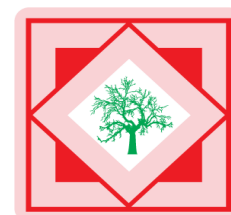




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Abroma augusta Linn f: A review

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ABSTRACT

Herbal medicines are getting more importance in the treatment of various diseases like diabetes, cancer and hepatic disorder etc. In ayurvedic system of medicine in India the extract of the herbal plants is used as a medicine to reduce the hazardous adverse effects of the drugs. Abroma augusta Linn f. is one of such ayurvedic remedy that has been mentioned in many Indian medicinal literatures. This article discusses about the medicinal values of Abroma augusta Linn f. In this communication, we reviewed the pharmacological and phytochemistry of Abroma augusta Linn f. and its application in the treatment of various ailments like the root parts of plants are used as a uterine tonic and an emmenagogue, dysmenorrhoea, amenorrhoea, sterility and other menstrual disorder powdered roots act as an abortification, and antifertility agent. Leaves are useful in treating uterine disorder diabetes, rheumatic pains of joints and headache with sinusitis. Leaves and stem are demulcent and an infusion of fresh leaves and stems in cold water is very efficacious in gonorrhoea. The major constituents of the plants are alkaloids, abromine, sterol, friedelin, abromasterol, taraxeryl acetate, taraxerol β -sitosterol. This review discusses the investigation made by various workers related to chemical constituents, pharmacological action and toxicological studies of this plant since years till date.

Key Words: *Abroma augusta*, cultivation and Phytochemistry.

INTRODUCTION

Abroma augusta Linn f. (*Ambroma*) syn. *A. fastuosa* (Family-Sterculiaceae) commonly known as Ulatkambal in Hindi and Devil's cotton in English. A genus of evergreen plant large, spreading, quick-growing hairy shrub or a small tree with velvety branches, 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 1,200 m, and southwards in peninsular India; it is also cultivated for ornament. [1] The roots and bark of pivari are uterine and nervous

dysmenorrhoea, ammenorrhoea, sterility and other menstrual disorder. Powdered root act as an abortifacient and anti-fertility agent. Leaves are useful in treating uterine disorders, diabetes, rheumatic pain of joints, and headache with sinusitis.[2] Leaves and stem are demulcent and an infusion of fresh leaves and stem in cold water is very efficacious in gonorrhoea.[3]The root-bark is used as an emmenagogue and uterine tonic, The action of dried roots as well as the sap of the fresh root, has been studied.[4-5]

Traditional uses:

Abroma augusta has a long history of medicinal use in Ayurvedic system. It highly possesses in gynecological disorders. It regulates the menstrual flow and also used as abortifacient and anti-fertility agent. In India it is used in dymenorrhea but in Indonesia it is used in scabies. It is used in dermatitis, anti-inflammatory and analgesics. The leaves and stems of *Abroma augusta* Linn f. were used by the traditional healers of Bogra district, but the bark of roots were used by the traditional healers of Jessore district. [6]

Cultivation and collection methods:

The species is of Indo-Malayan origin and occurs throughout tropical forests of India, particularly in North-East and East coast. Also found in tropical Asia, South and eastern Africa, and Australia. The species is often planted for its showy deep scarlet flowers. [1, 7, 8, 9]

Abroma augusta Linn f. is a shrubs or a small tree cultivation very in height from 1.8 to 3.6 m, but when wild, they often reach a height of 9 m; for economic cultivation the taller ones should be preferred. However, because of the nettle-like hair may cause dermatitis in susceptible persons. It grows in open areas in nature. [6] The shrub requires deep, fertile alluvial soil with good drainage. It suffers from frost and is a light-demander. Well-distributed rainfall is more important than its quantity. Propagation can be done either from seeds or stem-cutting; sometimes root suckers may be used for propagation. Since the seeds lose viability fairly quickly and their germination power is poor, fresh seeds soaked in water for 15 min at 28.c should be sown. Insecticidal treatment also improves the germination. The optimum temperature for germination is 32.c. About 24kg of seed is required to plant one hectare. Sowings are done before the rainy season. The field should be ploughed properly along with farm manure to a fine tilth. *Mucuna* spp., vigna sinensis Endl., etc., are good green manures and may be ploughed in. the seed can be sown either in nurseries for transplanting, or directly in the field. A depth of 5 cm is reported to be optimum for germination, and close spacing has been recommended.

