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SAPINDUS MUKOROSSI (AREETHA)-THE NATURALFOAMING AGENT: AN OVERVIEW

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ABSTRACT

Sapindus mukorossi, notable as soapnut, have a place with family Sapindaceae. It is a common component of ayurvedic products like shampoo, cleansers, and medicines usedto treat eczema, psoriasis, and freckles. It also has a mild insecticidal effect and is traditionallyused to remove lice from the scalp. The species is widely grown at altitudes ranging from 200 to 1500 meters in the upper reaches of the Indo-Gangetic plains, Shivaliks, and sub-Himalayan tracts. The Aritha tree, also known as the soapnut tree, is one of Asia's most valuable tropical and subtropical trees. This review includes the structure and chemical name of every kind of triterpenoidal saponin that has been found in Sapindus mukorossi. Numerous studies have demonstrated the plant's potential as spermicidal, hepatoprotective, anti-inflammatory, anti-protozoal, and other properties. The phytochemistry and pharmacological effects of Sapindus mukorossi are the primary topics of this review.

KEYWORDS: Sapindus mukorossi, Sapindaceae, Potential uses, Pharmacology.

INTRODUCTION

Sapindus mukorrosi Geartn, an individual from the family Sapindaceae, is regularly known by a few names, for example, soapnut, soapberry, washnut, reetha dodan and doadni. It is a deciduous tree generally filled in upper ranges of Indo-Gangetic fields, shivaliks and sub Himalayan plots at elevations from 200 m to 1500 m. The Sapindus mukorossi is a genuinely enormous, deciduous tree with a straight trunk up to 12 m in level, at some point accomplishinga level of 20 m furthermore, a size of 1.8 m, with a globose crown and rather fine rough foliage. The blast is 0.8 to 1.3 cm, hard, not sinewy, light orange brown, fragile and

granular. Leaves are 30 to 50 cm long, substitute, paripinnate; normal petiole very barely lined, glabrous; pamphlets 5-10 sets, inverse or substitute, 5-18 by 2.5-5 cm, lanceolate, sharpen, whole, glabrous, frequently somewhat falcate or sideways; petioles 2-5 m long.[1]

The fruit is prized for its pericarp's saponins (10.1%), which can make up as much as 56.5% of the drupe and are known to impede the formation of malignant cells. It has been used for generations as a cure in China and Japan. Its pericarp is known as "enmei-hi" (meaning "life-extending pericarp" in Japanese) and "wu-huan-zi" (meaning "non-illness fruit" in Chinese).[2] The seeds of Sapindus mukorossi are utilized in Ayurvedic medication to eliminate tan and spots from the skin. It purifies the skin of slick discharge and is even utilized as a chemical forwashing hair as it frames a rich, normal foam. The roots are used to treat gout and rheumatism,and the leaves are bathed in to alleviate joint pain. Since old times Sapindus mukorossi has been utilized as a cleanser for cloaks and silks. Indian jewelers used the fruit of the sapindus mukorossi plant to brighten tarnished gold, silver, and other precious metal ornaments.[3]

Soapnut is traditionally used to remove lice from the scalp because it contains saponins, which are known for their detergent and insecticidal properties. The fruits have medicinal value for treating a variety of conditions, including excessive salivation, acne, epilepsy, chlorosis, migranes, eczema, and psoriasis.[4] The sapindus mukorossi pericarps have traditionally been utilized as an expectorant and a source of natural surfactant.[5] The most widely utilized saponin source in plant materials is ginseng. Different plants containing saponin are; sugar beet, asparagus, soymilk, chickpeas, plum fruit, and soy. The saponins derived from Sapindus mukorossi inhibit the golden apple snail, a major pest of rice and other aquatic crops in Asian countries.[6] A synthetic surfactant (Tween 80) and the natural surfactant isolated from the bark of the Quillaja saponaria Molina tree have been compared for their ability to form and stabilize emulsions.[7]

Vernacular Names

Assamese: Haithaguti, **Bengali:** Ritha, **Hindi:** Aritha, Dodan, kanmar, **Kumon:** Ritha, **Punjabi:** Aritha, Dodan, Ritha, Thali, **Sanskrit:** Aristha, Phenila, Urista, United **provinces**: Kanmar, Ritha, **Italian:** Uriya, **Telugu:** Kunkudu.[8]

Botanical Description

It is known as tree of North India, a deciduous tree, referred to the everyday person as 'areetha'.

