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AN ANATOMICAL COMPARISON OF *ARISTOLOCHIA INDICA* L. WITH REFERENCE TO THE GEOGRAPHICAL REGION AND CERTAIN CLIMATIC PARAMETERS

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Abstract
Aristolochia indica as a whole plant is very active and it has been used in medicines since ancient times. In Ayurvedic preparations this plant is used to destroy the toxic effects of all poisons, especially snake poison.This plant also has anti- inflammatory, anti -microbial,antipyretic and antiseptic properties.In this context, anatomical characterization of *Aristolochia indica* L from different geographical regions of Pathanamthitta district has been studied. It gives an idea about the similarities and differences in their structure.

Key words: *Aristolochia indica*, preparations, inflammatory

Introduction

Now a days plants are vanished from the earth due to several reasons like rapid change of climate, pathogenic activity, over exploitation etc especially in the area of medicinally enriched plant category. Unfortunately Aristolochiacea family is one of them. The family is commonly called "Birthwort family" consist of nearly seven genera and about 400 known species (poonam etal., 2017). Aristolochia is the important genus of aristolochiaceae family having highly medicinal property and some species are cultivated as ornamental.

Aristolochia L. is a perennial climber having innumerable medicinal properties. Aristolochia is the large genus of the family aristolochaceae with about 500 known species (M vasu sudhakaran., 2016). This endangered plant is commonly called "Indian birthwort", Dutchman's pipe etc. because of their flower shape, it is resembles with the birth canal some references state that the scientific name of Aristolochia was derived from Ancient Greek word "aristo (best) + "lochia" (child birth or child bed").
In Indian subcontinent, the plant is found in low hills and plains of India from Nepal and lower Bengal to Chittagong in Bangladesh and Coromondal Coast (Murugan *et al*., 2006; Kanjilal *et al*.,2009).

The plant *Aristolochia indica* L. is a shrubby or herbaceousvine with a woody root stock (Kanjial *et al.*,2009). leaves are glabrous (without hairy projection) , variable in shape and size, usually obovate – oblong to sub pendurate, margins entire and undulate ,basal portion is cordate acuminate. Flowers are few arranged in axillary racems with a 4cm long perianth having a glabrum green inflated (Das et al., 2010). Aristolochia plant have so manyvernacular names, in Hindi it is commonly called "Ishwamul and Hookabel". In Malayalam and Tamil its called "Garudakodi and Ishwaramuli" respectively (M Vasu Sudhakaran.,2016).

The plant has a variety of traditional benefits. It is used as a curative agent in system of traditional medicine for variety of aliments (Baskar sarama et al., 2015). The usage of Aristolochia genus have mentioned in the ancient Indian and chines medicinal literatures. In Indian system of medicines especially in Ayurveda and Unani , Aristolochica leaves and root used against snake bite and also it is used

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for the treatment of hypertension, leukocytes enhancement, rheumatism, eczema, festering wounds and as analgesic and diuretic and against tumor (Krishnaraju etal., 2005). In chines medicine aristolochia plants are widely used for the treatment of different illness, including hepatitis, urinary tract infection,vaginitis, oral ulcers, upper respiratory tract infection, headache, dysmenorrhea, pneumonia,heart failure and edema (Lai *et al.,*2010).

Because of the vital significance of Aristolochia genus in medical system was extensively studied by various workers for its phytochemical,pharmacological, morphotaxonomical,cytological aspects(Dey *et al.*, 2011). The present study was underbreaken with the objective of describing the anatomical features of Aristolochia indica from different geographical habitat.

Materials and methods

Materials

Aristolochia indica L. FAA solution, 1% Safranin, Leica DM 500 stereomicroscope, Razor blade,cleaned objective microscopic slide etc

Methods

Preparation of FAA solution
Plant collection and authentication
Anatomical study

1. Preparation of FAA solution

Using standard protocol. For 100 ml FAA preparation take 70ml ethanol then add 15ml of formaldehyde solution to it ,mix well ,again add 10ml of distilled water and 5ml of glacial acetic acid. Mix the solution thoroughly.

2. Plant collection and authentication

Aristolochia indica L. was collected from three different accessions in Pathanamthitta district of the state of Kerala, India. Leaves and the stem of the plant was carefully cut into small pieces using razor blade and it is immediately immersed into the FAA solution on a glass vial for preservation, and tightly closed and keep in room temperature for further use.

3.Anatomical studies

Fine hand section of leaves, stem, petiole from five accessions were taken using razor blade and the thin sections were stained with 1% Safranin and mounted on a glass slide with glycerine. Photographs were taken by using Leica DM 500 stereomicroscope with Leica EZ software.

