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PHILIPPINE MEDICINAL PLANTS

Family • Plumbaginaceae

Laurel

Hangad-ang-babae

Plumbago indica Linn.

ROSE LEADWORT

Zi hua teng

Scientific names	Common names
<i>Plumbago indica</i> Linn.	Hangad-ang-babae (Tag.)
<i>Plumbago rosea</i> Linn.	Laurel (Tag., Engl.)
<i>Thela coccinea</i> Lour.	Pampasapit (Tag.)
	Panting-panting (Tag.)
	Fire plant (Engl.)
	Indian leadwort (Engl.)
	Rose-colored leadwort (Engl.)
	Rosy leadwort (Engl.)
	Scarlet leadwort (Engl.)
	Whorled plantain (Engl.)
In the Philippines, laurel is a common name shared by (1) <i>Plumbago indica</i> , Laurel, Pampasapit, Fire plant, and (2) <i>Laurus nobilis</i> , Laurel, Bay leaf.	
Plumbago indica L. is an accepted name. The Plant List	

Other vernacular names

ARABIC: Shittermul, Shitarajehmar, Shitturridge.

BENGALI: Kaing-khao, Rakt-chitrak, Raktachita, Raktachitra, Agnichita, Laichita.

CHINESE: Xie san niang, Zi hua dan.

GUJARATI: Kalochitrak, Chitro.

HINDI: Lai chitrak.

MALAYALAM: Kotuveli, Chethikiduvveli.

MALAYSIA: Binasa, Chelaka merha, Cheraka merah, Setaka.

MANIPURI: Mukaklei.

PORTUGUESE: Plumbago de flor vermelha.

SANSKRIT: Rakta chitrak.

SRI LANKAN: Rath nitul.

TAMIL: Akkini.

Botany

Laurel is an erect or spreading, more or less branched, herbaceous or half-woody plant, 1.5 meters or less in height. Leaves are ovate to oblong-ovate, 8 to 13 centimeters long, smooth, slightly drooping,

with entire, undulate or wavy margins, with a pointed or blunt tip and a pointed base. Spikes are 15 to 30 centimeters long. Calyx is tubular, 8 to 10 millimeters long, covered with stalked, sticky glands. Corolla is bright red, tube is slender, about 2.5 centimeters long, and the spreading limb, about 3 centimeters in diameter.



Distribution

- Cultivated throughout the Philippines for ornamental purposes for its showy red flowers.
- Also occurs in Cambodia, southern China, Indonesia, Laos, Thailand, Vietnam.

Constituents

- Contains plumbagin, sitosterol glucoside.
- Roots are the highest source of plumbagin, a naphthoquinone.
- Aerial parts yielded reducing sugars, alkaloids, steroids, flavonoids, and gums. (see study below) (13)
- Phytochemical studies of various parts yielded: **Roots:** quinones (plumbagin, roseanone, 6-hydroxyplumbagin, drowner, elliptical, plumbago acid lactose), phenols (flavonoids, carboic acids), alkaloids (α -naphthylamine), aliphatic acids (myricyl palmitate, palmitic acid), steroids (β -sitosterol); **Aerial parts:** steroids (β -sitosterol, campesterol, stigmasterol), quinones (plumbagin, 6-hydroxyplumbagin), flavonoids (plumbaginol); **Flower:** pigments (pelargonin, cyanidin, delphinidin, kaempferol), and carbohydrates (mono and di-galloylglucose). (17)
- Study of roots yielded a new quinone derivative-plumbagic acid lactose, two flavonol methyl ethers-azaleatin (5-O-methylquercetin), ayanin (3,7,4', tri-O-methylquercetin), two aliphatics-palmitic acid, myricyl palmitate, and one naphthoquinone-plumbagin. (26)



Properties

- Considered vesicant, stimulant, sialagogue, sudorific.
- Roots considered abortifacient and antifertility, stimulant, digestive, vesicant.
- Juice of the root is acridly pungent to taste, producing a severe, lancinating pain the tongue.
- Juice of the root is blistering to the skin.
- Leaves and stems are pungent in taste, but not as virulent as the root.
- Bark considered antidiyspeptic.

- Phytochemical screening of leaves yielded reducing sugar, alkaloids, flavonoids, gum, steroids. (see study below) (16)

- Studies have suggested anti-fertility, abortifacient, anti-tumor, antimicrobial, estrogenic, anti-Helicobacter, cytotoxic, macrofilaricidal, anti-influenza, anti-acne activities.

Toxicity

- Considered a poisonous plant, valued mainly for its external use for skin problems.

- Taken internally, root is poisonous and acts on the stomach as an acro-narcotic or narcotico-irritant poison. Taken internally or applied to the genital organs, it acts as an abortifacient.

