phloem; VB – Vascular bundle; X – xylem)

**Fig. 4: Trichome Morphology in surface view:Fig.4.1 Distribution of trichome.Fig.4.2. One trichome enlarged**

[Gtr – Glandular trichome; MV – Mid vein; VI – Vein-islets; VT – Vein termination]

**Fig : 5. Structure of trichomes.Fig.5.1. Two celled spindle shaped trichome. Fig. 5. 2 Circular peltate trichome [Gtr - Glandular.]**

**Fig. 6. Anatomy of the petiole and stem.Fig.6.1.T.S. of petiole Fig.6.2. T.S. of stem.**

**Fig 6.3 T.S. of stem one vascular bundle enlarged.**

[Abs – Abaxial side; Ads – adaxial side; Co – Cortex; Ep – Epidermis; LVB – Lateral vascular bundle; MVB – Median vascular bundle; Pa – Parenchyma; Ph – Phloem; Pi – Pith; PM – Palisade Mesophyll; Tr -Trichome; X – Xylem

**Artemisia abrotanum  
Legends for figures**

**Fig : 2 : Cross - sectional features of the petiole.Fig:2.1. T.S. of petiole under low magnification.Fig:2.2.T.S. of the petiole under high magnification.**

[Abs – Abaxial side; Ads – Adaxial side; EP – Epidermis; GT – Ground tissue; Lb – Lateral bundle; Mb – Median bundle; Ph – Phloem; SC – Sclerenchyma; W – Wing, X – xylem]

**Fig: 3: Anatomy of the leaf. Fig:3.1. T.S. of leaf entire view. Fig:3.2. T.S. of leaf a sector enlarged. Fig:3.3. T.S. of leaf midrib enlarged.**

[Abe – Abaxial epidermis; Abs – Abaxial side; Ads – Adaxial side; La – Lamina; Lb – Lateral bundle; MR – Midrib; MT – Mesophyll tissue; Ph – Phloem; PM – Palisade mesophyll; SM – Spongy mesophyll; St – Stomata; VB – Vascular bundle; X – xylem]

**Fig: 4: Anatomy of the stem – ground plane**

[Col – Collenchyma; Ep – Epidermis; MR – Medullary ray; Ph – Phloem; Pi – Pith; X – Xylem]

**Fig: 5. T.S of stem Fig: 5.1. T.S of stem a sector enlarged. Fig:5.2. Cortical portion of the stem bearing epidermal trichome.**

[Co – Cortex; Col – Collenchyma; Cu – Cuticle; En – Endodermis; Ep – Epidermis; GTR – Glandular trichome; Ph – Phloem; SC – Sclerenchyma; X – xylem]

**Fig: 6: Structure of cleared lamina. Fig:6.1. Lamina showing venation pattern Fig:6.2. Stomatal Morphology. Fig:6.3. Trichome features.**

[EC – Epidermal cell; Lv – Lateral vein; MR – Midrib; St – Stomata; Tr – Trichome]

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## Results :

Microscopical observation of *Artemisia pallens* showed that the leaf is dorsiventral with isolateral mesophyll tissue. The midrib is fairly prominent and spindle shaped in cross sectional view, projecting equally on the upper and lower sides. The epidermal layer of the midrib is thin and distinct with squarish cells and smooth cuticle.

There is a single large vascular bundle which is surrounded by compact parenchymatous tissue; the vascular bundle is collateral with adaxial parallel rows of xylem and abaxial are of phloem.

Thick mass of sclerenchyma cells occurs both on the upper and lower sides of the Vascular bundle. The epidermis is stomatiferous both on the upper and lower sides.

Microscopical observation of *Artemisia abrotanum* revealed that the leaf is flat and dorsiventral; the surface has shallow furrows. It is 700 µm wide and 200 µm thick along the midrib. The lamina has fairly distinct epidermis, made up of squarish cells with thick echinate cuticle.

Both abaxial and adaxial epidermal layers are stomatiferous. On the adaxial part of the lamina is a palisade zone comprising of two or three layers of vertically oblong, loosely organized cells. On the abaxial part also, there is a single layer of short palisade cells.

In between the abaxial and adaxial palisade zones occurs a horizontally



distributed spherical or lobed spongy parenchyma cell. A thick mass of parenchymatous cells occurs at the abase of the midrib bundle.

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