



# Atlas of Macro-microscopy of *Savuripazham* of Siddha – Fruit of *Trichosanthes tricuspidata* Lour.

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## ABSTRACT

**Introduction:** *Trichosanthes tricuspidata* Lour. is used in various traditional system of medicine all over the world. Though highly traded medicinal plant it is little explored material of medicinal importance. Savuri pazham is used in Siddha medicine for sinusitis, headache and body pain. The present study was taken up to evaluate the macro-microscopic characterization for the authentication of dried fruit rind of *T. tricuspidata*. **Methods:** Fruits were collected from Mettur, Tamil Nadu; fruits were cut into halves and dried under shade. The macroscopic and microscopic details including the powder were studied following standard pharmacopoeial procedures. **Results:** Macroscopically fruit is glabrous, smooth, ovoid to fusiform indehiscent berry with many ellipsoid to angular seeds. Microscopically, transverse section of the fruit pericarp showed epicarp, mesocarp with sclerids and parenchymatous cells which is traversed by vascular bundle and randomly distributed resin canal cells; seed showed outer testa, middle testa and inner testa followed by endosperm, pigment layer and cotyledon. Microscopy of powder of fruit pericarp showed the presence of thick walled polygonal cells of the epicarp; fragment of vascular bundle with spiral, annular and pitted vessels; group of polygonal to rounded sclereids of various sizes and shapes; powder of seed showed groups of elongated sclereids from outer testa; pitted sclereids of the mesotesta; thick walled cells of the endosperm with oil drops; and scattered simple starch grains. **Conclusion:** The atlas will be useful in the identification for standardization and quality control of fruit rind of *T. tricuspidata*.

## KEYWORDS

Macro-microscopy Atlas, Pharmacognosy, *Savuripazham*.

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India has a tremendous potential to offer in the field of herbal medicine owing to its immense diversity of flora which is bestowed with enormous number of medicinal plants. The drug manufacturing units in India make use of nearly 300 species of drugs in addition to those used by the traditional systems of medicine.<sup>[1]</sup> *Trichosanthes*, the largest genus of the Cucurbitaceae comprising about 100 species is distributed along India, Sri Lanka, China, Japan, Southeast Asia, Malaysia, New Guinea, Australia, Fiji and Vanuatu.<sup>[2]</sup> *T. tricuspidata* is a large climber, often attaining a height of 9 to 10 m with a robust stem which is woody below and gives out 3-cleft tendrils. The leaves are palmately 3 to 5 lobed with a cordate base, and the lobes are ovate to oblong with serrate to dentate margins. Male flowers are in axillary 5 to 10 flowered racemes with large bracts, while the female flowers are solitary. This plant has been widely used for curing asthma, migraine, fever, diabetic carbuncles and other maladies.<sup>[3]</sup> *T. tricuspidata* finds application in nearly all the traditional system of medicine including Ayurveda, Siddha, Unani<sup>[4]</sup>, Thai<sup>[5]</sup>, in addition to veterinary<sup>[6]</sup> and folklore practice.<sup>[7]</sup> Savuri pazham is used in Siddha medicine for sinusitis, headache and body pain. It is also called as Korattai pazham and Peenisa Korattai. As fruits are believed to be poisonous and it is used only externally. Leaf juice is used for vitiligo and fruit juice is used for blackening of hair.<sup>[8]</sup> The seeds are emetic and a good purgative.<sup>[9]</sup> A number of pharmacologically important phytochemicals such as cucurbitacins, oleic acid, punicic acid, trichotretol, octanorcucurbitane glycosides<sup>[5,10,11]</sup> has been isolated from this plant. The cucurbitacins isolated from the fruit pericarp of *T. tricuspidata* possess cytotoxic activity.<sup>[12]</sup>

