Vol 5, Issue 3, 2018 ISSN 2349-7041

Review Article

A REVIEW ON PHYTOCHEMISTRY AND PHARMACOLOGICAL ASPECTS OF *Derris scandens* (Roxb.) Benth

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ABSTRACT

Objective: Traditional herbal medicines were very important and play a vital role. Scientific research was trending of the isolation of active compounds of herbal origin. The secondary metabolites have prominent therapeutic effect like treatment for musculoskeletal pain, antimicrobial, antioxidant effects so in the present review study was based on the overall significance of active constituents, pharmacological aspects, identification tests for active constituents were discussed in which the one can review all the important information and the research done in the Derris scandensBenthwhich may be helpful for the future research work. **Conclusion:** It may remain as the fundamental source of chemical diversity and an important source of drug discovery. This study highlights the bioactive metabolites produced by Derris scandens.

Keywords: Secondary metabolites, Diversity, anti-inflammatory, antimicrobial, antioxidant, anticancer.

INTRODUCTION

Derris scandens (ROXB)Benth. (Family Leguminosae) is distributed in South East Asia and Australia [1]. In India, it is distributed in subhimalayan tract, south India .It is a garden plant The stem was widely used in traditional medicine as an anti-tussive, diuretic, expectorant, anti-dysentery agent and for treatment of muscle pains [1], cough and diarrhea. Insecticidal constituents rotenone and lonchocarpic acid were also reported from the roots of D. scandens, these compounds demonstrated insect antifeedant activity.The use of D. scandens as folk medicine and the antimicrobial activity of the crude extract helpedphytochemical investigation. Previous studies indicated the presence of coumarins, isoflavones, flavones, isoflavone glycosides and phenyl coumarins as chemical constituents from D. scandens [1].it is an anti-dysentery agent and in curing diarrhea lead to propose the hypothesis that plant parts may have bactericidal, antifungal, anti-protozoa, antialgal properties.

CLASSIFICATION

Kingdom: Plantae [2]
Order: fabales
Family: Leguminosae
Genus : Derris
Species : scandens

VERNACULAR NAMES

English: Hog creeper[2]
Hindi: Tupbael
Marati : Garudvel
Oriya: Mahaguno
Telugu: Chirutalibaadu,nallateega

SYNONYMS

*Derris scandens (*Roxb.)Benth[3]
*Dalbergia scandens (*Roxb)
*Derris timoriencis(*DC)
*Dalbergia timorienses (*DC)
Milletia littoralis Dunn

Images of *Derris scandens*

Fig 1: A POD of *Derris scandens* in Hyderabad (Ref efloraindia)

Fig 2: Flowers of *Derris scandens* (ref efloraindia)

Fig 3 :*Derris scandens* image (Ref Wikipedia)

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Fig 4: *Derris scandens* root (Ref image by vijai Malik)

Fig.5: Derris Scandens (Roxb.) benth. Var saharanpurensis

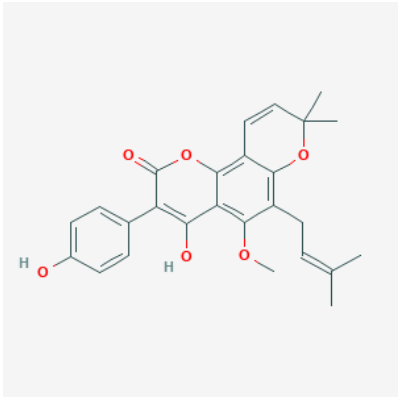
MACROSCOPIC CHARACTERS

Derris scandens is a climbing shrub. Leaves are compound which are 3-6 inches long; rachis is channeled, leaflets are elliptical, oblong, axillary,racemose long[4].Each node contains 3-4 flowers; flowers are pink and white in colour .calyx is grey and corolla is silky. Stamens are united by filaments. Legume pod contains five seeds.

