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A critical review on *Karanja* (*Pongamia pinnata*) & its medicinal properties

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ABSTRACT

Karanja (*Pongamia pinnata* Linn.) an ancient plant described in Veda, Samhita, and almost in all Nighantu. Nature has been a good source of medicinal plants since immemorial time and an impressive number of modern drugs have been isolated from plant sources, many based on their use in traditional medicine. *Karanja* has been recognized in Ayurveda - a traditional system of medicine for the treatment of various diseases of human beings. Different parts of this plant are traditionally used for the treatment of various ailments including *Kushta, Arsha, Prameha, Yonidosha,* etc. Despite the overwhelming influences and our dependence on modern medicines and tremendous advances in synthetic drugs, an outsized segment of the planet population still likes drugs of plant origin. Of the 2,50,000 higher plant species on earth, quite 80,000 are medicinal. However, only 7000-7500 species are used for his or her medicinal values by traditional communities. Therefore, the present review study reveals the overall information of *Pongamia pinnata* with various scientifically documented pharmacologically activities, traditional uses along its non-therapeutic importance.

Key words: *Karanja, Pongamia pinnata, Ayurveda.*

INTRODUCTION

Karanja [*Pongamia pinnata*(Linn.) Merr.] is one of the popular and extensively used herbs in Ayurvedic medicine. It belongs to family Fabaceae. The references of *Karanja* are found in Rugveda and Atharvaveda. In Rigveda the term *Karanja* is used as the name of *Rakshasa* (Demon) and in Atharvaveda *Karanja* is used as the Mantra. In Kalpasutra *Karanja* is used as a name of plant.[1]

In Charak Samhita it is quoted for *Dhantadhavan*.[2]

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Karanja is mentioned among the *Kandughna Varga* by Charaka. Sushruta highlighted the utility of *Karanja Taila* in *Krimi, Kushta, Prameha* and *Siroroga* and quoted it as *Kapha-Vathara, Shothahara, Kandughna* (anti-itch) and *Bhedana*.[3]

It contains Karanjin, pongapin, Karanja chromen. It shows antibacterial, hypoglycaemic activity. The essential oil from *P. pinnata* showed mild antifungal activity. Another importance of *Karanja* is because of its oil-containing seeds. The *Pongamia pinnata* seeds contain about 40% oil, which can be converted to biodiesel by transesterification method (Meher *et al.* 2006).

In the present article information on various aspects of *Pongamia pinnata* and its medicinal properties are reviewed.

Vernacular Names

Karanja [*Pongamia pinnata* (Linn.)] is commonly known as Indian beech in English and Dithouriin Hindi, *Karanja* in Sanskrit, Marathi and in Gujrathi, Dahar

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Karanja in Bengal, Pongum in Tamil, Punagu in Telagu.[4]

The plant *Pongamia pinnata* (Linn) is known as *Karanja* because when it grows on the banks of stream imparts bluish color to the water, with flowers scattered there in (*Udakirya*). Which are shaped like a nail (Karaj) or parched paddy (*Lajapushpak*) in bunches (*Gucchapushpak*) and blooming in the night (*Naktamal*). The leaves are glossy (*Snighdhapatra*), the leaves look like they are oozing *Ghruta* (*Ghrutparnak*). The seeds yield oil like ghee (*Ghrutpurna*). It is an effective drug for filaria (*Sleepada*).[5]

Table 1: Showing different synonyms.

Synonyms	Charak [6-11]	Sushrut [12-16]	Vagbhat [17-18]	Bhavprakash [19]
Karanja	+	+	+	+
Karanjika	-	+	+	-
Udakirya	+	+	+	+
Ghrutapoora	-	-	-	+
Chirbilva	+	+	+	+
Putika	+	+	+	+
Putikaranja	-	-	-	+
Naktamala	+	+	+	+
Naktahwa	-	-	+	-
Prakirna	+	+	+	+
Sharangeshta	-	+	-	-
Somavalka	-	-	-	+

Botanical Description

It is a medium-sized glabrous almost evergreen tree, growing up to 18m height and 1.5m in girth.

Leaves: 8-10inch long, pale green, imparipinnate; leaflets 5-7, oblong or ovate, obtuse or shortly acuminate, 2-4-inch-long, sub coriaceous, midrib and lateral nerves rather prominent beneath.

