ASEAN

Herbal and Medicinal Plants

Volume II

Edited by Mastura Mohtar, Ling Sui Kiong, Ummu Hani Badron & Rasadah Mat Ali

Compiled by Dian Sukmajaya & Anita Permatasari

ASEAN Herbal & Medicinal Plants

Volume 2

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The ASEAN Secretariat is based in Jakarta, Indonesia.

For inquiries, contact:
The ASEAN Secretariat
Community Relations Division (CRD)
70A Jalan Sisingamangaraja
Jakarta 12110, Indonesia
Phone: (62 21) 724-3372, 726-2991
Fax : (62 21) 739-8234, 724-3504
E-mail: public@asean.org

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FOREWORD

I am pleased to present the second ASEAN Herbal and Medicinal Plants (AHMP) comprising information on vernacular, habitats, indigenous usage as well as relevant scientific data of 159 species found in ASEAN member countries. As a sequel to the first volume published in 2010, this book by itself, symbolize the comradeship amongst ASEAN Herbal Expert Group members in utilization and sharing of their respective local knowledge.

As region, ASEAN is blessed with enormously rich forests hosting vastly diverse fauna and flora. It is also a home to a big number of indigenous communities with very diverse cultural and religious beliefs and customary practices. Traditionally used to treat various kind of illnesses and disorders, collecting naturally-occurring medicinal plants has taken place in Asia since prehistoric time. Most herbs are found in home gardens and are easily accessible, others however may not be as common and are therefore not readily recognized for their medicinal potentials. At present, such activity, although limited in amount in most countries, are still carried out with the objectives of using them in traditional medicine or for processing into pharmaceutical products. It generates income to the native people, provides raw material at a low cost, and access to material which are not available through cultivation.

The rapid economic transformation as well as the declining of natural resources faced by many member countries have far reaching impacts on the biodiversity, culture and sustainability of the indigenous and local communities' traditional knowledge. Thus the AHMP is an effort to compile information on 159 species of various herbs and medicinal plants commonly used and consumed for their immense health benefit and preventive properties for future generations.

I would like to take this opportunity to congratulate contributing members of the ASEAN Herbal Expert group and Forest Research Institute Malaysia (FRIM) on their relentless effort to realize the second volume of ASEAN Herbal and Medicinal Plants book. Hopefully, this meaningful publication will further build on the interest and appreciation towards our valuable heritage as well as its enormous potential to benefit mankind.

Thank you.

DR. MEGAT SANY BIN MEGAT AHMAD SUPIAN
ASOF Leader Malaysia

FOREWORD

Three of ASEAN Countries, namely Indonesia, Philippines and Malaysia are categorized as Mega Diversity Countries in the world due to their great diversity in species, genera and families of fauna and flora. The richness of biodiversity in ASEAN has been contributing, among others, to economic development of the region through ecotourism, production of herbal and traditional medicines.

The use of herbal and medicinal plants has been part of the ASEAN culture in utilizing the natural resources for communities living in or adjacent to the forests for their healthy life/treatment. Nowadays the use of herbal and traditional plants has become an alternative for treatment of illness and health care. Despite the absence of reliable data on the number of plant species that are currently traded, about 1500 species have been widely used for traditional medicines.

This publication shows how diverse the region is in herbal and medicinal plants. With this high potential it is expected that ASEAN Member States and people in the region could get benefit from utilizing herbal and medicinal plants for improving livelihood and support healthcare for the region's population. With reliable policy support, standards, safety, quality and sustainable resources, herbal and medicinal plants can be further explored to support the development of the traditional medicine industry. As ASEAN is celebrating its 50th anniversary, this publication will mark the importance of ASEAN Cooperation in Forestry toward supporting the ASEAN Community.

I am confident that this publication will be useful for practitioners of traditional medicine.

LE LUONG MINH
Secretary-General of ASEAN

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Abrus precatorius L.
Leguminosae

1.0 Scientific Name : *Abrus precatorius* L.

2.0 Vernacular Names : Saga and akar saga

3.0 Plant Description

A perennial slender vine usually with several shoots from the base. **Leaves** alternate, pinnately compound with about 14 pairs of 1.5 cm x 1.0 cm, oblong leaflets. **Inflorescences** at stem terminals up to 4 cm long; flowers with stalks up to 1 mm long, purple-coloured with hood, side wings and a larger keel; 9 stamens. Pods flattened, up to 2.5 cm x 1.0 cm. **Seeds** bright red hard coat, each with a black spot.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Occasionally planted, sometimes found wild on wasteland near shore.

6.0 Chemical Constituents

Gallic acid, quercetin, triacontane ceryl alcohol, phytosterin, phytosterolin, jambulol, melissic acid, palmitic acid, oleic acid, linoleic acid, euphosterol, xanthorhamnine, camphol and leucocyanidol. **Seed:** β-amyrin, friedelin, hentriacontane, myricyl alcohol, β-sitosterol and taraxerol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-inflammatory, diuretic and anti-pruritic.

7.2 Uses in traditional medicine

- The decoction of the leaves is taken orally to overcome problems associated with the presence of blood in the urine.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Bixa orellana L.
Bixaceae

1.0 Scientific Name : *Bixa orellana* L.

2.0 Vernacular Names : Kesumba and pacar keling

3.0 Plant Description

A small tree, about 4 m tall. **Stem-bark** fibrous and covered with dark red scales when young. **Leaves** spirally arranged, glabrous, ovate with acuminate tips, 20 cm x 13 cm, petiole to 6 cm long with both ends swollen. **Inflorescences** at stem terminal, panicle of about 10 cm long with 1 to 3 flowers per branch; sepals 5, small to 2 mm in diameter and greenish-coloured; petals 5 to 2.5 cm x 1.8 cm, pink-coloured; stamens numerous with pink anthers and, yellow and pink filaments; ovary superior with a 1.5 cm long style. **Fruit** is a capsule with 2 carpels, red-coloured and covered with soft bristle, dehiscent when dried and splits into 2 parts releasing many seeds, each seed 5 mm in size and covered with orange-red aril.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on drained clay loam in full sun.

6.0 Chemical Constituents

Seed: Bixin, annatto and oil palmitin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The extracts of bark, leaves and seed have certain antibacterial substances.

7.2 Uses in traditional medicine

- The aril of the seed used as a purgative in West Malaysia. The leaves and stem-bark are boiled together with *Allium cepa* (onion) and *Nigella sativum* and consumed to relieve constipation.
- The leaves are sometimes mixed with 10 to 12 other herbs to make a decoction which is used to bathe the mother after childbirth.
- The red pigment of the seed aril is often used to colour the fingers for cosmetic purposes. It is also sometimes used in food colouring.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Crinum asiaticum L.
Amaryllidaceae

1.0 Scientific Name : *Crinum asiaticum* L.

2.0 Vernacular Names : Bakong and bawang hutan

3.0 Plant Description

A large rosette herb to 1.4 m tall. **Pseudostems** upright, up to 30 cm tall and 15 cm in diameter. **Leaves** equitant and spirally arranged; lamina linear with wavy margins and tapering to a pointed tip up to 1.7 m long and 15 cm at the widest part, glabrous, leathery and produces connecting thread-like sap when torn. **Inflorescences** a simple umbel of 8 to 12 flowers from the leaf-axil; stalk to 50 cm long and 4 cm across, oval-shaped in cross section and smooth; involucre 2, thin and papery, each to 5 cm x 2 cm; corolla tubular, light green in colour up to 12 cm long and splits into 6, 10 cm x 6 mm, white pendulous lobes; stamens 6 up to 8 cm long and extended.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on sandy loam in full sun and occasionally found growing on dry and sandy seashores above the waterline.

6.0 Chemical Constituents

Bulb: Alkaloid (lycorine, baconine) and tannins, crinamine, crinidine and haemanth-amine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- This herb is acrid tasting. It promotes blood circulation and reduces swellings.
- The leaf is used to treat sprained joints, bruised, pulled muscles or tendons as well as poultice for external wounds.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Curanga fel-terrae Merr.
Scrophulariceae

1.0 Scientific Name : *Curanga fel-terrae* Merr.

2.0 Vernacular Names : Hempadu tanah

3.0 Plant Description

Herbaceous spreading creeper with squarish stems. **Leaves** simple, opposite, ovate, to 9 cm x 5 cm with coarsely serrated margins. **Inflorescences** axillary with 4-10 stalked flowers; sepals 4, outer-most ovate-shaped, inner needle-like; corolla white and brown, upper lip narrow, lower lip broader and longer with 3 white lobes; stamens 2; staminoides 2. Capsules round with many seeds.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on moist sandy loam and occasionally found growing in shady places under trees and along edges of drains.

6.0 Chemical Constituents

The leaves contain curangin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- This herb is used by the Malays, Chinese and Javanese elsewhere for colic, snake-bite, headache, coughs, asthma and high blood pressure.
- The herb is soaked in hot water for half-an-hour and the infusion is traditionally taken orally once or twice a day.
- The leaves contain a bitter substance that stimulates the heart, liver and intestine, it is also diuretic and sudorific.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition.
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Cymbopogon nardus Rendle
Gramineae

1.0 Scientific Name : *Cymbopogon nardus* Rendle

2.0 Vernacular Names : Serai wangi

3.0 Plant Description

A quite straight tree, trunk solitary. **Leaves** pinately compound, leaflets numerous, glabrous. **Inflorescences** spathe double; male flowers very numerous, female flowers solitary at the base. **Fruits** avoid, brown, astringent and slightly bitter.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on sandy loam in full sun and establishes quickly into a bush.

6.0 Chemical Constituents

Analysis of the Java accession yielded 26.6-45 % geraniol and 25-54 % citronellal whereas Malaysia accession recorded 88.9% citronellal and geraniol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Infusion of the leaves is sometimes used in herbal bath for a mother after childbirth in order to regain health.
- Decoction of the stems is taken to treat certain stomach pains, especially in children.
- The sheaths are pounded and the poultice applied to the abdominal region. Consumption of food strongly flavoured by the sheaths is said to relieve indigestion and other stomach complaints.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Dioscorea hispida Dennst.
Dioscoreaceae


1.0 Scientific Name : *Dioscorea hispida* Dennst.

2.0 Vernacular Names : Ubi gadong

3.0 Plant Description

A long climber with thorny stems and large ground tubers. **Leaves** spiral; petiole up to 16 cm long and thorny: leaflets 3, all about 20 cm x 12 cm, scabrous, sunken veins above and raised veins below; mid-leaflet, obovate with acuminate tip and have 3 main veins; side-leaflets skewed-ovate with acuminate tips and have 5 main veins each. **Tuber** roundish when small, but elongate as they grow bigger, bunched at the base of the stem and often protruding above the ground. Each bunch may weigh up to 25 kg, yellowish white when fresh, turning dark-grey on exposure to the air.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

This widely distributed plant is often found in old lowland secondary forest and thrives on moist clay loam under shade.

6.0 Chemical Constituents

Tuber: Highly toxic alkaloids, dioscoreine and dioscoricine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- As a traditional remedy for piles, the tuber is washed and then scraped into a small clay-pot of water. An egg is put into the water which is then brought to boil and consumed.
- The poison on the other hand has been traditionally used as an antiseptic for sores in Malaysia.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam.* 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Euphorbia hirta L.
Euphorbiaceae


1.0 Scientific Name : *Euphorbia hirta* L.

2.0 Vernacular Names : Kulamatikan laki and kematikan

3.0 Plant Description

A tender herb with reddish-green, hairy, up to 30 cm long ascending stems. **Leaves** opposite with petioles up to 3 mm long; lamina elliptic and unsymmetrical, to 4.5 cm x 2 cm, both surfaces pubescent and margins serrated. **Inflorescences** an axillary compound umbel with numerous tiny, greenish flowers; calyx cup-shaped with 4 sepals, each with a red, disc-like structure attached; anther 4; ovary 3-lobed and held above the calyx by a stalk. **Seeds** red when ripe.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on sandy soils in full sunlight.

6.0 Chemical Constituents

- **Herb**: Gallic acid, quercetin, triacontane ceryl alcohol, phytosterin, phytosterolin, jambulol, melissic acid, palmitic acid, oleic acid, linoleic acid, euphosterol, xanthorhamnine, camphol and leucocyanidol.
- **Seed**: β-amyrin, friedelin, hentriacontane, myricyl alcohol, β-setosterol and taraxerol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The herb has a slightly bitter and sour taste and is slightly poisonous, anti-inflammatory, diuretic and anti-pruritic.

7.2 Uses in traditional medicine

- A poultice of the herb mixed with *Ceratopteris thalictroides* is applied topically to cure boils and reduce certain types of swellings.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Gendarussa vulgaris Nees
Acanthaceae

1.0 Scientific Name : *Gendarussa vulgaris* Nees

2.0 Vernacular Names : Sarimbangun hitam and sarimbangun laki

3.0 Plant Description

An upright shrub up to 1.5 m tall with many branches. Old stems light brown and slightly woody, young stems dark purple and swollen above the nodes. **Leaves** narrowly elliptic, opposite, up to 14 cm x 2.3 cm with wavy margins and purplish veins below. **Inflorescences** in terminal or upper axillary spikes, up to 10 cm long, with crowded flowers; sepals 5, narrow, up to 4 mm long and dark purple; corolla tube up to 1 cm long, 3 mm in diameter, purple with pink spots; petals 2, dorsal lobe elliptic with pointed tip, lip 3-lobed; stamens 2 with yellow anthers; style purple; ovary superior. Capsules club-shaped.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Often found growing on damp soil and under some natural shade. It thrives on clay loam soil.

6.0 Chemical Constituents

Alkaloid in the leaves, stems and roots. The decoction is slightly sour.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in Traditional Medicine

- A decoction of the twigs together with 7 to 10 other herbs is used as herbal bath for a mother after childbirth in order to restore health and to prevent post-natal depression (classified as one of the "uri" disorders by the local herbalists).

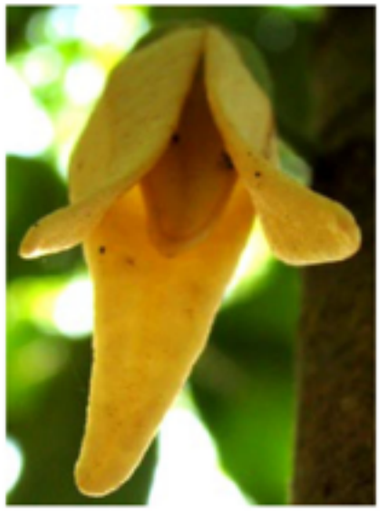
8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Goniothalamus macrophyllus Hook
Annonaceae

1.0 Scientific Name : *Goniothalamus macrophyllus* Hook

2.0 Vernacular Names : Limpanas putih

3.0 Plant Description

A small tree up to 5 m tall, straight and non-branching with greyish smooth lower stem and green young stem. **Leaves** alternate on plane, up to 35 cm x 15 cm oblanceolate, glabrous with prominent ribs and veins; petioles grooved, up to 2.5 cm long. **Flowers** singly from the leaf-axils and scented; stalk green, up to 1.3 cm long; sepals 3, spade-shaped and green; petals in 2 whorls; outer petals 3, yellow, to 4 cm x 1.6 cm; inner petals 3, smaller to 3 cm x 1.2 cm yellow with purple patches inside and stamens numerous.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

Often found in primary or secondary forests under heavy shade of the higher canopy.

6.0 Chemical Constituents

The leaves and bark emit pungent smell when ruptured. No information on the chemical content of this plant has been found.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The stem also have repellant powers against snakes and wild animals.
- The smoke from the simmering branches is sometimes used to relieve fits in children. It is believed that the twigs protective powers against evil spirits.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Hemigraphis colorata (Blume) H. G. Hallier
Acanthceae

1.0 Scientific Name : *Hemigraphis colorata* (Blume) H. G. Hallier

2.0 Vernacular Names : Seliwah and seliwah merah

3.0 Plant Description

A straggling much branched herb that seldom reaches 30 cm above the ground. **Stem** cylindrical, sometimes squarish, up to 4 mm in diameter, purple-coloured and scabrous. **Leaves** opposite; petiole up to 3 cm long, purple-coloured and scabrous; lamina broad-cordate with toothed margins to 7 cm x 5 cm, upper surface greenish-purple and generally scabrous, lower surface glabrous, purple-coloured and have prominent veins. **Inflorescences** at stem terminal, a 3 cm long panicle on a 3.5 cm long peduncle, flower opposite with 2 per bract-axil; bracts relatively large to 2 cm x 7 mm, elliptic, glabrous and purple; sepals 5, up to 1 cm long and narrow; corolla tube to 2 cm long, white with few purplish longitudinal strips on the inside, petals 5 and joined at the throat, to 1.4 cm across and white-coloured.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on moist sandy or clay loam with little shade and often grown in the garden for its aesthetic value in landscaping.

6.0 Chemical Constituents

- The leaves contain a large amount of potassium salts and are considered diuretic.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Decoction of the leaves has a cooling effect and used to wash the head for headache and certain types of fever.
- In West Malaysia, the decoction is traditionally taken for excessive menstruation and applied externally for skin complaints.
- The leaves are also consumed as cure for gallstones.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Impatiens balsamina L.
Balsaminaceae


1.0 Scientific Name : *Impatiens balsamina* L.

2.0 Vernacular Names : Bunga pacar

3.0 Plant Description

A tender herb up to 70 cm tall with upright stem and spreading branches. **Leaves** spirally arranged; lamina to 10 cm x 2.3 cm, narrowly elliptic, puberulent, both ends narrowly acuminate with serrate margins. **Flowers** singly from leaf-axils; stipules 2, at the base of 1 cm long stalk; sepals 3, boat-shaped, unequal in size with a curved spur each; petals 3, side-petals lobed and overlapping, central petal bears a tiny spur. Colours of petals may be pink, white or mauve with 5 stamens joining at the anthers; ovaries superior. **Fruits** a spindle-shaped capsule, up to 2 cm long and 1 cm in diameter which opens elastically when ripe is ejecting the dark brown seeds.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild, thrives on sandy loam in full sunlight and flowers regularly.

6.0 Chemical Constituents

Bark, flowers and leaves contains cyanophoric acid whereas leaves possess 2-methoxy-1, 4-naphthol quinone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The herb is bitter, warm and mildly toxic and promotes blood circulation and reduces swellings.
- The leaves are pounded, mixed with lime and brushed on the finger nails to strengthen the nails and prevent them from cracking and for cosmetic purposes.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam.* 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Lophatherum gracile Brongn.
Gramineae

1.0 Scientific Name : *Lophatherum gracile* Brongn.

2.0 Vernacular Names : Rumput buluh, rumput padi and rumput kelurut.

3.0 Plant Description

A perennial grass with many culms, each to about 60 cm tall is bearing 5–7 leaves. **Leaves** linear, to 20 cm x 2 cm with parallel veins. Inflorescences in terminal panicles with widely spaced alternating pedicles; spikelets green, narrow, cylindrical and compact. Lower flowers have short, stiff glumes. **Roots** fibrous with small spindle-shaped tubers, each up to 3 cm x 4 mm.

4.0 Propagation : Seed or dividing the culm

5.0 Ecology/ Geographic Distribution

Often found growing at the edge of the forest and along forest paths. It thrives on sandy loam with some shade.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Decoction of the whole herb is anti-pyretic, anti-inflammatory and diuretic.
- The tubers are slightly sweet and cooling.

7.2 Uses in traditional medicine

- The Chinese consider the herb as a carminative for relieving colic and griping and also as a stomachic.
- To cure cough, the tuber is washed and eaten fresh or it is boiled with water and the resultant decoction is taken orally as a traditional remedy.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Passiflora foetida L.
Passifloraceae

1.0 Scientific Name : *Passiflora foetida* L.

2.0 Vernacular Names : Pengarut and timun dendang

3.0 Plant Description

A 2-3 m long herbaceous creeper with hairy stems and axillary tendrils. **Leaves** alternate, heart-shaped in outline with 3 lobes, up to 12 cm x 8 cm, pubescent on both surfaces. **Flowers** singly from leaf-axils; bracts 3-segmented, pinnately divided into glandular filaments which completely enclose the flower buds and fruits; petals 5, up to 2 cm long, white with purplish veins; corolla filamentous and numerous; stamens 5; stigmas 3. Berrries, subspherical up to 2 cm in diameter with pulp and black seeds inside.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on most soils and climbs with tendrils.

6.0 Chemical Constituents

- **Herb**: Chrysoenol, apigenin, isovitexin, vitexin, 2-xylosylvitexin, 2-xylosylisovitexin, luteolin-7-beta-D glucose, kaempferol, luteolin, isoschaftoxide, vicenin, glucose, galatose and saccharose.
- **Fruits:** Hydrocyanic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The whole herb is anti-inflammatory, diuretic and analgesic.

7.2 Uses in traditional medicine

- The fresh, ripe fruits are eaten to relieve constipation.
- A decoction of the leaves is taken for coughs.
- The macerated leaves are used for poulticing external sores.

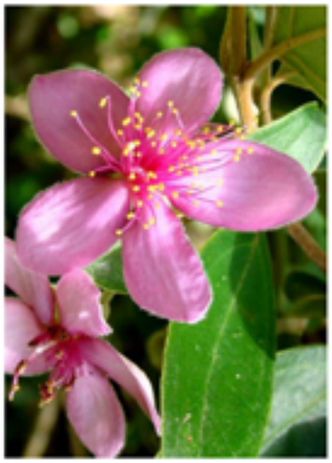
8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam.* 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Rhodomyrtus tomentosa (Ait.) Hassk
Myrtaceae

1.0 Scientific Name : *Rhodomyrtus tomentosa* (Ait.) Hassk

2.0 Vernacular Names : Keramunting

3.0 Plant Description

A small tree with straggly branches, up to 4 m tall, but often dwarfted forming a small bush. **Leaves** opposite; petiole up to 5 mm long; lamina up to 5 cm x 2.8 cm, oblong with cuneate base and retuse apex, glabrous and green above, puberulent and grey below. **Flowers** 2 per leaf-axil; stalk to 1.2 cm long; bracts 2, oval; sepals 5 roundish up to 6 mm in diameter and green-coloured; petals 5, oblong-oval, up to 1.6 cm x 1 cm and purple; filaments numerous, to 1.3 cm long purple with yellow anthers; style white and purple, to 1.3 cm long; ovary inferior. **Fruits** rounded with persistent bracts and sepals, dark purple when ripe with many seeds.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

Commonly found on dry sandy soil near the coast or on open heathland.

6.0 Chemical Constituents

Leaves: lupeol, β-amyrin, campesterol, stigmasterol, sitosterol, β-amyrenonol, betulin, friedelin, α-amyrin, taraxelol and betulin diacetate.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The leaves are pounded and the juice is taken orally to alleviate anaemia, especially after illnesses.
- The fresh fruits are eaten for the same purpose and they are also applied externally to accelerate wound healing.

8.0 Contraindication : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Stachytarpheta jamaicensis (L.) Vahl.
Verbenaceae


1.0 Scientific name : *Stachytarpheta jamaicensis* (L.) Vahl.

2.0 Vernacular names : Selasih hutan and selasih dandi

3.0 Plant Description

A straggly shrub let, up to about 1.6 m tall with scurfy stems. **Leaves** opposite, elliptic, toothed, up to 6 cm x 4 cm with lamina tapering to the bases of the petioles. **Inflorescences** in terminal spike, up to 40 cm long; bracts ovate-lanceolate, up to 5 mm long; calyx pale green, hidden by the bracts; corolla tube up to 8 mm long and pale blue; petals 5, round, spreading 6 mm across, deep blue-coloured with white mouth; stamens 2. **Fruits** up to 6 mm long, enclosed in the calyx.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Grows on wasteland near the coast on sandy soil and thrives in full sunlight.

6.0 Chemical Constituents

- Leaf extracts contain gamma-amino butyric acid which increases blood pressure, and tarphetalin.
- The leaves also contain alkaloid, saponins, steroids and triterpenes.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-bacterial activities.

7.2 Uses in traditional medicine

- A decoction of the whole herb is taken for diabetes, headaches and for "cooling".
- Macerated leaves are used for treating external ulcers and wounds.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Stenochlaena palustris Bedd.
Blechnaceae

1.0 Scientific Name : *Stenochlaena palustris* Bedd.

2.0 Vernacular Names : Lamiding

3.0 Plant Description

A scrambling fern with a long green stolen which has roots formed at irregular intervals without visible nodes. Very young **frond** are coiled. Newly opened fronds are bright red. Sterile fronds pinnate, up to 75 cm long; pinnae glabrous, lanceolate with narrow acuminate tips, up to 16 cm x 3.6 cm, with sharply toothed margins. Fertile fronds up to 60 cm x 3.6 cm with pinnae up to 25 cm x 4 mm. **Sporangia** in 2 thick bands on the under surface of the lamina, are brown in colour.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

Can be found climbing on trees at edges of forests and thrives on acidic soil.

6.0 Chemical Constituents

The young fronds have a high nutritive value for their vitamin C, dried protein, carbohydrate, fat and iron content.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The young fronds are wrapped in layers of banana leaves and baked over hot charcoal. When cooked, the fronds are eaten by the mother at the later stage of pregnancy in order to prevent excessive growth (size) of the fetus, thus possibly facilitating easy birth. The young fronds are also consumed as a vegetable.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam.* 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Tacca bibracteata Drenth
Taccaceae

1.0 Scientific Name : *Tacca bibracteata* Drenth

2.0 Vernacular Names : Teliwah

3.0 Plant Description

A perennial rosette herb to about 90 cm tall with fibrous roots without a tuber. **Leaves** elliptic and glabrous, up to 32 cm x 15 cm. **Inflorescences** axillary, with upright peduncle up to 18 cm long; bracts in 3 sets; outer-most involucral bracts 2, opposite, ovate, sessile up to 5 mm x 4 cm; inner involucral bracts 2, opposite, up to 5 mm wide at base and tapering in to thread 18 cm long; filiform bracts 20, thread-like, each 19 cm long; corolla tubular; sepals 3, purplish-green and spade-shaped; petals 3, outwardly folded; stamens adnate and purple; stigma purple with 6 lobes; ovary inferior.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It thrives on moist sandy soil and undergrowth along the edges of stream in primary forest.

6.0 Chemical Constituents

The roots contain alkaloid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The Malays in Malaysia use pulped tubers as a traditional remedy for a rash caused by certain caterpillars. The roots are cut into small pieces and soaked in cold or warm water for several hours.
- The infusion is used to wash the head to relieve headache, heartiness and mouth ulcer in children.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam. 2000.* Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Tetrastigma planicaule (Hook.) Gagnep
Vitaceae

1.0 Scientific Name : *Tetrastigma planicaule* (Hook.) Gagnep

2.0 Vernacular Names : Badi terbang and akar badi terbang

3.0 Plant Description

A medium sized vine which reaches to a great height in the forest. **Stem** stout, flattened with swollen nodes, up to 4 cm wide and 1.4 cm thick, green and smooth-textured when young; older stem straw-coloured with 1 cm wide cork formation on both sides. **Leaves** alternate, palmate; petiole up to 15 cm long, swollen and curved at the base; leaflets 5, sometimes 4; lamina glabrous, elliptic with acuminated tip and about 18 cm x 7 cm. Tendril leaf-opposed, up to 25 cm long, coiled and very tough. **Inflorescences** a flat-topped umbel from leaf-axil; flowers numerous, small, green-coloured with 4-lobed perianth. **Fruits** round, up to 1.2 cm in diameter which turns black when matured.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It can be cultivated on clay loam with good drainage and some shade.

6.0 Chemical Constituents

No information on the chemical contents of this species was documented. The leaves taste sour and are mildly astringent. A related species, *Tetrastigma hookeri*, from Malaysia was found to contain some alkaloids in the stem.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-rheumatic, muscles relaxing and blood circulation promoting properties.

7.2 Uses in traditional medicine

- The cork and dried bark of the stems are pounded and taken together with betel nut in a traditional remedy to treat hernia (especially in women).
- The whole stem is reduced to ash, mixed with coconut oil and rubbed on the lower abdomen. This paste is also used to rub on the baby's abdominal region to treat colic, "wind" in the stomach and swollen stomach.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam* – Revised Edition (2000)
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Tinospora crispa Miers. Ex H. & T.
Menispermaceae

1.0 Scientific Name : *Tinospora crispa* Miers. Ex H. & T.

2.0 Vernacular Names : Ratnawali and aratnawali

3.0 Plant Description

A climber with long twining stems, old stems brownish and smooth, young stems green and characterized by protruding pores on the bark. **Leaves** alternate with petioles up to 7 cm long and swollen at the bases; leaf-blades cordate, glabrous, up to 15 cm x 14 cm with abruptly acuminated tips. **Flowers** dioecious, light yellow, arise from leaf-axils. **Fruits** oval, to about 1 cm long with small uneven lumps.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

It grows on most soil type with some shade.

6.0 Chemical Constituents

The bitter constituent of the stems is likely a glucoside, not berberine. Another species, *Tinospora cordifolia* contain gilloin, giloinin, giloinsterol, tinosporine, β-sitosterol tinosporidine (fresh stems), cordifol and cordifolone (dried stems). The leaves of *Tinospora crispa* contain alkaloid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-rheumatic, muscles relaxing and blood circulation promoting properties.

7.2 Uses in traditional medicine

- Reduce high blood pressure, cure diabetes and certain abdominal pains (could be gastric pains). It may be taken together with some honey or other food to mask the extremely bitter taste.

8.0 Contraindications : Not available

9.0 Dosage : The young stem is eaten fresh, at a dose of about 1 cm in length for every 12 hours to reduce high blood pressure, cure diabetes and abdominal pains

10.0 Bibliography

- *Medicinal Plants of Brunei Darussalam*. 2000. Revised Edition
- Brunei Agriculture Research Centre, Kilanas. Department of Agriculture & Agrifood Ministry of Industry and Primary Resources.

Cambodia

Acalypha indica L.
Euphorbiaceae

1.0 Scientific Name : *Acalypha indica* L.

2.0 Vernacular Names : Sok Chhma

3.0 Plant Description

Plant herb, 40 to 100 cm height, erect and many branches. **Leaves** soft, round, acute, serrulate, 3 to 5 cm long and 2.5 to 4 cm wide and long petioles. **Flowers** grow from the stems and axils, long petioles and small leaves at the axils.

4.0 Propagation : Seed

5.0 Ecology/Geographic Distribution

Villages, farms and wetlands.

6.0 Chemical Constituents

Stem contains acalyphine, glucoside, cyanogenetic, triacetonamine, hydrogen cyanide and a poisonous unidentified component.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Plant is traditionally used for cough, expectorant, laxative, dyspnea, heal, bronchitis and pneumonia.

8.0 Contraindications: Not available

9.0 Dosage:

- Apply 15 to 30 g of macerated fresh leaves is to be applied on the wound or affected area to treat snake bites or scabies respectively.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia.*

Aloe vera L.
Liliaceae

1.0 Scientific Name : *Aloe vera* L.

2.0 Vernacular Names : Prateal kantuy krapeu

3.0 Plant Description

A stemless herb. **Leaves** lanceolate, large, thick, fleshy, sessile, apex sharp and spiny margin. **Inflorescences** raceme, scape longer than the leaves, dense flowers yellow or orange cylindrical.

4.0 Propagation : Leaf

5.0 Ecology/Geographic Distribution

Herb with succulent leaves found in China and other countries, introduced in Indochina and cultivated in gardens as ornamental. Widely cultivated in central Cambodia.

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-hyperlipoproteinaemic agent and indigestion.

7.2 Uses in traditional medicine

- Hypertension, menstrual disorders, eye and ear diseases, constipation, numbness, paresis, paralysis, skin diseases/disorders, menorrhagia and as tonic.
- In local medicine the leaves have the reputation to be laxative, stimulates milk secretion and antidote against poison.

8.0 Contraindications : Not available

9.0 Dosage

- Fresh leaves are used in the preparation of medicated paste by the ratio of about 30 %. Such paste is orally taken in dose of 0.5 g.
- Jelly of fresh leaf is externally used as skin lotion cream.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Alpinia galanga (L.) Willd.
Zingiberaceae

1.0 Scientific Name : *Alpinia galanga* (L.) Willd.

2.0 Vernacular Names : Rum deng

3.0 Plant Description

Perennial herb. **Leaves** alternate oblong lanceolate, upper surface glabrous and shining greenish with. **Fruits** globose or ovoid. **Rhizomes** cylindrical, stout, aromatic and covered with scales.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Herb cultivated in South East Asia

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Indigestion, flatulence, dyspepsia, colic, nausea, vomiting, diarrhea, cough, haemoptysis, fever, allergic reaction, laxation and as blood purifying agent.