Result and Discussion

Accession 1- Ezhumatoor (Pathanamthitta district), Kerala

Latitude :$9^0$25’0”N,Longitude: $76^0$42’0”E, Wind speed: .30m/s, Humidity:75% ,Pressure:989.70hpa, Cloud: 52%, Light : 29^0C (Table 1)

TS of Stem

Detailed T.S of stem (figure 1) shows uniseriate epidermis with thick cuticle. Epidermal cells somewhat spherical in shape. Below the epidermal layer collenchymatous hypodermal region followed by two layer of chlorenchymatous tissue. A large round shaped sclerenchymatous pericycle is present below the chlorenchymatous tissue. Vascular bundles are arranged in a ring like manner, distinctly collateral and single vascular bundle is U or V shaped. Cambium is present between thexylem and phloem and it is extended to the adjacent vascular bundles to forming a cambial ring. Centre portion is consist of parenchymatous pith.

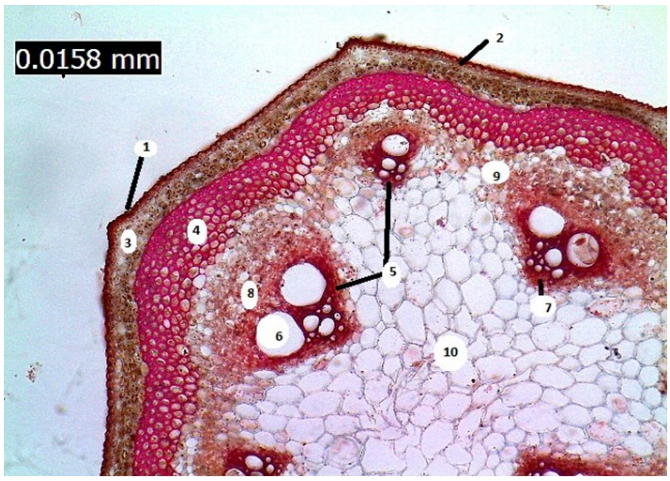

Figure 1. 1- cuticle, 2- epidermis,3- cortex, 4- sclerenchyma, 5 -vascular bundles,6-meta xylem,7-proto xylem, 8-s phloem, 9-cambium, 10-pith

T.S petiole

Cross sectional diagram of petiole (figure 2) is appeared as spherical in shape with a deep serrated groove. Epidermis is single layered with single or multicellular trichome. Under the projection

compactly arranged collenchymatous cells present, followed by cholrenchymatous hypodermis. Vascular bundles are arranged in a letter V shaped with in the parenchymatous ground tissue. Vascular bundles are five in number , three large bundles at the centre and two small bundles at lateral.xylem arranged ina radial row and phloem lie below the xylem

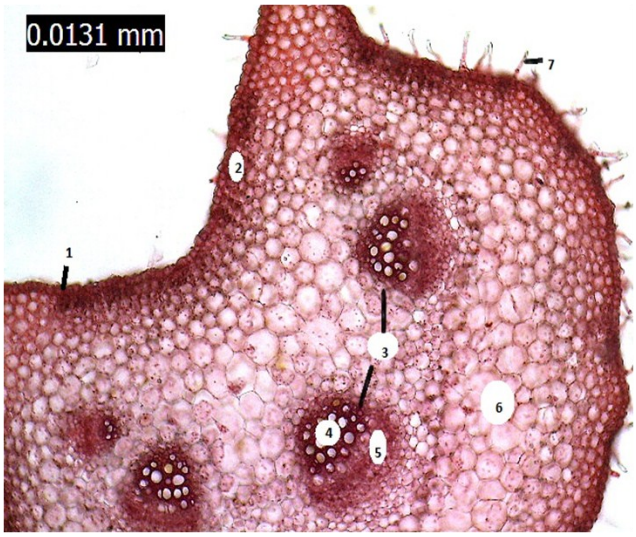

Figure 2. 1 - Epidermis, 2-collencyma, 3- vascular baundles, 4- xylem , 5- phloem, 6- ground tissue, 7-trichome

T.S of leaf

Cross sectional diagram (figure 3) of leaf shows single layered upper and lower epidermis with thick cuticle. Below the epidermis cells are differentiated into upper elevated and lower elevated portions. Upper portion consist of 2,3 layer of collenchyma cells. Vascular bundles are crescent shaped, xylem arranged in a radial row and phloem lie under the xylem. Followed by sclerenchymatous bundle sheath. Mesophyll consist of single layered rectangular cells called palisade tissues and loosely arranged parenchyma cells called spongy tissues. Ground tissue is composed of parenchyma cells.

