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PHARMACOGNOSTICAL EVALUATION AND PRELIMINARY PHYTOCHEMICAL ANALYSIS OF DIFFERENT PARTS OF *LAGERSTROEMIA SPECIOSA*

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ABSTRACT: The present study aimed to determine the pharmacognostical evaluation and phytochemical analysis of the plant part of *Lagersreomia speciosa*. In this study, a macroscopical, microscopical evaluation was done. Various quantitative parameters such as total ash, acid insoluble ash, water-soluble ash sulphated ash, extractive value with various solvent were done. In the preliminary phytochemical analysis, various chemical test were performed for the determination of phytoconstituents present in the plant. Fluorescence analysis of powder drugs was done in a deferent wavelengthrange. TLC was performing for the methanolic extract taking the solvent system with various ratios. From the experiment result it was found leaves are bitter in taste, the shape is elliptical to oblong, acute base subacute apex, entire margin and pinnate venation the leaves are dorsiventral, long epidermis layer, spongy mesophyll, loosely packed parenchyma cell present in the leaf. Microscopic powder drug analysis shows the prism and rosette shape calcium oxalate crystals, lignified and annular xylem vessels, and multicellular trichomes. From quantitative microscopic study stomatal number, vain-islet number, vein termination number was found 19.4, 9, and 10.4. In the fluorescence analysis, when powder drugs were treated with a different chemical reagent, exhibit different color in various UV light range. Phytochemical analysis revealed the presence of alkaloid, glycoside, carbohydrate flavonoids, and tannin saponin. TLC study of the various solvent extract was done in the different solvent; better resolutions were found in the methanol chloroform system. This study helps to standardization and evaluation of the various part of the *Lagerstroemia speciosa*.

INTRODUCTION: Human being very much depends on nature and nature also provide all type of solution. From the ancient time of life for prevention and cure of various type heath problems, human being depends on the herbal medicine [1]. Still now, in this world, a large group of the population gives their faith only in the medicinal plant for their safety profile.

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From 5000 BC, Indian people have been used Ayurvedic medicine, and from that time till now, India is famous for Ayurvedic medicine. Instead of the popularity of the safety profile of the herbal drug, there must need more focus on the scientific evaluation of traditional medicine [2].

Although recognition of synthetic medicine is growing due to the cost, quick action, easy to evaluation there was a big question mark about their safety profile. So, for various reasons, the future meditative framework only relies upon elective prescription, particularly herbal medicine, as it is less toxic and has few feature impacts [3]. *Lagerstroemia speciosa* belong to the family Lythraceae generally call as jarul or banaba is a

very effective medicinal plant. The native place of banaba was tropical Asia, mainly the Indian subcontinent [4]. From a long time back, *Lagerstroemia speciosa* used as flock medicine for the various type of medical issues. From the ongoing examination, it was discovered that the plant part has a great impact on reducing obesity as well as help to reduce the blood glucose level [5].

This plant also uses for gout, to reduce oxidative stress, diuretic, and decongestant. The main active ingredients found from this plant are ellagic acids, corosolic acid, gallic acid, caffeic acid, p-coumaric acid. It was reported that the corosolic acid can able to reduce the blood sugar level within an hour [6].

MATERIALS AND METHODS: *Lagerstroemia speciosa* were identified and authentification (voucher no. NHCP/ NBPGR/216-6 Dated May 5, 2016) by Dr. Anjula Pandey, Principal Scientist, National Bureau of Plants Genetic Resource (NBPGR), New Delhi. At first, the plant was collected, all dust particle was removed by water, then pants material were subjected for shade dried for farther investigation.

Macroscopical and Microscopical Evaluation: Macroscopical investigation of the plant leaves, stem, and fruits were done. In the microscopical investigation, we mainly observed color, order, flavor, size, apex, margin, venation, presence or absence of petiole, base surface, lamina, texture, and so on. In the microscopical investigation, the transverse section prepared and examine under the trinocular microscope.

Quantitative Analysis: In the quantitative analysis, we have determined the stomatal index, stomatal no, vein islet number, vain terminator number. Here for the determination of quantitative analysis, fallow the method written by Evans *et al.*, 2006 [7].

Physico-chemical Evaluation: According to WHO quantitative guideline examination of ash value, extractive value was determined. Fluorescence analysis was done in various range of UV light [8, 9].

Preliminary Phytochemical Screening: Preliminary phytochemical was done according to the standard method written by Kokate. In the preliminary phytochemical analysis, the various solvent extract was taken and analyzed for phytochemical test [10].

