

REVIEW ON THERAPEUTIC PROPERTIES OF ABROMA AUGUSTA L.

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ABSTRACT

Abroma augusta L. is an important and well known medicinal plant, widely used in traditional systems of medicine. Preliminary studies have found various chemical constituents of *Abroma augusta* L. which exhibits a variety of therapeutic effect. Studies indicate that *Abroma augusta* L. possesses emmenagogue, uterine tonic, antiinflammatory, antimicrobial, antidiabetic, wound healing, antihyperlipidemic, antioxidant, demulcent effect and useful in painful menstrual and neuralgic dysmenorrhoea, metritis, gonorrhea, irregular menstruation, leucorrhoea, burning urination and other medicinal conditions. The aim of the review is comprehend and put forth, available information on biological activities of this plant from a pharmacological point of view. The results are very encouraging and indicate this shrub should be studies more extensively to confirm these results and reveal other potential therapeutic properties. Clinical trials using *Abroma augusta* L. for a variety of conditions should also be conducted.

KEYWORDS: Therapeutic properties, *Abroma augusta*, Abromine, Emmenagogue, Uterine tonic.

INTRODUCTION

Abroma augusta L. is a well-known medicinal plant and large spreading bushy shrub with fibrous bark and irritable hairs, widely distributes all over the Bangladesh, India, Pakistan, China and many other parts of the world. The shrub has long been known as a valuable fiber yielding plant and it is said that around 1872 attention was given first time to its emmenagogue activity and use in the treatment of dysmenorrhea.^[13] Later many of medicinally important phytochemicals has been identified from the various parts of this shrub, including fixed oil, resin, abromine (alkaloid approx 0.01%), β -sitosterol, stigmasterol, cholin, betain, friedelin, a basic compound picrate.^[13] L- rhamnose, L- aribinos, D-xylose, D- mannos, D- galactose, D- glucose, D- galactuonic acid and D- glucuronic acid.^[8] the shrub as a valuable emmenagogue and uterine tonic, useful in the congestive and neuralgic varieties of dysmenorrhoea. Because of theses specific medicinal properties, *Abroma augusta* L. is incorporated in some reputed formulations, very useful in the treatment of female menstrual disorders. Beside these, leaves of *Abroma augusta* L. are effective in diabetes, rheumatic pains of joints and headache with sinusitis and diabetes, leaves and stem are demulcent and is very efficacious in gonorrhea. The present review discusses the investigation made by the researchers related to medicinal properties of *Abroma augusta* L. during the years.^[7]

Botanical classification

Kingdom: Plantae
Phylum: Magnoliophyta
Class: Magnoliopsida
Order: Malvales
Family: Malvaceae
Genus: *Abroma*
Species: *A. augusta* L.,^[6]

Geographical distribution

Abroma augusta L. is distributed from India throughout South-East Asia to southern China, northern Australia and the Solomon Islands. It is cultivated in India and sometimes in South-East Asia. It has also been grown on a small scale in tropical Africa, especially in DR Congo and Uganda, it has also been introduced into West Africa and Tanzania.^[1] According to Babita, 2011, *Abroma augusta* L. found in tropical Asia, South and eastern Africa, and Australia. It is found in both wild and cultivated throughout the hot and moister parts of India from Punjab and Uttar Pradesh eastwards to Arunachal Pradesh, Assam, Meghalaya and Tripura, ascending to 1200 m. and southwards in peninsular India. It is also cultivated for ornament,^[2] The author of medicinal plants of Bangladesh Abdul Ghani mentioned that *Abroma augusta* L. grows wild and is also planted in the gardens throughout the country.^[4] It also found in Java, Philippines and China.^{[18][5]}

Morphological description

Abroma augusta L. is a large shrub, attaining a height of 2-5 meters with horizontal and velvety branches; branches downy. Leaves are alternate, ovate-lanceolate, 10-20 cm. in length, 5-15 cm. wide, cordate, acuminate,



Fig. 1: Leaves of *Abroma augusta* L.

sometimes lobed, glabrescent above, petiole 1.5-2.5 cm long, deciduous, softly pubescent or tomentose beneath, with a pointed tip, heart-shaped base, and toothed margins. Flowers are bisexual, deep scarlet, few in leaf axils, about 5 cm in diameter.



Fig. 2: Flowers of *Abroma augusta* L.



Fig. 3: Fruits of *Abroma augusta* L.



Fig. 4: Seeds of *Abroma augusta* L.

Fruit is a capsule, 3.5-4.0 cm long, 5-angled, covered with irritating hairs, ultimately smooth. Seeds are albuminous, obovate, small, numerous, blackish and covered with silky hairs. The bark in its outer surface is dull brown and longitudinally wrinkled along with small watery marking, whitish yellow and finely longitudinally straight. The dry root is 0.5-1.0 mm thick and highly fibrous. The thickness of the bark varies according to the age and girth of the root.