The stems yield a fiber, and are harvested during flowering between July and dec, 100-120 days after sowing, or after the growth of the new stems following the previous harvest. For coarse fiber, the harvesting may be done as late as 6-7 months. The stems are cut 25cm above the ground for new flush. Although up to four harvests can be taken in the year, normally only two harvests are taken or sometime only one. The fibers are retting the stem for 7-15 days, is washed and beaten to make it supple and to separate the individual strands. Over-drying makes the fiber brittle. The yield of fiber varies depending upon the climatic, edaphic, and several other factors. An average yield of 735-990kg/ha been recorded.[1, 7]

Features:

Abroma augusta Linn f. is a shrubs and small tree, attaining a height of 3-5 meters with horizontal and velvety branches. The branches and branch lets are downy. The leaves are alternate. The dry roots have 0.5-1.0 mm thick, highly fibrous, brown barks; the thickness of the bark varies according to the age and girth of the root. When freshly cut the root produces a thick gummy substance. The outer surface of the bark is dull brown and longitudinally wrinkled with small warty markings; the outer surface is whitish yellow and finely longitudinally striate. The root bark is test less, slimy, odorless, and tough, but not brittle. When soaked in cold water for 3-4 days, the bark produces slimy mucilage which can be extracted.[1, 3]

Leaves are polymorphous about 10-30 cm. long and 6-18 cm. broad, repand-denticulate, base 3-7 lobed, cordate nerved, upper non-lobed, ovate-lanceolate; smaller, narrower, entire, glabrescent above, tomentose below; petiole 12-25 mm. stipules linear, deciduous, as long as the petiole. Peduncle about 4 cm. long, axillar. [1, 7]

Flowers are 5 cm. in diameter, dark red, purple or yellow in colour occurring on few flowered cymes. Sepals are 2.5 cm. lanceolate, free nearly to the base. Petals scarcely exceeding the Sepals, imbricate in bud, deciduous. And fall soon. Stemens are present on short staminal tube. Five staminoides are present. Capsules are almost 4 cm. long, obpyramidal, membranous finally pubescent, and truncate at the apex. Capsules are thrice as long as the persistent calyx. Each carpel has a triangular wing behind it. Flowering and fruiting occur in the month of December and January. Seeds many, small, blackish, covered with silky hairs. [1, 4, 7] The leaves and fruits are shown in picture 1 and 2 respectively.



Picture 1: Leaves of plant

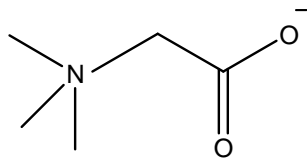
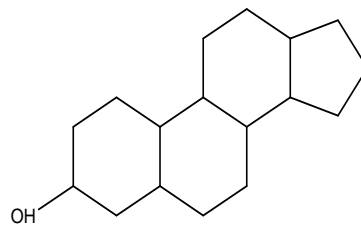
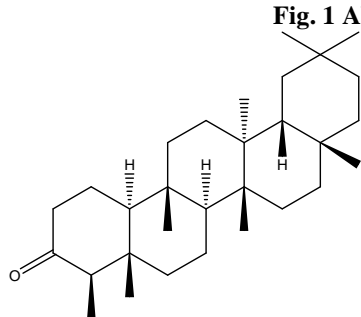
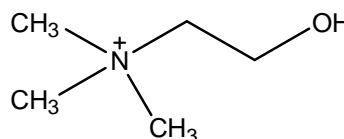
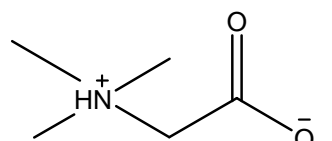
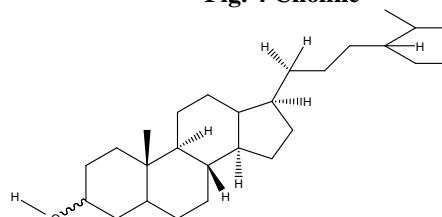
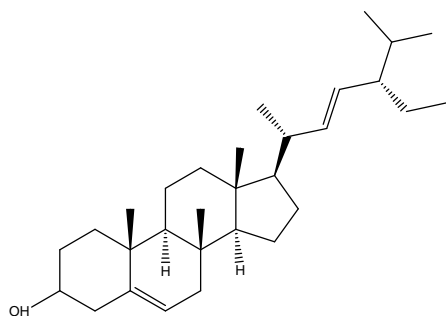
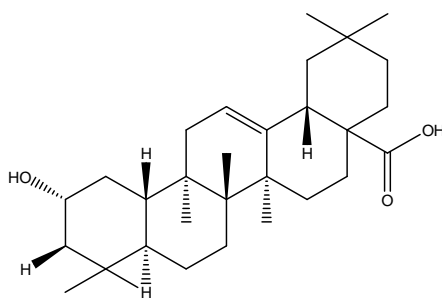
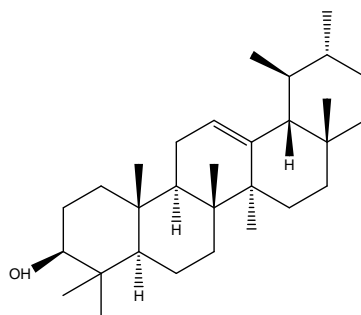
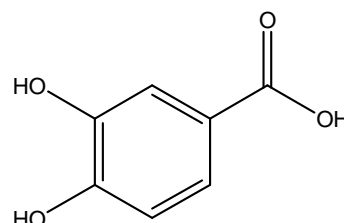


