INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
www.irjponline.com ISSN 2230 – 8407
Research Article

ANATOMICAL STANDARDIZATION OF *CAPPARIS ZEYLANICA* L.

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Article Received on: 24/04/12 Revised on: 11/06/12 Approved for publication: 30/06/12

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ABSTRACT
The genus *Capparis* L. is shrubs or rarely tree, erect, scandent or sprawling; shoots generally armed with stipular spines and belonging to the family Capparadaceae. The *Capparis zeylanica* L. is anodyne, sedative, stomachic, anti-hydrotic, boils, cholagogue, colic, rheumatism, sore and used against swelling, pleurisy, cholera, hemiplegia, neuralgia and rheumatism. The taxa were polymorphic so present paper deals with standardization of *C. zeylanica* L. Anatomy and maceration techniques used to delimit the taxa. The anatomical data shown arrangements of tissues in particular pattern i.e. stomata anomocytic or ranunculaceous, eglandular tomentose, dorsiventral mesophyll, perivascular fibers, thickened cuticle and presence of crystals in epidermis of leaf as well as near to vascular cylinder of petiole, are the peculiar characters of *C. zeylanica* L. Maceration of stem gives exact dimensions of vascular elements so the qualitative and quantitative data is useful for identifying adulteration in herbal products.

KEY WORDS: *Capparis zeylanica* L., Anatomy, Maceration, Dermatology etc.

INTRODUCTION:

Standardization of medicinal plants is global perspective. The proposed research work has been done on plant anatomical standardization of the genus *Capparis* L. is shrubs or rarely tree, erect, scandent or sprawling; shoots generally armed with stipular spines and belonging to the family Capparidaceae. The *Capparis zeylanica* L. is anodyne, sedative, stomachic, anti-hydrotic, boils, cholagogue, colic, rheumatism, sore and used against swelling, pleurisy, cholera, hemiplegia, neuralgia and rheumatism. While the taxa is polymorphic so present paper deals with dermatology, anatomy and maceration to delimit the taxa. The anatomical evaluation is identification tool for medicinal plants and is one of the essential parameter in monograph. The maceration and dermatological data gives the criteria to finding out the adulteration, numerical data and quantitative microscopy are parameters that are unique to the plant and required in its standardization.

Medicinal Properties:

The various species of *Capparis* L. are used in treatment of cough, asthma, inflammation, fevers, and useful as poultice in gout[1]. Traditionally it is used as to cure swelling of testicles, small-pox, boils, cholera, colic, hemiplegic, neuralgia, sores, pneumonic and pleuriasy[2,3,4]. Leaves are used as counter-irritantant, febrifuge and as a cataplasm in swellings, boils and piles[5]. Whole plant is anodyne, sedative, stomachic, anti-hydrotic, boils, cholagogue, colic, rheumatism, sore and used against swelling, pleurisy, cholera, hemiplegia, neuralgia and rheumatism[6]. Fruits are use as antidote against the snake bite[7]. Methanolic extract of *C. zeylanica* L. have antipyretic activity[8]. For the treatment of diabetes ripe fruits are consumed twice for four nights and during indigestion[9]. C. zeylanica methnolic leaf extract contains pharmacologically active substance responsible for anti-diarrheal properties of drug as proposed by traditional healers[10]. The green fruit are cooked and eaten. Leaves applied as counter-irritant. The bark, along with native spirit, is given in cholera. In Madras, a decoction of leaves is used in syphilis[11]. Root and bark past of *C. zeylanica* L. are applied together on rheumatic swellings[12].

Enumeration:

Cappairs zeylanica L. Sp. Pl. 1762 (ed.2)1: 720, Synonyms: *C. horrida* L.

Family: Capparidaceae

Common Names: English: Caper bush; Hindi: Baghanai, Kanthari, Kareruaa; Kannada: Kathiramullu, Mulhukallari; Tamil: Atandai, Kattukathiri, Marandan, Thoratti; Telugu: Nalla uppi; Marathi: Ardanti, Vyaghranakh, Wag, Wagati,Toratti, Govind-phal;

Distribution: Frequent in deciduous forest.