Flowers: in simple peduncle axillary racemes nearly as long as the leaves; nodes tumid bearing 2-4 pedicels; rachis and pedicels sparsely puberulous; pedicels with 2 bracteoles at the base and with 2 others, towards the apex. Calyx widely campanulate, mouth truncate. Corella ½ inch or less, white tinged with violet or pink; standard orbicular, silky on the back, subcordate and2 auriculate at the ace. The ovary is finely pubescent.

Fruit: Pod 1 ½ -2inch long, with a short decurved point, turgid, woody, glabrous, brownish-green, 1-rarely 2-seeded.

Seeds: 1-2, elliptic or reniform, wrinkled, white, marbled with brownish lines.

Bark: Thin grey to greyish brown and yellow on the inside.[20]

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Distribution

This tree is found all over India, up to an altitude of 1200m. Commonly found in the coasts of South India and also found in river banks, Central eastern Himalayas and its foothills (Shivalik and Others).[21]

Classical References

- In Rugveda the term *Karanja* is used as the name of the *Rakshasa*. In Atharva Veda, *Karanja* is used as the Mantra.
- In Kalpasutra, *Karanja* is used as the name of the plant.
- In Kouthumgruhyasutra Samhita stated that *Karanja* should not be used in Yagnya and it is also mentioned that this is useful in Dantadhavan.[22]
- Depending upon the drug origin, morphology, property, pharmacodynamics, and therapeutics values, the ancient text has classified the drugs into *Mahakashaya, Gana, Varga* and *Skanda*.

Samhita	Gana/Varga
Charak Samhita	*Kandughna Mahakashaya* *Virechan Dravya* *Snehayoni* *Katu Skandha* *Tikta Skandha*[23]
Sushruta Samhita	*Tikta Skandha* *Kapha Samshaman Varga* *Aaragvadhadi* *Varunadi* *Salsaradi* *Arkadi* *Shyamadi* [23]
Ashtanga Hrudaya	*Vamana Dravya* *Kapha Samshaman Dravya* *Aargvadhadi* *Varunadi* *Arkadi*
	Shyamadi [17],[18],[24],[25]

- Almost all the Nighantu have mentioned *Karanja* in there text.

Text	Varga
Bhavprakash Nighantu	*Guduchyadi Varga* [19]
Dhanvantari Nighantu	*Aamradi Varga*[26]
Madanpal Nighantu	*Vatadi Varga*[27]
Kaiydev Nighantu	*Aushadhi Varga*[28]
Shodhal Nighantu	*Aamradi Varga*[29]
Raj Nighantu	*Prabhadradi Varga*[30]

Chemical Constituents

The plant *P. pinata* has been subjected to chemical investigations extensively and several chemical constituents belonging to the different groups, viz. alkaloids, tannins, glycosides, steroids, saponins, flavonoids have been reported. The plant mainly contains alkaloids, protein, fatty oil, tannins, and a mixture of fatty acids.

Phyto-chemistry

a) Contents of Seeds[31-32]

Component	Percentage
Fatty oil	27.5%
Protein	17.4%
Starch	6.6%
Crude fiber	7.3%
Moisture	19%
Ash	2.4%

- Alkaloids demethoxy-kanugin
- Gamatay
- Glabrin
- Glabrosaponin

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- Kaempferol
- Kankone
- Kanugin
- Karangin
- Neoglabrin
- Pinnatin
- Pongamol
- Pongapin
- Quercitin
- Saponin
- β-sitosterol
- Tannin

b) Contents of Bark[33]

- Contains a bitter alkaloid
- Resin
- Mucilage
- Sugar

From the stem bark of *Pongamia pinnata*, two new compounds

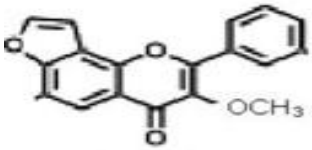
- 3-methoxy-(3,4-dihydro- 3-hydroxy-4-acetoxy)-2,2-dimethylpyrano- (7,8:5,6)-flavone
- 3-methoxy-(3,4-dihydro-4- hydroxy-3-acetoxy)-2,2-dimethylpyrano-(7,8:5,6)-flavone
- Caryophyllene oxide
- Obovatachalcone
- 8-hydroxy-6-methoxy-3-pentyl-1Hisochromen-1-one,6,7,2,2- dimethylchromono-8
- Dimethylallylflavanone
- Isolonchocarpin
- Ovaliflavanone A

c) Contents of Leaves[34]