Botanically identified and authenticated dried fruits *T. tricuspidata* were procured from Mettur, Tamil Nadu. The macroscopy was documented by Nikon COOLPIX5400 digital camera. Part of the sample was preserved in FAA (Formalin-5ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml) for sectioning and the rest was powdered, passed through mesh no. 60, and preserved in an air-tight covers for powder microscopy. Transverse sections of the preserved specimens were hand cut using a 7'o clock platinum blade, stained with safranin and photographed using Nikon ECLIPSE E200 trinocular microscope attached with Nikon COOLPIX5400 digital camera under bright field light. Magnifications were indicated by the scale-bars. A pinch of powder was mounted in glycerine on a clean microscopic slide. Slides were observed under Nikon ECLIPSE E200 trinocular microscope and diagnostic characters were identified. Individual characters were magnified to 400X and photographed.<sup>[13]</sup>

Fruit glabrous, smooth, ovoid to fusiform indehiscent berry with many ellipsoid to angular seeds. Halved pieces of fruits are fragmented further into curved pericarps with or without seeds sticking to the placental tissue adhering to the walls. The lower halves shows, at their base, the stalk of the fruit adhering, often with mark of stalk showing as a sunken pit with two tiers of

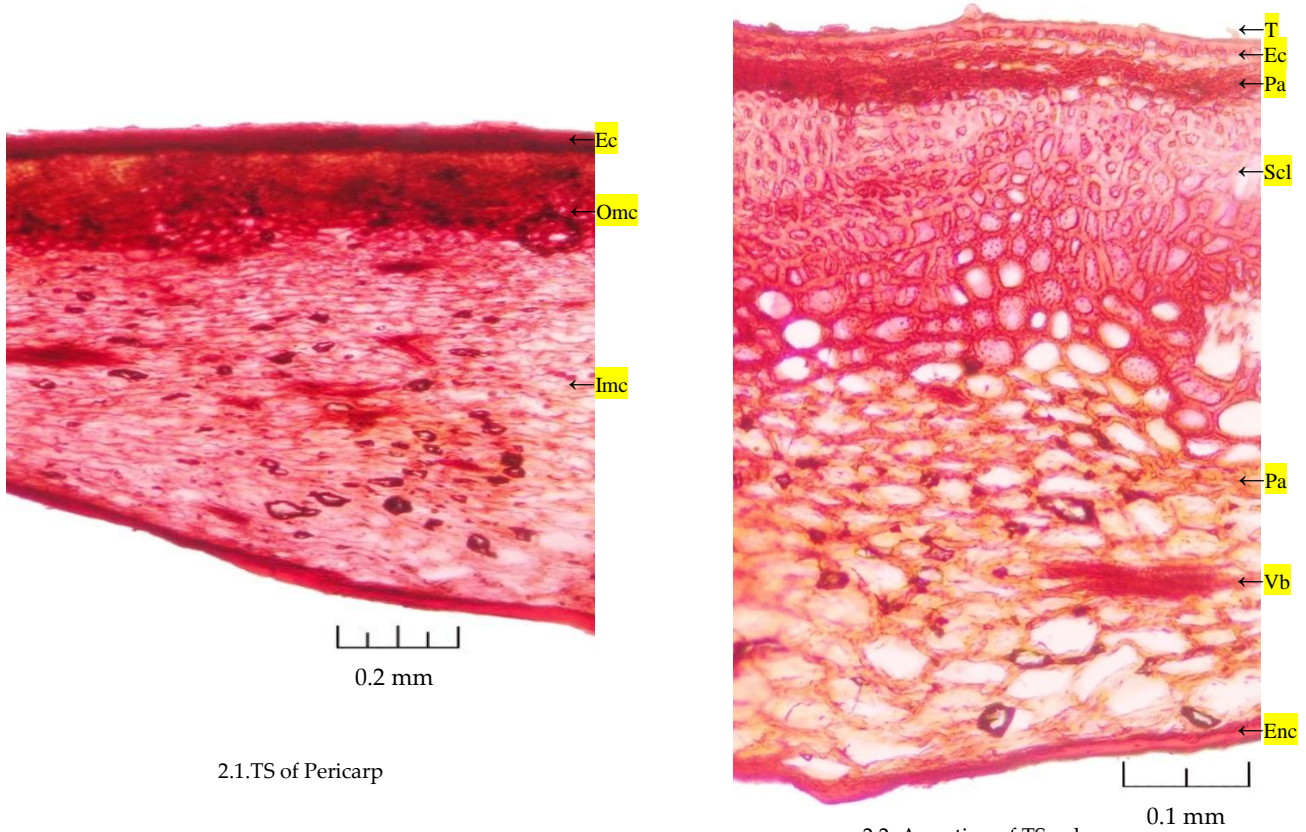
about 10 minute pores formed by detachment of veins with the stalk. The periphery of the pit is surrounded by about 10 prominent dark colored veins traversing from base to tip of the fruit. Inner surface of the halved pericarp shows three placental bases which form network like veins seen sticking to the wall. The brownish black colored placental tissues of the dried fruits are binding the seeds. Seeds are ovate or oblong or elliptical in shape, flat, thin near radicles and show a raised mark on either side almost of the shape of the seed, 0.8 to 1.4 cm long, 0.4 to 0.6 cm broad at the center (Figure 1).