Morphology:

Shrub or tree or sometime climber, (Fig. III) shrub or tree, branches teret with hooked stipular spines, young parts clothed with rufous tomentose; Leaves 2.5-7.5 X 1.8-5 cm long, elliptic-oblong, obtuse, acute or retuse, with a long, stout mucronate at apex, narrowed at the base, reticulatly veined, blade apex leathery, glabrous and shining above; petioles 6-7 mm long, stipular spine hooked; Flowers (Fig. II) supra -axillary, solitary or 2-3, one above the other in a vertical line, the upper longest; Sepals 7-9 mm long, densely villous; Gynophore 3-3.2 cm long, base white tomentose; Ovary ellipsoid, aciculate; Fruit (Fig. I) sub-globose, 3-3.2 cm in diameter, thickened stalk, obtusely 4-angled, red-brown; Seeds many.

Flowering and fruiting: February-April.

MATERIAL AND METHODS:

The identified plant of *Cappairs zeylanica* L. was collected from different localities of Marathwada region. It was confirmed and voucher specimen deposited at the Herbarium of Botany Department Vivekananda Art's Saradar Dalipsingh Commerce and Science College Aurangabad. The taxonomic features of the plant confirmed with the flora of Maharashtra[13]. The plant materials collected in sterile polyethylene bags and immediately brought to laboratory. They were sort out for anatomical preservation; plant material is soaked in 70% alcohol or Formalin-aceto-alcohol. The free hand sections of the leaf, stem, and petiole were taken for detailed microscopic observation. Dermatology was carried out by semi-permanat mounting and maceration by Jeffry's maceration fluid[14,15]. Measurements were taken by ocular micrometer on 10 X and 40 X lence with 10 X eye piece.

MICROSCOPIC EVALUATION:

Dermatology:

Trichome: Abaxial and adaxial (Fig. IV)epidermis papillose, hairs unicellular, multiserrate, eglandular, peltate or stellate tomentose, ca. mean 336.5-110µ, measured range 250 x 60 - 400 x 162.5µ.

Stomata: anomocytic or ranunculaceous, (Fig. V & VI)upper stomatal pore length ca. mean 8.125µ, lower stomatal pore length ca. mean 8µ, upper and lower stomatal pore observed length range 5-10µ, upper guard cell length ca. mean 18.875µ, lower guard cell length ca. mean 19.25µ, upper and lower guard cell length observed range 12.5-27.5µ Epidermal cell squired, thick walled, upper epidermal cell length ca. mean 20.625µ, lower epidermal cell length ca. mean 26µ, upper epidermal cell length measured range 17.5-25µ and lower epidermal cell length measured range 16.25-35µ, upper stomatal index ca. mean 4.11 and stomatal no. 3-10, lower stomatal index ca. mean 26.08 and stomatal no. 42-56.

Leaf anatomy:

T.S. of Leaf Lamina:

Transverse section of the leaf (Fig. IX)showed dorsiventral lamina, surface papilose, tomentose, unicellular, multiserrate, stelate or peltate; single layered epidermis with U-shaped thickened cells, wall breadth 10µ at outer side, squared to vertically elongated observed range 37.5 x 25 - 37.5 x 30µ; The ground tissue or the mesophyll with sclerencymatous idioblasts cells contains solitary prisms or clusters of calcium oxalate crystals, dorsiventral, bilayered palisade parenchymatous, homogeneous, cells thin, compactly arranged, vertically elongated, squared to rectangular, observed range is 50 x 37.5 - 92.5 x 37.5 µ; spongy parenchyma thin, small, irregularlly oval to circular; beneath it vertical patches of perivascular sclerenchymatous fibers on both sides, cells thick walled, short lumen, Squired to hexagonal, observed range 7.5 x 5 - 12.5 x 7.5µ, minor leaf veins without phloem transfer cells, thick walled, narrowed; lower layer of collenchymatous cells, 37.5 x 17.5 - 42.5 X 12.5µ; lower epidermis single layered 'U-shaped' thickened walls on outer side wall 12.5-15µ in breadth, clustered crystals in upper and lower epidermis.

