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Pharmacognostical and Phytochemical Studies of *Royal Poinciana*

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Abstract
In the present study, an attempt was made to investigate pharmacognostical and phytochemical screening of *Delonix regia* seeds. The pharmacognostical parameters studied were macroscopy, microscopy, physicochemical analysis and chromatography. The phytochemical screening revealed that the presence of secondary metabolites such as carbohydrates, sterols, triterpenoids, saponins and fixed oils in *Delonix regia* seeds. All the parameters were studied according to the WHO and Pharmacopoeial guidelines.

Keywords: *Delonix regia, Royal Poinciana*, Gulmohar, Pharmacognostical, Phytochemical, Chromatography

1. Introduction
Herbal medicine also known as botanical medicine or phytomedicine-refers to using plants seeds, flowers, roots for medicinal purpose. Even today plant materials continue to play a major role in primary health care as therapeutic remedy in many developing countries. In the last few decades, medicinal plants have been subjected to pharmacognostical studies [1]. This will help us to identify the correct plant for further study.

Royal Poinciana is a deciduous, large tree with fern-like leaves[2]. *Delnix regia* is also known as Gulmohar or flame tree or peacock tree[3]. It is mostly planted for their shade-giving properties and as an ornamental tree[4]. The major medicinal properties of *Delonix regia* include anti-diarrhoeal, anti-inflammatory, anti-diabetic, anti-oxidant, hepatoprotective, anti-microbial, anthelminitic, wound healing and gastroprotective activity [5]. It is used for the diabetes treatment in Bangladesh folk medicine[6]. Sterols, triterpenoids and saponin are reported to have anti- diabetic property.

2. Materials and methods
2.1 Plant details
Sample collection, processing, storage and method of extraction
The dried seeds of *Delonix regia* were collected from Nugambakkam, Chennai, TamilNadu in June 2015 and authenticated by Dr.M. Palanisamy Scientist D-In-charge of Botanical Survey of India, Southern circle, TNAU Campus, Coimbatore (BSI/SRC/5/23/2015/Tech.1696). The seeds were collected from seed pods by applying mechanical strength and spreader on a neat sheet for shade drying and powdered using mechanical grinder. The powdered seeds of *D. regia* were stored in an air tight container. The coarsely powdered seeds were subjected to successive solvent extraction using petroleum ether, ethyl acetate, ethanol and water. The extracts were concentrated under reduced pressure and stored in a refrigerator for further use. Percentage yield of the various extracts were described in Table 1.

2.2 Pharmacognostical evaluation
Macroscopy [7].
Organoleptic evaluation of *D. regia* seeds were done to identity the nature of the plant. Macroscopical studies were carried out as per WHO guidelines. The parameters such as colour, odour, taste, size and shapes were measured and shown in the Fig 1 and Table 2.

Fig 1: Macroscopy of seeds and seed pods.

2.3 Microscopy [8, 9].
The seed was cut and fixed in FAA solution (Formalin 5ml + Acetic acid 5ml + 90ml of 70% Ethanol). The specimen was dehydrated after 24 hours of fixing. The seeds were graded with series of tertiary butyl alcohol. The sections were stained as per the method published by O'Brein *et al.* The paraffin embedded specimens were sectioned with the help of Rotary Microtome. The thickness of the section was 10-20µ. The sections were stained using Toludine blue. Microscopical structures were shown in the Fig 2, Fig 3.

2.4 Powder microscopy [8, 9].

Microscopic examination of the powdered seeds of *D.regia* was performed. The crude powder passed through sieve no 60 was used for powder microscopy. The powdered drug was separately treated with phloroglucinol and hydrochloric acid solution, glycerin and iodine solution to determine the presence of lignified cells, calcium oxalate crystals and starch grains. Both stained and unstained specimens were used to identify and confirm the microscopic structures. structures of the powder of *D. regia* were shown in Fig 4.

Fluorescence analysis [10].

The powdered seeds of *D. regia* when treated with different chemical reagent showed different colour reactions, in accordance to the nature of the constituents present in it. Many plants constituents show fluorescence in visible light and some of the metabolites shows fluorescence only when they are exposed to ultraviolet light. Fluorescence characteristics of the powder and extracts were described in Table 3 and Table 4 respectively.

