ANATOMICAL STUDIES ON *A. INDICUM* L. SWEET (MALVACEAE) A WELL KNOWN MEDICINAL PLANT

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1. ABSTRACT

Medicinal plants are a boon to human beings to lead a disease free healthy life. They play a major role in maintaining human health. There are vast varieties of medicinal plant in the world which are therapeutically importance. With increasing popularity of herbal medicine as a curative measure, the need for correct identification and standardization of the plant is also increased. One such medicinal plant is *Abutilon indicum.* It is an erect, woody, shrubby plant and widely distributed in the tropical countries. The whole plant is used to cure many diseases. Present work was performed to study the pharmacognostic and phytochemical characters of seeds of *A.indicum,* a well-known medicinal plant. *Abutilon indicum* (Linn) family *Malvaceae*, commonly known as Atibala is an important medicinal plant. The whole plant as well as specific part such as root, leaves, and flower is used to treat various health ailments. In Ayurveda it is called 'Atibala', literally *Ati* means *"very"* and *Bala* means *"powerful"*, referring to the properties of this plant as very powerful. *Abutilon indicum* L. (SWEET) is used in medicine by the local hakims interviewed. Anatomy of all plant parts is studied to confirm its therapeutic uses.

Keywords:- *Abutilon indicum* L (Sweet),Unani system, medicinal herb, anatomy, pharmacognostic study, therapeutic uses.

2. INTRODUCTION

Abutilon indicum (Linn.) belongs to family Malvaceae. *Abutilon indicum* (Linn.) (Malvaceae) is a shrub distributed throughout India. The whole plant or its specific parts (leaves, stem, roots, fruits and seeds) are known to have medicinal properties and have a long history of use by indigenous and tribal people in India. Traditional medicinal knowledge in India has been handed down through generations, often within specific regions or tribal communities. This knowledge is deeply rooted in the cultural practices and environments of each group, preserving unique approaches to healing that are adapted to local resources and traditional beliefs (Dey, A., et.al. 2017). This traditional knowledge finds its root in Indian traditional systems of medicine i.e., Ayurveda and Siddha which is now gaining popularity in western world too. The plant possesses many medicinal properties and uses. The roots are cooling, astringent, stomachic, tonic, aromatic, bitter, febrigue, demulcent, diuretic, in asthma, as cardiac tonic, infusion in nervous disease, disorders of blood and bile, strangury, haematuria, in bleeding piles, in gonorrhea, cystitis, leucorrhoea, chronic dysentery, in insanity, facial paralysis in rheumatics and for leprosy. Juice of the whole plant is used for spermatorrhoea, rheumatism and gonorrhea (Nadkarni, 1927, Kirtikar and Basu, 1937 and Chopra et. al, 1956). Leaves are demulcent, aphrodisiac, laxative and diuretic. The leaves also be used to treat ulcers, headaches, gonorrhea and bladder infection (Nishanta Rajakaruna et. al., 2002) the leaves are used as adjunct to medicines used for pile complaints. The flowers are used to increase semen in men (Ramchandran, 2008) fixed oil is analgesic. It is an Asian phytomedicine traditionally used to treat several disorders including diabetes mellitus (Chutwadee et al., 2017). In Unani system, the plant is used for chest troubles, piles and bronchitis. John Graham (1996) has reported choline in this plant and also mentioned its use in ayurvedic and unani medicine, in cramps, colic pains and in dysentery. Ethanolic extract of plant is used in central nerve depression (Bhakuni et. al, 1971). Plant is laxative, anti-inflammatory and anthelmintic. The plant is very much used in Siddha medicine. It is called as *Bala* in Marathi, *atibala* in Sanskrit and *Kanghi* by local hakims.

Ethno-medicines and herbal remedies are increasingly popular due to their affordability and generally lower incidence of side effects. These traditional treatments are valued not only for their cost-effectiveness but also for their natural approach to healing, offering alternatives to synthetic medications with fewer adverse reactions (Modak, B. et.al.2015). Recently, the World Health Organization (WHO)

has acknowledged the vital role of traditional medicine in healthcare. Recognizing its significance, the WHO has emphasized the integration of traditional medicine practices with modern healthcare to enhance global health outcomes, especially in communities where these practices are deeply embedded and play a crucial role in accessible, holistic healthcare (Ekor, M. et.al. 2013, Yigezu, Y., 2014). In Ayurveda and Siddha systems, treatments are crafted using carefully selected plant parts to address a wide range of ailments. Over the past three decades, numerous ethno-medicinal plants referenced in these systems have undergone scientific evaluation, as noted by Sharma (2010). This research supports evidence-based alternative medicine and fuels the herbal drug industry while also facilitating the discovery of new drug targets for pharmaceutical development.

