IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, Dec 2022

VESSELS STUDY OF SOME MEDICINAL PLANTS

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ABSTRACT:

The study of vascular anatomy in plant species provides essential insights into their physiological adaptations, ecological roles, and potential applications in pharmacology and medicine. This study focuses on the comparative analysis of the vascular structures of *Maerua oblongifolia*, *Marsdenia volubilis* and *Sansevieria roxburghiana*. *Maerua oblongifolia* and *Marsdenia volubilis* two climber species known for their medicinal properties. Both species belong to distinct families, Capparaceae and Apocynaceae, respectively, but exhibit similar growth habits and environments, making them suitable for comparative vascular analysis. *Sansevieria roxburghiana* belongs to family Agavaceae. Histological examinations were conducted on the stems and roots of each species to observe the arrangement, size, and distribution of xylem and phloem tissues. *Maerua oblongifolia* was found to possess well-developed xylem vessels adapted for efficient water transport, a feature likely beneficial for survival in arid conditions. Conversely, *Marsdenia volubilis* exhibited a denser phloem network, which may support its climbing habit and facilitate nutrient distribution across its elongated structure.

The study concludes that while these three species have unique vascular adaptations related to their growth forms and environmental demands, these structural characteristics also contribute to their medicinal applications. The vascular structures likely play a role in the synthesis and storage of bioactive compounds. Findings from this comparative analysis of *Maerua oblongifolia*, *Marsdenia volubilis* and *Sansevieria roxburghiana* used for electuary in consumptive complaints and chronic cough of long standing contribute to the broader understanding of plant vascular anatomy and its implications for botanical pharmacology, ecology, and sustainable medicinal plant use.

Keywords: Vessels, *Maerua oblongifolia*, *Marsdenia volubilis*, *Sansevieria roxburghiana.*

INTRODUCTION:

The study of medicinal plants has long been a focus in botany and pharmacognosy due to their traditional uses in healing and potential for pharmaceutical applications. Among various plant species, *Maerua oblongifolia, Marsdenia volubilis and Sansevieria roxburghiana* are notable for their medicinal properties, which make them valuable for scientific study. These three plants are native to tropical and subtropical regions and have been used in traditional medicine systems for centuries.

In the context of vessel studies, understanding the vascular structure of these plants -specifically their xylem vessels is essential for several reasons. Xylem vessels play a critical role in the transport of water and nutrients, which impacts the plant's growth, resistance to environmental stress, and effectiveness in producing secondary metabolites with medicinal value. Examining the vessel morphology and anatomy can provide insights into the plant's adaptive strategies, ecological preferences, and overall physiology.

Maerua oblongifolia is a small shrub in the Capparaceae family, traditionally used to treat various ailments such as digestive issues and respiratory infections. Its roots, leaves, and stems contain bioactive compounds, such as flavonoids, that contribute to its medicinal properties. *Marsdenia volubilis*, a twining vine from the Apocynaceae family and *Sansevieria roxburghiana* has been used in traditional medicine, particularly in Southeast Asia and the Indian subcontinent. It is known for its anti-inflammatory, analgesic, and antioxidant properties, with parts of the plant used to manage pain and inflammation.

This introduction highlights the importance of vessel study in these species as it can help in understanding how each plant sustains itself under different environmental conditions, potentially influencing the yield and efficacy of their medicinal compounds. Detailed analysis of vessel elements in *Maerua oblongifolia, Marsdenia volubilis and Sansevieria roxburghiana* will provide insights into their growth and adaptability, as well as their role in traditional and modern medicine.

1. Uses of *Maerua oblongifolia* Foresk a rich:

The plant is used to cure piles, leucoderma, asthma and urinary discharges. It contains a substance of glucosidal nature with low toxicity and traces of an alkaloid. It stimulates all organs having cholinergic nerve supply and causes a prolonged fall of blood pressure (Chopra, 1965). The plant is tonic, cooling, aphrodisiac cures vata, biliousness, burning sensation, useful in diseases of the eye. The bitter variety alexiteric, antipyretic, good for dyspepsia, inflammations, rat bite, cures tumours, piles, leucoderma, asthma, urinary discharges. Leaves are much employed as an application to boils and abscesses. The roots and tender stalks are considered emetic and expectorant (Kirtikar and Basu, 1980). The plant is used in colds and eyes diseases to cause sneezing le and their livestock in Kenya, (W.T.W. Morgan, 1980).