- Alkaloids
- Carbohydrates
- Phytosterols
- Saponins
- Tannins
- Flavonoids

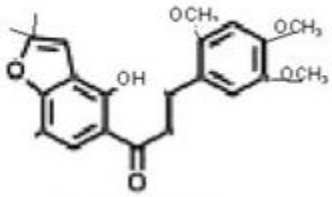
d) Contents of seed oil[35-37]

- Karanjin ($S_{18}H_{12}O_4$),



karangin

- Pongamol
- Pongapin
- Kanjone
- Glabrachalcone



Glybanchalcone

Folk Medicine

According to Hartwell (1967–1971), the fruits and sprouts are used in folk remedies for abdominal tumors in India, the seeds for keloid tumors in Sri Lanka, and a powder derived from the plant for tumors in Vietnam.

In India, seeds were used for skin ailments. Today the oil is used as a liniment for rheumatism. Leaves are active against *Micrococcus*; their juice is used for colds, coughs, diarrhea, dyspepsia, flatulence, gonorrhea, and leprosy. Roots are used for cleaning gums, teeth, and ulcers. The bark is used internally for bleeding piles. Juices from the plant, as well as the oil, are antiseptic. It is said to be an excellent remedy for the itch, herpes, and pityriasis Versicolor.

Powdered seeds are valued as a febrifuge, tonic, and bronchitis and whooping cough. Flowers are used for diabetes. Bark has been used for beriberi. Juice of the

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root is used for cleansing foul ulcers and closing fistulous sores. Young shoots have been recommended for rheumatism.[38]

Pharmacological Activity

- Anti-plasmodial activity - *Pongamia pinnata* shows anti-plasmodial activity against Plasmodium falciparum (Simonse et al. 2001).[39]
- Anti-inflammatory activity - It shows anti-inflammatory activity against different phases (acute, sub-acute and chronic) of inflammation was reported by the 70% ethanolic extract of *Pongamia pinnata* leaf (Srinivasan et al. 2001).[40]
- Anti-Microbial Effect - The anti-microbial effect of crude leaf extract of P. pinnata evaluates its effect on the production and action of enterotoxins. Its extraction has o anti-bacterial, anti-giardia, and anti-rotaviral activities but reduces the production of cholera toxin and bacterial invasion to epithelial cells. This indicates that the extraction of *Pongamia pinnata* has selective anti-diarrhoeal action with efficacy against cholera (Brijesh et al. 2006).[41]
- Anti-oxidant activity - P. pinnata leaf extracts show circulatory lipid peroxidation and antioxidant activity. It has been evaluated in ammonium chloride-induced hyper ammonium rats. That enhanced lipid peroxidation in the circulation of ammonium chloride-treated rats, resulting ina significant decrease in the levels of vitamin A, C, E which further reduces catalase glutathione, glutathione peroxides and superoxide dismutase (Essa and Subrahmanian.2006).[42]
- The methanolic extract of P. pinnata roots showed significant protection against aspirin and tends to decrease acetic acid-induced ulcer after 10 days of treatment. Having augmentation of mucosaldefensive factors like – mucin secretion, the life span of mucosal cells, mucosal cell glycoprotein's, cell proliferation and prevention oflipid peroxidation, the extract also shows ulcers protective effect (Prabha et al. 2003).[43]
- The oral administration of ethanolic extract of *Pongamia pinnata* flower shows significant anti-hyperglycemic and anti-lipid peroxidative effect and also enhance the antioxidant defense system in alloxan-induced diabetic rats. Hence suggestive that the treatment of P. pinnata extract could be used as a better and safe alternative anti-hyperglycemic drug for diabetic patients (Punitha and Manoharan, 2006).[44]

Ayurvedic Properties and Pharmacological Effect

Almost all the Aacharya have opined the properties of *Karanja* is *Tikta* (bitter), *Katu* (pungent) *Kashaya* (astringent) in *Rasa* (taste), *Laghu* (light) and *Tikshna* (sharpness) in *Guna* (properties), *Ushna* (hot) in *Virya* (potency) and *Katu* (pungent) in *Vipaka* (metabolism).