Physicochemical parameters [11].

The physicochemical parameters such as ash values, extractive values and loss on drying values were evaluated and resulted in Table 5. This parameter helps to determine the quality and purity of the drug.

Phytochemical analysis [12].

The chemical tests for the phytocostituents present in the various seed extracts of *D. regia* were shown in the Table 6.

Chromatographic study [12].

TLC studies were carried out in the ethanolic extract of *Delonix regia* seeds using hexane: Ethyl acetate (3.5:1.5) and calculated its R_f values. HPTLC were also done using CAMAG software (c) 1998. TLC and HPTLC chromatogram were shown in Fig 5.

3. Results and discussion

Table 1: Percentage yield of extract of *D. regia* seeds

S. No	Extract	Method of Extraction	Physical Nature	Colour	Yield (%)
1	Hexane	Successive solvent extraction	Semi-solid	Green	0.6
2	Ethyl acetate		Sticky	Brownish green	1.3
3	Ethanol		Semi-solid	Green	4.6
4	Aqueous		Solid	Brown	5.7

Table 2: Organoleptic characters of crude powder

S. No	Parameters	Observation
1.	Nature	Coarse powder
2.	Colour	Greenish brown
3.	Odour	Pleasant
4.	Taste	Bitter

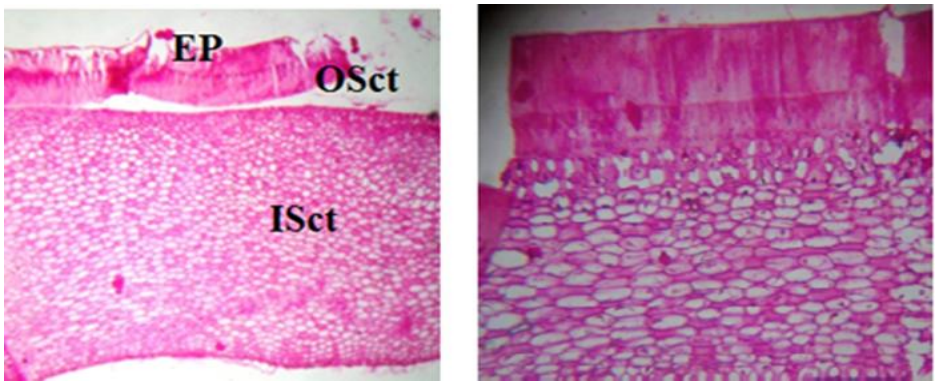


Fig 2: Palisade epidermis and bearer cells in transverse section

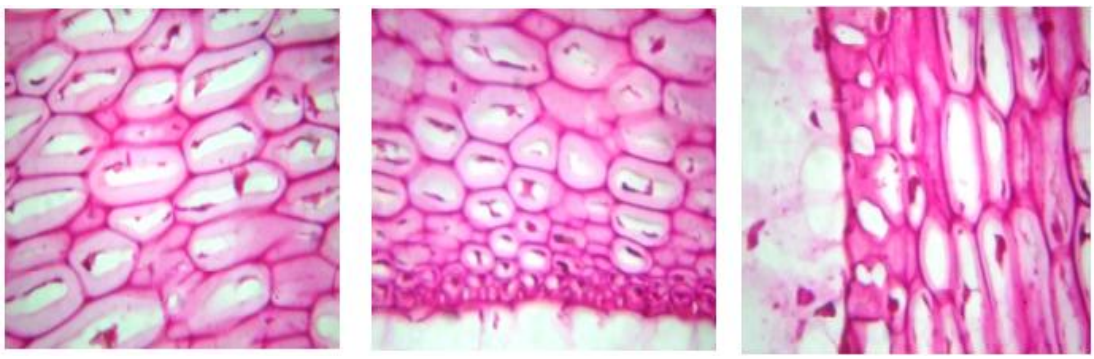


Fig 3: a). Palisade epidermis layer, b). Bearer cells in surface view- pigment layer, c). Epidermis of flat face and palisade cells of cotyledon in transverse section