It is otherwise called doda, dodan, and ritha in Indian lingos. It is one of the main trees of tropical and sub-tropical locale of Asia. It is normal tree in Shivaliks and the external Himalayas of Unadulterated Pradesh, Uttranchal, Himachal Pradesh, Haryana and Jammu and Kashmir.[9] It is a genuinely enormous, deciduous tree, typically up to 12 m in level, now and then accomplishing a level of 20 m and a size of 1.8 m, with a globose crown and rather fine weathered foliage. Bark: dull to light yellow, genuinely smooth, with numerous upward lines of lenticels and fine crevices shedding in sporadic wood scales. Leaves: 30-50 cm long, substitute, paripinnate; normal petiole barely lined, glabrous; flyers 5-10 sets, inverse or substitute, 5-18 by 2.5-5 cm, lanceolate, sharpen, whole, glabrous, frequently somewhat falcate or slanted; petioles 2-5 m long. Inflorescence: a compound terminal panicle, 30 cm or more long, with pubescent branches. Flowers: around 5 mm across, polygamous, greenish white, subsessile, various, for the most part sexually open. Sepals 5, each with a wooly scale on one or the other side over the paw. Fruit: a globose, plump, 1-cultivated drupe, some of the time 2 drupels together, around 1.8-2.5 cm across. Seed: 0.8-1.3 cm in measurement, globose, smooth, dark, free in dry natural product.[10]

Species Information[11-12]

Species	Common Name	Geographical Region
Sapindus mukorossi	Chinese Soapberry	India, Southern China
Sapindus emarginatus	NA	Southern Asia
Sapindus trifoliatus	South India Soapnut, Three-leaf Soapberry	Southern India, Pakistan
Sapindus delavayi	NA	India, China
Sapindus oahuensis	Hawaii Soapberry, Lonomea	Hawaii
Sapindus rarak	NA	Southeast Asia
Sapindus saponaria	Wingleaf Soapberry	Caribbean, Central America
Sapindus marginatus	Florida Soapberry	Florida
Sapindus tomentosus	NA	China
Sapindus drummondii	Western Soapberry	Southern United States, Mexico

Botanical Information[13-14]

Biological Name	Sapindus Mukorossi
Kingdom:	Plantae
Subkingdom:	Tracheobionta
Superdivision:	Spermatophyta
Division:	Magnoliophyta
Class:	Magnoliopsida
Subclass:	Rosidae
Order:	Sapindales
Family:	Sapindaceae

Genus:	Sapindus
Species :	Sapindus Mukorossi
Tribe:	Andropogoneae
Phyllum:	Spermatophyta
Subphyllum:	Angiospermae
Common Name:	Soapnut, Soapberry, Washnut, Ritha, Aritha, Dodan, Doadni, Doda, Kanma and Thali

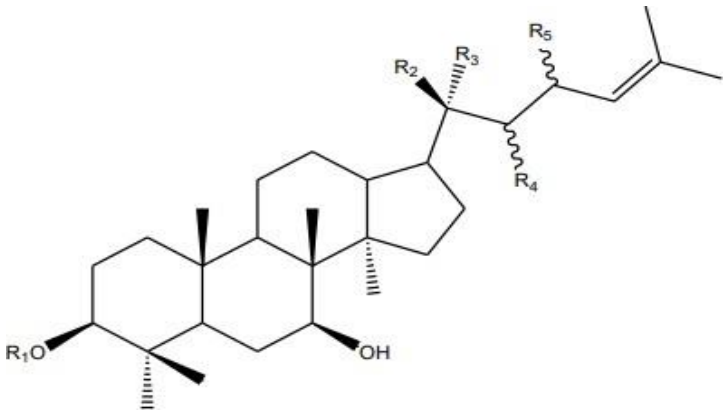


Fig: Structure of Sapimusaponins A-B And O-P.

