

Pharmacognostical studies of *Saccharum munja* Roxb. Root

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Abstract: The present study deals with the macroscopical, microscopical, physiochemical parameters and preliminary phytochemical studies of *Saccharum munja* Roxb. root. Roots are adventitious porous type. Some distinct and different characters were observed with transverse sections of the root. The anatomy of the root was studied by taking transverse section. Epidermis was single layered and consisting of cubicular to rectangular, thin walled cells. Cortex consisting of oval to round, thin walled parenchymatous cells. Xylem and phloem form equal number of bundles, arranged alternately in rings consisting of usual elements; metaxylem elements much bigger than protoxylem. Pith consisting of thin walled, polygonal, parenchymatous cells having intercellular spaces. Calcium oxalate crystals were abundant and were predominantly prismatic. Powder of the root exhibited xylem parenchyma, xylem fibers and trichome rods. Physiochemical parameters and preliminary studies of the root powder were also carried out. The present study on pharmacognostical investigation of *Saccharum munja* roxb. root might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

Keywords: *Saccharum munja*, Roots, Fibers.

Introduction:

Saccharum munja, known as **munja** is a grass found in arid areas and along river banks in India. The grass is tall, panicles silky and greenish brown. The grass grows in excess and up to 7 feet in height. Leaf sheath shortly silky at extreme base, otherwise quite smooth, straight, pale straw colored, villous on margins at apex with long white hairs usually much longer than proper internodes, uppermost sheath sometimes extending beyond the base of panicle. Its white flowers are of ornamental value. The common name of the plant is **Kana** or **sarkanda** or **Moonja** and is distributed from north and North West India to Pakistan and Afghanistan. There are 24 vernacular names of plant in Sanskrit language such as bahupraja, bana,

bhadramunja, brahmanya, chakshuveshtana, darbhavhaya, dridhatrina, durmula, ikshukanda, maunji, munja, munjanaka, munjata, ranjana, sara, shakrabhanga, shara, shiri, sthuladarbha, sumekhala, tejana, tejanavhaya, trinakhaya, vaniraka. Flowering and fruiting are perennial and mostly from October to January. The plant is a large tufted grass and is of little account as fodder plant because cattle and buffaloes eat young leaves only during scarcity of food. The stem is used in making chiks and moorhas. The flowering scape is woven into winnowing trays (chhaj) and cover for grain heaps and carts, while the thick sheath next to scape is twisted into strings for weaving bed-streeds etc. [1-6]



Figure 1: *saccharum munja*

Materials and Methods

Plant material [7]

The plant specimens for the study were collected from different parts of Punjab and Himachal Pradesh, India in the month of November. It was identified and authenticated by Dr. H.B.Singh, Scientist F & Head, Raw Materials Herbarium and Museum, Nisair, New Delhi (Ref.No.NISCAIR/RHMD/Consult/-2009-10/326/128). The sample of different organs were cut suitably and removed from the plant and thoroughly washed with water to remove the adherent impurities and dried in sunlight. Selected samples of the dried root were stored in a solution containing formalin (5ml), acetic acid (5ml) and 70% v/v ethyl alcohol (90ml).

Safranin (0.5% w/v aqueous solution) and fast green (2% w/v in absolute alcohol) were used for making permanent stains. Iodine (2% w/v aqueous solution) was used to stain starch grains. All chemicals were procured from S.D. Fine Chemicals, Mumbai. Absolute alcohol (Bengal Chemicals) was used for permanent staining of transverse sections of different plant parts.

Sectioning

The specimens were sectioned with the help of Senior Rotary Microtome, RMT-30. The thickness of the sections were kept between 10 and 12 μ m. The sections were stained as per the methods.^[6]

Photomicrograph

Microscopic descriptions of selected tissues were supplemented with micrographs. Photographs of different magnifications were taken with Letiz Dialux 20EB microscope attached with MPS 15 semiphotomat. For normal observations, bright field was used. Polarized light was used for the study of crystals starch grains and lignified cells.

Physiochemical Parameters [8]

Physiochemical parameters of *Saccharum munja* root powder were determined and reported as total ash, water soluble ash, acid insoluble ash, alcohol-soluble extractive, water-soluble extractive and moisture content. Calibrated digital pH meter was used to measure the pH of 1 and 10% aqueous extracts.