Medicinal parts

Root, root bark, stem and leaves are frequently used. Most effective medicinal part is the bark.^[13]

Chemical constituents

Primarily the plants consist of alkaloid.^[2] The root bark of the plant has the following constituents: fixed oils; resins; alkaloids; the root part contains abromine ($C_6H_{12}NO_2$), friedelin, choline, betaine, β -sitosterol, stigmasterol,^{[13],[2]} magnesium salt,^{[19],[3]} a sterol ($C_{30}H_{52}O_2$), maslinic acid, α -amyrin, Protocatechuic acid, vanillic acid, caffeic acids, in their free glycosidic and ester forms identified in root bark extract, a water soluble polysaccharide fraction isolated from root bark and found to contain rhamnose, arabinose, xylose, mannose, galactose, glucose, galacturonic acid and glucuronic acid an acidic polysaccharide containing

rhamnose, galacturonic acid glucuronic acid isolated from root bark and partially characterized. The leaves contain taraxerol, and its acetate, β -sitosterolacetate, lupeol, an aliphatic alcohol ($C_{32}H_{66}O$), octacosanol and probably a mixture of long chain fatty diols. The stem bark of the plant contains β -sitosterol and friedelin. The seeds contain a fixed oil (20.2%) with the following physico-chemical characteristics: 1.4685; saponification value, 290.5; iodine value, 129.5; acid value, 1.0; hydroxyl value, 22.3; and unsaponification matter, 1.5%. The fatty acid composition of the oil is as follows: palmitic acid, stearic; oleic, linoleic, and hexadecenoic. The oil is rich in linoleic acid.^[2] Seed contains a fixed oil with 71.5% linoleic and augustic acid from the roots.^[4]

Elementary composition (% age concentration on dry weight basis)

Manganese- 0.0029, Cadmium- 0.00006, Magnesium- 0.1753, Zinc- 0.0228, Lead- 0.00012, Calcium- 1.19073, Iron- 0.0099, Nickel- 0.00105, Cobalt- 0.00011, Chromium- 0.00036, Sodium- 0.220, Potassium- 0.200, Aluminium- 0.0070, Strontium- 0.0050.^[13]

Pharmacological Action and Therapeutic uses

Abroma augusta L. is very popular medicinal plant in the indigenous systems of medicine as a good

emmenagogue, and in the congestive and neuralgic variety of dysmenorrhoea. It has also proved to be an effective medicine for diabetes mellitus and inspidus.^[20] Pharmacological activities of *Abroma augusta* L. are given below.

Effects on specific female diseases

From the various literatures, books & writings it is found that the *Abroma augusta* L. is effective in the treatment of various female diseases. The root and root bark are used in medicine as emmenagogue in menstrual disorders. It is useful in congestive and neuralgic varieties of dysmenorrhoea, regulates menstrual flow and acts as uterine tonic. Sirkar, found in an aqueous alcoholic extract of *Abroma augusta* L. large quantities of magnesium salts in combination with hydroxy acids, besides gums, resins and other organic residues. Magnesium salts of some hydroxy acid act as styptics. So it is said that the utility of the plant in uterine hemorrhages may be due to the presence of magnesium salts.^{[3],[19]} Bark extracts contractile action on uterus and is also used for the treatment of amenorrhea, sterility and menstrual disorders.^[13] The plant relieves functional uterine debility, metritis and leucorrhoea.^[9] Infusion of leaves and stem is effective uterine tonic, regulates irregular menstruation, and pain.^[4] The root bark possesses anti-fertility property.^{[10],[4]} Powdered roots act as an abortification agent. The aqueous extract of the roots has oxytocic action and also possess galactotrophic effect on lactating albino rats.^[2] It stimulates ovaries, influences hormones, by which it can help starting periods. It also stimulates the ovulation.^[6]

Antiinflammatory effect

The plant contains alkaloids and flavonoids, which is effective in the treatment of inflammation. A scientific study showed that the methanolic extract of different parts of *Abroma augusta* L. has potent antiinflammatory activity comparing with the standard drug diclofenac sodium.^[16] It helps decreasing joint inflammation and swelling in patients with rheumatoid arthritis. It also relieves headache associated with sinusitis.^[6]

