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## Comparative study of different extraction technique and phytochemical screening of *Delonix regia*

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### Abstract

Extraction is separation of active portions of plant tissue using selective solvents through standard procedure. For extraction purpose Leaves, Root and Stem were used of plant *D.regia*. The plant contains Alkaloids, Saponin, Steroid, Flavonoids etc. The technique used for extraction was ultra-sonication method and Soxhlet method using methanol as solvent. From this Soxhlet technique was given highest % yield of extract as compared to that of Ultrasonic method. In phytochemical screening it was found that alkaloids, terpinoids, steroid, saponins and flavonoid were found to be present in extract of Ultrasonic method and Soxhlet method.

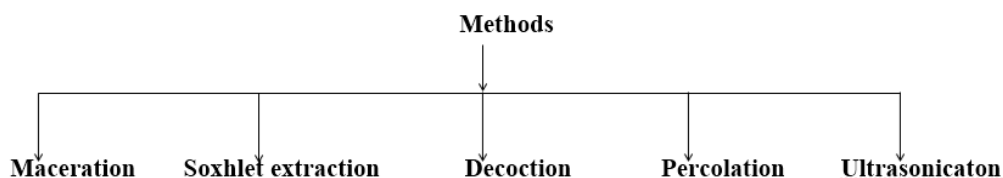
**Keywords:** extraction, ultra-sonication, soxhlet

### Introduction

*D.regia* is a tall tree reaching a height of more than 15 m and a girth of 2 m under favorable conditions. The trunk is buttressed and the stem form above the buttress is generally normal in taper. The trees are almost evergreen, with broad-spreading, open, umbrella-shaped crowns. It is deciduous in localities which experience long pronounced dry seasons. The bark is grey or brown, smooth or slightly rough, and exfoliating. The compound leaves of *D.regia* are bipinnate and feathery, up to 60 cm long, pinnae 11-18 pairs, petiole stout. The leaflets are in 20-30 pairs on each pinna, oblong, 7.5-10 mm long, 3.4-5 mm wide. At the base of the leaf, two stipules occur which have long, narrow comb-like teeth. The inflorescence of *D.regia* is a lax terminal or axillary raceme. The flowers appear in corymbs along or at the end of branches and are large, 10 cm across and bright red. They vary considerably in intensity of colouring, ranging from orange-vermillion to deep scarlet. Most of the common names for *D.regia* are derived from the colour of its flowers. The pods are 5 cm broad and 30-60 cm long, ending in a beak when mature. They are green and flaccid when young and are compressed, firm and rather thick when mature. Seeds are large, yellowish, oblong, arranged at right angles to the length of pod and transversely mottled.

### Extraction

Extraction is defined as the process of removing a substance or several substances from another substance. The process is extremely important in a wide range of technical applications, for instance biotechnology, the pharmaceutical and food industries as well as environmental protection. Extraction is a separating process which has the advantage of low energy consumption.



### Maceration

In this process, the drug is placed with the whole of the menstrum in a closed vessel for seven days. During this period shaking is done occasionally. After seven days, the liquid is strained and marc is pressed. The expressed liquid is mixed with strained liquid. It is then filtered to make a clear liquid. The final volume is not adjusted.

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### Soxhlet extraction

When a compound of low solubility needs to be extracted from a solid mixture a Soxhlet extraction can be carried out. The technique places a specialized piece of glassware in between a flask and a condenser. The refluxing solvent repeatedly washes the solid extracting the desired compound into the flask. Soxhlet extraction was carried out for colorant identification. In this work dried plant parts were put into thistle of soxhlet extractor and methanol was used as solvent. Temperature of the instrument was maintained well under boiling point of the used solvent. Several cycles of solvent were run so as to extract all the compounds from plant parts.

