



**Review Article**

**A LITERARY REVIEW ON *SAPINDUS TRIFOLIATUS* (GASPENELA) AND ITS MEDICINAL VALUES**

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**ABSTRACT**

*Sapindus trifoliatus* is a large tree used in treatment of numerous ailments. Its fruits, known as soap nuts, contain Saponin and are widely used in cosmetics. Fruits, skin of the fruit, seeds and leaves are used in medicine internally and externally. Knowledge on medicinal uses of *Sapindus trifoliatus* is scattered. Therefore, it was decided to gather and record this dispersed information. Data was collected from Ayurveda and Sri Lankan medical books, journals, physicians and through web search. *Sapindus trifoliatus* is used to conduct *Vamana Karma*, *Virechana Karma* and *Nasya Karma*. It is used in treatment of migraine, epilepsy, bronchial asthma, cough and burning sensation. It is also used in preparation of body shampoo, hair shampoo and detergents. Anti-ulcer, anthelmintic, anti-inflammatory, muscle relaxant, anti-acne and anti-dandruff effects of *Sapindus trifoliatus* are scientifically proven. Leaf extract was found to be non-toxic up to 2g/kg but frequent administration in high doses elevate in aspartate aminotransferase, alanine aminotransferase, blood urea and serum creatinine in rats. It is concluded that *Sapindus trifoliatus* has multifaceted medicinal values.

**KEYWORDS:** *Sapindus trifoliatus*, Gaspenela.

**INTRODUCTION**

*Sapindus trifoliatus* (Gaspenela) belong to the family Sapindaceae. It is also known as South Indian Soap nut tree. Members of the genus are commonly known as soapberries or soap nuts because the fruit pulp is used to make soap. The generic name is derived from the Latin words *Sapo*, meaning "soap", and *indicus*, meaning of 'India'. It is used to treat various diseases by Ayurveda and Sri Lankan traditional physicians. Knowledge on medicinal uses of *Sapindus trifoliatus* (Gaspenela) is scattered. Therefore, it was decided to collect the information on medicinal uses of *Sapindus trifoliatus* and record in order to preserve this knowledge.

**MATERIALS AND METHODS**

Information on *Sapindus trifoliatus* (Gaspenela) and its medicinal uses were collected from authentic Ayurveda texts, traditional medical texts, scholarly publications on the web and from traditional physicians for documenting.

**RESULTS**

Synonyms of *Sapindus trifoliatus* (Gaspenela).<sup>[1,2]</sup>

**Scientific names:** *Sapindus laurifolius*, *Sapindus acutus* *Sapindus abstergens*, *Sapindus mollis*.

**Common names:** South India soapnut, three-leaf soapberry, trijugate-leaved soap-nut

**Sinhala names:** Gaspenala, Kahapenala

**Sanskrit names:** *Arishta*, *Arishtaka*, *Arthasadhana*, *Garbhapatana*, *Guchhaphala*, *Krishnavarna*, *Kumbhabijaka*, *Mangalya*, *Phenila*, *Pijaphena*, *Prakirya*, *Raktabija*, *Rishta*, *Somavalkala*

**English name:** Soap nut tree

**Tamil name:** Manipungan maram

**Scientific Classification of *Sapindus trifoliatus* (Gaspenela)**<sup>[3]</sup>

Kingdom: Plantae

Subkingdom: Tracheobionta

Superdivision: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Sapindaceae

Genus: *Sapindus*

Species: *Trifoliatus*

### Morphology of *Sapindus trifoliatus* (Gaspenela)<sup>[1]</sup>

A medium-sized tree with pubescent young parts; leaves compound, alternate, exstipulate, pinnate, long-stalked, rachis is 25cm long, rigid, pubescent, leaflets 4-6 on very short, thick, pubescent petiolules, subopposite, 12.5-17.5cm long, lanceolate or oval-lanceolate, acute at base, shortly acuminate, obtuse, entire, glabrous above, softly hairy beneath; flowers regular, polygamous, white, sweet-scented, small, numerous on short pedicels, in erect much branched, dense, pyramidal, terminal, more or less pubescent panicle; sepals 5, distinct, much imbricate, silky, obtuse, two outer much smaller; petals 5, distinct, linear-oblong, erect, longer than sepals; disc annular, fleshy; stamens 8 inserted within the disc, filaments hairy throughout, ovary superior, very hairy, 2 or 3-locular with one erect ovule in each loculus, fruit not seen. (Figure 1 and 2)



Figure1: *Sapindus trifoliatus*



Figure2: Fruits of *Sapindus trifoliatus*

### Distribution of *Sapindus trifoliatus* (Gaspenela)<sup>[1,2]</sup>

Much cultivated in South India and is rather common in the moist low-country regions in Sri Lanka. It also grows in East Asia, India, Pakistan and Panjab. Figure 3 shows geographical distribution of *Sapindus trifoliatus*.



