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Root and Stem anatomy of *Naregamia alata*

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ABSTRACT

Present study deals with the pharmacognostical study of root and stem of Naregamia alata Wight & Arn for its identification and to distinguish it from the co-existing weeds and adulterations with the help of its macroscopic and microscopic features. From the microscopic observation the thin roots have a thin, less prominent, superficial, wary but continuous periderm and the thin roots has wide, undulate, fissured prominent periderm. In thin stem, the cortex fairly wide comprises four or five layers of dilated, thin walled compact parenchyma cells and thick stem, the cortex has five or six layers of thin walled parenchyma cells.

Key words: *Naregamia alata*, Anatomy, Root, Stem.

INTRODUCTION

In India, plants have been traditionally used for human and veterinary health care and medicinal plants and it also play a great role in food supplements for health care as well as in personal care of the mankind [1].Though the traditional Indian system of medicine has a long history of use, they lacked adequate scientific documentation, particularly in the light of modern scientific knowledge [2]. *Naregamia alata Weight & Arn* . (Family: Meliaceae) an undershrub with pungent, aromatic roots (Fig. 1). Distributed throughtout South India in all districts upto 900m. The plant is acid, sweet, cooling, aromatic, alexeteric, vulnerary, emetic, cholagogue, expectorant, depurative and antipyretic. It is useful in the treatments of wounds, ulcers, vitiated conditions of pitta and vata, halitosis, cough, asthma, bronchitis, splenomegaly, scabies, pruritus, dysentery, dyspepsia, catarrh, anaemia and malarial fevers [3].

Fig.1. ***Naregamia alata***

The systematic anatomy is mainly aimed towards relating structure particularly of vegetative organs to taxonomic classification of the plants in which the characters are exemplified [4]. The morphological, microscopic, physicochemical and chromatographic studies would serve as a standard reference for identification, authentication and distinguishing the plants from its adulterants [5].So far no pharmacognostical studies for stem and root of *Naregamia alata* have been reported and hence our effects were devoted in this detection.

EXPERIMENTAL SECTION

The parts of the plant was collected from Thenmalai, Kerala in June 2009 and authenticated by Botanical survey of India, Tamil Nadu Agricultural University, Coimbatore. The voucher specimen number was BSI/SRC/5/23/09-10/Tech.-981 and the specimen was deposited at herbarium of botany department.

Anatomical studies were carried out as per standard methods [6]. For anatomical studies, the section of root and stem of about 10-12 µm thickness were prepared and stained with polychromatic stain, toluene blue and stained with safranin and fast green [7]. Micro photographs at different magnifications were taken with Nikon Lab photo 2 microscopic units to study the anatomical characters. Polarized light was employed to study the nature of starch grains in cortex [8].

RESULTS AND DISCUSSION

Macroscopical studies

The macroscopical studies reveals that the leaves were alternate, three-foliate with unrigged petiole, the leaflets were small, cuneate-obovate. The flowers were either solitary and axillary or two together in the axil. The flowers were pentamerous, with 5 lobed sepals and 5 free, white petals. Sameus were 10, fused into a colum with free authens which were appendaged. Ovant was superior, three celled with two ovules in each cell. Fruit was a loculicidal capsule, seeds were curved and truncate at both ends.

Microscopical studies

Roots

Thin root: A thin root measuring 220 µm thicknesses was studied (Fig.2a) the root has a thin, less prominent, superficial, wary but continuous periderm. This was followed by a wide zone of cortex whose cells were radially feathered and thin walled. There was a ring of small, isolated groups of fibers along the median part of the cortex-phloem zone. The secondry phloem was not well marked. It consists of narrow zone of polygonal cells. Secondry xylem was in the form of wide, dense circular, diffusely distributed vessels. They exhibit accumulation of starch grains in the cortex (Fig. 2b).