### Decoction

In this process, the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered. This procedure is suitable for extracting water-soluble, heat-stable constituents. This process is typically used in preparation of Ayurvedic extracts called “quath” or “kawath”. The starting ratio of crude drug to water is fixed, e.g. 1:4 or 1:16; the volume is then brought down to one-fourth its original volume by boiling during the extraction procedure. Then, the concentrated extract is filtered and used as such or processed further.

### Percolation

This is the procedure used most frequently to extract active ingredients in the preparation of tinctures and fluid extracts. A percolator (a narrow, cone-shaped vessel open at both ends) is generally used. The solid ingredients are moistened with an appropriate amount of the specified menstruum and allowed to stand for approximately 4 h in a well closed container, after which the mass is packed and the top of the percolator is closed. Additional menstruum is added to form a shallow layer above the mass, and the mixture is allowed to macerate in the closed percolator for 24 h. The outlet of the percolator then is opened and the liquid contained therein is allowed to drip slowly. Additional menstruum is added as required, until the percolate measures about three-quarters of the required volume of the finished product. The marc is then pressed and the expressed liquid is added to the percolate. Sufficient menstruum is added to produce the required volume, and the mixed liquid is clarified by filtration or by standing followed by decantin.

### Ultrasonication

Sonication is the act of applying sound energy to agitate particles in a sample, for various purposes. Ultrasonic frequencies (>20 kHz) are usually used, leading to the process also being known as ultrasonication ultra-sonication

### Plant profile



Fig 1.1: *Delonix regia*

Table 1: Botanical Classification (Plant Taxonomy):

Kingdom	Plantae – Plants
Subkingdom	Tracheobionta – Vascular plants
Division	Magnoliophyta – Flowering plants
Class	Magnoliopsida – Dicotyledons
Subclass	Rosidae
Order	Fabales
Family	Fabaceae/Leguminaceae – Pea family
Genus	<i>Delonix</i> Raf. – delonix
Species	<i>Delonix regia</i> (Bojer ex Hook.) Raf. – royal poinciana

**Name of plant:** *Delonix regia* (Gulmohar).

**Biological Source:** It consists of dried root, stem, leaves of *Delonix regia* and species of flowering plant belonging to family *Fabaceae*.

### Geographical Source

Bangladesh, Vietaman, India.

### Chemical constituents

1. Leaves – Lupeol and  $\beta$  sitosterol.
2. Stem – Bark yield 4 triterpenes- Lupeol, epilupeol,  $\beta$  sitosterol, Stigma sterol, p-methoxybenzaldehyde.
3. Root – secondary metabolite tannins, phenols, alkaloids, sterols, cardiac glycosides, terpenoids.