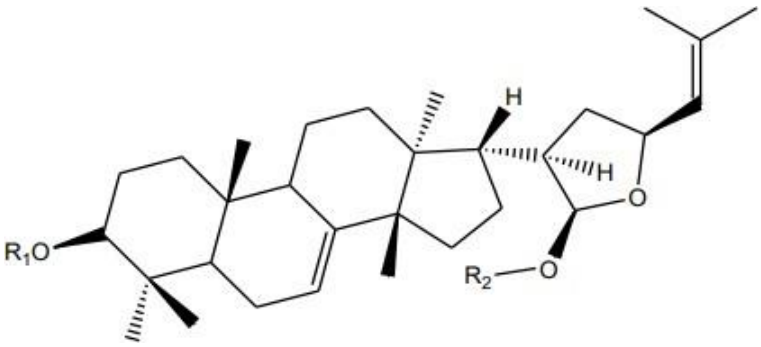


Fig. Structure of Sapimukosides A-J.

Phytoconstituent[15,16,17,18,19,20,21,22,23]

S.NO.	Chemical constituent	Part of the plant
1	Triglyceride[15] • Oleo-palmito-arachidin glyceride • Oleo-di-arachidin glyceride	Seed
2	Lipid[16]	Seed
3	Sesquiterpeneoidal gtlycosides[17]	Fruits
4	Flavanoids[18] Quercetin, Apigenin, Kaempferol, Rutin	Leaf
5	Saponin[19] Triterpene[20] • Oleanane (sapindosideA & B)[21] • Dammarane (sapinmusaponin A-E)[22] • Tricullane (sapinmusaponin F-K)[23]	Gall, fruit & root Fruit Gall gall & root

Plant profile

Figures: (A) Fresh S. mukorossi fruit and leaf. (B) After maturation, the S. mukorossi fruit turn darkbrown and contain a black seed. (C) The seed consists of an oil-enriched pulp coveredwith a hard shell.

POTENTIAL USES OF REETHA

1. Uses Of Reetha For Cancer[24]

Saponins, for example, are essential compounds found in reetha. It's possible that these substances have anticancer and antitumor properties. Different lab investigations have discovered that Reetha really halted the development of malignant growth cells and cancer arrangement in disease cell lines. As a result, cancer cells might die when exposed to Reetha. In any case, this study is deficient on the grounds that it is finished in the lab and not on people. Therefore, in order to demonstrate the true potential of Reetha in the human fight against cancer, large-scale human trials are required.

2. Uses Of Reetha For Anti-bacterial Activity[24]

An animal study found that when taken orally, Reetha extract stopped the growth of the bacteria Helicobacter pylori. Moreover, the concentrate was useful in getting out the Helicobacter pylori contamination in an in-vivo study. However, this information is insufficient, and further research is required to support the possibility of treating bacterial infections with Reetha in humans.

3. Uses Of Reetha For Liver[24]

Reetha might help liver wellbeing. The Reetha fruit pericarp extract had a beneficial effect on the animal's liver in a model study. The concentrate could assist with lessening the harm caused to the liver cells. If you notice any changes in the health of your liver, you should see a qualified doctor.

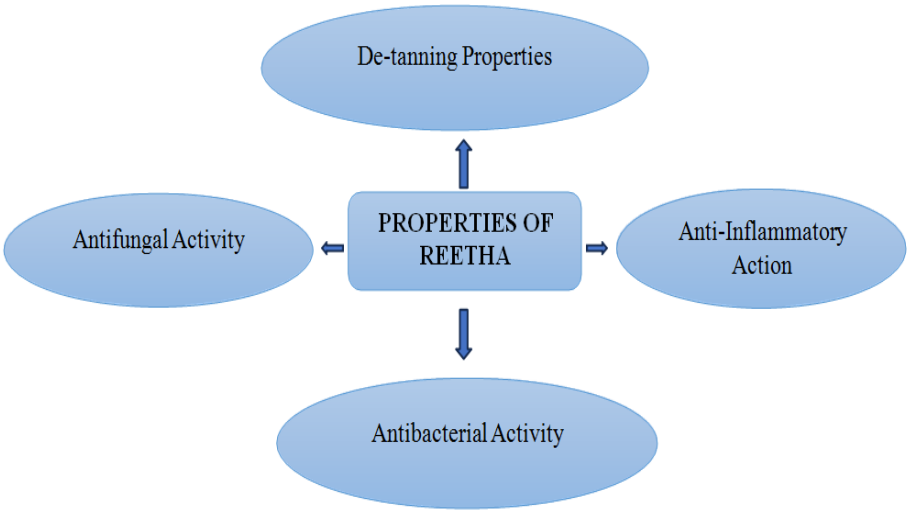
4. Uses of Reetha For Anti-fungal Activity[24]