8.0 Contraindications : Not available

9.0 Dosage

- Stem or flower powder is orally taken in a dose of 1 to 2 g for indigestion, flatulence, vomiting and colic.
- Decoction of rhizome, together with sugar is orally in a dose of 15 to 30 ml or dried powder in a dose of 1 to 2 g for cough, fever and menstrual disorders.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia.*

Areca catechu L.
Palmae

1.0 Scientific Name : *Areca catechu* L.

2.0 Vernacular Names : Sla

3.0 Plant Description

A quite straight tree, trunk solitary. **Leaves** pinnately compound, leaflets numerous, glabrous. **Inflorescences** spathe double; male flowers very numerous, female flowers solitary at the base. **Fruits** avoid, brown, astringent and slightly bitter.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

Cultivated in many areas of Cambodia for its fruits.

6.0 Chemical Constituents

Not available.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Fruits are traditionally used for oliguria, dysuria, indigestion, gingivitis, gastrointestinal tract bleeding, menorrhagia and skin infections.

8.0 Contraindications : Not available

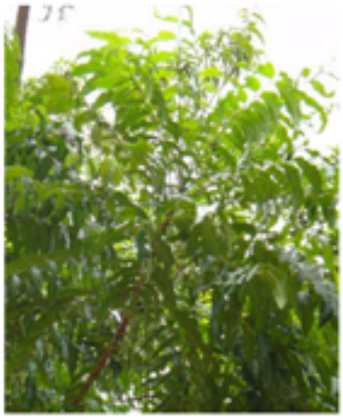
9.0 Dosage

- Drink 9 to 12 ml macerated fruit decoction to treat oliguria, dysuria and indigestion.
- Consume 1/2 tea spoonful ash of fruits with jaggery to stop gastrointestinal tract bleeding.
- Decoction of matured fruit is taken in dose of 150 to 450 ml for menstrual disorders.
- Ash of fruit is externally used for skin infection with coconut oil.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Azadirachta indica A juss.
Meliaceae



1.0 Scientific Name : *Azadirachta indica* A juss.

2.0 Vernacular Names : Sdau

3.0 Plant Description

A large tree with a straight trunk, 2–6 m tall. **Leaves** pinnate, 5–6 leaflets pairs, opposite, ovate, lanceolate, sessile or sub-sessile, acuminate, serrate edge, oblique, glabrous. **Flowers** white, numerous. **Fruits** drupes, oval and elongated yellowish green. Seed single, linear oblongoid.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Found in sunny areas or secondary forest in South-East Asia. Naturalized in many areas especially in the middle parts of Cambodia.

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Leaves and flowers are consumed as salad. Both parts are also used to treat diabetes, skin diseases, malaria, fever, dysentery, colic, round worm, pin worm, injuries and oedema.
- Slurry of bark is externally used in inflammation and injuries.

8.0 Contraindications: Not available

9.0 Dosage

- 200 to 400 ml decoction of leaves and flowers or 5 to 10 mg dry powder are consumed for diabetes and antiseptic purposes.
- 300 to 600 ml of leaves and flowers ash solution are applied externally for malaria, fever and dysentery.
- 4 to 6 mg dried powder with honey is orally taken for colic and anti-helminthic.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Coleas aromaticus (Roxb.) Benth.
Labiatae

1.0 Scientific Name : *Coleas aromaticus* (Roxb.) Benth.

2.0 Vernacular Names : Chi trachiek chruk

3.0 Plant Description

A perennial herb, shrubby below, hispidly villous or tomentose, fleshy. **Leaves** broadly ovate, cordate, crenate fleshy, aromatic. **Inflorescences** close paniculate or racemose or densely many flowered cymes, flowers blue, minute. **Fruits** calyx sub-erect.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Originated from the Moluccas, grow wild among shrub, cultivated as medicinal plant.

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Cough, fever, asthma, tinnitus, earache and as topical agent.
- The leaves' juice sweetened, is applied on the children's lips to protect them from cold.

8.0 Contraindications : Not available

9.0 Dosage

- Crushed fresh leaves together with sesame oil is externally applied on children' foreheads for fever.
- Fresh leaves juice in a dose of 2 to 4 tea spoonful a day for cough, asthma, fever and arthritis.
- It can also be used as ear-drop.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Heliotropium indicum L.
Boraginaceae

1.0 Scientific Name : *Heliotropium indicum* L.

2.0 Vernacular Names : Pramaoy damrei

3.0 Plant Description

A succulent annual herb. **Stems** stout ascending branches more or less densely rough spreading hairs. **Leaves** alternate, ovate or ovate-oblong, few scattered hairs on above, minutely soft hairs beneath, wavy margins. **Flowers** pale violet, numerous, densely arranged on the stalk. **Fruits** deeply 2 lobed, each lobe compressed.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Ruderal pantropical herb, the inflorescence evokes the form of an `elephant trunk'. Found wild as a weed among grass along the roadsides.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Anti-inflammatory, oliguria, hematuria and oedema due to renal related diseases.

8.0 Contraindications : Not available

9.0 Dosage

- Dried powder in a dose of 3 – 6 mg or decoction in a dose of 200 – 400 ml are orally taken for urinary diseases.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Ixora chinensis L.
Rubiaceae

1.0 Scientific Name : *Ixora chinensis* L.

2.0 Vernacular Names : Pkaa kamrotehs

3.0 Plant Description

Shrub, 0.5–2.0 m tall. **Leaves** are ovate to oblong or an ovate, with a sub-cordate base and obtuse apex. **Flowers** have triangular calyx lobes that are lanceolate or ovate-lanceolate and are orange to scarlet white, yellow or pink. This species is often cultivated for its beautiful flowers. **Fruits** are edible.

4.0 Propagation : Seed and stem cutting.

5.0 Ecology/ Geographic Distribution

Grows in the undergrowth of dense forest in Southeast Asia as well as in Cambodia.

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The leaves and flowers are often used effectively against headache and womb related problems.
- A decoction of the roots is used after childbirth
- Infusion of the fresh flowers is reputedly used to treat incipient tuberculosis and hemorrhages.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Mentha cordifolia Opiz.
Labiatae

1.0 Scientific Name : *Mentha cordifolia* Opiz.

2.0 Vernacular Names : Chii angkaam

3.0 Plant Description

Herb with ascending or lying stalk, 10–60 cm long, aromatic creeping herb with quadrangular stem, 10–30 cm high, brownish purple and branchy. **Leaves** are simple, opposite, broadly elliptic, 1.5–2.5 cm wide and 2–3 cm long with many sunken nerves on the upper surface, serrate-dentate and aromatic. **Flowers** are small and violets. **Fruits** ellipsoid nutlets and are often used as condiments.

4.0 Propagation : Seed and stem cutting

5.0 Ecology/ Geographic Distribution

This plant grows domestically and is not commercially available in Cambodia.

6.0 Chemical Constituents

Essential oil, menthol and menthone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Indigestion, flatulence, dyspepsia, colic, nausea, vomiting, diarrhea, cough, haemoptysis, fever, allergic reaction, laxation, as blood purifying agent.
- The whole plant is reportedly used as a carminative, anti-flatulent and normally applied to relative headaches.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Moringa oleifera Lam.
Moringaceae


1.0 Scientific Name : *Moringa oleifera* Lam.

2.0 Vernacular Names : Mrum

3.0 Plant Description

Tree, 3 to 10 m tall, a small middle side tree, bark corky. **Leaves** tripinnate, leaflets opposite, deciduous, elliptic or obovate. **Flowers** while in large puberrulous panicles. **Fruits** long pods with ribs. **Seeds** tri-angled, the angles winged.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Originated from India and Pakistan, introduced into Southeast Asia where it is planted as ornament. In grows wild or extensively cultivated throughout Cambodia.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Menstrual disorder, tingling and numbness, oedema, dry cough, menorrhagia, hypertension, promotes spermatogenesis and to improve memory.
- The bark is formulated into tonic drink for post-partum treatment.

8.0 Contraindications : Not available

9.0 Dosage

- Decoction of root and bark together with jaggery in a dose of 100-200 ml for menstrual disorders. Slurry of root or bark is externally used for oedema tingling and numbness.
- Leaves, flowers and fruits are commonly used as vegetable and salad for the tonic purposes.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Ocimum tenuiflorum L.
Zingiberaceae

1.0 Scientific Name : *Ocimum tenuiflorum* L.

2.0 Vernacular Names : Mreah praow

3.0 Plant Description

An erect herbaceous plant, 30–60 cm tall. **Leaves** are elliptical, oblong, acute or obtuse, pubescent on both sides. **Flowers** are very small, purplish in longelose racemes. **Fruits** nutlets which are sub-globose or broadly elipsoid, with a pale brown colour.

4.0 Propagation : Seed and stem cutting

5.0 Ecology/ Geographic Distribution

Cultivated in the tropical regions of Cambodia for domestic use.

6.0 Chemical Constituents

Apigenin, apigenin-7-0-glucuronide, citric acid, fumaric acid, lucteolin and phenols. Essential oils include, camphor, carvacrol, caryophyllene, apinene, terpenen-4-ol, linalool and methyl chavicol. Fatty acids include stearic, myristic, palmitic, oleic, cholesterol and stigmasterol. Flavonoids include galutcolin, cirsilineol, gallic acid and gallic acid methyl.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Indigestion, flatulence, dyspepsia, colic, nausea, vomiting, diarrhea, cough, haemoptysis, fever, allergic reaction, laxation, as blood purifying agent.
- Leaves, flowers and fruits are commonly used as vegetable and salad for the tonic purposes.
- Slurry of root or bark is externally used for oedema tingling and numbness.

8.0 Contraindications : Not available

9.0 Dosage

- Decoction of root and bark together with jaggery in a dose of 100 to 200 ml for menstrual disorders.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Orthosiphon aristatus (Blume)
Labiatae

1.0 Scientific Name : *Orthosiphon aristatus* (Blume)

2.0 Vernacular Names : Pukmoet chma chrung

3.0 Plant Description

A perennial herb, stem 4-angled. **Leaves** opposite in distant pairs, ovate to ovate-acuminate, coarsely toothed margins, base cuneate. **Inflorescences** close whorled raceme; flowers purplish white. **Fruits** nutlets, broadly oblong, compressed.

4.0 Propagation : Seed and stem cutting

5.0 Ecology/ Geographic Distribution

Cultivated as a medicinal herb.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Diabetes and inflammation. Crush fresh leaves are externally used for ulcer and sore to reduce inflammation.

8.0 Contraindications : Not available

9.0 Dosage

- Decoction in a dose of 300 to 500ml or dried powder in a dose of 3 to 6 mg is orally taken for diabetes.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Phyllanthus urinaria L.
Euphorbiaceae

1.0 Scientific Name : *Phyllanthus urinaria* L.

2.0 Vernacular Names : Prakplae

3.0 Plant Description

A monoecious, generally annual, and usually erect herb up to 60 cm tall with phyllanthoid branching. **Leaves** are oblong or elliptical-oblong to elliptical-obovate, 4 to 20 mm long and 3 to 6 mm wide, obtuse to rounded and sometimes slightly unequal at base with a rounded apex. **Flowers** are solitary and anther free.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Annual herb grows on free land, farmland or garden of the tropical region.

6.0 Chemical Constituents

Almost similar constituents to *P. amarus.*

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-hyperglycaemic, anti-microbial, indigestion and reduce appetite. The extracts possess anti-viral and analgesic properties.

7.2 Uses in traditional medicine

- Indigestion, flatulence, dyspepsia, colic, nausea, vomiting, diarrhea, cough, haemoptysis, fever, allergic reaction, laxation and as blood purifying agent.
- In traditional Cambodian medicine, the infusions of the plant are used to treat liver diseases, diarrhea and malaria.
- The seed are used to facilitate deliveries.
- The leaves have reportedly been used to improve blood circulation, treat skin diseases, chronic cough and liver diseases.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Piper lolot C. DC.
Piperaceae

1.0 Scientific Name : *Piper lolot* C. DC.

2.0 Vernacular Names : Chaplu

3.0 Plant Description

Herb, 50 to 80 cm tall. **Leaves** are simple, altemate, cordate, 5 to 10 cm wide and 7 to 15 cm long. **Inflorescences** in auxiliary spike are tubular and unisexual. **Fruits** obovoid berries.

4.0 Propagation : Seed and stem cutting.

5.0 Ecology/ Geographic Distribution

Cultivated in Cambodia as condiment and culinary herb.

6.0 Chemical Constituents

Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- **Roots**: Anti-dysenteric.
- **Whole plant** to stimulate intestinal movements and relaxes skeletal muscle.

7.2 Uses in traditional medicine

- An ingredient for cough remedy, the leaves as carminative and to treat ulcers.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Platycladus orientalis (L)
Gymnospermes

1.0 Scientific Name : *Platycladus orientalis* (L)

2.0 Vernacular Names : Kantuy damrey

3.0 Plant Description

Shrub, 2 to 8 m tall. **Leaves** like fish scale, alternative or opposite, 4 rows. **Flowers** fragrance, yellow, violet, round and terminal**. Fruits** obovate and gray when ripe.

4.0 Propagation : Seed and stem or branch cutting.

5.0 Ecology/ Geographic Distribution

- Originating from Central Asia, cultivated as ornamental.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Leaves are used to stop bleeding (menstruation, cough with blood, vomiting of blood and blooding feces).
- Seed are used for insomnia, menorrhagia, cold, sweat, neurasthenia and constipation.

8.0 Contraindications : Not available

9.0 Dosage

- Leaves: 6 to 12 g. Seed: 4 to 12 g.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Plumeria alba L.
Apocynaceae


1.0 Scientific Name : *Plumeria alba* L.

2.0 Vernacular Names : Champey saa

3.0 Plant Description

Shrub, 2 to 8 m tall. It has many thick branches which are sometimes deciduous. The white flowers are a part of ritual offerings to the deities; necklaces are sometimes made out of it to decorate the coffins.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

American origin, cultivated as decorative, especially in the pagoda. Introduce into Cambodia and is often cultivated as a decorative plant, especially in the Buddhist monasteries.

6.0 Chemical Constituents

- Alkaloids and glycosides.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Studies conducted have shown potential anti-viral properties.

7.2 Uses in traditional medicine

- Flowers are edible, in the form of fritters.

- The heart of the wood is used as a vermifuge.
- The plants milky bark latex is applied as a plaster over hard tumours and used to dispel indolent swelling.
- Internally, the root-bark is a strong purgative and used as laxative.

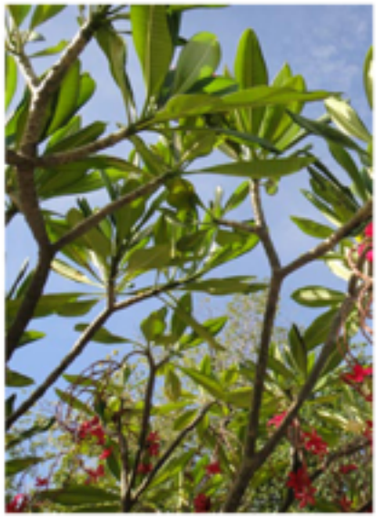
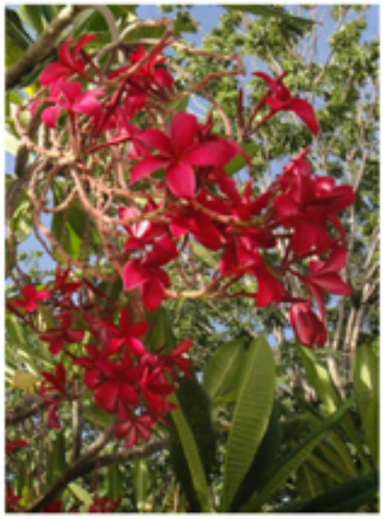
8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Plumeria rubra L.
Apocynaceae

1.0 Scientific Name : *Plumeria rubra* L.

2.0 Vernacular Names : Champey krahaam

3.0 Plant Description

Shrub, 2 to 8m tall. It has many thick branches which are sometimes deciduous. Edible flowers in fritters. **Leaves** are alternate and up to 35 cm long. The red **flowers** are strongly scented and have up to five petals, width 5 cm in diameter.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

American origin, cultivated in the tropical regions (also in Cambodia) for its beautiful red flowers.

6.0 Chemical Constituents

- The latex contains triterpenses lupeol and lupeol acetate.
- The essential oil of the leaves contain monoterpenes, such as geraniol and citronellol.
- The stem and bark contains fulvoplumeride, which is a novel iridoid.
- The plant also contains agoniadin, plumeride, plumeric acid, ceratonic acid and lupeol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Infusion of the leaves have smoothing properties. A decoction of the scraped bark is used against scabies.
- The plant has also reportedly been used to treat conjunctivitis.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Sanseviera trifasciata L.
Liliaceae

1.0 Scientific Name : *Sanseviera trifasciata* L.

2.0 Vernacular Names : Pra teal puors krai

3.0 Plant Description

A perennial herb. **Leaves** acuminate, 2.5 to 8 cm wide and 30 to 120 cm long, white blotched dark green. **Flowers** with 30 to 80 cm high, white mix green. **Inflorescences** from 3 to 8 flowers in a pedicle. **Fruits** are rounded.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild and is cultivated as decorative.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Leaves are used for cold, cough, bronchitis, carbuncle, centipede or snake bite.
- Rhizome are used for rheumatism and numbness.

8.0 Contraindications : Not available

9.0 Dosage

- Wash 15 to 30 g with water, dry, chop, boil and drink the decoction.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Sauropus androgynus (L.) Merr.
Euphorbiaceae

1.0 Scientific Name : *Sauropus androgynus* (L.) Merr.

2.0 Vernacular Names : Ngup

3.0 Plant Description

Shrub, 0.8–2 m tall, erect slender woody stem, basal branches. **Leaves** alternate, piannte, ovate-lanceolate, tip acute, base obtuse. **Inflorescences** axillary clustered yellowish-redflower. **Fruits** globose, berry white tinged with pink color. **Seeds** are ovoid.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild in the secondary formations and deforested places of Southeast Asia and also cultivated in many places.

6.0 Chemical Constituents

- Not available

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The leaves are used as culinary spices. They are generally singed before being added to liquid dishes or "samlor" to flavour them.
- The fruits are edible, they are used in some countries to make jams.
- In traditional medicine, the roots are used in decoction as febrifuge. It is also used to treat hepatitis and jaundice, gastric bleeding, urinary disorder, oedema, ringing ear, earache, constipation and stiffness.

8.0 Contraindications : Not available

9.0 Dosage

- 10 to 15 mg of dried powder or 45 to 75 ml of decoction to be consumed daily.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Thevetia peruvana (Pers.) Schum.
Apocynaceae


1.0 Scientific Name : *Thevetia peruvana* (Pers.) Schum.

2.0 Vernacular Names : Yithao phka loeung

3.0 Plant Description

Shrub, 1–3 m tall. **Leaves** spirally arranged crowed, linear, petiole minute. **Inflorescences** terminal cymes, flowers yellow. **Fruits** ovoid or elliptic. **Seeds** 4 or fewer by suppression.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

American origin, cultivated as decorative in the warm and temperate regions. Cultivated in garden or roadside for its elegant foliage and beautiful flowers.

6.0 Chemical Constituents

- The latex and the seed are toxic.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Nasal spray for sinusitis and menstrual cramps.

8.0 Contraindications : Not available

9.0 Dosage

- 100 to 200 ml decoction of the roots daily for menstrual cramps.

10.0 Bibliography

- *Cambodia Medicinal Plants*. 2006. Ministry of Health, National Center of Traditional Medicine.
- Dy Phon Pauline. 2000. *Plants Used in Cambodia*.

Indonesia

Abrus precatorius L.
Fabaceae

1.0 Scientific Name : *Abrus precatorius* L.

2.0 Vernacular Names : Saga (Indonesia), saga telik/manis (Java), thaga (Aceh), areuy saga, saga leutik (Sunda), walipopo (Gorontalo), piling-piling (bali), seungeu (Gayo), ailalu pacar (Ambon), buncik saga, saga ketek (Minangakabau) & kaca (Bugis).

3.0 Plant Description

Small to medium size tree. **Leaves** are compound, oval and small in size resembling *Tamarindus indica* leaves (usually called sweet saga). **Flowers** with a shape resembling a butterfly. **Seeds** are slick red in colour with shiny black dot.

4.0 Propagation : Seed

5.0 Ecology/ Geographical Distribution

Grows wild in many forests at lowland areas up to an altitude of 1000 m above sea level.

6.0 Chemical Constituents

- Leaves and roots: protein, vitamins A, B1, B6, C, calcium oxalate, glisirizin, flisirizinat, polygalacturomic acid and pentosan).
- Seeds: abrin (a toxic substance).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Natural contraceptive for women. Follicles in female white mice decreased after saga seed extract consumption.

7.2 Uses in traditional medicine

- Roots and leaves to treat mouth sores, throat inflammations and cough.
- Leaves as women's natural contraceptive and constipation.

8.0 Contraindications : Abrin inhibited protein synthesis and act as anti-mitotic.

9.0 Dosage : Tonsillitis and throat inflammation: Saga root, one knuckle of *Cinnamomum burmanii* and palm sugar boiled in four cups of water and reduce to two cups. Drink decoctions twice a day.

10.0 Bibliography

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- *Herbal Indonesia Berkhasiat*. Bukti ilmiah dan cara racik. Trubus Info Kit Vol. 8
- Muljodihardjo S, Sitepu D, Nursini S, Ahmad S, Maesuri A, Zainsam HF, Farizi S & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia.
- RHMJ Lemmens & FJ Breteler. 2002. *Abrus precatorius* L. In: van Valkencurg, JLCH & Bunyapraphatsara N. (Eds). *Plant Resources of South-East Asia 12*(2). *Medicinal and Poisionous plants 1*. Prosea Foundation, Bogor, Indonesia Pp. 77.
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Aleurites moluccana (L.) Willd
Euphorbiaceae

1.0 Scientific Name : *Aleurites moluccana* (L.) Wild

2.0 Vernacular Names : Kemling (Lampung), muncang (Sunda), payang kurek (East Kalimantan/ Dayak) and gambiri/ kembiri (Batak).

3.0 Plant Description

A large tree, reaches 10–40 m height, canopy leaves are pale green, whitish and wide. **Leaves** alternate, single and quickly falls. **Stem** length up to 30 cm. The nut has a diameter of about 4–6 cm. **Seeds** covered by very hard protective coating; high oil content.

4.0 Propagation : Seed

5.0 Ecology/ Geographical Distribution

Grows on various types of soil such as limestone soil, latosol, podsolic fertile or infertile and sandy soils at altitudes 0-800 m above sea level (asl). Thrive in areas with temperature of 21-27°C, rainfall 1100 -2400 mm with rainy days 80 -110 days per year and an average humidity of 75%.

Geographical distribution:

Widely distributed. Indigenous to Indo-Malaya (including Brunei, Cambodia, China, Cook Islands, Fiji, French Polynesia, Indonesia, Kiribati, Laos, Malaysia, Marshall Islands, Myanmar, The New Caledonia, Norfolk Island, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Tonga, Vanuatu and Vietnam).

6.0 Chemical Constituents

Saponins, flavonoids, polyphenols, fatty oils and tannins.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Laxative (seed's cotyledon) and anti tumour (cortex).

7.2 Uses in traditional medicine

- The leaves are used to cure headaches and gonorrhea (Sumatra), seeds as laxative and treatment for diarrhea, thrush and dysentery (Java).
- The seed oil for hair care (strengthen and promotes hair growth).

8.0 Contraindications : Not available

9.0 Dosage

Hair care: Oil extracted from six seeds of finely ground candlenut is rubbed onto the scalp, three times a week. The mixture can also be prepared from 10 g of candlenut herb, six leaves, two fragrant *pandan* leaves, six *urang aring* leaves, 50 ml of coconut oil, 50 ml of sesame oil, two rosebud, 14 jasmine petals, boiled with 2 L of water until halved of its' initial volume. Stew, filtered and massage onto the scalp with twice daily.

10.0 Bibliography

- Izemi B, BR Sidharta & Yanuartono. The potential of liquid extract from candlenut (*Aleurites moluccana* L.) and soybean (*Glycine max* (L.) *Merill*) mixtures as hair growth enhancer. http://e-journal.uajy.ac.id /8622 /1/JURNAL%20BL01226.pdf
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Alstonia scholaris (L.) R. Br
Apocynaceae

1.0 Scientific Name : *Alstonia scholaris* (L.) R. Br

2.0 Vernacular Names : Lame (Sunda), pule (Java), polay (Madura), pulai (Sumatra), hanjalutung (Kalimantan), kaliti, reareangou, bariangow, rariangow, wariangow, mariangan, deadeangow, we (Minahasa), rite (Ambon), tewer (Banda), aliag (Irian) & hange (Ternate).

3.0 Plant Description

A tree of 20–25 m height. Straight trunk, diameter reaches 60 cm, woody, branching fragile bark. **Leaves** single, whorls 4-9 strands, stemmed in length from 7.5 to 15 mm, oval shaped to oblong or oval to oval breech. **Inflorescences** arranged in panicles. **Flowers** fragrant, green light to yellowish white. **Fruits** dangling in the form of ribbon-shaped tube. **Seeds** are small.

4.0 Propagation : Seed or stem cuttings and branches.

5.0 Ecology/ Geographical Distribution

Scattered throughout the Archipelago from lowlands to 900 m above sea level. Sometimes planted as an ornamental tree.

6.0 Chemical Constituents

- Bark: alkaloids, ekitamin (ditamin), ekitenin, ekitamidin, alstonin, ekiserin, ekitin, ekitein, porphyrin and triterpenes (α-amyrin & lupeol).
- Leaves: pikrinin
- Flowers: ursolic acid and lupeol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Triterpenoids (from the bark) lower rabbits' blood glucose levels.
- Water extract (130 µg/ml) is ovicidal to roundworm eggs (*Ascaris suum*) *in vivo* and delayed the process of eggs to become larvae *in vitro* at 65 µg/ml.
- Fever-lowering effect in white rats via peptone induction (intravenous 10%) at doses of 7.5 g/kg bw; 10 g/kg bw; 12.5 g/kg bw and 15 g/kg bw.
- Pain-relieving effect on white mice via fenilkuinon induction (intravenous 10%) at doses of 7.5 g/kg bw; 10 g/ kg bw and 12.5 g /kg bw (Siegmund method).

7.2 Uses in traditional medicine

- Fever, malaria, lymphatic, cough, diarrhea, dysentery, low appetite, abdominal bloating, abdominal pain, colic, anemia, diabetes, hemorrhoids, menstrual disorders, ulcers, hypertension, acute rheumatism, *beri-beri* and swollen breast due to breastfeeding .

8.0 Contraindications : Phenylquinon at ≥ 9 g/kg bw may interfere with reflex.

9.0 Dosage:

Hypertension: Decoction of ¼ of finger-length pulai bark, kumis kucing (*Orthosiphon aristatus*) leaves, a handful of *pocosudo's* leaf, ¼ handful of pegaga (*Centellla asiatica*), ¼ handful of meniran (*Phylanthus urinaria*), a ketapang fruit and palm sugar boiled in 3 cups of water and reduced to 2¼ cups is taken three times a day.

10.0 Bibliography

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Areca catechu L.
Palmae

1.0 Scientific Name : *Areca catechu* L.

2.0 Vernacular Names : Pinang tunku, pinang, jambe rende & monkey pinang.

3.0 Plant Description

Slender-trunked tree, growing straight, 10–30 m tall, 15–20 cm diameter. **Leaves** pinnate compound, rosette at the terminal. Midrib leaf 80 cm long with short petiole. **Flowers** with a long sheath emerging beneath the rosette of leaves. **Fruit** is elongated ovoid, 5–7 cm long red-orange in colour when ripe. **Seed** cone shaped with short rounded tip; flat base with a shallow indentation and 15–30 mm long.

4.0 Propagation : Seed

5.0 Ecology/ Geographical Distribution

Generally cultivated but also grows wild at 1-1400 m above sea level.

6.0 Chemical Constituents

Seeds: 0.3–0.6% alkaloids (arecoline ($C_8H_{13}NO_2$), arekolidine, arekain, guvakolin, guvasine and isoguvasine), tannins 15% red, 14% fat (palmitic, oleic, stearic, caproic, caprylic, lauric, myristic acid), starch and resin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Seed: anthelmintic, laxative, antiflatulent, dysmenorrhrea, diuretic, improve digestive process, astringent & sedative.

7.2 Uses in traditional medicine

- Areca decoction: as menstruation with excessive blood, nose bleed (nosebleed), sores, ulcers, boils, eczema, scabies, diphtheria, intestinal parasitic worms, diarrhea and dysentery (Semayang Kutai Timur, Kalimantan), reduce swelling due to fluid retention (edema), feeling of fullness in the chest, wounds, cough with phlegm, diarrhea, delayed menstruation, vaginal discharge, *beri-beri and* malaria.
- Young betel nut decoction: to cure sore eyes (Kendayan Dayak, West Kalimantan).

8.0 Contraindications

Alkaloid content (arecoline is poisonous) can trigger nausea and vomiting (20–30%), abdominal pain, dizziness and nervousness. Consumption of cold decoction will reduce the incidence of vomiting.

9.0 Dosage

5–10 g dried seed husks boiled in water can be use to wash wounds and other skin infections.

10.0 Bibliography

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Arenga pinnata Merr.
Arecaceae

1.0 Scientific Name : *Arenga pinnata* Merr.

2.0 Vernacular Names : Enau, kawung (Sunda), aren (Madura), bak juk (Aceh), nau, hanau, peluluk, biluluk, kabung, juk or ijuk (Sumatra), kawung, taren (Sunda) akol, akel, akere, inru, indu (Sulawesi); moka, moke, tuwa & tuwak (Nusa Tenggara).

3.0 Plant Description

A tree up to 25 m tall and 65 cm diameter with the uppermost part of the trunk covered by black fibers known as ijuk. **Leaves** are compound and pinnate, up to 5 m long with petiole up to 1.5 m length. The upper surface of the young leaves are dark green in colour and whitish at the bottom due to the wax layer. Male **flowers** are separated from the female flowers at different axillary cob. **Fruits** round in shape, with a diameter of about 4 cm. Each bunch has at least 10 stems and each stalk has about 50 grains of green until brown fruits.

4.0 Propagation : Seed

5.0 Ecology/ Geographical Distribution

Ecology: Native to southeast Asia, occurring in tropical rainforest and dry forest. Usually it grows close to human settlements where anthropic propagation plays a major role. Otherwise it prefers secondary forest at the border of primary. In Indonesia, *A. pinnata* grows wild or cultivated, up to an altitude of 1,400 m above sea level.

Geographical Distribution: *A. pinnata* is native in Bangladesh, Brunei, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

6.0 Chemical Constituents

Saponins, flavonoids and polyphenols.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Fresh juice for fever, abdominal pain, constipation and purgative.

8.0 Contraindications : Not available

9.0 Dosage :

- Fever and constipation: Drink a cup of palm sugar decoction.
- Stomach ache: Drink a cup of palm sugar-tamarind mixture decoction.

10.0 Bibliography

- Heyne K. 1987. *Tumbuhan Berguna Indonesia Jilid 1*. Yayasan Sarana Wana Jaya. Jakarta.
- Muljodihardjo S, Sitepu D, Nursini S, Ahmad S, Maesuri A, Zainsam HF, Farizi S & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia. Pp. 146.
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Artocarpus communis Forst.
Moraceae

1.0 Scientific name : *Artocarpus communis* Forst.

2.0 Vernacular names : Sukun, mentawa, kluwih, pintau, selanking, klempatak & keledang.

3.0 Plant Description

An evergreen tree (12-15 m up to 21 m) with spreading canopy. **Leaves** (15-60 cm or longer) are almost entire to deeply dissected with 1-6 pairs of lobes. **Fruits** (10-30 cm long × 9-20 cm wide) vary in shape and size. They are usually round, oval or oblong weighing 0.25-6 kg. The color is light green, yellowish-green or yellow when mature. **Seeds** are rounded or obovoid, irregularly compressed, 1-3 cm long and with a pale to dark brown seed coat.

4.0 Propagation : Root shoot and stem cuttings.

5.0 Ecology/ Geographical Distribution

Ecology: Grows best in the hot lowlands especially in moist areas with adequate soil aeration.

Geographical Distribution: Native to Pacific and tropical Asia with the centre of genetic diversity extends from Indonesia to Papua New Guinea. Widely distributed throughout the humid tropics lowlands up to an altitude of 1, 200 m above sea level.

6.0 Chemical Constituents

Phenol, quercetin and champorol, carbohydrates, protein, fat, vitamins B1, B2, C and minerals (calcium, phosphorus, and iron).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Leaf: Cardiovascular disease.

7.2 Uses in traditional medicine

- Breadfruit leaves: Heart/cardiovascular diseases, ailing kidneys and reduce bad cholesterol in the blood.

8.0 Contraindication : Avoid consumption of breadfruit leaf with spinach, cassava leaves, water spinach (*Ipomoea aquatica*) leaves or raw meat as it may increase blood viscosity leading to muscle cramping.

