Pharmacognostical Study of Leaves of *Sonchus arvensis* Linn.

Dr. Prashant Kumar Jha, Reader, Research Methodology, ALNRMAMC, Koppa
Prof. (Dr.) Sanjaya K.S., Department of Dravyaguna,
Anushree H.S., Research Assistant, ALNRMAMC, Koppa

Abstract: Present study is to establish the pharmacognostical characters of leaves of S. arvensis, a plant used for swellings in Indian folklore medicine. The leaves were lyrately-pinnatifid with toothed margin and auriculate base, almost half-covering to stem. The veins were mixed craspedodromous type. The macroscopic characters revealed the astringent, bitter taste while anomoncytic stomata was seen in surface preparation. Open bicollateral vascular bundles with presence of outer and inner phloem were noted. Solubilities of powder of leaves was higher in both alcohol and water. Total 8 spots of varying Rf values were observed in thin layer chromatography under long UV.

Keywords: Sonchus arvensis, pharmacognosy, lyrate, pinnatifid, craspedodrmous, anomocytic stomata.....

Since time immemorial, plants are used for basic needs, religious activities and medicinal purposes in India. They are still being used in folklores' medicinal practices and traditional system of medicines[1]. An estimate suggests that plant drugs contribute about 80% of all drugs used in India[2]. They are utilized either in raw forms or processed forms. Worldwide resurgence of interests in herbal medicines have availed opportunities for researches on traditionally used herbs for revival and modernization of herbal medicines. Greater number of plant species widens the scopes of such researches.

Out of 268,600 species of *Angiosperms*, 20,141 taxa of *Angiosperms* under 2991 genera and 251 families are found in India[3]. *Asteraceae* is one big family with 900 species under 167 genera in India[4]. Many plants from the family are attributed to medicinal uses.Some of them are already placed in *Ayurveda* after researches viz., *Eclipta alba*, *Vernonia cinerea*, *Pluchea lanceolata*, *Artemisia maritima* etc. All the same, a good number of plants from same family are used in folklore medicines, yet seeking researches like *Bidens bipinnata*, *Blumea bifoliata*, *Conyza stricta*, *Sonchus arvensis* etc.

Sonchus arvensis L. is a perennial herb up to 80 cm in height. Rootstock is creeping. Stem is glabrous and hollow. Leaves are oblanceolate, elliptic-oblong, runcinated-pinnatifid, bases auriculate, ½ amplexicaul. Heads are yellow, 1-1.7 cm across, glandular-hispid, in terminal irregular umbellate cymes. Achenes are narrow, 0.20-0.25 cm, obconical, compressed with regular ribs on each face[5,6,7]. The leaves of this plant is applied for swellings as anti-inflammatory agent[17]. Infusion of leaves are suggested in case of obstruction of milk ducts draining to breast[18]. This plant is also taken as bigger variety of *Sahadevi*, a renown Ayurvedic medicinal plant[17]. Therefore, setting of standards is important for purity, quality and efficacy of plants. As the pharmacognostical screening of leaves of present plant was not found, so the leaves were selected for pharmacognostical evaluation.

Materials and Methods:

Chemicals: All chemicals used in experiment was from Merck India.

Plant Collection: The leaves were collected from the campus of A.L.N. Rao Memorial Ayurvedic Medical College. The voucher specimen (ALNRMAMC/QC/2018/1) was deposited to *Department of Dravyaguna* for future reference. The leaves were cleaned in running water to reference. The leaves were cleaned in running water to remove foreign objects. They were dried in shade and thereafter, they were milled to fine powder. The powder was stored in paper bags until it was used.

Macroscopic Evaluation: The shape and colour of leaves was observed with naked eyes. Apex, margin, venation,

base etc. of leaves were marked. The size was measured using one feet steel scale (*Classic*). The odour and taste were also noted. Oraganoleptic characteristics of powder was observed[8,9,16].

