

## Anthelmintic activity of *Pongamia glabra*

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### Abstract

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Leaves, wood, seed, bark and pericarp of the fruit of *Pongamia glabra* were separately dried, powdered and extracted with methanol in Soxhlet extractor. Anthelmintic activity of these various extracts was evaluated on Indian adult earthworms, *Pheretima posthuma*. Results showed that the seed part of *P. glabra* took less time to cause paralysis and death of the earthworms; therefore, seeds were extracted successively with petroleum ether, ethyl acetate and methanol in Soxhlet extractor. Again these extracts were screened for anthelmintic activity. Results showed that the ethyl acetate extract of seeds of *P. glabra* was most potent followed by petroleum ether extract. It can be concluded that anthelmintic activity of the seed of *P. glabra* is due to the active principles present mostly in the ethyl acetate and petroleum ether extracts.

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**Key words :** *Pongamia glabra*, anthelmintic activity, *Pheretima posthuma*

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*Pongamia glabra* syn *Pongamia pinnata* (Papilionaceae) is a tree, commonly known as karanj in India. Leaves are alternate, imparipinnate. Flowers are in lax auxiliary racemes. Seeds are reniform and thick. Helium of seed is small. Root and bark are hot, acrid and used as anthelmintic as well as useful in the diseases of eye and skin, good for tumours, piles, wounds, ulcers, itching and urinary discharges. Leaves are digestive, laxative, anthelmintic and useful in wounds and inflammation. Flowers are used as antidiabetic. Fruits and seeds are used as anthelmintic and useful in keratitis and urinary discharges. Oil is also used as anthelmintic and useful in rheumatism, leucoderma, scabies, wounds, leprosy, piles and ulcers. Every part of the plant is useful in the antidotal treatment of snakebite (Kirtikar and Basu, 1987).

$\beta$ -sitosterol, karanjin, pongamol, pongalabrone, pongapin, kangone, glabrachromene, pongajflavone, pongol, glabrachrome-II and glabrachalcone were previously isolated from seeds. Waxes, kaempferol,  $\beta$ -sitosterol and pongaglabol were isolated from flowers. Demethoxy kanugin and pongachromene were isolated from stem bark (The Wealth of India, 2005).

Objective of the present research has to prove traditional anthelmintic use of the plant *P. glabra*.

## Materials and Methods

### Plant materials

Seeds, leaves, bark, wood and pericarp of the fruit of *P. glabra* were collected from Ahmednagar district and get authenticated from Botanical Survey of India, Pune (Voucher specimen number: 111763).

### Drugs and chemicals

The following drugs and chemicals were used. Drugs: Albendazole (BANDY, Mankind Pharma Ltd., New Delhi), Nitazoxamide (NITACURE, Alembic Ltd., Vadodara), Chemicals: Petroleum ether (60-80°C) A.R. (PCL, Pune), Ethyl acetate A.R. (PCL, Pune), Methanol A.R. (PCL, Pune), Dimethyl formamide (DMF) (PCL, Pune)

and saline water (Claris Lifesciences Ltd., Ahmedabad).

### Preparation of extracts

Dried and coarsely powdered leaves, wood, seeds, bark and pericarp of the fruit (500 g, each) of *P. glabra* were each separately subjected to extraction in Soxhlet extractor using methanol as a solvent. The extracts of leaves, wood, seeds, bark and pericarp of the fruit of *P. glabra* were concentrated by vacuum distillation and then dried in open air to yield 8.4%, 5.4%, 11.2%, 6.0% and 5.6% of extracts, respectively. The most active part i.e. seeds (500 g) (based on primary anthelmintic screening) were dried, coarsely powdered and subjected to successive solvent extraction in Soxhlet extractor by using petroleum ether (60-80°C), ethyl acetate and methanol as a solvent. The respective extracts were concentrated by vacuum distillation and then dried in open air to give 4.3%, 3.5% and 4.0% of extracts, respectively (Harborne, 1973).

### Animals

Indian adult earthworms (*Pheretima posthuma*) collected from moist soil and washed with normal saline to remove all faecal matter were used for the anthelmintic study. The earthworms of 3-5 cm in length and 0.1-0.2 cm in width were used for all the experimental protocol due to their anatomical and physiological resemblance with the intestinal roundworm parasites of human beings (Thorn et al., 1977; Vigar, 1984).

### Anthelmintic activity (Tambe et al., 2006)

All the extracts of *P. glabra* were dissolved in minimum amount of DMF and then volume is adjusted to 10 ml with saline water. All drugs and extract solutions were freshly prepared before starting the experiment.

Eight groups, of six earthworms each were released into 10 ml of desired formulations as follows; vehicles (5% DMF in normal saline), Albendazole (20 mg/ml), Nitazoxamide (20 mg/ml) or total methanolic extracts of leaves, wood, bark, pericarp of fruit or seeds of *P. glabra* (20 mg/ml, each) in normal saline containing 5% DMF.

In the second set of experiment, six groups of six earthworms were released in to 10 ml of desired formulations as follows; vehicle (5% DMF in normal saline), Albendazole (20 mg/ml), Nitazoxamide (20 mg/ml) or petroleum ether extract or ethyl acetate extract or methanolic extract of seeds of *P. glabra* (20 mg/ml, each) in normal saline containing 5% DMF. Observations were made for the time taken to paralysis and death of individual worms. Paralysis was said to occur when the worms did not revive even in normal saline. Death was concluded when the worms lost their motility followed with fading away of their body colors.

### Results and Discussion

The data revealed that total methanolic extracts of various parts of the plant *P. glabra* showed significant anthelmintic activity at 20 mg/ml concentrations. Results are comparable with standard drugs Albendazole and Nitazoxamide, at same concentration. Table 1 reveals that total methanolic extract of seed of *P. glabra* showed best anthelmintic activity. In order to find out active

constituents from seeds, which are responsible for the activity, are polar or nonpolar compounds, successive extracts of seeds of *P. glabra* like petroleum ether, ethyl acetate and methanolic extracts were screened for anthelmintic activity. The results show that ethyl acetate extract of seeds of *P. glabra* took the least time to cause paralysis and death of the earthworms, followed by petroleum ether and methanolic extracts, respectively.

Results of preliminary phytochemical tests suggest that petroleum ether extract of seeds contain sterols, triterpenes and fatty substances; ethyl acetate extract of seeds contain flavonoids and methanolic extract of seeds contain tannins and glycosides.

It can be concluded that active constituents responsible for anthelmintic activity are present in the ethyl acetate and petroleum ether extracts of seeds of *P. glabra*. This indicates that the anthelmintic principles are nonpolar compounds.

**Table 1. Anthelmintic activity of *Pongamia glabra*.**

Treatment	Time to paralysis (min)	Time to death (min)
TME of Leaves	2.83±0.34	1.94±0.38
TME of Wood	4.69±0.26	3.69±0.57
TME of Pericarp of fruit	2.23±0.38	1.69±0.95
TME of Seed	1.29±0.44	1.09±0.28
TME of Bark	2.28±0.52	1.88±0.98
PEE of seed	1.01±0.30	0.89±0.31
EAE of seed	0.71±0.28	0.60±0.35
ME of seed	2.20±0.36	2.10±0.80
Albendazole	3.77±0.51	2.62±0.22
Nitazoxamide	2.5±0.21	2.4±0.44

Results are expressed as mean±SEM from six observations; Control worms were alive up to 24 hrs of observation. TME is total methanolic extract, PEE is petroleum ether extract, EAE is ethyl acetate extract and ME is methanolic extract. All the extracts and standard drugs were given at 20 mg/ml concentration.

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