Antimicrobial effect

The n-hexane extract of the seeds of *Abroma augusta* L. showed antifungal activity. The seed oil of *Abroma augusta* L. possesses a moderate activity against fungi, like *Candida albican*, *Aspergillus niger* (Human pathogens) and *Trichophyton schoenleinii*, *Pseudallescheria boydii*, *Microsporum canis* and *Trichophyton simii* (Animal pathogens). The seed oil of *Abroma augusta* L. has also the potential to be an antifungal agent against *Trichophyton schoenleinii* and *Microsporum canis*.^[2] The acetone extract of leaves showed significant anti-bacterial activity against *Bacillus subtilis*, *B. megaterium*, *staphylococcus aureus*, *E.coli*, *Shigella dysenteriae*, *S. sonnei* and *Salmonella typhi*. The antifungal action was found strong against *Aspergillus niger*, *Aspergillus flavus*, *Candida albican*, *Rhizopus oryzae* and *Aspergillus fumigatus*.^[14]

Antidiabetic effect

Abroma augusta L. is effective in the treatment of diabetes mellitus. It showed anti-diabetic effects in alloxan induced diabetic rabbits. It possesses the chemical substances that stimulate precursor cell differentiation causing regeneration of beta-cells. Studies showed that abromine, the active constituent of *Abroma augusta* L. identified as betaine is responsible as anti-hyperglycemic activity. The leaves contain octacosanol, taraxerol, beta-sitosterol actate, lupeol, and an aliphatic alcohol.^[15] Aqueous extract of dried root bark has been observed in diabetic rats by Halim and Ali Hussain. They showed that the water extract of the roots of *Abroma augusta* L. resulted in significant fall in fasting blood glucose and improvement in glucose tolerance. The methanolic extract of leaves significantly reduced the blood glucose level in alloxan induced diabetic rats when administered at a dose of 300 mg/kg/day.^[17]

Wound healing effect

Abroma augusta L. has been used traditionally for the treatment of sores. The wound healing profile of alcoholic extract of *Abroma augusta* L. and its effect on dexamethasone suppressed wound healing was evaluated in wistar rats. An alcoholic extract of *Abroma augusta* L. was prepared. Three models were used- incision, excision and dead space wound models. The extract was found to increase the breaking strength and dexamethasone suppressed wound healing.^[12]

Antigonorrheal effect

Infusion of fresh leaves and stem in cold water is very efficacious in gonorrhea.^{[12],[19]}

Hypolipidemic effect

From an experimental study carried out by the researchers showed the marked decrease in lipid level in sterptozotocin induced diabetic rats. Oral administration (300mg/kg) of the aqueous extract of combination of Curcume from *Curcuma Longa* L. and partially purified product from *Abroma augusta* L. On blood glucose, lipid per oxidation (LPO) was studied for 8 weeks in sterptozotocin induced diabetic rats. Result in total decrease in body weight, cholesterol and creatinine. The oil is rich in linoleic acid, which controls arteriosclerosis because of its ability to lower the cholesterol level in blood.^[2]

Antioxidant effect

The methanolic extract of *Abroma augusta* L. shows strongest antioxidant activity with IC50 value of 51.9785 mg/ml. The combination of *Abroma augusta* L. and *Curcuma longa* L. also possess antioxidant activity by inhibiting thiobarbituric acid reactive substances (TBARS) and increase in reduced glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT).^[2]

Others effects

The plant is also effective as resolvent, diuretic, spasmogenic, cardiac depressant.^[9] Leaves and stems are

demulcent. Leaf stalks are useful in dysentery, weakness and burning urination.^[4] The plant is also used in stomachache, dermatitis and whitish discharge in urine in men.^[11]

General dosages

Aqueous extract of 2-4 gram bark. Fresh viscid juice or aqueous extract (Approximately 70 ml) of bark as douche before breakfast or twice a day.^[9]

Side effects

The plant described as spasmogenic and cardiac depressant, however, following the use of recommended doses of the herb or products in which it is included, no side effect have been reported.^[9]

Toxicity

No known toxicity reported following the use of prescribed doses for recommended duration,^[13] and sour food (Citrus juice), Sikanjbin (honey and vinegar syrup in water) may be used as antidote.^[9]

Substitute

Some of the medicinal plants may be used as the substitute of *Abroma augusta* L. if needed, like *Ruta graveolens*, *Peganum harmala*, *Valeriana officinalis* and *Adiantum capillus-veneris*.^[9]

CONCLUSION

The extensive literature survey revealed that *Abroma augusta* L. is important medicinal plant with diverse pharmacological spectrum. The plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal properties. It is important to recognize that the plant may be effective not only as a single drug, but also potentiating the effects when given in combination with other herbs. Although the results from this review are promising for the use of *Abroma augusta* L. as a multi-purpose medicinal agent, several limitation currently exist in the current literature. While *Abroma augusta* L. has been used successfully in traditional systems of medicine for centuries, but it is needed to explore its medicinal values at molecular level with the help of biotechnological tools and techniques and also more clinical trials should be conducted to support its therapeutic use.

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