**Figure 1. Macroscopy of *Trichosanthes tricuspidata* Lour. fruit**



TS of fruit pericarp shows outer layer of epicarp followed by mesocarp which is differentiated into outer and inner regions. The epicarp consists of radially elongated rectangular shaped thick walled cells which are covered by thick cuticle and attached with few multicellular covering trichomes. Below the epidermis the outer mesocarp is made of 2 to 3 layers of thin walled parenchymatous cells followed by 10 to 15 layers of thick walled broad lumened pitted sclereids. The outer 5 to 6 layers have cells with thickened radiating walls and very small lumen followed by bigger cells with large lumen and the innermost layer of sclereids are made of larger cells with wide pitted lumen and beaded thickened wall. The inner mesocarp consists of loosely arranged parenchymatous cells which are varying in shape being oblong to oval and thin walled traversed by the vascular bundle and randomly distributed resin canals. The endocarp is formed by multiple layers of compressed parenchyma (Figure 2).

**Figure 2. Detailed microscopy of *Trichosanthes tricuspidata* Lour. fruit**

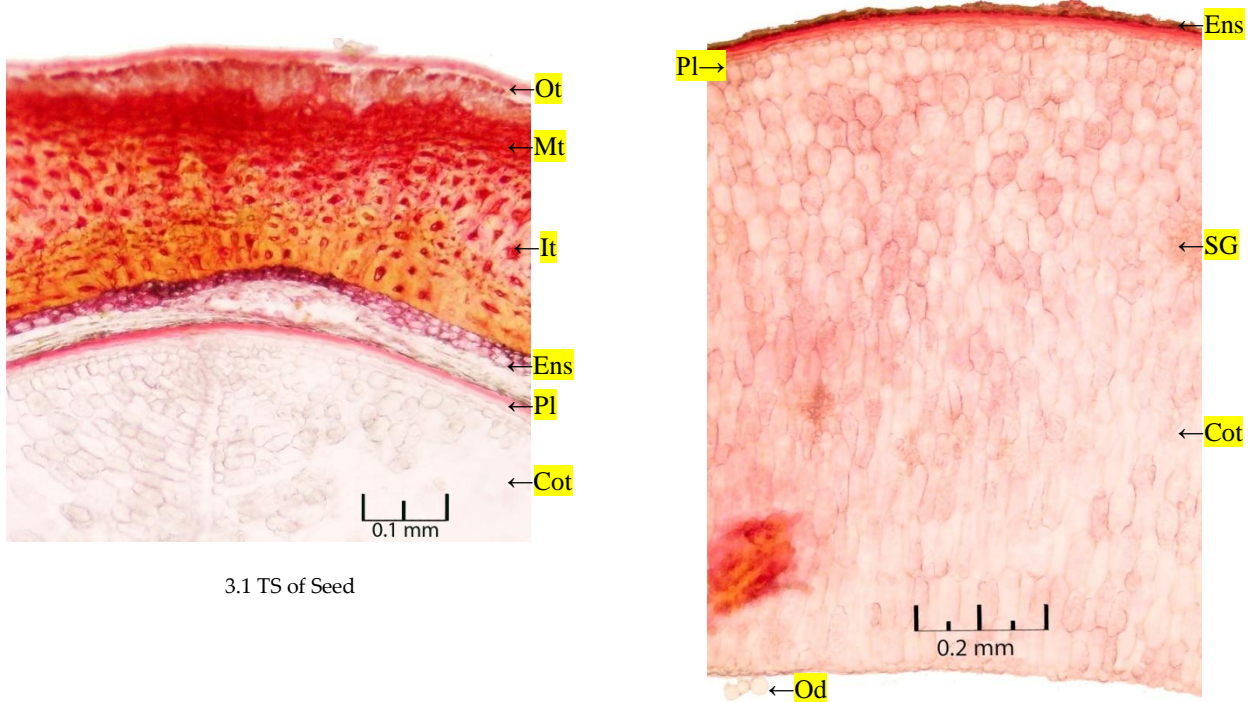


Ec – epicarp; Enc – endocarp; Imc – inner mesocarp; Omc – outer mesocarp; Pa – parenchyma; Scl – sclerenchyma; T – trichome; Vb – vascular bundle.



The TS of seed shows tests differentiated into outer testa, middle mesotesta and inner testa. The outer testa is made up of columnar cells with thick coating of cuticle; the mesotesta cells are formed by compactly arranged tiny sclereids; inner testisa is made up of sclereids of the same type of mesotesta but the size increases from outer side to inner side and the cells have thick wall and narrow lumen. Below testa there are few layers of endosperm cells followed by a pigment layer and then the central region occupied by cotyledon. The endosperm is made up of 4 to 7 layers of tubular cells containing volatile; the pigment layer is made up of closely arranged thin walled small parenchyma cells filled with pigments. The cotyledon consists of numerous layers of thin walled polygonal cells which contain starch grains, aleurone grains and oil globules. Vascular bundle is seen traversing along the lower part of cotyledon (Figure 3).