9.0 Dosage : Not available

10.0 Bibliography

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Azadirachta indica A.Juss.
Meliaceae

1.0 Scientific name : *Azadirachta indica* A.Juss.

2.0 Vernacular names : Imba, neem, mempheuh, intaran, neem & daun imbau.

3.0 Plant Description

An evergreen tree that can reach a height of 15–20 m (occasionally 35–40 m). **Leaf**: Opposite, simple pinnate leaves 20–40 cm long, with 20–31 medium to dark green leaflets 3–8 cm long with short petioles. **Flowers**: White and fragrant which arise from the junction of the stem and petiole in more-or-less drooping flower clusters (inflorescences) up to 25 cm long which bear from 150 to 250 flowers. An individual flower is 5–6 mm long and 8–11 mm wide. **Fruits**: Smooth, glabrous olive-like drupe varies in shape from elongate oval to nearly roundish (1.4–2.8 x 1.0–1.5 cm). The fruit skin turns yellow when ripe. Seed: elongated kernels with brown seed coat.

4.0 Propagation : Not available

5.0 Ecology/ Geographical Distribution

Grows in the area with a long dry season and annual rainfall of 450–2250 mm. Often found at 0–700 m above sea level.

6.0 Chemical Constituents

Azadirachtin, β-sitosterol, hyperoside, nirnbolide, quercetin, quercitrin, rutin, azadirachtin, nimbin, nimbine, 6-desacetylbimbine, nimbolide and oil glyceride.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-diabetic, anti-diarrhea, anti-pyretic (fever), anti-inflammation, anti-rheumatic, anti-fertilities, antivirus, anti-gastric pain, hepato-protector, immune modulatory, anti-bilious, anticancer (liver), skin disorders, antiviral and antibacterial (nimbin & nimbidin).
- **Bark:** Gastric pain medication and malaria.
- **Leaves**: Repellent, appetite enhancer, antihypertensive and deworming.

7.2 Uses in traditional medicine

- Leaves: Improve appetite and antimalarial.
- Stem bark: Fever and tonic.
- Seed oil: Cure for scabies and eczema.

8.0 Contraindications : Pregnant women are prohibited from taking this as medication.

9.0 Dosage : Diabetes mellitus:
Seven neem leaves boiled in three cups of water reduced to one added with a tablespoon of honey. Drink three times a day (an hour before meals).

10.0 Bibliography

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Senna siamea (Lam.) H.S. Irwin & Barneby
Leguminosae

1.0 Scientific Name : *Senna siamea* (Lam.) H.S.Irwin & Barneby Leguminosae

2.0 Vernacular Names : Johar (general), bujuk, dulang (Sumatra).

3.0 Plant Description

Annual herbaceous plant, spreading, rounded stems approximately 3 m long. **Leaves:** single, alternate, lanceolate, pointed tip, flat edge, 3–15 cm long, 1–9 cm wide, green in colour. **Flowers:** bright yellow and borne in numerous large pyramidal panicles up to 60 cm long at the ends of branches. Peduncles 15-25 mm long; pedicels 15–20 mm long; bracts subpersistent, petals 15–25 mm long, fertile stamens 7 or 10 (with 3 large staminodes). **Pods** are flat 15–25 cm long, soft and ribbon-like when young, brown when ripe, indented between the seeds. Seed: bean-shaped, shiny dark-brown, 8 mm long with 20–30 seeds per pod.

4.0 Propagation : seed

5.0 Ecology/ Geographical Distribution

Ecology: Grows at altitude 0–1 200 m, mean annual temperature: 20–31° C, mean annual rainfall: 400–2 800 mm. Performs best on deep well-drained fertile soils with pH 5.5–7.5, but will grow on degraded lateritic soils with good aeration.

Geographical Distribution: Native to Brunei, Cambodia, China, India, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam.

6.0 Chemical Constituents

- Taraxasterol, taraxacerin, taraxarol, choline, inulin, pectin, koumestrol dan asparagin.
- **Root:** taraxol, taraxasterol, taraxacerin, taraxerol, taraxaci, b-amyrin, stigmasterol, B-sitosterol, choline, levulin, pectin, inulin, calcium, potassium, glucose, and fructose.
- **Leaves:** lutein, violaxanthin, plastoquinone, tannins, carotenoids, potassium, sodium, calcium, choline, copper, iron, magnesium, phosphorus, silicon, sulfur, and Vitamin A, B1, B2, C, D.
- **Flowers:** arnidiol & flavoxanthin,

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Leaves decoction: Hepato-protective, hypoglycemic, antibacterial and antifungal.

7.2 Uses in traditional medicine

- Bark decoction: Scabies, laxative, malaria and skin disorders.
- Roots: Intestinal worms.

8.0 Contraindication : Not available

9.0 Dosage : Antimalarial:
Prepare decoction of 15 g fresh leaves in three cups of water reduced to one and a half. Drink twice a day.

10.0 Bibliography

- Gutteridge RC. 1997. *Senna siamea* (Lamk) Irwin & Barneby [Internet] Record from Proseabase. Faridah HI & van der Maesen, L.JG. (Eds). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. Accessed from Internet: 28-Sep-2016.
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Syzigium cumini (L.) Skeels
Myrtaceae

1.0 Scientific Name : *Syzygium cumini* (L.) Skeels
Myrtaceae

2.0 Vernacular Names : Jamblang, juwet, duwet

3.0 Plant Description

Tree, 10–30 m diameter up to 20 m high. Low branched and rounded or irregular canopy. **Leaves:** Opposite, slightly oblong to elliptic, oblong, 5–25 x 2–10 cm, base width peg-shaped or rounded, blunt tip or slightly tapering, flat-brimmed. Young leaves are pink, pinnate leaves. **Flowers:** Small, 3–8 florets on each end of the shaft, fragrant. Leaf petals wide bell or funnel shape, height 4–6 mm, yellow to purple. Corolla round and drop-off, 3 mm, white and gray to pink, easily fall. **Fruit:** Oval, often little twisted, 1–5 cm long, crowned with petals lobes, thin skin slick glossy, dark red to purple-black, sometimes white. **Seeds:** Oblong, up to 3.5 cm length.

4.0 Propagation : Seed or grafting

5.0 Ecology/ Geographical Distribution

Ecology: In Java, *S. cumini* grows either wild in the teak forests or cultivated at the lowland up to 500 meters above sea level. Rainfall (more than 1000 mm per year) is needed for good growth though it is tolerant to drought and can grow in different types of poor soils and wetlands with good aeration.

Geographical Distribution: *S. cumini* has a natural distribution area in the Himalayas subtropical, India, Sri Lanka, Malesia and Australia.

6.0 Chemical Constituents

Essential oils, phenols (methylxanthoxylin), alkaloids (jambosine), quercetine, organic acids, flavonoids, triterpenoids such as oleanolic acid, lauric, myristic, palmitic, stearic, oleic, mivalic, sterculic, vernolic, gallic acid, ellagic acid, ellagitannis, and tannin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Oleonolic acid: Skin cancer treatment, hepatoprotective, anti-inflammatory, antiviral, anti-hiperlipidemik, against free radicals and prevents atherosclerosis.
- Fruit: Hypoglycemic and anti-diabetic agents.
- Leaves: anti-allergy (acts as an antihistamine and anti-serotonin).

7.2 Uses in traditional medicine

- Bark: Diabetes and diarrhea.
- Fruit and bark: To treat digestive disorders such as flatulence, allergies, diabetes, dysentery, and abdominal pain.

8.0 Contraindications : Not available

9.0 Dosage : Treating cancer sores:
A handful of jamblang leaves, boiled in four cups of water reduced to two, strain and leave to cool. Use as mouthwash, a few times a day.

10.0 Bibliography

- Coronel RE. 1991. *Syzygium cumini* (L.) Skeels [Internet] Record from Proseabase. Verheij, EWM & Coronel RE. (Eds). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. Accessed on: 29 Sep 2016.
- *Herbal Indonesia Berkhasiat. Bukti Ilmiah dan Cara racik*. Trubus Info Kit Vol. 08.
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Cinnamomum burmannii Nees and Th.Nees Bl.
Lauraceae

1.0 Scientific Name : *Cinnamomum burmanii* Nees and Th.Nees Bl.

2.0 Vernacular Names : Cinnamon, kulit manis, kasiavera, manis jangan, holim, madang kulit manih, huru mentek, kenyengar, cingar & pandinga.

3.0 Plant Description

Tree up to 17 m high. **Leaves:** single, lanceolate, pale red colour (young leaves) which turns to dark green. **Inflorescences:** Yellow in colour, in axillary panicles **Fruits:** Buni form, young fruit (green) and black (mature).

4.0 Propagation : Seed or stem cutting.

5.0 Ecology/ Geographical Distribution

Ecology: *C. burmanni* grows well at an altitude of 1000-1500 m above sea level in hot, wet, tropical climates.

Geographical Distribution: *C. burmanii* is native to Southeast Asia and Indonesia. In Indonesia, *C. burmanni* scattered in Java (East Java-Tengger), Sulawesi (Luwu), Flores (Manggarai), Sumatra (West Sumatra Coast).

6.0 Chemical Constituents

- Bark: Cinnamic aldehyde, cinnamyl acetate, cinnzeylanol, cinnzeylanine, phenylpropyl acetate, tannins and saffrol.
- Raw fruit: Cinnamic aldehyde, coumarin, transcinnamic acids, beta sitosterol, choline, protocatechuric acid and syringic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Antibacterial: *Staphylococcus aureus* and *Salmonella typhosa*

7.2 Uses in traditional medicine

- Gastric pains, diarrhea, indigestion, shock, fever, foot and hand sweating, cough due to cold lungs, cough, shortness of breath, rheumatism, painful menstruation (dysmenorrhea), late menstruation (amenorrhea), high blood pressure, pain in the fingertips (frost-bite), tumor in the abdomen (abdominal tumors), fever, flu due to the wind chill, swelling due to fluid retention, swelling due to heart and kidney and muscle pain (rheumatism).

8.0 Contraindications : Not available

9.0 Dosage :

- To treat gastric pains, diarrhea and indigestion:
- Drink decoction of 1.5 g of cinnamon powder twice a day.
- To treating dysmenorrhea, amenorrhea, hypertension, frost-bite and abdominal tumors:
- Drink decoction of 0.5 – 2.5 g cinnamon powder twice a day.

10.0 Bibliography

- Herbal Indonesia Berkhasiat. Bukti Ilmiah dan Cara racik. Trubus Info Kit Vol. 08.
- Heyne 1987. *Tumbuhan Berguna Indonesia, Jilid 2.* Terjemahan Badan Litbang Kehutanan, Penerbit Yayasan Sarana Wana Jaya, Departemen Kehutanan RI, Jakarta. Pp. 795.
- Muljodihardjo S, Sitepu D, Nursini S, Ahmad S, Maesuri A, Zainsam HF, Farizi S & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia. Pp: 210-212.

Lagerstroemia speciosa Auct.
Lythraceae

1.0 Scientific Name : *Lagerstromeia speciosa* Auct.

2.0 Vernacular Names : Bungur, bhungor, wungur, ketangi, laban and wungu.

3.0 Plant Description

A tree-shaped plant with height of 5-25 m. The **trunk** usually crooked and branches. **Leaves** ellipse 24 cm long and 12 cm wide. **Flowers** are panicle shape up to 40 cm in length and with purple colour.

4.0 Propagation : Seed and grafting

5.0 Ecology/ Geographical Distribution

Ecology: *L. speciosa* is found at low altitudes to medium altitudes (300 – 800 m above sea level) in comparatively open habitats, in disturbed or secondary forest, grassland, and along the rivers. The habitat may vary from well drained to occasionally flooded but not peat soil. It is resistant to fire.

Geographical Distribution: *L speciosa* is native to Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam and is exotic to Singapore.

6.0 Chemical Constituents

Tannins, alkaloids, saponin, terpene and glucose.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-diarrhea, diuretics and anti-diabetic.

7.2 Uses in traditional medicine

- Some studies reported that drinking boiled old leaves (about 20 g of leaves in 100 ml of water for 45 minutes) has equal effect with consuming 6 to 6.7 units of insulin. The entire parts of the plant can be used for diabetic drug, but the old leaves give the best effect.

8.0 Contraindications : Not available

9.0 Dosage

30 fresh old leaves of the purple flowering species (*L. speciosa*), boiled in 150 ml of water for about 1 hour. Boiled water was then divided to three to be consumed three times a day preferably half to one hour before a meal daily.

10.0 Bibliography

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Melaleuca leucadendra L.
Myrtaceae

1.0 Scientific Name : *Melaleuca leucadendra* L.

2.0 Vernacular Names : Kayu putih, gelam (Sundanese, Javanese), ghelam (Madura), inggolom (Batak), gelam, kayu gelang, bru galang, waru gelang (Sulawesi); nggielak, ngelak (Rote), iren, sakelan (Piru), irano (Amahai), ai kelana (Hila), irono (Haruku), ilano (Nusa Laut Saparuna) dan elan (Buru).

3.0 Plant Description

Tree, reaches a height of 10-20 m. **Bark** grayish white with irregular intact skin surface. **Leaves** single, a bit thick like leather, short-stemmed, alternate layout, leaf blade elliptic or lanceolate, 4.5 to 15 cm long, 0.75 to 4 cm wide, tapered tip and base, flat edge, almost parallel veins, surface haired, gray-green to brownish green, the leaves are crushed for oil. **Inflorescences** are compound, grain shape, bell-shaped, with white petals. The anthers yellowish white, branching out in the end. **Fruits** are 2.5-3 mm long, 3-4 mm wide, brown to dark brown. **Seeds** are smooth and yellow in colour.

4.0 Propagation : Seed or root buds.

5.0 Ecology/ Geographical Distribution

Ecology: Capable of growing on barren soil and swampy, mangrove coastal area or form a small forest in the dry to wet soil. The species grows in forests near the edges of rivers and streams on a range of soils.

Geographical Distribution: Widely distributed in northern parts of Western Australia, the Northern Territory and in Queensland as far south as Shoalwater Bay. It also occurs in New Guinea and Indonesia.

6.0 Chemical Constituents

- Bark contains lignin and melaleucin.
- The leaves contains essential oil, consisting of 50%-65% cineol, α-terpineol, valeraldehida and benzaldehyde.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Ethanolic extract of eucalyptus leaf: analgesic effect on male mice (Protection effect of 5. 12 g/kg ethanolic extract is equivalent to 65 mg /kg BW paracetamol).

7.2 Uses in traditional medicine

- Essential oil: rheumatism, colitis, diarrhea, rash, cough, fever, flu, headache, toothache, eczema, bone, nerve pains, neurasthenia, insomnia and asthma.
- Leaves: analgesic, diaphoretic, anti-rheumatic, carminative and spasmolytic.

8.0 Contraindication : Not available

9.0 Dosage

- Apply ground barks or leaves onto the affected (dermatitis allergic, eczema, ulcers) area or use the fresh leaves decoction to cleanse the affected area.

10.0 Bibliography

- Doran JC. 1999. *Melaleuca cajuputi* Powell. Record from Proseabase. LPA.
- *Herbal Indonesia Berkhasiat. Bukti Ilmiah dan Cara Racik*. Trubus Info Kit Vol. 08.
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- Oyen & Nguyen Xuan Dung (Eds). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. Accessed on: 30 Sep. 2016.
- Pratita FST, Purwantiningsih & Arifah SW. 2007. The analgesic effect of eEucalyptus (*Melaleuca leucadendron* L.) leaves ethanol extract on male mice. PHARMACON, 8(2) Desember 2007, 40–43 https://publikasiilmiah.ums.ac.id/bitstream/handle/11617/941/2.%20PRATITA%20(KAYU%20PUTIH).

Melia azadirachta L.
Meliaceae

1.0 Scientific Name : *Melia azadirachta* L.
Meliaceae

2.0 Vernacular Names : Renceh, mindi, merambung (Sumatra); gringging, mindi, chakra-cikri (Java).

3.0 Plant Description

Tree, 20–30 m tall. **Stem** woody, round, branched, dirty white. **Leaves** compound, 20–60 cm long, elliptical leaflets, 3-9 cm long, 15–30 mm wide, the edge serrated, tapered tip and base, green. **Flowers** compound, panicle shape, in the armpit leaves, hair, ± 20 cm long, toothed 10 stamens, anthers down, five crowns, ± 1 cm long, purple. **Fruits** atone, length ± 1.5 cm, yellowish brown. **Seeds** spherical eggs, grooved, white. **Root** stables, light brown.

4.0 Propagation : Seed

5.0 Ecology/ Geographical Distribution

Ecology: The natural habitat is seasonal forest at the altitude of 0 – 200 m above sea level with annual rainfall ranges from 600 – 2000 mm. Optimal growth is obtained at well-drained, deep, sandy loams though highly adaptable and tolerates a wide range of weather and soil conditions (eg. shallow soils, saline and strongly alkaline soils).

Geographical Distribution: Widely distributed probably of South Asian origin, occurring in tropical, subtropical and warm temperate regions. It is found wild in the Himalayan foothills of India and Pakistan, widely scattered in China, through Malesia to the Solomon Islands and northern and eastern Australia.

6.0 Chemical Constituents

- **Plant:** limonoids (triterpene), azadirahtin (ekdison hormone-like compounds), deasetilazadirahtinol, melantriol, salanin, 3-deasetilsalanin, salanol.
- **Fruits and wood:** limonoids and triterpenoids, sterols, catechol, vanilat acid and bakayanat acid.
- **Stem**: melianin B, sendanolakton, ohchinin acetate and surianol.
- **Leaves:** 3.11-l-cinnamoyl dihydroxymeliacarpin (C-secolimonoid), alkaloids, flavonoids and kaempferol, tannins, triterpenoids /steroids, coumarins and lignans.
- **Seeds:** 60% fatty oil (stearic acid, palmitic, oleic, linoleic, lauric, valerianat, butyrate, and a small amount of essential oil.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Efficacious as diuretic, laxative, anthelmintics, pain reliever, anti-fungal, insecticide.

7.2 Uses in traditional medicine

- Almost all parts of this plant can be used as medicine.

8.0 Contraindications : Seeds contain very poisonous resin

9.0 Dosage

- Drink water decoction prepared from either 15–30 g of wood or root powder or 5–10 g of fruit.

10.0 Bibliography

- Ahmed S. & Idris S. 1997. *Melia azedarach* L. [Internet] Record from Proseabase. Faridah Hanum, I & van der Maesen, L.J.G. (Eds). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. Accessed on: 30 Sep 2016.
- Dalimartha, S. 2003. *Atlas Tumbuhan Obat Indonesia* Jilid 3. Cet. 1. Jakarta: Trubus Agriwidya. ISBN: 979-3235-73-X.
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Morinda citrifolia L.
Rubiaceae

1.0 Scientific Name : *Morinda citrifolia* L.

2.0 Vernacular Names : Mengkudu, noni (Indonesia); pace, kemudu, kudu (Java); cengkudu (Sunda); kodhuk (Madura); wengkudu (Bali), wangkudu, manakudu, bakulu (Nusa Tenggara), eodu, mengkudu, bengkudu (Sumatera); mangkudu, wangkudu & labanan (Kalimantan).

3.0 Plant Description

Tree reaching 3-8 m in height. **Leaves** dark green glossy in colour, elliptical, oval or oblong in shape, up to 40 cm in length and 25 cm width. **Flower** 5-8 pieces, white in colour, emerging from the axillary. **Fruit** 5-10 cm in length, with green uneven surface turning to white and transparent when ripe. **Seed** small blackish brown.

4.0 Propagation : Seeds, cuttings and grafting.

5.0 Ecology/ Geographical Distribution

Ecology: Noni thrives well at lowlands to the altitude of 1500 m above sea level with temperature ranges between 22-30°C. It can grow on barren soil, coastal mangrove forests, swampy ground or form a small forest in the dry to wet soil.

Geographical distribution: Indigenous in tropical Asia and tropical Australia. It is naturalized in many tropical regions and almost pantropical.

6.0 Chemical Constituents

- Morindadiol, morindone, morindin, damnacanthal, methyl acetyl, acid and sorandiyiol kapril.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-diabetic, anti-bacterial, promotes healthy digestion, anti-cancer, reduce cholesterol levels and anti-oxidants.

7.2 Uses in traditional medicine

- **Fruits:** relieve respiratory problems, cough, bile inflammation and inflammatory bowel disease. Otherwise it is used as shampoo (clean the hair and eliminate dandruff).
- **Leaves**: to treat dysentery, improve the digestive system and to treat pneumonia.

8.0 Contraindication : Not available

9.0 Dosage : To treat cough:
Drink half a cup potion of *M. citrifolia* fruit juice added with 2 cups of water, lemon juice and lime betel mixture four times a day.

10.0 Bibliography

- *Herbal Indonesia Berkhasiat. Bukti Ilmiah dan Cara Racik*. Trubus Info Kit Vol. 08.
- Kartasubrata J. 2010. *Sukses Budidaya Tanaman Obat*. IPB Press.
- Muljodihardjo S., Sitepu D., Nursini S., Ahmad S., Maesuri A., Zainsam HF., Farizi S. & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia. Pp. 297– 298.
- RHMJ Lemmens & Bunyapraphatsara N. (Eds). 2003. *Plant Resources of South-East Asia* No 12(3). *Medicinal and Poisionous Plants* 3. Prosea Foundation, Bogor, Indonesia Pp. 304–305.

Moringa oleifera LAMK.
Moringa

1.0 Scientific Name : *Moringa oleifera* LAMK.

2.0 Vernacular Names : Kelor, kilor, celor, kerol (Malay, Sundanese); kelo (Ternate); keloro, murong (Aceh); kawona (Sumba); munggai (Minangkabau).

3.0 Plant Description

Moringa tree grows in the form of long-lived (perennial) with 7–12 m high. Woody **stem** erect, dirty white, thin skin and rough surface. Branches erect or oblique direction tends to grow straight and elongated. **Leaves** compound, long-stemmed, alternate, imparipinnatus, young leaves are green when young, after an old dark green, ovate leaf shape, 1–2 cm long, 1–2 cm wide, limp thin, blunt tip and base (obtusus), flat edge, pinnate, upper and lower surfaces smooth. **Flowers** axillary, long-stemmed, white petals, slightly creamy, and spread the aroma. Moringa bear fruit after the age of 12–18 months. Pods, 20–45 cm long, contain 15–25 seeds, blackish brown.

4.0 Propagation : Seed or root buds.

5.0 Ecology/ Geographical Distribution

Ecology: *M. oleifera* grows in tropical and subtropical country with peculiar environmental features, namely, dry to moist tropical or subtropical clime, with annual precipitation of 760 to 2500 mm (it requires less than 800 mm irrigation) and temperature between 18 and 28 °C.

Geographical distribution: *M. oleifera* indigenous to sub-Himalayan tracts of Northern India. Currently, *M. oleifera* and its derivatives are distributed mainly in Middle East, African and Asian countries and are still spreading to other areas.

6.0 Chemical Constituents

- Pterigospermin, essential oils, alkaloids moringin, moringinin, fatty oils and alkaloids.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-inflammatory, antipyretic, diuretics, allergies, herpes, anti-microbe, diabetes mellitus, anti-cancer and anti-oxidant.

7.2 Uses in traditional medicine

- **Roots:** muscle swelling, headaches and rheumatism and thrush, difficult urination, lack of appetite, jaundice, rheumatism and epilepsy, antimicrobial, tartar, flu, fever, asthma, strengthen the heart, maintaining the health of the reproductive organs & skin toners.
- **Leaves**: allergy, herpes and festering wounds, bronchitis, liver disorders, anti-tumor, fever, prostate cancer, skin cancer, anemia, diabetes, thyroid, nerve disorders, colic in the digestive tract, rheumatism, headaches, antioxidants, source of nutrients (protein and minerals).
- **Flowers**: Antimicrobial, anti-bacteria, flu, intestinal worms, mouth sores, sore throat, antitumor, rheumatism, nerve disorders, nutrient source and tonic.
- **Bark**: Overcoming tartar, indigestion, flu, ulcers, antitumor, rheumatism, detoxify, neutralize poison snakes and scorpions, a source of nutrition, contraception and aphrodisiac.

8.0 Contraindications : Not available

9.0 Dosage : To treat thrush, difficult urination, lack of appetite, jaundice, rheumatism, epilepsy.
Moringa roots (length of a finger) boiled with 2 cups of water and reduced to one cup. Drink the decoction twice a day (1/2 cup each time).

10.0 Bibliography

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- *Herbal Indonesia Berkhasiat: Bukti Ilmiah dan Cara Racik*. Trubus Info Kit Vol 08.

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Parkia speciosa Hassk
Fabaceae

1.0 Scientific Name : *Parkia speciosa* Hassk

2.0 Vernacular Names : Petai, pete, petai papan, peuteuy, petai gede, pete, segobang, petai pare.

3.0 Plant Description

Perennial plant that can reach a height of 25 m. Optimal growing altitude 200 – 800 m. In the lower area plagued by many plants weevils and in areas of higher seeds cannot be great. Begin to bear fruit at the age of 4-6 months with the most productive age 8-10 years.

4.0 Propagation : Seed or cutting

5.0 Ecology/ Geographic Distribution.

Ecology: Occurs scattered in lowland rain forest and sometimes also in tall secondary forest, on sandy, loamy and podzolic soils, also in waterlogged locations, in freshwater swamp forest and on river banks, up to 1000 -1400 m above sea level. In the tropical lowland, young tree requires some shade.

Geographic Distribution: A pantropical genus with about 35 species, mostly found in tropical America, especially in the Amazon basin. In Asia, *Parkia* occurs from north-eastern India and Bangladesh eastward through the whole of the South-East Asian region, with more isolated species in Micronesia and Fiji. About 6 species occur within Malesia. Peninsular Malaysia and Sumatra have 4 species, Borneo has 5 species. *P. timoriana* has the largest area of distribution, occurring from India to New Guinea. P. *speciosa* is native to Indonesia, Malaysia, Philippines and Thailand.

6.0 Chemical Constituents

- Petai contains as much as twice of carbohydrate, three times of phosphorus, four times protein, five times vitamin A and iron and twice of the amount of other vitamins and minerals.
- It contains protein and fat higher than any other forest plants, i.e. as many as 8%, 11% carbohydrate, 71% water.
- In addition it also contains a lot of calcium, phosphorus, iron, vitamin A, Vitamin B1, Vitamin B2, and vitamin C.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Petai stimulate the production of red blood cells and helps anemia due to its high iron content.
- Petai can overcome satiety, nausea in the morning, a chaotic emotional illness, for neurological diseases and also mosquito repellents.

7.2 Uses in traditional medicine

- Petai can control blood sugar levels.
- Eating petai as part of a regular diet can cut the risk of death from stroke by up to 40 percent, overcoming heart disease, diabetes, inflammation of the kidneys, liver, de-worming of children and reduce depression.

8.0 Contraindications : Not available

9.0 Dosage : Eating petai as part of the daily diet would reduce the risk of death from stroke by 40%.

10.0 Bibliography

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Archidendron jiringa (Jack) I.C. Nielsen
Fabaceae

1.0 Scientific Name : *Archidendron jiringa* (Jack) I.C. Nielsen

2.0 Vernacular Names : Jering (Gayo); jering (Batak); jarieng (Minangkabau); nets (Lampung); jengkol (Sunda); jengkol (Java); blandingan (Bali); lubi (Sulawesi).

3.0 Plant Description

Trees, 20m high. **Stem** firm, rounded, woody, smooth, simpodial branching, dirty brown. **Leaves** compound, oblong, opposite, 10-20 cm long, 5-15 cm wide, flat edge, pointed tip, rounded base, pinnate, stalk 0.5-1 cm long, dark green. **Flowers** compound, bunch form, located at the ends and armpit leaves, stems rounded, ± 3cm long, purple, bowl like petals, yellow stamen, cylindrical pistil, yellow, oval crown, white yellowish. **Fruits** flat round, blackish brown. **Seeds** flat round, dicotyledonous, yellowish white. **Root** tap root and dirty brown.

4.0 Propagation : Seed or stem cuttings

5.0 Ecology/ Geographic Distribution

Ecology: The tree is indigenous to primary and secondary forest in humid, mountainous and undulating areas as well as on river banks from sea-level up to 1'600 m altitude in Southeast Asian countries such as Bangladesh, Indonesia (Sumatra, Sulawesi, Kalimantan), Malaysia, Myanmar and Southern Thailand. Trees grow best in pervious sandy or lateric soils and they need a high rainfall.

Geographic Distribution: *A. pauciflorum* commonly found in Indonesia, Malaysia, Myanmar, Bangladesh, Southern Thailand and the Philippines.

6.0 Chemical Constituents

Seeds, cortex and leaves contain saponins, flavonoids and tannins.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Based on research, jengkol seed extract can reduce a decrease in serum concentrations of GSH levels and has antioxidant abilities.

7.2 Uses in traditional medicine

- Leaves: Eczema, scabies, sores and ulcers.
- Fruits: Skin problem and ulcers.

8.0 Contraindications : Seed is slightly toxic due to its amino acid content. Symptoms include muscle spasm, urinary retention and acute renal failure primarily affecting men regardless amount consumed.

9.0 Dosage : To treat eczema:
Wash the affected area with *P. lobatum* leaves ash water solution.

10.0 Bibliography

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- Muljodihardjo S., Sitepu D., Nursini S., Ahmad S., Maesuri A., Zainsam HF., Farizi S. & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia. Pp. 190–191.

Santalum album L.
Santalaceae

1.0 Scientific name : *Santalum album* L.

2.0 Vernacular names : Cendana, sandalwood and sandalwood oil.

3.0 Plant Description

A tree with height between 12-15 m. **Bark** is coarse, grey in color. **Leaves** fall easily.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Ecology: Sandalwood occurs from coastal dry forests up to 700 m elevation. It normally grows in sandy or stony red soils, but a wide range of soil types are inhabited. This habitat has a temperature range from 0 to 38 °C and annual rainfall between 500 and 3000 mm. The seedlings require host trees to support their growth, hence initially sandalwood is parasitic. Due to its characteristics, sandalwood is rather difficult to cultivate.

Geographic Distribution: Sandalwood is native to semi-arid areas of the Indian subcontinent. It is now planted in India, China, Sri Lanka, Indonesia, Malaysia, the Philippines and northern Australia. Commonly grown in East Nusa Tenggara (Indonesia), in particularly on the island of Timor, although now it is also found in Java and other Nusa Tenggara islands.

6.0 Chemical Constituents

- Essential oils and tannins, santalol (sesquiterpene alcohol), santalen (sesquiterpenes), santen, santenon, santalal, santalon and insovalerialdehida.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Antipyretic, analgesic, carminative, stomachic, diuretic, antibacterial and antiviral.

7.2 Uses in traditional medicine

- Alternative aromatherapy for spiritual purposes. Sandalwood oils in its pure form, is used primarily for Ayurveda healing and is believed can relieve anxiety.
- Traditional medicinal plants to restore appetite.
- The woods are used for urinary tract antiseptic, dysentery, diarrhea, intestine inflammation.
- Leaves are used for cure asthma.
- Root and bark for irregular menstruation.

8.0 Contraindications : Not available

9.0 Dosage : To treat enteritis:
2 teaspoons powdered sandalwood mix to 100 ml of boiling water. Drink 100 ml of the sandalwood solution twice a day (morning and afternoon) for 14 days.

10.0 Bibliography

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Sesbania grandiflora (L.) Pers.
Fabaceae


1.0 Scientific Name : *Sesbania grandiflora* (L.) Pers.

2.0 Vernacular Names : Gabusan, turi (Java), toroy (Maduranese); turi (Sumatra); deaf, turing, ulingalo, suri, gongo gua, kayu java (Sulawesi); tuwi (Balinese), palawu, kalala; gala-gala, tanumu, ghunga, ngganggala (Nusa Tenggara).

3.0 Plant Description

Tree 5–12 m tall. Outer bark gray to brown, rough, with longitudinal and transverse grooves irregular, cork layer easily peeled. **Leaves** pinnate, strands of elongated elliptic leaflets, 3–4 cm long, and 0.8 to 1.5 cm wide. **Flowers** in bunches with 2–4 sessile flowers. Flower buds crescent shaped, 7–9 cm in length which turn to butterfly shape upon full bloom. There are two varieties namely the white and red flowers. **Fruits**: Ribbon-shaped fruit pods 20–55 cm long, 7–8 mm width. **Seeds** 15–50 and transverse layout inside the pod.

4.0 Propagation : Seed or stem cuttings.

5.0 Ecology/ Geographic Distribution

Ecology: suitable for the lowland tropics, up to 800 m above sea-level. Best adapted to places with an annual rainfall between 2000—4000 mm. It can be grown in a wide range of soils including those that are poor and waterlogged. It tolerates saline and alkaline soils and has also some tolerance to slightly acidic soils (pH: 4.5).

Geographic Distribution: The exact country of origin of *S. grandiflora* is not known (India or Indonesia have been suggested) but it is considered native to many South-East Asian countries. It is widely distributed through the tropics from southern Mexico to South America and has been planted in southern Florida and Hawaii. It has been cultivated for at least 140 years in West Africa and more recently in East Africa.