A laboratory study suggests that the extract of Reetha may inhibit the growth of Candida albicans, the organism that causes cutaneous (skin) candidiasis. Strong antifungal activity against Candida parapsilosis was observed in the extract of Reetha. Additionally, the saponin component of the extract was found to be effective against Trichophyton rubrum. There is insufficient data here; Consequently, extensive human studies are required to support its human benefits.

5. Uses Of Reetha For Hair[25-26]

Reetha is frequently used in shampoo preparations.[25] Shampoos can use the dried fruit powder as a foaming ingredient.[26] It might clean the sleek emissions in the skin and may be utilized as a cleaning agent for hair and a hair tonic as it shapes a characteristic lather. When incorporated into a regimen for hair care, reetha powder can improve the health of the scalp and prevent hair loss. Reetha's natural surfactants can remove dirt, excess oil, and buildup from the hair and scalp without stripping natural oils. It might likewise be utilized for eliminating lice from hair.[25] Be that as it may, you ought to never utilize any spice to self-sedate yourself. Always check with your doctor first, and only use them if they recommend it.

Properties Of Reetha[27]



PHARMACOLOGY

1. **Insecticidal activity:**[28] Ethanolic concentrate of Sapindus mukorossi was explored for repellency and insecticidal movement against Sitophilus oryzae and Pediculus humanus. Normal mortality rate showed that the concentrates caused critical mortality and

repellency on the objective bugs and bioassays demonstrated that poisonous and repellent impact was relativeto the focus.

2. **Spermicidal activity:**[29] Strong spermicidal activity was found in saponin that was isolatedfrom Sapindus mukorossi. Scanning electron microscopy was used to examine the morphological changes that occurred following exposure to this saponin in human ejaculated spermatozoa. The base successful focus (0.05% in spot test) didn't influence the surface geology after openness for 1 moment. However, extensive vesiculation and disruption of the plasma membrane in the head region were observed after spermatozoa were incubated for ten minutes. Changes such as vesiculation, vacuolation, membrane disruption or erosion in the head region were more or less mirrored at higher concentrations (0.1 percent, 1.25 percent, 2.5percent, and 5.0 percent, respectively). These results suggest that changes in the glycoproteins associated with the spermatozoa plasma membrane's lipid bilayer are to blame for the observedmorphological shifts.
3. **Anti-protozoal activity:**[30] When female Anopheles were exposed to neem, reetha (S. mukorossi), and garlic, their gonotropic cycle was disrupted.
4. **Anti-inflammatory activity:**[31] The calming exercises of hederagenin and rough saponin secluded from Sapindus mukorossi were explored using carrageenan-actuated edema, granuloma pocket and adjuvant joint pain in rodents. The impacts of these specialists on vascular penetrability and acidic corrosive prompted squirming in mice were likewise analyzed. Saikogenin A, crude platycodin, platycodigenin, and oleanolic acid were used in some experiments to compare results. Calming movement on carrageenan edema was seen with I. p. also, p. o. directed rough saponin, while hederagenin and different specialists utilized showed movement just when controlled I. p. Hederagenin, 100 and 200 mg/kg p. o. each day for 7 days, showed no huge inhibitory impact on granuloma and exudate arrangements in rodents, while rough saponin, 100 and 200 mg/kg p. o., showed tremendous impacts.
5. **Pesticidal activity:**[32] Impacts of Sapindus mukorossi have been concentrated on fish. The Sapindus mukorossi pericarp is the most toxic part, with a mean survival time of 1.18 hours and a mortality rate of 100% within 12 hours. LD0, LD50, and LD100 have a high probability of eliminating fish in 48 hours and have concentrations between 3.5 and 10 ppm. Sapindus mukorossi natural product pericarp can be utilized as a particular eradicant for horny fish likeHeteropneustes fossils and channa intersperse.
6. **Cytotoxic activity:**[33] In-vitro cytotoxic action of triterpenoid saponins from Sapindus mukorossi showed that α-hederin, β-hederin, Sapindoside A, Sapindoside B, Sapindoside

C, Sapindoside D displayed great cytotoxic action at 10µg/ml to 100µg/ml when tried on four cell strains like Mouse B16 melanoma cells, Mouse 3T3 non-malignant growth fibroblasts, Stream 2002 non-malignant growth human cells and HeLa human growth cells. In the study, strychnopentamine served as the reference compound. All saponins were accounted for to be no less than multiple times less dynamic than the reference compound.