Preliminary Phytochemical studies [9-14]

Preliminary phytochemical test of *Saccharum munja* powder were performed and the chemical constituents were determined by using standard procedures described by Kokate C.K., Purohit A.P. and Gokhale S.B.

Results

Macroscopic study

Roots are adventitious porous, numerous, arising from a common root stock, cylindrical, 5-30 cm long, 0.1-0.5 cm in diameter, pale straw colored with attached rootlets, bark papery; fracture splintery.[Figure 1]. It had no specific odor and taste.



Figure 1. Roots of *Saccharum munja roxb.*

Microscopy study

The roots were circular and even surfaced and consist of following tissue zones:

Epidermis was single layered and consisting of cubicular to rectangular, thin walled cells; hypodermis single layered composed of parenchymatous cells; beneath hypodermis continuous ring of 2-5 layered, thick-walled, lignified, sclerenchymatous cells found scattered.

Cortex consisting of oval to round, thin walled parenchymatous cells, those of inner layers becoming smaller in size and rectangular in shape; endodermis is single layered forming a ring around stele, consisting of tangentially elongated cells; pericycle single layered composed of thin walled cells [Figure 2].

Xylem and phloem form equal number of bundles, arranged alternately in rings consisting of usual elements; metaxylem elements much bigger than protoxylem [Figure 2.1].

Pith distinct consisting of thin walled, polygonal, parenchymatous cells having intercellular spaces. [Figure 2.2].