In Ayurveda and Siddha systems, formulations from appropriate parts of plants are made and used for treatment of various ailments. For almost past three decades, many ethno-medicinal plants mentioned in Ayurveda and Siddha systems of medicines are being scientifically evaluated (Sharma,R, 2010). Scientific evaluation of ethno-medicinal plants, provides evidence-based alternative medicines which form the basis of herbal drug industry and discovery of drug targets in the pharmaceutical industry (Patwardhan, B.,2005). It is important to emphasize that the use of ethno-medicinal plants in traditional medicine or for manufacturing ayurvedic and other herbal medicines, when backed by scientific evidence, can promote the safe and effective application of natural product drugs on a global scale. Medicinal plants have long been a cornerstone for developing both synthetic and herbal medicines, with their therapeutic use dating back to ancient times.

It may be emphasized here that usage of ethno medicinal plants for traditional medical treatment or for use in manufacture of Ayurvedic medicines/other herbal drugs, when supported by scientific evidences can ensure safe and more effective utilization of natural product drugs universally. Medicinal plants are a significant source of synthetic and herbal drugs. Medicinal plants have been used for the treatment of diseases since antiquity. The traditional systems of medicines viz. Siddha, Unani, Ayurveda, Western herbal medicine, Traditional Chinese medicine and Homeopathy have roots in medicinal herbs (Saroya, A.S. 2010). *Abutilon indicum* L. (Sweet) is used in medicine by the local hakims interviewed (Ahmad, 2004). When I decided to pursue research, the search for a suitable topic began. During that time, one of my teachers was working on Ayurveda, and my guide asked if I knew anyone

familiar with the Unani system of medicine, specifically a *hakim* (traditional practitioner). Through my search, I discovered that many of my relatives and acquaintances practiced this healing system. While exploring Unani medicine, I realized that no significant research had been conducted in the Amravati district. This sparked my curiosity to learn more about the system and spread awareness about its effectiveness and lack of side effects. However, we gathered information only from *hakims* who had inherited their knowledge and medicinal recipes through generations, rather than from those formally trained in Unani medicine or practicing it professionally.

Plant contains flavones', gossypetin 8 and 7 glucids and cyanidin – 3 – rutinoside (Subramanian, 1970). Essential oil is antibacterial to human pathogenic bacteria (Arvind, G; 1978). Antifungal property (Jain, 1978). Leaves yield B sitosterol and tocopherol oil, isolated flavonols like gossypetin – 8 – glucosides and gossypetin 7 glucoside.

3. MATERIAL AND METHODS

The hakims consulted for the study used to collect plant material themselves from the field. For identification, plant was brought to the laboratory, described and identified with the help of standard flora (Naik, 1998). Fresh plants were collected and preserved in 70% FAA. Hand sections of root, stem, node and leaf were taken. For vessel studies thin slices of old roots and stems were treated with macerating fluid 5% solution of HNO_3 and 5% solution of $K_2Cr_2O_7$ for 12 to 24 hr. the macerate was then thoroughly washed stained with 1% aqueous safranin and measurements were made by ocular scale lens. Camera lucida sketches were drawn. Classification of Radford et. al., 1974 is followed for categorizing the vessel elements.

4. RESULTS AND DISCUSSIONS

4.1 Macromorphology

Hoary tomentose undershrubs, 1-2 m. tall. Leaves broadly ovate, 3-10 x 3-9 con, cordate, acuminate, toothed; petioles 3-7 cm long, stipules linear, deflexed. Flowers solitary, axiliary, 1.5-3 cm across, pedunculate; peduncles 3-5 cm. long. Sepals fused below the middle, lobes ovate, acuminate. Petals orange-yellow, obovate, 1-3 cm long. Stamens undefinite, united to form a staminal tube, staminal tube antheriferous at the top, spreading. anthers monothecous, kidney shaped. Gynoecium syncarpous, 15-20 carpellary, hairy locules as many as carpels, placentation axile, styles free,

stigmas capitate. Fruit a schizocarpic capsule, seeds reniform, dotted with minute stellate hairs, hairy at hilum.(Fig. 1-9).