Thin Layer Chromatography: The methanolic extracts of *Lagerstroemia speciosa* was subjected to thin-layer chromatography [11].

Preparation of TLC Plate: Slurry was prepared by dissolving 5 gm of silica gel G with 10 ml of distilling water. The slurry was applied to the TLC plate by pouring method. Then the plates were air-dried and kept in the oven for 30 min at 110 °C. Plant extract was applied to the TLC plate with the help of capillary. Solvent system was prepared by taking chloroform and chloroform in different ratio.

RESULTS:

Macroscopy Study: Fresh *Lagerstroemia speciosa* leaves are dark green in color, the odour is characteristic bitter in taste. The shape of the leaf is elliptical to oblong, length 6 to 20, and width 4 to 6. Acute base subacute apex, entire margin, and pinnate venation.

Microscopy of the *Lagerstroemia speciosa* Leaf: The leaf represented a typical dorsiventral leaf. It is divided into two parts lamina and midrib. The lamina region consists of upper and lower epidermis, and cells are in beaded in nature. Below the epidermis layer palisade cell is seen, which are long, elongated, and columular in nature.

Below the palisade cell the spongy mesophyll region is present which consist of loosely packed parenchymatous cell. Presence of calcium oxalate crystal is also observed in a sheath form. Stomata were of anomocytic type. The midrib consists of xylem and phloem in the end arch pattern.

The arrangement of the vascular bundle is in radial form. The collenchyma cell are arrange at the bottom part of the leaf section. The rest portion of the midrib is covered by loosely packed parenchymatous cells. Some of the cells showed the presence of mucilage which were confirmed by staining with ruthenium red solution. Transverse sections of *Lagerstroemia speciosa* is given in **Fig. 1**.

Microscopy of the *Lagerstroemia speciosa* Stem: Epidermis consists of a single layer quadrangular cell covered with cuticle. The cortex contains a 5-7 layer of collenchymas cell.

Calcium oxalate crystal also presents. The endodermis is distinct and followed by a single layer of parenchyma cell. Secondary phloem consists of sieve tune and phloem parenchyma. Xylem consists of the lignified trachea, fiber, and few vessels. In the pith region, large thin wall polygonal parenchyma cell present. Some cell also contains mucilage substance **Fig. 2.**

