

MORPHOTAXONOMIC STUDIES, MEDICINAL IMPORTANCES AND ANATOMICAL PECULIARITIES OF *Tinospora cordifolia* (Wild) Miers

Mrs.S.V.Syed ,

Department of Botany, Shri.Shivaji College, Parbhani, Maharashtra, India.

sabahajuned18@gmail.com

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**Abstract:**

*Tinospora cordifolia* (Wild) Miers belongs to family Menispermaceae is an indigenous drug plant commonly known as Gulvel in Marathi from Maharashtra region. This plant is used in the treatment of cold and fever from ancient time in ayurvedic medicine. Almost all plant parts of *Tinospora* are rich in phytochemicals like alkaloids, glycosides, diterpenoids, glycosides, polysaccharides etc. During Covid -19 pandemic infection this plant was one of the chief ingredient of immuno buster decoctions consume to boost immune system against covid -19 infection through out India. It also possesses anti-diabetic activity, antimicrobial anti-inflammatory etc activities so used to cure these diseases .

The current research was conducted during Acd.Yr.2021-22 . The plant samples were collected from different places of Parbhani tahasil and were analysed for Taxonomic and Anatomical peculiarities with the help of different floras and double stained permanent mounted in DPX for confirming anatomical characters of root ,stem and leaves respectively.

**Key Words :** *Tinospora cordifolia* (Wild) Miers, Covid -19 , immunity buster , polysaccharides

**Introduction:**

Medicinal plants are used as a natural source of medicine from ancient time. Plants have been taken in the form of crude extract directly because of presence of active chemicals like alkaloids, flavonoids, glycosides, vitamins, tannins etc. within it (1,2). These phytochemicals play an important role as immunity busters , protect human body against various types of infections after consumption hence large no. of human population-80% rely on plant drugs sources (3).

Out of a large no. of medicinal plants one of the most important drug plant *Tinospora cordifolia* (Wild) Miers commonly known as Gulvel in Maharashtra is selected and studied for its morphotaxonomic and anatomical peculiarities during Acd.Yr.2021-22 . After collecting samples from different regions of Parbhani Tahasil it is found that *T.cordifolia* (Wild) Miers is a climbing vine belonging to family Menispermaceae which has 70 genera and 450 species found in tropical regions of the world of which 8 are reported from Marathwada region (4). This plant contains a special kind of starch called "Gilo ka sat" prepared from aqueous extract of dry stem and used as Tonic.

**Material and Methods:**

The present research was conducted in two phases  
Collection of samples from different parts of Parbhani Tahasil – During this phase collection of *T.cordifolia* was done by visiting various localities. The specimens collected and preserved in the form of herbarium for ready reference. Fresh plant material was used for taxonomic identification with the help of Flora of Marathwada Vol.I (4).

Laboratory study of collected samples – During this phase experimental taxonomic studies were carried out includes study of anatomical structures of Root, Stem and Leaves by taking thin hand sections and made into double stained permanent stained slides by double staining technique. , Type of stomata and Stomatal Index was determined from leaf peel staining in 1% saffranin , Vessel anatomy by maceration technique(5) and vessels were classified by following Radford et.al classification (6).

**Result and Discussions:****Taxonomic Classification:**

Kingdom: Plantae , Division : Spermatophyta , Class : Dicotyledons , Sub-class : Polypetalae , Series : Thalamifloriae , Order : Ranales , Family : Menispermaceae , Genus : *Tinospora* , Species : *T.cordifolia*

**Macroscopic study:**

*T.cordifolia* (Wild) Miers is a climbing vine with cordate 5-8 cm long and broad leaves. Stem straight glabrous ; old one lenticulate. Flowers dioecious , born on long racemes , Male flowers yellow-green with outer 3 sepals and inner 3 large membranous concave petals in embracing the stamen. Female flowers – petals cuneate-

oblong, with entire margins. Fruit- a red coloured dorsally convexed droops. Flowers and Fruits: January to June (6). (Fig.1).

**Medicinal Uses Of *Tinospora cordifolia*:** *T.cordifolia* is widely used in traditional ayurvedic medicine because of its biological activities like anti-inflammatory, anti-diabetic, hepato-protective, etc. The root and stem is given as antidote on snake and scorpion bite (7),(8).

