WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 6, Issue 7, 1001-1009. Research Article ISSN 2277– 7105

# PHARMACOGNOSTIC STUDY OF *BARRINGTONIA ACUTANGULA* (LINN.) GAERTN.

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Article Received on
23 April 2017,
Revised on 13 May 2017,
Accepted on 03 June 2017
DOI: 10.20959/wjpr20177-8730

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## ABSTRACT

Pharmacognosy - is the study of medicinal drugs derived from plants or other natural sources. A crude drug is any naturally occurring, unrefined substance derived from organic or inorganic sources such as plant, animal, bacteria, organs or whole organisms intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in humans or other animals. Medicinal plants have curative properties due to the presence of various complexes. Pharmacognostic studies of crude drug plays a very important role in identification of purity and quality of crude drugs. In the present study the plant *Barringtonia acutangula* of family Myrtaceae has been taken up. This plant has important chemical constituents and is medicinally important. In the present study the chemical tests, physicochemical parameters like total ash, water-soluble ash, acid insoluble ash, extractive values have been studied.

**KEYWORDS:** *Barringtonia acutangula*, Myrtaceae, chemical tests, physicochemical parameters, total ash, water-soluble ash, acid insoluble ash, extractive values.

## INTRODUCTION

The plant *Barringtonia acutangula* is commonly called as Samundarphal or Indian oak belonging to the family Myrtaceae. The study will provide proper identification of crude drug i.e. *Barringtonia acutangula* leaf and fruit.

*B. asiatica* and *B. racemosa* are other species of *Barringtonia*.

*Barringtonia* comes in the tribe Lecythideae (Hooker-1883).

*B. acutangula* is an evergreen medium sized tree attaining a height of 30-40 feet, found throughout India, plentifully in the plains of Bengal. Glabrous with simple, alternate leaves, obovate to oblong, denticulate or crenate margin, petiolate, unicostate reticulate venation. It consists of pendulous racemes (elongate) inflorescence, up to 40 cm long and 1.5 cm across, dark scarlet pink flowers with 4 lobed ovate calyx and 2 celled ovary. It has ellipsoid to ovoid berries, fibrous, bluntly quadrangular, truncate at both ends and each berry bears one ovoid black seed. (Hooker 1883).

According to Ayurveda, the properties of *B. acutangula* are ruksha (dry), laghu (light) and tikshna (sharp). It has a rasa (taste) of katu (pungent), tikta (bitter), sheeta (cold) and- virya (potency) (Kapoor, 1990).

## CHEMICAL CONSTITUENTS

Leaves contain a trihydroxy triterpene monocarboxylic acid, acutangulic acid, and other organic acids, barringtogenic, tangulic and oleanolic acids, saponins and sapogenins, three triterpenoid sapogenols, barringtenols B, C, D and E, two triterpenoid acid sapogenins. Fruits contain barringtogenol D, C and B, saponins and barringenic acid. Seeds contain triterpenoid glycosides, barringtogenin. Bark contains tannins and a small amount of sapogenin. (Joshi, 2000).

## USES

Juice of the **leaves** is bitter, constipating and tonic. It is given in diarrhea and dysentery. The **fruits** are bitter, coolant, acrid, astringent to the bowels, vulnerary, anthelminthic, useful in bronchitis, sore eyes, nasal catarrh and hallucinations, diuretic, expectorant, intestinal worms, wounds, ulcers, skin diseases, cough, intermittent fever etc. **Seeds** are very warm and dry and are used as an aromatic, carminative and emetic. (Drury, 1873; Sala, 1994).

## MATERIALS AND METHODS

The plant material i.e. leaves and fruits of *Barringtonia acutangula* for the present work was collected from Vile Parle and Victoria garden (Byculla) & authenticated.

For determination of ash content the method is as described by Shah and Quadry,1983.

For determination of percentage extractive values the method is as described by Trease and Evans, 1983, Wallis, 1985.

The pharmacognostic tests performed were as mentioned by Khandelwal, 2007.

## MACROSCOPY

In organoleptic evaluation, appropriate parameters like taste, odour size, shape, colour of powder of whole plant (leaves and fruits) were studied.