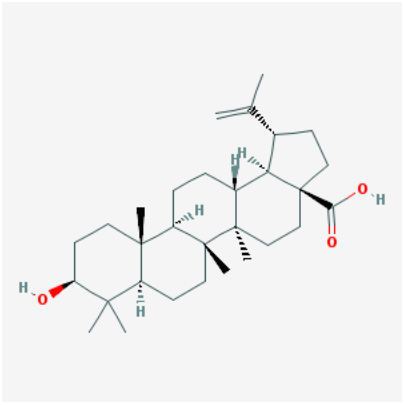
CHEMICAL CONSTITUENTS

Phytochemical investigation ofDerris scandens resulted in scandedin,scandenin A, Betulinic acid, lupeol, β amyrin,β sitosterol and β sitosterol glucopyranoside[3] from the different parts of Derris scandens like flower, leaf, stem, and root. All the chemical constituents mentioned above are secondary metabolites.Secondary metabolites are defined as small organic molecules produced by an organism that is not essential for the plant growth development and reproduction. Secondary metabolites specifically modulate health maintaining processes, including excretion of waste and toxic products from organ systems of the body. It means secondary metabolites sustains the overall functional condition of the cells within organ systems of the body. The group of metabolites working with an enzyme during the entire process of metabolism is called metabolome.

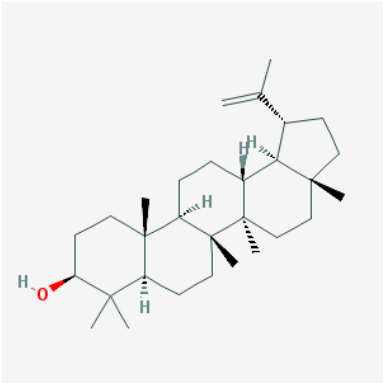
Important Phytochemical constituents of Derris Scandens



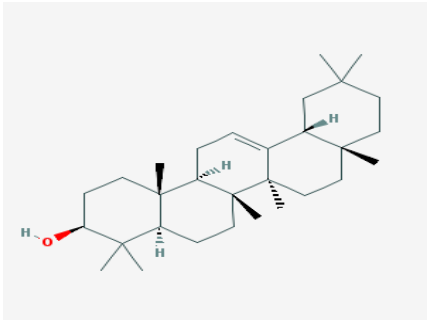
scandenin



Betulinic acid



Lupeol



Beta amyrin

Table 1: Patent ID and Patent Title for different chemical constituents.

	Molecular weight	Molecular formula	Patent ID	Patent Title[5]
Scandenin	434.488 g/mol	$C_{26}H_{26}O_6$	US2009143279	Methods and composition for treating metabolic disorders.
				Compounds, composition, and methods for preventing skin whitening.
			US8563754	Systems and methods for identifying combinations of compounds of therapeutic interest.
			US2009269772	Coumarin compounds as melanogenesis modifiers and uses thereof
			US8772252	
Betulinic acid	456.711 g/mol	$C_{30}H_{48}0_3$	US8802717	Methods of treating arthritic conditions using (+)-2-[1-(3-ethoxy-4-methoxyphenyl)-2-methylsulfonylethyl]-4-acetylaminoisoindoline 1, 3-dione.
				Inhibitors of Brutons Tyrosine kinase
				Use of Brutons Tyrosine kinase inhibitors
			US8957079	
			US8754090	
Lupeol	426.729 g/mol	$C_{30}H_{50}0$	US2017020176	Highly soluble Rebaudioside D
			US2015284362	Carbazole-containing amides, carbamates, and ureas as cryptochrome modulators.
			US9562064	High-puritysteviol glycosides
			US2014343000	Compositions having c-17 and c-3 modified triterpenoids with hiv maturation inhibitory activity.
			US2014287030	Antileishmanial compositions and methods of use
Beta amyrin	426.729 g/mol	$C_{30}H_{50}0$	US2013065868	Anxioyticmarc graviaceae compositions are containing betulinic acid, betulinic acid derivatives, and methods.
			US2011124740	Novel diarylhepatonoid-based compounds and use thereof.
			US2010247593	Novel compounds and pharmaceutical preparations.
			US2012195988	Therapeutic Uses for Plants of the Capsicum Genus.