Due to these properties, it alleviates *Vata* & *Kapha Dosha.*

Author	*Rasa*	*Guna*	*Veerya*	*Vipaka*
C.S.[9]	*Tikta, Katu.*	-	*Ushna*	*Katu*
S. S.[45]	*Katu*	*Laghu Tikshna*	*Ushna*	*Katu*
B.N.[46]	*Katu*	*Tikshna*	*Ushna*	-
R.N.[30]	*Katu*	*Snigdha*	*Ushna*	-
K.N.[28]	*Katu,Tikta Kashaya.*	*Tikshna*	*Ushna*	*Katu*

The pharmacological effects of *Karanja* are *Kapha-Vathara, Shothahar* & *Bhedana*. It cures *Kustha* (skin diseases), *Arsha* (hemorrhoids), *Krimi* (worm infestation), *Visha* (Poisoning), *Kandu* (itching), *Yoniroga* (vaginal disease), *Apasmara* (epilepsy), *Unmada* (Insane), *Urusthamba* (wryneck), *Udawarta*, *Meha* (Urinary disorder), *Shiroroga* (Head diseases), *Indralupta* (alopecia), *Shleepad* (filariasis), *Hrudroga* (heart disease), *Gulma* (Tumours).[47]

Useful Parts[47]

Root

Bark

Leaves

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Seed

Steam Bark

Twigs (as toothbrush)

Seed oil

Dose[47]

Fresh juice 10-20ml,

Seed Powder 1-3gm,

Bark powder 3.5gm.

Therapeutic Uses

- In *Granthivisrpa* paste of *Karanja* bark may be applied locally.[48]
- *Karanja* leaves are fried in *Ghruta* and made it into powder. This powder is administered along with *Saktu* for *Anuloman*.[49]
- *Karanja* fruit mixed with *Saindhav, Danti, Marich, Pippali* and powdered it. This powder used in *Kushta* for *Nasya*.[50]
- *Karanja Patra* can be used for *Pradeha* in *Kushta*.[50]
- *Kasis* and tender leaves of *Karanja* pounded with the juice of *Kapitha* is useful in *Romasanjanan*.[51]
- Seed powder of *Karanja* should be given with sugar and honey in *Raktapitta*.[52]
- *Yavagu* prepared along with *Kwath* of leaves of *Karanja* is administered for all types of *Chardi*.[53]
- *Karanja* along with *Haritaki*, *Vidang, Sidharthak, Bakuchi, Haridra* is used for *Lepan* in *Kushta*.[54]
- *Karanja Taila* should be applied in *Vrana* due to *Kushta*.[55]
- For *Vrana Prakshalan Karanja* fresh juice can be used.[56]
- *Karanja* along with *Gomutra* should be used for *Lepana* in *Urusthamba*.[57]
- Tender leaves of *Karanja* fried in the mixture of oil and *Ghruta* and added with parched grain flour should be given. It acts as carminative and laxative.[58]
- The alkali of *Karanja* decanted with sour gruel etc. and added with *Bida* and *Pippali* powder should be used for splenomegaly.[59]
- In Pterygium after removing the bandage on the third day, it should be sprinkled with milk processed with *Karanja* Seed.[60]
- In Scorpion sting, the flowers of *Karanja*, *Arjun*, *Shleshmatak, Katabhi, Kutaj* and *Shirish* mixed with cured are applied as a paste on the spot.[61]

Non-Therapeutic Uses[62]