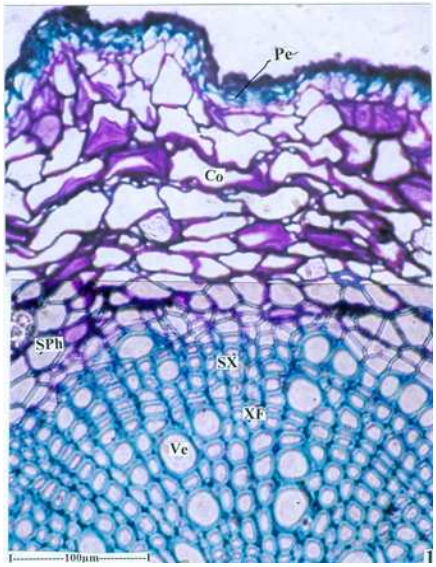

Fig.2a. T.S. of thin root-a sector enlarged

Fig.2b. Starchgrains in the root cortical tissue (as seen under polarized light microscope)
(Co-Cortex, Pe-Periderm, Sph-Secondary phloem, Sx-Secondary xylem, Ve-Vessel, XF-Xylem fibres)

Thick root: The thick root measuring 4mm thickness was studied (Fig. 3a). The root has wide, undulate, fissured prominent periderm, wide homogeneous cortex, wide zone of secondary phloem and wide, solid circular cylinder of secondary xylem (Fig. 3b).
At certain places, the periderm was raised into a thick hump forming lenticels like structures. In this part, the periderm consists of wide, fan shaped, expanded phellem and inner derivatives of wide bund of filling tissues; the cells of the filling tissue was in regular radial series. The phellem cells in the region other than the lenticels portion were thick walled, homogeneous and suberised. Inner to the phellem was a wide zone of phelloderm, where the cells were rectangular and radially arranged.

Secondary phloem (Fig. 3c) was 300-400 µm wide in radial plane. It consists of outer collapsed tissue which can be seen as thick, dark patches, arranged in a circle. In between the dark patches were intact large parenchyma cells.

Secondary xylem (Fig. 3d) exhibits less distinct growth rings with diffusely distributed vessels. The vessels were narrow, circular, thick walled and mostly solitary. The diameter of the vessel ranges from 10-40 µm, xylem fibers were thick walled, lignified and wide lumened. Xylem rays were narrow and straight.