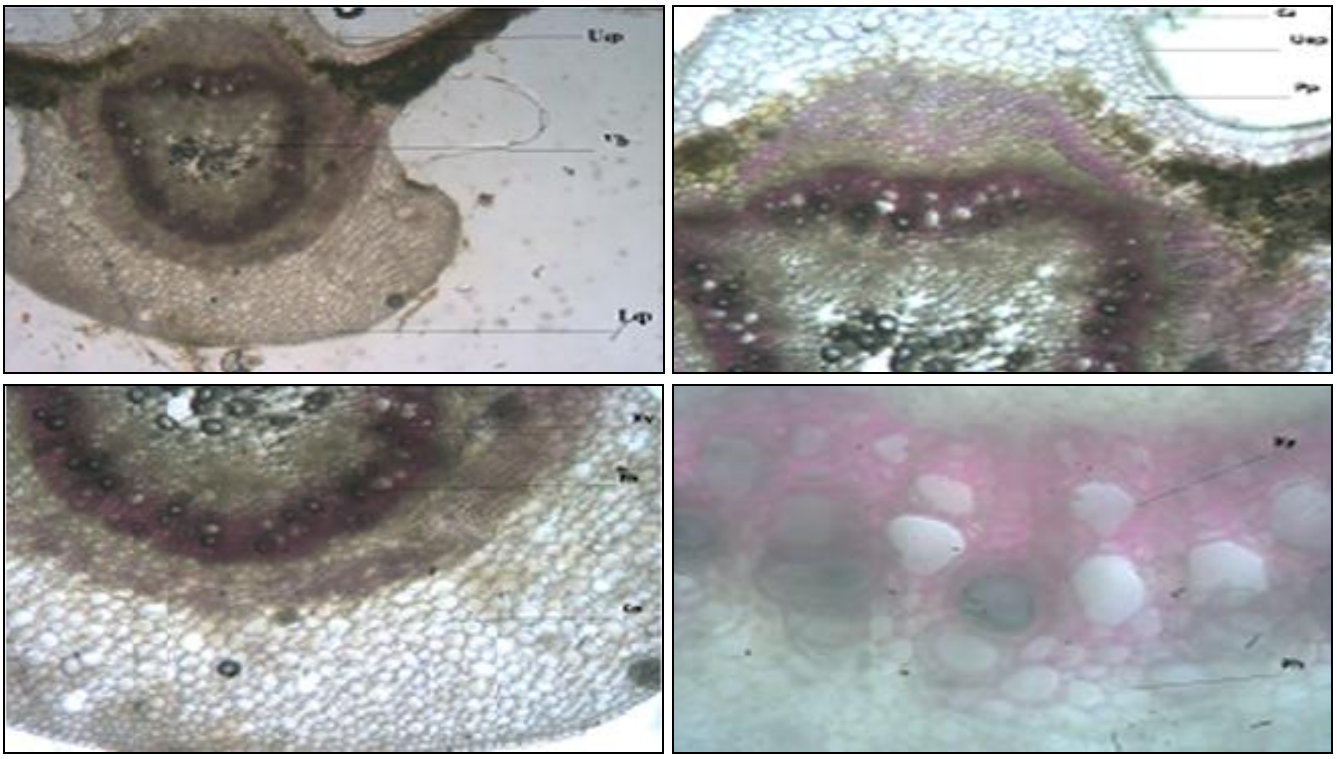

FIG. 1: TRANSVERSE SECTION OF *LAGERSTROEMIA SPECIOSA* LEAF (Uep: UPPER EPIDERMIS, Pp: PALISADE CELL, Vb: VASCULAR BUNDLE, Lep: LOWER EPIDERMIS, Cu: CORTICAL Layer Xy: XYLEM, pH: PHLOEM. T: TRICHOMES)

