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Histological Study of Some Monocot Stems

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Abstract:

The present investigation was focused on the anatomical comparison of the stems of two monocots viz. *Oryza sativa L.* and *Tradescantia pallida (Rose) D.R. Hunt.* The Vascular bundles in *O. sativa L.* were scattered along with small canals. The Vascular Bundles in *T. pallida (Rose) D.R. Hunt* were found to be scattered as well. Aforementioned plants had well defined cortex composed of parenchymatous & collenchymatous cells. Pith was present in the centre of all the plants formed by spaces parenchyma cells. This study will help us to understand the internal organisation as well as differences among the monocot species. This study reveals the marvel of natural diversity among the flora.

Keywords: Anatomy, vascular bundles, parenchyma, collenchyma, sclerenchyma, *O. sativa*, *T. pallida*.

Introduction

O. sativa L. commonly known as rice and is one of the staple food of India and south-east Asia [1].

Systematic position of *O. sativa L.* is as follows-

Kingdom – Plantae

Division – Angiosperms

Class – Monocots

Order – Poales

Family – Poaceae

Genus – *Oryza*

Species – *O. sativa*

Shoot system consists of culm, leaves, panicle and spikelet [2].

Medicinal Value of *O. sativa L.* – Rice is well known as staple food of south Asia but vast variety of rice germplasm is a rich source of several medications for many health related malaises such as gastritis, diabetes, bone related problems, neuromotor diseases, and give strength to pregnant and lactating mothers. Different medicinal and curative properties of many varieties of rice was testified by our Ayurvedic literature. Kanthi Banko (Chhattisgarh), Meher, Saraiphul & Danwar (Orissa), Atikaya & Kari Bhatta (Karnataka), are some important varieties of rice cultivated in India. Some indigenous varieties of rice are cultivated in specific regions of Kerala for their medical properties e.g. Chennellu, Kunjinellu, Erumakkari & Karuthachembavu etc [2].

T. pallida (Rose) D.R. Hunt commonly known as Purple heart and is an ornamental plant [3]. Recent works suggest some histological and physiological changes in overall body. Changes in lamina structure and component (thickness of the mesophyll, of the hipodermis, the contents into photosynthesising pygments, in antocyanins, the stomatae index, epicuticular layer) are observed, under the action of light of various intensities [4]. The results obtained suggest that this species has a great capacity to adapt, it can colonize a wide range of environments, growing very well both in a strong light and it shady places. Research has also been made attesting to the presence of the calcium oxalate crystals in the parenchyma of all vegetative organs and in the flower, under the form of rafids and tetragonal crystals [5].

Systematic position of *T. pallida (Rose) D.R. Hunt* -

Kingdom – Plantae
Division – Angiosperms
Class – Monocots
Order – Commelinales
Family – Commelinaceae
Genus – *Tradescantia*
Species – *T. pallida*

Material and method

The plants were collected from Bairahana, Dist. Prayagraj U.P. India. All the plants were first identified using the Standard Method. The specimens were properly cleaned and the transverse section of the specimen were cut using sterilised dissection blade and then stained using safranin and fast green. After proper staining, we add glycerin and the put cover slip gently over the material. Finally, observed under a compound microscope [6].

Results and Discussion:

(1) *Oryza sativa L.*

Epidermis has cuticle on the outer side [figure 3]. Vascular bundles start just after the epidermal layer that consists of parenchyma cells, collenchyma cells and storing sclerenchyma cells. Starch is stored in the storage parenchymatous cells [1]. Stem of rice is hollow and works as a canal for the transportation of water and minerals as well as acts like a channel for gases to be translocated. Small canals are present with the vascular bundles

[figure 2], scattering all the way from the cortical region to the central canal [7]. The hollow central canal is also known as aerenchymatous centre. Pith is replaced by aerenchymatous centre [figure 1]. But at the nodes, the centre gets filled by aerenchyma tissues that are basically branched parenchyma cells [7].