7. **Hepatoprotective activity:**[34] Petroleum ether, benzene, chloroform, and ethanol were used to extract and concentrate the dried powder of S. mukorossi and R. emodi in a vacuum. To demonstrate the hepatoprotective properties of various extracts of S. mukorossi and R. emodi, in vitro and in vivo studies were carried out. Essential rodent hepatocyte monolayer societies were utilized for in vitro examinations.

These societies were treated with CCl4 and concentrates of S. mukorossi and R. emodi. In the primary monolayer culture with CCl4 damage, a protective effect could be seen. In the in vivo study, liver-injured male rats treated with CCl4 were used to evaluate the hepatoprotective properties of an extract of the fruit pericarp of S. mukorossi and the rhizomes of R. emodi. Serum marker enzyme activities revealed that S. mukorossi fruit pericarp extract (2.5 mg/mL) and R. emodi rhizome extract (3.0 mg/mL) had protective effects on rats with CCl4-induced liver damage. As a result, it was decided that the extracts of S. mukorossi and R. emodi do protect against CCl4-mediated liver injury in a rat model and in vitro on primary hepatocyte cultures.

8. **Anti-platelet aggregation activity:**[35-36]Natural assessment of ethanolic concentrate of the nerves of S. mukorossi showed that two saponins segregated, Sapinmusaponins Q and R, exhibited more powerful enemy of platelet collection action than ibuprofen.[29]

Sapinmusaponins F-J that were isolated from the galls of S.mukorossi exhibited anti-platelet-aggregation properties, but lactate dehydrogenase (LDH) leakage analysis revealed no evidence of cytotoxic activity against platelets.[30]

9. **Anti-trichomonas activity:**[37] Involving in-vitro powerlessness measure, the MIC of Sapindus saponins for T. vaginalis (0.005%) was viewed as 10-overlap lower than its powerfulspermicidal focus (0.05%). Saponins fixation conditionally hindered the capacity of parasites to stick to HeLa cells and diminished proteolytic action of the parasite's cysteine proteinases. Adhesin AP65 and the membrane-expressed cysteine proteinase TvCP2 genes were both less frequently expressed as a result of this. In the mitochondrial

reduction potential measurement assay, saponins did not harm host cells in any way.

10. Saponins additionally turned around the inhibitory instruments applied by Trichomonas for sidestepping host invulnerability. Early reaction of saponins to disturb actin cytoskeleton in correlation with their impact on the core recommends a layer interceded method of activity asopposed to through enlistment of apoptosis.
11. **Anti-fungal activity:**[38] Extricates from the dried pericarp of Sapindus saponaria L. (Sapindaceae) natural products were researched for their antifungal action against clinical detaches of yeasts Candida albicans and C. non-albicans from vaginal discharges of ladies with Vulvovaginal Candidiasis. Four clinical secludes of C. albicans, a solitary clinical secluded ofevery one of the animal varieties C. parapsilosis, C. glabrata, C. tropicalis, and the type of C. albicans ATCC 90028 were utilized. Strong activity was demonstrated by the bioactivity- directed hydroalcoholic extract against a clinical isolate of C. parapsilosis. The n-BuOH extractand a single fraction were effective against all of the tested isolates.

CONCLUSION

S. mukorossi is a typical plant accessible at different spots in India. The plant is generally utilized in superficial planning like shampoos and chemicals. It is accounted for to contain principally oleanane, dammarane and tirucullane type saponins. In this review, the structures and chemical names of various saponins isolated from S. mukorossi are compiled. The pharmacological studies presented in this review confirm this plant's therapeutic value. Numerous studies have demonstrated the plant's potential as spermicidal, hepatoprotective, anti-inflammatory, anti-protozoal, and other properties. The phytochemistry and pharmacological effects of Sapindus mukorossi are the primary topics of this review.

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