

## Research Article

# Pharmacognostic Studies of *Lantana aculeata* Roots

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### ABSTRACT

Indian sub-continent is rich in a variety of flora and also considered to be the home of many medically important plant species. Weeds are part of the flora that varies in density of the species in different areas and in different conditions. Considering the importance of the weed *Lantana aculeata* and its multivarious applicability in Ayurvedic medicine, it is felt that a thorough analysis of various stages (young and mature root) of the plant species is worthwhile, which deals with their evaluation of microscopic, cellular composition, tissue organization and cell inclusions. Such a study may enable one to identify the taxon in any fragmentary form of its parts. Under a situation when incomplete sterile samples are to be identified, one has naturally resort to the histological analysis of the samples by employing certain special techniques, which have been in vogue in the field of Pharmacognosy. Botanical microtechniques have been playing a role par excellence not only in Pharmacognosy but also in Forensic Sciences and other related fields of investigations. Having apprehended its worth, this section is devoted to the pharmacognostic analysis of *Lantana aculeata* roots (young and mature) and to propose a protocol of anatomical features for diagnosing and distinguishing from its adulterants.

**Keywords:** *Verbenaceae*, *Lantana aculeata*, Pharmacognosy

### INTRODUCTION

*Lantana* is the genus of the family Verbenaceae with 150 species. *Lantana* is mostly native to subtropical and tropical America, but a few taxa are indigenous to tropical Asia and Africa<sup>1</sup>. The family Verbenaceae has about 70 genera comprising of about 800 species<sup>2</sup>, while the Indian Verbenaceae consists of 14 genera<sup>3</sup>. The Indian *Lantana* has 6 species namely *L. aculeata*, *L. indica*, *L. splendens*, *L. trifolia*, *L. veronicifolia* and *L. wightiana*<sup>4</sup>.

*Lantana aculeata* is the most aggressive weed which is distributed in many locations and even ground covering extensive areas<sup>3</sup>. *Lantana aculeata* is known by different names in vernacular languages - *Vanaccedi* (Sanskrit), *Ghaneri* (Hindi), *Unnichi* (Tamil), *Pulikampa* (Telugu), *Arippu* (Malayalam). A low, erect or sub-scant shrub, 1.2 – 2.4 m high with stout recurved prickles and a strong odour of black currants, introduced into India as an ornamental and hedge plant, now completely neutralized and found throughout India. Leaves are opposite, ovate or ovate-oblong, acute or sub acute, crenate-serrate, rugose above, scabrid on both sides; flowers are small, in axillary heads, usually orange in colour, sometimes varying from white to red or yellow; fruit drupaceous, small, greenish blue black or blackish, shining, with two nutlets. Flowers and fruits are present almost throughout the year, but chiefly during the month of July – October<sup>5</sup>.

The primary objective of the present study is to make a detailed anatomical analysis of mature and Young roots of *Lantana aculeata*. It is generally acceptable that each taxon, as a biological entity, is endowed with specific structure and organization that distinguish it from others. Depending on a limited quantum of characters of selected organs of a plant for diagnosis may sometimes land the investigators in a bewildering state, because of overlapping of structure among species inhabiting similar ecological regime. Bearing this fact in mind, a combination of characters pertaining to different organs of a taxon will prove to be of high diagnostic value.