Figure 3: Geographical distribution of *Sapindus trifoliatus*

(<https://www.gbif.org/species/5421131>)

### Ayurveda Pharmacodynamic properties of *Sapindus trifoliatus* (Gaspenela)<sup>[4]</sup>

Ayurveda texts describes Ayurveda pharmacodynamic properties as follows.

*Rasa:* Tikta, Katu

*Guna:* Laghu, Tikshna

*Virya:* Ushna

*Vipaka:* Katu

*Prabhava:* Vamana

*Effects on Dosha:* Thridoshaghna

### Other Medicinal Properties

*Vamanakaraka* (emetic), *Virechana* (purgative).

### Parts used in Medicine

Roots, leaves, fruits, skin of fruits, kernel<sup>[2,4]</sup>

### Dosage of *Sapindus trifoliatus* (Gaspenela)

According to *Dravyaguna Vijnana* dose of *Sapindus trifoliatus* (Gaspenela) is 3-6gm.<sup>[4]</sup>

Ayurveda *Aushadha Samgraha* describes various doses. Dose as an emetic is 2.250gm to 4.5gm. Purgative dose is 3 to 6gm. Dose for other purposes is 625mg to 1.250mg.<sup>[2]</sup>

### Utilization of *Sapindus trifoliatus* (Gaspenela) in Panchakarma

*Sapindus trifoliatus* (Gaspenela) is used in treatment of various ailments. It is also used in conducting *Panchakarma* therapies such as *Vamana Karma*, *Virechana Karma* and *Nasya Karma*.

#### a) Procedure of *Vamana Karma* using *Sapindus trifoliatus* (Gaspenela)

##### Preparation of *Vamana Aushadha*

Fruits were seeded, and the skins were dried in wither. 2.5g powdered skin of the dried fruit was mixed with hot water.

##### Procedure of *Vamana Karma*

Traditional physicians perform *Vamana Karma* using *Sapindus trifoliatus* (Gaspenela), especially in treatment of *Vicarchika* (eczema). The patients should be oleted by administering ghee orally in

progressive doses. After observing the symptoms of adequate oleation (*Samyak Snigdha Lakshana*), fomentation (*Sweda Karma*) will be carried out for one day. Early morning of the following day, *Vamana Karma* will be performed by orally administering 2.5g of powdered skin of dried fruit mixed with 120ml of hot water. When the patient starts vomiting, warm water will be given to ease vomiting.

#### b) Procedure of *Virechana Karma* using *Sapindus trifoliatus* (Gaspenela)

##### Preparation of *Virechana Aushadha*

Fruits were seeded, skins were dried in wither. 3.5g powdered skin of the dried fruit mixed with hot water.