### Structure of $\beta$ sitosterol, epilupeol

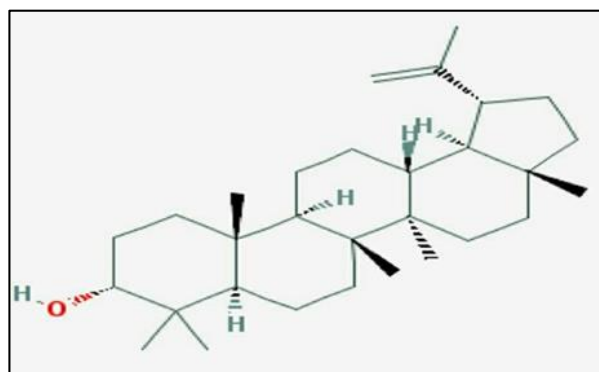


Fig 1.2: Epilupeol

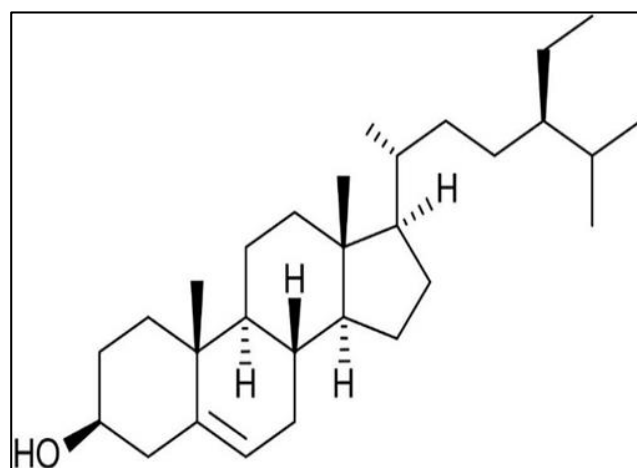


Fig 1.3: Betasitosterol

### Macroscopy

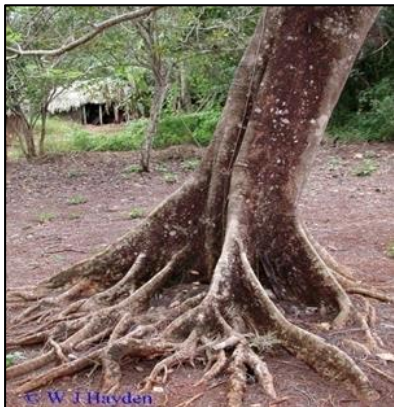
Organoleptic evaluation of *D.regia* Leaves, Stem, and Root were done to identify the nature of the plant. The parameters such as colour, odour, taste, were measured.

**Table 2**

Sr. No.	Macroscopy	Leaves	Root	Stem
1	Colour	Dark Green	Dark Brown	Brown
2	Odour	Characteristic	Characteristic	Characteristic
3	Taste	Bitter	Bitter	Bitter



**Fig 1.4:** Leaves



**Fig 1.5:** Root



**Fig 1.6:** Stem

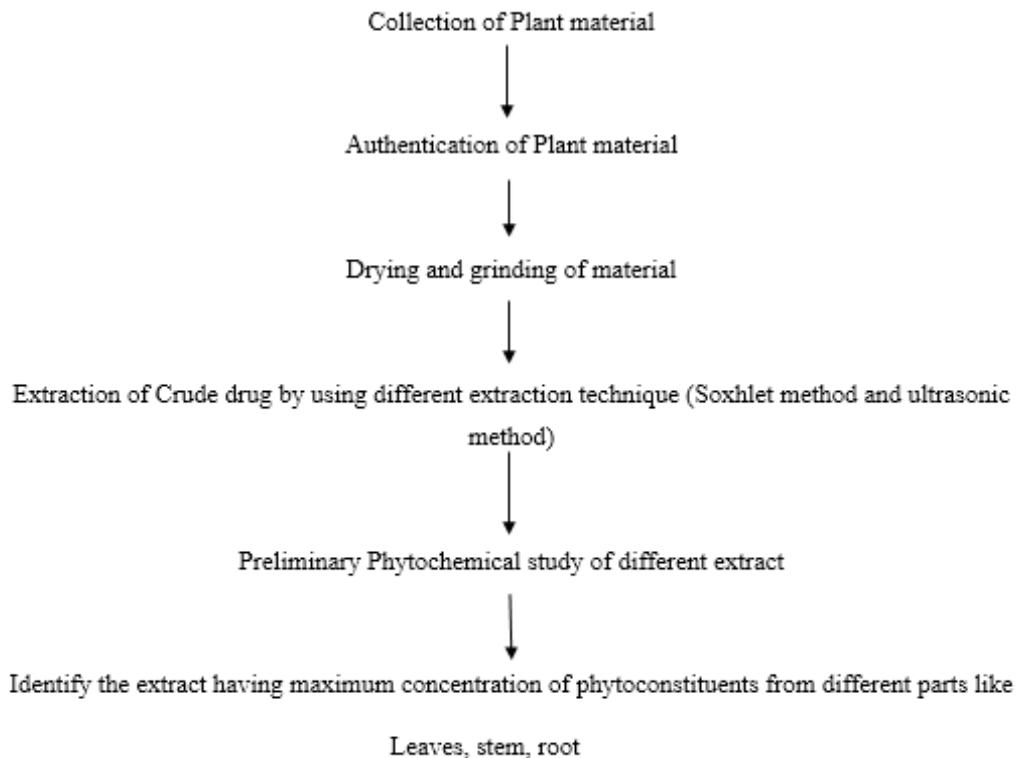
**Need of present investigation**

There is no scientific report on comparative study of extraction technique. To find out suitable extraction technique and solvent this gives high percentage yield of extract and phytochemical constituents.

