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PHARMACOGNOSTIC STUDIES ON *LAGASCEA MOLLIS* (ASTERACEAE)

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Lagascea mollis Cav. (Asteraceae) is an introduced weed plant growing abundantly in waste lands. Literature survey revealed that no systematic study was carried out on this plant. With a view to fix its anatomical features scientifically, *Lagascea mollis* was chosen for the study which includes macroscopy, microscopy of leaf, petiole, internode and root and also the physico-chemical evaluation, the preliminary phytochemical studies, and fluorescence analysis. These observations will enable to standardise the botanical identity of the drug in crude form.

Keywords : Asteraceae; *Lagascea mollis Cav.;* Pharmacognosy.

Introduction

Lagascea mollis Cav. (Asteraceae) is an erect herb with pale violet capitula type flowers. It is an introduced weed native of tropical America[1,2]. It has become super abundant all over the country. The plant is known as Jharvad in Marathi[3]. From this plant isolation of flavonol glycoside patulitrin and isopatulitrin, and anti bacterial activity of the leaf oil was reported by earlier researches. The taxon belongs to Asteraceae family which includes many medicinal plants of high therapeutic value[4,5]. Hence, multidisciplinary work was undertaken, on introduced weed, to find out their potential utility in Herbal medicine[6].

Materials and Methods

The present study involves anatomical as well as preliminary phytochemical standardization of *L.mollis* . For anatomical investigation, customary techniques of microtomy were followed[7]. Paraffin sections of 10µm thickness were stained with safranin- fast green. Photomicrographs were prepared with NIKON Lab Phot-2 microscope unit. Physical constant, behavior of powder with chemical reagent and preliminary phytochemical tests were carried out[8].

Observation

Macroscopy - The Plant *L. mollis* Cav. is an erect herb with violet coloured capitula type of flowers (Fig. 1 a, b, c). The leaves opposite, upper ones alternate, ovate lanceolate with penninerved; leaf margins are serrate; lamina softly pubescent on both sides; petiole upto 2 cm long, capitula 1-flowered aggregated in solitary, terminal, long peduncled. Pollen grains are fairly large, spherical, and strongly spinulose (Fig. 1 d).

Microscopic Features -Leaf: The leaf exhibit mesomorphic features and dorsiventral organization (Fig. 2). The lamina amphistomatic with anomocytic stomatal type (Fig. 10); epidermal cells are lobed with much wavy and thin anticlinal walls (Fig. 10). Epidermal trichomes are 'covering type', multicellular, uniseriate, unbranched pointed at the tip with broad campanulate basal cell (Fig. 12). The hair is thin and smooth. Mesophyll is differentiated into two layers of adaxial palisade cells and broad zone of lobed spongy mesophyll enclosing wide air spaces (Fig. 2, 3). The midrib of the lamina distinctly projecting abaxially as hemispherical hump and short conical structure on the adaxial side (Fig. 3) with single collateral vascular strand and parenchymatous sheath.

Petiole- The petiole is plano convex in sectional view with perfectly flat adaxial surface and hemispherical abaxial side (Fig. 4, 5). The terminal part of petiole has deeply ridged and furrowed abaxial side (Fig. 4). The vascular strand consists of three larger strands placed in the middle portion and two smaller rib traces situated at the extreme lateral margins of the petiole.

Internode - The young internode in primary state of growth is circular in transactional profile with shallow ridges and furrows (Fig. 6). Surface is hairy with two intact epidermal layers and third layer of cells collapsed due to tangential pressure (Fig.7). Pith is wide and parenchymatous. The vascular cylinder consists of about 12 discrete collateral vascular strands capped by a thick mass of fibres (Fig. 6, 7). Fairly thick stem is circular and even (Fig. 8). Secondary thickening is just initiated forming interfascicular cambium (Fig. 9). The vascular bundles

Fig. 1a. A shoot with terminal capitulum; 1b. Female floret; 1c. Bisexual floret; 1d. Pollen grains.

have also increased in radial dimension due to formation of fascicular cambium (Fig. 9). The vascular elements are cylindrical, long and have narrow oblique perforation plate (Fig. 13 a). The fibres are narrow, thick walled and have no pits (Fig. 13 b).

