

Research Article

Pharmacognostical Standardization and Phytochemical Analysis of Leaves of *Dichrostachys cinerea* W & Arn

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ABSTRACT

The plant kingdom represents as enormous reservoir of biologically active molecules and so far only a small fraction of plants with medicinal activity has been assayed. Nearly 50% drugs used in medicine are of plant origin. *Dichrostachys cinerea* Wt & Arn is commonly known as Vidattalai in Tamil and Vellantaraha in Sanskrit. Tender shoots of the plant are bruised and applied to the eyes in case of ophthalmia. Bark to treat dysentery, toothache, elephantiasis, vermifuge, snake-bite, leprosy, syphilis, gonorrhoea, anthelmintic, purgative, laxative and diuretic, arthritis, abortifacients, and also used for pulmonary trouble, pain killer. The standardization of herbal drugs are important parameter in order to ensure authentic material used in the preparation of herbal formulation. In this study, standardization of the plant such as macroscopic, microscopic physio-chemical characters of the leaves of *Dichrostachys cinerea* has been carried out. Preliminary phytochemical analysis of various extracts of the leaves was also performed. All these pharmacognostical and phytochemical investigation can be used for correct identification of the plant.

Keywords: *Dichrostachys cinerea*, Pharmacognosy, Phytochemistry, Microscopical studies, Physio chemical evaluation.

INTRODUCTION

Dichrostachys cinerea W&Arn (mimosaceae) is a perennial much – branched thorny shrub sometimes a small tree upto 2m in height, bark light coloured furrowed branchlets ending in spines, indigenous to N.W – India, N. Australia. Leaflets are minute, sessile 12-20 pairs, close, linear or strap shaped oblique, subacute. The leaves of *D. cinerea* are used as laxative and used to treat gonorrhoea and boils. It is also used as a fodder. Powder from leaves is used in the massage of fractures. The leaf also used as pain –killer, oedema, gout, venereal diseases, swellings, diuretics and also naso-pharyngeal affections.^{1,2} Brushed young shoots used in the treatment of ophthalmia, astringent, rheumatism and urinary calculi.^{3,4} The various phytoconstituents were reported for this plant such as a novel compound namely (-) mesquite were isolated from the wood of *D. cinerea*, it is better antioxidant and it may have potent anti-inflammatory and anticancer activity,⁵ the epicatechin from wood powder known to possess several therapeutic activity like anti-diabetic, antiviral inhibition of angiotension.⁶ The present paper deals with the macroscopic and Quantitative microscopic studies of the plant and physio chemical characters like loss on drying, total ash, acid insoluble ash, water soluble ash and extractive values and also preliminary phytochemical studies of various extracts were carried out.

MATERIALS AND METHODS

The plant material was collected from the forest area of Perambalur District in the month of August, it was authenticated by the Taxonomist The voucher specimen has been preserved in the herbarium of Department of

Pharmacognosy, Madurai Medical College, Madurai. The healthy leaves were washed and dried in shadow, the dried leaves were powdered coarsely. This is used for further studies.

Microscopic studies: The leaves were cut and fixed in FAA (Formalin-5 ml + Acetic acid – 5 ml + 70% ethyl alcohol-90 ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary-butyl alcohol. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60°C), until TBA solution attained super saturation. The specimens were cast into paraffin blocks. The paraffin embedded



Fig 1: Macroscopy of *D. cinerea* leaves

Table:1 Quantitative microscopy of leaves of *Dichrostachys cinerea*

S.No	Parameters	Minimum	Maximum	Average
1.	Vein islet	10	12.5	15
2.	Vein termination	6	7.4	9
3.	Stomatal index	23.26	25.04	27.08
4.	Stomatal No	75	79.9	84