Root used as tonic and stimulant and fruit used in stomach diseases of children. (Rathor et. al., 2000). Roots are edible (Maheshwary, 2000). Roots emetic, expectorant used in boils and abscesses, eye diseases (Jayvir et. al., 2002). Leaves used in toothache intestinal diseases and hypocholesterolemic (Mossa et. al., 2004). Antimicrobial activity of toothbrush sticks, (Van et. al., 2006). Antihepatoxicity, (Antihepatoxicity. blogspot.com/-39k, 2008). The bark is used by masai, medicine men, and the plants toxic properties. (WWW.aluka Org/action/..).

2. Uses of *Marsdenia volubilis* (L. f.) Benth. Ex Hook f.: -

It is very common in treatment of many common diseases. They prepare a special herbal combination by dipping dry root powder of this herb in ginger juice. The herb vendors use it in treatment of troubles related to digestive system, appetizer. Root, Kuchla (Strychnes nuxvomica) and Bhang (Cannabis sativa) seeds, all mixed in equal proportion by boiling, decoction is prepared from this seeds, kuchla and Bhang seeds are removed and the seed cover is peeled out. Kuchla and Bhang seeds are again add in decoction besides these, Acorus calamus, fennel, papal, dried ginger are also added, boiled made solution. This solution used for paralysis patients. Traditional medicinal knowledge about common herbsin Chhattisgarh. Botanical. Com/site/column _ poudhia/publish/Journal/ 866.txt-5 k.

3) *Sansevieria roxburghiana* L. (willd.)

Fibers development from leaf (Arthur et. al,1947). *Sansevieria* uses bowstring hemp obtained from leaf (Albert, 1951). This species is probably not different from the. Leaf fibers used cordage, bowstring hemp, (Katherine Esau, 1959). In *sansevieria*, Agave and Musa the average length of the exatraxylary fibers depend on the length of the part of the leaf from which fibers are obtained (Meeuse, 1938) (Katherine Esau. 1965). Stem of *Sansevieria,* Secondary growth from a restricted meristem occur in herbaceous and woody Liliflorae (Alove, *Sansevieria*, Yucca, Agave, Dracaena) and other group of monocotyledons (Cheadle, 1937- Katherine Esau, 1965).

Sansevieria uses as bowstring hemp (Elizabeth Cutter, 1970). Used for Cordage, bowstring hemp (Katherine Esau, 1974). Yield of fiber used for bowstrings cordage, matting, and fine cloth Rhizomes mucilaginous used in the form of an electuary for cough, Juice of tender shoots given to children for cleaning the phlegm from the throat (Ambasta et. al., 1986) on experiment, this plants produced a most beautiful fibers, as soft and as fine human hairs, but possessing, not withstanding, extraordinary strength and tenacity. The fibers are used for ropes, twine, thread, bowstrings and cord manufacture of paper. (Drury,1990). Root is used as an electuary in consumptive complaints and chronic cough of long standing. Juices of tender shoots are

given to children to clear viscid phlegum in throat (Maheshwary, 2000). *Sansevieria* and Agave the average length of the extra xylary fibers depend upon the length of leaf, and in Musa that of the leaf sheath (Maiti et. al., 2006). The plants of general *sansevier*ia produced fiber for the utilization of cordage growing principally in the tropical and sub - tropical countries of Africa and Asia, finding more than 50 species, being some localized in wild condition, although, is diversity in ornamental plants in morphological characteristics and the leaves are originated of rhizome being form with a length of 50 to 90 cm. The plants used to children to clear their throats of viscid phlegm. Rhizome are used in purgative, febrige, gonorrhoea, heart-disease, itch, leprosy (Singh, 2006). Fleshy creeping root is in a slight degree, warm to the taste, and of not unpleasant Odour. It is prescribed in the form of an electualry, in consumptive complaints and coughs of long standing of, fever, cough, piles, asthma, tuberculosis and dysuria to a quantity of small tea spoonful twice daily. Juice of tender shoots, (Saraswathy, 2007).

MATERIALS AND METHODS:

Plants material was collected from Jalna and Chhatrapati Sambhajinagar district Maharashtra. Some plants of *Maerua oblongifolia*, *Marsdenia volubilis* and *Sansevieria roxburghiana* was preserved in herbarium. For vessel studies a thin slice of root stem were treated with 5%solution of HNO3 +5 % solution of K2Cr2O7 for 12 to 24 hours. The maceration was then thoroughly washed with water and vessel elements were stained with 1 % aqueous solution of safranine and mounted in glycerine. Measurement was talked by ocular micrometre and camera lucida and stage micrometer. Classification of Radford et. al. (1974) is followed for catgoring the vessels element.