Fig1: *Lantana aculeata*

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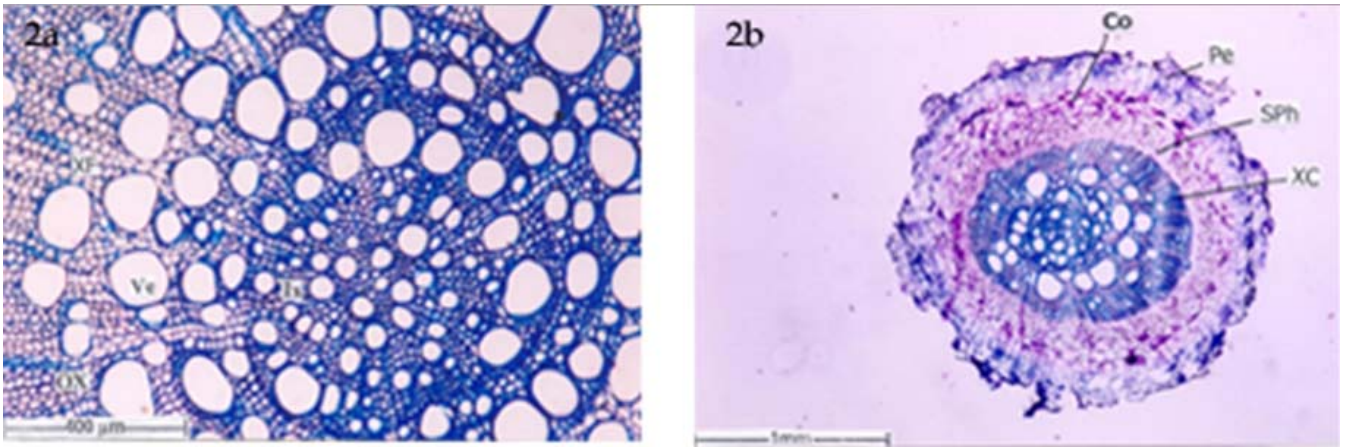


Fig 2a. Thin (Young) root – T.S of Secondary Xylem – enlarged, 2b. T.S of thin (Young) root – entire view

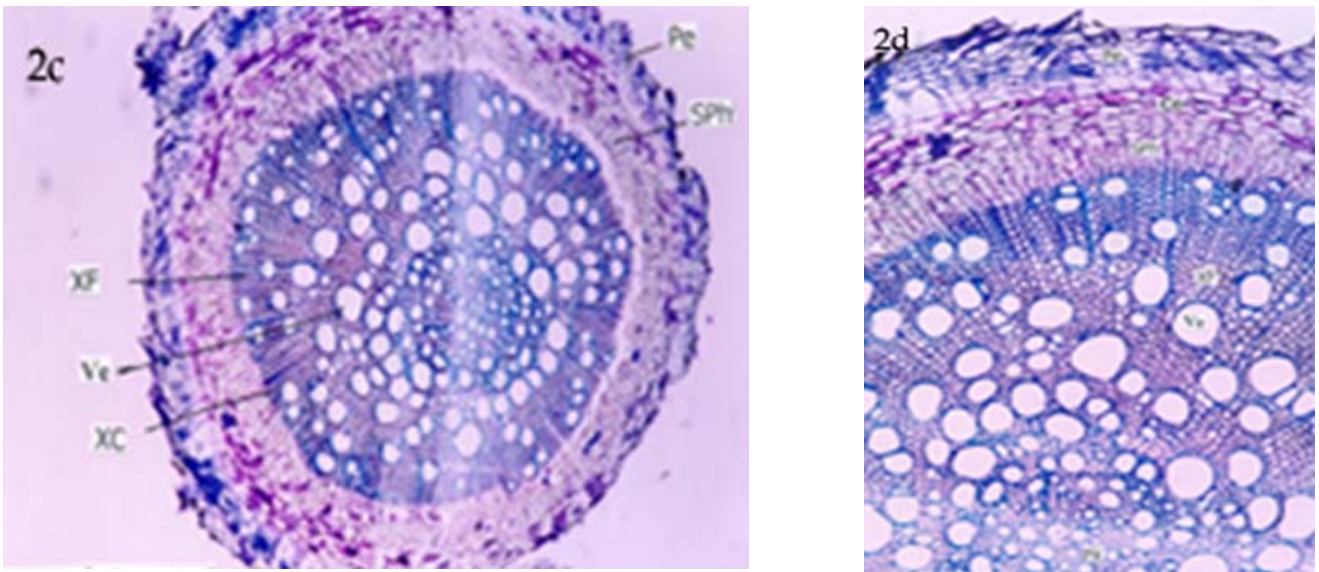


Fig 2c. T.S of thick (Old) root – entire view, (Co-Cortex; Pe-Periderm; Sph-Secondary Phloem; Ve-Vessel; XF-Xylem fibres; XC-Xylem Cylinder), 2d. Old – root – a sector enlarged, (Co-Cortex; Pe-Periderm; PX-Primary Xylem; Sph-Secondary Phloem; Ve-Vessel; XF-Xylem Fibres)