**Aim and Objectives**

To perform comparative study of different extraction techniques and phytochemical screening of Delonix regia. The objectives of my present investigation were,

1. To authenticate the Delonix regia plant.
2. To extract out the leaves, root and stem by Soxhlet extraction and Ultrasonic extraction method.
3. To check the Phytochemical Constituent of the extract.
4. To check the percentage yield of extraction
5. Plan of Work



## Method and Material

### A. Selection of plant

The fresh leaves root and stem of the plant will be collected from the Lonand city, from Satara district of Maharashtra in month of September 2017.

### B. Authentication of Plant

Plant is authenticate from Yashwantrao Chavan institute of sciences, Satara.

### C. Preparation of *Delonix regia* Plant Extracts:

Plant materials were dried for 15-20 days and powdered. The air dried powder was subjected to solvent extraction with methanol.

### Extraction technique

#### Soxhlet Extraction



Fig 1.7: Soxhlet Extraction

#### Principle

When a compound of low solubility needs to be extracted from a solid mixture a Soxhlet extraction can be carried out. The technique places a specialized piece of glassware in-between a flask and a condenser. The refluxing solvent repeatedly washes the solid extracting the desired compound into the flask. Soxhlet extraction was carried out for colorant identification. In this work dried plant parts were put into thistle of soxhlet extractor and methanol was used as solvent. Temperature of the instrument was maintained well under boiling point of the used solvent. Several cycles of solvent were run so as to extract all the compounds from plant parts.

#### Procedure

1. Finely ground crude drug is placed in a porous bags or thimble made of strong filter paper which placed chamber of soxhlet apparatus.
2. The extracting solvent methanol is heated & its vapour is condensed in condenser.
3. The condensed extractant drips into the thimble containing crude drug.
4. When the level of liquid in chamber rises to the top of siphon tube, the active constituents of chamber siphon tube into the flask, thus emptying the body of extractor.
5. This alternation of filling & emptying the body of extractor goes on continuously.

6. The soluble active constituents of a drug remain in the flask while the solvent is repeatedly volatilized.
7. The process of filling & emptying of the extractor is repeated until the drug is exhaustion.

#### % yield of extract by Soxhlet

Table 3

Sr. No.	Parts	Colour	Odour	% yield
1.	Leaves	Dark green	Characteristics	39.8 % w/w
2.	Root	Faint green	Characteristics	39.4 % w/w
3.	Stem	Faint green	Characteristics	20.8% w/w

#### Advantages

The main advantage of soxhlet extraction is that it is a continuous process. Isolated desired oil when it has limited solubility in a solvent and when impurity is insoluble in a solvent. The extracting solvent always has zero concentration of the material to be extracted when the solvent first contacts the substrate to be extracted, so that the extraction rate is increased.

#### Ultrasonic extraction

Sonication is the act of applying sound energy to agitate particles in a sample, for various purposes. Ultrasonic frequencies (>20 kHz) are usually used, leading to the process also being known as ultrasonication or ultra-sonication.



Fig 1.8: Ultrasonication Extraction

#### Procedure

1. Take 5 gm. of drug powder in a three beaker and add 50 ml of methanol.
2. Then kept this beakers in sonicator bath 15,30 and 45 min.
3. After completion filter the extract in petri dish and it allow to drying or evaporation.
4. After this calculate % yield.