Vessel elements are observed in the stem and roots of plants. The studied of their length, width, perforation, plates, pits arrangement, end-wall and lateral wall thickening

Vessel elements in *Maerua oblongifolia* Foresk. a. rich stem.

Length of vessel elements	: 430 - 650 µ.
Average length	: 540 µ.
Diameter of vessels elements	: 120 - 150 µ.
Average diameter	: 135 µ.
Shape	: Tubular, drum shaped
Lateral wall thickening	: Simple pitted
Pits arrangement	: Alternate
Perforation plate	: Simple
Shape of perforation plate	: Oval, circular
Position of plate	: Transverse
Tail	: Very short & pointed

(Plate No. – 1, table no. – 1)

Vessel elements in *Maerua oblongifolia* Foresk. a. rich root.

Length of vessel elements	: 440 - 660 µ.
Average length	: 550 µ.
Diameter of vessels elements	: 70 - 220 µ.
Average diameter	: 145 µ.
Shape	: Barrel shaped, tubular, cylindrical
Lateral wall thickening	: Simple pitted
Pits arrangement	: Alternate

Perforation plate	: Simple
Shape of perforation plate	: Oval, rounded
Position of plate	: Oblique, transverse
Tail	: Very short & pointed
	: (Plate No. 1, Table no. – 2)

Vessel elements in *Marsdenia volubilis* (L. f.) Benth. Stem.

Length of vessel elements	: 140 - 470 µ.
Average length	: 305 µ.
Diameter of vessels elements	: 20 - 90 µ.
Average diameter	: 55 µ.
Shape	: Tubular, cylindrical
Lateral wall thickening	: Simple pitted
Pits arrangement	: Alternate
Perforation plate	: Simple
Shape of perforation plate	: Oval, barrel like
Position of plate	: Oblique, transverse
Tail	: Short, blunt or pointed
	: (Plate No. 2, Table no. - 1)

Vessel elements in *Marsdenia volubilis* (L. f.) Benth. root.

Length of vessel elements	: 560 - 810 µ.
Average length	: 685 µ.
Diameter of vessels elements	: 120 - 190 µ.
Average diameter	: 155 µ.
Shape	: Cylindrical
Lateral wall thickening	: Simple pitted
Pits arrangement	: Alternate
Perforation plate	: Simple
Shape of perforation plate	: Barrel like, circular
Position of plate	: Oblique, transverse
Tail	: Very short & pointed
	: (Plate No. 2, table no. - 2)

Vessel elements in *Sansevieria roxburghiana* L root.

Length of vessel elements	: 330 - 660 µ.
Average length	: 495 µ.
Diameter of vessels elements	: 90 - 150 µ.
Average diameter	: 120 µ.
Shape	: Spindle shaped, barrel shaped
Lateral wall thickening	: Simple pitted
Pits arrangement	: Alternate, opposite, parallel
Perforation plate	: Simple
Shape of perforation plate	: Oval, circular

Position of plate : Transverse
Tail : Short & blunt
(Plate No. 3, table no. - 2)

Table No. 1. Vessel element in Stem

Sr. No	Name of Species.	Length of vessels members (µm)			Diameter of vessel members (µm)		
		Minimum	Maximum	Average	Minimum	Maximum	Average
1	*Maerua oblongifolia*	430	650	540	120	150	135
2	*Marsdenia volubilis*	140	470	305	20	90	55

Table No. 1. Table No. 1. Vessel elements in Root.

Sr. No	Name of Species	Length of vessels members (µm)			Diameter of vessel members (µm)		
		Minimum	Maximum	Average	Diameter	Maximum	Average
1	*Maerua oblongifolia*	440	660	550	70	220	145
2	*Marsdenia volubilis*	560	810	685	120	190	155
3	*Sansevieria roxburghiana*	330	660	495	90	150	120

CONCLUSION:

The study of vessel anatomy in *Maerua oblongifolia*, *Marsdenia volubilis* and *Sansevieria roxburghiana* offers significant insights into the structural adaptations that support their survival, growth, and medicinal potency. Both species demonstrate unique vascular structures that align with their ecological niches and physiological requirements, influencing their water transport efficiency, drought resistance, and resilience in various environmental conditions.