Roots - Both taproot and lateral root exhibit secondary growth. Epidermis unistratose with broad rectangular thin walled cells (Fig. 13 a, b). There is a narrow core of parenchyamatous pith, enclosed by the vascular cylinder. Stele consists of hollow, compact cylinder of xylem fibres with radially occurring 6-9 exarch xylem strands with limited number of vessels (Fig. 14 a). Xylem tissues consist of libriform fibres and circular wide vessels (Fig. 14 b).

Quantitative Microscopy - Quantitative microscopical data pertaining to stomatal frequency, palisade ratios and veination features are presented in Table 1.

Physicochemical Constants - The whole plant powder

Table 1. Quantitative microscopic data.

Parameters	Value
Stomatal Number	
Adaxial epidermis	62-67/mm²
Abaxial epidermis	73-77/mm²
Stomatal Index	
Adaxial epidermis	19.25-19.76/mm²
Abaxial epidermis	20.25 – 20.92/mm²
Palisade ratio	4.11 to 5.5
Vein islet number	16.25 to 17.28 / mm²
Vein termination number	15.46 to 18.5/mm²

Table 2. Physico - chemical constants.

Parameters	Value w/w
Total Ash content %	8.4
Water Soluble ash %	0.8
Alkalinity of water soluble Ash 0.1 N HCl/5	0.45 ml
Acid insoluble ash %	3.0
Loss on drying %	10.8
Successive Extractive Value %	
Hexane	1.3
Benzene	0.2
Chloroform	0.4
Solubility %	
Alcohol	6.0
Water	10.5

was studied for their physicochemical constants. The higher hexane extractive value reflexes the significant amount of waxy materials (Table 2).

Behaviour of powder with different chemical reagents - The drug powder reacted positively for saponins, tannins, steroids, terpenes, sugars and phenols (Table 3).

Preliminary phytochemical tests for extracts - Preliminary phytochemical tests for hexane, benzene, chloroform and alcohol extracts on various types of phytochemicals were carried out. Steroids and terpenes were present in all the extracts. Sugars, phenols, flavonoids, acids, tannins and saponins were present in both chloroform and alcohol extracts (Table 4).

Fluorescence Analysis of Extracts and Drug Powder - Fluorescence analysis of drug powder and its various extracts, treated with acids and alkali, was studied and the observations are presented in Table 5.