T.S of Midrib:

The main midrib is prominent, (Fig. VII) with convex arc, single layered epidermis with U-shaped thickened walls on outer sides observed range 30 x 25 – 35 x 30µ; beneath it 4-7 layer of collenchymatous cells, thin, hexagonal to oval, range 70 - 62.5µ, shows prismatic or clustered crystals 32.5 - 17.5µ in diameter; vascular cylinder surrounded by pericyclic sclerenchymatous fibers, thick, short lumen, 20 x 12.5 - 22.5 x 20µ; vascular strand consist of wide arc, long, thick radial segments of bicollateral bundles; separated by 1-2 vertical rows of medulary rays, cells thin, rectangular, 22.5 x 7.5 – 25 x 8.75µ; xylem consists vessels thick, diffused, solitary, diameter 40-12.5µ, trachieds and parenchyma; cylindrical, diffusely distributed. Phloem wide, ensheaths xylem strand; below that 10-13 layered collenchyma present, hexagonal, thick, 45 x 45 – 55 x 52.5µ; Prismatic or clustered crystals present in grauond tissues, epidermis and medulary rays 32.5-17.5µ.

T.S. of Petiole:

Outline circular, (Fig. VIII) cuticle present, papilose with unicellular, stelate or peltate tomentose; epidermis single layered, cells thick, squired, average range 30 x 25 – 35 x 30µ, 'U-shaped' thickened folds on outer sides, 12.5µ in width, ground tissue parenchymatous, thin, oval, hexagonal, polygonal, 37.5 x 27.5 – 80 x 50µ; prismatic or clustered crystal, measured diameter 32.5-17.5µ; perivascular sclerenchymatous fibers, thick, short lumen, 20 x 12.5 - 22.5 x 20 µ; vascular cylinder consist of 15 bicollateral bundles separated by medulary rays, multiserrate 2-4 radial rows of rectangular cells, measured range 18.75 x 8.75 - 37.5 x 11.25µ; V.B. consist xylem composed of xylem vessels diameter 40-12.5µ, trachieds and parenchyma; surrounded by phloem composed of sieve elements;

Stem anatomy:

Outline slightly wavy, cuticle thick, tomentose present,(Fig. X, XI XII) primary stem consist single layered epidermis, cells squared 18.75 x 15 – 20 x 17.5µ, outer covering of 'U-shaped' stone cells, secondary growths by Cork cambium, 2-3 layers, tangentially elongated, 12.5 x 7.5 - 21.5 x 8.75µ, initially deep-seated, or superficial, at various points in cortex; cork 10-13 layered, cells, parenchymatous, thin, pentagonal to hexagonal,12.5 x 10 – 40 x 25µ; pericycle include fibers, thick, alternate to dilated parenchyma, incomplete ring, cells thick, hexagonal, short lumen, 20 x 12.5 - 22.5 x 20µ; medullary rays multiserrate, rectangular cells, 20 x 10 - 31.5 x 10µ, dilated from cortex to pith; secondary thickening developing from a conventional cambial ring; via concentric cambia. The secondary phloem stratified into soft parenchymatous zones, included phloem, xylem with fiber tracheids, fibers, vessels thick, hexagonal, measured range 17.5 x 12.5 - 82.5 x 62.5µ; pith parenchymatous, thin, hexagonal to oval and central pith cavity present.

Maceration:

Stem maceration shows thin and thick walled parenchyma, simple and spiral vessels, trachied and fibers.

Parenchyma:

Thin walled Parenchyma: Cells irregularly squired to rectangular, thin; pits large, alternate, abundant; observed range 360 x 26.25 – 105 x 17.5µ, ca. mean 256.3 x 22.875µ, (Fig. XIV).

Thick walled Parenchyma: Cells square to squired, wall thickened, pitted, pits small, abundant circular, observed range 25 x 20 – 55 x 42µ, ca. mean 41.8 x 27.2µ

Vessels:

Simple vessels: Vessels oblong to narrowed, with secondary thickenings, intervascular pitting alternate pits small, simple, alternate, sometimes on beaks; beaked and unbaked, beaks small pointed in large-diameter to drum shaped vessels and narrowed in small vessels, perforations simple, vertical or oblique, observed range 170 x 65 – 400 x 110µ ca. mean 276.5 x 59.225µ, (Fig. XIII).