4.2 Micromorphology

Since whole plant is used as medicine in various systems of medicine for standardization anatomy of all the organs were studied.

4.2.1 Root – triarch to tetrarch. Pith absent. Secondary growth normal. Rays uniseriate as well as multiseriate. Ray cells containing stored material appear blackish in colour. Multiseriate rays gradually become broad and funnel shaped towards cortex. This results in the formation of ring of secondary discrete patches secondary phloem traversed by sclerenchymatous bands. Cork cambium hypodermal in origin producing a broad cork towards outer side and few layers of secondary cortex to the inner side. (Fig. 10-11)

Root Vessels – Very short 192-231µm 46-88 µm

moderately short 258-346 µm and 46-115 µm (Fig. R1-R4).

4.2.2 Stem – Epidermis single layered covered with thick cuticle. Hypodermis heterogeneous consisting of alternating bands of chlorenchyma and collenchymas; stomata slightly elevated, present in the region of chlorenchymatousbands. Hypodermis followed by few layers of chlorenchymatous cortex. Indistinct endodermis present. Pericycle multilayered, consisting of discontinuous bands of sclerenchyma interrupted by parenchyma. Xylem and phloem in the form of continuous cylinder with cambium ring in between. Pith large parenchymatous; cells containing abundant starch grains. Cells of outer pith lining the vascular bundle with tannin. (Fig. 12-13).

Secondary growth normal. Vessels mostly arranged in uniseriate rows.

Vessels extremely small 104-154 µm and 38-65 µm very short 192-238 µm and 27-35 µm and moderately short 265 µm and 50 µm. (Fig. S1-S8).

Parenchyma produced rays uniseriate and multiseriate. Multiseriate rays gradually becoming broader towards cortex. ex. Secondary phloem wedge shaped with bands of sclerenchyma. (Fig. 14-15).

4.2.3 Node – trilacunar three trace. Lateral bundles give off branch to the stipules. All the three bundles then unite to form an arc. Higher above still in the stem the arc splits and the traces get arranged roughly in the ring. (Fig. 16-18).

4.2.4 Petiole – shows vasculature somewhat in the form of ring. A deep c shaped arc is formed in the higher side of petiole due to change in arrangement. Just below the

lamina traces variously unite to form 3 patches of vasculature. Ground tissue parenchymatous.(Fig. 19-21).

4.2.5 Lamina – dorsiventral, amphistomatous. Epidermis cutinized and cuticularised. Epidermal cells angular on upper side while lower epidermal cells are sinuous. Stomata dicytic in upper epidermis while anomocytic in lower epidermis (Fig. 22-23). Palisade cells of upper layer larger than the cells of inner layer. Spongy parenchyma 3-4 layered; irregularly shaped cells enclosing large air spaces. Sphaeraphides present in spongy tissue as well as palisade (Fig 24).

4.2.6 Midrib – with single large vascular bundle in the centre. Single layered epidermis with cells cutinized; followed by 2-3 layered collenchymatous hypodermis. Ground tissue parenchymatous (Fig.25).

4.2.7 Trichomes – present on all parts of the plant. Hairs non glandular as well as glandular. Non glandular hairs are of 3 types: - 1) unicellular with single celled base, 2) uniseriate with multicellular uniseriate pitcher like base and 3) stellate hairs. Glands small with unicellular stalk and 3-4 celled uniseriate secretory head (Fig. 26-28).

4.2.8 Crystals –of calcium oxalate. Sphaeraphides present in soft tissue of all organs.

5. Conclusion

Initially, gathering knowledge about Unani medicinal plants was a challenging task, as traditional Hakims were reluctant to share their wisdom. For generations, this knowledge had been their primary means of livelihood, and they feared that sharing it might lead to its misuse or competition. They believed that if others gained access to their expertise, it could threaten their profession. However, through consistent efforts and reassurance, we were able to gain their trust. We emphasized the importance of preserving this invaluable heritage, as the younger generation is increasingly moving away from traditional healing practices. We assured them that documenting their knowledge would not only honor their contributions but also ensure that future generations could benefit from their wisdom. Eventually, the Hakims recognized the significance of this endeavor and generously shared intricate details about the preparation of Unani medicines, including the ingredients, formulations, and methods of extraction. Their willingness to cooperate extended beyond just sharing information—they even guided us into the forests, helping us identify and collect medicinal plants firsthand. This journey highlighted the deep-rooted wisdom and

scientific foundation of Unani medicine. By preserving and promoting this knowledge, we can ensure its continuity, bridging the gap between ancient healing practices and modern healthcare. It is now our responsibility to safeguard this traditional wisdom and integrate it into contemporary medical research, allowing it to benefit future generations while honoring the legacy of the Hakims who dedicated their lives to healing.