6.0 Chemical Constituents

- Leaves contain saponins, tannins, glycosides, peroxidase, vitamin A and B.
- Bark contains tannins, egatin, zantoagetin, basorin, resin, calcium oxalate, sulfur, peroxidase, dyestuffs.
- Flower contains calcium, iron, sugars, vitamins A and B.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Flowers are used for skin softening, laxative and conditioning.
- Stem as analgesic, anti-pyretic, laxative, chelating agent (astringent), vomiting stimulant and tonic.
- The leaves are used to dissolve blood clots, relieve pain, mild laxative and diuretic.

7.2 Uses in traditional medicine

- Thrush, dysentery, diarrhea, scabies, chicken pox, sprains, hit, vaginal discharge, cough, beri-beri, headache, sore throat, fever postpartum, milk production, runny nose, cough, rheumatism and wounds.
- Leaves and flowers can be eaten as a vegetable.

8.0 Contraindications : Not available

9.0 Dosage : Thrush, dysentery, diarrhea, fever, chicken pox: Drink decoction of stem bark (a thumb length).
Scabies: The bark is finely crushed and applied onto the affected areas.

10.0 Bibliography

- Heering JH. & Gutteridge RC. 1992. *Sesbania grandiflora* (L.) Poiret [Internet] Record from Proseabase. Mannetje, L.'t and Jones, R.M. (Editors).PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org. Accessed on: 30 Sep 2016.
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Syzygium polyanthum (Wight) Walp.
Myrtaceae


1.0 Scientific Name : *Syzygium polyanthum* (Wight) Walp.

2.0 Vernacular Names : Gowok (Sunda); manting (Java); kastolam (Kangean); meselangan, ubar serai (Sumatera); salam (Indonesia, Sunda, Java, Madura).

3.0 Plant Description

Tree, reaching 25 m tall, trunk-riding roots round, smooth, single leaf, where the line of sight, which stemmed 0.5–1 cm length. **Leaves** blade oblong to elliptic shape or round eggs breech, pointed tip, base tapering, flat edge, 5–15 cm long, 3–8 cm wide, pinnate, the slippery surface dark green, lower surface light green color, aromatic when crushed. **Flowers** are arranged in panicles compound interest coming out of the end of the branch, its white, smells wonderful. **Fruits** buni, rounded, 8–9 mm diameter, green in colour when young. **Seeds** round, about 1 cm cross section and brown in colour.

4.0 Propagation : Seed, grafting or cuttings.

5.0 Ecology/ Geographic Distribution

Ecology: Wild plants in forests and mountains, or planted in the garden and around the house. Common as understory tree in lowland primary and secondary forests to the mountains up to 1000 m in Java.

Geographic Distribution: Widely distributed in Burma (Myanmar), Indo-China, Thailand, Malaysia, and Indonesia (Java, Sumatra, Kalimantan).

6.0 Chemical Constituents

Saponin, triterpen, flavonoid, tannins polyfenol and alkaloid. Essential oil of leaves (0,05%) contains citral, seskuiterpen, lactones, eugenol and fenol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Anti-cholesterol: Bay leaf extract in experimental animals lower cholesterol levels (LDL) and increase HDL cholesterol levels in the blood serum.
- Anti-hypertension: flavonoid compounds in the bay leaf reduce high blood pressure.

7.2 Uses in traditional medicine

- Diarrhea, diabetes, heartburn, intoxicated due to alcohol, scabies and itching

8.0 Contraindications : Not available

9.0 Dosage :

- Anti-cholesterol / lower blood pressure: Drink decoction of 15 leaves boiled in 2 cups of water until reduced to half - twice a day. To lower blood pressure similar decoction taken twice a day, ½ cup each time.
- Anti-diabetes: Drink the decoction of fresh 8 – 15 fresh bayleaf leaves and 30 g (*Andrographis paniculata*) (boiled in 2 cups water reduces to half) twice a day before meal.

10.0 Bibliography

- *Herbal Indonesia Berkhasiat: Bukti Ilmiah dan Cara Racik*. Trubus Info Kit Vol 08.
- Muljodihardjo S., Sitepu D., Nursini S., Ahmad S., Maesuri A., Zainsam HF., Farizi S. & Mahmud Ul-Haq H. (Eds). 2011. *Direktori Rempah Indonesia*. Coop Indonesia Foundation, Dewan Rempah Indonesia. Pp. 362–363.
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Tamarindus indica L.
Leguminosae

1.0 Scientific Name : *Tamarindus indica* L.

2.0 Vernacular Names : Asam jawa; asem (Java Sunda); celagi (Bali); bak mee (Aceh); acem (Madura); asam Jawi (Gorontalo)

3.0 Plant Description

Perennial large tree with height reaching to 15 m. The bole is firm and form wide canopy. Leaves alternate, compound with 10-18 pairs of opposite leaflets, leaflets narrowly oblong 12-32 x 3-11 mm. **Flowers** are pale yellow or pinkish in small, lax spikes about 2.5 cm width. Flower buds completely enclosed by 2 bracteoles, which fall very early; sepals 4, petals 5, the upper 3 well developed, the lower 2 minute. **Fruit** a pod, subcylindrical, 10-18 x 4 cm, straight or curved, velvety, rusty-brown; the shell of the pod is brittle and the seeds are embedded in a sticky edible pulp. **Seeds** 3-10, approximately 1.6 cm long, irregularly shaped, testa hard, shiny and smooth.

4.0 Propagation : Seeds, marcotting, grafting and budding

5.0 Ecology/ Geographic Distribution

Ecology: Tamarind grows well over a wide range of soil and climatic conditions. It is found in places with sandy to clay soils, at low to medium altitudes (up to 1000 m, sometimes to 1500 m), where rainfall is evenly distributed or where the dry season is long and very pronounced. Its extensive root system contributes to its resistance to drought and strong winds.

Geographic Distribution: It is generally believed that it is indigenous to the drier savannas of tropical Africa, but it certainly naturalized long ago in tropical Asia. Tamarind is now cultivated in all tropical countries, even on a plantation scale in India, and it is economically important all over South-East Asia.

6.0 Chemical Constituents

- Fruits: Grape acid, tartaric acid, succinic acid, pectin and inverted sugar. A 100 grams of ripe tamarind fruit contains 239 calories, 2.8 grams protein, 0.6 grams fat, 62.5 grams carbohydrate, 74 mg calcium, 113 mg phosphorus, 0.6 mg iron, 30 SI vitamin A, 0.34 mg vitamin Bl and 2 mg vitamin C. Fruits also contains geranial, limonene, peptin, proline, leucine, phenylalanine, pipecolic acid, citric acid, serine, tartaric acid, α-alanine.
- The leaves contain stexin, iovitexin, and isoorietin.
- Bark and seeds contain phlobatannnin (albuminoid and starch).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Immunomodulator: Polysaccharide from the fruit has a fairly high biological activity affecting the body's immune system via inhibiting leukocyte migration, proliferation, and stimulates the addition of phagocytes.
- Lowering cholesterol: Due to saponins, flavonoids, and tannins in tamarind leaves as indicated *in vivo*.

7.2 Uses in traditional medicine

- Used as an antiseptic, cough, fever, rheumatism, boils, relieving nausea, appetizer and painkillers.
- Also used to treat gout, eczema, ulcers, fever, mouth sores, measles, high cholesterol, diabetes, asthma, stomachache, allergy, thrush, wounds, menstrual irregularity, and swelling caused by poisons (centipede/ bees/ snake bites) and prevent hair loss.

8.0 Contraindications : Not available

9.0 Dosage : Lowering cholesterol: Mashed 100–175 g of tamarind leaves, then pour a cup of hot water, strain and drink twice a day.

10.0 Bibliography

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Lao PDR

Acorus gramineus Soland.
Acoraceae

1.0 Scientific Name : *Acorus gramineus* Soland.

2.0 Vernacular Names : Hang khao, Slep narm (Lao)

3.0 Plant Description

A perennial semi-aquatic herb. The entire plant contains essential oil, creeping and much-branched. **Leaves** long and amplexicaule in fascicles, bright green, principal nerves parallel. **Inflorescences** in spike in a compress scape, surrounded by long bract; flowers small. **Fruits** oblong berries, bright-red when ripe. Seed rare. Flowering period is from March to July.

4.0 Propagation : Root or whole plant

5.0 Ecology/ Geographic Distribution

A. gramineus wildly grows under the shade and wet soil, on the banks of the streams or in water stagnant ponds. It is found in almost provinces of Lao PDR. In many countries in Southeast Asia it naturally grows at the altitude of more than 100 m.

6.0 Chemical Constituents

The main chemical compositions of the essential oil are asarons, α-asarone and β-asarone and asarylaldehyde; a bitter glycoside, acorin, 8-O-4'-neolignans namely suramensinols A and B and a phenolic compound, acoramol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Lao traditional medicine healers use the entire plant of *A. gramineus* for cardio-vascular related diseases, especially in case of arrhythmia, asthma, sore-throat and stomachache. Oriental medicine theory considers *A. gramineus* having bitter taste, pungent, warm in character. It affect the meridians of heart, liver and bile, exerts analeptic, it is a good expectorant, antidote and antiseptic, it dispels wind element and removes damp.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Adenosma bracteosum Bon.
Scrophulariaceae

1.0 Scientific Name : *Adenosma bracteosum* Bon.

2.0 Vernacular Names : Chi nai korm (Lao), mrich kang kep (Khmer), ruta hutan timba tasek, tasek-tasek (Malay), karabun pa, kratai cham, prik kratai, sanam chao rai, so se, ya khao kam (Thai), bo bo, chè (long, chè noi, chè cát (Vietnamese)

3.0 Plant Description

An annual herb, 20 to 50 cm in height, stem erect, many branched, young twigs pubescent, finally glabrous. **Leaves** opposite, petiole short, lanceolate, pubescent, margins toothed. **Inflorescence** in terminal in a sort of head, flowers violet. Capsules with numerous seeds. Flowering period: From September to October.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Commonly found in grass field, abandoned land, rice field edges. It is found in the northern part of Laos. It is found also in Vietnam.

6.0 Chemical Constituents

The plant contains 0.5 to1.0 % essential oil, which consists of L-fenchon, fenchol, L-limonen, humulen, cineol, piperitone oxide, 5 L-monoterpenes and 2 D-sesquiterpenes. Chlorogenic acid, neoclhorogenic acid and cafeic acid, flavonosides, saponosides and a relatively high proportion of potassium nitrate.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Lao traditional medicine healers use the aerial part of *A. indiana* as an ingredient of steam bath and inhalation for treating common cold, flu, influenza, the decoction is used as tonic and galactogogue for post partum, the fluid extract is used as remedy for jaundice in hepatitis.
- According to oriental medicine theory, *A. indiana* having hot, slightly bitter taste, calm character, exhausting wind, antipyretic, surodific improves digestion. According to Vietnamese experience, *A. indiana* is used for the treatment of oliguria, biliuria, ophthalmalgia, vertigo and dispepsia.

8.0 Contraindications : Not available

9.0 Dosage : Jaundice: It is prescribed 10 to 20 g in the form of decoction, fluid extract or syrup.

10.0 Bibliography

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Andrographis paniculata (Burman f.) Nees.
Acanthaceae

1.0 Scientific Name : *Andrographis paniculata* (Burman f.) Nees.

2.0 Vernacular Names : La xa bee, sam pan bee(Lao), chuanxinlian (Chinese), creat, creyat root, kariyat, green chireta (English), roi des amers (French),pramat monus (Khmer) sunbiroat (Japanese), bidara, sadilata, sambilata, takila (Javanese), aka cerita, empedu tanah, hempedu bumi, pokok (Malay), kalmegh, teetakaa (Nepalese), bhunimbah, kirattiktah (Sanskrit), fa-thalai-jon (Thai), xuyên tâm liên, công c□ng (Vietnamese)

3.0 Plant Description

Annual herbaceous plant, 0.4 to 1.0 m high. **Leaves** alternate, lanceolate, 40 cm long by 7 cm wide, lower part surrounding the stem. **Inflorescences** in terminal dense raceme 15 to 30 cm long; flowers white, lip veined with red. **Fruits** globose or ovoid, 12 mm long and 8 mm wide. Flowering period is from September to January.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

A. paniculata grows wildly and cultivated in tropical region. In Laos, it is found in the slope of Phou See mountain, in Luangphrabang world heritage city.

6.0 Chemical Constituents

The plant contains 2.68 % bitter glucoside, diterpenes andrographolide, neo-andrographolide. Flavonoids and polyphenols were also isolated from the aerial parts.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Lao traditional medicine, the decoction and tincture of the root and aerial part are used for regulating the 4 elements of the body, antipyretic, bitter tonic, digestive tract diseases and malaria. The leaves are also used for diarrhea, tonsillitis, sore throat and colic in children.
- In Chinese medicine the drug is used for the treatment of gastroenteritis, common cold, tonsillitis, boils and wound infection and snake bites. In India, the plant is used for the treatment of fever, digestive tract diseases and malaria, and used as tonic. The decoction of the fresh leaves is used to treat colic of the children. The infusion of the root is used for the treatment of snake bites (*Cobra capella*).

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Alocacia macrorrhiza (L.) Schott.
Araceae

1.0 Scientific name : *Alocacia macrorrhiza* (L.) Schott.

2.0 Vernacular names : Hua Ka pook (Lao), hai-y (Chinese), big-rooted taro, elephant ear, giant alocacia, giant taro, kopeh root (English), chou des caraides, oreille d'éléphant (French), kadat hora (Khmer), sente (Javanese), birah, keladi sebaring (Malay), bon kawi, co vat, kadard, kradat, kladdi-bu-ko, thai,dăvu,Ráy dai, khoai sáp,Vat veo (Vietnamese)

3.0 Plant Description

A perennial herb, 1-3 m high. **Rhizomes** big, long with nodes, cylindrical and stout. **Leaves** are very large, ovate-cordate, margins wavy, long stalks. **Inflorescences** in spadix, male flowers above, with stamens combined to form a hexagon, female flowers below with long ovary. Berry ovoid, red when mature. Flowering and fruiting periods are from January to May.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

A. macrorrhiza wildly distributed in many countries of southeast Asia. In Laos it is found in primary forest in almost parts of the country. It prefers to grow under the shade, wetland and along the river and stream banks.

6.0 Chemical Constituents

The rhizome consists of alocasin, alkaloids, amino acid of Fd A and Fd B iso-proteins, calcium oxalate (a toxic compound which causes itching), coenzymes, B-glucosidase,

polyphenoloxydase, phytosterol, campestrol, sugars, fructose and glucose, trigochine, iso-trigochine,vitamins (A, D2, α and B-carotenes), riboflavine, thiamine and polysaccharide (especially starch).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The rhizome of *Alocacia* are prescribed for healing malaria.
- Nepalese (call giant taro as ghampe tarul), used its root for laxative, diuretic and scorpion-sting, snake bite, the roots and leaves are also externally applied for treating arthralgia, furunculosis, impetigo and asthma.
- According to oriental medicine theory *A. macrorrhiza* has insipide taste, but hot and itchy, toxic, may cause itchiness in the mouth and throat when eaten.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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- Malla SB. 1984. Medicinal Plants of Nepal (Supplement Vol.) May 2nd. Pp. 30.
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Curcuma longa L.
Zingiberaceae


1.0 Scientific Name : *Curcuma longa* L.

2.0 Vernacular Names : Khi min, khi min kheun (Lao), huang chiang (Chinese), common turmeric, turmeric (English), safran des indes (French), ro miet (Khmer), haridra (Sanscrit) Khmin (Thai), nge, huỳnh khuang (Vietnamese)

3.0 Plant Description

A perennial herb about 0.6 to 1 m high. **Rhizomes** thick, golden yellow with characteristic odor and taste. **Leaves** blade is ovate-lanceolate, thin, entire-margined and narrows to a long sheath-like petiole, up to 45 cm long and 6 to 10 cm wide, glabrous on both sides. **Inflorescences** cylindrical 10 to 15 cm long, arising from the leaves, yellow flowers and greenish or whitish bract with pink tips 10 to 12 cm in length and 5 to 6 cm in diameter.

4.0 Propagation : Rhizome (collected during winter).

5.0 Ecology/ Geographic Distribution

The plant is a native of southern Asia (probably India) and cultivated throughout the warmer parts of the world, such as Cambodia, China, India, Laos, Madagascar, Malaysia, the Philippines and Vietnam.

6.0 Chemical Constituents

- The rhizome of *C. longa* contains essential oil with major constituents reported being: bisabolene, trans-ocimene, myrcene, 1,8-cineol, thujene and thymol, α turmerone, turmerone derivatives: cis-turmerone, β turmerone,

(Z)-β-ocimene, a-phellandrene, 1,8-cineol, undecanol, p-cymene, monoterpene, sesquiterpene, humulene oxide, 6-cadinen, curcuminoids, curcumin, demethoxy curcumin, bis-demethoxy curcumin, 5'-methoxycurcumin, dihydrocurcumin and cyclocurcumin.

- The essential oil from leaves consist mainly of α phellandrene while p-cymene-8-ol from flowers and α turmerone from rhizomes and roots

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- In Lao the turmeric rhizome is used for astringent, gastric and intestinal ulcers. Fresh rhizome (crushed) with lime solution is applied on the wound to avoid their cicatrisation or taken orally (drink) to treat diarrhea and dysentery. In many regions of the country the healers used to macerate the powder of dried rhizome in honey for the treatment of gastric ulcer.
- In Chinese medicine, turmeric is used for rheumatalgia, pains in the chest, ribs, abdomen, liver and stomach, bleeding nose, vomiting with bleeding and heat stroke. It is used also for treating rheumatalgia, regulating menses and amenorrhoea.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- BLA. Usman et al. 2009. Chemical composition of rhizome essential oil of *Curcuma longa* L. growing in North Central Nigeria. *World Journal of Chemistry;* 4(2): 178–181.
- A Wasthi P K et al. 2009. Chemical composion of *Curcuma longa* leaves and rhizome oil from the plains of Northern India. *J. Young Phamacists*; 1: 3312–6
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Curcuma xanthorrhiza Robx.
Zingiberaceae

1.0 Scientific Name : *Curcuma xanthorrhiza* Robx.

2.0 Vernacular Names : Van hoa dieo, van nang (Lao), java turmeric, giant curcuma, false turmeric (English), temu lawak, tewon lawa (Indonesian), temu lawak (Malay), wan chak mot luk (Thai)

3.0 Plant Description

A perennial plant 1.75 cm high and leafy. **Leaves** are in long thin sheaths on the rhizome, leaves blades are broadly lanceolate or oblong and have a narrow, purple mark on the midrib. The main rhizome is thickened like a tuber, ovate, the size of the fist with numerous roots and thin lateral rhizomes. **Roots** terminating partially in ovate tubers. **Inflorescences** large, it is purple or crimson. The corolla has a red margin. Very similar to *Curcuma domestica* Valeton. **Flower** yellow in colour.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

C. xanthorrhiza is indigenous to the forests of Indonesia and the Peninsular of Malaysia and mainly cultivated in Java, in Malaysia, Thailand and the Philippines. It is also found in the forest of Laos and cultivated in many provinces for commercial purposes.

6.0 Chemical Constituents

The rhizome of *C. xanthorrhiza* consists of volatile oil with curcuminoids and bisabolane-type sesquiterpenes as major components present. Curcumin is the most important compound. Dimethoxy-curcumin, ar-curcumene (a-urcumene) p-

curcumene, xanthorizol, germacrene, furanodiene, furanodienone, non-phenolic diarylheptanoids, alnustone and starch were also present.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The rhizome is used for the treatment of leucorrhea, uteritis, drying up of the lochia, uterodynia and hernia.
- Indonesian used the rhizome to treat liver diseases, gallstone, digestive system related problems, to increase appetite, anti-aging, anti-wrinkle as well as improve agility. It also used for post-partum care.
- Malaysian used the rhizome to treat rheumatism, sexual neurasthenia, chest pain, fever, diarrhea and inflammation.
- In Chinese traditional medicine, the rhizome has been used as an antirheumatic medicine.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Eurycoma longifolia Jack.
Simarubaceae


1.0 Scientific name : *Eurycoma longifolia* Jack.

2.0 Vernacular names : Yik bo thorng, Ian dorn (Lao), ali's umbrella, long jack, Malaysian ginseng (English), antoung sâr (Khmer), babi kurus, mempoleh, piak, tungke ali (Indonesian), bedara-pahit, pasak bumi, penawar bisa, tongkat ali, pa (Malay), cha-naang, Ian don, plaa-lai pheuak, yik bo thong, yik may tueng (Thai), bá b□nh, bách b□nh, (Vietnamese)

3.0 Plant Description

A small woody tree, up to 5 m high, stem erect, less branched, black. **Leaves** imparipinnate, up to 1 m long, leaflets numerous, sub-opposite or opposite, lanceolate to ovate-lanceolate and slightly acuminate. **Inflorescences** in the branches; flowers red. **Drupe** ovoid, glabrous, grooved, red when mature, one seeded. Flowering and fruiting periods are from January to April.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

E. longifolia grows wild on sandy soil in secondary and evergreen and mix deciduous forests in most Lao PDR provinces. It is also found in other countries in Indochina peninsular, Myanmar, Malaysia, Borneo, Sumatra (Indonesia) the Philippines and Thailand.

6.0 Chemical Constituents

- *E. longifolia* contains canthin-6-one alkaloids, anthraquinone glycoside, β-

sitosterol, campestrol, eurycoma lactone, 2, 6-dimethoxy-benzoquinone, eurycomaoside, eurycolactone, eurycomalactone, and pasakbumin-B.

- The root, stem bark and wood contain quassinoid substances, including eurycomalactone, eurycomanol and their derivatives. Canthinone, a canthin-6-one alkaloid is isolated from the wood while campesterol, longilactone, sterols, scopoletin and palmitic acid from the roots.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Root has been used to treat diabetes mellitus, first stage uterus cancer, anti-malarial, aphrodisiac, anti-diabetic, anti-microbial and anti-pyretic medicine.
- In Cambodia, the stem bark is used for indigestion, the root as antidote for alcoholic addiction and antihelminthic.
- In Myanmar, the root or ground bark rubbed over the body to treat dropsy while seeds are used as astringent, febrifuge and antihelminth.
- In Malaysia, the bark found its use for lumbago, arthralgia, jaundice, dropsy, cachexia and diarrhea while *E. longifolia* leaves-turmeric paste is used for dermatitis caused by poisonous caterpillars.
- Vietnamese used the stem bark for indigestion, flatulence and malaria.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Harborn JB. et al. 1993. *Phytochemistry Dictionary. A Handbook of Bioactive Compounds from Plants.* Pp. 158, PD588 and Pp. 732, PD3716.
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- Rajeev B. et al. 2010. Tongkat ali (*Eurycoma longifolia* Jack): A review on its ethnobotany and pharmacological importance. *Fitotherapia.* 81(7): 669–679.

Holarrhena antidysenterica (Roth.) Wall.
Apocynaceae


1.0 Scientific name : *Holarrhena antidysenterica* (Roth.) Wall.

2.0 Vernacular names : Mouk nhay (Lao), let-htoke-gyi (Burmese), bitter oleander, conessi bark, dysentery rose-bay, tellichery bark (English), connessie, écorce de codapala (French), phut thung (Thai), moc hoa trang, thung muc lá to (Vietnamese).

3.0 Plant Description

Small deciduous tree. **Stem** bark is rough, brown, about 0.5 cm exfolliating in small flakes, wood white, soft even grained, younger branch tomentose, the older one is glabrous. **Leaves** opposite, obovate, oblong rounded at the base, membranous sub-sessile, pubescent on both surfaces. **Infloresences** in terminal corymbose cymes. Cylindrical paired folicles, 20 to 30 cm long, about 1.5 cm in diameter, dehiscing along the suture. **Seeds** with tuft of long silk hair at apex. Flowering period is from May to July and fruiting period is from February to March.

4.0 Propagation : The root, stem bark and seeds

5.0 Ecology/ Geographic Distribution

Wildly distributed in Laos' secondary and dipterocarp forests. It is also common to other countries in Indochina peninsula, Myanmar, Malaysia and India.

6.0 Chemical Constituents

- Stem bark contains alkaloids; wrightine conessine, neriine, rochessine, roquessine (major) and their derivatives such as nor conessine, conessimine, isoconessimine. Also present are konkurchine, kurchicine, and regholarrhenines A, B, C, D, E and F.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The plant is used for the treatment of amoebiasis dysentery.
- In Malaysia and in Indian medicine, the plant is used for anthelmintic, antidysentric, antiperiodic, astringent, carminative and febrifuge.
- According to oriental medicine theory, *H. antidysenterica* possesses antiseptic and anticholeric effects.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Evans WC. 2009. Trease and Evan Pharmacognosy, Sixteenth Edition. Pp. 414–5.
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- Shahid BU. 1995. Studies on the Chemical Constituents of *Holarrhena antidysenterica* L. and the B-carboline Series of Bases and Their Pharmacological Activity. Doctor of Philosophy Thesis. Pp. 36.
- PNV. 1977. *Krup Hand Book of Medicinal Plants.* Volume 1, Pp. 58.
- WHO Regional Publications: Western Pacific. 1990. Medicinal Plants in Viet Nam; Series No 3, Pp. 201.

Homalomena aromatica Schott.
Araceae


1.0 Scientific name : *Homalomena aromatica* Schott.

2.0 Vernacular names : Born horm, Khing-khaeng-pa-kang, born pa kang (Lao), qian-nian-jian (Chinese), kelemoyang (Malay), hora (Thai), ráy huong, son thuc, thiên niên kien, (Vietnamese)

3.0 Plant Description

A perennial herb with rhizome long, many-noded, tubular and needlelike and hard fibers. **Leaves** on clusters, sagittate, base deeply cordate, apex acuminate, nerves rising from the base, petiol 30 to 50 cm with clasp sheath. **Inflorescences** in axillary spadix, greenish, with male flowers above the female. **Berries** oblong, red when mature, seeds numerous. All plant parts especially rhizome produce agreeable odour when crushed. Flowering and fruiting periods are from March to June.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

A hygrophyllous and ombrophyllous plant, it grows along the streams and on the slope of the mountains in primary forests and wet lands. It is abundant in most provinces in Laos PDR, Viet Nam and Yunnan province of China.

6.0 Chemical Constituents

- The rhizome of *H. occulta* contains sesquiterpenoids, cadinane-46, 5a, 10a-triol, 5(11)-epoxycadinane-46, 5 6, 106, 11-tetraol, bullatantrol-16 methyl-maleate, acetyl bullatantrol, sesquiterpene alcohols, namely 16, 4 6, 7 α-trihydroxyeudesmane, homalomenols A and B.
- The essential oil (2.4 – 3.9 %), consisting of α and β-pinene, linalool, nerol, geraniol, terpinene-4-ol, patchouli alcohol, iso-borneol, lynalyl acetate, dihydrocuminaldehyde and terpinolene.
- Phenolic compounds, protocatechuic acid, vanillic acid, syringic acid, caffeic acid, coumaric acid, ferulic acid and apigenin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The rhizome is used as one of the ingredient to treat rheumatism, arthritis and strengthen bone joints.
- Vietnamese used the plant for rheumatism, lumbago, dysmenorrhea, burns, boils and insecticide.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Bích ĐH. et al. 1999. *Selected Medicinal Plants in Vietnam.* Volume II, Plant No. 105. Pp. 25–31.
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- Xiao-Yu Xie et al. 2012. Sesquiterpenoids from the rhizomes of *Homaloma occulta. Planta Med.* 78(10): 1010–1014.
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Kaempferia galanga L.
Zingiberaceae

1.0 Scientific name : *Kaempferia galanga* L.

2.0 Vernacular names : Van toup Moup (Lao), shannai (Chinese), galanga, East Indies galingale, resurrection-lily, ginger maraba, finger root, chinese ginger (English), kaemférie, fausse galangal (French) prâs svar (Khmer), cekur, cengkur (Malay), chandramulika, sugandhamula (Sanskrit) pro horn, sa khuong (Thai), dia lien, son nai, tarn nai (Vietnamese)

3.0 Plant Description

Perennial herbaceous plant. **Rhizome** includes little ovate tubers. **Leaves** 2–3 with broad blade, spreading flat on the ground, appearing annually in rainy season, hairy beneath. **Flowers** white tinged with violet, sessile, arising from the axil. All parts of the plant, especially the rhizomes are strongly aromatic. Flowering period is from Jun to July.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

Grows at the mountains, open grasslands, cultivated for medicinal purpose in most provinces of Laos as well as in many countries of southeast Asia and Western Pacific region.

6.0 Chemical Constituents

The rhizome contains 2.4 to 3.9 % essential oil, consisting of ethyl-p-methoxy-trans-cinnamate, methylcinnamate, p-methoxy-trans-cinnamic acid, trans-cinnamic acid, cinnamic aldehyde, anis-aldehyde, p-methoxy-styrene, p-coumaric acid, n-pentadecane, 1,8-cineol, y-car-3-ene, borneol, carvone, A3-carene, cineol, p-cymene and camphene and eucalyptone, cis-p-methoxy-ethylcinnamate, trans-p-methoxy-ethyl-cinnamate. Marginatol (=15-sanderacopimaradiene-1a, 9a-diol), a new isopimarene diterpenoid, germacrone and pentadecan were also isolated.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The rhizome is recommended for dyspepsia, treatment of pectoral and abdominal pains, headache, toothache and cold. It is prescribed in the form of decoction, powder or pills for oral administration.
- The tincture is employed externally in massage for the treatment of rheumatism.

8.0 Contraindications : Not available

9.0 Dosage :

- Stomach pain: Fresh rhizome 3 – 6 g per day.
- Stomach ulcer and pain relief: *Curcuma longa*, *Eleutherine subaphylla* and *Kaempferia galanga* with equal quantity and pure honey to make 0.50 g.

10.0 Bibliography

- Anon. 2012. *Medicinal Plants and Herbs of Lao Volume I*. Pp.273
- Fan Ya-ming et al. 2005. Analysis of chemical compounds of volatile oil from *Kaempferia galanga* L. in South China. *Food Science*. 26(6):196 –198.
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- Yu J. G. et al. 2000. Studies on the chemical constituents of *Kaempferia marginata. Yao Xue Xue Bao*. 35(10): 760–776.

Leonurus heterophyllus Sweet
Lamiaceae

1.0 Scientific name : *Leonurus heterophyllus* Sweet

2.0 Vernacular names : Nat soy, set ka sack, sa kansa (Lao), pai-hua i-mu-tsao, yi-mu-cao (Chinese), chinese motherwort herb, lion's tail, motherwort, wormwood like (English), agripaume (French), padang derman, tebing agu (Malay), kancha thet, sa nam, sa sa (Thai), cha linh lo, chói den, ich mau, làm ngài, Sung uý, xác dien (Vietnamese)

3.0 Plant Description

Annual or biannual herbaceous plant, 0.5 to 1 m high. **Stem** erect, quadrangular, longitudinally furrowed on 4 surfaces, pubescent or glabrous, much branched. **Leaves** opposite, long-petioled, the basal nearly round, dentate-crenate, pubescent on both sides, the middle, long, pinnatipartite, irregular, dentate, the upper, short, usually entire, the upper and middle leaves lamina rolls round the petiole, up to the base, pubescent on the lower surface and obvious on the ribs. **Inflorescences** in axillary; flowers small, pink white or pink purple. Nutlets small, triangular, glabrous, dark brown when mature. Annually, seedlings emerge during March to April, grow in summer and wither after numerous flowering and fruiting phases in mid-autumn.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows naturally on transported soil, river banks (especially Mekong river bank) as well as other countries in Indochina, Indian subcontinent (India, Nepal), Myanmar and Malaysia.

6.0 Chemical Constituents

- The aerial parts contains leosibirin, leosibiricin, benzoic acid, salicylic acid, syringic acid, adenosine, stigmasterol, tannin, lavandulifolioside, flavonoside, rutin, leoheteronin A-F, leopersin G.
- The leaves contains alkaloids, leonurine, leonurinine, leonuridine and stachydrine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Lao traditional medicine used *L. heterophyllus* for regulating menstrual disorders. *L. heterophyllus* and leaves of *Nelumbo nucifera* Gaertn. (lotus) extracts is a cardio tonic.
- In Vietnam *L. heterophyllus* is used to ease menstrual cramps, healing nephritis and post-partum care.

8.0 Contraindications : Not available

9.0 Dosage : Menstrual disorders: *L. heterophyllus*: *Cyperus rotundus*: *Artemisia vulgaris* [2:3:1] mixture decoction to be taken thrice a day, 15 ml each time.