**Figure 3. Detailed microscopy of *Trichosanthes tricuspidata* Lour. seed**

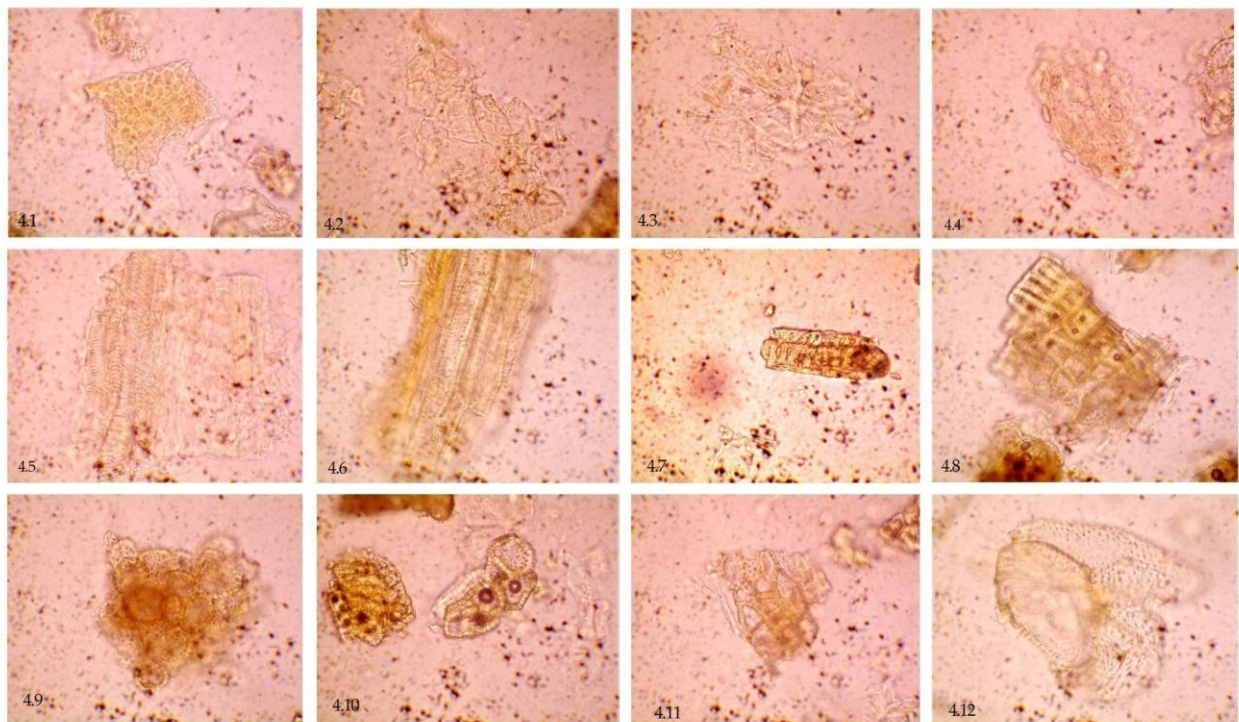


3.1 TS of Seed

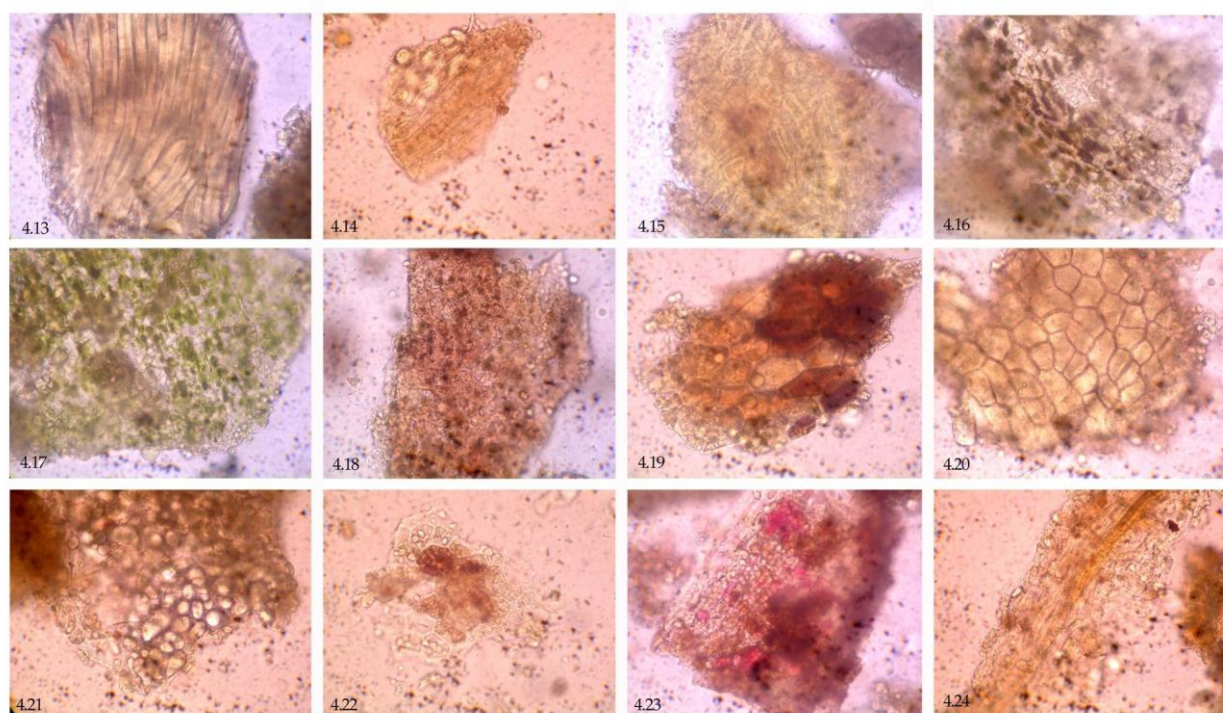
3.2. A portion of Cotyledon enlarged

Cot – cotyledon; Ens – endosperm; It – inner testa; Mt – mesotesta; Od – oil drops; Ot – outer testa; Pl – pigment layer; Sg – starch grains; Vb – vascular bundle.

**Figure 4. Powder microscopy of *Trichosanthes tricuspidata* fruit and seed**







4.1-4.12 fruit and 4.13-4.24 seed

Microscopy of powder of fruit pericarp shows the presence of thick walled polygonal cells of the epicarp (Fig. 4.1); thin walled parenchyma cells of the mesocarp, often with simple