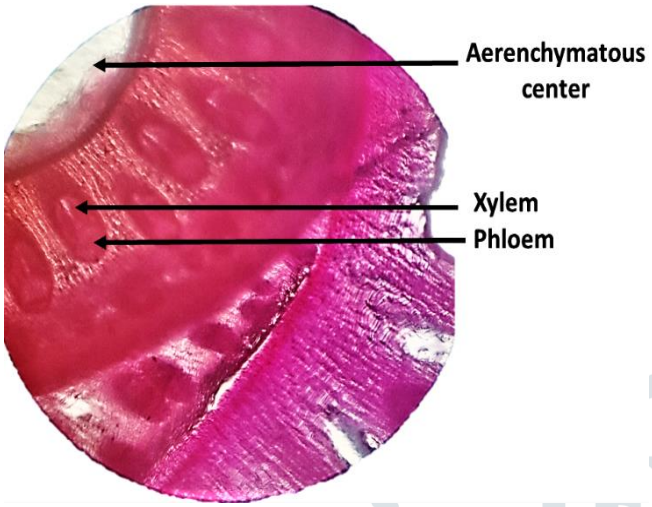

Figure 1. T.S. showing vascular bundles & canals of *O. sativa.*

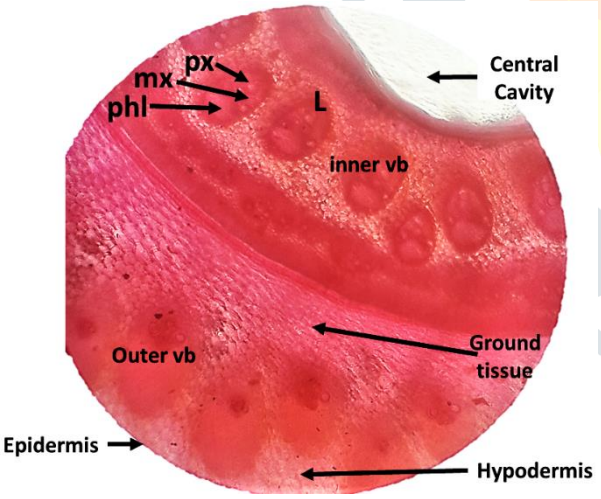

Figure 2. Vascular bundles along the Central Aerenchyma, proto xylem (px), meta xylem (mx), phloem (phl), lacuna (L), outer vascular bundle (outer vb), inner vascular bundle (inner vb), epidermis, hypodermis and ground tissue.

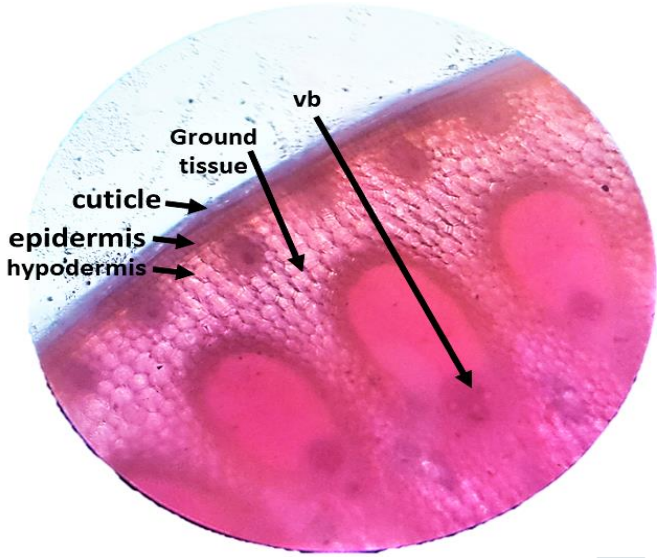

Figure 3. Cuticle, epidermis, hypodermis, ground tissue and vascular bundle (vb) of *O. sativa*.