10.0 Bibliography

- Hai-Qun Gong et al. 2012. New labdane-type diterpenoids from *Leonurus heterophyllus*. *Helvetica Chimica Acta*. Vol. 95(4): 618–625.
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Litsea cubeba (Lour.) Pers.
Lauraceae

1.0 Scientific name : *Litsea cubeba* (Lour.) Pers.

2.0 Vernacular names : Si khai ton, mak sang (Lao), shan-hu-chiao (Chinese), cubeb (English) cubèbe (French), medang (Malay), cha khai ton, ta khrai, ta khrai ton (Thai) gie huong, khao khinh, khuong moc, màng tang, may chang, son thuong, ta châm điang, tat trung già (Vietnamese)

3.0 Plant Description

Medium sized, evergreen tree. Twigs cylindrical bark glabrous, grayish, striate and lenticellate. **Leaves** alternate, oblong-lanceolate, base narrowed, apex acuminate, glabrous on both side, shining dark green above, alaucous beneath. **Inflorescences** in axillary umbellate raceme; flowers white; 4 to 6, dioecious, bracts 4; perianth 6-lobed subequally, male flowers: stamens 9; female flowers: ovary ovoid glabrous. **Fruits** globose or ovoid, black when ripe. The whole plant have pleasant odour. Flowering period is from March to May and fruiting from June to August.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild in the northern part of Laos PDR, abundant in Vientiane, Luangphrabang, Oudomxay, Houa phanh and Xieng khouang provinces. It is also found in China, India, northern part of Thailand and Vietnam.

6.0 Chemical Constituents

- The whole plant is fragrant, the fruit oil consists of precious essential oil, which contains mainly citral, citronellal, some other substances, d-limonene, α and 3-citral, monoterpenes, monoterpenes oxide, dipentene, ethyl heptenone, linalool aliphatic acids, esters, p-cymene, thujanol, d-limonene, linalool. (+)-/V-(methoxy-carbonyl)-/V-norlauroscholtzin, and (+)-/V-(methoxy-carbonyl)-/V-norlaglau cine, α-cis-ocimene, 3,7-dimethyl-1,6-octadiene-3-ol, and n-transnerolidol were also reported.
- The root contains naphthalene, 3-pinenes, citronellelal and camphor.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- *L. cubeba* wood is an ingredient for tonic liquor prepared for vitality, energy booster, improve blood circulation, treatment for rheumatism and lumbago.
- Chinese used the fruit for amoebic and bacillary dysentery.
- In Vietnam, the root is used to treat venomous snake bite, the fresh roots are sliced or in a form of poultice to be applied at the wound/infected skin area for its antiseptic and cleansing effect. *L. cubeba* also used to protect grain against storage grain insect.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Hongwu Wang et al. 2010. Chemical composition and antibacterial oils from different parts of *Litsea cubeba*. *Chemistry & Biology.* Vol. 2. Pp. 229.
- Ko ko et al. 2009. Repellency, fumigant and contact toxicities of *Litsea cubeba* Lour. Persoon against *Sitophyllus zeamais Motschulky* and *Tribolium castaneum* (Herbst). Kasetsart. *J. Nat. Sci.* 43: 56–63.
- Linlin Si et al. 2012. Chemical composition of essential oils of *Litsea cubeba* harvested from its distribution in China. *Molecules.* 17(6): 7057–7066.
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- Mohammad Arfan et al. 2008. Antioxidant activity of phenolic fractions of *Litsea monopetala* (Persimon-leaved bark extract). *Polish Journal of Food and Nutrition Sciences.* No. 2: Pp. 229–333.

- Wang F et al. 1999. Chemical composition of essential oil from leaves of *Litsea cubeba* and its antifungal activities. *Zhong Yao Cai* 22(8): 400–402.
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Momordica charantia L.
Cucurbitaceae



1.0 Scientific name : *Momordica charantia* L.

2.0 Vernacular names : Mark xay, mark hoy, mark khom (Lao), kyet-hinga (Burmese), k'u-kua (Chinese), margose amere, margosa à piquants, margosier piquant, pomme de emerveille (French) african cucumber, balsam apple, balsam peer, bitter cucumber, bitter gourd, carilla fruit, leprosy gour (English), mras (Khmer) peria, peria katak, peria laut, peria pahit (Malay), mara, maroi ru, ma hai, ma hoi, phak hai, phak hoei, su-pha-de su-pha-su (Thai), cam le chi, kho qua, luong qua, muop dang (Vietnamese)

3.0 Plant Description

An annual climbing plant, much branched, angle and grooved simple tendrils. **Leaves** alternate, cordate at the base, 5 to 7 lobed. **Inflorescences** in axillary, flowers unisexual, both male and female solitary, yellow. **Fruits** fusiform, pendulous, bearing numerous triangular tubercles, orange-yellow when ripe. Flowering and fruiting are in June to September.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows and cultivated in lowland across the country as well as along the Mekong river bank.

6.0 Chemical Constituents

- The fruit contains triterpenic glycosides, momordicosides A and B, glycosides of a pentahydroxy-cucurbitane triterpene, charantine; amino acids: alanine, aspartic, cysteine, methionine, glutamic acids, pigments and vitamins, inorganic elements (including K, Na, Ca, Mg, Cu, Fe, Zn).
- The fruit also contains blumenol, guanosine, uracil, cytosine, momordicolides ((10E)-3-hydroxy-dodeca-10-en-9-) and monodicophenoide A (4-hydroxybenzoic acid 4-O-B-D-apiofuranosyl (1--2)-O-B-D-glucopyranoside).
- The seeds contains lipids, nonpolar lipids (a-eleostearic acid as the predominant fatty acid), glycolipids, phospholipids, mineral, amino acids and essential oil (which consists of trans-nerolidol, c/s-dihydrocarveol and germacrene).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The plant is used for antidiabetic remedies.
- Burmese use the fruit juice as purgative and emetic while the root for astringent for haemorrhoids.
- Malaysian use pounded leaves to cure skin disorders, burns, scalds, headache and diarrhea, flowers for asthma and the seeds to lower high blood pressure.
- Vietnamese used unripe fruit for diabetes, fatigue and rheumatism.

8.0 Contraindication : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Ananya Paul et al. 2010. Medicinal uses and molecular identification of two *Momordica charantia* varieties: A review. *Electronic Journal of Biology.* Vol. 6(2): 43–51.
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- Kuri EY. et al. 1991. Chemical composition of *Momordica charantia* L. fruits. *J. Agric. Food Chem*. 39(10): 1762–1763.

- Li QY et al. 2009. Chemical constituents of *Momordica charantia* L. *Yao Xue Xue Bao*. 44(9): 1014–1018.

Nauclea orientalis (L.) L
Rubiaceae


1.0 Scientific name : *Nauclea orientalis* (L.)

2.0 Vernacular names : Kan leuang (Lao), cheese wood, leichhardt pine, leichhardt tree, yellow cheese wood (English), kaen luang, kra thum noen (Thai), gáo vàng, huỳnh bá, gáonam (Vietnamese)

3.0 Plant Description

Medium-sized to tall tree, with a height of 30 m and diameter of 1 m. **Bark** deeply furrowed, outer blaze cream, yellowish orange or pink, with visible reddish layers. **Leaves** hearth-shaped, deep green, glossy and oppositely placed, 10 to 27 cm long by 6 to 17 cm wide, petioles 2 to 3.5 cm long. Stipule large and obovate. **Inflorescences** spherical heads about 3 to 5 cm in diameter. Flowers yellowish or orange, calyx difficult to distinguish, corolla tube 0.7 to 1 cm long, lobes 5 to 6. Stamens 5 to 6, anthers about 1.5 cm long, almost sessile at the mouth of the corolla tube. Style and stigma white, 1.5 to 1.7 cm long, expanded into a conical or bullet shaped stigma at the apex. **Fruit** a fleshy irregularly shaped globular mass containing many seeds. Each fruit is actually an aggregation of many fruits, each produced from a single flower in the inflorescence. **Seeds** tiny, about 1.5 to 1.0 mm.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Native to Australia, Indonesia, Malaysia, Thailand and Vietnam; it is found mainly in low mountains or lowland. In Laos, *N. orientalis* is found in almost provinces.

6.0 Chemical Constituents

- Leaves contains alkaloids, 10-hydroxy strictosamide and 6-O-acetyl strictosamide, vincosamide.
- Stem contains two tetrahydro-B-carboline monoterpene alkaloid glycosides, naucleaorine and epimethoxynaucleaorine, strictosidine lactame, 3,4,5-trimethoxyphenol, 3a, 19a, 23-trihydroxyurs-12-en-28-oic methyl ester, β-sitosterol, palmitic, oleanolic acid.
- Bark contains triterpene glycoside, naucleoside and nor-eugenine.
- Roots contains indole alkaloids, naucleaorean, naucleaoral A and naucleaoral B.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- In Australia, the bark and leaves of *N. orientalis* are used for abdominal pain, animal bites and wounds.
- Cambodian people use *N. orientalis* as a medicine for pain relief.
- In the Philippines, the decoction of bark is used to regulate menstruation, diarrhea and toothaches while the leaves are applied to boils and tumors.
- Vietnamese use *N. orientalis* to treat fever, malaria and liver related diseases.
- According to oriental medicine theory, *N. orientalis* has bitter taste, astringent, tonic and antipyretic.

8.0 Contraindication : Not available

9.0 Dosage

Lao healers use the decoction of *N. orientalis, Paradina* sp. and *Vitex pubescens* for anti-fatigue. The daily dose is 8-20 g.

10.0 Bibliography

- Erdelmeier CA. et al. 1991. New indole alkaloid glycosides from *Nauclea orientalis. Planta Med.* 57(2): 194–152.
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Oroxylum indicum (L.) Benth. ex Kurz
Bignoniaceae

1.0 Scientific Name : *Oroxylum indicum* (L.) Benth. ex Kurz

2.0 Vernacular Names : Lin may, ung ka(Lao), broken bones, indian trompet flower, midday marvel (English), oroxyle, calosanthe, oroxylon (French), soli-za-la (Japanese) pika, peika (Khmer), berak, beka, beka kampung, bikir, bikir hangkap, boli, boloi, bongloi kayu, kankatang, kulai, mekulai etc. (Malay), kaa-do-dong, litmai, lin faa, ma linmai, ma litmai, pheka (Thai), hong kỳ, moc ho diep, nam hoàng bá, núc nác (Vietnamese)

3.0 Plant Description

A medium size deciduous tree, 10 to 15 m in height. **Stem** bark smooth, gray, somewhat fissured. **Leaves** opposite, 2 to 4 times pinnate, leaflets ovate or elliptic. **Inflorescences** in terminal racemes, tubular without lobes, large; corolla thick, campanulate, 5 wrinkle lobes at the top, usually lurid purple. Capsules sword-shaped, hanging, 50 to 70 cm long. **Seeds** embricate with broad transparent wing on 3 sides. Flowering period is from May to July, fruiting period is from August to October.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild throughout the country. It is also found in most countries in Asian region.

6.0 Chemical Constituents

- The roots and stem barks of *O. indicum* contain flavonoids, baicalein-7-O- diglucoside, baicalein-7-O-glucoside; baicalein (5,6,7-trihydroxy flavone), oroxylin, pinostrobin; baicalein-7-O-diglucoside, pterocarpan, rhodioside, p-hydroxyphenylethanols and cyclohexanols, 5-hydroxy 6,7 dimethoxy flavone, 5,7-dihydroxy-6-methoxy flavone, chrysine-7-O-β-D-glucopyrranoside, apigenine, aquinoctine, , sterols including, tannic acids and galactosa.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The root or stem bark for antiallergic, antidiabetic and jaundice.
- In India, the root bark is used as an astringent, bitter, carminative diaphoretic, diuretic, purgative, stomachic, abdominal pain, anorexia, diarrhea, dysentery, enteric fever, giddiness, piles, respiratory disorders, rheumatism, thirst and urogenital disorders.
- In Nepal, the stem is use for scorpion stings; seeds are purgative and the bark is astringent to the bowel, cooling, tonics and improve appetite.
- In Thailand, the poultice of the root rubbed on rough stone with water or saturated lime solution is applied onto the abscesses or inflammatory area.
- Vietnamese used 6-8 g of the plant decoction daily to treat jaundice, urticaria, angina, hoarsening cough, urinary tracts inflammation, urodynia, haematuria, infantile rush and measles.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Bích ĐH. et al. 1999. Selected Medicinal Plants in Vietnam. Vol. 2.
- Hom Nath Luitel et al. 2010. Chemical constituents from *Oroxylum indicum* (L.) Kurz. of Nepalese Origin. *Science World.* (8):8.
- Liu R. et al. 2010. Preparative isolation of flavonoid compounds from *Oroxylum indicum* by high-speed counter-current chromatography by using ionic liquids as the modifier of two-phase solvent system. *J. Sep Sci.* 33(8): 1058–1063.
- Yin WG et al. 2007. Advances In the chemical constituents from *Oroxylum indicum*. *Zhongguo Zhong Yao Za Zhi.* 32(19): 1965–1970.

Orthosiphon aristatus (Blume) Miq.
Lamiaceae

1.0 Scientific name : *Orthosiphon aristatus* (Blume) Miq.

2.0 Vernacular names : Nha nuat meo (Lao), se-cho, myit-shwe (Burmese) mao-tsü-ts'ao (Chinese), indian kidney herb, java tea, kidney tea plant (English) barbilore, orthosiphon, moustache de chat, thé de java (French), remukjung, kumis kucing (Javanese), kra pen prey (Khmer), hu tan, kumis kucing, misai kucing, ru ku, remujung (Malay), ya nuat meo, phayap mek (Thai), cây bông b□c, râu mèo (Vietnamese)

3.0 Plant Description

A perennial undershrub. **Stem** quadrangular, less branched, glabrous, more or less hairy, rigid, usually tinged violet. **Leaves** opposite in distance pairs, ovate, apex acute, round at the base, margin toothed. **Inflorescences** in terminal raceme. Flowers numerous, purplish-white. Nutlets broadly oblong, compressed and glabrous. Flowering from March to July.

4.0 Propagation : Stem

5.0 Ecology/ Geographic Distribution

Grows wild in many provinces of Laos along the road, at the edge of the rice field or forests. It is also found in many countries Australia, China, Indonesia, India, Malaysia, Myanmar, Thailand and Vietnam. It is now cultivated for medicinal and ornamental purposes.

6.0 Chemical Constituents

- Leaves and stems contain orthosiphonin, apophonine, tannins, organic acids (including glycolic acid, ursolic acid, B-sitosterol and myoinositol), benzochromenes, methyl-ripariochromene A, acetovanillochromene, orthochromene A, iopimarane-type diterpenes, orthosiphols F-J, orthosiphon A, orthosiphon B, orthosiphonone A and orthosiphonone B, yellow essential oil with disagreeable odour, phytosterols, sugars, alkaloids, tannin, hederagenine, choline, betaine, organic acids, K salts.
- *O. aristatus* of Indonesia consists of sinensetin, caffeic derivatives: rosmarinic acid and 2, 3-dicaffeoyl-tartaric acid, α-sitosterol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The leaves are used as a strong diuretic to treat kidney and bladder related diseases, especially lithiasis, urinary calculi. It is also used for rheumatism, gout and hepatitis with edema.
- In Brunei the decoction of leaves combined with *Nigella sativa* and *Allium cepa* is consumed to treat diabetes.
- In Vietnam, the plant is used for nephritis, intestinal ulcer, rheumatism, gout and to improve liver functions.
- According to oriental medicine theory *O. aristatus* possesses sweet taste, slightly bitter, cool character, induces diuresis, antipyretic and anti rheumatism.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Bich ĐH. et al. 1999. *Selected Medicinal Plants In Vietnam* 1999; Volume II. Pp. 159-161.
- Daw Mya Bwin et al. 1967. *Burmese Indigenous Medicinal: Plants with Reputed Hypoglycemic Action.* Special report. Series No. 4. Pp. 127.
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- Ohashi K. et al. 2000. Indonesian medicinal plants. XIII. Chemical structures of two new migrate pimarane-type diterpenes, neoorthosiphon A and B, and suppressive effects on rat thoracic aorta

of chemical constitution isolated from the leaves of *Orthosiphon aristatus* (Lamiaceae). *Chem Pharm Bull* (Tokyo). 48(3): 3–5.

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- Yasuhiro et al. 2000. Constituents of the Vietnamese medicinal plants *Orthosiphon stamineus*. *Chem. Pharm. Bull*. 48(11):1711–1719.

Plantago major L.
Plantaginaceae

1.0 Scientific Name : *Plantago major* L.

2.0 Vernacular Names : Nha en yuet, nang chay mia(Lao), a kyawbaung-tahtaung, hpa-kyaw-ywet, mahn-suit ywet, segyawgyi (Burmese), da-che-qian (Chinese), great plantain, large plantain, plantain ripple-grass, plantain robwort, ripple grass, way-bred (English), plantain commum, plantain majeur, plantain des oiseaux, grand plantain (French), menjangan, mela kilo, otot-ototan, suripandak (Javanese), slap chang va (Khmer), daun sejumbok, ekor angin, ekor anjing (Malay), mo noi (Thai) mã đ□, bông mã đ□ (Vietnamese).

3.0 Plant Description

A perennial herb with an erect stout rootstock. **Leaves** radical, alternate, ovate or oblong-ovate, forming a rosette, spoon-shaped, sinuate toothed or obtuse margin, leaf stalk (petiole) tightly clasping each other at the base, longer than leaf blade, five nerved. **Inflorescences** in axillary, longer than leaves, flowers small, crowded in long slender rather than cylindrical, lax spikes with colour. **Fruits** ovoid capsules, seeds numerous brownish or dull black, angled. Flowering and fruiting period the whole year.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Grows wild along the stream or river banks, rice field dam, road hedge, in shady and moist places throughout Laos. It is also found also in many Asian, European countries as well as America.

6.0 Chemical Constituents

- The plant contains two glycoside (aucuboside), rhinantine or aucubine, of which its sugar part is glucose, and homoplantagin (4', 5' dihydroxy-6-methoxy-7-D-glucosyloxyflavone or hispiduline 7-D-glucoside).
- The leaves mainly consist of mucilage, saponins, volatile oil, potassium salts, citric acid, vitamins A, C and K.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The root decoctions is used to treat diarrhea, dysentery, gastritis, peptic ulcers, irritable bowel syndrome, hemorrhage, hemorrhoids, cystitis, bronchitis, catarrh, sinusitis, coughs, asthma and hay fever.
- Plant extracts have antibacterial activity, hence safe and effective treatment for bleeding, quickly stops blood flow and encourages the repair of damaged tissue.
- The heated leaves are used as a wet dressing for wounds, skin inflammations, malignant ulcers, cuts, stings and swellings.
- The seeds are used in the treatment of parasitic worms.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Chang-Xiao Liu et al. 1993. *An Introduction To Chinese Materia Medica* Pp. 134–5 (*Plantago asiatica*).
- Mohamed et al. 2011. Biochemical studies on *Plantago major* L. and *Cyamopsis tetragonoloba* L. *International Journal of Biodiversity and Conservation*. 3(3): 883–91.
- Samuelsen et al. 2000. The traditional uses, chemical constituents and biological activities of *Plantago major* L. A review. *J. Ethnopharmacology*. 71(1–2): 1–21.

Plumeria rubra L.
Apocynaceae

1.0 Scientific name : *Plumeria rubra* L.

2.0 Vernacular names : Champadeng (Lao), frangipanni plant, pagoda tree, temple tree (English), frangipanier (French), kampoja, samboja, semboja (Javanese), champey sâr-krahâm (Khmer), kemboja merah (Malay), lan thom daeng (Thai), bông sứ, dại, sứ cùi, hoa cham pa (Vietnamese).

3.0 Plant Description

Medium-sized tree, stems erect, branches fleshy, glabrous, brittle, glaucous, sealed with scars of fallen leaves. **Leaves** thick alternate, usually crowded in terminal cluster, lanceolate, alternate at both ends, dark green above, pale beneath. **Inflorescences** in terminal cyme, flowers reddish-pink, fragrant, corolla 5-lobed, follicles divaricate, cylindrical, brownish-black when ripe. **Seeds** oblong, thinly winged. All parts of the plant yield milky latex. Flowering and fruiting from April to October.

4.0 Propagation : Stem cutting.

5.0 Ecology/ Geographic Distribution

Found in all parts of Laos, it is usually planted for ornamental purpose.

6.0 Chemical Constituents

- The stem bark contains iridoides, fulvoplumierin, agoniadin, plumieride, allamcin and allamandin, plumeric acid, oerotinic acid and lupeol; 2,5-dimethoxy-p-benzoquinone; triperpens of amyrin series, rubrinol (3β, 30-dihydroxy-12-uresen) and 6α-hydroxy-3-epi-oleanic acid and 13α, 27-dihydroxy-12-oleanene.
- Rich in alkanoic acids and 2-phenylethyl benzoate. The major components of the essential oil of the flowers of *Plumeria rubra* L. are 2-hydroxybenzoic acid phenylmethylester; nanodecane and heneicosane.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- In Lao traditional medicine, *P. rubra* wood is used as remedies for blood related problem or tonic for woman.
- Malaysian used the plants to treat skin disorders, intermittent fever, gonorrhea, toothache, inflammation and to regulate menstruation. It is claimed to be diuretic and laxative.
- Vietnamese used the stem bark and root as laxative and cathartic, treating constipation, oedema, intestinal and urinary retention. Slices and torrefied bark is used as laxative and purgative. Root bark is also used to treat impetigo.

8.0 Contraindication : Not available

9.0 Dosage

Ingredient for woman blood tonic remedies: (1) 20 g of *P. rubra* wood and 30 g *Plumbago rosea* root boiled in 1 liter of water for 30 minutes and divided into 3 portions to be consumed thrice a day (morning, noon and evening).

10.0 Bibliography

- Jasmin G. et al. 2011. Phytochemical and pharmacological potential of *Plumeria rubra* Linn. (Apocynaceae): A Review. *International Journal of Pharmaceutical Sciences* Jan – Apr. 3(1): 1162–1168.
- Kardono LB et al. 1990. Cytotoxic constituents of the bark of *Plumeria rubra* collected in Indonesia. *J. Nat. Prod.* Nov – Dec. 53(6): 1447–55.
- Nargis A. 1992. Isolation and structural studies on the constituents of *Calotropis procera*, *Plumeria rubra* and *Amberboa ramosa*. Doctor of Philosophy Thesis. Pp. 106–126. .

- Noral Ashikin Y. et al. 2002. *Compendium of Medicinal Plants Used In Malaysia.* Volume II, Pp. 242.Norsita T. et al. 2006. Chemical composition of the essential oil of four *Plumeria* species grown in the Peninsula of Malaysia. *Journal of Essential Oil Research.* 18(6): 613–7.
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Quisquilis indica Lindl.
Combretaceae

1.0 Scientific name : *Quisquilis indica* Lindl.

2.0 Vernacular names : Samang (Lao), shih-chun-tzu, shijunzi (Chinese); chinese honey-suckle, drunken sailor, rangoon creeper (English); liane vermifuge (French), cheguk, kachekluk, wedani (Javanese), andaung pras (Khmer); akar suloh, aka pontianak, belimbing hutan, dani, urdani (Malay), lep mue nang, cha mang, ma chi mang (Thai); dây giun, mác giáo giun, may lang cuong, qua giun, qua nac, sii quân (Vietnamese).

3.0 Plant Description

A climbing woody vine, young vine are covered with soft brown hair. **Leaves** nearly opposite, lobe oblong or elliptic, apex apiculate, nerves membranaceous, apparently conspicuous beneath, having thin and soft hair. **Inflorescences** in terminal raceme. **Flowers** fragrant, darkish rose, bract lanceolate calyx tubular. **Fruits** dry capsules 5-angled, ellipsoid and one-seeded. Flowering from May to July while fruiting from August to September.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Native to tropical Asia; sparsely found in Lao provinces. Cultivated for ornamental purposes, it prefers sandy and well aerated soil and climbs on the fences or small trees. Found in many countries, including Cambodia, China, Indonesia and the Philippines.

6.0 Chemical Constituents

- *Q. indica* contains of alkaloid namely trigonellin, α-aminoaciid, L-prolin, L-asparagin, quisquilic acid, flavonoids and enzymes. An important matter, 25-O-acetyl-23, 24-dihydrocucurbitacin was also isolated from the plant.
- The active compounds isolated from the fruit are ellagitannins, quisqualins A and B, and one hydrolysable tannin, punicalin. Fatty acids, including malic acid, stearic acid, succinic acid were also reported.
- The leaves contain potassium quisquilate, rutoside and some amino-acids. The leaves and the flowers contain the traces of glycoside, flavonoids and tannins.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- In Malaysia, the extract of the root or leaves is used as an antihelmintic, healing hiccough and cough. The leaves are made into poultice to be applied on the forehead to cure headache.
- In Thai, the decoction of seeds is used to expel hook worms (in adults).
- Vietnamese use the root for treating rheumatism and stomach ache, while the decoction of the fruit is used for odontalgia.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Zingiber cassumunar Roxb.
Zingiberaceae


1.0 Scientific Name : *Zingiber cassumunar* Roxb.

2.0 Vernacular Names : Varn phay (Lao), chiu-ehiang (Chinese), gingembre fou (French), bengle, bangle, bunglai, kunit bolai (Javanese), prateal vong preach a tit (Khmer), bungelai, bongelai, bonglai, bolai, kunyit bolai, bulai, boleh (Malay).

3.0 Plant Description

Perennial herb with underground yellow rhizome, stem up to 1.5m in height. **Leaves** simple, oblong-lanceolate, apex acute, base narrowing and clasping the stem by long sheaths. **Inflorescences** on a separate shoot without leaves, cylindrical spike grown from the rhizome. **Flower** white. Capsules globose.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

Commonly cultivated in community back yard. It is found in every locality in Laos. It is found also in many countries of Asia including Cambodia, China, Malaysia, Myanmar, Thailand, Viet Nam etc.

6.0 Chemical Constituents

- The rhizome of *Z. cassumanar* contains essential oil (β-pinene, sabinene, terpinen-4-ol, 3,4 dimethoxybenzaldehyde, 2,4,5 trimethoxy benzaldehyde, curcumine, vanilline, vanillic acid, veritric acid,

phenylbutanoids, trans-1-(3, 4-dimethoxyphenyl)but-1-ene, trans-1-(3, 4-dimethoxyphenyl)butadiene, trans-4-(3, 4-dimethoxyphenyl)but-3-ene-1-yl acetate, triquinacene 1, 4-bis (methoxy), (Z)-ocimene and terpinene-4-ol), phlobatannins, flavonoids, alkaloids, saponins, terpenoids, steroids and glycosides.

- Novel aromatic compounds, cyclohexene derivatives and quinone isolated: cis-3-(2', 4', 5'-trimethoxyphenyl)-4-[(E)-2'", 4'", 5'"-trimethoxy-styryl] cyclohex-1-ene and 8-(3', 4"-dimethoxyphenyl)-2-methoxy naphtho-1, 4-quinone respectively.
- The essential oil from the leaves of *Z. cassumunar* contains sabinene, β-pinene, caryophyllene oxide, caryopyllene and γ-terpinen.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Thai people used *Z. cassumunar* for sprain and inflammation.
- Malaysian used *Z. cassumunar* rhizome as a carminative and stimulant. In combination with other Zingiberaceae, it is orally used to treat flatulence, diarrhea colic, jaundice and post-partum care.

8.0 Contraindications : Not available

9.0 Dosage

- *Z. cassumunar* with ensuing ingredients is used to treat cholera: (1) 15 g of *Erioglossum edule* BL. root (2) 10 g lemon grass (*Cymbopogon nardus* Stapf), (3) 10 g *Areca catechu* L. young shoot (4) 10 g *Z. cassumunar* Roxb. (5) 6 immature lemon fruits. All ingredient are sliced to thin pieces, sun or oven dried, grind to fine powder and added with a sufficient quantity of honey to make 0.5g pills. Take 2 pills at a time, twice daily.
- For stomach and intestine discomfort, decoction of 30 g of *Paederia tomentosa* BL. young buds and 15 g of *Z. cassumunar* Roxb. in a liter of water reduced to half are divided into 2 parts to be taken twice a day (before lunch and dinner).

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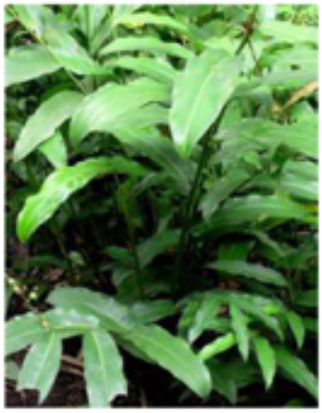
Malaysia

Alpinia conchigera Griffith
Zingiberaceae




1.0 Scientific Name : *Alpinia conchigera* Griffith

2.0 Vernacular Names : Lengkuas ranting, langkuas kechil, lengkuas padang and chengkenam.

3.0 Plant Description

A slender herb, 0.6 to1.5 m tall; rhizome slender. **Leaves** oblong, 15 to 30 cm x 4 to 8 cm, margins cillate, glabrous, petiole about 5 mm long, pubescent; raceme 20 to 30 cm long, sometimes with 1 basal branch, cincinni numerous, bracts small, broadly funnel-shaped. **Inflorescences** slender; flowers small, up to 1.5 cm long, lip pink to red, calyx short, 3 mm long, thick, corolla tube short, lobes elliptical-oblong, about 13 mm long, white to greenish white, labellum obovate, strongly concave, yellowish or pinkish white with red stripes on each side, 2 short teeth glabrous. **Seeds** strongly aromatic.

4.0 Propagation : Rhizome

5.0 Ecology/ Geographic Distribution

Eastern India through continental Asia to Peninsular Malaysia and Sumatra.

6.0 Chemical Constituents

- Dichloromethane extract of the rhizome contains phenylpropanoids (e.g. 1'S-1'-acetoxychavicol acetate, 1'S-1'-acetoxyeugenol acetate, 1'-hydroxychavicol acetate, trans-ρ-coumaryl diacetate, ρ-hydroxycinnamyl acetate, ρ-hydroxycinnamaldehyde).

- Essential oils of the rhizome contains monoterpenes (eg. β-sesquiphellandrene, β-bisabolene, 1,8-cineole, terpinen-4-ol, β-pinene, chavicol, β-elemene, ρ-terpinene, (+)-4-carene, (+)-globuol, δ-cadinene, α-bergamotene, ρ-cymene, α-terpineol, cineol, α-bisabolol, trans-muurolol, α-caryophyllene, α-durenol, α-linalool, α-muurolene, α-panasinsen, α-phellandrene, α-pinene, α-selinene, α-thujene, methyleugenol); sesquiterpenes (e.g. pseudo limonene, sabinene, terpinolene, α-terpinol(p-menth-1-en-8-ol)), 1.6.10-dodecatriene, β-bisabolene, β- caryophyllene; 7,11-dimethy-3-methylene,14-methyl-8-hexadecyn-1-ol, citral, 2-decen-2-ol, (Z), 2-methylnorbornane, 3,4-dihydrocoumarin, 4-chromanol,, 4,4-dimethyl-6-hydroxycoumarin, 3.7-cyclounedeaaden-1-ol, 1,5,5,8-tetramethyl, 3-buten-2-ol, 4-(2,6,6-trimethyl-1-cyclohexen-1-yl), (Z)-3-octen-1-ol, 4-terpineol, 5-nonanol, 5-methyl nonanol, 8-heptadecene, benzene, bergamotol, Z,α-trans, bicyclo [3,1,0] hexan-2-ol, 2-methyl-5-(1-methylethyl), bicyclo (5,2,0) nonane, 4-methylene -2,8,8,-trimethyl-2-vinyl, carvyl acetate, caryophyllene, caryophyllene oxide, chavicol, cinerone, cinnamyl acetate, cis-carvyl acetate, cis-L-bisabolene, cis-P-mentha-2,8-dien-1-ol, cis-piperitol, cis-verbenol, eucalyptol, eugenol, cycloisolongifolene, 4,5-dehydrocycloisolongifolene, dihydrochavicol, eugenyl acetate, fenchol, germacrene-d, isoborneol, isobornyl acetate, juniper camphor, α,4-dimethylstyrene, neryl acetate, ningidrin, ocimene, *o*-cymol, thymyl acetate, trans-nerolidol, trans-farnesal, trans-carveo, valencene. bicyclo(3.1.1)hept-2-ene,2,6,- trimethyl, benzene,1-methyl-3-(1-methylethyl), cyclohexene, 1-methyl-4-(1-methylethynyl), eucalyptol, 1-dodecanol, 1,4-cyclohexadiene,1-methyl-4-(1-methylethyl), bicyclo(3.1.1)heptan-3-ol,6,6-dimethyl-2-methylene, bicyclo(3.1.1)hept-2-ene-2-methanol,6,6-dimethy, 3-cyclohexen-1-ol,4-methyl-1-(1-methylethyl), 3-cyclohexeno-1-methanol, alpha,alpha 4-trimethyl, Bicyclo(3.1.1)hept-3-en-2-one,4,6,6-trimethyl, cyclohexene 4-ethyl-3-4-methyl-3-(1-methylethenyl)-1-(1-methylethyl), phenol,4-(2-propenyl)-acetate, 2,6-octadien-1-ol,3,7-dimethyl-acetate, 2,6,10-dodecatrien-1-ol,3,7,11-trimethyl, bcyclo (7.2.0) undec-4-ene,4,11,11-trimethyl-8-methylene, 1,6,10-dodecatriene, 7,11-dimethyl-3-methylene, 1H-cycloprop(e)azulene, decahydro-1,1,7-trimethyl-4-methylene, naphthalene, 1,2,3,5,6,7,8,8a-octahydro-1,8a -dimethyl-7-(1-methylethenyl), n-hexadeconoic acid, cyclohexene, 1-methyl-4-(5-methyl-1-methylene-4-hexenyl), cardamomin, phenol, 2-methoxy-4-(2-propenyl)-acetate, cyclohexene,3-(1,5-dimethyl-4-hexenyl)-6-methylene, T-murolol, α-bisabolol, α-cadinol.bicyclo 4,1,11-trimethyl-8-methlene-undec-4-ene, β-sitosterol, stigmasterol, chalconaringenin 2 '-O-methyl ether, alpinetin and naringenin 5-nonalol-5-methyl ether.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Gastroprotective activity:

- The extract of this rhizome have effects on the gastric mucosa. Studies to look into the gastroprotective properties of methanolic extract of the

rhizome of *A. conchigera* Griffith exhibited protective effect against the assault of ethanol, 0.6 M HCl, and indomethacin ($p<0.01$) with ED_{50} values of 2.7, 9.8, and 16.5 mg/kg taken orally (p.o) respectively which is comparable to omeprazole (2.5–100 mg/kg *p.o.*).