Spiral Vessels: Long, primary wall thin, secondary wall thick and spiral, perforations simple terminal, circular or oblique, beaks very short, observed range 220 x 20 – 400 x 20, ca. mean 318.2 x 20µ, Fig. XV.

Trachied:

Tracheids slender, ends blunt or pointed at one or both, pits few to many, alternate or paired, simple, small, walls thick, pitted, observed range 175 x 12.5 – 450 x 15µ, ca. mean 290 x 13.5µ, (Fig. XVIII & XIX)

Fiber:

Simple fibbers, (Fig. XV & XVI) long, slender, tapering and sharply pointed, walls thickened, pitted, internal lumen present, observed range 950 x 10 – 4000 x 20µ, ca. mean 2246 x 14.25µ

DISCUSSION:

C. zeylanica L. is polymorphic taxa and allied to a variety of *C. horrida* L. for which *C. spinosa* is used. To avoid such adulteration work has been done to addressing the issue of standardization in several commercial preparations. The anatomical data shown arrangements of tissues in particular pattern i.e. stomata anomocytic or ranunculaceous, eglandular tomentose, dorsiventral mesophyll, perivascular fibers, thickened cuticle and presence of crystals in epidermis of leaf as well as near to vascular cylinder of petiole, are the peculiar characters of *C. zeylanica* L. Maceration of stem gives exact dimensions of vascular elements so the qualitative and quantitative data mentioned in table no. I is useful for identifying adulteration in herbal products.

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TABLE NO. I MESUERMENTS OF VARIOUS CELLS

No	Cell Type	Range (μ)	Mean±S.D.	C.V.
1	Upper Epidermal Cell Length	17.5-25	20.25±2.32	11.25
2	Lower Epidermal Cell Length	16.25-35	26±6.75	25.96
3	Upper Gaurd Cell Length	12.5-27.5	18.87±4.08	21.65
4	Lower Gaurd Cell Length	12.5-27.5	19.25±4.78	24.84
5	Trichome Length	250-387.5	336.5±46.03	13.67
6	Trichome Breadth	60-162.5	110±28.63	26.03
7	Upper Stomatal Index	1.66-7.69	4.115±1.97	47.98
8	Lower Stomatal Index	20-36.84	26.08±4.93	18.9
9	Crystal Diameter	17.5-32.5	25.25±5.055	20.02
10	Thin wall Parenchyma Length	105-360	256.3±83.98	32.76
11	Thin wall Parenchyma Breadth	17.5-26.25	22.875±3.53	15.46
12	Thick wall parenchyma Length	25-55	41.8±9.066	21.69
13	Thick wall parenchyma Breadth	20-42	27.2±8.89	32.68
14	Simple Vessles Length	170-400	276.5±67.75	24.5
15	simple Vessles Breadth	20-90	59.225±25.76	43.5
16	Spiral Vessles Length	120-44	318.2±56.93	17.89
17	Spiral Vessles Breadth	20-20	20±0	0
18	Trachieds Length	175-450	290±89.88	30.99
19	Trachieds Breadth	12.5-15	13.5±1.224	9.07
20	Fibers Length	950-4000	2246±1022.02	45.5
21	Fibers Breadth	10-20	14.25±4.03	28.34

Morphological And Anatomical Photographs of *Capparis zeylanic* L.