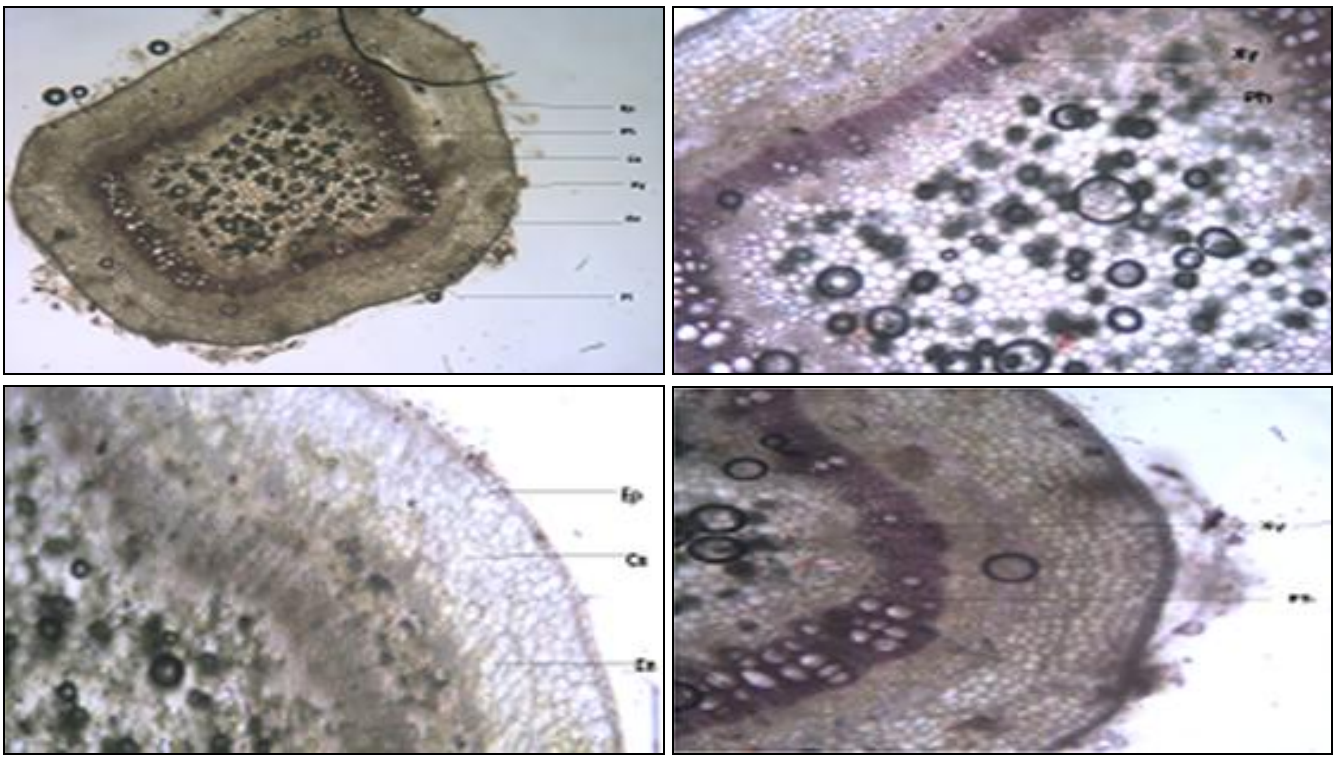

FIG. 2: TRANSVERSE SECTION *OF LAGERSTROEMIA SPECIOSA* STEM Ep: EPIDERMIS, Cx: CORTEX, En: ENDODERMIS, pH: PHLOEM, Xy: XYLEM, Pi: PITH

Microscopical Powder Study of *Lagerstroemia speciosa*: From the powder microscopy, it was found that stomata are anomocytic, prism and rosette shape calcium oxalate crystals are present. Xylem vessel is lignified and annular. Multicellular trichomes present in the plant **Fig 3**.

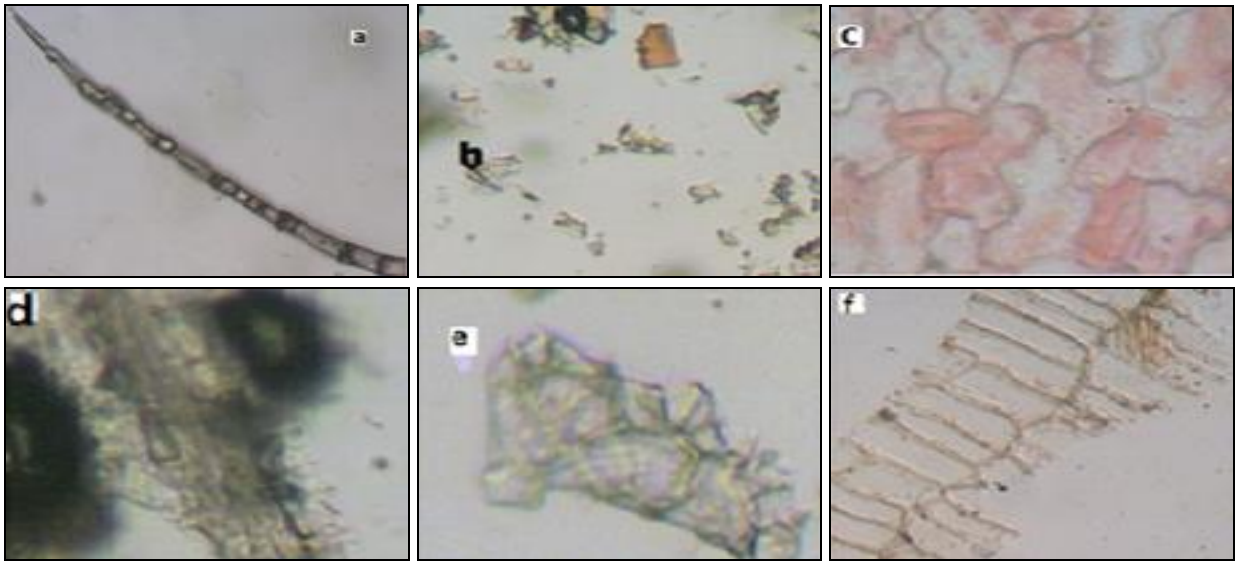

FIG. 3: MICROSCOPICAL POWDER STUDY OF *LAGERSTROEMIA SPECIOSA*: a-TRICHOMES, b-CALCIUM OXALATE CRYSTAL, c-CALCIUM OXALATE CRYSTAL, d-VASCULAR BUNDLE, e-CORK CELL, f-PARENCHYMA CELL

Quantitative Microscopy: In the quantitative microscopic study stomatal number, vain-islet number, vein termination number of the leaf was determined and given in **Table 1.**

Physicochemical Constituents: Various physico-chemical property of the various part of the plant was determined according to the WHO guideline given in **Fig. 4**.

Extractive Value Determination: For the extractive value determination here, we used different solvent from nonpolar to the polar range and found out the extractive value, which given in **Fig. 5.**

Phytochemical Screening: Phytochemical screening of the extract of the various solvent was done for determination of the types of compounds present in the drug and for determination of suitable solvent in which extract the maximum compounds **Table 2**.