Discussion

Pharmacognostic studies on *L.mollis* Cav. have brought

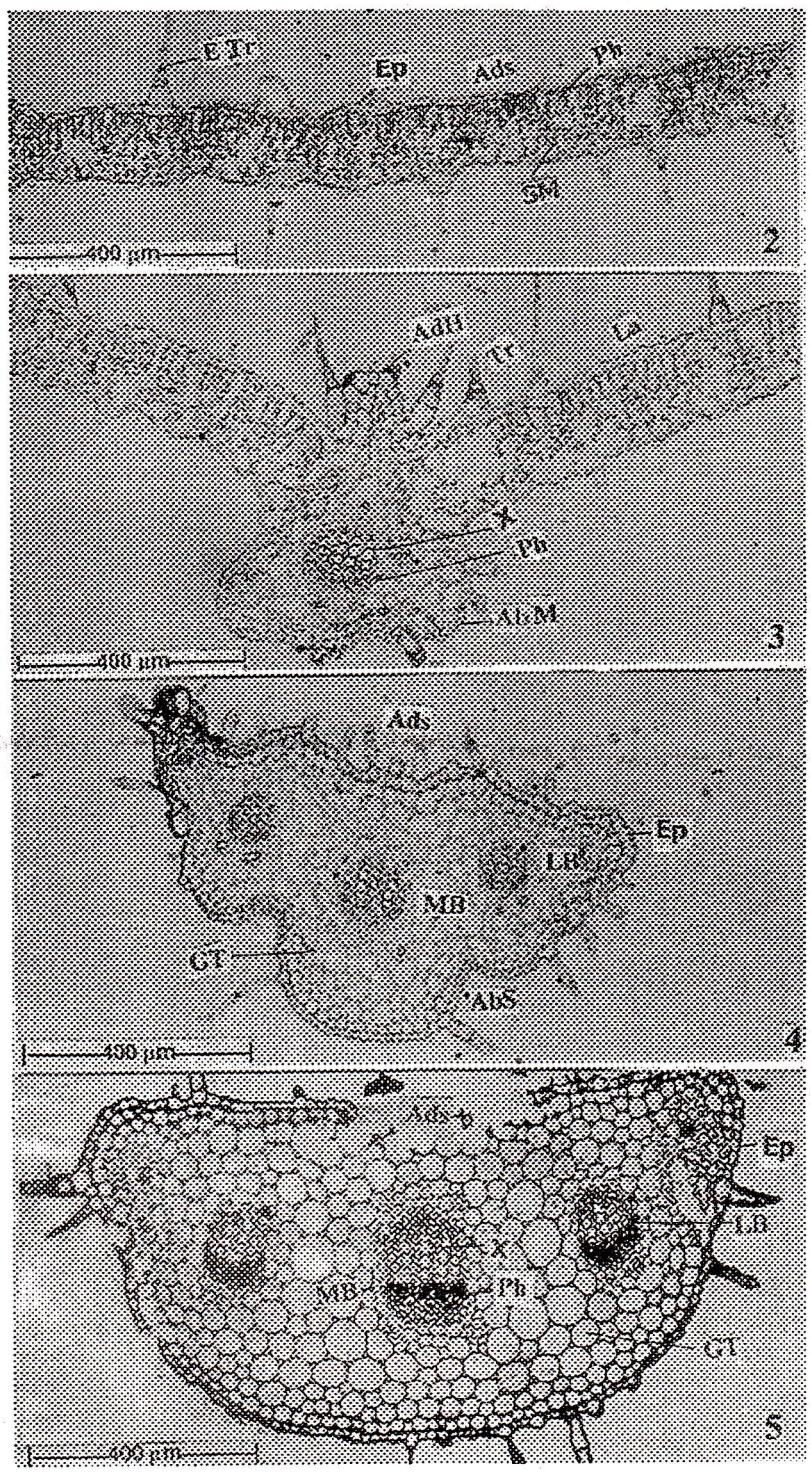

Fig. 2. T.S. of lamina; 3. T.S. of leaf through midrib and lamina; 4. T.S. of petiole through distal region; 5. T.S. of petiole through proximal region.