Picture 2: Fruits of plant

Phytochemistry:

Primarily the plants consist of alkaloid. The root bark of the plant has the following constituents: mixed oils; resins; alkaloids; in minute quantities; water soluble base. The root part contains abromine ($C_6H_{12}NO_2$) (fig. 1), mp 283-285⁰; a sterol ($C_{30}H_{52}O_2$) (fig. 2), mp 153-157⁰; friedelin (fig. 3), abromasterol a mp 125.5⁰. choline (fig. 4), betaine (fig. 5), β -sitosterol (fig. 6), stigmasterol (fig. 7), a basic compound and a fixed oil. Maslinic acid (fig. 8) and α -amyrin (fig. 9) isolated from root bark. Protocolechuic (fig. 10), vanillic (fig. 11) and caffeic acids (fig. 12) 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 rhamanose, arabinose, xylose, mannose, galactose, glucose, galacturonic acid and glucuronic acid an acidic

polysaccharide containing rhamnose, galacturonic acid glucuronic acid isolated from root bark sand partially characterized.[10-13]

**Fig. 1** Abromine**Fig. 2** Sterol**Fig. 3** Friedelin**Fig. 4** Choline**Fig. 5** Betaine**Fig. 6** β -Sitosterol**Fig. 7** Stigmasterol**Fig. 8** Masilinic acid**Fig. 9** α -Amyrin**Fig. 10** Protocatechuic acid

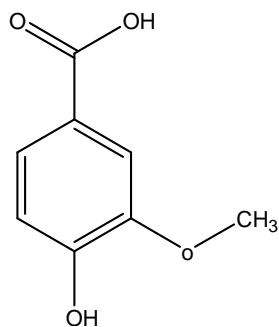


Fig. 11 Vanillic acid

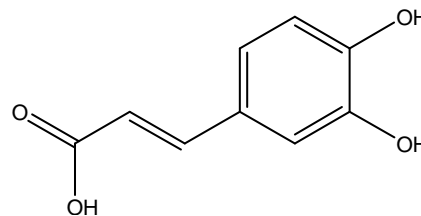


Fig. 12 Caffeic acid

The leaves of *Abroma augusta* plant are contains taraxerol (fig. 13) and its acetate, b-sitosterol-acetate, lupeol (fig. 14), an aliphatic alcohol ($C_{32}H_{66}O$), octacosanol (fig. 15), and probably a mixture of long chain fatty diols.[11,12]

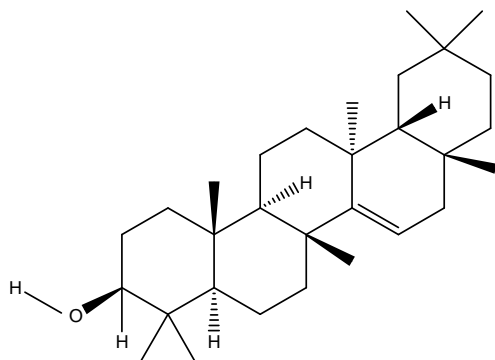


Fig. 13 Taraxerol

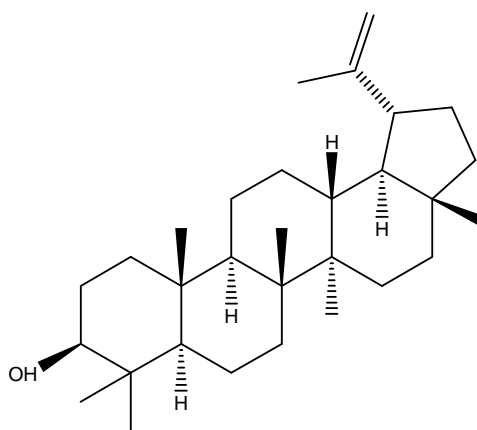


Fig. 14 Lupeol

The stembark of the plant contains b-sitosterol and friedelin. The presence of β -sitosterol and octacosne-1, 28-diol is reported in the heartwood.[1-5,10-14]