Unani medicinal plants offer a promising avenue for holistic healing and wellness. Their time-tested efficacy, combined with modern scientific advancements, can contribute significantly to global healthcare. Promoting sustainable cultivation, rigorous research, and awareness about these natural remedies will help preserve their therapeutic legacy while ensuring their safe and effective integration into contemporary medicine. By embracing both traditional wisdom and scientific validation, Unani medicine can continue to thrive as a valuable resource for health and healing.

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8. Conflict of Interest - None.

9. AUTHOR CONTRIBUTION STATEMENT

Dr. P.Y. Bhogaonkar conceptualized and supervised the data and Dr. Sameera Khwaja Ahrar Ahmad gathered the data with regard to this work. Rest is done by Dr. Sameera Khwaja Ahrar Ahmad herself.

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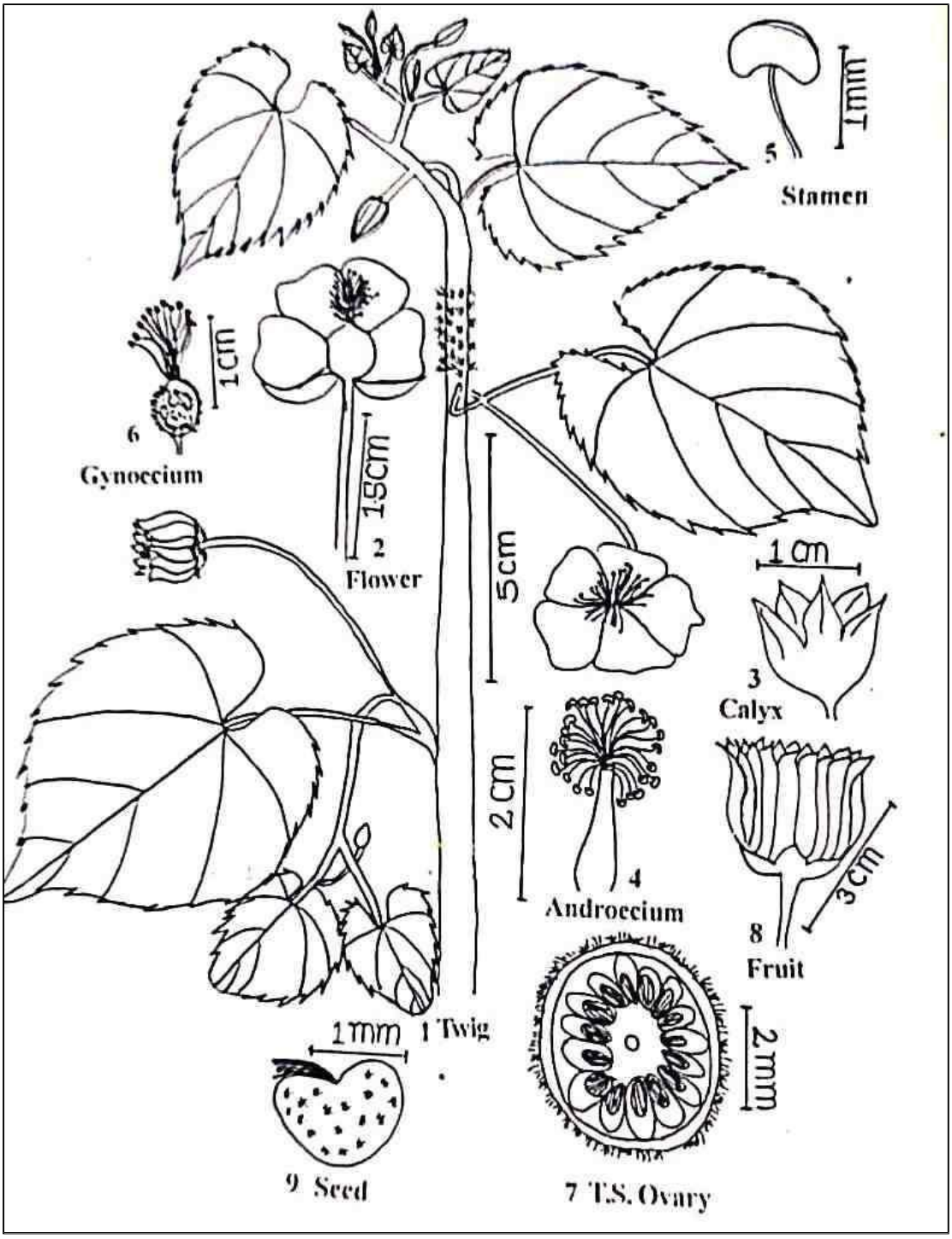
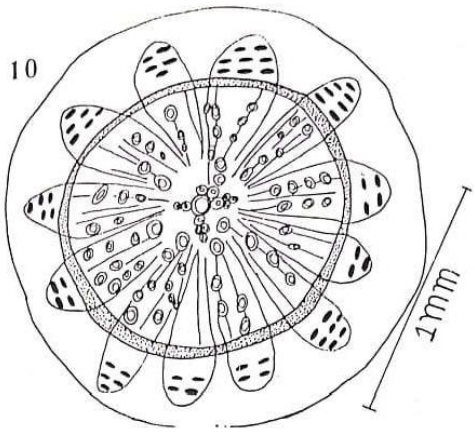
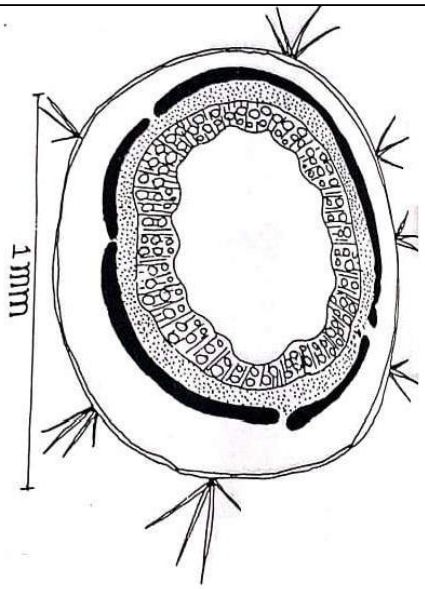
11. Declaration