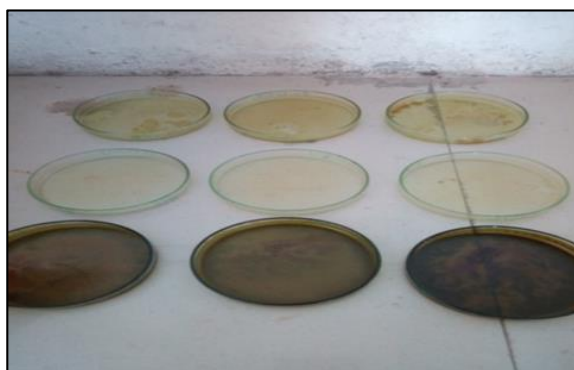


Fig 1.9: Methanolic Extract by Ultrasonication

**% yield of extract by ultrasonication****Table 4**

Sr no.	Parts	Minutes	Colour	Odour	% yield
1	Leaves	15 minutes	Faint green	Characteristics	20.4 % w/w
		30 minutes	Green	Characteristics	20.6 % w/w
		45 minutes	Dark green	Characteristics	38.6 % w/w
2	Root	15 minutes	Lightly green	Characteristics	19.6 % w/w
		30 minutes	Faint green	Characteristics	20.2 % w/w
		45 minutes	Faint green	Characteristics	38.4 % w/w
3	Stem	15 minutes	Faint green	Characteristics	19.6 % w/w
		30 minutes	Green	Characteristics	20.2 % w/w
		45 minutes	Green	Characteristics	20.6 % w/w

Advantages: High accuracy, Rapid result

**Preliminary pharmacognostic study: Phytochemical screening of methanolic extract of leaves, stem and root prepared by Soxhlet method****Table 5**

Sr. No.	Tests	Leaf extract in methanol	Root extract in methanol	Stem extract in methanol
1	Alkaloids			
	Dragendrof's test	+	+	+
	Wagners test	+	+	+
	Mayers test	+	+	+
	Hagers test	+	+	+
3	Test for saponins			
	Foam test	+	+	+
4	Test for flavanoids			
	Alkaline reagent test	+	+	+
4	Test for steroid			
	Salkowski test	+	+	+

**Phytochemical screening of methanolic extract of leaves, stem and root prepared by Ultrasonication method****Table 6**

Sr. No.	Tests	Leaf extract in methanol	Root extract in methanol	Stem extract in methanol
1	Alkaloids			
	Dragendrof's test	+	+	+
	Wagners test	+	+	+
	Mayers test	+	+	+
	Hagers test	+	+	+
3	Test for saponins			
	Foam test	+	-	-
4	Test for flavanoids			
	Alkaline reagent test	+	+	+
4	Test for steroid			
	Salkowski test	+	+	+

**Result****Percent of extract by different extraction techniques of Leaves, Root and Stem**

- By soxhlet extraction

**Table 7**

Sr. no.	Parts	% yield
1.	Leaves	39.8 % w/w
2.	Root	39.4 % w/w
3.	Stem	20.8% w/w

**By ultrasonication****Table 8**

Sr. no.	Parts	Minutes	% yield
1.	Leaves	15 minutes	20.4 % w/w
		30 minutes	20.6 % w/w
		45 minutes	38.6 % w/w
2.	Root	15 minutes	19.6 % w/w