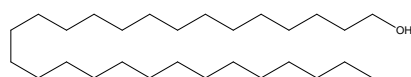


Fig. 15 Octacosanol

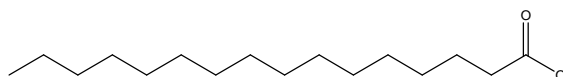


Fig. 16 Palmitic acid

The seeds of the *Abroma augusta* contain a fixed oil (20.2%) with the following physic-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 (fig. 16), 14.5; stearic, 3.8; oleic, 9.4; linoleic, 71.5; and hexadecenoic, 0.9%. The oil is rich in linoleic acid which has an important dietary role in the control of arterio-sclerosis because of its ability to lower the cholesterol level in blood.[1, 10, 11]

Pharmacological activity:

From literature survey it was found that the almost all parts of the plants *Abroma augusta* is used in the treatment of various diseases; The root and root bark are reputed remedies as an emmenagogue and uterine tonic, used in ammenorrhoea for congestive and nervous

dysmenorrhoea; prescribed during irregular menses. Fresh viscid juice (sap) abounding in the thick easily separable bark of the root is more efficacious and is given in half drachm or 30 grains doses a day in verities of dysmenorrhoea. A single administration during the menses will cure the disease and regulate the menstrual flow, act as a uterine tonic and bring on conception in young married women. The viscid sap is insoluble in water. It is generally given from the first day of the flow for 7 days successively. In case where the pain precedes the flow, it is given two days previous to its appearance. The utility of *Abroma augusta* in uterine hemorrhage might be due to the presence of the magnesium salts.[3]

The leaves are reported to be useful in treating uterine disorders, diabetes, rheumatic pains of joints, and headache with sinusitis. The cold aqueous infusion of the fresh leaves and twigs is reported to be demulcent and very efficacious in gonorrhoea.[7] It is also mention that the leaves are used aphrodisiac as a sex stimulant. 50g. Juice obtained from crushed leaves is taken with honey twice daily for 14 days. Other uses of the plant are used in stomachache, diabetes, dermatitis, and also in whitish discharge in urine in men. [15]

Antidiabetic activity:

Different parts like roots, leaves and barks of the plant of *Abroma augusta* are used in the treatment of diabetes. The methanolic extracts and decoction of the leaves of *Abroma augusta* are used in the treatment of alloxan (110 mg/kg) induced diabetic rats. The experimental study shows that the methanolic extracts are effective in the diabetic rats at a dose of 300 mg/kg body weight when administered for seven days.[16-18]

The ethanolic extract of the roots of *Abroma augusta* also exhibit the hypoglycemic effect in alloxan (100 mg/kg) induced diabetic rats.[19-21]

Abroma augusta are also effective in combined dosage form with other naturally occurring drugs like *Curcuma longa* and *Coccinia indica* for the treatment of streptozotocin (STZ) induced diabetic rats. The combined aqueous extracts of the *Abroma augusta* and *Curcuma longa* are used in the treatment of STZ (60 mg/kg) induced diabetic rats at a dose of 300 mg/kg of body weight, whereas it also used in combination of *Coccinia indica* for the treatment of diabetes.[22-23]

The combined aqueous extract of the leaves of *Abroma augusta* and *Azadirachta indica* (1:1) used to treat the alloxan induced diabetic rats when administered for 8 weeks.[24]

Antioxidant activity:

The extracts were investigated for its antioxidant activity by using hydrogen donation assay method. The methanolic extract of *Abroma augusta* shows strongest antioxidant activity with IC₅₀ value of 51.9785 mg/ml. The combination of *A. augusta* and *C. longa* also possess antioxidant activity by inhibiting thiobarbituric acid reactive substances (TBARS) and increase in reduced glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT). [23, 25]

Anti-inflammatory activity:

The petroleum extracts of the roots of *Abroma augusta* is used for its anti-inflammatory activity. The different doses (50 mg/kg, 100 mg/kg and 200 mg/kg) of the extract were evaluated for its

anti-inflammatory activity and 200 mg/kg dose was found to be effective against carrageenan-induced inflammation.[26]

Wound healing activity:

Abroma augusta has been used traditionally for the treatment of sores. The wound healing profile of alcoholic extract of *Abroma augusta* and its effect on dexamethasone suppressed wound healing was evaluated in wistar rats.