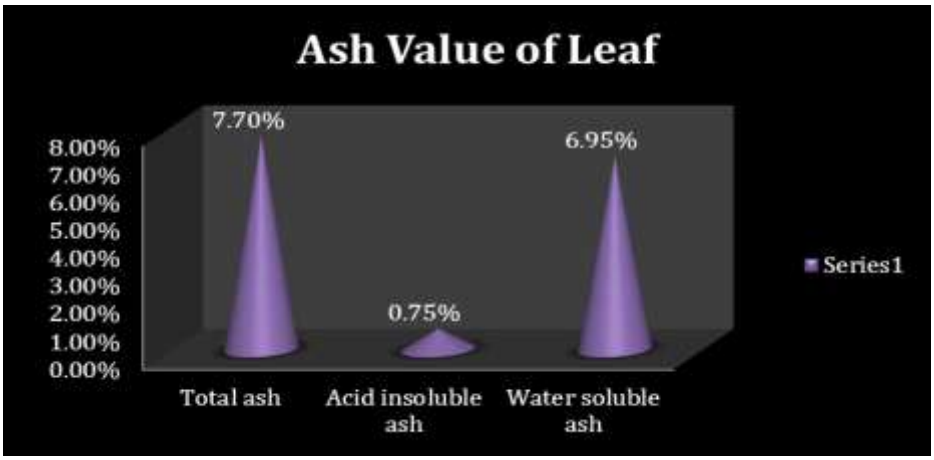
Leaf powder: Pale green in colour
Nature of powder: Coarse
Odour: Characteristic
Taste: Bitter

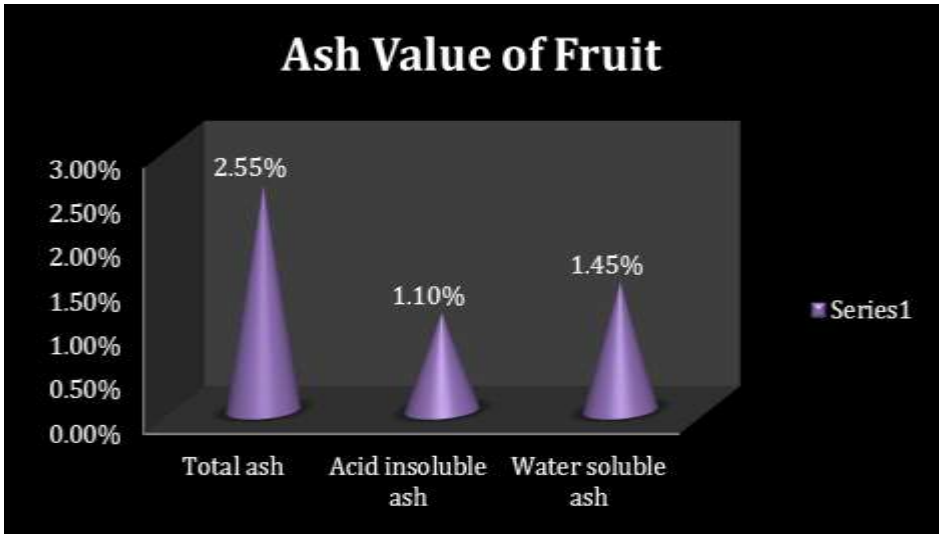
Fruit powder: brown in colour
Nature of Powder: Coarse
Odour: Characteristic
Taste: Bitter