TABLE 1: LEAF CONSTANT OF *LAGERSTROEMIA SPECIOSA*

S. no.	Stomatal number	Vein-islet number	Vein termination number
1	19	9	10
2	20	10	11
3	19	8	10
4	18	9	10
5	21	9	11
Mean	19.4	9	10.4
SD	1.140	0.707	0.547
SE	0.509	0.316	0.244

Powder drug with deferent chemical reagent and observed in UV and visible light. The fluorescence analysis result is given in **Table 3.**

TABLE 2: PHYTOCHEMICAL SCREENING OF EXTRACTIVES FOR THE PRESENCE OF ACTIVE CONSTITUENTS IN OF *LAGERSTROEMIA SPECIOSA*

S. no.	Plant constituents	Petroleum ether	Benzene	Chloroform	Ethyl acetate	Acetone	Methanol	Aqueous
1	Amino acid	-	-	+	+	_	_	+
2	Alkaloid	-	+	-	-	+	+	+
3	Steroids	-	-	-	+	+	+	-
4	Triterpenoid	-	-	-	+	-	+	+
5	Saponin	+	-	+	-	+	+	+
6	Flavonoid	-	-	-	+	+	+	_
7	Tannin	-		+	-	+	+	+
8	Glycoside	-	+	-	-	-	-	+
9	Carbohydrate	-	-	-	-	+	+	+

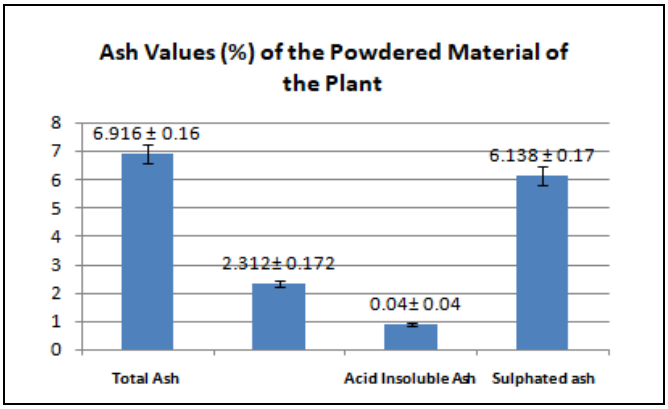

FIG. 4: PHYSICAL CONSTANT VALUES OF POWDER OF *LAGERSTROEMIA SPECIOSA*

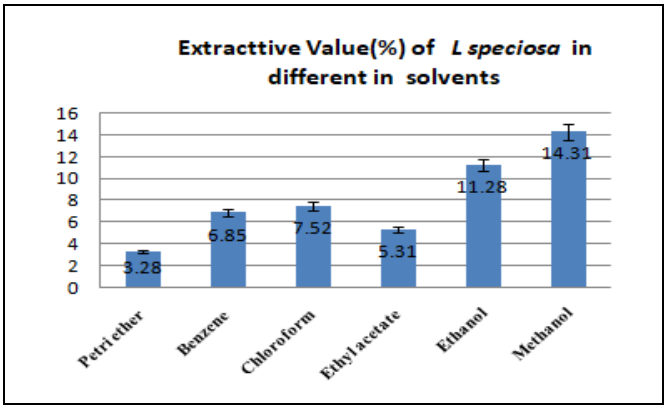

FIG. 5: EXTRACTIVE VALUE (%) OF *L. SPECIOSA* IN DIFFERENT SOLVENTS

TABLE 3: FLUORESCENCE CHARACTER OF THE POWDER OF *LAGERSTROEMIA SPECIOSA* UNDER UV LIGHT

Reagents	UV light short (254 nm)	UV light long (366 nm)
Powder as such	Bluish	Green
Powder with 1N NaOH solution	Bluish black	Brown green
Powder with acetic acid solution	Brownish black	Brownish green
Powder with picric acid solution	Green	Light green
Powder with 1N HCl solution	Light greenish black	Green
Powder with 5% $FeCl_3$ solution	Blue	Green
Powder with methanol solution	Light bluish green	Green

TLC Analysis: TLC of methanolic extract of *Lagerstroemia speciosa* was done in chloroform-methanol system in various ratios at normal condition (temperature 20 °C and humidity 35). Maximum separation was found in chloroform-methanol 3:7 ratio **Fig. 6.**