Microscopic Examination: Free hand sectioning techniques was applied for transverse sections of leaf. Iodine, phloroglucinol, HCl and safranin were used as reagents while glycerine was used for temporary mounting. Dewinter fluorescent microscope (Classic FL) attached with camera (Dewinter) was used for photomicrography. Calibrated micrometer scale was used with photomicrographs. Quantitative microscopy technique was used to measure stomatal number, stomatal index, vein-islet number and veinlet-termination number. Powder was examined for microscopical characters[8,10,11,12,16].

Physico-chemical Screening: Total moisture of fresh leaves, total ash, acid insoluble ash, water insoluble ash, water soluble extractives and alcohol soluble extractives were determined[8,13].

Phytochemical Investigation: The presence of carbohydrates, tannin, glycosides, terpenoids, saponin, alkaloids and flavonoids were determined. The fluorescence test was done using 10% of acidic and alkaline conditions. The colour-patterns were noted under visible light and under long UV. Toluene: Ethyl acetate (8:2) was used as solvent system for thin layer chromatography alcoholic extract of leaves. Iodine vapor was used for derivatization[8,9,14,15,16].

Result

Macroscopic Evaluation: (Figure number:1)

Colour	: Adaxially dark green while abaxially pale green
Odour	: Characteristic
Taste	: Astringent, bitter, tingling
Surface	: Adaxially glabrous, light glaucus; abaxially sparsely hairy with more density on veins
Shape	: Oblancelolate-ovate, elliptic, lyrately pinnatifid
Size	: 4-20 x 1.5-5 cm
Margin	: Spinous-toothed
Venation	: Pinnatifid, mixed craspedodromous

Microscopic Examination: The surface preparation of leaves disclosed anomocytic stomata on both surfaces. The stomatal number was noted on upper (adaxial) and lower (abaxial) surface respectively in ranges of 148-192 and 185-245. The stomatal index was calculated for both upper and lower surfaces in sequence as 18-29 and 16-26. The vein-islet number was 6-11 while veinlet termination number was noted in range of 15-27. **(Figure number: 2)**

The transverse section of leaf showed dorsiventral nature. The detailed section of midrib portion revealed a layer of epidermis enveloped with cuticle and scarcely interrupted with unicellular to multicellular trichomes. Beneath this, 1-2 layers of collechyma cells were present which were followed by ground tissue composed of comparatively bigger parenchyma cells. 3-5 open bicollateral vascular bundles were observed in which xylem elements were surrounded by outer and inner cambium and outer and inner phloem elements respectively. Below the ground tissue portion, 1-2 layered collenchyma cells were present leading to a layer of lower epidermis. **(Figure number**: **3-7)**

The lamina portion exhibited a layer of upper and lower epidermis traversed with stomata at places. The mesophyll cells were composed of 1-2-layered palisade parenchyma in continuation with 4-8 layers of spongy parenchyma cells towards upper to lower epidermis. **(Figure**: **8-9)**

The powder of leaves was dark green in colour with characteristic odour and astringent-bitter taste (tingling sensation). Fragments of epidermal cells (surface view), fragment of reticulate vessel and fibers (surface view), fra-

gments of parenchyma cells (both in surface and sectional view) and few anomocytic stomata were observed under microscope. **(Figure: 10)**

Physico-chemical Screening:

Total moisture of fresh leaves	: 87.25%
Total ash	: 14.25%
Acid insoluble ash	: 1.28%
Water soluble ash	: 2.34%
Alcohol soluble extractives	: 35.05%
Water soluble extractives	: 36.26%

Phytochemical investigation:

Preliminary phytochemical screening

Carbohydrate	Present
Tannin	Present
Glycosides	Present
Terpenoids	Present
Saponin	Present
Alkaloids	Present
Flavonoids	Present

Fluorescence test

Material	Colour under visible light	Colour under long UV
Powder + Water	Dark green	Brown
Powder + Methanol	Yellowish-green	Fluorescent green
Powder + 10% NaOH	Yellowish-orange	Fluorescent dark green
Powder + 10% HCl	Creamish-yellow	Fluorescent brown
Powder + 10% HNO_3	Light orange	Fluorescent brown
Powder + 10% H_2SO_4	Light yellow	Dark brown
Powder + 10% NH_3	Greenish-brown	Dark fluorescent green