- Toxicity is attributed to the principle active compound, the naphthoquinone plumbagin. In small doses, it promotes sweating and stimulates the central nervous system; in large doses, it may cause paralysis and death from respiratory failure.



Parts used

Roots, leaves, bark.

Uses

Folkloric

- Poultice of bark scrapping used as poultice for headaches.

- Bark used as blistering plaster; also applied to spine for fevers; antidyspeptic.

- Juice distinctly blisters the skin.

- In **India**, root is used as abortifacient and antifertility medicine; root is used as irritant, introduced into the vagina and applied directly to the neck of the uterus. Juice of root used as powerful sudorific.

- Taken internally, root is poisonous and acts on the stomach as an acro-narcotic or narcotico-irritant poison. Taken internally or applied to the genital organs, it acts as an abortifacient.

- Juice of leaves and roots, alone or mixed with oil, used as application for rheumatism and paralysis, buboes, glandular swellings, and leprosy.

- Liniment made from bruised roots and mixed with oil used for treating rheumatism, paralysis, leucoderma, abscesses and scorpion stings.

- Milky juice of leaves used in ophthalmia; applied onto skin scabies, ringworm, and hemorrhoids.

- Roots also used for dyspepsia, piles, diarrhea, and to improve the appetite.

- In **Ayurveda**, suppresses vata and pitta.

- In **Myanmar**, used for leprosy and syphilis.

- In **West Bengal**, decoction of fresh roots used as abortifacient. (20)

- Used by the Mullu Kuruma tribe in Kerala, **India** as an antibacterial herb. (15)

Studies

• **Fetotoxic / Abortifacient:** Study evaluated a methanolic root extract of roots on rat uterus and pregnant mice. Study indicated the possible presence of utero-active compounds. Results showed pronounced fetotoxic and mild abortifacient potential, and supports its traditional use in avoiding unwanted pregnancies. (1)

• **Plumbagin / Anti-Fertility:** Plumbagin, a naphthoquinone, has shown to have antifertility activity similar to embelin, an antifertility agent of plant origin.

• **Plumbagin / Isolation / Roots:** Roots are the richest source of plumbagin, a major active compound and potential biomarker. Study presents a simple method for isolation of plumbagin from roots of *Plumbago rosea*, through precipitation out by addition of water to an acetone extract. (2) A reverse phase HPLC method with UV detection was developed to quantify plumbagin, the bioactive marker of the roots of *P. indica* and *P. zeylanica*. *P. indica* was found to contain significantly higher amounts of plumbagin than *P. zeylanica*. The HPLC and HPTLC methods described were simple, rapid, accurate, and sensitive. (23)

• **Anti-tumor:** An in vivo study was done for tumor inhibitory and radiosensitizing effects of an Indian

medicinal plant, *Plumbago rosea* on experimental mouse tumors. Results shows PE to have a weak antitumor effect, but may have a potential use in enhancing the tumor-killing effect of radiation. (3)

- **Plumbagin / Anti-Tumor:** The antitumor and radio-modifying properties of plumbagin were tested on mouse Ehrlich ascites carcinoma. Plumbagin showed inhibition of exponentially growing tumors. Its mode of anticancer activity was unclear in the study.

Plumbagin / Anti-Tumor: Plumbagin was found to have tumor growth inhibitory effects and contemplated for use in human cancer therapy.

- **Antimicrobial:** Antimicrobial Activity in Vitro of Plumbagin Isolated from *Plumbago* Species: PR was shown to exhibit activity against yeast and bacteria suggesting the naphthoquinone plumbagin as a promising antimicrobial agent. (4)

- **Antifertility:** Study of five extracts of stems of PR in rats showed antifertility activity in female Wistar rats with interruption of the estrous cycle, temporary inhibition of ovulation. The acetone extract showed significant estrogenic and antiestrogenic activity. Results indicated the antifertility activity of stems of *P. rosea*. (5)

- **Toxicity Study / Roots:** Study of ethanolic root extract of PR in mice showed severe diarrhea at doses above 1250 mg / kg. While a higher dose was tolerated in fractionated administration, it was shown to have growth inhibitory effect in both sexes. (6)

- **Antiovaratory / Estrogenic Activity / Antifertility:** Study showed the acetone and ethanol extracts to be effective in interrupting the normal estrous cycle of rats, with prolonged diestrous cycle and consequent temporary inhibition of ovulation. Both extracts showed significant estrogenic and antiestrogenic activities. It concludes that both extracts have antifertility effects. (9)