Antinociceptive and Anti-inflammatory activity:

- Ethanolic extract of the leaves exhibits antinociceptive and anti-inflammatory effects in all test models (acetic acid-induced abdominal writhing test, the hot plate test and the formalin test for antinociceptive effects; and carrageenan-induced paw oedema test for its anti-inflammatory effects). The findings corroborate with the traditional uses.
- Cardamomin (chalcone analog) isolated from this plant significantly inhibited the induced expression of NF-κB reporter gene by lipopolysaccharide or tumour necrosis factor (TNF)-α in a dose dependent manner. LPS-induced production of TNF-α and nitric oxide well as expression of inducible nitric-oxide synthase and cyclooxygenase-2 was also significantly suppressed by the treatment of cardamomin in RAW264.7 cells.
- Cardamonin did not inhibit LPS-induced activation of extracellular signal-regulated kinase and stress-activated protein kinase/c-Jun $NH(_2)$-terminal kinase, but significantly impaired activation of p38 mitogen-activated protein kinase. It is also demonstrated that pretreatment of cardamomin rescued C57BL/6 mice from lipopolysaccharide-induced mortality in conjunction with decreased serum level of TNF-alpha.

7.2 Uses in traditional medicine

- In Southeast Asia, the rhizome is used to flavour dishes as a substitute for *Alpinia galanga.*
- The rhizome is used to treat jaundice, to regulate uterine bleeding and is given in case of metritis. It is used in steam bath to treat fever and also as an ingredient of pot herb in the treatment of bronchitis.
- The powdered rhizome helps to relieve stomach ache while the juice of the rhizome is a remedy for dysentery, abdominal pain, stomach upset, gastric pain and other digestive problems.
- The pounded rhizome is used to relieve inflammation and rheumatism/ arthritis/ ostealgia. It is also used to treat headache, vertigo and parasitic infestation of the scalp (fleas).
- In Myanmar it is used to treat gout while the Thai people use it to treat diabetes.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Areca catechu L.
Arecaceae

1.0 Scientific Name : *Areca catechu* L.

2.0 Vernacular Names : Pinang (Malay), betel nut, betel-nut palm, areca-nut palm (English).

3.0 Plant Description

An erect, slender, unarmed, unbranched, solitary, pleonanthic, monoecious palm, up to 30 m tall with a terminal crown of 8-12 leaves. **Root** system dense but superficial, most roots within a 1 m radius from the trunk in the top 60 cm of soil. **Trunk** cylindrical, 15-30 m tall, 10-15(-40) cm in diameter, grey-brown, densely and regularly ringed with leaf scars. **Leaves** arranged spirally (phyllotaxy 2/5), crowded at the trunk top, 1-1.5 m long, paripinnate, sheathing; sheath completely encircling the stem like a tube, 0.5-1 m long; pinnae 30-50, subopposite, linear to lanceolate, 30-75 cm x 3-7 cm, longest in the centre of the blade, longitudinally plaited, apex dentate or irregularly incised, dark green, upper ones often partly cohering. **Inflorescences** erect, appearing on the trunk below the crown leaves (infrafoliar), 30-60 cm long, branched broomlike to 3 orders basally, tertiary branches filiform, spicate, 15-25 cm long, very fragrant; before opening, inflorescence enclosed by a double boat-shaped bract which opens longitudinally along the upper surface; male flowers numerous, borne above the female flowers, arranged in pairs in 2 rows, sessile, about 6 mm x 3 mm, creamy, deciduous, sepals 3, small, petals 3, lanceolate, larger, stamens 6 in 2 whorls; female flowers borne on the thickened bases of secondary and tertiary branches, 1-3 per branch, 1-2 cm x 1 cm, sessile, with persistent perianth of 3 sepals and 3 longer, creamy-white petals, ovary trilocular (2 carpels usually aborting), ovoid, stigmas 3, triangular, fleshy. **Fruit** an ovoid drupe, 3-6(-10) cm x 2-5 cm,

orange to reddish, usually 1-seeded; pericarp fibrous, about 6 mm thick. Seed (so-called nut) ovoid, globose or ellipsoidal, 3-4 cm x 2-4 cm; endosperm ruminates with hard reddish tissue from inner integument running horizontally for some distance into pale brown endosperm.

4.0 Propagation : Seed

5.0 Ecology/Geographic Distribution

The exact origin of *A. catechu* is not known, but most probably it originated from central Malesia where it is known to be of very ancient cultivation and where variability of the genus Areca L. is greatest. *A. catechu* is only known from cultivation. Seemingly wild plants have always turned out to have been planted or distributed by humans. The cultivation of areca palm had spread from Malesia to the Indian subcontinent in pre-historic times and this spread was to continue later, although slower. At present areca palm is cultivated pan tropically but is of greatest importance in South and South-East Asia.

6.0 Chemical Constituents

- Alkaloids: arecoline, arecaidine (=arecain), guvasine, arecolidine, guvacoline, isoguvacine, choline, guracine.
- Other chemicals: tannin, glycerides of lauric acid, oleic acid, myristic acid, some sugars, palmitic acid, caprylic acid, resin, chavicol, gallic acid, lignin, oil gum and volatile oil.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Astringent, diarrhoea, gonorrhoe, stomachache for infant.
- In India, a tincture of the nuts is used for bleeding gums.
- Half-ripe seeds are pounded and used as an oinment for skin diseases, vermifuge, anti-helmintic, use in the eye in several complaints, for specks on the cornea and dimness of vision, fever, hysteria, dysentery in children and a peculiar complaint called 'pirai'.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Brucea javanica (L.) Merrill
Simaroubaceae

1.0 Scientific Name : *Brucea javanica* (L.) Merrill

2.0 Vernacular Names : Lada pahit, melada pahit, embalau padang, kusum (Malaysia); ya dan zi (Chinese)

3.0 Plant Description

A shrub up to 5 m tall, branched, young twigs hairy. **Leaves** compound, 20 to 50 cm long, consisting of 3 to15 pairs oblong lanceolate leaflets, 1.5 to 5 cm x 3.5 to11 cm, hairy above and base lobed. **Flowers** are unisexual, axillary panicles greenish white or greenish purplish. **Fruit** green turning black when matured, 4 mm x 5 mm long.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Widespread and occurs from Sri Lanka and India towards Indo-China, southern China, Taiwan, Thailand, rare in the Moluccas and New Guinea throughout the Malesian region to northern Australia. It has certainly been introduced in Micronesia (Ponape) and Fiji. Its patchy distribution in eastern Malesia suggests that it was introduced there long ago.

6.0 Chemical Constituents

- The fruits and seeds contain mainly quassinoids (bruceaketolic acid, bruceantarin, bruceantin, bruceantinol B, bruceantinoside A and B, bruceene, bruceines A-F and H-L, bruceosides A-F, brusatol, bruseocin,

dehydrobrusatol, dehydrobruceines A and B, dihydrobrusatol, javanicolides A-F, javanicosides A-L, yadanzigan, yadanziolides A-D and S, yadanziosides A-G and I-P, and aglycone of yadanziolide D).

- The fruits and seeds also contain alkaloids (4-ethoxycarbonyl-2-quinolone) [25], triterpenoids and steroids((20R)-O-(3)-β-D-glucopyranosyl-(1→2)-α-L-arabinopyranosyl-pregn-5-en-3β,20-diol, daucosterol, (6*S*,7*E*)-6,9,10-trihydroxymegastigma-4,7-dien-3-one, (6*S*,7*E*)-6,9-dihydroxymegastigma-4,7-dien-3-one, blumenol, and acetates of α-amyrin, β-amyrin, taraxerol, tirucalla-7,24-dien-3β-ol, lupeol, 24-methylenecycloartanol and cycloartanol) [27, 28, 31–33]; flavonoids (quercetine, luteoline, thevetiaflavone, quercetin-3-*O*-β-D-galactoside, luteolin-7-*O*-β-D-glucoside) [28,30]; fatty acids and their derivatives (vanillin, vanillic acid, glycerol 1,3-bisoleate, azelaic acid, (±)-8-hydroxyhexadecanoic acid) [30, 34]; protein (brutoxin) [35]; and others (p-hydroxybenzaldehyde, cleomiscosins A-C, erythro- and threo-guaiacylglycerol-β-coniferyl ether, pinoresinol).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The quassinoid glucosides isolated from the seeds of this plant exhibited cytotoxic activities on P-388 murine leukaemia cells and antiviral activity against Epstein-Barr virus.

7.2 Uses in traditional medicine

- The seeds are commonly used to treat infection of the intestines.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Chromolaena odorata (L.) R. King & H. Robinson
Asteraceae

1.0 Scientific Name : *Chromolaena odorata* (L.) R. King & H. Robinson

2.0 Vernacular Names : Pokok Jerman, pokok kapal terbang (Malay), baby tea, cristmas bush, siam weed (English)

3.0 Plant Description

Leaves opposite, flaccid-membranous, velvety-pubescent, deltoid-ovate, acute, 3-nerved, very coarsely toothed, each margin with 1–5 teeth or entire in youngest leaves; base obtuse or subtruncate but shortly decurrent; petiole slender, 1–1.5 cm long; blade mostly 5–12 cm long, 3–6 cm wide.

4.0 Propagation : Vegetatively using stem cuttings

5.0 Ecology/ Geographic Distribution

A native of central and Southern America throughout the tropical and subtropical areas of the world and has been introduced to tropical Asia, west Africa and parts of Australia.

6.0 Chemical Constituents

(+) Eupaten, 2',3',4,4',6'-pentahydroxychalcone, acacetin, amarixentin, aromadendrin 4'-methylether, cendrol, copper,epoxylupeol, eriodictyol 7,4-dimethyl ether, essential oil, ferulic acid, flavonoid, isosakuranetin, mikanin, odoratin, sakuranetin, salvigenin, velutin, b-sitosterol, anisic acid, b-amyrin, a-sitosterol, cerylalcohol, eupatenol, kaempferol 3-O-untinoside, kaempferol 4'-methyl ether, lupeol, magnesium, manganese, methylether, naringenin, 4'-methylether, phosporus, protocatechuic, quercetin 4'-methylether, quercetin 7-methylether,

quercetin 7,4'-methylether, tannin, p-hydroxybenzoic, p-coumaric, vanillic acids, sesquiterpenoids, taxifolin 4'-methylether, taxifolin 7-methylether, pyrrolizidine alkaloid and quercetagenin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The leaves extract demonstrated antioxidant and antibacterial activity against *Pseudomonas aeruginosa* and *Streptococcus faecalis*.
- It also promotes blood coagulation, healing including soft tissue wounds and burns, skin infection and dento-alveolitis.
- Leaves extract enhanced proliferation of fibroblasts, stimulation of keratinocyte migration in an *in-vitro* wound assay, up-regulation of production by keratinocytes of extracellular matrix proteins and basement membrane components, and inhibition of collagen lattice contraction by fibroblasts.

7.2 Uses in traditional medicine

- It is used as antiseptic and haemostatic for wound healing, malaria, fever, infections and leech bites.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Cinnamomum iners Reinw. ex Blume
Lauraceae

1.0 Scientific Name : *Cinnamomum iners* Reinw. ex Blume

2.0 Vernacular Names : Medang teja, medang kemangi, teja badak, teja lawang, kayu manis hutan

3.0 Plant Description

Evergreen tree 20 to 30 m tall, crown bushy rounded sapwood whitish. **Leaves** simple, opposite or sub- opposite, 7.5 to 30 cm by 2.5 to 9 cm, oblong to elliptic, apex pointed, base usually cuneate, margin entire, blade leathery, slightly brownish when drying, glaucous above, glabrous on both sides, pink when young, glaucous beneath with three longitudinal veins, crushed fresh leaves and inner bark with strong smell of cinnamon. **Flowers** are grouped in terminal or axillary panicles, creamy with unpleasant smel. **Fruit** green with yellow spots when young, dark blue when ripe, calyx lobes present.

4.0 Propagation : Seed and young cutting

5.0 Ecology/ Geographic Distribution

Thailand, Peninsular Malaysia, Sumatra, Java, Borneo (Sabah, Sarawak, Brunei), Philippines.

6.0 Chemical Constituents

- Ethyl acetate extract of the leaves has been found to contain xanthorrhizol [5-(1,5-dimethyl-4 hexenyl)-2-methylphenol], cardiac glycosides, flavonoids, polyphenols, saponins, tannins and terpenoids.
- Essential oils of the leaves have been found to contain monoterpenes (e.g. cis-linalool oxide, trans-linaool oxide, linalool, borneol L, terpinen-4-ol, α-terpineo, geraniol, α-copaene, β-elemene); sesquiterpenes (e.g. α-humulene, β-selinene, α-muurolene, β-bisabolene, α-cubebene, δ-cadinene); l, 2,6-octadien-1-ol, propanoic acid, bornyl acetate, cyclohexene, 3-allyl-6-methoxyphenol dodecanal, *cis*-α-bergamotene, caryophyllene, aromadendrene, 2-propen-1-ol, α-amorphene, adendrene, aromadendrenealloarom, germacrene-depiglobulol, nerolidol, palustrol, spathulenol, caryophyllene oxide, viridiflorol, tetradecanal, calarene, naphthalene, 1,2,3,4,4a,7-hexahydro, isospathulenol, α-cadinol, α-copaene, cadinol, α-longipinene and benzyl benzoate.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The leaf extract exhibited antimicrobial activities against Gram negative and Gram positive pathogens with specific high potency against methicillin-resistant *Staphylococcus aureus*.

7.2 Uses in traditional medicine

- The roots and leaves are combined for treatment of poisoning, wounds and fever.
- Its decoction is given during confinement as a protective medicine against post-partum depression (*meroyan*).
- The juice of the leaves is applied as application to relieve rheumatism.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Cinnamomum verum J.S. Presl
Lauraceae

1.0 Scientific Name : *Cinnamomum verum* J.S. Presl

2.0 Vernacular Names : Kayu manis

3.0 Plant Description

Evergreen tree up to 28 m tall, bole, low branching, up to 60 cm in diameter, buttresses 60 cm tall, 70 cm deep, thin, light pinkish brown. **Bark** about 10 mm thick, strongly aromatic, the bark on young shoots is smooth and pale brown, on mature branches and stems rough, dark brown or brownish grey. **Leaves** opposite, strongly aromatic; petiole 1 to 2 cm long, grooved on upper surface; blade ovate to elliptical, 5 to 25 cm x 3 to 10 cm, apex acuminate, glabrous, shiny dark green. **Inflorescence** consist of lax axillary or terminal panicles; peduncle creamy white, softly hairy; flowers small, 3 mm in diameter, with foetid smell, pale yellow. **Fruit** a one-seeded berry, ellipsoidal to ovoid, 1 to 2 cm long, black when ripe.

4.0 Propagation : Seed and cutting

5.0 Ecology/ Geographic Distribution

Ceylon cinnamon occurs wild in south-west India, western Sri Lanka and the Tenasserim Hills of Myanmar. Cultivation in Java (Indonesia) began in 1825 but, after initial success, declined rapidly. Subsequently, Ceylon cinnamon has been distributed to many countries. It is grown in southern India, the Seychelles and in Madagascar but Sri Lanka continues to dominate the market.

6.0 Chemical Constituents

Essential oils of the stem bark have been found to contain terpenoids (e.g. α-pinene, 1,8-cineole, limonene, eugenol, linalool), benzaldehyde, E-cinnamaldehyde, E-cinnamyl aceate and E-cinnamic acid), benzyl benzoate, butane,1,1-diethoxy-3-methyl-, hexanoic acid,ethyl ester; propane, 1,1,3-triethoxy; 2-propen-1-ol,3-phenyl; 4,7-methano-1H-indene-1,8-dione,3α,4,7,7α-tetrahydro-benzenepropanol, cinnamyl alcohol, 2-propen-1-ol,3-phenyl-, acetate, copaene; coumarin, naphthalene, 1,2,4α,5,6,8α-hexahydro-4,7-dimethyl-1-(1-methylethyl), cedrene, naphthalene, 1,2,3,5,6,8α-hexahydro-4,7-dimethyl-1-(1-methylethyl)-(1S-cis); 2-Methyl-Z,Z-3,13-octadecadienol, 12-methyl-E,E-2,13-octadecadien-1-ol; n-butyl-α-phenylpropionate, 1,2-benzenedicarboxylic acid, bis(2-methylpropyl) ester,n-hexadecanoic acid, hexadecanoic acid, ethyl ester, E-11-hexadecenoic acid, ethyl ester, 9,12-octadecadienoic acid (Z,Z)-,cyclopent-2-enone, 2-methyl-3,4-diphenyl-, 1,2-benzenedicarboxylic acid, diisooctyl ester and oleic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The essential oils exhibited larvicidal properties against two mosquito species, antimicrobial activities against bacteria and *Candida* species, antinociceptive activity towards acetic acid-induced writhing and hot plate-induced thermal stimulation and anti-inflammation activity in a dose dependent manner.
- The essential oils exhibited apoptosis and cytotoxic effects against fibroblast.

7.2 Uses in traditional medicine

- The bark is an ingredient for tonic for the kidneys, eliminating common cold, stimulates blood circulation, nausea, flatulence, diarrhea, digestive-related problems, oral and dental hygiene.
- External application of the essential oil for rheumatism have also been reported.
- Other uses include treatments of cancer, tuberculosis, leucorrhoea, hypertension, arthritis and external remedy for skin disorders (as antifungal) and ulcers.
- The plant is considered a 'warm' solution to treat cold conditions like chills or influenza.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Citrus aurantifolia (Christm & Panzer) Swingle
Rutaceae


1.0 Scientific Name : *Citrus aurantifolia* (Christm.& Panzer) Swingle

2.0 Vernacular Names : Limau asam, limau nipis

3.0 Plant Description

Small, densely and irregularly branched, evergreen tree, about 5 m tall. **Twigs** armed with short stiff sharp spines. **Leaves** alternate, elliptic to oblong-ovate, 4 to 8 cm x 2 to 5 cm, margin crenulate; petioles narrowly winged. **Inflorescences** are short axillary racemes, flowers small, white in bud, calyx cup-shaped. **Fruit** globose to ovoid berry, 3 to 6 cm in diameter, sometimes with apical, papillae, greenish yellow; seed small, plump, ovoid, pale and smooth with white embryose.

4.0 Propagation : Seedling or root suckers

5.0 Ecology/ Geographic Distribution

Originated in northern India and adjoining parts of Burma, or in northern Malesia. The lime is now cultivated throughout the tropics and in warm subtropical areas.

6.0 Chemical Constituents

- The fruit juice contains flavonoids (eriocitrin, hesperidin, neoeriocitrin); flavones (diosmin); polymethoxyflavones (heptamethoxyflavone, natsudaidain, nobiletin, tangeretin) and aglycones (taxifolin, luteolin).
- Essential oils of the fruits have been found to contain monoterpenes (α-pinene, β-pinene, limonene, cis-ocimene, γ-terpinene, terpinolene, linalool, fenchol, 4-terpineol, α-terpineol, sabinene, myrcene, telinene); sesquiterpenes (β-elemene, dodecanal, α-cedrene, α-bergamotene, α-

humulene, (Z)-β-santalene, (Z)-β-farnesene, germacrene-d, galencene), α-neral, geranial, γ-elemene, neryl acetate, geranyl acetate, nerolidol, (E)-β-farnesene, (E)-ρ-bisabolene, ρ-elemene, α-bisabolol, tetradecanal, β-bisabolol and hexadecanoic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The volatile oil extracted from this plant exhibited antiproliferative activities towards human colon cells. The isolimonexic acid compound demonstrated the highest potency to induce apoptosis against human pancreatic cancer cells.

7.2 Uses in traditional medicine

- The lime combined with glycerine of pepsin is useful for treatment of cold, sore throat and dyspepsia.
- In Southeast Asia and Guyana, the lime juice is traditionally prepared to treat nausea, diarrhoea, pain in stomach or abdominal region and indigestion.
- It also acts as carminative and a tonic.
- The juice is a cough remedy and can also be used for nerve pain.
- The extract can be applied as a topical paste to the body during pregnancy and for treatment of dermatological condition like yaws. The *Phyllantus* pulp mixed with lime juice is used to treat gonorrhea.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Citrus microcarpa Bunge
Rutaceae


1.0 Scientific Name : *Citrus microcarpa* Bunge

2.0 Vernacular Names : Limau kasturi

3.0 Plant Description

Evergreen, small trees or shrubs, often spiny, growing to a height of 3 to 5 m. **Leaves** simple, alternate and elliptic to oblong-elliptic, 4 to 8 cm long; petioles are narrowly and scarcely winged. **Flowers** are axillary, solitary, rarely in pairs, white, and short-stalked. **Fruit** yellow when ripe, nearly spherical, 2 to 3.5 cm diameter, 6- to 7-celled, and thin skinned, skin or peel is green to yellowish green or yellow, loosely adhering to the flesh.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Pantropic. Commonly planted at backyards. Climbs on other vegetation or on fences.

6.0 Chemical Constituents

Essential oils of the fruits contains monoterpenes (e.g. β-pinene); sesquiterpenes, aldehydes, linalool, linalyl acetate, tannin, glucoside and cyanogenetic substances.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- *Antimicrobial activity:* Extracts from this plant demonstrated antimicrobial activity against *Trichophyton mentagrophytes* and *Candida albicans*.

7.2 Uses in traditional medicine

- The juice is a known refrigerant, deodorant and an antiphlogistic. It removes mucus from the mouth and throat as well as treats typhoid, dysentery and cholera. It is also a remedy for cough and pruritus, a type of skin condition.
- The fruit is used in the treatment of pulmonary infections especially productive cough. It is believed to be an effective expectorant.
- The cut fruit is applied over insect bites to relieve itching and irritation.
- In the Philippines, a warm kalamansi (*C. microcarpa*) drink is given for cough, cold and sore throat, while in Malaysia the freshly squeezed juice added with some pepper makes an excellent expectorant.
- The juice from the fruit is applied directly on freckles to help lighten the spots, to treat acne and pruritus vulvae (itchiness at the vulva area).
- In yesteryears, the rural people of Malaysia use the juice of the fruit together with the saponaceous bark of Entada phaeseoloides as a shampoo to relieve itching and promote hair growth.
- Poultice made of pandanus leaves, salt and kalamansi juice is applied to treat abscesses.
- The root is used as a medicine during pregnancy.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Ficus deltoidea Jack var. *angustifolia* (Miq.) Corner
Moraceae

1.0 Scientific Name : *Ficus deltoidea* Jack var. *angustifolia* (Miq.) Corner

2.0 Vernacular Names : Ara burong, ara jelateh, ara tanah, mas cotek, serapat angin

3.0 Plant Description

Epiphyte or small shrub up to 2 m tall. **Leaves** lamina narrow, oblanceolate to spathulate to linear-oblanceolate, relatively small, apex rounded to obtuse, with the furcation of the midrib usually above the middle of the lamina; petioles up to 1 cm long. **Figs** solitary or paired, globose to oblong, ripening to orange or red.

4.0 Propagation : Figs

5.0 Ecology/ Geographic Distribution

Roadside and open forest.

6.0 Chemical Constituents

The leaves contain flavonoids (vitexin, isovitexin); tannins, polysaccharides and protein.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The extracts of this plant from three solvents (hexane, chloroform and methanol) exhibited antioxidant activities in ferric thiocyanate, thiobutiric acid and 1,1-diphenyl-2-picryldrazyl methods.
- Methanolic and aqueous extracts of this plant also exhibited anti-

inflammatory activities in three *in vitro* assays; lipoxygenase, hyaluronidase and TPA-induced oedema.

7.2 Uses in traditional medicine

- *F. deltoidea* is known to have medicinal properties such as reducing blood sugar level and cholesterol.
- It is also claimed to be useful for post partum care, delay menopause incidence and reducing risk of cancer.
- The leaves are traditionally used for treating diabetes, heart problem, gout, diarrhea, pneumonia and skin disease.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Goniothalamus macrophyllus (Blume) Hook.f. & Thomson
Annonaceae

1.0 Scientific Name : *Goniothalamus macrophyllus* (Blume) Hook.f. & Thomson

2.0 Vernacular Names : Akar gajah beranak, penawar hitam dan lada hutan

3.0 Plant Description

A shrub or tree up to 8 m tall. **Leaves** oblong-lanceolate to oblong-oblanceolate, 22 to 30(-50) cm x 6 to 11 cm, base sub-acute to rounded, apex acute, coriaceous, glabrous; petiole 1-3 cm long. **Flowers** are solitary, axillary, pedicel 1 to 1.2 cm long with 2 to 3 bracts at base, sepals oblong-ovate to oblong-lanceolate, 1.5 cm long, purplish, outer petals oblong-lanceolate, 3.3 cm long, almost glabrous, greenish, inner petals rhomboid, 1.8 cm long, greenish, stamens numerous, carpels 12 to 18, elongate, 6 mm long, glabrous, ovule 1; monocarp globose to ovoid, slightly apiculate, 1 to 2 cm x 1 cm, glabrous, sessile, red, 1-seeded.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Thailand, Peninsular Malaysia, Sumatra, Java and Borneo.

6.0 Chemical Constituents

The roots contain lactone, goniothalamin, and its oxide.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Abortifacient activity:

- Traditionally different parts of the plant have been used by various communities in Malaysia to induce abortion and as an ingredient in post-partum care. It is believed to be able to cause the involution of the uterus and keep the body of the mother warm. Studies indicated that the styrylpyrone content of this plant does has embryonic toxicity, inducing teratogenic effects on the foetus.

Cytotoxic activity:

- Goniothalamin, demonstrated cytotoxic activities against colon cancer cell line, breast cancer cell lines and lung carcinoma. LDH assay of goniothalamin suggested that it had no toxicity on cell membrane.
- Cytotoxic evaluation of goniothalamin to normal cell revealed moderate toxicity against skin and human fibroblast.
- The cytotoxic action of goniothalamin was time and dose-dependent. At the ultrastructural level, goniothalamin-induced cytotoxicity revealed a necrotic mode of cell death towards MCF-7 cells.

7.2 Uses in traditional medicine

- A decoction of the roots is used externally to relieve cold and the steam is used to treat fever. It is administered during confinement and the root is believed to act as an abortifacient.
- The leaves are heated and applied externally to reduce swellings.
- The plant has been claimed as useful for hypertension treatment.
- In Brunei, patients with febrile fits are treated by exposing them to smoke from the burning stem.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Goniothalamus scortechinii King
Annonaceae

1.0 Scientific Name : *Goniothalamus scortechinii* King

2.0 Vernacular Names : Akar gajah beranak, daun pelah besar, bunga chenang.

3.0 Plant Description

Shrub or small trees up to 7 m tall. **Leaves** leathery or papery, oblanceolate or oblong-lanceolate, line of interarching of nerves not very bold. **Flowers** are solitary or in pairs, not exclusively from base to trunk, flowers pendant, flowering pedicels 5–13 mm long, inner petals sparsely hairy abaxially.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Pantropic. Commonly planted in backyards. Climbs on other vegetation or on fences.

6.0 Chemical Constituents

- The roots have been found to contain an anthraquinone, i.e. scorazanone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Goniothalamin, exhibited antimalaria properties in combination with chloroquin against *Plasmodium yoeii* and *P. berghei* growth in mice.

- Acetogenins and styrl-lactones, exhibited cytotoxicity activity against several human cancer cell lines.
- Dichloromethane extract demonstrated antibacterial properties by inhibiting both gram-positive and gram-negative bacteria.

7.2 Uses in traditional medicine

- The decoction is consumed either alone or mixed with other substances by Malays after child birth.
- Its anti-malarial properties has been reported.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Gynura procumbens (Lour). Merr.
Compositae

1.0 Scientific Name : *Gynura procumbens* (Lour). Merr.

2.0 Vernacular Names : Sambung nyawa, daun dewa (Malay)

3.0 Plant Description

A scandent or erect and glabrous herb. **Leaves** simple and exstipulate, (2.5-2.7 cm x 0.8-2.5 cm) succulent, elliptic to lanceolate, base cuneate and margin dentate. Both surfaces of the leaf are puberulent pale green.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Not available

6.0 Chemical Constituents

Gynurone, 4-hydroxy-4-methyl-2-pentanone, methylhexadecocanoate, methyl-9-ostadecenoate, bis-(2-ethylhexyl)-1,2-benzenedicarboxylate, dibutyl malonate, 6, 10,14 –trimethyl-2-pentadecanone, octadecanal, 3,7,11,15-tetramethyl-2-hexadecen-1-ol, stigmasterol, β-sitosterol, ethyl-p-methoxycinnamate, 4-hydroxy-4-methyl-2-pentanone, stigmasterol acetate, quercetin, quercetin 3-O-rhamnosyl-(1-6)-galactoside, quercetin 3-O--rhamnosyl-(1-6)-glucoside, nonadecane, phytyl valerate, kaempferol 3-O-glucoside, kaemferol 3-O-reohesperidoside, adenoside.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The leaf extract reduced blood glucose levels in normal and streptozotocin-induced rats as well as inhibiting contraction of isolated rats aorta and isoprenalin-induced inotropic activity of the left atria.
- The plant triggers hypoglycemic activity in normal rats and stimulate insulin secretion, thus contributing to the anti-diabetic property of the plants. Aqueous extract exhibited antihypertensive effect on spontaneously hypertensive rat while leaf ethanolic extract has antihyperglycaemic and anti-hyperlipidemic activities in diabetic rats.
- Ethanolic extract of the leaf was reported to have potential as anti-herpes simplex virus type I and type II.
- Meanwhile, methanolic extract and ethyl acetate fractions of the leaf reported as water extraction can reduce blood pressure and bradycardiac effect.

7.2 Uses in traditional medicine

- Used for diabetes, hypertension, high fever, kidney problems, rheumatism and malaria.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Melastoma malabathricum L.
Melastomataceae

1.0 Scientific Name : *Melastoma malabathricum* L.

2.0 Vernacular Names : Senduduk

3.0 Plant Description

A shrub or small tree up to 5 m tall, young branches quadrangular, covered with appressed, spreading or erect scales and/or bristles, bark brown, old branches terete, glabrescent. **Leaves** elliptical to lanceolate, 4 to15 x 2 to 6.5 cm, base rounded to acute, apex acuminate, 5 to 7 veined, above and beneath strigose to pilose; cyme terminal, 3 to 12 flowers, flowers normally 5-merous, hypanthium campanulate, 5 to 11 x 1 to10 mm, covered with long golden red scales, sepal lanceolate, petal obovate, 15 to 35 x 10 to 22 mm, violet, seldom white. **Fruits** are soft, dark blue pulp with orange seeds.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

From the Indian Ocean Islands throughout South and South-East Asia, China, Taiwan, Australia and South Pacific Ocean.

6.0 Chemical Constituents

- The leaves of light pink magenta petal variety have been reported to contain tannins (malabathrins A-F, nobotanins B, D, G, H, J, strictinin, casuarictin, pedunculagin, pterocarinin C, stenophyllanins A, B, stachyurin, alienanin B, 1,4,6-tri-O-galloyl -β-D-glucoside, 1,2,4,6-tetra- O-galloyl-β-D-glucoside); flavonoids (quercetin, quercitrin, rutin), terpenes (2-amyrin, uvaol, ursolic acid, 2-2-hydroxyursolic acid, asiatic acid); sterols (2-sitosterol, 2-sitosterol 3-O-β-D-glucopyranoside) and 1,2-dilinolenyl-3-O-β-D-galactopyranoside.