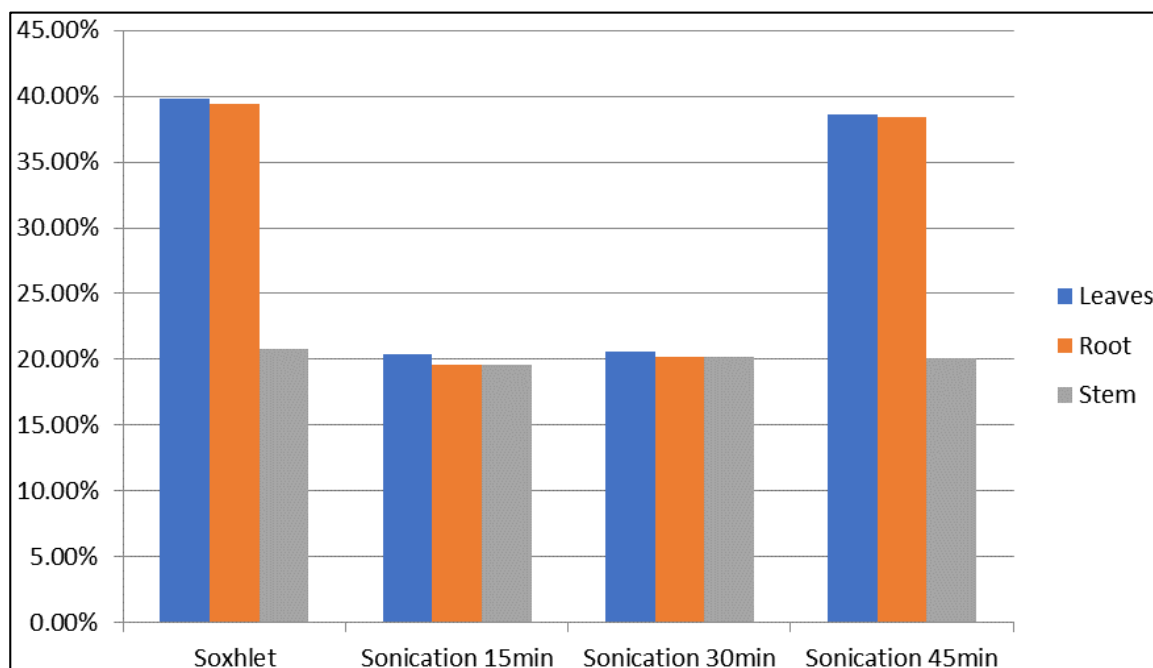
		30 minutes	20.2 % w/w
		45 minutes	38.4 % w/w
<b>3.</b>	Stem	15 minutes	19.6 % w/w
		30 minutes	20.2 % w/w
		45 minutes	20.6 % w/w

### From the above observation of the table

The soxhlet process was given the highest % of extract as compared to the ultrasonication method as per shown in

above table, and in ultrasonication method 45 min extract so highest percentage of extract.

### By statistical analysis



### Conclusion

By comparative extraction technique of different parts of plant we concluded that by soxhlet extraction technique gives maximum percentage of yield with maximum presence of phytochemical constituents.

### References

1. Dhanalakshmi D, *et al.* Antibacterial Activity of Leaf and Seed extract of *D. regia* and *A. aspera* against selected bacterial strains. *International Journal of Pharma Medicine and Biological Science*. 2013, 2278-5221.
2. Abdul Aziz, *et all.* Invitro comparative study of whole Plant and Roots Bark of *D. regia*. *International Journal of Pharma science*. 2014; 4(5):736-741.
3. Mohamed ZM Salem, *et al.* Bioactivity of *D. regia* *Bio Resources*. 2014; 9(2):2382-2395.
4. Indalkar Ankita S, Bhokare PV, Khadake AP. Standarization and Comparative Phytochemical Screening of *Delonix Regia* Different Extracts Obtained by Different Extraction Techniques; *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017; 6:694-701.
5. Dr. Khandelwal KR. *Practical Pharmacognosy, Techniques and Experiments* Chaptor No-25, Preliminary Phytochemical Screening. Published by NIRALI Prakashan. 2005; 25(1):25-9.
6. Dhane NS, *et al.* Antibacterial Activity Of methanolic Extract of *Nycthsnthes Arbortristis* *Int. J Pharmacol. Pharm. sci.* 2016; 3(4):76-79.