No human or animals are used in the preparation of this paper.

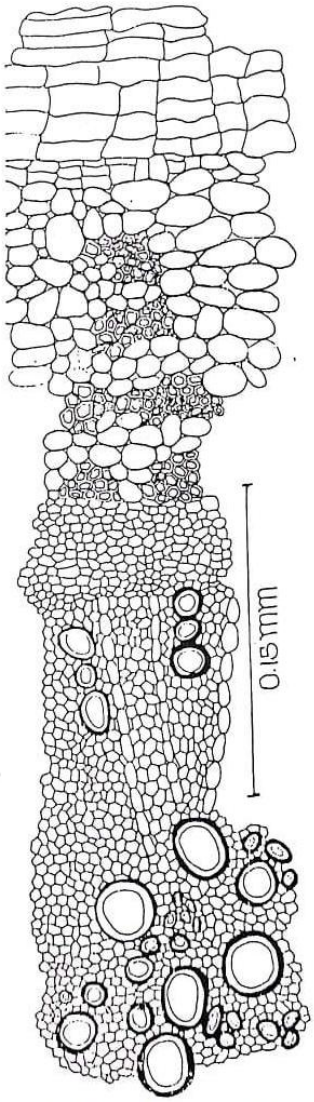

1mm
5
Stamen
1cm
6
Gynoecium
1.5cm
2
Flower
5cm
1cm
3
Calyx
2cm
4
Androecium
3cm
8
Fruit
1mm
1 Twig
2mm
9 Seed
7 T.S. Ovary



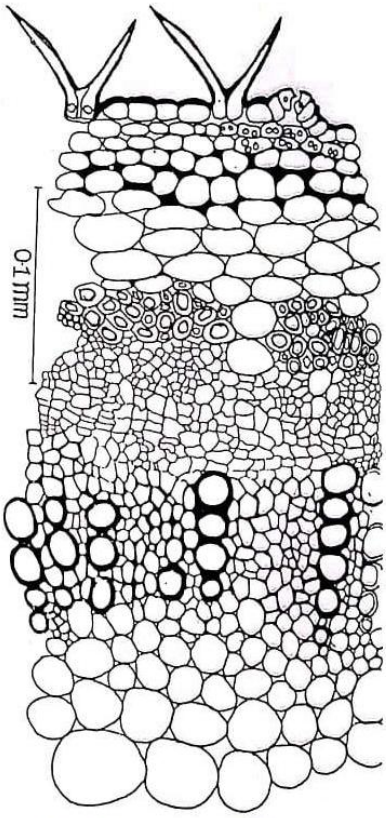
10. T.S. Root (diagrammatic)