Thin Layer Chromatography: The Rf values were noted under long UV before derivatization and under visible light after derivatization only. **(Figure number: 11)**

Rf value	Under Long UV before derivatization	Under Visible light after derivatization
0.07	Orange-red	Bluish-brown
0.11	Fluorescent cream	Creamish-yellow
0.22	Red	Orange-red
0.30	Red	Bluish-brown
0.41	—	Yellowish-brown
0.45	Pale red	Yellowish-brown
0.57	Pale red	Light bluish-brown
0.64	—	Light yellow
0.68	Blue	Blue
0.84	Light red	Pale blue

Figure number: 1
Morphological and Macroscopical Characters

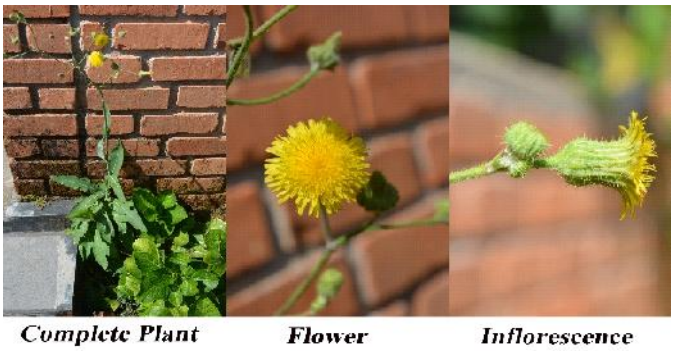

Figure number: 2: Stomata on Both Surfaces, Vein-islet and Veinlet Termination

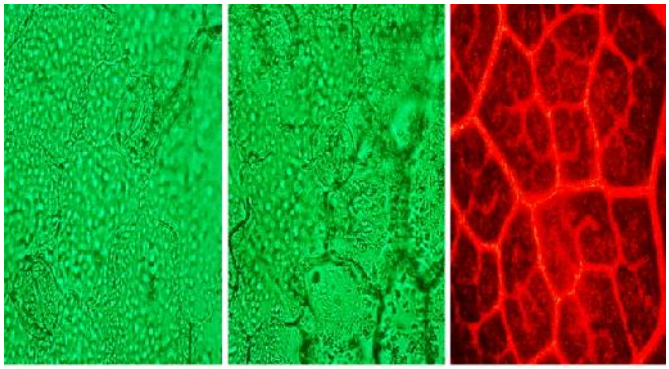

Figure number: 3: Outline of Transverse Section

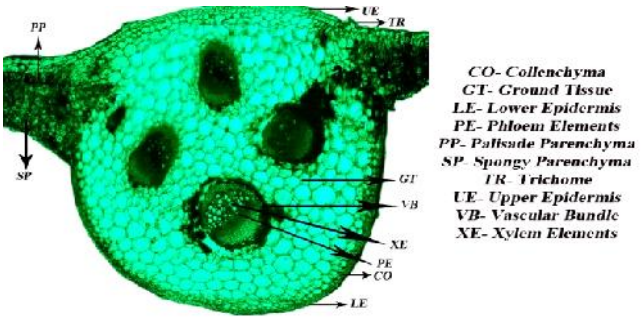

Figure number: 4
Upper epidermis and collenchyma

Figure number: 5: Ground tissue

Figure number: 5
Bicollateral open vascular

Figure number: 6
Vascular cells and laticifers

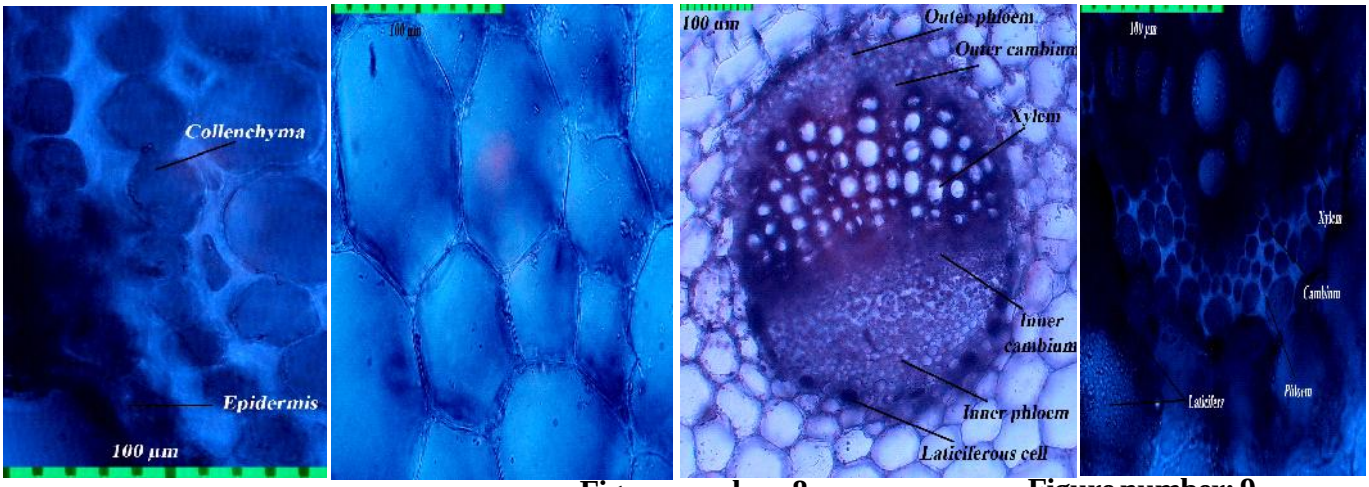

Figure number: 7
Lower epidermis and collenchyma

Figure number: 8
Lower epidermis and spongy parenchyma

Figure number: 9
Upper epidermis and palisade parenchyma

Figure number: 10
Powder Characters

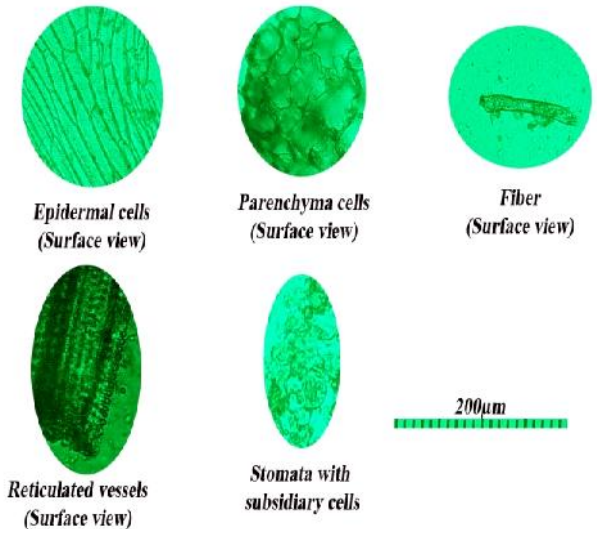

Figure number: 11
Thin Layer Chromatography

Under Long UV before derivatization

Under Visible light after derivatization

Discussion: The leaves of *S. arvensis* is having tingling sensation due to latex. The histological examination and powder exhibited typical characteristics of leaves. The anomocytic stomata, stomatal number, stomatal index, vein-islet number, veinlet termination number and open bicollateral type of vascular bundle are characteristic to plant, if altogether considered. Over 87% of moisture content shows requirement of immediate drying of leaves to maintain quality and purity. Higher ash value means for good quantity of inorganic salts, but lower acid insoluble salts are indicators of those soluble in HCl. Both alcohol and water soluble extractives were higher which means they can be used as solvents for isolation of compounds. Preliminary phytochemicals screening exposed carbohydrates, triterpenoids, tannin, glycosides, alkaloids, saponin and flavonoids. The iodine was used to expose flavonoids as yellow to brown colours.

Total 8 spots were observed in UV while 10 spots under visible light after derivatization. A good options of study is there for isolation and characterization of compounds present with drug.

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