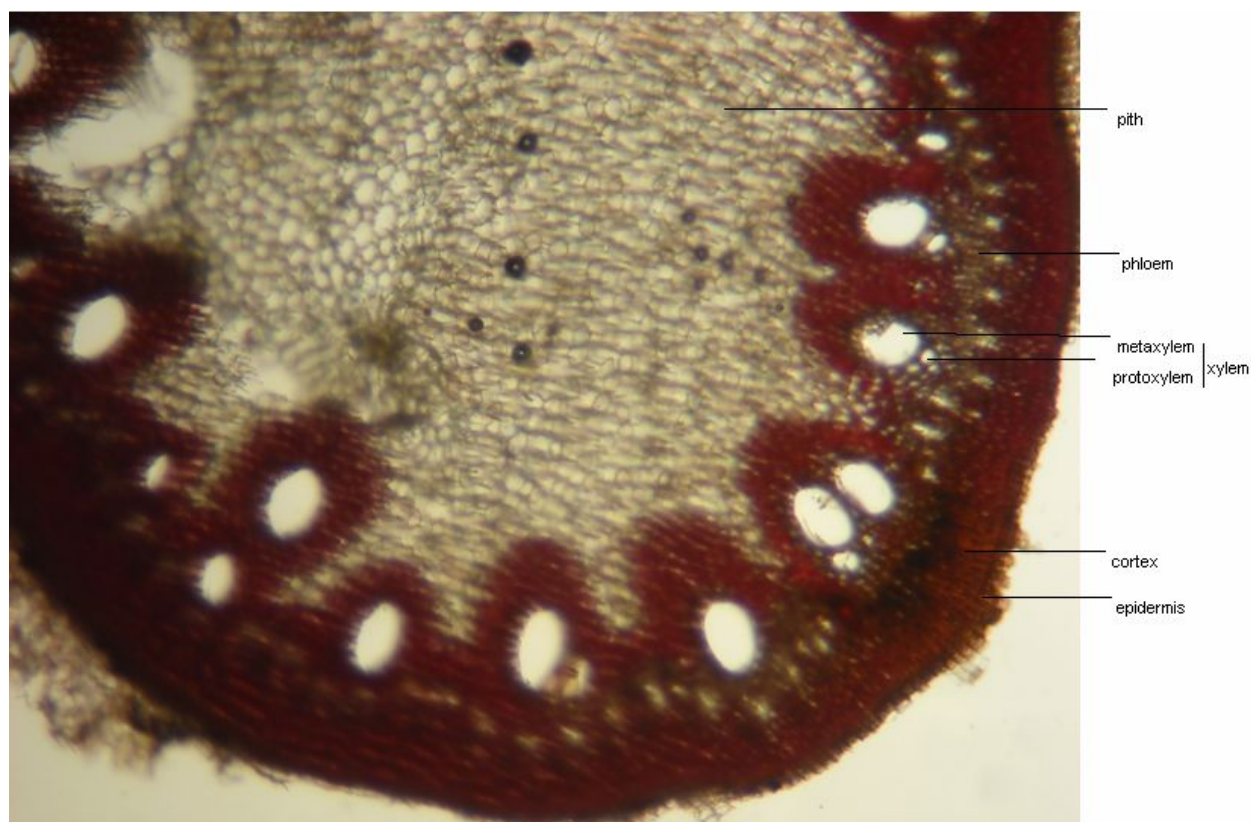


Figure 2. T.S. of thin root of *saccharum munja roxb.*

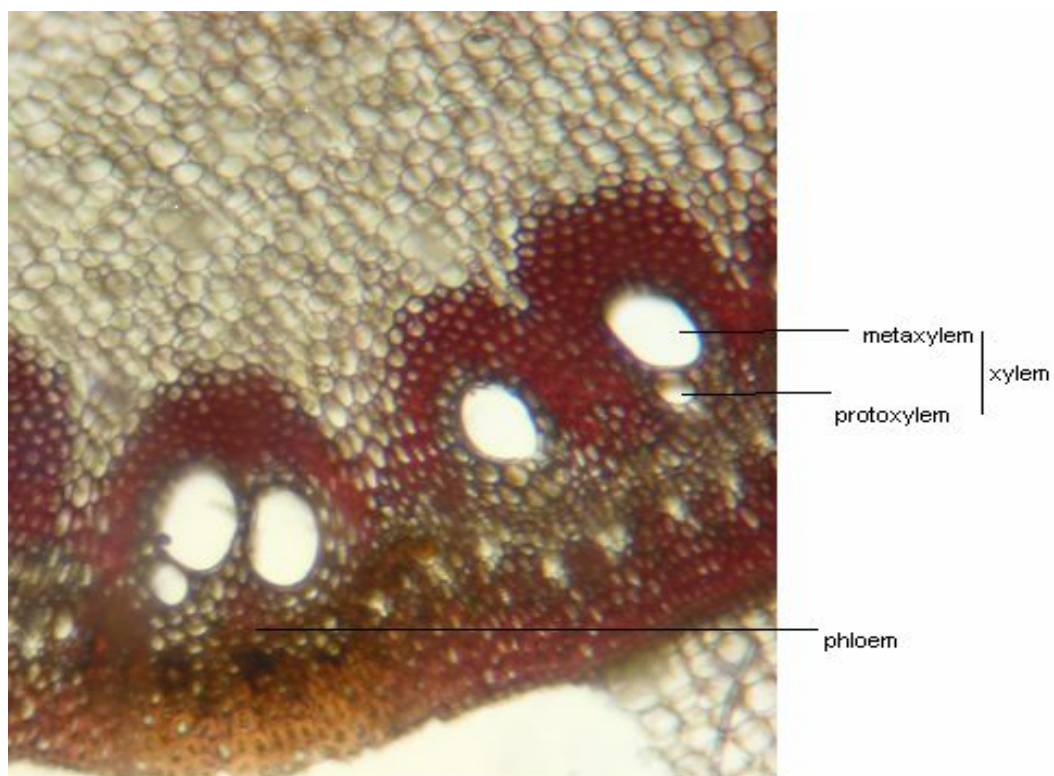


Figure 2.1 Rings of xylem and phloem

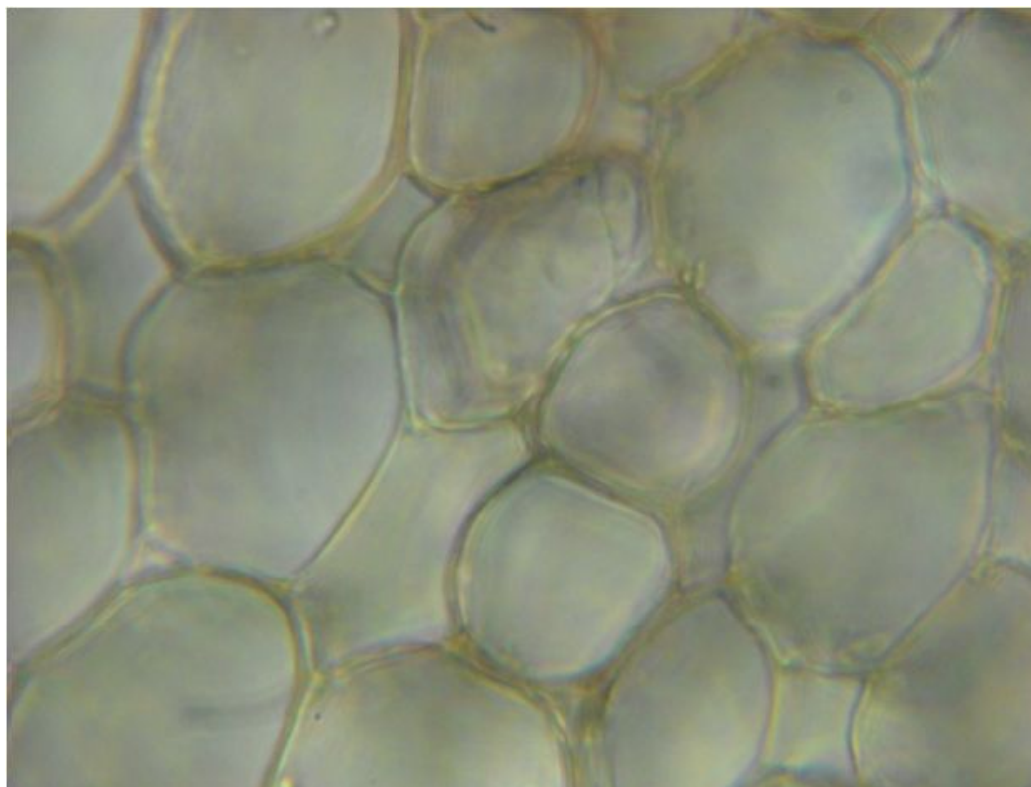


Figure 2.2 Pith- Thin walled, polygonal, parenchymatous cells having intracellular spaces

Crystal Distribution

Calcium oxalate crystals were abundant in different parts of the root. The crystals were predominantly prismatic [Figure 3].