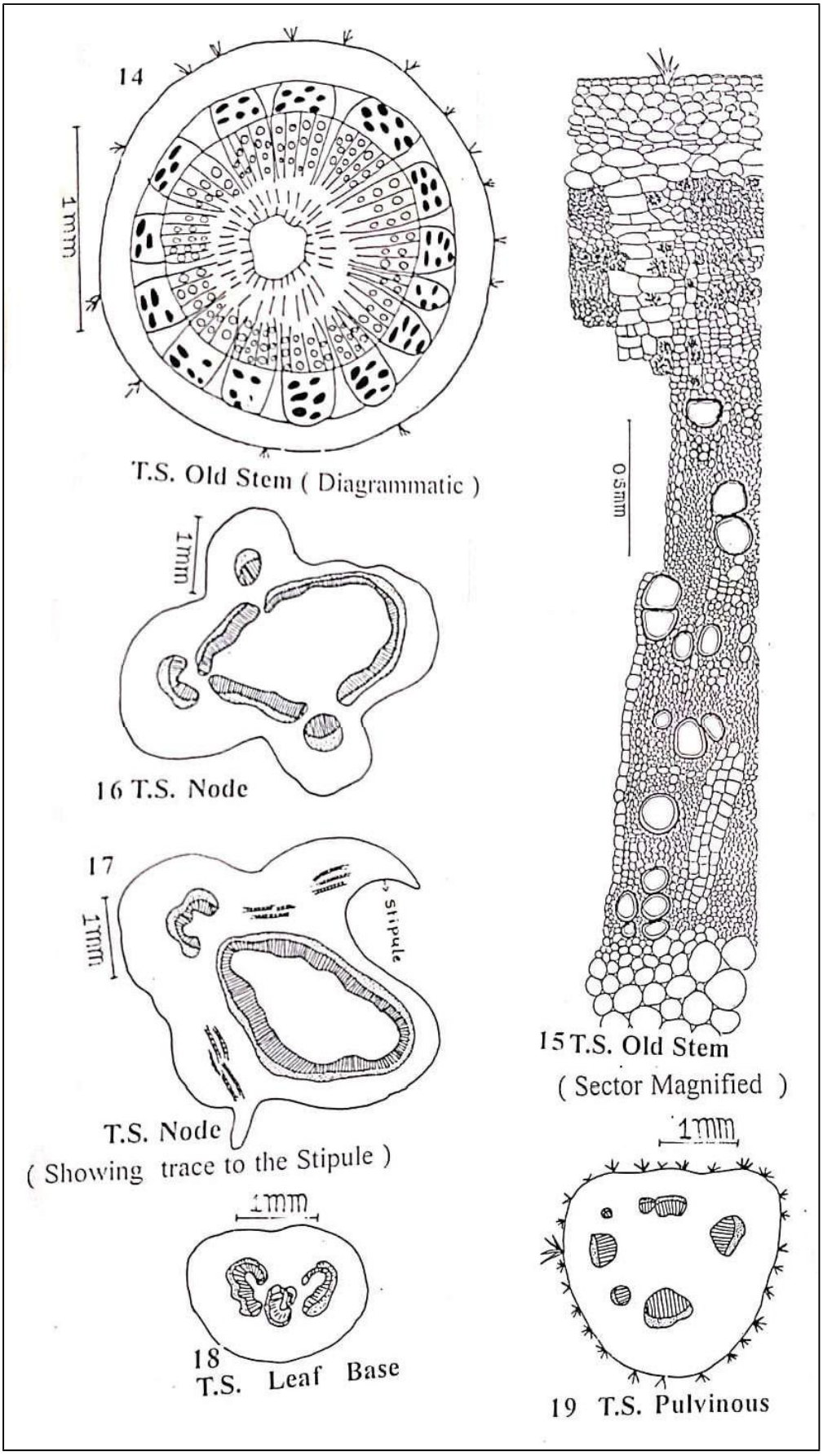
12. T.S. young Stem (Diagrammatic)