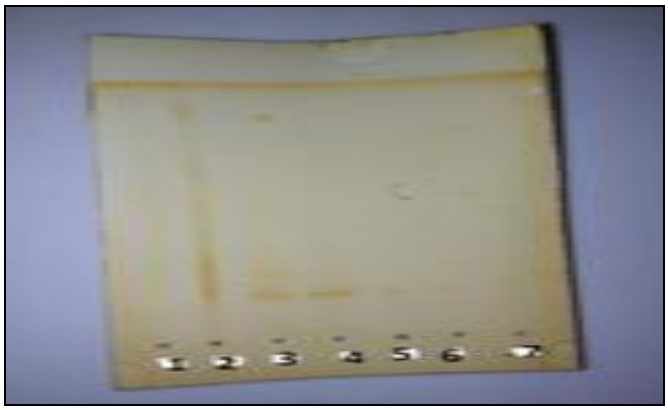

FIG. 6: TLC CHROMATOGRAM OF *L. SPECIOSA* IN METHANOL CHLOROFORM SYSTEM SPOT 1 CHLOROFORM, SPOT 2 CHLOROFORM: METHANOL (1:9), SPOT 3 CHLOROFORM: METHANOL (3:7) SPOT 4 CHLOROFORM: METHANOL (4:6), SPOT 4 CHLOROFORM: METHANOL (4:6), SPOT 5 CHLOROFORM: METHANOL (7:3), SPOT 6 CHLOROFORM: METHANOL (8:2), SPOT 7 CHLOROFORM: METHANOL (9:1)

DISCUSSION: In microscopical study involves examination of microscopic cells and their arrangement in a plant drug very carefully. In each and every plant, there was sufficient difference in the arrangement of the cells or tissues. The microscopical technique provides authentic information about drug [12]. Stomata are anomocytic; prism and rosette shape calcium oxalate crystals are present.

Anomocytic stomata generally found from the dicot plant. Type, pattern, and distribution of calcium oxalate crystal vary from species to species. Vein islet and vein termination number are helpful to distinguish the plant from the closely related species and constant for any species of the plant. Vein termination and vein islet number of the remain constant through the age; it does not affect by the age and size of the plant [13].

Stomatal number, vain islet, and vein termination numbers were found respectively 19.4, 9, and 10.4 determination of ash values give the idea about the earthy matter and an inorganic substance present in the drug and also suggest about the impurities present in the drug 14, 15. From this present experiment total ash value of *L. speciosa* powder material was 6.916%, and respectively water-soluble ash value (2.321%) acid insoluble ash value (0.896%), sulphated ash (6.138%) were found. Pharmacognostical information gives the proper information about authentification and identification of the plant.

Less extractive value gives information about the presence of exhaustive material [16]. From the extractive value of deferent solvent, give the idea for the selection of best solvent for farther study. It's also giving an idea about the polarity of the compound. From the above experiment, it as concluded that methanol is the most suitable solvent for extraction [17].

Every drug has a specific chemical constituent, and for this reason, they attribute significant biological and pharmacological activity [18]. Isolation, identification, and purification of the herbal drugs were performed on the basis of the chemical test.

The phytochemical test is an important part of the standardizations of any drug. From the phytochemical analysis, it was found that the *L. spesiosa* contain amino acids alkaloids steroids triterpenoids, seponin, flavonoids, tannin, glycoside, *etc*. Each and every compound show the different color-specific when reacting with the different reagent due to the chemical structure of the compound, and as a result, fluorescence analysis gives the broad idea about the chemical constituent present in the drug [19]. TLC analysis for a methanolic extract of *Lagerstroemia speciosa* gives the best result in the chloroform-methanol system at 3:7 ratios.

CONCLUSION: Standardization of herbal drug is essential before starting any work. The first step for ensuring the quality of the drug is the authentification of the crude drug. A pharmacological investigation like microscopical and macroscopical is a very important parameter for the standardization of the herbal drug. A quantitative analysis wound is helpful for the determination of pharmacopeial standards. Phytochemical and TLC studies would be useful for the check the purity of the drug and determining which type of compounds present in the drug.

The above study will helpful for authentification and identification of the various part of *L. spesiosa*. To ensure reproducible quality of herbal medicines, proper control of starting material is of utmost essential. The first step towards ensuring the quality of starting material is authentification, followed by creating numerical values of standards for comparison.

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CONFLICTS OF INTEREST: There are no conflicts of interest.

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