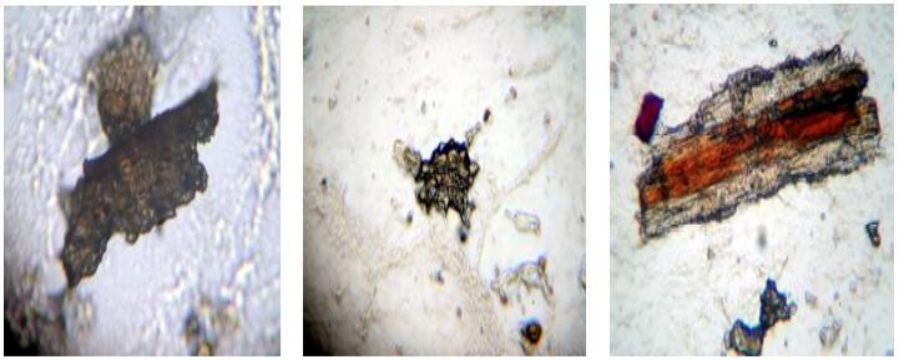
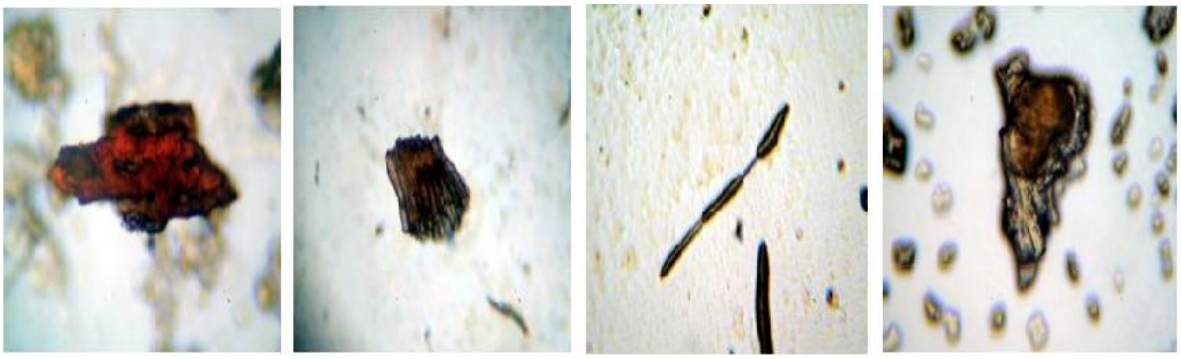


Fig 4: a). Palisade epidermis, b). Modified parenchyma and sclerenchyma, c). Aleurone layer within seed-coat



a b c d

Fig 4: a). Sclerotic seed coat, b). Isolated bearer cells, c). Trichomes, d). Calcium oxalate crystals

Table 3: Fluorescence analysis of the powders of *D. regia* seeds

Treatment	Day light	UV light	
		254nm	365nm
Powder as such	Brownish green	Dark brown	Pale brown
Powder + water	Pale brown	Dark brown	Pale brown
Powder + NaOH	Brownish green	Dark green	Pale brown
Powder + Hcl	Dark green	Brownish green	Pale brown
Powder + Acetic acid	Pale brown	Dark brown	Pale brown
Powder + Alc.NaOH	Brownish green	Dark green	Pale brown
Powder + Picric acid	Brownish yellow	Brownish yellow	Yellowish brown
Powder + Sulphuric acid	Pale brown	Brownish green	Pale brown
Powder + Nitric acid	Brownish green	Dark brown	Pale brown
Powder + Iodine	Dark brown	Dark brown	Dark brown