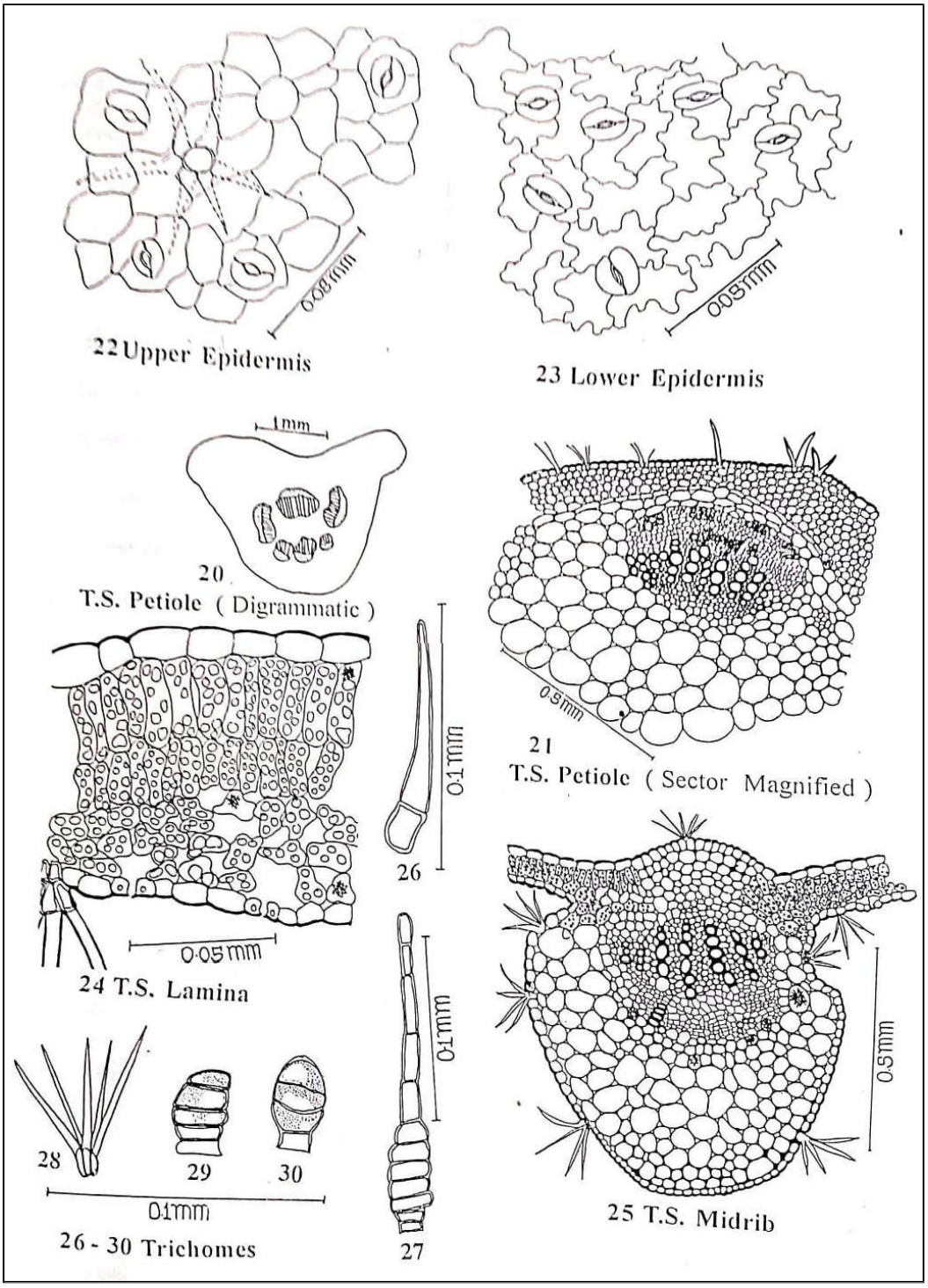


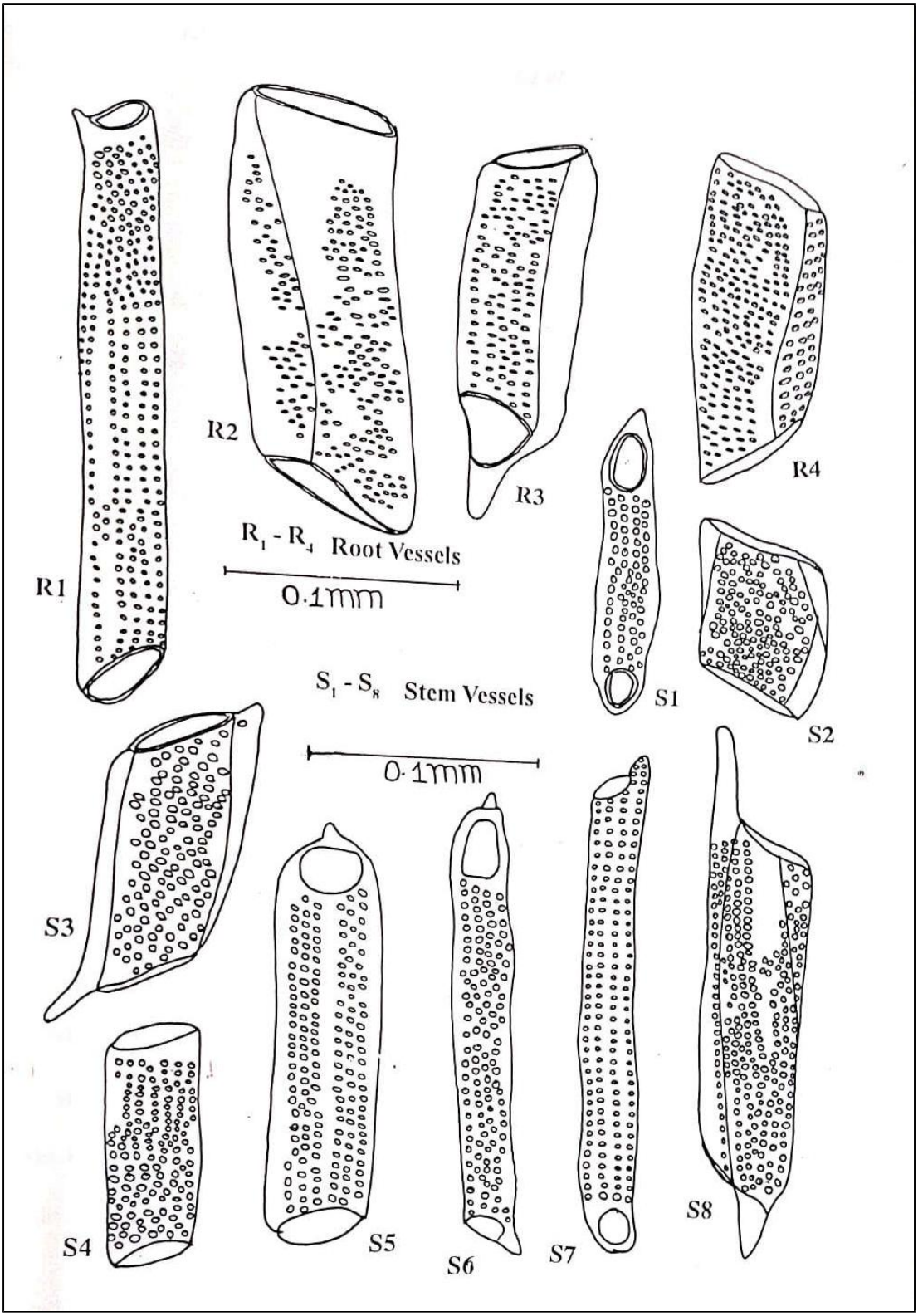
11. T.S. Root (Sector Magnified)



13. T.S. young stem
(Sector Magnified)


14
1mm
T.S. Old Stem (Diagrammatic)
1mm
16 T.S. Node
17
1mm
Stipule
T.S. Node
(Showing trace to the Stipule)
1mm
18
T.S. Leaf Base
0.5mm
15 T.S. Old Stem
(Sector Magnified)
1mm
19 T.S. Pulvinous


0.08mm
22 Upper Epidermis
0.08mm
23 Lower Epidermis
1mm
20
T.S. Petiole (Digrammatic)
0.5mm
21
T.S. Petiole (Sector Magnified)
0.1mm
26
0.05mm
24 T.S. Lamina
0.1mm
27
0.5mm
25 T.S. Midrib
28
29
30
0.1mm
26 - 30 Trichomes


R1
R2
R3
R4
R_1 - R_4 Root Vessels
0.1mm
S1
S2
S_1 - S_8 Stem Vessels
0.1mm
S3
S4
S5
S6
S7
S8