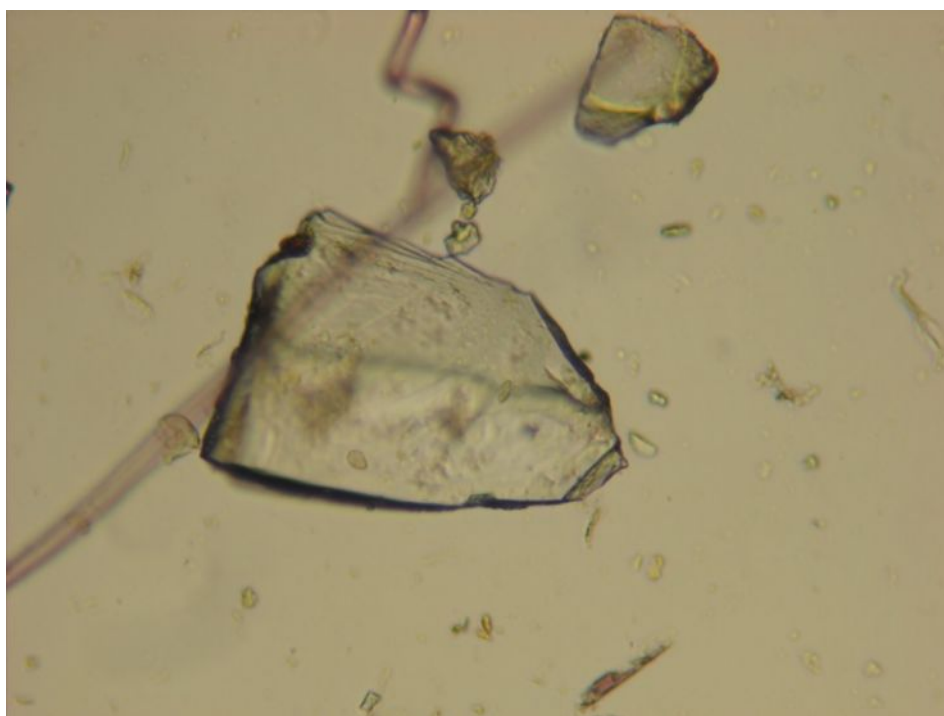


Figure 3 Crystals of calcium oxalate

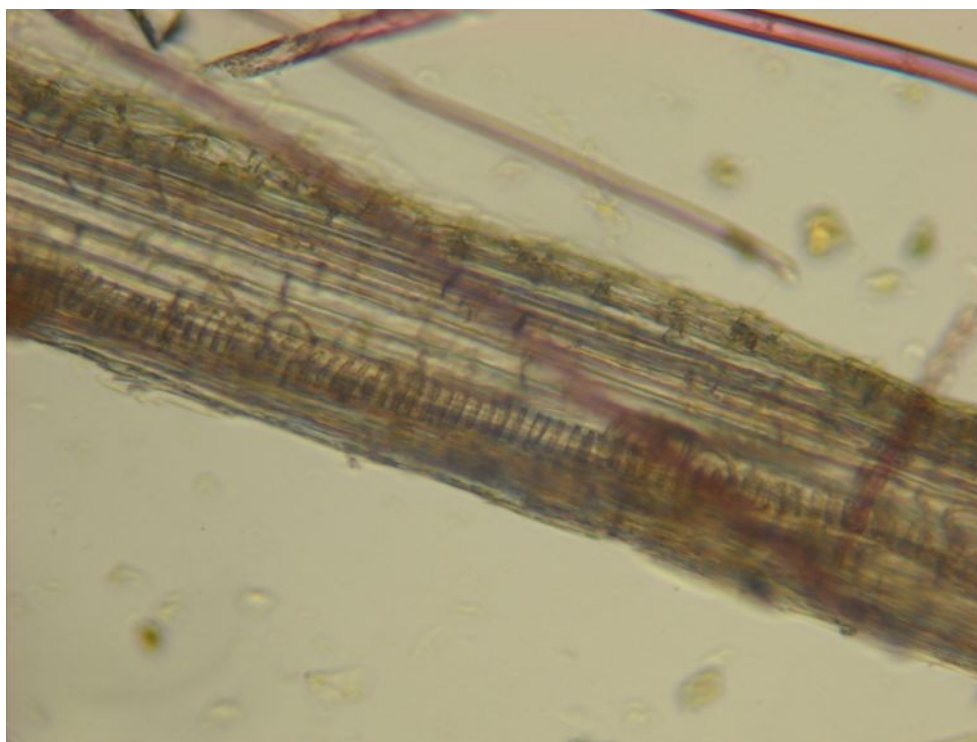


Figure 3.1Part of a group of pericyclic fibres from the stem with associated parenchyma containing cluster crystals of calcium oxalate.

Powder Microscopy

Powder of the root exhibited following types of elements [Figure 4.1-4.4].

Xylem Parenchyma: The parenchyma cells were abundant. They were thin walled occurred in small groups. The shape of the cells varied from rectangular to polygonal.

Xylem Fibres: The xylem fibers were non-gelatinous type.

Trichome Rods: The trichome rods were present in excess.