- The Pongamia tree is cultivated for two purposes, as an ornamental in gardens and along avenues and roadsides for its fragrant flowers and as a host plant for lac insects.
- Well decomposed flowers and leaf letters are used by gardeners as compost for plants requiring rich nutrients. The bark is used for making strings and ropes.
- The leaves are said to be a valuable lactagogue fodder, especially in arid regions. It is sometimes intercropped with pasture, the pasture grasses said to growwell in its shade.
- Dried pongam leaves are used in stored grains o repel insects. Leaves often ploughed green manure, thoughts to reduce nematode infestations.
- The wood is yellowish-white, coarse, hard and beautifully grained, but is not durable. The use of wood islimited to cabinet making, cartwheels, posts, and fuel.
- The seeds contain pongam oil, bitter, red-brown, thick, non-edible oil, which is used for tanning leather, soap making.
- Both the oil and residues are toxic. Still the press cake is described as a useful poultry feed.
- As a Source of Biodiesel - Biodiesel is expanding at a very rapid rate because of increasing demand, necessary policy support, and technological availability. India consumes approximately 40 million tons of biodiesel and ranked fifth in the

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world after the US, China, Russia and Japan in terms of fossil fuel consumption. Recently, the Government of India launched "National Mission on Bio-diesel" with a review to find a cheap and renewable liquid fuel based on vegetable oils. Biodiesel fuel can be defined as medium length (C16 ± C18) chains of fatty acids and is comprised mainly of monoalkyl fatty acid esters. It has the benefits of being non-toxic, biodegradable, and essentially free of sulfur and carcinogenic ring components (Yamane *et al.* 2001).

- The *Pongamia pinnata* is known for its multipurpose benefits and as a potential source of biodiesel (Naik et al. 2008).

Toxicity[63]

LD_{50} for Karanjin was found to be 14.32mg/kg and of pongamal 17.14mg/kg body weight. The pure oil did not show lethal effect even at 20ml/kg body weight. *Karanja* Oil is found to be most toxic and it is prepared to have an adverse effect on the body of mice. Karanjin and de-Meo-Karanjin are also reported to be toxic compounds.

CONCLUSION

Pongamia pinnata (*Karanja*) is one of the most important medicinal plants used in medicines of Ayurveda because of having several pharmacological as well as therapeutic properties and Industrial uses. Traditionally, this plant is used to treat a huge variety of health problems. The present review indicates the importance of Karanja as one of the important medicinal plants described for its pharmacological actions and indications in the Ayurvedic lexicons. The various researches have proved many of its activities mentioned in Ayurvedic classics and demonstrate its effective use in various diseases. The plant is widely studied for the subject of biodiesel. Although the results from this review are quite promising for the use of *Karanja* as a multi-purpose medicinal agent, several limitations currently exist in the current literature. While *Karanja* has been used successfully in Ayurvedic medicine for centuries, more clinical trials should be conducted to support its therapeutic use.

REFERENCES

1. P.V. Sharma, Dravyaguna Vigyan Vol. 4, Reprint, Chaukhamba Bharati Academy, Varanasi, 2007, P-43.
2. Agnivesh, Charak Samhita, Sutra Sthan, Chapter 05, Shlok no. 73, Aacharya Vidhya Dhar Shukla & Prof. Ravidatta Tripathi, Reprint, Choukhamba Sanskrit Pratishtan Delhi, 2007, P-99.
3. Dr. J. L. N. Shastry, Dravyaguna Vijnana Vol 2, Reprint, Chaukhamba Orientalia Varanasi, 2014, P-167.
4. P.V. Sharma, Dravyaguna Vigyan Vol. 2, Reprint, Chaukhamba Bharati Academy, Varanasi,2013, P-144.
5. P.V. Sharma, Namarupajnanam, Reprint, Chaukhamba Vishvabharati Academy, Varanasi,2015, P-47.
6. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan, P-44.
7. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan, P- 73.
8. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan,P- 99.
9. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan,P- 664.
10. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan,P- 108.
11. Agnivesh, Charak Samhita, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint 2007, Chaukhamba Sanskrit Pratisthan,P- 626.
12. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan Varanasi, P-47.
13. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan Varanasi,P-183.
14. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan Varanasi,P-192.
15. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan Varanasi,P-115.
16. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan Varanasi,P-344.
17. Vagbhat, Ashtang Hruday, Dr. Ganesh Krushna Garde, Reprint 2006, Anmol Prakashan Pune, P – 66.
18. Vagbhat, Ashtang Hruday, Dr. Ganesh Krushna Garde, Reprint 2006, Anmol Prakashan Pune,P- 67.