An alcoholic extract of *Abroma augusta* 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.[6, 27]

Hypolipidemic activity:

From the experimental studies carried out by the workers showed the marked decrease in lipid level in streptozotocin induced diabetic rats. Oral administration (300mg/kg) of the aqueous extract of combination of Curcumin from *curcuma Longa*, Linn and partially purified product from *Abroma augusta*, Linn. On blood glucose, lipid per oxidation (LPO) was studied for 8 weeks in streptozotocin induced diabetic rats. Result in total decrease in body weight, cholesterol and creatinine.[23]

Antifungal, antibacterial and insecticidal activity:

The n-hexane extract of the seeds of *Abroma augusta* is used as antifungal activity. The extract was evaluated by agar tube dilution method. Antifungal activity of the oil was tested against *Trichophyton schoenleinii*, *Pseudallescheria boydii*, *Microsporum canis*, *Trichophyton simii* (animal pathogens), *Candida albican*, *Aspergillus niger* (human pathogens), *Fusarium solani var. lycopersici*, *Macrophomina phaseolina* (plant pathogen). Growth in the medium containing the oil was determined by measuring the linear growth (mm) and growth inhibition (%) was calculated with reference to the negative control. The result indicates that the seed oil of *Abroma augusta* Linn. f Posses a moderate activity against human and animal pathogens but no significant activity of the extract was observed against the plant pathogens. The seed oil of *A. augusta* Linn has the potential to be an antifungal agent against *Trichophyton schoenleinii* and *Microsporum canis*. The oil was also screened against various bacteria like *Corynebacterium diphtheria*, *Escherichia coli*, *Klebsiella pneumonia*, *Proteus morganni*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Shigella boydii*, *Staphylococcus aureus* and *Streptococcus pyogenes* for antibacterial activity and insecticidal activity tested against *Tribolium castaneum*, *Sitophilus oxyzae*, *Ryzopartha dominica* and *Trogoderma granarum*.[28]

Phytotoxic activity:

Seeds of *Abroma augusta* was extracted by the n- hexane and the extract were used as a phytotoxic activity. The extracted oil of was tested against the *Lemna aequinoctialis Welv*. These results the phytotoxic activity of the seed oil was interpreted by analyzing the growth regulation in control. Paraquate was used as standard inhibitor. The result shows that the oil posses remarkable phytotoxic activity against *Lemna aequinoctialis Welv*. and inhibit the growth of plant by 82.35% at a concentration of 500 $\mu\text{g ml}^{-1}$.[28]

Gynecological disturbance:

The ethanolic extraction of leaves and stems of *Abroma augusta* Linn f. is also used in menstrual disorders, diseases of uterus leucorrhoea, It shows contractile action on the uterus, and is used for the treatment of dysmenorrhoea, amenorrhoea, sterility, and other menstrual disorders. Powdered roots act as an abortifacient and anti-fertility agent, and the petroleum-ether extract of the roots, at a dose of 50mg/kg body wt, showed anti-implantation as well as abortifacient action in mice. Significant abortifacient activity was also noticed with alcoholic and chloroform extracts. The alcoholic extract of the roots showed acetyl choline-like action, comparable to that of choline on isolated smooth and skeletal muscles. The aqueous extract of the roots showed oxytocic action. It has also been reported to possess galactotrophic effect on lactating albino rats. [1, 6, 15, 29]

CONCLUSION

From the above literature review it can be concluded that *Abroma augusta* Linn. f preparation are widely available in open areas of nature and employed by the practitioners of natural health for treatment of infection, pain, wound healing, and used as a uterine tonic. Though *Abroma augusta* has medicinal activity but it is time to explore its medicinal value at molecular level with the help of various techniques. There have been reports on the clinical uses of *Abroma augusta* which have shown promising results as the plant *A. augusta* has a wide array of pharmacological activities, many isolated compounds and synthetic analogs of *A. augusta* lack of study on their pharmacological activity.

The main reason is that the other system of medicine associated with number of side effects that often cause serious problems. This has led to a phenomenal increase in the demand for herbal medicines in the last two decades and a need has been felt for ensuring the quality, safety and efficacy of herbal drugs. In the current scenario world the trend has been changed from synthetic to natural medicine, because of the less side effects associated with the use of natural medicines.

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