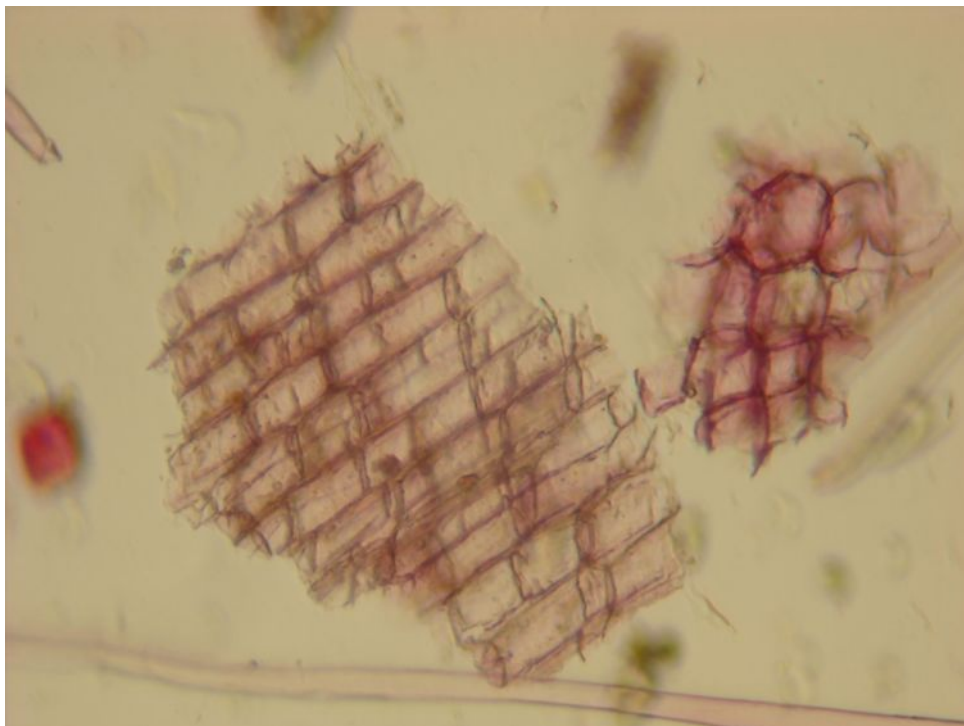


Figure 4.1 Xylem parenchyma in longitudinal section

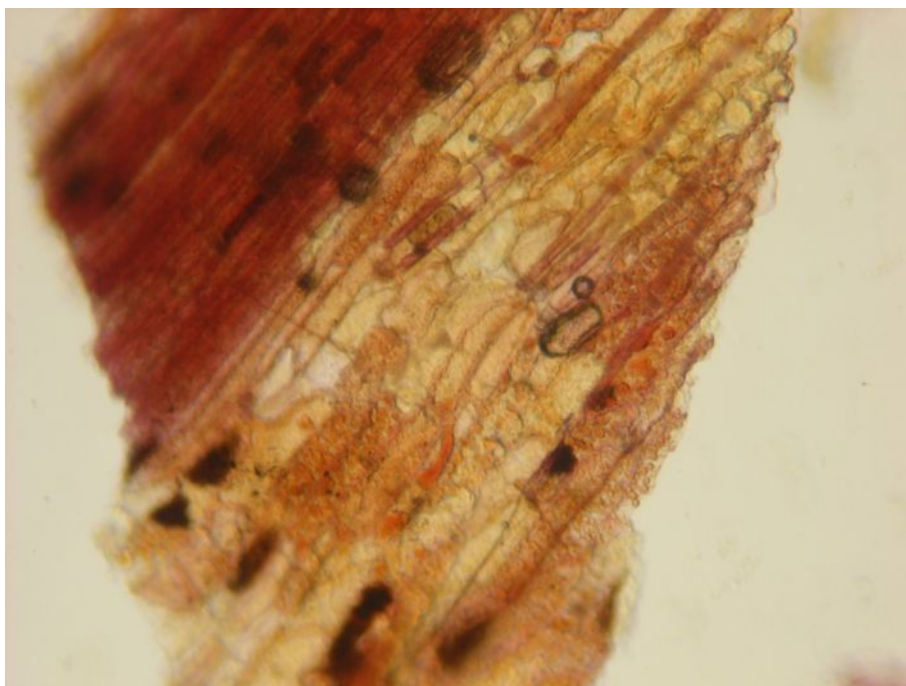


Figure 4.2 Parenchyma of the embryo

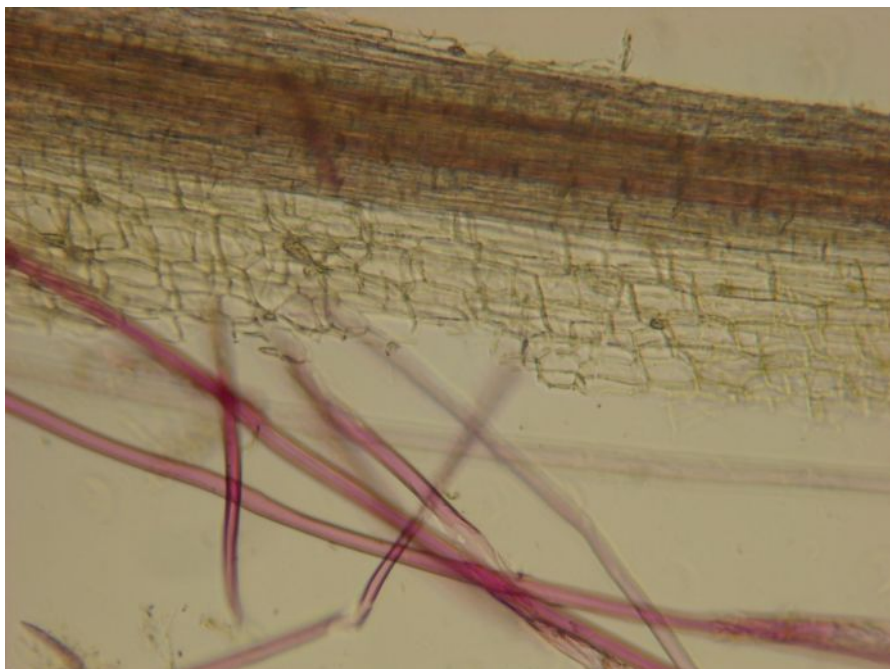


Figure 4.3Part of a group of fibers with associated perenchymatous cells



Figure 4.4Fragments of trichome rods

Physiochemical Parameters

Saccharum munja root powder showed the presence physiochemical parameters such as total ash, water soluble ash, acid insoluble ash, alcohol soluble extractive, water soluble extractive, and moisture content presented in Table no.1. The pH of 1 and 10% solution of powered drugs of *Saccharum munja* was noted in Table 2.

Preliminary Phytochemical studies

The preliminary phytochemical investigation of the aqueous, methanol, petroleum ether and chloroform extracts of *Saccharum munja* Roxb. root powder showed the presence of phytosterols, flavonoids, terpenoid saponins, carbohydrates, tannins, glycosides, alkaloids and proteins presented in Table 3.

Table 1. Physiochemical Parameters of root of *Saccharum munja* Roxb.

Quantitative Parameter	Value Obtained (%w/w)
Total ash	59.95%w/w
Acid insoluble ash	0.4%w/w
Water soluble ash	0.6%w/w
Alcohol soluble extractive	0.015%w/w
Water soluble extractive	0.6%w/w
Loss on drying	6.88%w/w

Table 2. Determination of pH of the drug

Sample	pH
1% Solution	7.72
10% Solution	6.72

Table 3. Qualitative analysis of phytochemicals in *Saccharum munja* Roxb.

Extracts	Pet. ether	Chloroform	methanol	Aqueous	4N Pot. hydroxide
Sterols	—	—	—	—	—
Tannins	—	—	—	—	—
Flavonoids	—	—	—	—	—
Proteins and amino acids	—	—	—	—	—
Glycosides	—	—	—	—	—
Phenols	—	—	—	—	—
Acidic Compounds	—	—	—	—	—
Carbohydrates	—	—	—	—	+
Saponins	—	—	—	—	—
Alkaloids	—	—	—	—	—

+ Present, - Absent

Discussion