Figure I Ripen Fruit

Figure II Flowering Twig

Figure III Habit

Figure IV Tomentose 10X

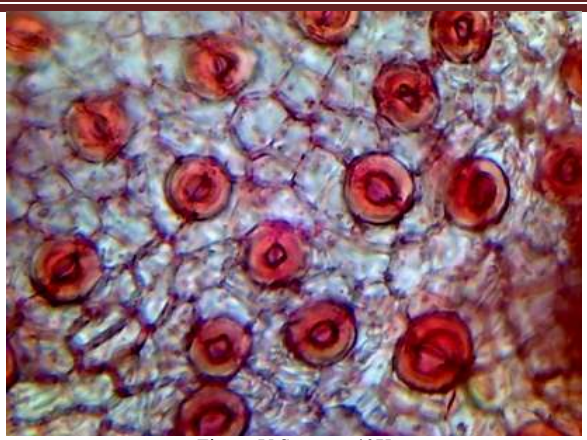


Figure V Stomata 40X

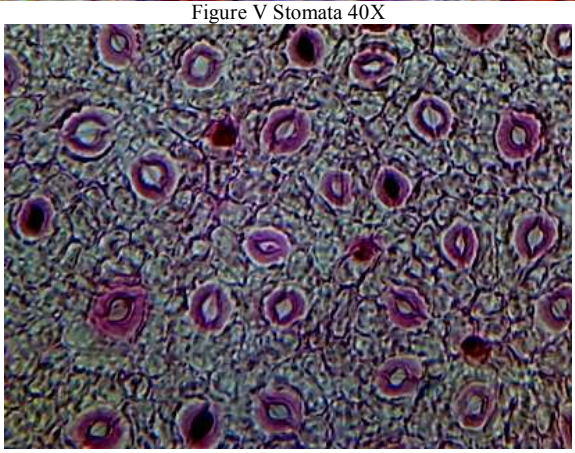


Figure VI Stomata 10X

Figure VII T.S. of Midrib 4X

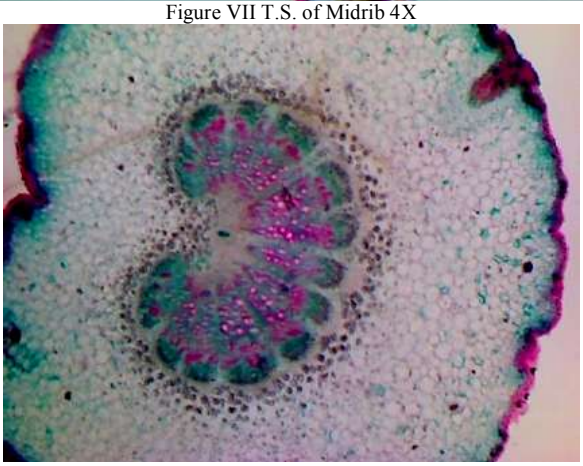


Figure VIII T.S. of Petiole 4X

Figure IX T.S. of Leaf Lamina 10X

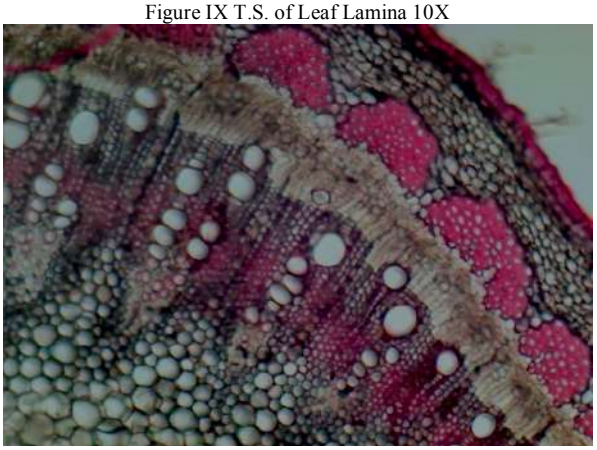


Figure X T. S. of Stem 10X

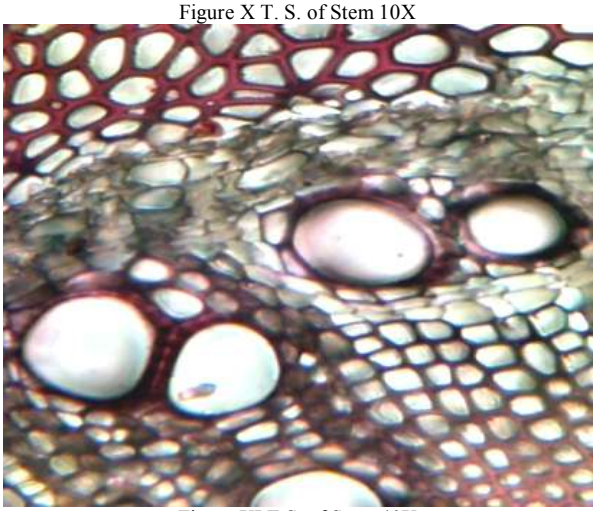


Figure XI T.S. of Stem 40X

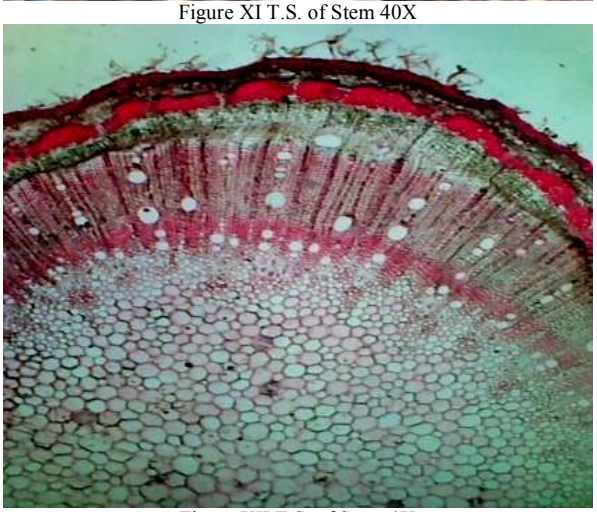