**Microscopic study /Anatomical Peculiarities:**

**T.S. of Root shows:-** Epidermis – outermost layer composed of single layer of rectangular cell, followed by Cork and phellogen – Just below epidermis radial few layered cork cells are present followed by phellogen layer cells which divide tangentially forming cork layer towards outside and secondary cortex layer towards inner side. Endoderis and pericycle inconspicuous, disappears due to secondary growth. Radial – tetrach vascular bundles with alternate patches of xylem and phloem . scanty pith is present in the centre (Fig.2).(9)

**T.S. of Stem:-** It is circular in outline anatomically showing three distinct regions –cork, cortex and secondary vascular tissue . Outermost layer of superficial cork originated from outer cortex layer forms 4-10 layers interepted by lenticels . Just below cork layer multilayered parenchymatous cortex is present followed by stele . The stele consists of – sclerenchymatous crescent shaped pericycle present above each vascular bundle and groups of parenchymatous cells , Secondary vascular bundles are present in ring form intrafascicular anomalous secondary growth interepted by parenchymatous medulary rays and in centre of the stem parenchymatous pith with abundant starch is present (Fig.3).

**T.S. of Leaf:-** The vertical transverse section passing through midrib shows- upper and lower epidermis interepted by stomata and externally covered by thin layered cuticle. Mesophyll tissue is present in between upper and lower epidermis forms major portion of leaf lamina consists of upper palisade and lower spongy tissue. Stomatas are confined to lower epidermis. In centre of the leaf a large vascular bundle is present (Fig.4).

**Stomatas :-** Stomatas are reported from ventral surface only , these are cruciferous type with 3-4 or many subsidiary cells in same leaf . Stomatal index is 34.17% (Fig.5).

**Xylem elements of Root:-** Macerated root tissues shows presence of vessels, trachides and fibres. Vessels are cylindrical in shape with bordered pitted, shows alternate, simple perforations, tailed at one end. The average length ranges between 71.4 to 314.1 micrometers with average length of vessels 169.91 micrometers. The diameter of vessel measures about 71.4 to 214.2 micrometers and average diameter about 108.52 micrometers. Trachides are cylindrical in shape. Length of trachides ranges between 371.2 to 656.8 micrometers. Average length measured is 491.19 micrometers. Fibers are pointed at both ends with average length 14.28 micrometers. (Fig.6).

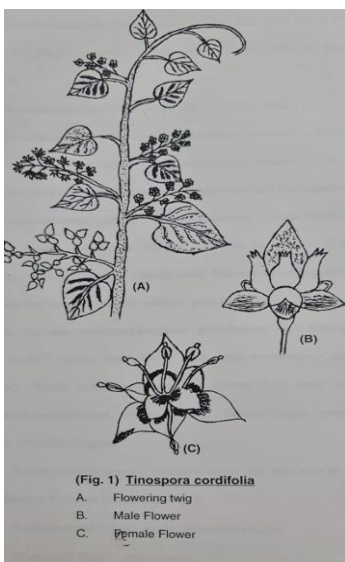
**Xylem elements of Stem:-** Macerated stem tissues shows presence of vessels, trachides and fibres. Vessels are cylindrical in shape with

bordered pitted, shows alternate, simple perforations, tailed at both ends. The average length ranges between 42.84 to 428.4 micrometer with average length of vessels 214.19 micrometer. The diameter of vessel measures about 28.56 to 114.20 micrometer and average diameter about 57.71 micrometer. Trachieds are cylindrical in shape. Length of trachieds ranges between 371.2 to 656.8 micrometer. Average length measured is 491.19 micrometer. Fibers are pointed at both ends with average length 14.28 micrometer. (Fig.7).

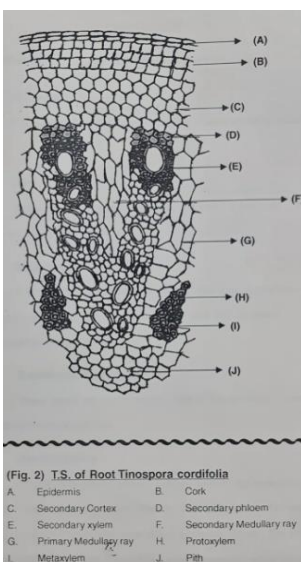
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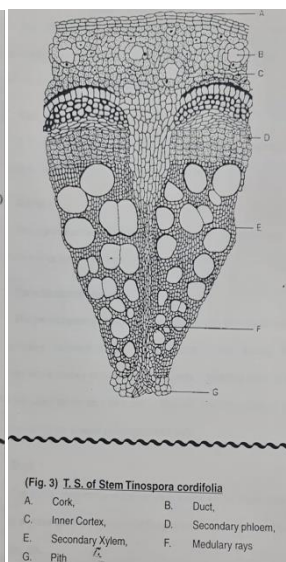
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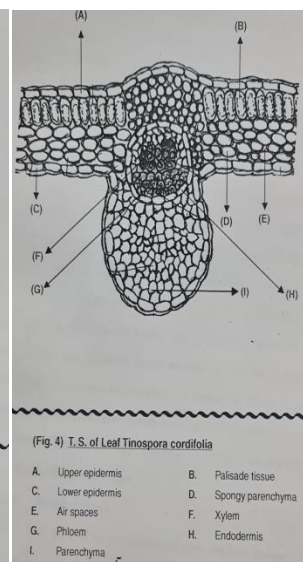
(Fig. 1) *Tinospora cordifolia*  
 A. Flowering twig  
 B. Male Flower  
 C. Female Flower