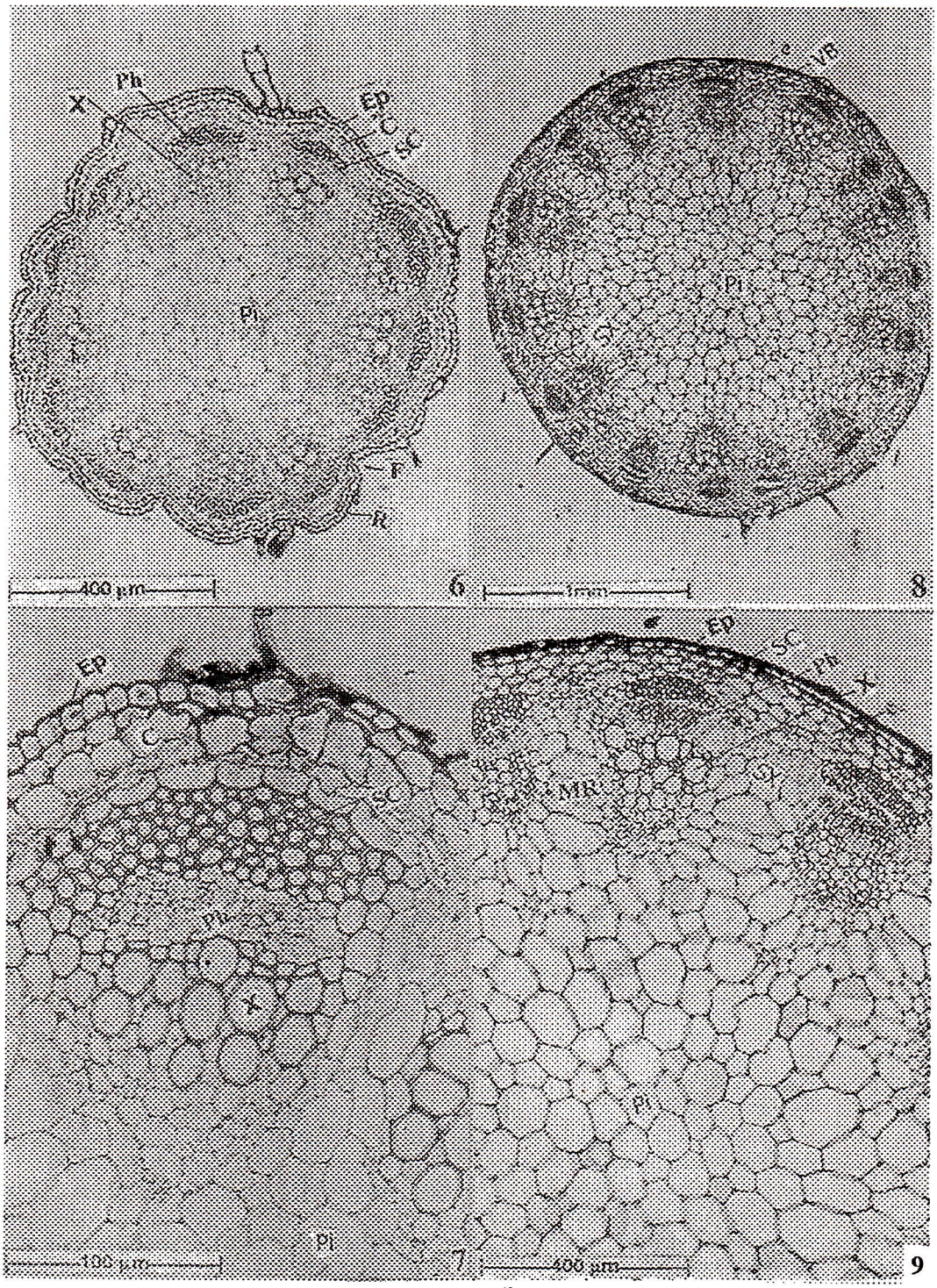

Fig. 6. T.S. of young stem; entire view; 7. Young stem, a sector enlarged; 8. T.S. of old stem; 9. T.S. of old stem, a sector enlarged.