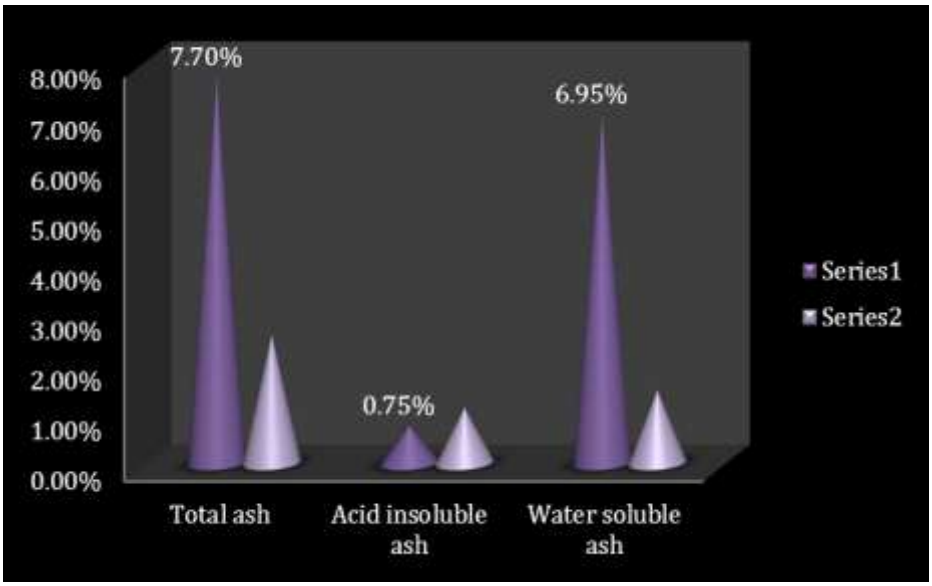
## PHARMACOGNOSTIC STUDIES

| **Ash value of powdered leaf of *Barringtonia acutangula*** | |
|---|---|
| **Total ash** | 7.70% |
| **Acid insoluble ash** | 0.75% |
| **Water soluble ash** | 6.95% |

| **Ash value of powdered fruits of *Barringtonia acutangula*** | |
|---|---|
| **Total ash** | 2.55% |
| **Acid insoluble ash** | 1.10% |
| **Water soluble ash** | 1.45% |