- Other chemical constituents are alkaloids (patriscabratine, auranamide); anthocyanins: (cyanidin-3-glucoside, cyanidin-3,5-diglucoside, malvidin-3,5-diglucosid); fatty acids/esters/alcohols(stearic acid, 1-octyl decanoate A, hexacosanoic acid, 11-methyl-1-triacontanol, 32-methyl-1-Triacontanol); flavonoids (kaempferol, kaempferol-3-O-β-D-glucoside, kaempferol -3-O-α-L-rhamnophyranoside, kaempferol-3-O-(2",6"-di-O-p-trans-coumaroyl)-β-glucoside, quercetin, kaempferol-3-O-β-D-xyloside, kaempferol-3-O-β-D-galactogyranoside, quercitrin, kaempferol-3-O-(2",6"-di-O-E-p-coumaroyl)-β-D-galactogyranoside, rutin, quercetin-3-O-α-L-rhamnosyl-(1→2)-α-D-galactoside, isoquercitrin 6"-O-gallate, naringenin, 4'-methylpeonidin-7-O-β-D-glucoside); glycerols (glycerol-1,2-dilinolenyl-3-O-β-D galactopyranoside, glycerol 1,2-dilinolenyl- 3-O-(4,6-di-O-isopropylidene)-β-D-galactopyranoside); phenolic acids (p-hydroxybenzoic acid, gallic acid, brevifolincarboxylic acid); Polycyclic aromatic hydrocarbon/aromatic hydrocarbon (methyl-2,5,6-trihydroxynaphtalene carbonate, 2,5,6-trihydroxynaphtoic carbonic acid, 2-(2'-hydroxyvinyl)-1-methyl-4-propoxyphthalate); tannins (ellagic acid, malabathrin A, B, C, D, E and F,1,4,6-tri-O-galloyl-β-D-glucoside, 1,2,4,6-tetra-O-galloyl-β-D-glucoside, strictinin, casuarictin, pedunculagin, nobotanin D, pterocarinin C, nobotanin B, nobotanin D, nobotanin G, nobotanin H, nobotanin J, ellagitannin flavan-3-ol, casuarinin, (-)-epicatechingallate,(-)-epicatechin, stachyurin, procyanidin B5 and B2, stenophyllanin A and B, alienanin B); and triterpenes (α-amyrin, uvaol, ursolic acid, 2α-hydroxy ursolic acid, asiatic acid, betulinic acid, melastomic acid, serrat-14-en-16-one).
- The plant is also a known aluminium (Al) accumulator.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antinociceptive, anti-inflammatory and antipyretic activity:

- Aqueous extract of the leaves exhibited significant antinociceptive, anti-inflammatory and antipyretic properties in dose dependent manner using animal models.
- A study using ethanol extract of the leaves produced better antinociceptive result. It also significantly increased the response latency period to thermal stimuli. It appeared to the investigators that naloxane blocked both these effects suggesting that the ethanolic extracts of the leaves may act both peripherally and centrally.
- The extract also exhibited strong inhibition in the TPA model in mice at a dose of 2 mg per ear.

Antimicrobial and cytotoxicity activity:

- Methanolic extract showed significant antiviral (HSV-1 and poliovirus) and cytotoxic activities on murine and human cancer lines (3LL, L1210, K562, U251, DU145, MCF-7).
- Methanol extract of leaves also inhibited the growth of *Staphylococcus*

aureus and clinical isolates of methicillin resistant *S. aureus* (MRSA 1-6), possibly through inhibition of DNA synthesis, peptidoglycan production, and nuclease production.

- Naringenin and kaempferol-3-*O*-(2□,6□-di-*O*-*p*-*trans*-coumaroyl)glucoside isolated from the flowers showed active inhibition on cell proliferation of MCF7.

Antiplatelet activating factor (PAF) activity:

- Penta-cyclic triterpenes (i.e. α-amyrin, betulinic acid) and natural flavonoid (quercetin and quercitrin) showed inhibiting activities on PAF receptor binding.

Gastro-protective activity:

- Aqueous extracts of the leaves reduced mucosal damage caused by ingestion of ethanol at an effective dose of 500 mg/kg in rats.

7.2 Uses in traditional medicine

- A decoction of the leaves or mixture with *Hedyotis* sp. and *Ageratum* sp. is used to treat digestive problems. The leaves are remedies for cholera, diarrhoea and dysentery. They are considered antiseptic and used to clean wounds and cuts as well as to prevent scarring as in the case of smallpox to prevent the development of pock-marks. The leaves are also used to treat allergic reaction to caterpillars by applying the pounded leaves over the lesions. They are also used to treat keloid and acne. In Fiji the leaves are chewed to relieve oral thrush while in Singapore, they are used as a tonic.
- The leaves are useful to rejuvenate women after giving birth. A special bath is prepared by boiling the leaves of *Morinda citrifolia, Cymbopogon nardus, Pandanus amaryllifolia* and *Citrus hystrix* together with the leaves of *M. malabathricum*. During confinement period, the shoot is consumed to treat infection. The juice from mature leaves has been used to heal internal injuries and thus is given to women after delivery.
- A decoction of the leaves with ginger, sugar and *Zingiber cassumunar* is used to treat leucorrhoea. The leaves are also used for the treatment of haemorrhoids, thrush and to relieve sore legs.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Morinda citrifolia L.
Rubiaceae


1.0 Scientific Name : *Morinda citrifolia* L.

2.0 Vernacular Names : Mengkudu (Malaysia); pace, cengkudu (Indonesia); mark nio (Laos)

3.0 Plant Description

Medium sized tree, 5-10 m height, young twigs angular, slightly compressed and grooved. **Leaves** opposite, stipuliferous, shining above and pale below, undulate at margins. **Inflorescences** in dense ovoid head, white at the beginning of the flowering period and then yellow. **Fruits** are ellipsoid, dark green which turn to yellowish when ripe, seed numerous.

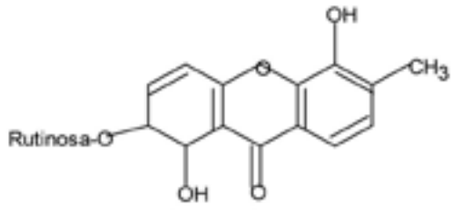
4.0 Propagation : Seed and stem cutting

5.0 Ecology/ Geographic Distribution

Often found growing at the edge of the forest and along forest paths. It thrives on sandy loam with some shade.

6.0 Chemical Constituents

Phytochemical screening shows that the root, stem and leaf contain anthraquinone derivatives. Root bark contains morindine, morindone, alizarine derivative (alizarine-1-ethylethr), and flavonoid, rutine; the stem bark contains morindone, physcion-8-O-[{3-L. arabinosy1 (1→3)}{3-D-Galactopyrannosy1(1→6)}(3-D-Galactopyranoside)]. The flower contains anthraglycoside and flavonoside while fruit contains a small amount of essential oil.



Morindin

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Extracts of *M. citrifolia* exhibited antitumor, antitumor-promoting, hypotensive, antibacterial (*Staphylococcus*, but weak on *Bacillus subtilis*), anti-ascariasis, anti-mutagenic (*Salmonella*) and anti-nematode (*Bursaphelenchus xylophilus*) activity.
- The over-ripe fruit is used as an emmenagogue while the juice is recommended for leucorrhea, sapraemia, dysuria and diabetes. The fruit in various preparations is used for swollen spleen, liver disease, beri-beri, haemorrhage, coughs, mild laxative and arthritis. Dried fruit used for treatment of cardiotonic, arthritis, diabetic, breast cancer, abortifacient and emmenagogue.
- The leaf is used for stomachic, sore gums, sore throat, cold in infants, pleurisy, dysentry, induced abortion, infected wound healing, inflammation, broken bones and leprosy sores. Aqueous extract of leaf or root is consumed for the treatment of acute malaria and cathartic.
- Fresh root is used for ichtheotoxin/sting and external cancerous swelling while the decoction is used for cough. Both dried root and fruit in the form of decoction or infusion for hypertension, lumbago and relieving body pain.
- Dried bark is used for urinary disorders.

7.2 Uses in traditional medicine

- In traditional medicine the parts used are administered raw or as juices and infusions or in ointments and poultices. Despite the smell of putrid cheese when ripe, the fruits are eaten raw or prepared, as are the leaves.
- The fruit pulp can be used to cleanse hair, iron and steel. In Malaysia and Thailand the tree is used as a support for pepper plants.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Oroxylum indicum (L.) Kurz
Lamiaceae

1.0 Scientific Name : *Oroxylum indicum* (L.) Kurz

2.0 Vernacular Names : Beka, kulai, bongelai kayu, bonlai johar, juar dan bonglai

3.0 Plant Description

A semi-deciduous, sparingly branched tree up to 27 m tall, trunk up to 40 cm in diameter, bark grey, with prominent leaf scars, twigs thick, pithy, later hollow, lenticellate. **Leaves** crowded, imparipinnate, 3 to 4 times pinnate, 0.5 to 2 m long; petiole long, rachis swollen at points of insertion; stipules absent; leaflets ovate to oblong, 4 to 11(15) cm x 3 to 9 cm, base cuneate or mostly oblique, apex acuminate, entire, with scattered glands on the lower surface. **Inflorescences** an erect raceme, terminal, 25 to 150 cm long, peduncle and rachis partitioned, flowers bisexual, pedicel 2 to 4 cm long, bracteolate, calyx coriaceous, campanulate, containing water in bud, 2 to 4 cm long, 1.5 to 2 cm in diameter, brown or dirty violet, corolla funnel-shaped, about 10 cm long, lobes 5, subequal, margin wrinkled, reddish outside, yellowish to pinkish inside; stamens 5, inserted in the throat, hairy at the base; ovary superior, 2-celled, many-ovuled; fruit a pendent capsule, sword-shaped, 45 to 120 cm x 6 to 10 cm, valves flat, almost woody, finally black. **Seeds** are 5 to 9 cm x 2.5 to 4 cm, including the membranous and transparent wing, seedling with epigeal germination; hypocotyl elongated; cotyledons leafy.

4.0 Propagation : Easily propagated through 3 or 4 noded stem cuttings.

5.0 Ecology/ Geographic Distribution

Not available.

6.0 Chemical Constituents

The leaves contain flavonoids (baicalein, chrysin, scutellarein, baicalein-7-*O*-glucoside, baicalein-7-*O*-diglucoside, chrysin-diglucoside, chrysin-7-*O*-glucuronide, chrysin-7-*O*-diglucuronide) and an anthraquinone (aloe-emodin).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antioxidant activity

- A non-polar (methanol, ethyl acetate) and polar (water) solvent extract derived from different parts of this plant exhibited moderate antioxidant activity when tested using diphenyl-picryl-hydrazyl (DPPH) assay.

7.2 Uses in traditional medicine

- A decoction of leaves is recommended to treat stomach ache, loss of appetite, rheumatism and wounds and used externally as a hot fomentation during confinement, relieve cholera, fever and rheumatic swelling.
- The boiled leaves are applied during and after delivery to treat dysentery and splenomegaly.
- The leaves are applied to the cheek to treat toothache and as a poultice to relieve headache and fever.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Orthosipon aristatus Benth.
Lamiaceae

1.0 Scientific Name : *Orthosipon aristatus* Benth.

2.0 Vernacular Names : Misai Kucing, Kumis kucing (Malay), Java tea (English)

3.0 Plant Description

A herbaceous shrub, which can grow up to 1.5 m height tall. **Stem** quadrangle, reddish in colour, erect and branches profusely. Petioke about 0.3 m in length, reddish purple in colour. **Leaves** arranged in opposite pairs, simple, green and glabrous with a lanceolate leaf blade and serrated margin. The leaf apex is acuminate with acute leaf base. **Flowers** are campanulate in shape, white to bluish in colour with longfar exerted filaments that makes the flower looks like cat's wiskhers.

4.0 Propagation : Easily propagated through 3 or 4 noded stem cuttings.

5.0 Ecology/ Geographic Distribution

Found mainly throughout South East Asia and tropical Australia.

6.0 Chemical Constituents

- Volatile oil (0.02 to 0.06%): including among others β-caryophyllene, a-humulene, caryophyllene-epoxide flavonoids: in particular more highly methoxylated example (0.2%) including eupatorin, sinensetin, scutellarine

tetramethyl ethers, salvigenin, 7,3',4'-tri-O-methylluteolin, 5-hydroxy-6,7,3'4'-tetramethoxyflavone, ladanein, 6-hydroxy-5,7,4'-trimethoxyflavone. Caffeic acid derivatives: 2,3-dicaffeoyltartrate, rosmarinic acid, 2-caffeoyl tartrate. Diterpene ester: orthosiphol A to E, (diterpene dibenzoyl diacetyl ester of primarane type), neoorthosiphol A & B, orthosiphole A & B, staminol A & B, norstaminol A, octhochromene A (benzochromene), methylripariochromene A (MRC) triterpene saponins: aglycone hederagenin antioxidants: α-and β-carotene, cryptoxantin, β-zeacarotene, αcarotene oxide.

- Others: vomifoliol, aurantiamide acetate, oleanolic acid, ursolic acid, betulinic acid, β-sitosterol

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- *O. stamineus* possesses antifungal, anti-inflammatory and antibacterial activities.
- Its aqueous extract is effective for alleviating hyperglycemia and improving lipid profile in diabetic rat. Lyophilized aqueous extract (750 mg/kg body weight) demonstrated diuretic effects in rat by enhancing ion excretion without increasing the urine output. Similar effects also were observed in human where diuresis has increased while chlorides and urea were eliminated. Increase excretion of citrate and oxalate in healthy volunteer in Thailand were recorded. Although a higher level of oxalate may increase the risk of kidney stones but increasing of citrate output helps prevent stone formation.
- The hydroalcohol extract of the plant also showed diuretic activity which is the urine flow and urinary sodium excretion were increased.
- The chloroform soluble portion of the water decoction of the plant showed antihypertensive activity.

7.2 Uses in traditional medicine

- Posseses diuretic, antiallergic acid, anti-inflammantory, antihypertensive and antitumour properties.
- It is also used for treating gout, diabetes, jaundice, eruptive fever, influenza, hepatitis and rheumatism.
- Leaves are widely used for treating catarach of the bladder.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Piper betle L.
Piperaceae

1.0 Scientific Name : *Piper betle* L.

2.0 Vernacular Names : sireh (Malaysia, Indonesia, Brunei), kun (Myanmar);

3.0 Plant Description

A perennial aromatic creeper. **Stem** long, slender, producing small roots at the nodes. **Leaves** alternate long petiolate, coiled at the base, leaves shaped broadly ovate, tip acute, base cordate, margin entire, 5-7 nerved, palmately veined, upper surface bright green, lower pale, thick, long stalk. **Inflorescences** are spikes and flower minute. **Fruits** are small berries, one-seeded.

4.0 Propagation : Seed and stem cutting

5.0 Ecology/ Geographic Distribution

Tropical region

6.0 Chemical Constituents

- Leaf contain aromatic essential volatile oil of sharp burning taste, aromatic odour containing betel–phenols; starch, sugars and tannin.
- Essential oil: eugenol, methyleugenol, α-terpineol, terpinyl acetate and caryophyllene.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The leaf is used for the treatment of low pressure and irregular movements of the hearts. It has been used successfully for colds, loss of voice, coughs and asthma. It cures throat disorders, loss of appetite, indigestion, constipation and germ diseases.

7.2 Uses in traditional medicine

- The decoction of leaf is taken orally for the treatment of fever. It is also widely used in asthma and inflammation. The fresh leaves are eaten together with jaggery for the treatment of hypertension. The decoction of leaf combined with sugar and jaggery is given for diarrhea.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Polyalthia bullata King
Annonaceae

1.0 Scientific Name : *Polyalthia bullata* King

2.0 Vernacular Names : Pokok peleh angin and tongkat ali hitam

3.0 Plant Description

A shrub up to 3 m tall, young twigs covered with golden hairs. **Leaves** lanceolate or oblong-lanceolate, 28 to 37 cm x 3 to 12 cm, deeply cordate and auricled at base, papery or thinly leathery, bullate; petiole 3 to 5 mm long, stout. **Flowers** are solitary or 2 to 3 together opposite the leaves, petals linear, yellowish in colour.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Pantropic. Commonly planted in backyards. Climbs on other vegetation or on fences.

6.0 Chemical Constituents

The roots contain a lignan, i.e. αββα-3,4-dimethyl-2,5-bis(3,4,5-trimethoxyphenyl) tetrahydrofuran; and alkaloids (7,7'-bisdehydro-*O*-methylisopiline, 7-dehydronornuciferinyl-7'-dehydro-*O*-methylisopiline).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Flowers, leaves and roots are finely pounded and taken to reduce high blood pressure and treat diabetes.
- A decoction of the roots is drunk to treat kidney infections and as tonic especially for men. A decoction of the roots mixed with *Eurycoma longifolia* is regarded as an aphrodisiac for men.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Prismatomeris tetrandra (Roxb.) K. Schum.
Simaroubaceae

1.0 Scientific Name : *Prismatomeris tetrandra* (Roxb.) K. Schum.

2.0 Vernacular Names : Tongkat Haji Samad, sepedeh, mundess dan susun kelapa hutan

3.0 Plant Description

A shrub or small tree up to 7 m tall, young branches with 2 prominent longitudinal ridges. **Leaves** decussately opposite on vertical branches, simple and entire, elliptical or narrowly elliptical to ovate or narrowly ovate, 3 to 23 cm x 1 to 8 cm, base truncate, apex acute to acuminate, papery to leathery, pinnately veined, petiole 2 to 25 mm, stipules interpetiolar, narrowly triangular, up to 7.5 mm, caducous or persistent; inflorescence terminal or axillary cyme, up to 20-flowered. **Fruits** are subglobose, drupe, 7 to 11 mm in diameter. **Seeds** are spherical, up to 9 mm in diameter, dark reddish-brown testa; root orange in colour.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Pantropic. Commonly planted in backyards. Climbs on other vegetation or on fences.

6.0 Chemical Constituents

The roots contain mainly anthraquinones (damnacanthal, nordamnacanthal, 1-hydroxy-2-methyl-9,10-anthraquinone, 1-hydroxy-2,3-dimethoxy-7-methyl-9,10-anthraquinone, 1,3-dihydroxy-2-methyl-9,10-anthraquinone (rubiadin), 1,3-

dihydroxy-2-methoxy-9,10-anthraquinone, 1,3-dihydroxy-2-methoxyethyl-9,10-anthraquinone (lucidin omega-ethyl ether),1,3-dihydroxy-2-methoxymethyl-9,10-anthraquinone (lucidin omega-methyl ether), 1,3-dihydroxy-6-methoxy-2-methoxymethyl-9,10-anthraquinone, 1,3-dihydroxy-5,6-dimethoxy-2-methyl-9,10-anthraquinone, 1,3-dihydroxy-5,6-dimethoxy-2-methoxymethyl-9,10-anthraquinone, 2-hydroxy-3-hydroxymethyl-9,10-anthraquinone, 2-hydroxy-3-methoxy anthraquinone, 2-hydroxymethyl-1-methoxy-9,10-anthraquinone, 3-hydroxy-1,5,6-trimethoxy-2-methyl-9,10-anthraquinone, 3-hydroxy-1-methoxy-2-methyl-9,10-anthraquinone (rubiadin-1-methyl ether), tectoquinone); sterols (β-sitosterol) and triterpenes(β-acetylolean-12-en-28-olic acid, and 3β-*O*-acetyl-11α,12α-epoxyolean-28,13-olide)).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The triterpenoids isolated from this plant, 3β-O-acetyl-11α and 12α-epoxyolean-28, 13-olide, exhibited antimalarial activity,
- The anthraquinones compound isolated exhibited antifungal activity and cytotoxic activity towards breast cancer cell line.
- Both triterpenoids and anthraquinones exhibited antituberculosis activity and cytotoxic activity towards NCI-H187 cell line.

7.2 Uses in traditional medicine

- The root extracts of *Prismatomeris tetranda* (Roxb.) K. Schum. is used traditionally as a tonic.
- The aqueous extracts were reported to be used as an adjunct in dart poison.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Phyllanthus amarus Schum.
Euphorbiaceae

1.0 Scientific Name : *Phyllanthus amarus* Schum.

2.0 Vernacular Names : Dukong anak, meniran, rami buah (Malay), stone breaker, seed on the Leaf, child pick-a-back (English)

3.0 Plant Description

A small erect annual herb growing up to 30 to 40 cm in height with slim round stem. The branches spreading and close set with pinnate compound leaves. **Leaves** are green, entire and alternately arranged with an elliptical blade, 0.15 to 0.75 inches long. **Flowers** are axillary, small, yellow or greenish white, 1-3 male flowers, female flowers solitary. **Fruits** are globose, smooth, on underside of leaf rachis. **Seed** pale brown with 6-7 straight longitudinal ribs.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

A native to the Americas, but now a pan tropical weed. It is found throughout Malesia, though not yet reported from Sulawesi.

6.0 Chemical Constituents

3,5,7-trihydroxyflavonal-4'-O-alpha-1(-)-rhamnopyranoside, 4-meth-oxysecurinine, 4 methoxynorsecurinine, astragalin, 5,3',4'-trihydroxyflavonone-7-O-alpha-1-(-)-rhamnopyranoside, brevifolin-carboxylic acid, cymene, hypophyllanthin, limonene, lintetralin, lupa-20(29)-ene-3-beta-ol, lupa-20(29)-ene-3-beta-ol-acetate, lupeol, methyl salicylate, niranthin, nirtetralin, niruretin, nirurin, niruriside, phyllanthin, phyllochrysine, phyltetralin, quercetin, quercetin-heteroside, quercetol, quercitrin, rutin, saponins, triacontanal, tricontanol and geraniin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Antihepatotoxic, antihypertensive, diuretic; treatment of jaundice, dropsy and genito-urinary infections; emmenagogue, febrifuge, stomachic (plant decoction); antidysenteric (shoots); purgative (bark); for cuts, bruises, ulcers, sores (poultice of leaves); treatment of swelling.

7.2 Uses in traditional medicine

- Considered anodyne, aperatif, carminative, digestive, laxative, stomachic, tonic and vermifuge based on its long documented history of uses.
- The plant is also employed for blennorrhagia, colic, diabetes, dysentery, fever, flu, tumors, jaundice, vaginitis and dyspepsia.

8.0 Contraindication : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Tinospora crispa (L.) Hook.f. & Thomson
Menispermaceae

1.0 Scientific name : *Tinospora crispa* (L.) Hook.f. & Thomson

2.0 Vernacular names : Akar patawali, petawali, daun akar wali, batang wali dan akar seruntum.

3.0 Plant Description

Woody climber up to 15 m long, older stems very prominently tuberculate and producing very long filiform aerial roots. **Leaves** broadly ovate to obircular, 7 to 14 cm x 6 to 12 cm. **Inflorescences** appearing when plant is leafless. **Flowers** usually with 3 petals. **Fruits** are ellipsoidal, about 2 cm long, orange in colour.

4.0 Propagation : Vegetative via stem cuttings

5.0 Ecology/ Geographic Distribution

Not available

6.0 Chemical Constituents

Furano-diterpene (glycoside), tinotufolin A-F (leaves), borapetoside A-H (stem), borapetol A, B, borapetoside A, B, tinocrisposide (stem – bitter), clerodane-diterpene glycoside, rumphioside A,B,C,C-1, Ac-D, E,F. Protoberberine, palmatine, berberine, aporphine, tembetarine. Methanolic stem extract: (-)-N-formyl-annonaine, (-)-N-formyl-nor-nucirerine (tinocrispicine), (-)-N-acetyl-nor-nuciferine. N-trans & N-cis feruloyl tyramine. tinotuberine, flavones-O-glycoside, luteolin-4'-methylether-7-glucoside, genkwanin-7-glucoside, luteolin-4'-methylether-3'-glucoside, diosmetin, genkwanin, jatrorrhizine, magnoflorine, palmatine, arabinose, choline, galactose, β-sitosterol, sterols.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Berberine and its salt are known to have spasmolytic, antibacterial, antifungal antiprotozoal activity.
- An aqueous extract from *Tinospora crispa* stems showed lowering of blood glucose levels and stimulate insulin release in moderate alloxan-diabetic rats.
- Toxicity of *Tinospora* extract proved to be low in rats (LD_{50} values of over 5 g/kg orally, 3 g/kg dermally).
- *Tinospora* extracts in high concentrations affect the liver and follicular atresia in mice, but the kidneys are not much affected.
- Crude extracts showed protective effects in mice with experimental urinary tract infection caused by *Pseudomonas aeruginosa*.

7.2 Uses in traditional medicine

- The leaves and stems are valued for their anti-rheumatic, febrifugal, anti-malarial, anti-bacterial properties.
- Used externally for skin complaints as antiseptic, antiparsitic and to treat wounds and itches; stomach complaints used for ulcers, as appetizer and tonic, diarrhea, fever (malaria, smallpox, diabetes mellitus, cholera, jaundice and high blood pressure.
- It also used to treat snake bite, wash for sore eyes, syphilitic sores, gout, leprosy and insanity.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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- Samy J., Sugumaran M. & Kate LWL. 2005. Herbs of Malaysia. Time Edition, Selangor, Malaysia. Pg 118–129.

Zingiber cassumunar Roxb.
Zingiberaceae

1.0 Scientific Name : *Zingiber cassumunar* Roxb.

2.0 Vernacular Names : Bonglai

3.0 Plant Description

The rhizome is orange in colour while powder of rhizome is pale brown, aromatic and fibrous. Taste slightly hot and pungent.

4.0 Propagation : Stem cutting

5.0 Ecology/ Geographic Distribution

Tropical region.

6.0 Chemical Constituents

Cassumunaquinone 3 3, cassumunaquinone 3,cassumunere (1RS, 2RS)2, cassumunere (1RS,2SR)2, cassumunere (1SR,2SR)2, 4-(3,4 dimethoxyphenyl)-3-buten-1-2,3-(2,4,5)-trimethoxyphenyl)-4-(2,4,5 trimethoxystyryl)cyclohexane).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available.

7.2 Uses in traditional medicine

- As tonic, carminative, poultice for swelling, vermifuge (in children), rubbed to treat rheumatism, constipation, flatulence, stomachache, fever, malaria, contusion
- Used in preparation for after childbirth, numb feet, gonorrhea and as cosmetic.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Burkill IH. 1966. *A Dictionary of the Economic Products of the Malay Peninsular*. Ministry of Agriculture, Malaysia.
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Myanmar

Adhatoda vasica Nees.
Acanthaceae

1.0 Scientific Name : *Adhatoda vasica* Nees.

2.0 Vernacular Names : Ma-ya-gyi (Myanmar); vasaka (English)

3.0 Plant Description

A small evergreen sub-herbaceous bush. **Leaves** opposite, petiolate, entire, broadly lanceolate or ovate lanceolate, apex acuminate, tapering at the base, taste bitter. **Inflorescence** axillary spikes; flowers white, dense, short pedunculate, bracteate. **Fruits** are 4 seeded, small, capsule, shortly and bluntly pointed, pubescent. **Seeds** are orbicular oblong, glabrous.

4.0 Propagation : Seeds and cutting stem

5.0 Geographic Distribution

Found in tropical and sub tropical regions.

6.0 Chemical Constituents

Leaves contain crystalline bitter alkaloids vasicine, vasicinone & 6-hydroxyvasicine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Haematemasis, melena, pulmonary diseases, bleeding piles & dry cough.

8.0 Contraindications : Not available

9.0 Dosage :

- 100 – 200 ml decoction of leaves with sugar taken orally.
- 100 – 200 ml expressed juice with sugar and lime juice orally taken.

10.0 Bibliography

- Shah DCS & Qadry JS. 1995. *A Textbook of Pharmacognosy*. 11th edition.
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Catharanthus roseus (L.) G. Don
Apocynaceae

1.0 Scientific name : *Catharanthus roseus* (L.) G.Don

2.0 Vernacular names : Thin-baw-ma-hnyo (Myanmar); peri winkle (English)

3.0 Plant Description

A perennial woody shrub. **Leaves** opposite, oblong-lanceolate, stipules minute. **Flowers** are solitary, white or pinkish purple, arising from the axil of the leaves. **Fruits** are paired, follicle slender, cylindrical.

4.0 Propagation : Seeds, cutting stem or branch.

5.0 Geographic Distribution

Mostly cultivated tropical and sub-tropical regions.

6.0 Chemical Constituents

Contains more than 95 alkaloids (mostly monoterpene indole alkaloids) such as catharanthine and vindoline, vincristine and vinblastine. (Vinblastine and vincristine occur at very low levels in the plant (≤ 3g per ton)).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Hypoglycaemic effects due to catharanthine and vindoline.
- Dimeric indole alkaloids vincristine and vinblastine are used in cancer therapy.

7.2 Uses in traditional medicine

- Diabetes, anaemia, dizziness due to anaemia, inflammation (ulcers and sore).

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Department of Traditional Medicine. 2000. *Medicinal Plants of Myanmar Vol. 1.*
- Van Wyk B. & Wink M. 2004. *Medicinal Plants of the World. An Illustrated Guide to Important Medicinal Plants and Their Uses.* Timber Press. United Kingdom. Pp. 479

Euphorbia hirta L.
Euphorbiaceae

1.0 Scientific Name : *Euphorbia hirta* L.

2.0 Vernacular Names : Kywe-kyaung-min-hsay (Myanmar), chara (Sanskrip), dudhi (Hindu); amampatchaiarisi (Tamil), milk weed (English)

3.0 Plant Description

An annual erect herb, hispid with often yellowish crisped hairs, branching from the root stock. **Leaves** opposite, obliquely oblong-lanceolate or obovate-lanceolate, apex sub-acute, base unequal sided, dark green above, pale beneath, pubescent; petiole short, reddish. **Inflorescences** globose cymes; flowers whitish green, minute. **Fruits** capsule, villous with white hairs. Seeds trigonous, reddish brown in colour.

4.0 Propagation : Seeds

5.0 Geographic Distribution

Common in open non shady places, road sides, gardens, rice fields.

6.0 Chemical Constituents

- Leaves and stem contain hentriacontane, myricyl alcohol, β-sitosterol, β-amyrin, friedelin and taraxerol.
- Bark and latex contain phytosterolin, stigmasterol, myricetin, myricitrin, quercetin, quercetrin, rutin, myoinositol, tannin and related polyphenols.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The whole plant juice is beneficial for colic and dysentery.
- The decoction of the whole plant is used for asthma, bronchial affection, cough and bowel complaints.

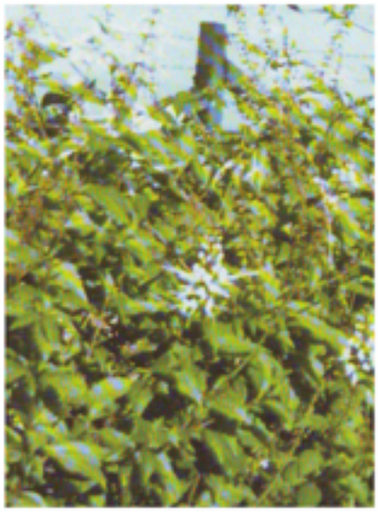
8.0 Contraindictions : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Chatterjee A. & Pakrashi SC. 1994. *The Treatise on Indian Medicinal Plants. Vol. 3.*
- Department of Traditional Medicine, Ministry of Health. 2000. *Medicinal Plants of Myanmar. A Selection of 60 Commonly Used Species.*

Orthosiphon aristatus (Blume) Miq.
Labiatae



1.0 Scientific name : *Orthosiphon aristatus* (Blume) Miq.

2.0 Vernacular names : Tha-gya-ma-gaik (Myanmar); java tea (English)

3.0 Plant Description :

A perennial herb, stem 4- angled. **Leaves** opposite in distant pairs, ovate to ovate-accuminate, coarsely toothed margins, base cuneate. **Inflorescences** close whorled raceme; flowers purplish white. **Fruits** nutlets, broadly oblong, compressed.

4.0 Propagation : Seeds and cutting stem

5.0 Geographic Distribution

Cultivated as a medicinal herb in topical and sub tropical regions.

6.0 Chemical Constituents

Large amounts of potassium salts (about 3%) and only small amounts (up to 0.3%) of a complex essential oil, yielding mostly borneol, limonene, thymol and sesquiterpenoids. Of interest are several methoxylated flavonoids such as eupatorin, rhamnazin, scutellarein tetramethyl ether, salvigenin and sinenstein as well as flavonol glycosides. Caffeic acid esters are present in the form of rosmarinic acid, together with mono- and dicaffeoyltartaric acids and smaller amounts of lithospermic acid. There are also diterpenes derived from pimarane, known as orthosiphol A-E, some triterpenes and saponins.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Diabetes and inflammation.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Ben-Erik van Wyk & Michael Wink. 2004. *Medicinal Plants of the World: An Illustrated Guide to Important Medicinal Plants and Their Uses.*
- Department of Traditional Medicine. 2000. *Medicinal Plants of Myanmar Vol.(1)*

Sophora exigua Craib.
Papilionaceae

1.0 Scientific Name : *Sophora exigua* Craib.

2.0 Vernacular Names : Pyin-nyar-linka

3.0 Plant Description

Shrub. **Leaves** pinnately compound, leaflets 9–13, oval elliptic. **Inflorescences** racemes; flowers purple, calyx teeth shorter than the tube, stamens 9–10, connate at the base, stigma terminal, ovary 1, style glabrous. **Fruit** pod and moniliform. **Seeds** are oblong - ellipsoid, hilum small and radicle.