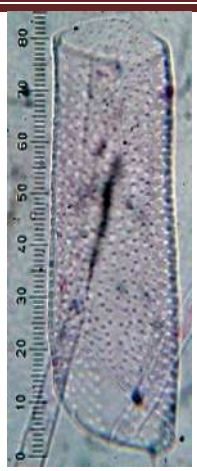
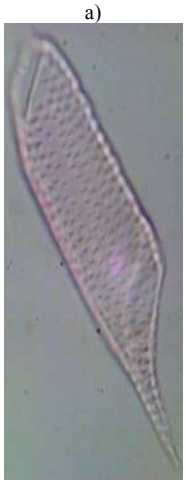


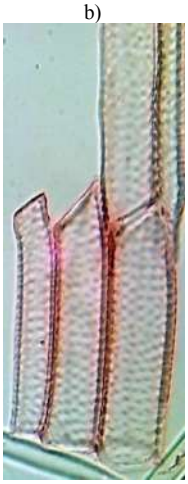
Figure XII T.S. of Stem 4X



a)



b)

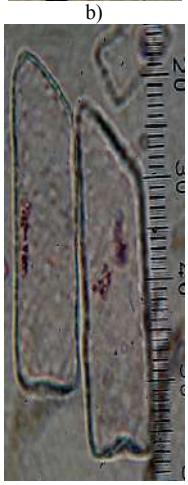


c)

Figure XIII Vessels 40X Beaked 10X &40X

a)

b)



c)

Figure XIV Thin & Thick Parenchyma Cells 40X

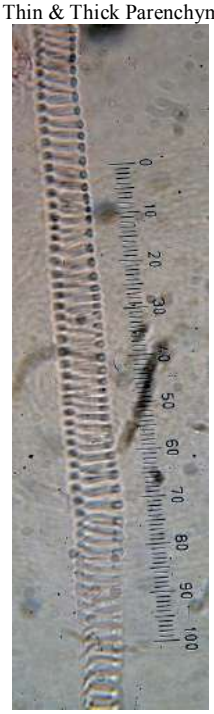


Figure XV Spiral Vessels 40X

Figure XVI Fiber 4X

Figure XVII Fiber 10X

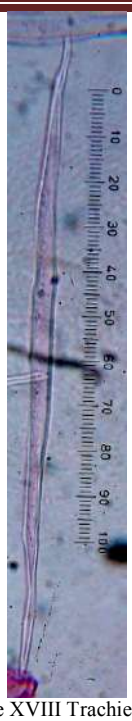


Figure XVIII Trachied 10X

Figure XIX Trachied 40X

Source of support: Nil, Conflict of interest: None Declared