Accession 2- Edamuri , Pathanamthitta

Latitude : $9^0$25’14”N, longitude : $76^0$49’0”E, wind speed: 0.18m/s, humidity : 73%, pressure : 990.72hpa, cloud : 56%, light : 27℃

T.S of stem

T S of stem (figure 4a, 4b) look like a star shaped structure, outer portion has 8 wedges. Epidermis is single layered and cuticle is not much prominent. Below the epidermis collenchymatous hypodermis is present. Two or three layer rectangular thick

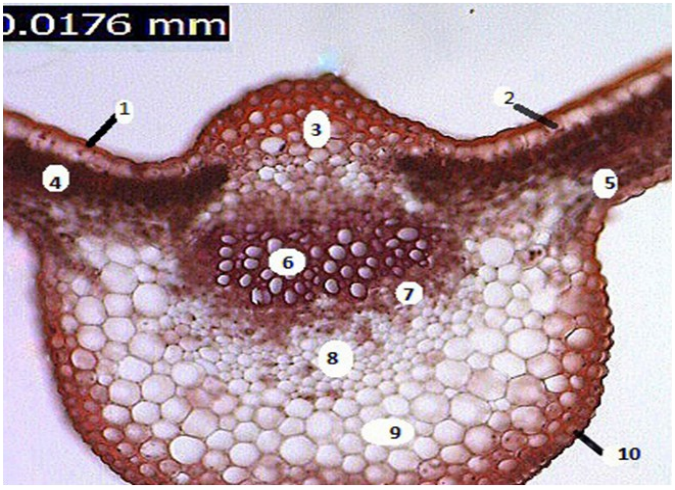

Figure 3. 1- cuticle, 2-upper epidermis, 3- collenchyma, 4-palisade, 5-spongy tissues,6-xylem, 7- phloem, 8-sclerenchyma, 9-parenchymatous ground tissue, 10- lower epidermis

sclernchymatic pericycle is present. Cortex and pith region is composed of parenchyma cells. Vascular bundles are embedded within the parenchyma cells and arranged in ring like manner. Totlal 13 vascular bundles are present. They are collateral in nature, that means xylem and phloem are lie in a same radius, with thephloem located towards the periphery and xylem towards the pith region. Xylem is endarch.

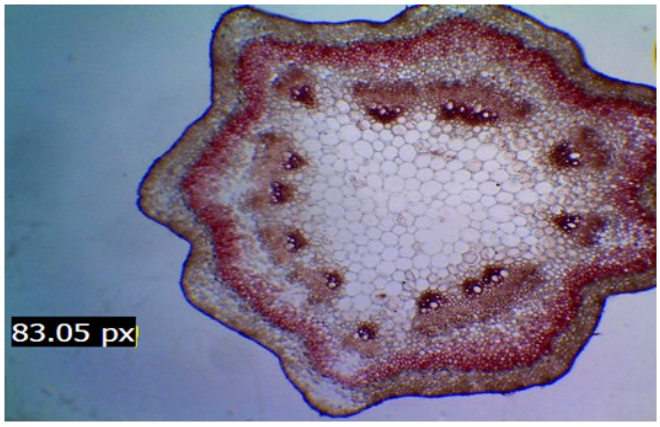

Figure 4a. **T.S of stem**

T S of petiole

Petiole is somewhat spherical in structure with a deep grove and two projections. Below these projections thickly packed collenchyma cells are present. Epidermal cells are unicellular and posse numerous trichomes. Petiolar bundles are five in number and it is arranged in a letter “ V” shaped with in the

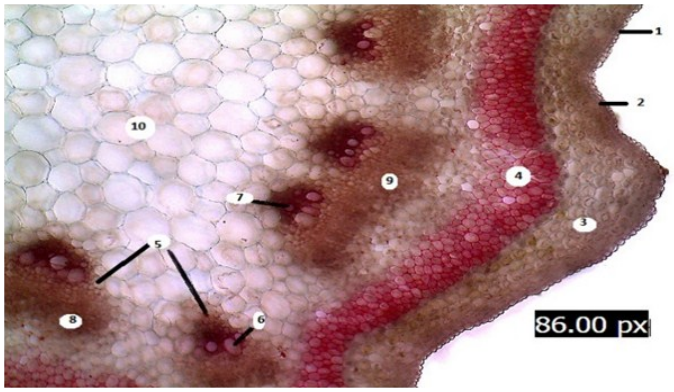

Figure 4b. **T.S of stem (Enlarged Portion)** 1- cuticle, 2- epidermis,3- cortex, 4- sclerenchyma, 5-vascular bundles,6-meta xylem,7-proto xylem, 8-s phloem, 9-cambium, 10-pith

parenchymatous ground tiisue. Among the five vascular bundles three are larger and two are small in lateral postion. Xylem is endarch. No distigutiable pith region Figures 5a and 5b).