starch grains (Fig. 4.2-4.4); fragment of vascular bundle with spiral, annular (Fig. 4.5) and pitted (Fig. 4.6) vessels; group of polygonal to rounded sclereids of various sizes and shapes (Fig. 4.7-4.11). The powder of seed shows groups of elongated sclereids from outer testa (Fig. 4.13); pitted sclereids of the mesotesta (4.14-4.16); parenchyma with chlorophyll (Fig. 4.17) starch grains (Fig. 4.18); thick walled cells of the endosperm with oil drops (Fig. 4.19); polygonal epidermis of the cotyledon in surface view (Fig. 4.20); thick walled parenchyma of the cotyledon with starch grains (Fig. 4.21-4.22) and pigments (Fig. 4.23); and fragment of vascular bundles with spiral vessels attached to xylem parenchyma (Fig. 4.24).

The macro-microscopic study of *Trichosanthes tricuspidata* revealed diagnostic features which will help in the correct identification and authentication of the drug. As many different species of *Trichosanthes* is used in medicine this atlas can be used as reference standards in the future for comparative studies also.

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## CONFLICT OF INTEREST

Nil

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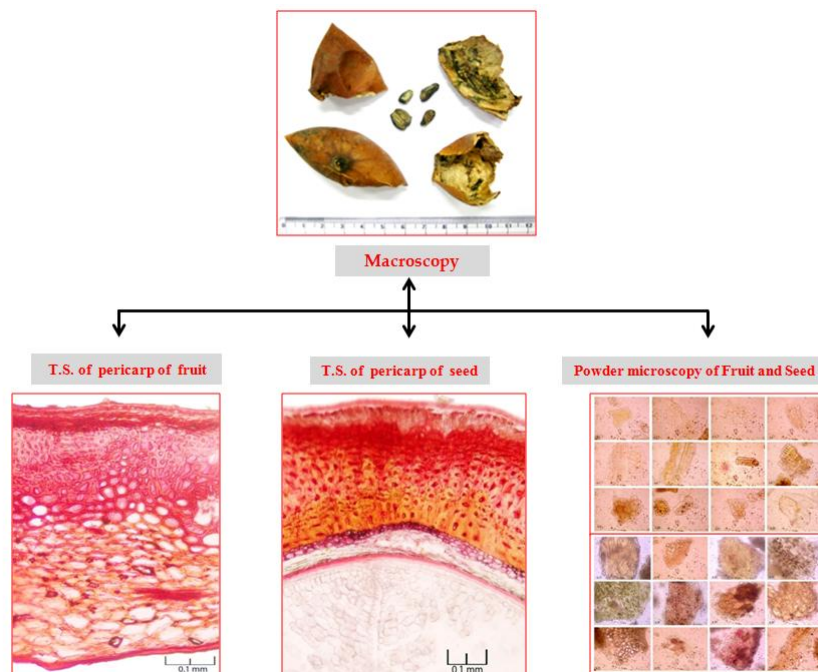
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## GRAPHICAL ABSTRACT



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