(2) *Tradescantia pallida (Rose) D.R. Hunt* –

The transverse section of stem is round. Epidermis is outermost region of the stem with thin cuticle. Epidermis is followed by the cortex and cylindrical central part. The epidermis is contains a single layer of cells. It contains stomata. There is an angular collenchyma made up of 3-4 layers of cells (Figure 5), interrupted at the level of the stomata with the chlorenchyma [8]. These cannot be observed the endodermis and the pericycle, the central cylinder comprising of two concentrical rings of closed collateral vascular bundles, specific to the monocotyledonous plants. In the exterior ring, the fascicles are protected by sclerenchyma, thicker above the phloem and thinner below the metaxylem [8]. Sclerenchyma linked all the fascicles. These fascicles are not surrounded by the sclerenchyma. Towards the leaf pod, in the internal ring, the presence of several fascicles can be observed. Small oil particles are present between cells in clusters (figure 4) [3].

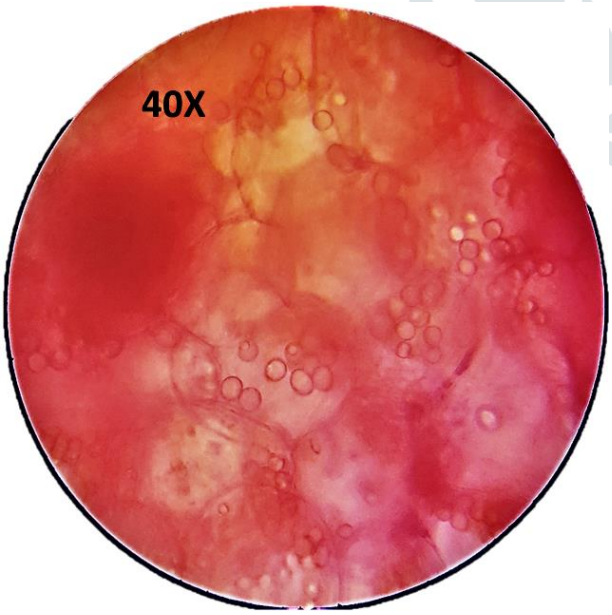

Figure 4. T.S. of T. pallida (40X) showing oil droplets.

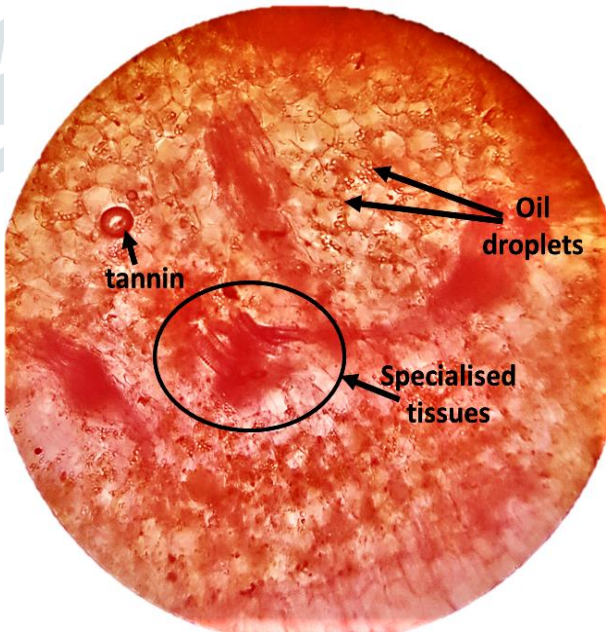

Figure 5. T.S of *T. pallida* stem (10X)

Conclusion:

In the present investigation we found that diversity exist in the monocots according to adaptation and environmental requirements. Overall body plan of both are quite similar but differences are also very clear. One can easily identify and classify these plants using histological knowledge. Since both the plants have some medicinal properties therefore these plants require more attention for possible development of the herbal drugs. *O. sativa* is a nutraceutical and medicinal plant whereas *T. pallida* is medicinal and environment indicator species. Histological comparison helps us to know more about plants ecosystem and environmental adaptations. In future some more studies are required for better understanding about internal organisation.

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Conflict of Interests: The authors have no conflict of interests.

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