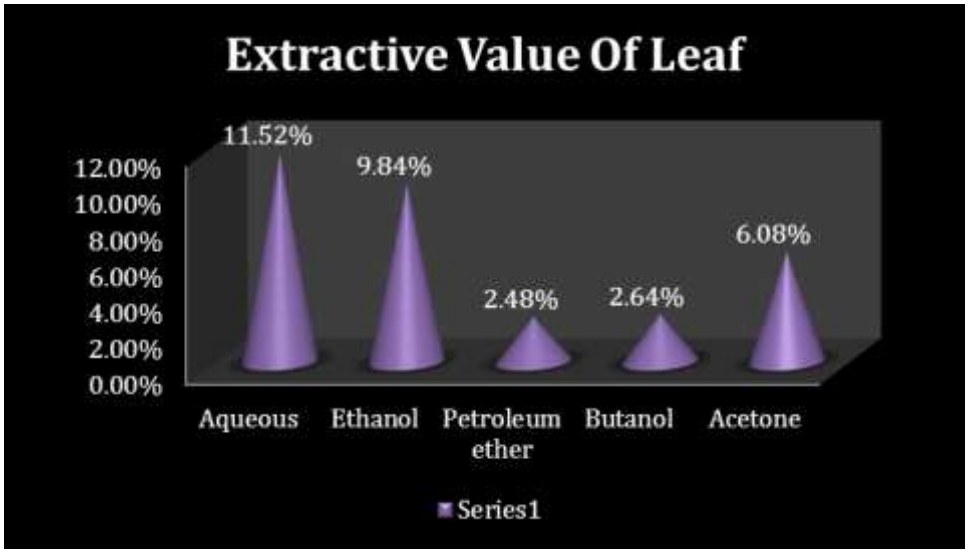



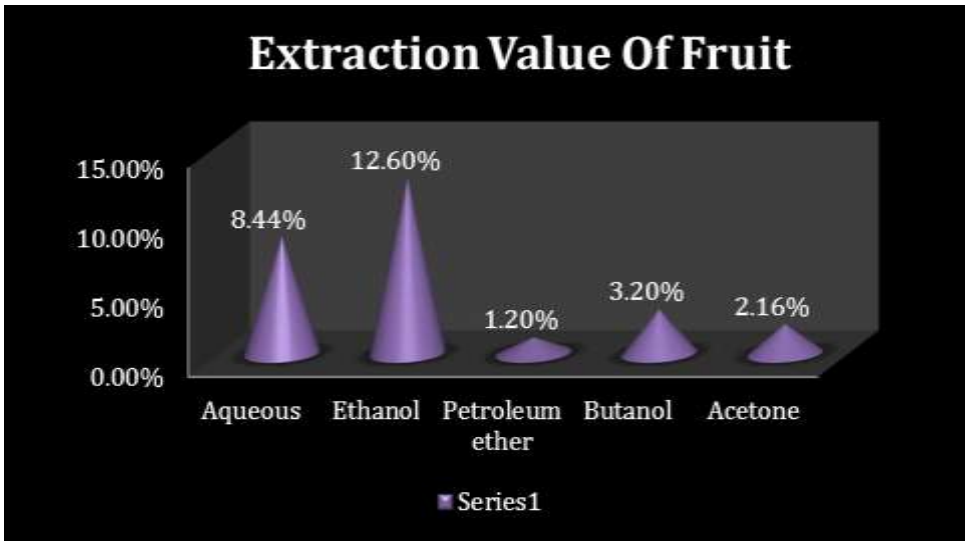

**COMPARISION OF ASH VALUES OF LEAF AND FRUIT**

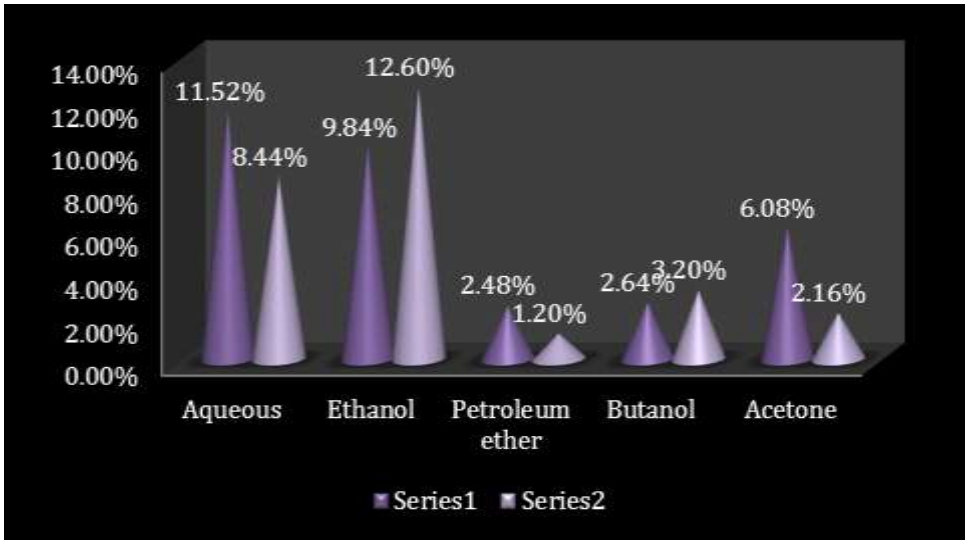
## PHARMACOGNOSTIC STUDIES

| **Extractive values of powdered leaf of *Barringtonia acutangula*** | |
|---|---|
| **Aqueous extractive value = not less than** | 11.52% |
| **Ethanol extractive value = not less than** | 9.84% |
| **Petroleum ether ext. value = not less than** | 2.48% |
| **Butanol extractive value = not less than** | 2.64% |
| **Acetone extractive value = not less than** | 6.08% |

| **Extractive values of powdered fruits of *Barringtonia acutangula*** | |
|---|---|
| **Aqueous extractive value = not less than** | 8.44% |
| **Ethanol extractive value = not less than** | 12.60% |
| **Petroleum ether ext. value = not less than** | 1.20% |
| **Butanol extractive value = not less than** | 3.20% |
| **Acetone extractive value = not less than** | 2.16% |




**COMPARISION OF EXTRACTIVE VALUES OF LEAF AND FRUIT**

**PREPARATION OF EXTRACT**

The dried powdered plant material (Leaves & fruits) was extracted with chloroform, methanol, ethanol, petroleum ether, distilled water, in an extraction apparatus.