Figure 5a. T S of petiole

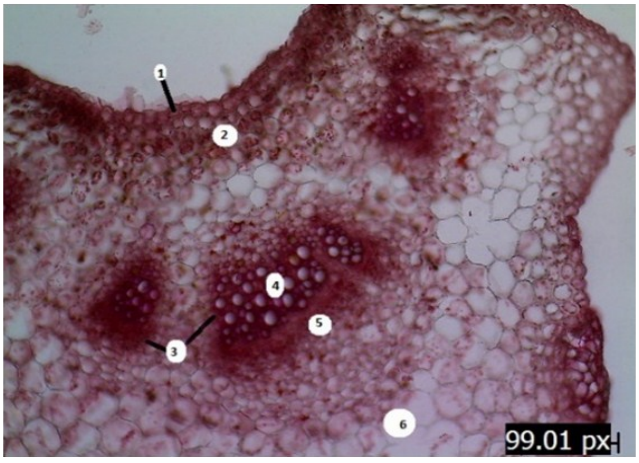

Figure 5b. T S of petiole (Enlarged portion): 1 - Epidermis, 2-collencyma, 3- vascular baundles, 4- xylem , 5- phloem, 6-ground tissue, 7- trichome

T .S of leaf

It shows dorsiventral differentiation (figure 6). Both epidermis are single layered with cuticle. Midrib id differentiated into upper small elevation and lower wider elevation. Upper elevation consist of two three layer of closely packed collenchyma cells present. Mesophyll is differentiated into palisade and spongy cells. Palisade is composed of single layered rectangular cells and the spongy cells are loosely arranged parenchyma tissues. Vascular bundles are seen in the parenchymatic ground tissue, and it is crescent shaped. Xylem arranged in radial row and phloem lie below the xylem.

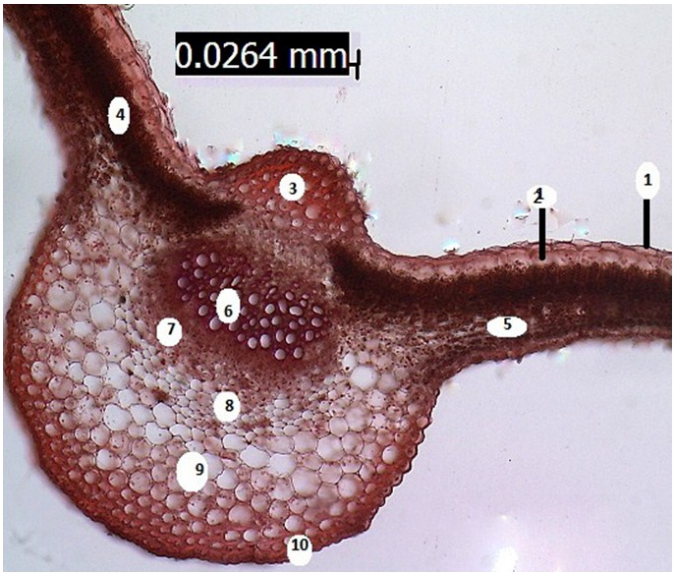

Figure 6. T .S of leaf : 1- cuticle, 2-upper epidermis, 3- collenchyma, 4-palisade, 5-spongy tissues,6-xylem, 7- phloem, 8-sclerenchyma, 9-parenchymatous ground tissue, 10- lower epidermis

Conclusion

The present study was aimed to describe the anatomical differentiations of Aristolochia indica. L from two different accessions within Pathanamthitta district and the influence of geographical conditions and climatic parameters in anatomy. The result shows there is no significant variations in cell structure and organisation of cells. In stem anatomy there is a small variation is observed in outer wall and number of vascular bundles. So we can concluded that within *Aristolochia indica* species there is no difference in anatomy and also geographical conditions and climatic parameters are not affected the anatomical structure.

Table 1. Details of accessions

Accession	Latitude	Longitude	Temperature	Pressure	Humidity
Ezhumatoor	$9^0$25'0"N	$76^0$42'0"E	29^0C	989.70hpa	75%
Edamuri	$9^0$25'14"N	$76^0$49'0"E	27^0C	990.72 hpa	73%

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