#### Other Indications of *Sapindus trifoliatus* (Gaspenela) and Formulae

Indication	Formulae
<i>Ardhavabhedaka</i> (Migraine) <i>Murchcha</i> (Syncope), <i>Shawasa</i> (Bronchial asthma)	Fruits of <i>Sapindus trifoliatus</i> are soaked in water for 3 hours. <i>Nasya Karma</i> is performed with the resultant slimy solution. Powder of dried fruits are also used in <i>Nasya Karma</i> . <sup>[5]</sup>
Hemicrania, Hysteria, Epilepsy	A thick aqueous solution of the pericarp of <i>Sapindus trifoliatus</i> is used for the treatment of hemicrania, hysteria or epilepsy in folk medicine. <sup>[6]</sup>
Sore throat, when phlegm blocks the throat	Skin of fruits of <i>Sapindus trifoliatus</i> and Ammonium Chloride (Sinhala name: Navasaran) are ground together and made into small pills. These pills are mixed with juice of leaves of <i>Acacia caesia</i> (Family: Fabaceae; Sinhala name: Hingurupata Wel) and <i>Vitex negundo</i> (Family: Verbenaceae; Sinhala: Nika) and <i>Nasya Karma</i> is performed in treatment of sore throat and when phlegm blocks the throat. <sup>[7]</sup>
<i>Sanni Roga</i> (A group of <i>Vata Rogas</i> described in Sri Lankan tradition medicine)	Fruits of <i>Sapindus trifoliatus</i> , rhizome of <i>Zingiber officinale</i> (Family: Zingiberaceae; Sinhala: Inguru), juice of leaves of <i>Acacia caesia</i> (Family: Fabaceae; Sinhala: Hingurupata Wel) are ground with lime juice, squeezed and filtered. <i>Nasya Karma</i> is performed with resultant filtrate in treatment of <i>Sanni Roga</i> . <sup>[8]</sup>
For burning sensation in chronic fever ( <i>Jeerna Jwara</i> )	For burning sensation in chronic fever ( <i>Jeerna Jwara</i> ), leaves of <i>Sapindus trifoliatus</i> are ground together with vinegar and the resultant paste is applied in the body. <sup>[9]</sup>
Fainting sensation, thirst due to burning sensation	Leaves of <i>Sapindus trifoliatus</i> are ground into a paste and stirred in water. Then the resultant froth is applied on the body to reduce fainting sensation and thirst arising from burning sensation. <sup>[10]</sup>
Erysipelas in children	Fruits of <i>Sapindus trifoliatus</i> , King coconut water, leaves and stem bark of <i>Barringtonia racemose</i> (Family: Lecythidaceae; Sinhala: Midella), roots of <i>Saussurea lappa</i> (Family: Asteraceae; Sinhala name: Suwandakottam), residue oil cakes of <i>Madhuca longifolia</i> (Family: Sapotaceae; Sinhala name: Mee), seeds are pounded together, made in to boluses, heated and fomentation should be performed. <sup>[11]</sup>
<i>Kashta Prasava</i> (Difficulty in delivery)	Fruits of <i>Sapindus trifoliatus</i> are ground with water, made in to vaginal suppositories ( <i>Yoni Varti</i> ) and kept in the vagina to ease <i>Kashta Prasava</i> (difficulty in delivery). <sup>[12]</sup>
Insect and snake bites	Paste prepared with leaves and stem bark of <i>Sapindus trifoliatus</i> is applied in snake bites, scorpion and bee's stinging. <sup>[12]</sup>
Removing hair lice	Fruits of <i>Sapindus trifoliatus</i> are ground with water and applied on head to remove lice.

#### Cosmetic and Other Uses

Fruit of *Sapindus trifoliatus* is a popular ingredient in the preparation of Ayurvedic shampoos

#### Procedure of *Virechana Karma*

The patients should be oiled by administering ghee orally in progressive doses till appearance of symptoms of adequate oleation (*Samyak Snigdha Lakshana*). Fomentation (*Sweda Karma*) will be carried out for three consequent days. *Virechana Karma* will be performed by orally administering 3.5g of powdered skin of dried fruit mixed with 120ml of hot water.

#### c) Procedure of *Nasya Karma* using *Sapindus trifoliatus* (Gaspenela)

*Nasya Karma* is performed in various ailments in combination of *Sapindus trifoliatus* (Gaspenela) with other medicaments.

and cleansers. Hair shampoo prepared with *Sapindus trifoliatus* is used to remove dandruff and also used

as a hair tonic. Soap nut is used in treating eczema, psoriasis and freckles. Regularly washing the body with soap nuts prevents many skin diseases and makes skin gentle. Fruits of *Sapindus trifoliatus* are used as a substitute for soap in washing clothes.<sup>[13]</sup> It is also used in cleaning and polishing silver objects.<sup>[13]</sup>

**1. Uses in Veterinary Practice:** Seeds of *Sapindus trifoliatus* can be used locally to delouse animals.<sup>[14]</sup>

**2. Propagation of *Sapindus trifoliatus* (Gaspenea):** Seeds, Greenwood cuttings.<sup>[13]</sup>

**3. Contraindications of *Sapindus trifoliatus* (Gaspenea):** Oral usage is contraindicated during pregnancy, as it has the property of *Garbhashaya Samkochaka* (capable of contracting uterus and inducing abortion).<sup>[4]</sup>

**4. Phytochemical Screening of *Sapindus trifoliatus* (Gaspenea):** *Sapindus trifoliatus* contains phytochemicals such as Saponins, flavanoids and glycosides.<sup>[15]</sup>