19. Bhavmishra, Bhavprakash Nighantu, Dr. K C Chunekar, Dr. Gangasahay Pandey, Reprint 2002, Choukhamba Bharati Academy, Varanasi, P – 349.
20. Prof. D S Lucas, Dravyaguna Vijnana Vol. 2, First edition 2008, Chaukhamba Bharati Academy, P –117.
21. Prof. D S Lucas, Dravyaguna Vijnana Vol. 2, First edition 2008, Chaukhamba Bharati Academy,P- 117
22. P.V. Sharma, Dravyaguna Vigyan Vol. 4, Reprint, Chaukhamba Bharati Academy, Varanasi,2007, P-43.
23. Vd. Vishnu Mahadev Gogate, Dravyagun Vigyan, Third edition 2014, Vaidyamitra Prakashan Pune, P – 308.
24. Vagbhat, Ashtang Hruday, Dr. Ganesh Krushna Garde, Reprint 2006, Anmol Prakashan Pune, P – 68.
25. Vagbhat, Ashtang Hruday, Dr. Ganesh Krushna Garde, Reprint 2006, Anmol Prakashan Pune, P – 69.
26. Dhanvantari Nighantu, Aamradi Varga, P V Sharma, Reprint 2008, Chaukhamba Orientalia Varanasi, P-166.
27. Madanpal Nighantu, Vatadi Varga, Dr. J L N Shastry, First edition, Chaukhamba Orientalia Varanasi, P-543.
28. Kaiydev, Kaiydev Nighantu, Aushadhi Varga, P V Sharma, Dr. Guruprasad Sharma, First edition 2009, Choukhamba Krishnadas Academy Varanasi, P-178.
29. Aacharya Shodhal, Shodhal Nighantu, Aamradi Varga, Prof. Gyanedra Pandey, Prof. R R Dwivedi, First edition 2009, Choukhamba Krishnadas Academy Varanasi, P-116.
30. Narahari Pandit, Raj Nighantu, Prabhadradi Varga, Dr. Indradev Tripathi, Third Edition 2003, Chaukhamba Krishnadas Academy, Varanasi, P-276.
31. http://www.hortpurdue.edu/duke_energy/pongamiapinnata .htm
32. R.S.Kureel, C.B.Singh, A.K.Gupta, Ashutosh Pandey, *Karanja*-A potential source of bio-diesel, Chapter 12, National oilseeds and vegetable oils development Board Gurgaon, 2008, P-08.
33. Hao Yin, Si Zhang, Jun Wu, Haihan Nan, Dihydropyranoflavones from *Pongamia pinnata*. J. Braz. Chem. Soc, 17 (7), 2006, P-1432-1435. 132
34. Mahendra, Giri, Rasika Bhalke and Subodh Pal, Gastroprotective effect of hydroalcoholic leaves extract of *pongamia pinnata,* International Journal of Pharma and Bioscience, 1(3), 2010, P- 1-6.
35. Khare C.P. Indian medicinal plants: an illustrated dictionary, Springer science Berlin, 2007, P- 209.
36. Warrier P K, Nambiar VPK, Ramankutty C. Indian medicinal plants: a compendium of 500 species, Volume 4, Orient Longman Private Limited,Hyderabad, 1995, P-339-344.
37. Singh MP, Himadri Panda. Medicinal Herbs with Their Formulations. Daya Publishing House, Delhi, 2005, P-678-680.
38. https://www.hort.purdue.edu/newcrop/duke_energy/Pongamia_pinnata.html
39. Simonsen HT, Nordskjold JB, Smitt UW, In vitro screening of Indian Medicinal plants for antiplasmodial activity, J Ethnopharmacol, 74, 2001, P-195-204.
40. Srinivasan K, Muruganandan S, Lal J, Evaluation of anti-inflammatory activity of *Pongamia pinnata* leaves in rats. J Ethnopharmacol, 78, 2001, P-151–157.
41. Brijesh S, Daswani PG, Tetali P, Studies on *Pongamia pinnata* (L.) Pierre leaves: Understanding the mechanism(s) of action in infectious diarrhea, J Zhejiang Univ. Sci. B7, 2006, P-665-74.
42. Essa MM, Subramanian P, *Pongamia pinnata* modulates the oxidant-antioxidant Imbalance in ammonium chloride-induced hyper ammonemic rats, Fundam Clin Pharmacol, 20, 2006, P-299-303.
43. Prabha T, Dorababu M, Shalini Goel, Agarwal PK, singhA, Joshi VK, Goel KK, Effect of methanol extract of *pongamia pinnata* Linn. seed on gastro-duodenal ulceration and mucosal offensive factors in rats, Indian J. Exp. Biol, 47,2009,P-649-659.
44. Punitha R, Manoharan S, Antihyperglycemic and antilipidperoxidative effects of *Pongamia pinnata* (Linn.) *Pierre* flowers in alloxan induced diabetic rats, Journal of Ethnopharmacol, 105(1-2), 2006, P-39-46.
45. Sushruta, Sushrut Samhita, Kaviraj Dr. Ambikadatta Shastri, Reprint 2009, Chaukhamba Sanskrit Sansthan, Varanasi, P-259.
46. Bhavmishra, Bhavprakash Nighantu, Dr. K C Chunekar, Dr. Gangasahay Pandey, Reprint 2002, Choukhamba Bharati Academy, Varanasi, P – 350.
47. Dr. J. L. N. Ssstry, Dravyaguna Vijnana Vol 2, Reprint, Chaukhamba Orientalia Varanasi, 2014, P-169.
48. Agnivesh, Charaka Samhitha, Chikitsasthana, Chapter 21, Shlok 124, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint, Choukhamba Sanskrit Pratishtan Delhi, 2009, P-518.
49. Agnivesh, Charaka Samhitha, Chikitsasthana, Chapter 21, Shlok 124, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint, Choukhamba Sanskrit Pratishtan Delhi, 2009,P- 374.
50. Agnivesh, Charaka Samhitha, Chikitsasthana, Chapter 21, Shlok 124, Acharya Vidyadhar Shukla & Prof. Ravidatta Tripathi, Reprint, Choukhamba Sanskrit Pratishtan Delhi, 2009,P- 188.
51. Sushruta, Sushruta Samhita, ChikitsaSthana, Chapter 01, shloka 103, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-14.
52. Sushruta, Sushruta Samhita, UttarTantra, Chapter 45, shloka 38, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-395.