Pharmacological activities

- The effective intake of oral dosage form D. scandens was prominent on reducing pain score was not significantly different from those of non-steroidal anti-inflammatory drugs at any time points (3, 7, 14 days and overall [6]. The overall pain reduction in the *D. scandens* group was significantly no change when treated with NSAIDs.
- Two coumarins, four triterpenes, and two steroids were isolated from the roots and stem extracts of *D. scandens*. They are proved to have anti-dysentery activity and in curing diarrhea lead us to propose the hypothesis that plant parts may have bacteriocidal, antifungal, anti-protozoa/antialgalproperties[7].
- The antioxidant potential of an Ethanolic extract of *Derris scandens[8]* as proved and was evaluated by using diphenylpicrylhydrazyl free radical (DPPH), Phospho molybdenum total antioxidant assay, reducing power assay and hydrogen peroxide assay.
- It is observed that methanolic extracts of *Derris scandens* possess potent antioxidant activity. The presence of most general phytochemicals might be responsible for their therapeutic effects[9]. It further reflects a development of novel chemotherapeutic agents and in future may serve for the reproduction of synthetically improved therapeutically active agents.
- The efficacy and safety of D*. Scandens* Benth extract compared with Naproxen[10] for therapy of patients with knee osteoarthritis.
- A study of the efficacy of *Derris scandens* Benth 50% ethanolic extract compared with diclofenac for the alleviation of low back pain[11].
- Pretreatment with *D. scandens* extract before gamma irradiation significantly increased clonogenic survival and decreased the proportion of radiation-induced abnormal nuclei of Hep-2 cells[12]. Further, the extract was found to enhance radiation-induced G2/M phase arrest, induce Akt activation, and increase motility of Hep-2 cells[13]. The study thus indicated that D. scandens extract had the potential of radioresistance of Hep-2 cells[14].
- Topical compositions of crude extract of *Derris scandens* proved to methods of treat symptoms of reduced skin elasticity[15]. These compositions are effective in stimulating LOXL-1, activity, inhibiting calcineurin activity, and stimulating glycosaminoglycan synthesis[16] in skin cells and can thus reduce age-related skin damage and improve the appearance of fine lines, wrinkles, skin sagging and other symptoms of skin aging and skin damage
- The different extracts of *D. scandens* exhibit appreciable antibacterial, antifungal and antialgal activities[17,18,19]. A preliminary study showed that scandenin showed strong antibacterial activity and convincing antifungal and antialgal properties.
- α-glucosidase enzyme inhibitory and free radical scavenging constituents[20]from *Derris scandens* Benth were isolated, characterized and chemobiological quantification.
- Ethanolic extract from *Derris scandens* Benth was proved to mediate radiosensitization via two distinct modes of cell death in human colon cancer HT-29 cells[21].(PMID:24641423)
- Scandenin, a constituent of the roots of *Derris scandens*, was isolated had noted as a very important therapeutic active ingredient[22]
- The aqueous extract of Derris *scandens* was proved to have[23] antimicrobial properties against *S.aureus, S.eppidermidis, and E.coli.*
- The methanolic extract of *Derris scandens* showed top 2 poison activity against the mutant yeast cells [24], the compounds isolated from the extract were found to be 5,7,4 trihydroxy 6-8diprenylisoflavone and lupalbigenin.
- An ELISA was established for GTG determination in Derris scandens; the GTG-PAb can react with GTG amdgenistin,butgenistin was not found in Derris[25]. So ELISA

can be used for high throughput quality control of GTG content in Derris scandens.

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