Table 4: Fluorescence analysis of the extracts of *D. regia* seeds

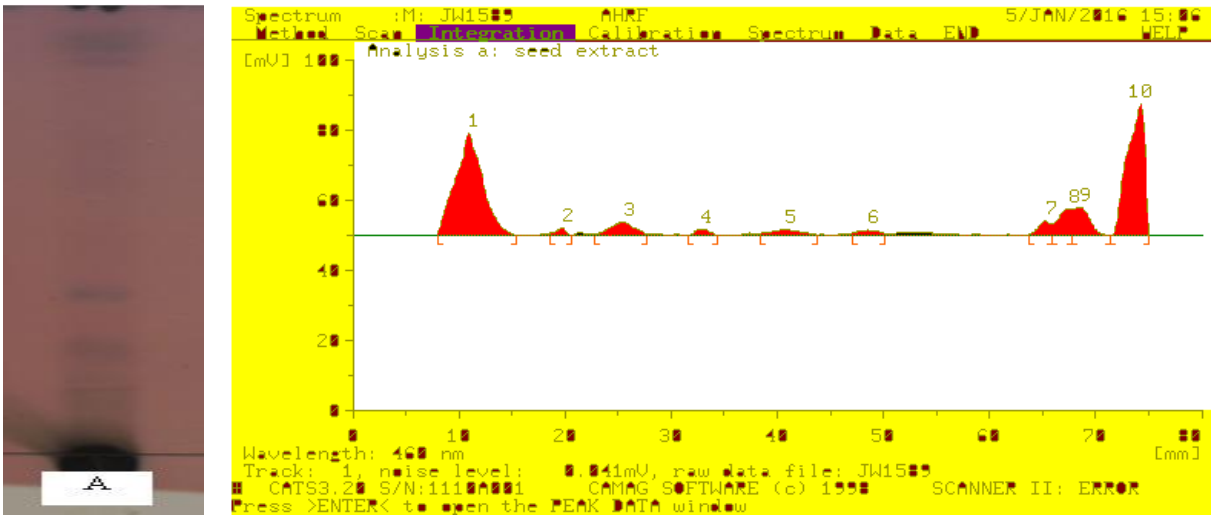
Extracts	Day light	UV light	
		254nm	365nm
Hexane extract	Dark greenish brown	Dark brown	Dark brownish
Ethyl acetate extract	Dark brown	Dark brownish green	Reddish brown
Ethanol extract	Dark brown	Dark brown	Reddish brown
Aqueous extract	Dark brown	Dark brown	Dark greenish brown

Table 5: Physicochemical parameters of *D. regia*

Parameters		Results (%)
Ash values	Total ash Sulphated ash Water insoluble ash Acid insoluble ash	2.53 15.0 3.3 0.9
Moisture content	By Loss on drying	6.5
Extractive values	Water soluble extractive Alcohol soluble extractive Ether soluble extractive Non – volatile ether soluble extractive	11.0 5.0 2.9 3.6
Other parameters	Foaming index Swelling index	<100 NIL

Table 6: Preliminary phytochemical screening of *D. regia*

Phytoconstituents	Hexane extract	Ethylacetate extract	Ethanol extract	Aqueous extract
Alkaloids	-	-	-	-
Saponins	+	-	+	+
Glycoside	-	-	-	-
Carbohydrates	-	+	+	-
Tannins and phenolic compounds	-	-	-	-
Flavonoids	-	-	-	-
Phytosterols	+	-	+	-
Proteins and aminoacids	-	-	-	-
Triterpenoids	+	-	+	-
Fixed oils and fats	+	-	+	-
Gums and mucilage	-	-	-	-



A b

Fig 5: Qualitative estimation of phytoconstituents of *D. regia.* a). TLC of *D. regia*, b). HPTLC of *D. regia* and its chromatogram

4. Conclusion

The present study showed that the presence of macroscopical and microscopical structures. Microscopical structures such as epidermis, pigment layers, palisade cell of cotyledons, modified parenchyma and sclerenchyma, aluerone grain, sclerotic seed coat, isolated bearer cells, trichomes, and calcium oxalate crystals were identified. In phytochemical studies, the presence of various phytoconstituents such as saponins, sterols and triterpenoids in the *Delonix regia* seeds of various extracts.

From the overall study we conclude that the plant have various phyto constituents and it might be useful plant for treating various diseases such as diabetes, inflammations, diarrhoea, gastric ulcers and microbial infections. Further studies are needed for knowing the exact mechanism of the plant on various diseases.

5. References

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