ISSN: 2456-3110 **REVIEW ARTICLE** Mar-Apr 2020

53. Sushruta, Sushruta Samhita, Uttar Tanta Sthana, Chapter 49, shloka 32, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-464.
54. Sushruta, Sushruta Samhita, ChikitsaSthana, Chapter 09, shloka 10, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-64.
55. Sushruta, Sushruta Samhita, ChikitsaSthana, Chapter 09, shloka 53, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-69.
56. Sushruta, Sushruta Samhita, ChikitsaSthana, Chapter 17, shloka 24, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-101.
57. Sushruta, Sushruta Samhita, ChikitsaSthana, Chapter 05, shloka 37, Kaviraj Dr. Ambikadatta Shastri, Reprint, Chaukhamba Sanskruta Sansthan Varanasi, 2009, P-45.
58. Vagbhat, Ashtang Hruday, ChikitsaSthan, Chapter 08, Shloka 54, Dr. Ganesh Krushna Garde, Reprint, Anmol Prakashan Pune, 2006, P-263.
59. Vagbhat, Ashtang Hruday, Sutra Sthan, Chapter 15, Shloka 87, Dr. Ganesh Krushna Garde, Reprint, Anmol Prakashan Pune, 2006, P-305.
60. Vagbhat, Ashtang Hruday, Sutra Sthan, Chapter 11, Shloka 21, Dr. Ganesh Krushna Garde, Reprint, Anmol Prakashan Pune, 2006, P-383.
61. Vagbhat, Ashtang Hruday, Sutra Sthan, Chapter 37, Shloka 36, Dr. Ganesh Krushna Garde, Reprint, Anmol Prakashan Pune, 2006, P-469.
62. R.S.Kureel, C.B.Singh, A.K.Gupta, Ashutosh Pandey, *Karanja*-A potential source of bio-diesel, Chapter 12, National oilseeds and vegetable oils development Board Gurgaon, 2008, P-08-09.
63. P.C.Sharma, M.B.Yelane, T.J.Dennis, Database on medicinal plants used in Ayurveda, Vol.2, Reprint, CCRAS, 2005, P-292.

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