The following table shows presence of phytoconstituents in the leaf and fruit of *Barringtonia acutangula*.

| T.S. + Reagent | Observations | Inference |
|---|---|---|
| **(Molish's Test) T.S. + α Naphthol in Alc.+ conc. HCl** | Violet ring formed at the junction of two liquids | Carbohydrates present |
| **(Benedict's Test) T.S. + Benedicts reagent** | Solution appears green and yellow | Reducing sugars present |
| **(Barfoed's Test) T.S.+ Barfoed's reagent (keep in boiling water bath)** | Red ppt. | Monosaccharides present |
| **T.S +Phloroglucinol + conc. HCl** | Yellow to red colour appears | Galactose present |
| **T.S.+ Sudan red III** | Red | Oil globules present |
| **(Cobalt Chloride Test) test- Powder + cobalt chloride + NaOH** | Solution appears greenish blue | Moisture is present |
| *** (Ninhydrin test) T.S + Ninhydrin solution (boiling water bath)** | Purple colour appears | Amino acid present in **fruit** |

| T.S. + Reagent | Observations | Inference |
|---|---|---|
| **T.S. + Chloroform + conc. Sulphuric Acid** | Chloroform layer appears red | Steroid present |
| **(Legals Test) T.S. + Pyridine + Sodium Nitroprusside** | Red colour | Cardenoloids present in **leaf** (Cardiac Glycosides) |
| **(Borntrager's Test) T.S + dil. $H_2SO_4$. Add $CHCl_3$. Shake well. Add Ammonia** | Ammonical layer appears red in leaf | Anthraquinone glycosides present in **leaf** |
| **(Modified Borntragers Test) T.S + $FeCl_3$+ dil HCl. Add benzene. Add ammonia** | Ammonical layer shows red colour | Anthraquinone glycosides present |
| **Section + catechol solution** | Yellowish brown section | Enzymes present |
| **Section +$H_2O_2$** | Oxygen gas evolves | Enzymes present |
| **(Test for Organic Acid) T.S. + Calcium chloride solution** | Ppt. observed on boiling and cooling | Citric acid present |
| **(Confirmatory Test for Citric Acid)** | White gelatinous ppt. | Citric Acid present |
| **T.S.+ Lead acetate** | White ppt. soluble in NaOH | Sulphate present |
| **T.S. + $HNO_3$** | White ppt | Chloride present |

| | | |
|---|---|---|
| **T.S. + $H_2SO_4$** | Brown colour at the junction | Nitrates present in the **leaf** |
| **Water** | Persistent foam observed | Saponin present |
| **Dil. $HNO_3$** | Yellow colour | Tannins and phenols present in leaf |
| **Extract+$FeCl_3$** | Dark blue colour | Tannins present in leaf |
| **Lead acetate** | Yellow coloured ppt | Flavonoids present |
| **NaOH** | Yellow colouration | Flavonoids present |
| **NH4OH+ $AgNO_3$** | Silver mirror | Tannins and phenols present |

## RESULTS AND DISCUSSION

The quantitative analysis and physico-chemical constants studied here can be used for judging the adulteration and purity of this drug. Since these parameters studied are constant and any change in these values are indicative of substitution and adulteration with the plant, *B. acutangula*.

The present work was taken up with a view to lay down standards that could be useful to detect the authenticity of this medicinally useful plants. Anatomical studies of the leaves of this plant have already been done by Vaidya & Ghaznavi (2017).

The preliminary phytochemical screening revealed the presence of terpenoids, flavonoids, glycosides, tannins and saponins. These constituents may be possibly responsible for the above said activity.

Leaves are used for diarrhea and dysentery.

The fruit consists of Carbohydrates, glycosides, monosaccharides and other reducing sugars. Flavonoids and saponins are also present. Fruits are very useful as a medicine.

In Ayurveda, its preparations include powder and pastes, used in vitiated conditions of *kapha* and *pitta*, leprosy, dysmenorrhea, lumbago, skin diseases, diarrhea, inflammation, flatulence, hemorrhoids, and as an anthelmintic.

Pharmacognostic standardization of *Psidium guajava* Vaidya et al. 2012, *Calophyllum inophyllum* Vaidya et al. 2015, *Carica papaya* Vaidya & Verma 2015 has already been studied.

## CONCLUSION

Standardization is essential measure for quality, purity and sample identification. Macromorphology along with the quantitative analytical microscopy is one of the simplest and cheapest methods to start with for establishing the correct identity of the source materials.

Physiochemical and qualitative Chemical analysis of leaves and fruits confirm the quality and purity of plant and its identification. Here the information collected was useful for further pharmacological and therapeutical evaluation along with the standardization of plant material.

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