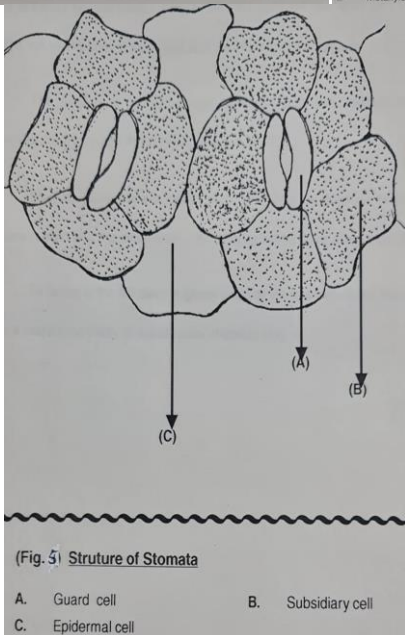
(Fig. 2) T.S. of Root *Tinospora cordifolia*  
 A. Epidermis B. Cork  
 C. Secondary Cortex D. Secondary phloem  
 E. Secondary xylem F. Secondary Medullary ray  
 G. Primary Medullary ray H. Protoxylem  
 I. Metaxylem J. Pith



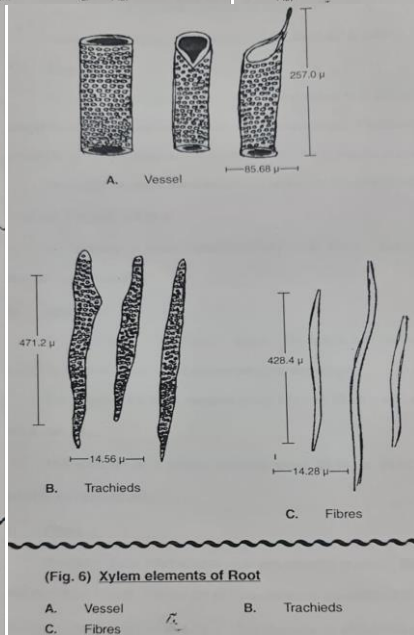
(Fig. 3) T.S. of Stem *Tinospora cordifolia*  
 A. Cork, B. Duct,  
 C. Inner Cortex, D. Secondary phloem,  
 E. Secondary Xylem, F. Medullary rays  
 G. Pith



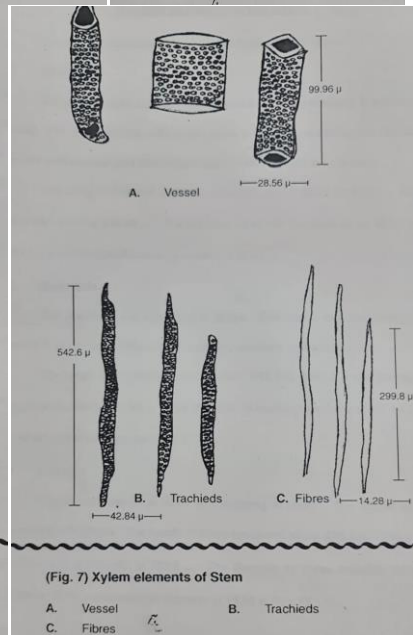
(Fig. 4) T.S. of Leaf *Tinospora cordifolia*  
 A. Upper epidermis B. Palisade tissue  
 C. Lower epidermis D. Spongy parenchyma  
 E. Air spaces F. Xylem  
 G. Phloem H. Endodermis  
 I. Parenchyma



(Fig. 5) Structure of Stomata  
 A. Guard cell B. Subsidiary cell  
 C. Epidermal cell



(Fig. 6) Xylem elements of Root  
 A. Vessel B. Trachieds  
 C. Fibres



(Fig. 7) Xylem elements of Stem  
 A. Vessel B. Trachieds  
 C. Fibres