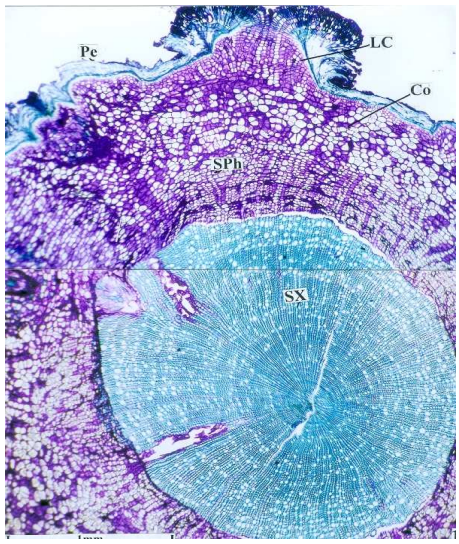

Fig.3a. T.S. of thick root-entire view

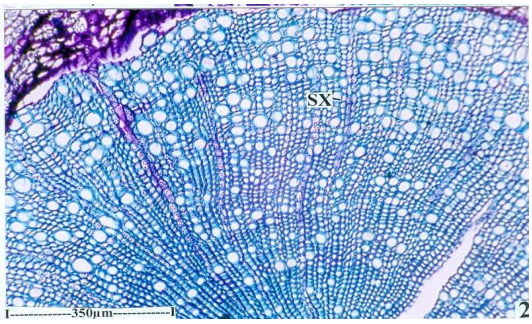

Fig.3b. Structure of the periderm and secondary phloem

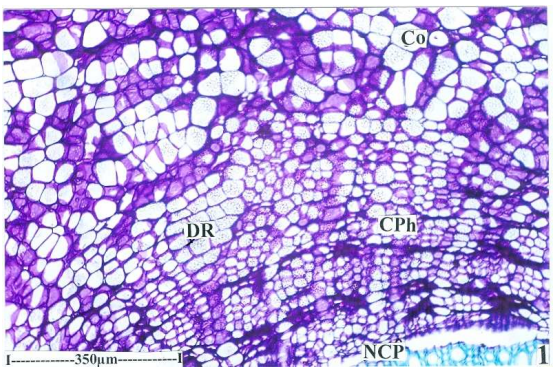

Fig.3c. T.S of Secondary phloem

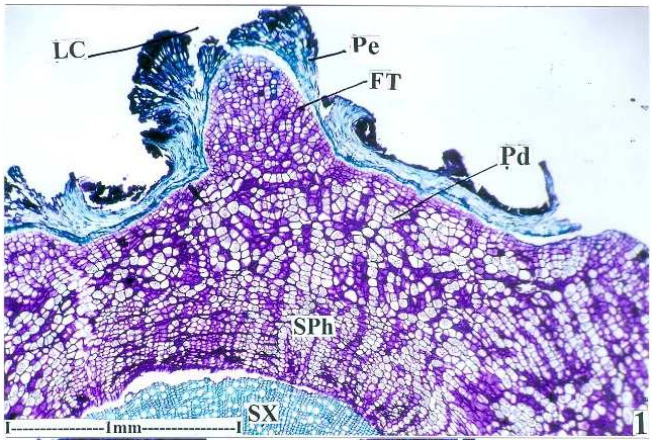

Fig.3d. T.S. of Secondary xylem
(Sph-Secondary phloem, Sx-Secondary xylem, Co-Cortex, Lc-Lenticel-like structure, Pe-Periderm, FT- filling tissue, Lc-lenticel, Pd-phelloderm,)

Stem

Thin stem: The thin stem was 1mm in thickness and it was circular in cross sectional outline with their superficial periderm (Fig. 4). The cortex fairly wide comprises four or five layers of dilated, thin walled compact parenchyma cells. Secondary phloem was narrow continuous sheath around the xylem. External to the phloem were discrete and isolated sclereids forming a ring.

Secondary was a hollow cylinder enclosing a central wide pith. The pith cells were parenchymatous tending to disintegrate. The xylem includes, narrow, angular or circular vessels which were either solitary or in short radial multiples. The fibers were thick walled, lignified and polyhedras was sectioned outline. The vessels were 10-20 µm wide.

Thick Stem: It was 1.5 mm in thickness and it consists of fairy wide superficial periderm measuring 60-70 µm wide (Fig. 5). The cortex has five or six layers of thin walled parenchyma cells. Phloem sheath with their discontinuous sclereid ring was seen outside the xylem. The pith was wide, parenchymatous and intact. The xylem cylinder measures 350 µm from inner to the outer periphery. The structure was similar to the thin stem. It consists of most long radial of

vessels, thick walled lignified fibers and narrow, less prominent rays. The vessels are 8-20 µm wide.

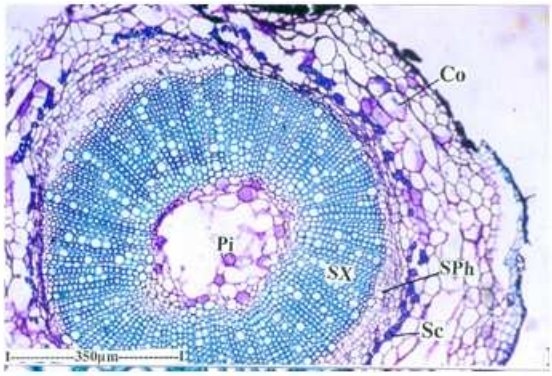

Fig.4. T.S of thin stem

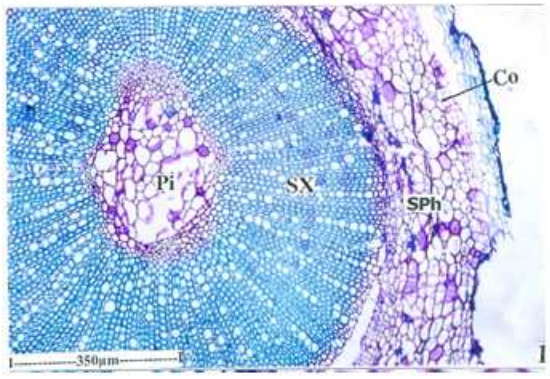

Fig.5. T.S of thick stem

(Co-Cortex, Pi-Pith, Sc-Sclereids, Sph-Secondary phloem, Sx-Secondary xylem)

The pharmacognostical characters reported in this work can serve as a valuable source of information and provide suitable diagnostic tool for the standardization as well as adulterant identification of this medicinal plant in future investigation or application.

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