The macroscopic study of root indicated that it is adventitious porous root [Figure 1]. It may be an important characteristic feature for identifying the plant. The anatomy of the root was studied by taking transverse section. Transverse section of the root showed epidermis was single layered and consisting of cubicular to rectangular, thinwalled cells. Hypodermis single layered composed of parenchymatous cells; beneath hypodermis continuous ring of 2-5 layered, thick-walled, lignified, sclerenchymatous cells found scattered. Cortex

consisting of oval to round, thinwalled parenchymatous cells, those of inner layers becoming smaller in size and rectangular in shape. Xylem and phloem form equal number of bundles, arranged alternately in rings consisting of usual elements; metaxylem elements much bigger than protoxylem. Pith distinct consisting of thin walled, polygonal, parenchymatous cells having intercellular spaces. [Figure 2- 2.2].

Calcium oxalate crystals were abundant and were predominantly prismatic and were seen parenchymatous fibers. [Figure 3-3.1]

Powder microscopy of the root exhibited xylem parenchyma, xylem fibers and trichome rods [Figure 4.1-4.4]

Physicochemical parameters and preliminary studies of the root powder will be useful tool along with macroscopical and microscopical characteristics of *Saccharum munja* Roxb. root.

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Conclusion

The present study on pharmacognostical investigation of *Saccharum munja* Roxb. root might be useful to supplement information in regard to its identification parameters assumed significantly in the way of acceptability of herbal drugs in present scenario lacking regulatory laws to control quality of herbal drugs.

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