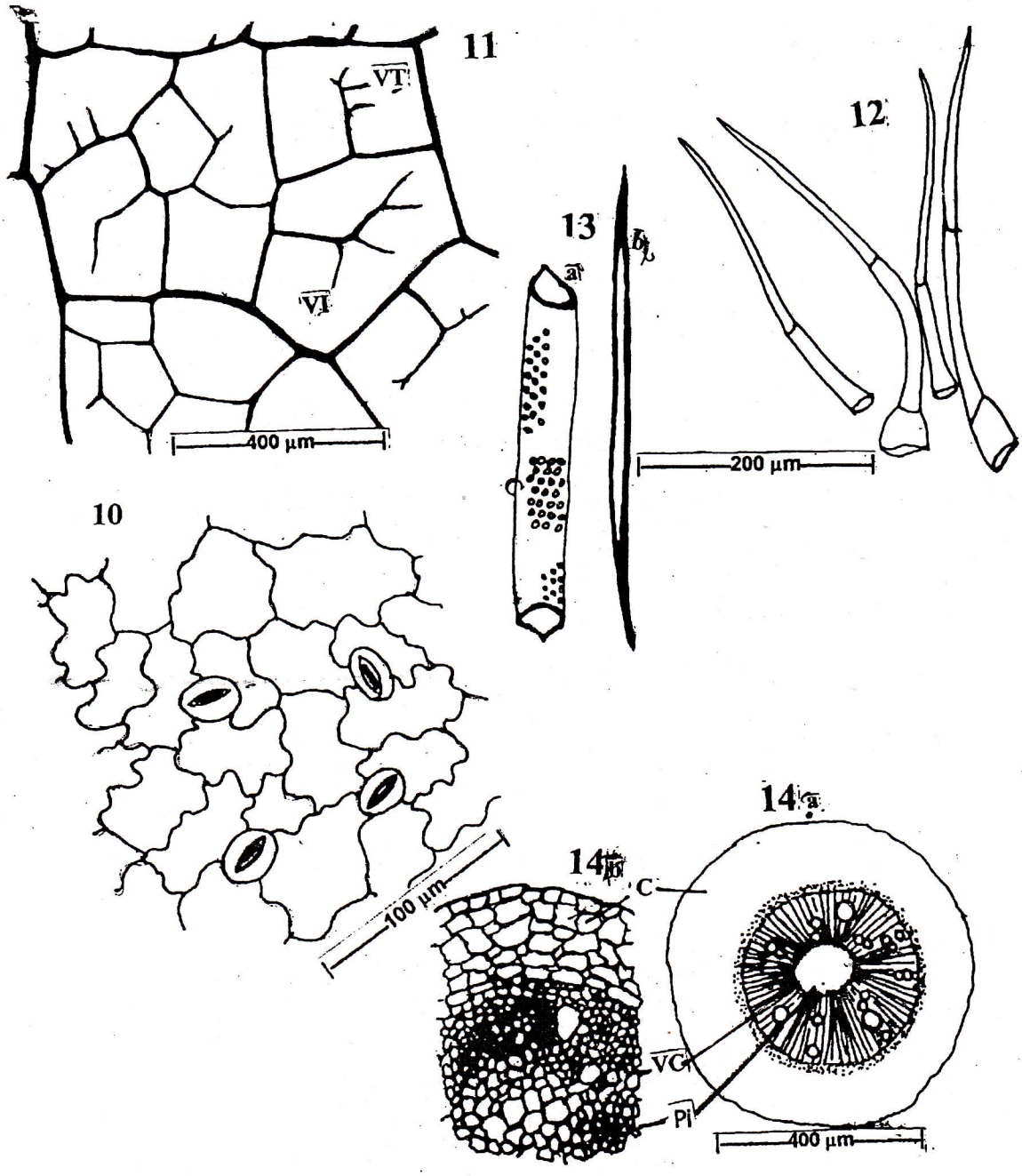

Fig. 10. Stomata and epidermal cell; 11. Vein islet and Vein termination; 12. Epidermal trichomes; 13a. A vessel element from the stem; 13b. Xylem fibre; 14a. T.S. of root; 14b. A sector enlarged.
(AbS– Abaxial Side; AdS– Adaxial Side; AbM- Abaxial Midrib; AdH- Adaxial Hump; C- Cortex; Ep- Epidermis; ETr- Epidermal Trichomes; F- Furrow; GT- Ground Tissue; La- Lamina; LB- Lateral Bundle; MB- Median Bundle; MR- Medullary Ray; Ph- Phloem; P- Pith; R- Ridges; Sc- Sclerenchyma; SM- Secondary Xylem; Tr- Trichome; VB- Vascular Bundle; VC- Vascular Cylinder; VI- Vein Islet; VT- Vein Termination).