In *Maerua oblongifolia*, the vessel structure, characterized by thick-walled xylem vessels, supports the plant's adaptability to arid conditions by reducing water loss and maintaining efficient nutrient transport. This structural adaptation enhances its potential to produce bioactive compounds, such as flavonoids, that contribute to its medicinal efficacy in treating digestive and respiratory issues. Similarly, *Marsdenia volubilis* shows vessel arrangements suited to its climbing habit and the humid environments where it commonly grows. The vessel architecture in this species enables flexibility and efficient water transport, contributing to its known anti-inflammatory and antioxidant properties.

Overall, the vessel anatomy in both plants provides insights into how their vascular systems support medicinal compound production and sustain their traditional medicinal applications. Understanding these anatomical adaptations also broadens the knowledge of plant physiology, with potential implications for improving cultivation practices, conservation, and the sustainable harvesting of these valuable species. This research contributes to the growing body of knowledge pharmaceutical potential. The medicinal plants emphasizing the role of plant anatomy in ecological resilience and pharmaceutical potential. The *Sansevieria roxburghiana* have not appeared stem, vessels obtained only in root. Root vessels are spindle shaped or barrel shaped simple pitted alternate opposite or parallel shape.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, Dec 2022

Plate No. 1

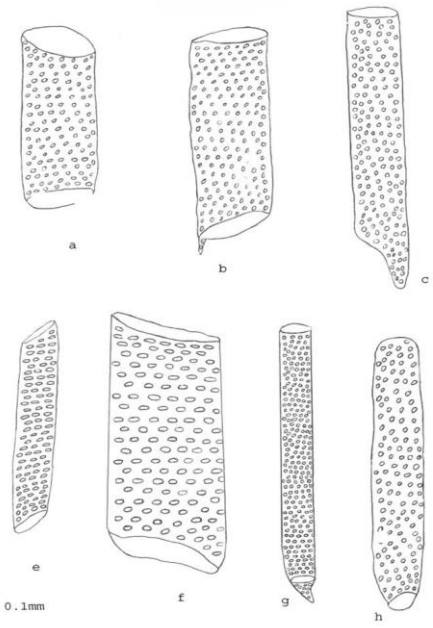

Figure: *Maerua oblongifolia* stem (a,b,c) vessels.root (e,f,g,h) vessels

Plate No. 2

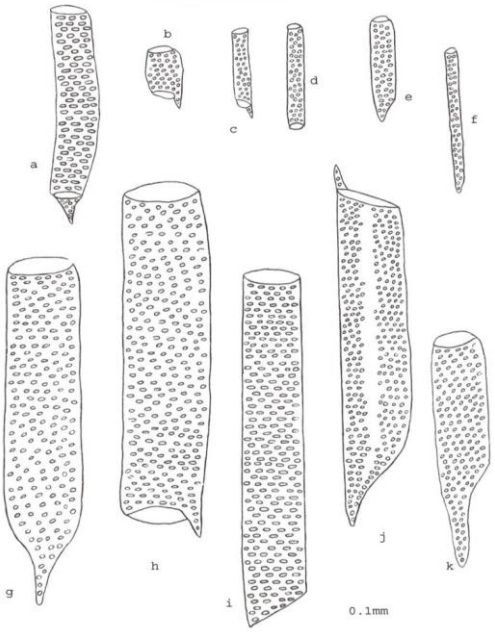

Figure: *Marsdenia volubilis* stem (a,b,c,d,e,f) vessels and root (g,h,i,j,k) vessels.

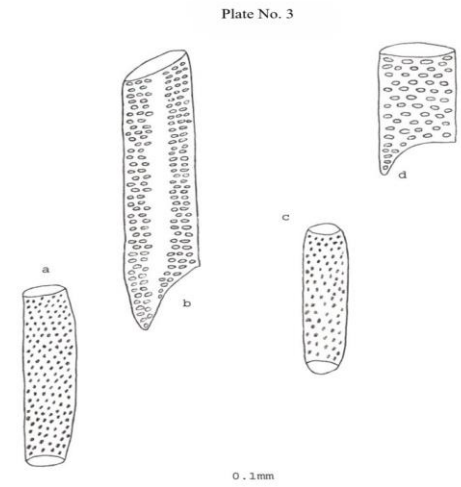

Fig: Sansevieria roxburghiana root (a,b,c,d) vessels

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