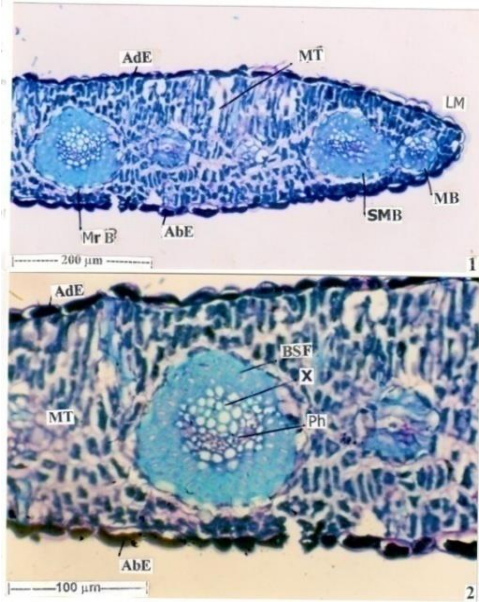


Fig 2: Leaflet of *D.cinerea*

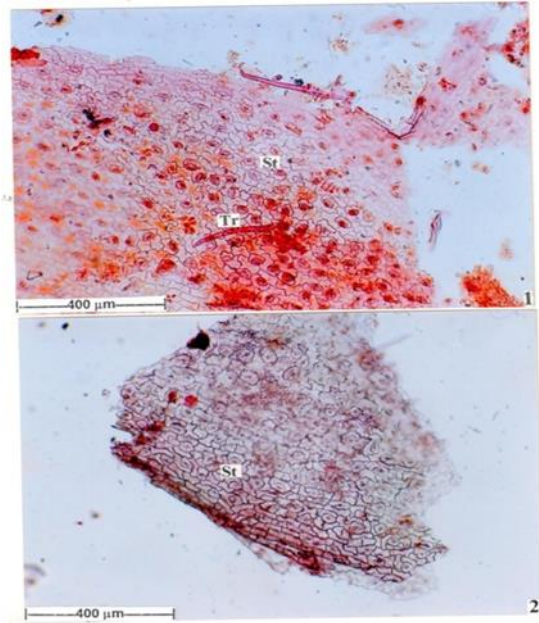


Fig 3: Abaxial epidermis of *D.cinerea* showing stomata

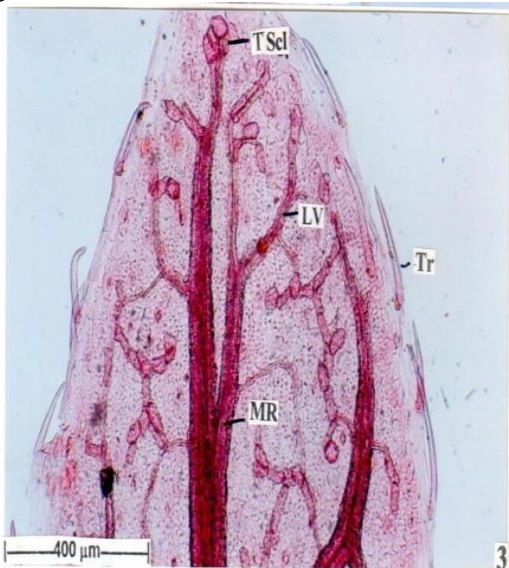
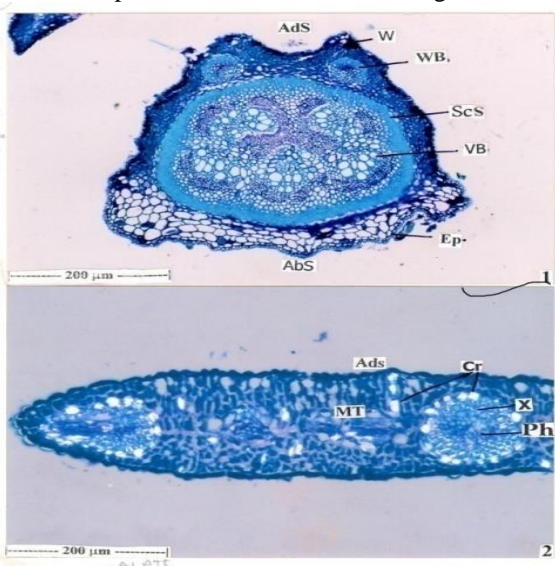


Fig-4: Venation pattern of Leaflet of *D.cinerea* & T.S of Rachis of *D.cinerea*



specimens were sectioned with the help of rotary microtome. Photographs of different magnifications were taken with Nikon labphot 2 microscope units.^{7, 8}
 Physiochemical constants:
 Physiochemical constant such as Percentage of total ash, acid insoluble ash, Acid soluble ash, Loss on drying, Benzene soluble, Petroleum ether soluble, Ethanol and

water soluble extractive values were calculated based on the procedure prescribed in Ayurvedic Pharmacopoeia of India.^{9, 10, 11}

Preparation of plant extract: The healthy leaves of *Dichrostachys cinerea* are washed & dried in the shade. The dried powder was successively extracted using Petroleum ether (40-60° C), Benzene, Chloroform, Ethanol and water by using Soxhlet apparatus. The solvents was