Table 3. Behaviour of drug powder with different chemical reagents.

No.	Test for	Reagent	Reaction	Result
1	Gum	Powder + drop of water	No reaction	-
2	Saponin	Water Shake	Froth	+
3	Protein	Picric Acid	No reaction	-
4	Tannin	Lead acetate solution	White ppt	+
5	Sterol	Acetic anhydride + H_2SO_4	Red	+
6	Terpenes	Tin and Thionylchloride	Pink	+
7	Sugar	Conc. H_2SO_4 + Anthrone	Green	+
8	Phenol	5% $FeCl_3$	Green	+
9	Flavonoid	10% NaOH (or) Mg bits + HCl	No reaction	-
10	Anthroquinone	5% KOH	No reaction	-
11	Furan	Alcohol & Ehrlich's reagent	No reaction	-
12	Alkaloid	Dragendorff's reagent	No reaction	-

Table 4. Preliminary phytochemical test for extracts.

Test	Hexane	Benzene	Chloroform	Alcohol
Steroid	+	+	+	+
Terpenes	+	+	+	+
Sugar	-	-	+	+
Alkaloid	-	-	-	-
Phenol	-	-	+	+
Flavonoid	-	-	+	+
Furan	-	-	-	-
Acid	-	-	+	+
Tannin	-	-	-	+
Saponin	-	-	+	+
Quinone	-	-	-	-

Table 5. Fluorescence analysis.

Name	Day Light	UV Light
Drug Powder	Grey colour	Light green
Drug Powder and aqueous 1N NaOH	Dark brownish green	Dark green
Drug Powder and alcoholic 1N NaOH	Green	Light green
Drug Powder in HCl	Light brown	Yellowish green
Drug Powder in 50% H_2SO_4	Reddish brown	Green
Hexane extract	Light yellow	Light green
Benzene extract	Light green	Dark green
Chloroform extract	Light green	Dark green
Alcohol extract	Dark green	Dark green
Water extract	Reddish brown	Yellowish green
Acetone extract	Light green	Dark green
Ethylacetate extract	Bluish green	Dark green

to light certain microscopic features as well as preliminary phytochemical data of diagnostic values. In the absence of the capitula type of flowers, the macroscopic feature of the vegetative parts of *L.mollis* seems to be less helpful in botonical identity of the drug. Collective microscopic data of all organs have proved to be simple technique for the identification. Bilateral symmetry of the lamina with anomocytic stomata and long, simple, multicellular covering trichomes pointed at the tip and with broad campanulate basal cells are characteristic of the leaf. Midrib is distinctly projecting abaxially as hemispherical hump and as short conical structure on the adaxial side plano convex transectinal outline of the petiole with undulate outline with perfectly flat adaxial surface and hemispherical abaxial side with three major vascular bundles and two rib traces, are diagnostic features of the petiole. Young internode, old taproot and lateral roots exhibit typical dicot type of structural features and these organs may add merely additional characteristics for diagnosis.

Quantitative microscopic data such as stomatal number, stomatal index, palisade ratio, vein islet number and vein termination number have been highly relied upon by pioneer pharmacognocists[8]. It is believed that these features are constant for given species and can be employed for inter specific identity of drugs. Physicochemical constants such as solubility, successive extractive values and other parameters of the drug are corroborative evidences in drug standardizations. The drug powder exhibits specific color reactions when mixed with different reagents, thereby indicating the presence or absence of different compounds in the drug. As showed in the Tables, the powder drug of *L.mollis* Cav. seems to contain sterols, terpenes, saponins, phenols, tannins and acids. Fluorescence analysis of the drug powder as well as drug extract is other tests for standardizing the drug for the presence of chromophores (Table 4, 5). Thus, the anatomical characters coupled with preliminary phytochemical results are specific for the weed drug *L.mollis* Cav.

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