#### Scientific research on *Sapindus trifoliatus* (Gaspenea)

1. Kumar *et al.* (2014) reported that *S. laurifolius* leaf extract was found to be non toxic up to 2 g/kg. In repeated dose 28-day oral toxicity, leaf extract administered at the doses 50, 200 and 800mg/kg and limit dose of 1000mg/kg. There was a significant ( $P < 0.05$ ) increase in AST, ALT, BUN and serum creatinine in rats administered with high dose of leaf extract. The histopathological changes confined to liver, kidney and intestine, which revealed mild to moderate hepatotoxicity, severe nephrotoxicity and increased goblet cell activity. The changes were found to correlate with increased dose of leaf extract. Satellite group administered with 800mg/kg of leaf extract revealed damage to the kidney and liver continued even after the treatment has been stopped or animals may require still longer duration for recovery.<sup>[15]</sup>

2. Arulmozhi *et al.* (2014) reported that *Sapindus trifoliatus* has an inhibitory activity on both peripheral and central pain mechanisms and has a modulatory role in NO-mediated nociceptive transmission.<sup>[16]</sup>

3. Arulmozhi *et al.* (2005) had investigated the antihyperalgesic effects of the lyophilized aqueous extract of *Sapindus trifoliatus* in animal models predictive of experimental migraine models using morphine withdrawal-induced hyperalgesia on the hot-plate test. The findings suggest that dopamine D2 antagonism could be the mechanism involved in the antihyperalgesic activity of the aqueous extract of *Sapindus trifoliatus*.<sup>[6]</sup>

4. Kishore *et al.* (2010) reported that methanolic and aqueous extracts of leaves of *Sapindus trifoliatus* showed significant reduction in the pylorus ligation induced ulcers in rats.<sup>[17]</sup>

5. Arulmozhi *et al.* (2005 a) reported that aqueous extract of pericarps of *Sapindus trifoliatus* has anti-inflammatory activity possibly mediated through 5-LO and COX pathways.<sup>[18]</sup>

6. Sravanthi *et al.* (2011) reported that concentrated methanolic extract of seeds of *Sapindus trifoliatus* showed anthelmintic activity.<sup>[19]</sup>

7. Jayasree *et al.* (2012) investigated the muscle relaxant action and locomotor activity of aqueous extract of pericarp of *Sapindus trifoliatus* in swiss albino mice in comparison with that of diazepam and reported that it has a muscle relaxant activity.<sup>[20]</sup>

8. Pradhan *et al.* (2010) observed the effect of antiproliferative effect on SKBR3 and MDA-MB435 human breast cancer cells of ethanolic extract of *Sapindus trifoliatus*. The results indicated that the extract fraction could induce cell cycle arrest in some way and further, studies are suggest to study the mechanism.<sup>[21]</sup>

9. Sahoo *et al.* observed that ethanolic extract of the aerial parts of *Sapindus trifoliatus* produced significant decrease in the blood glucose level in alloxan induced hyperglycemic rats and is comparable with the standard drug glibenclamide. Ethanolic extract reversed the weight loss of the diabetic rats and they returned to near normal.<sup>[22]</sup>

10. Raut and Bhatia checked 10 isolates which were obtained from extracts of *Sapindus trifoliatus*, for anti-dandruff activity. This implicated that saponin is one of the components which was found to inhibit *Malassezia furfur*. They reported that *Sapindus trifoliatus* was found to be an effective remedy for Pityriasis capitis in- vitro.<sup>[23]</sup>

11. The seed proteins showed anti-acne and anti-dandruff property against causal organisms. The further study suggested to be carried out on these proteins for separation and isolation of individual protein and which can be used in the formulation of shampoos and acne creams.<sup>[24]</sup>

#### DISCUSSION

Roots, leaves, fruits, skin of the fruits and seeds of *Sapindus trifoliatus* (Gaspenea) are used in medicine. *Sapindus trifoliatus* is a medicinal plant used in treatment of various diseases such as *Ardhavabhedaka* (migraine) *Murchcha* (syncope), *Shawasa* (bronchial asthma), *Kasa* (cough), fever, burning sensation and epilepsy. Skins of the fruits are used in *Panchakarma* therapy to conduct *Vamana Karma*, *Virechana Karma* and *Nasya Karma*. Anti-hyperalgesic effects, anti-ulcer activity of *Sapindus trifoliatus* are scientifically proven. It is used in

cosmetics to prepare hair shampoo, body shampoo, cleanser and also used as a detergent.

## CONCLUSION

It can be concluded that *Sapindus trifoliatus* (Gaspenela) posses a multitude of medicinal properties.

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