Table-2: The Physio-chemical characters of the leaves of *Dichrostachys cinerea*

S.No	Parameter	Values (%)
1.	Loss on drying	8.06
2.	Total ash	10.02
3.	Acid insoluble ash	1.08
4.	Water soluble ash	6.5
5.	Extractive values	
	Petroleum ether	1.52
	Chloroform	1.24
	Benzene	1.86
	Ethanol	2.75
	Water	4.01

Table-3: Response to the preliminary phytochemical screening for the different extracts of leaves of *D.cinerea*

Tests	Petroleum ether extract	Benzene extract	Ethyl acetate extract	Chloroform extract	Ethanolic extract	Aqueous extract
Alkaloids	-	-	-	-	-	-
Carbohydrates	-	-	-	-	+	+
Glycosides	-	+	-	-	+	+
Phytosterols	+	-	+	+	-	-
Saponins	-	-	-	-	+	+
Tannins	-	-	-	-	+	+
Proteins & free amino acid	-	-	-	-	+	+
Gums & mucilage	-	-	-	-	-	-
Flavonoids	-	-	-	-	-	-
Terpenoids	+	+	+	+	+	-
Fixed oil	-	-	-	-	-	-

“+” Indicate Positive reaction “-” Indicate Negative reaction

removed under reduced pressure by rotary evaporator, the dried extract were used for further study.^{12, 13}

Phytochemical screening: The concentrated extract of leaves of *D.cinerea* was subjected to preliminary phytochemical screening by various chemical tests prescribed in standard text^{14, 15}

RESULTS AND DISCUSSION

D.cinerea is a small tree up to 2m in height, bark grey or light brown coloured furrowed branch lets ending in spines. Leaves bipinnate, leaflets are minute sessile 12-20pairs close, linear or strap shaped oblique, subacute. Flowers are numerous crowded in dense auxiliary spikes 2.5-3.8cm long. The upper half of the spike yellow, the lower pink. (Fig.1)

The microscopic characters of the leaf were presented in Fig 2, 3, 4. In this study, the leaflet showed 150µm thick in the middle & 40 µm at the margin elliptical with narrow margin. Epidermis showed thin tanniferous & semicircular with raised outer preclinical walls, Mesophyll is not well differentiated into palisade and spongy parenchyma and it consist of 8-10layers of short, rectangular tanniferous compact & darkly staining cells. Xylem occurs as conical cluster and Phloem as a thick arc. Stomata occur on the abaxial epidermis and paracytic (rubiaceous) type with smaller & another larger subsidiary cells. The epidermal cells are amoeboid in shape with wavy thin anticlinal

walls. The epidermal cells along the veins are longitudinally elongated and straight walled. The trichomes are unicellular, conical all seen along the margin. The mesophyll tissue and in the lumen of the sclerenchymatous cells of vascular bundle randomly contains calcium oxalate prismatic crystals. They are cubic, rhomboidal and rectangular in shape.

In cross sectional view the rachis is shield shaped with two adaxial short wings shallow median concavity and wide adaxial side. The main vascular system has a thick, circular hallow parenchymatous cylinder which encloses five prominent vascular bundles.

The quantitative microscopical studies showed the vein islet, vein termination; Stomatal index and Stomatal number were calculated according to the standard procedure and recorded in table no: 1

Physiochemical constant Determination: The Physiochemical characters of *D.cinerea* were recorded in table no-2. The observed Loss of weight on drying of the leaves of *D.cinerea* is 8.06%w/w. The total ash and water soluble ash value of powdered leaves of *D.cinerea* were found to be more in crude drugs. The extractive values of *D.cinerea* leaves showed more amounts of water and alcohol soluble compounds than Petroleum ether, Chloroform, Benzene soluble compounds. Successive extraction of the leaves was carried out and the water soluble extractive value found to give maximum extractive

value (4.01%). The extractive values and the results of physiochemical constants were presented in Table no: 2. The preliminary phytochemical tests of various extracts of the leaves of *D.cinerea* revealed that the presence of carbohydrates, glycosides, sterols, terpenoids, Saponins, tannins and Proteins and free aminoacids. The results are presented in Table no: 3.

CONCLUSION

The microscopical studies, physico chemical parameters, and chemical tests performed will guide in the proper identification of the plant as well as help in authentication of the purity of the plant *Dichrostachys cinerea* from other species.

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