## MATERIALS AND METHODS

### Collection and authentication of specimens

The plant specimens (young and mature roots of *Lantana aculeata*) for the proposed study were collected during the month of October – November from Puducherry (India) and care was taken to select healthy plants and for normal organs. The plant materials was identified and authenticated by Dr. P. Jayaraman, Director, Plant Anatomy Research Centre, Medicinal Plant Research Unit, Chennai (India). A voucher specimen has been deposited for future reference (No. PARC/2006/8).

### Fixation

The required samples of different organs were cut and removed from the plant and fixed in FAA (Formaline – 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<sup>6</sup>. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58 – 60° C) until Thiobarbituric acid solution attained super saturation. The specimens were cast into paraffin blocks.

### Sectioning

The paraffin embedded specimens were section with the help of Rotary Microtome. The thickness of the sections was 10 – 12 µm. Sections were dewaxed<sup>7</sup>, stained with toluidine blue<sup>8</sup> and mounted in glycerine medium after staining. Different cell component were studied and measured.

### Photomicrographs

Photographs of different magnifications were taken with Nikon Labphot 2 Microscopic Unit. The observations were made with bright field.

## RESULTS

Histopathological analysis of the samples by employing certain special techniques performed distinguished the *Lantana aculeata* roots (young and mature) from its adulterants. Toluidine blue stain which was used rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc. The Microscopic studies were revealed as follows

### Young root

It is 1.6 mm in diameter. It has wide, irregularly fissured periderms, fairly wide and continuous secondary phloem ensheathing dense, solid cylinder of secondary xylem (Figure 2a). Periderm is nearly 100µM wide; it consists of regular radial files of thin walled tabular phellem cells followed by four or five layers of small parenchyma cells forming the cortex (Figure 2b). Secondary phloem has narrow cells, which occur in their radial rows. The secondary xylem is circular with excentric central core. The xylem cylinder consists of a central darker portion with diffuse narrow vessels and thick walled fibres – the inner denser xylem ends abruptly. The outer xylem has wider vessels and thin walled fibres (Figure 2b). The vessels are thin walled; they vary in shape and are thin walled. The widest vessel in the inner xylem cylinder is 70 µm in diameter; the vessels in the outer xylem are 120 µm in diameter.

#### *Mature root*

It is 2.25 mm thick. It has wider periderm with deep and broad fissures (Figure 2c and Figure 2d). The phellem cells of the periderm irregular in arrangement; it is 150 µm wide. The cortex has 6 or 7 layers of tangentially elliptical parenchyma cells. The secondary phloem has distinct, fairly wide sieve elements, which occur in small clusters (Figure 2d). Secondary xylem is dense and solid. It has central darker core and outer lighter zone. The central (inner) core of xylem has narrow vessels and thick walled fibres. The outer xylem has wide, diffusely distributed vessels in the thin walled fibres of ground tissues. The vessels are solitary, angular or circular in sectional view and diffuse in distribution. The widest vessel in the inner core of xylem is 15 µm while the outer vessels are 30 µm wide.

#### **DISCUSSION**

The comprehensive analysis of the anatomical features of roots (young and mature) of *Lantana aculeata* presented may help us to evaluate the utility of these attributes in establishing the botanical identity of the taxon. While discussing the purpose of systemic anatomy, it has rightly pointed out that any exercise that involves the identification of vegetable material when it

is in a fragmentary condition, partly decomposed, or when reproductive organs are not available, can be achieved only by the methods of comparative histology. This applies to confirm the identification of economic plant products ranging from timbers to foodstuffs as well as crude drugs of vegetative origin. Adulterants and substitutes can also be detected. Present informations obtain established the different stages of growth of plant and will serve as a guide to the future workers in case the roots of *Lantana aculeata* are available in fragmentary forms.

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