- **Macrophilicidal:** Study investigated the macrofilaricidal activity of *P. indica* in vitro against *Setaria digitata*, a filarial parasite of cattle. Complete inhibition of motility was observed in various concentrations. The active molecule was identified as plumbagin (5-hydroxy-2-methyl-1,4-naphthalenedione). (10)

- **Anti-Helicobacter Activity / Cytotoxicity / Roots:** Study evaluated the anti-helicobacter activity and cytotoxic activity of root ethanol extract of *Plumbago indica*, *P. auriculata*, and *P. zeylanica*. The three plants showed dose-dependent cytotoxicity activity in HGE-17 cell lines. All plants showed significant zones of inhibition against *H. pylori*, with *P. indica* showing more activity compared to the other two plant. (15)

- **Cytotoxicity / Leaves:** Study evaluated leaves of *Plumbago indica* for possible cytotoxic effects. In brine shrimp lethality assay, the LC50 and LC90 values were found to be 4.57 µg/ml and 9.87 µg/ml for a crude methanolic extract. (16)

- **Anti-Influenza Activity / Hemagglutination Inhibition:** Study evaluated the anti-influenza activity of *Plumbago indica* and *Allium sativum* extracts against Influenza A (H1N1)pdm09. Two assays were used for anti-influenza activity: simultaneous and post-treatment assays. *A. sativum* extracts showed only 14% reduction in hemagglutination in contrast to 100% reduction by *P. indica* in both simultaneous and post-treatment assay. Results suggest *P. indica* extracts are good candidates for anti-influenza therapy. (18)

- **Anti-Acne / Roots:** Study evaluated the in vitro anti-acne activity of acetone extract of root of *Plumbago indica* against two acne causing bacterial, i.e., *Propionibacterium acnes* and *Staphylococcus epidermis* and yeast *Malassezia furfur*. The extract showed dose dependent activity against all microorganisms. Minimum inhibitory concentrations against Pa, Se, and Mf were 600, 200, and 300 µg/ml, respectively. (19)

- **Immunosuppressive Effect:** Study evaluated four medicinal plant species (*Justicia gendarussa*, *Plumbago indica*, *Aloe vera*, and *Aegle marmelos*) from the Kolli hills of Tamil Nadu for immunosuppressive effect. Crude methanol extracts were tested for inhibition of lymphocyte proliferation via lymphocyte proliferative assay by thymidine uptake. All the extracts exhibited inhibition of lymphocyte proliferation. *J. gendarussa* showed highest lymphocyte inhibition (84%). Results suggest the extracts should be further investigated for immunosuppressive components. (22)

- **Antidiarrheal:** Study evaluated methanolic extracts of *Alpinia conchigera* and *Plumbago indica* for antidiarrheal potential against castor-oil induced diarrhea in mice using measures of latency period and diarrheal frequency by counting faeces time and number. The methanolic extracts at doses of 250 and 500 mg/kg showed antidiarrheal effect as evidenced by reduced induction time of diarrhea and total weight of faeces. (24)

- **Antifungal:** Study evaluated the methanolic extract of *Plumbago indica* for antifungal activity using disc diffusion method. Fluconazole was used as standard. Results showed good antifungal activity with zones of inhibition ranging from 10.0-27.0 mm. *Candida albicans* was the most susceptible fungal strain. (25)

- **Wound Healing / Antioxidant / Roots:** Study evaluated the wound healing activity of various extracts of *Pl. indica* roots using excision wound model in mice. An ethanol extract showed powerful antioxidant

potential. The ethanolic extract showed good wound healing efficacy, more effective than other extracts and commercial wound healing agents, as evidenced by rapid epithelization, better wound closure, and reduction of infection. (28)

• **Shodhana (Detoxification) of Roots in Ayurveda:** In Sri Lanka, Ayurveda formulations which incorporate *P. indica* roots are prepared using commercially air-dried material after subjecting it to a detoxification process (Shodhana) using lime water prepared from commercially available milk of lime. The process removes the toxicity associated with plumbagin, the predominant toxic naphthoquinone in *P. indica* roots. Study reports on an optimized quantitative extraction of plumbagin from root samples. Plumbagin content of 8.7 ± 0.1 mg/g fresh root was lower by 19.4% to 7.0 ± 0.1 mg/g with Sodhana. Commercial dried root sample contained much lower level (0.55 ± 0.05 mg/g) of plumbagin. Drying the root samples for 5 weeks reduced plumbagin level (8.6) by 62.7% to 3.2 mg/g after one week, with not further appreciable change up to week 5. Shodhana can further reduce the plumbagin. Total reduction by drying and Sodhana was 87.7%. Sodhana is the most effective method to reduce the plumbagin to a non-toxic level. (29)

Availability

- Cultivated.
- Herbal biosolutions in the cybermarket.

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