4.0 Propagation : Seed and cutting stem

5.0 Geographic Distribution

Grows on hilly regions.

6.0 Chemical Constituents

- The roots contain exiguaflavanone k

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- Asthma, respiratory diseases, antibiotics, and can also be used in the form of an ointment.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- Ashin-Nagathein *Encyclopedia of Medicinal Plants.*
- The Forest Herbarium Royal Forest Department. 1994. *Thai Forest Bulletin (Botany)* No.22. http://www.tci-thaijo.org/index.php/ThaiForestBulletin/article/ view/25063/21340
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- Harborne JB. & Mabry TJ. 1992. *The Flavonoids. Advances in Research.* Springer Link. Pp. 718

Philippines

Allium sativum L.
Alliaceae

1.0 Scientific Name : *Allium sativum* L.

2.0 Vernacular Names : Bawang (Tagalog), ajos (Bisaya), bawang putih (Malay), garlic (English).

3.0 Plant Description

A low herb 30 to 60 cm high. The true stem is much reduced. **Bulbs** are broadly ovoid, 2 to 4 cm in diameter and consist of several, densely crowded, angular, truncated tubers. **Leaves** are linear and flat. The umbels are globose nearly always with bulbs and with many flowers. The sepals are oblong, greenish white, or more or less tinged with purple. The stamens are not exerted from the perianth.

4.0 Propagation : Bulb

5.0 Ecology/ Geographic Distribution

It is extensively grown in Ilocos, Batanes, Batangas and to a limited extent elsewhere in the Philippines.

6.0 Chemical Constituents

Allicin, allyl disulfides, ash, calcium, copper, essential oils, germanium, iron, magnesium, manganese, phosphorus, phytoncides, potassium, selenium unsaturated aldehydes, zinc, vitamins A, B1, B2 and C.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Preliminary test conducted indicated positive results for acquired immune deficiency syndrome (AIDS) treatment.

- Several ensuing clinical tests and published studies recorded garlic's efficacy in lowering cholesterol in the blood and are beneficial to the circulatory system.

7.2 Uses in traditional medicine

- Good for the heart
- Helps lower bad cholesterol levels (LDL)
- Aids in lowering blood pressure
- Remedy for arteriosclerosis
- May help prevent certain types of cancer
- Boosts immune system to fight infection
- Cough and cold remedy
- Relives sore throat, toothache
- Aids in the treatment of tuberculosis
- Helps relieve rheumatism pain
- Anticoagulant properties

8.0 Contraindications

- Garlic may enhance the pharmacological effect of anticoagulants (eg. warfarin, fluindione) decreased platelet aggregation thus associated with bleeding events amongst patients undergoing anticoagulant therapy.
- Garlic reduce the efficacy of anti-AIDS drugs (i.e. saquinavir).
- Consumption of garlic may lower blood sugar.
- In large doses, garlic is irritant and capable of producing inflammation of the alimentary canal.
- Consumption of garlic by nursing mothers modifies their infant's behavior during breast-feeding.

9.0 Dosage : Not available

10.0 Bibliography

- http://www.philippineherbalmedicine.org/garlic.htm.
- Quisumbing E. 1978. *Medicinal Plants of the Philippines*. Katha Publishing Company, Inc. Pp 158–160.

Alstonia macrophylla G. Don
Apocynaceae


1.0 Scientific Name : *Alstonia macrophylla* G. Don

2.0 Vernacular Names : Batino

3.0 Plant Description

A medium-sized tree. **Leaves** are in whorls of three's, oblong-obovate, 10 to 30 cm long and 5 to 7 cm wide, pointed at both ends and short-stalked. **Flowers** are small, yellowish-white and borne on short, terminal cymes. The fruit is a double follicle, pendant, very long (20 to 40 cm) and slender. **Seed** small and very flat, with deep-brown hairs, especially along the edges.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Common in open primary and secondary forests and in thickets at low and medium altitudes. It also occurs in the Peninsular Malaysia, Borneo and New Guinea.

6.0 Chemical Constituents

Alkaloids, saponins, phenolics, tannins, triterpenoid, flavonoid and sterol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimicrobial activity:

- The extract inhibited various strains of *Staphylococcus aureus, S. saprophyticus, Streptococcus faecalis, Proteus mirabilis, Trichophyton rubrum, T. mentagrophytes* and *Microsporum gypseum*.

- The crude ethanolic extracts from the bark showed potential antibacterial effect against *S. aureus.*
- Comparative study on the phytochemical and antibacterial activities of the bark of *A. scholaris* and *A. macrophylla* indicated presence of alkaloids, saponins, phenolics, and tannins in both species.
- The chloroform extract of *A. macrophylla* showed broader spectrum of antibacterial activity than *A. scholaris.*

CNS depressant activities:

- Study indicated that *A. macrophylla* leaves caused a significant reduction in spontaneous activity, decrease in exploratory behavioral pattern, reduction in muscle relaxant activity.

Cytotoxic activity:

- 13 alkaloids isolated from the root bark of *A. macrophylla* and a semisynthetic bisindole was evaluated for cytotoxic activity against two human lung cancer cell lines.
- The bisindoles were found to possess pronounced activity against cancer cell lines.

Antipyretic activity:

- The methanol extract exhibited a significant antipyretic effect.
- Phytochemical testing yielded ursolic acid as a major constituent, with its diverse pharmacologic actions antiinflammatory, antihistamine and analgesic.

Sperm-motility inhibition:

- Proven to inhibit sperm motility, hence a potential use as vaginal contraceptive.

Chemomodulatory activity:

- The extract in combination with berberine HCl (BCL) a topoisomerase inhibitor, exhibited antineoplastic benefits in the early stages.

Antiprotozoal activity:

- Three alkaloids from *A. macrophylla* possess significant activity against *E. histolytica* and *Plasmodium falcifarum*, although less potent than emetine and chloroquine.

7.2 Uses in traditional medicine

- A decoction of powder is used as febrifuge, tonic, an antidysenteric, an emmenagogue, anticholeric and a vulnerary (heals wounds).
- The leaves were used as poultice on sprains, bruises and dislocated joints.

8.0 Contraindications : Not available

9.0 Dosage:

Adults (18 years and older):

- *For cancer:* garlic extract capsules (containing 2.4 ml of garlic extract) or 500 mg garlic must be consumed daily for 6–12 months. Additionally, 1 ml of aqueous garlic extract per kg body weight must be consumed daily for a month.
- *For cirrhosis (liver disease):* 250 mg capsules containing garlic oil (Garlic Pearls, Ranbaxy, India) must be consumed in two divided doses with meals for 9–18 months. The daily dose of garlic capsules provided 1–2 g/m^2 garlic oil
- *For clogged arteries-* 900 milligrams of a dehydrated garlic powder tablet must be consumed in single or divided doses for up to four years. A suggested dose for clogged arteries is 3-5 mg of allicin (one clove or 0.5–1 g dried powder) daily by mouth.
- *For athletic injuries-* 80 mg of allicin (garlic component) taken by mouth for 14 days.
- *For common cold / upper respiratory tract infection:* 180 mg of allicin (dried powder) taken by mouth daily for 12 weeks. Two capsules containing aged garlic extract (AGE) powder must be taken by mouth twice daily for 90 days. The suggested dose for respiratory infections is 2–4 g of garlic dried bulb or 2-4 ml of garlic alcoholic extract (1:5, 45% ethanol) taken by mouth three times daily.
- *For cystic fibrosis:* capsules containing 656 mg of garlic oil used once daily with evening meals for eight weeks. One garlic capsule must be taken daily for eight weeks.
- *For dental conditions:* 20 drops of garlic solution (40 mg/ml) must be used in the oral cavity three times daily for four weeks.
- *For hair loss:* 5% garlic gel must apply to the scalp four times daily for three months.
- *For heart disease risk and prevention:* 150 mg of garlic powder must be taken by mouth two times daily for 12 months. 6–10 g of a garlic ether extract must be taken by mouth for three years.
- *For high cholesterol:* 10–7,200 mg of garlic in powder, tablet, oil, extract, or allicin form must be taken by mouth daily in single or divided doses for up to 7.3 years.
- *For high blood pressure:* 600–2,400 mg of garlic powder or aged garlic extract in single or divided doses must be taken by mouth daily for up to 12 weeks.
- *For Helicobacter pylori infection:* 4,200 µg of allicin (the main ingredient in garlic) daily in conjunction with standard treatment must be taken by mouth for 14 days. Additionally, 400 mg of aged garlic extract plus 2 mg of steam-distilled garlic oil must be taken by mouth twice daily for seven years.
- *For oral candidiasis (yeast infection):* garlic paste must apply in the mouth four times daily for 14 days.
- *For a mosquito repellent:* four garlic capsules as a single dose must be taken by mouth.

- *For peripheral vascular disease:* 800–900 mg of dehydrated garlic must be taken by mouth daily for 12 weeks.
- *For pre-eclampsia (high blood pressure during pregnancy):* 800 mg of garlic must be taken by mouth daily for up to eight weeks.
- *For sickle-cell anemia (blood cell disorder*): 5 ml of aged garlic extract must be taken by mouth daily for four weeks.
- *For systemic sclerosis (thickening of skin*): 900 mg of dried garlic powder must be taken by mouth for seven days
- *For a tick repellant:* 1,200 mg of *Allium* capsules must be taken by mouth daily for eight weeks
- *For type 2 diabetes:* 300–900 mg of dehydrated garlic will be used in single or divided doses for up to 24 weeks.
- *For warts:* water-based garlic extract must apply twice daily on warts. A lipid extract must also twice daily on people with warts and corns.

Children (Younger than 18 years):

- For common cold/ upper respiratory tract infection - extended-release garlic tablets (Allicor® 600 mg) must be taken by mouth over a five-month period.
- For familial hyperlipidemia (inherited high cholesterol) - 900 mg of dehydrated garlic powder tablets must be taken by mouth in three divided daily doses.
- For parasitic infections - 5 ml of garlic extract in 100 ml of water must be taken by mouth in two doses daily, or a commercial preparation of 1.2 mgs must be taken by mouth twice daily for three days. Additionally, 8 g of a garlic infusion must be taken by mouth daily for five days.

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Azadirachta indica A. Juss.
Meliaceae

1.0 Scientific Name : *Azadirachta indica* A. Juss.

2.0 Vernacular Names : Neem

3.0 Plant Description

Medium to large size tree which reaches a height of 12 to 20 m and a diameter of 18 to 25 cm. Its trunk is straight with thick bark. **Leaves** are alternate compound, 23 to 38 cm long with 7 to 17 leaflets, alternate or opposite, short-stalked, 6 to 7 cm long, oblique and toothed. **Flowers** are white, small and mildly fragrant. The fruit is green, smooth, ellipsoidal drupe, 1.25 to 1.8 cm long, greenish-yellow when ripe. **Seed** linear, oblong-ovoid.

4.0 Propagation : Seeds, cuttings and tissue culture.

5.0 Ecology/ Geographic Distribution

Neem was introduced in 1983 and now raised or cultivated in different parts of the Phillipines. The species is endemic to India. It is extensively grown in Burma, Indonesia, Thailand and Togo.

6.0 Chemical Constituents

- The bark and leaves contain tannin and oil.
- The seed contains a bitter fixed oil, nimbidin, known as "Oil of Margosa" or neem oil and bitter compounds including gedunin, cyclic trisulfide, nimbolide, mahmoodin, margolone, margolonone, isomargolonone, nimbin, nimbidin, nimbolidfe, gedunin, azadirachtin, polysaccharides, NB-II peptoglycan, gallic acid, epicatechin, catechin and nimbidol.
- Azadirachtin, the insecticide constituent of the seeds, is biodegradable, non-mutagenic, and nontoxic to birds, fish, and warm-blooded animals. The EPA

has approved a neem formulation (Margosan-O) as a pesticide for limited use on nonfood crops.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antibacterial activity:

- The petroleum ether, methanol and aqueous extracts of the leaves of *Azadirachta indica* were screened for their anti-microbial activity using the cup plate agar diffusion method. The methanol extract exhibited pronounced activity against *Bacillus subtilis* (28mm)

Antioxidant:

- Extracts from young flowers and leaves have strong antioxidant potential. An indicator of oxidative stress, malondialdehyde (MDA), was reduced by 46.0% and 50.6% for flower- and leaf-based extracts, respectively, prompting the recommendation to use neem as a vegetable bitter tonic to promote good health.

Skin disorders:

- Neem can treat many skin disorders, including scabies and lice; in a paste combination with *Curcuma longa* (turmeric), neem was used to treat scabies in 814 people—97% of them were cured within 3 to 15 days of application, and no adverse reactions were observed.

Anti-HIV/AIDS:

- In HIV/AIDS patients, a 12-week oral administration of acetone water neem leaf extract (IRAB) had a significant influence *in vivo* on CD4 cells (which HIV reduces) without any adverse effects in the patients. Of the 60 patients who completed treatment, 50 were completely laboratory-test compliant. The mean levels of CD4 cells increased by 159% in 50 patients, which is a major increase; the number of HIV/AIDS pathologies decreased from the 120 baseline to 5; and significant increases were experienced in body weight (12%), hemoglobin concentration (24%), and lymphocyte differential count (24%). IRAB is recommended as part of an HIV/AIDS drug treatment program.

Antiulcer:

- Neem bark extract reduced human gastric acid hyper secretion, and gastro-esophageal and gastroduodenal ulcers. After 10 weeks, the duodenal ulcers were nearly fully healed; after 6 weeks one case of esophageal ulcer and gastric ulcer were fully healed.

Antimalarial activity:

- The antimalarial activities of the tablet suspension of the bark and leaf of *A. indica* were evaluated on plasmodium *Yoelli nigeriensis* infected mice. The tablet suspensions exhibited high prophylactic, mode-rate suppressive and a very minimal curative schizonticidal effect.

- The tablet suspensions from the leaf and bark at a concentration of 800 mg/kg and chloroquine at a concentration of 62.5 mg/kg body weight produced average percentage (%) parasitaemia of 79.6%, 68.2% and 99.5% for leaf, bark and chloroquine, respectively, in chemo suppression.
- For prophylactic treatment, the tablet suspensions at 800 mg/kg and pyrimethamine at a concentration of 0.35 mg/kg gave an average parasitaemia reduction of 75.3%, 65.6% and 98.3% for the leaf, bark and pyrimethamine, respectively. There was a clear indication that moderate beneficial effect.

Anti-tumour effect:

- A study on Azadirachta indica has revealed a chemopreventive capability by regressing the hepatocarcinogenesis induced by diethyl Nitrosamine (DEN) / 2 acetylaminofluorene (AAF) carcinogens on Spraque- Dawly rats.

Anti-dental caries:

- A neem-extract dental gel significantly reduced plaque and bacteria (*Streptococcus mutans* and *Lactobacilli sp*. were tested) over the control group that used commercially available mouthwash containing the germicide chlorhexidine gluconate (0.2% w/v).
- In preliminary findings, neem inhibited *Streptococcus mutans* (bacterium causing tooth decay) and reversed incipient carious lesions (that is, primary dental caries).

7.2 Uses in traditional medicine

- A decoction of the bark is used for malaria, fever, dysentery, intestinal worms whereas slurry of the bark is externally used for inflammation and injuries.
- A decoction of the leaves and flowers is used for diabetes and for antiseptic purposes.
- Dried powdered leaves and flowers are orally taken for diabetes; also used as carminative. The ashes of the leaves and flowers are externally used for skin diseases.

8.0 Contraindications

- The leaves should not be administered during pregnancy (as it may induce foetus abortion) or nursing mothers, or to children under the age of 12 years.
- It may reduce blood glucose levels and should therefore be used with caution in insulin-dependent diabetic patients or patients taking oral antihyperglycaemic drugs.
- Avoid by people with known allergy or sensitivity to neem or members of the Meliaceae family as allergic skin reactions (including burning and itching) have been reported.
- Neem may cause low blood pressure. Caution is advised for people taking drugs or herbs and supplements that lower blood pressure.
- Neem may interfere with the way the body processes certain drugs using the liver's "cytochrome P450" enzyme system.

- Use cautiously in people with heart conditions, liver disease, and thyroid conditions.

9.0 Dosage : Not available

- *For ulcers of the stomach and intestines:* neem bark extract taken by mouth in doses of 30-60 mg twice daily for 10 weeks.
- *For dental plaque:* a gel containing neem extract must apply to the teeth and gums twice a day, before bed and after breakfast, for six weeks. A neem extract mouthwash will used in the mouth for one minute, twice daily for two weeks, 30 minutes after brushing the teeth. Toothbrushes will soak for 12 hours in a 3 % neem solution before brushing the teeth.
- *As an insect repellent:* 3 ml of diluted neem root or leaf extracts will apply to the skin for two days.
- *As a mosquito repellent:* neem cream (5 % neem oil in vanishing cream base) will apply to the skin. Doses of 3–5 ml of 0.5–2 % neem oil will apply to the skin for up to 12 nights.
- *For psoriasis* - neem capsules taken by mouth three times daily after applying crude coal tar and salicylic acid, taking a bath, and having 15 minutes of sun exposure, for 12 weeks.

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Blumea balsamifera (Linn) DC.
Asteraceae

1.0 Scientific Name : *Blumea balsamifera* (Linn) DC.

2.0 Vernacular Names : Blumea camphor, nagai camphor (English), sambong (tagalog, Pampangan), alibum, alimun, ayoban, dalapot, gabuen, gintin-gintin, hamlibon, lakadbulan, lalakdan, lakdan-bulan (Bisaya), lakadbulan, sambun (Sulu), kaliban, sob-sob, subsub (Iloko), kaliban (Tagnbanua), sobosob (Igorot) and takamain (Bagobo).

3.0 Plant Description

The plant is a coarse, tall, erect, half woody, strongly aromatic herb which is densely and softly hairy, and 1.5 to 3 meters in height. **Stem** grow up to 2.5 centimeters in diameter. **Leaves** are elliptic to oblong lanceolate, 7 to 20 centimeters long, toothed at the margins, pointed or blunt at the tip, and narrowed to the short petiole, which is often auricled or appendaged. Flowering heads are stalked, yellow, numerous 6 to 7 mm long, and borne on branches of a large terminal, spreading or pyramidal, leafy panicle. The involucral bracts are green, narrow and hairy. The acme are 10 ribbed and silky.

4.0 Propagation : Propagated using plantlets (suckers). A plantlet must be planted with its roots.

5.0 Ecology/ Geographic Distribution

The plant can be found from northern Luzon to Palawan and Mindanao, in all or most islands and provinces. It is usually common in open grasslands at low and medium altitudes.

6.0 Chemical Constituents

- Volatile oil: 0.1 - 0.4% - l-borneol, 25%, l-camphor, 75%, limonene, saponins, sesquiterpene and limonene, tannins, sesquiterpene alcohol; palmitin; myristic acid. Main essential oil components are 1,8-cineole (20.98%), borneol (11.99%), β-caryophyllene (10.38%), camphor (8.06%), 4-terpineol (6.49%), α-terpineol (5.91%), and caryophyllene oxide (5.35%).
- Yields flavonoids, terpenes (borneol, limonene, camphor, a-pinene, b-pinene, 3-carene, sesquiterpenes, monoterpenes, triteroenes, and cryptomeridiol), lactones (blumealactone A, B, C).
- Fractionation of ethylacetate extract of leaves isolated nine flavonoids.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The leaves have been manufactured as tablet by the Department of Science and Technology through the Philippine Council for Health Research and Development.
- Sambong is indicated or used as diuretic and beneficial for patient with edema, high blood pressure and kidney troubles. Its secondary indication is as pain reliever for headache and gaseous distention.
- *Anticancer/Hepatoma:* Study of methanolic extract suggest a possible therapeutic potential in hepatoma cancer patients.
- *Antispasmodic/Cryptomeridiol:* Study isolated cryptomeridio from the dried leaves. Results showed antispasmodic activity from various plant parts.
- *Antifungal/Antibacterial:* Phytochemical study of leaves yielded icthyothereol acetate, cyptomeridiol, lutein and ß-carotene. Antimicrobial tests showed activity against *A. niger, T. mentagrophytes* and *C. albicans*. Results also showed activity against *P aeruginosa, S aureus, B subtilis* and *E coli.*
- *Dihydroflavonol/abrogation of TRAIL resistance in leukemia cells:* Study shows combined treatment with a dihydroflavonol extracted from *Blumea balsamifera* exhibited the most striking synergism with TRAIL (tumor necrosis factor [TNF]-related apoptosis-inducing ligand) and suggests a new strategy for cancer therapy.

7.2 Uses in traditional medicine

- The leaves juice or in powder form are used as vulnerary while fresh leaves are applied to the forehead to relieve headache.
- Leaves infusion is used for bathing by mothers after childbirth. A decoction of the leaves also find its uses as an anti-diarrhea, anti-gastralgic and stomach pain. The decoction is used for aromatic baths in rheumatism.
- The roots are used locally as cure for colds.

8.0 Contraindications : It can cause contraction of muscular fibers, mucous membranes, and other tissues.

9.0 Dosage

- *Fever:* decoction of roots; boil 2 – 4 handfuls of the leaves. Use the lukewarm decoction as a sponge bath.
- *Headaches:* apply pounded leaves on the forehead and temples. Hold in place with a clean piece of cloth.
- *Gas distention:* boil 2 tsp of the chopped leaves in 1 cup of water for 5 minutes. Drink the decoction while warm. Also used for upset stomach.
- *Boils:* apply pounded leaves as poultice daily.
- *Diuretic:* boil 2 tbsp chopped leaves in 2 glasses of water for 15 minutes. Take 1/2 of the decoction after every meal, 3 times a day.

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Canarium ovatum Engl.
Burseraceae

1.0 Scientific Name : *Canarium ovatum* Engl.

2.0 Vernacular Names : Pili

3.0 Plant Description

This large tree reaches a height of about 35 m and is a meter or more in diameter. **Leaves** are alternate, pinnate and about 30 cm long with usually three pairs of opposite leaflets and a terminal leaflet. The leaflets are ovate-oblong, 12 to 20 cm long and 3 to 7 cm wide, smooth and shiny on both sides, pointed at the apex and rounded or obtusely pointed at the base. **Flowers** clustered, and are borne on large compound inflorescences. **Fruit** ovoid, 4 to 5 cm long, 2 to 2.5 cm wide, entirely smooth, drupe-like. It consists of green or brown thin resinous pulp and contains a thick-shelled triangular seed.

4.0 Propagation : Seeds and asexual methods such as budding, grafting and marcotting.

5.0 Ecology/ Geographic Distribution

Found only in the Philippines where it is common to primary forests at low and medium altitudes. It grows particularly in the Bicol region including Masbate; in Cagayan Province of Northern Luzon and in some areas of eastern Visayas and southern Mindanao regions.

6.0 Chemical Constituents

- On dry weight it contains 8 % protein, 33.6 % fat, 3.4 % crude fiber, 9.2 % ash, 45 % carbohydrate.
- Pulp oil, greenish yellow in colour, is 56.7 % oleiglycerides, 13.5 % linoleic glycerides and 29.3 % saturated fatty acids.

- The kernel, which weighs 0.74-5.13 g and which comprises 4.4-16.6 % of the whole fruit by weight, contains: 35.6-51.4% moisture, 11.5-15.7% protein, 69.2-76.6 % fats and 2.59-4.32 % carbohydrates.
- Its mineral and vitamin contents (per 100 g): 119 mg calcium, 508 mg phosphorus, 2.6 mg iron, 489 mg potassium, 45 IU vitamin A, 0.95 mg thiamine, 0.12 mg riboflavin, 0.4 mg niacin and traces of vitamin C. Kernel oil is composed of oleic glycerides, 58.6 % and palmitic acids, 38.2 %; yellow with an agreeable odor and taste, suitable for culinary purposes and keeps perfectly for as long as 6 months.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimutagenic potential:

- *C. ovatum* were studied for its ability to inhibit chromosomal damage induced by tetracycline in the in vivo micronucleus test.
- The methanolic extract showed the most promising activity by reducing the number of micronucleated polychromatic erythrocytes by >50%.
- Study established its antimutagenic activity and identified F4B, the most active sub-fraction in the hexane portion. The F4B may be valuable in cancer chemoprevention.

Melanogenesis inhibitory activity/Skin whitening:

- Study yielded four known sesquiterpene alcohols, ten triterpene alcohols, and four triterpene acids from a methanol extract of *C. ovatum*.
- On evaluation on melanogenesis in B16 melanoma cells induced with α-MSH, compounds 1 and 2 exhibited concentration-dependent melanogenesis inhibitory activity suggesting their potential use as skin whitening agents.

Fatty acid and triacylglycerol composition:

- Analysis of fatty acid and triacylglycerol composition of pili nut oil and fractions was done by gas and liquid chromatography.
- Oil by solvent extraction was low in polyunsaturated fatty acids and high in saturates.
- Results show the HM (high melting) fraction may have applications as cocoa butter substitute in confectionery products.

Protein Source:

- Analysis of the *pili* nut showed that the aqueous soluble globulin was the main storage protein within the kernel, existing in an 11S-like form, and possessing many similar physiochemical properties to those of other 11S oilseed globulins.

7.2 Uses in traditional medicine

- The "saheng" (oleoresin) is used as a stimulant; a rubefacient and an anti-rheumatic when applied externally.

- Poultices are used externally for swellings of the legs. Oleoresin, prepared in the form of ointment, is applied on indolent ulcers.

8.0 Contraindications : As therapeutic ointment/oil, no special precautions are needed, but please note that elemi oil can be irritating to a sensitive skin.

9.0 Dosage : As therapeutic oil, simply add a few drops of elemi essential oil to an unfragranced cream or lotion and apply it at night-time for an intensive revitalising and nourishing overnight treatment.

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Senna alata L.
Fabaceae

1.0 Scientific Name : *Senna alata* L.

2.0 Vernacular Names : Andadasi, bayabas-bayabasan (Ilocos region), asunting, sunting (Cebu), andahan (Sulu), andasi, kasitas (Bicol), pakyungkong (Pampanga), paldotsina (Pangasinan), plutahina, palad tsina (Visayas), katanada, malabayabas, kapurko (Tagalog), ringworm bush (English),

3.0 Plant Description

A branched shrub growing up to three meters tall. **Leaves** equally pinnate contain 1 to 28 oblong leaflets 5 to 15 cm long, which are gradually increasing in size upward. **Flowers** yellow, showy in clusters on terminal or axillary racemes. **Fruit** which is a winged pod contains flattened triangular seeds.

4.0 Propagation : Seeds and cuttings.

5.0 Ecology/ Geographic Distribution

It grows abundantly in settled areas at low and medium altitudes.

6.0 Chemical Constituents

Anthraquinone, glycosides, chrysophanic acid, rhein and aloe-emodin heterosides.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

One of the ten plants approved by the Department of Health (DOH) as herbal medicine for the treatment of ringworms and skin fungal infections. The efficacy and safety of `akapulko' have been proven through scientific research and clinical trials by the DOH.

Antifungal:

- Crude ethanol and aqueous extract of the leaves and bark were evaluated *in vitro* against three fungi (*Aspergillus fumigatus, Microsporum canis* and *Candida albicans)* and proven to be effective against *Candida albicans.*
- Ethanolic extract of leaves showed potent activity against dermatophytes but without or low effect on non-dermatophytes.
- Anthraquinone high-yielding leaf extract showed antidermatophyte activity against – *Tricophyton rubrum, T. mentagrophytes* and *Microsporum gypseum*.
- Crude stem bark extract showed marked inhibitory effects against *M. canslaslomyces, T. verrucosum, T. mentagrophytes and E. floccosum.*

Antibacterial:

- Methanolic extracts of flowers, leaves, stem and root barks showed a broad spectrum of antibacterial activity, with the flower extract the most effective.
- The leaves- and bark-water extracts showed antibacterial activity against *S aureus*.
- The water extract of leaves was more potent than the ethanol extract in inhibiting *S. aureus*.

Antiseptic soap:

- A Nigerian study on *S. alata*-based soap exhibited high antimicrobial potency against *S. aureus.* At a reduction time of 5 mins, the herbal soap made a 94.78% reduction of the microbial load. Findings are of economic, industrial and medical significance.

Analgesic:

- Ethanol and hexane extract of the leaves showed analgesic effect in mice. 50 mg of kaempferol 3-O-sophoroside was equivalent to 100 mg of the extract.

Anti-inflammatory:

- Leaf extract showed anti-inflammatory activity through inhibition of histamine secretion.
- Anti-inflammatory activity of heat-treated extract and kaempferol 3-O-gentiobioside (K3G), an abundant flavonoid glycoside isolated were compared with the activities of sun-dried leaf extract. Both extracts exhibited strong inhibitory effects on concanavalin A-induced histamine release from rat peritoneal exudate.

Purgative effect:

- Fresh leaves showed significant purgative efficacy on volume and frequency compared to placebo.

Hematologic & toxicity effects:

- Aqueous leaf extract in albino showed significant dose-dependent decreases in hemoglobin levels and erythrocyte counts with emaciation, loss of appetite and weight loss as signs of toxicity.

Constipation treatment:

- Leaves have been claimed effective as a laxative, presumed to be due to anthraquinones.
- In a study testing the efficacy of leaves for treatment of constipation compared to placebo, the differences were statistically highly significant. Minimal side effects: nausea, dyspepsia, abdominal pain and diarrhea were noted in 16–25 % of patients.

Hepatoprotective:

- An alcoholic extract of dried leaves on paracetamol-induced hepatic injury in albino rats showed hepatoprotective activity which is attributed to the flavonoids.
- Crude extracts of petals showed hepatoprotective activity in rats with CCl4-induced hepatotoxicity. The effect was attributed to anthocyanin.

Weight-lowering effect / Hypolipidemic:

- Study showed *C. fistula* and *S. alata* significant and effectively reduced the body weight and weight of parametrial fat in mice due to their tannin contents. Both plants present as potential sources of anti-obesity and hypolipidemic compounds.

Pityriasis:

- A 10-year human study indicates the leaf extract can be reliably used as a herbal medicine to treat *Pityriasis versicolor* without any side-effects.

7.2 Uses in traditional medicine

- Fresh leaves are used for the treatment of skin diseases such as tinea flava, eczema, ringworm, athletes's foot, fungal infection. It also used as diuretic and purgative.
- The seeds are used for expelling worms.

8.0 Contraindications

- To be avoided by individual with known allergy or hypersensitivity to senna, its constituents, or members of the Fabaceae family. Occupational exposure to senna may cause allergy in the absence of increased risk of asthma.
- Safe for short-term use for constipation. The adverse effects of senna reported in clinical trials are mostly gastrointestinal in nature.

- Chronic laxative abuse may appear with watery diarrhea, abdominal discomfort (sometimes pain), muscle weakness, lassitude with low blood potassium, melanosis coli (symptom-free pigmentation of the colon, observed at colonoscopy), and the barium enema appearance of a "cathartic colon." Low levels of potassium in the blood may impair insulin secretion.
- Senna may increase the risk of bleeding. Caution is advised in patients with bleeding disorders or those taking drugs, herbs, or supplements that may increase the risk of bleeding.
- Use cautiously in patients who have had an obstruction of the gastrointestinal tract.
- Use cautiously in patients with hemorrhoids, stomach ulcers, or inflammatory bowel condition, as senna may cause these conditions to worsen.
- Use cautiously in patients taking diuretics or other laxatives, as senna may further reduce levels of blood potassium.

9.0 Dosage :

- Apply the ointment to affected areas twice daily. For wound treatment, leaves are boiled and simmered to one-third volume, then applied to affected areas twice daily.
- As laxative, boil 10-15 dried leaves in water, taken in the morning and bedtime.
- Pound enough fresh leaves; express (squeeze out) the juice and apply on the affected skin morning and evening.
- Dried powder in a dose of 3 to 8 mg or decoction 400 - 600 ml is orally taken for insomnia, palpitation and over sweating.
- Decoction of bark in the dose of 400 - 600 ml together with jiggery is orally taken for diarrhea diseases, flatulence and poor appetite.
- For chronic constipation, 1-2 tablets (or one teaspoon) of Senokot® have been taken daily by mouth. One to two tablets of Senokot-S®, increasing to a maximum of three tablets twice daily, or reducing to one tablet daily or every other day, have been taken by mouth in a nursing home setting.

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Casuarina equisetifolia L.
Casuarinaceae


1.0 Scientific Name : *Casuarina equisetifolia* L.

2.0 Vernacular Names : Agoho

3.0 Plant Description

A large evergreen tree, 20 m high, with a 65 cm diameter. The crown is narrowly pyramidal resembling some of the conifers in appearance. **Bark** is brown to dark brown and rough. The inner bark is light in color and has a bitter taste. **Leaves** are actually reduced to small sheaths on the needle-like branchlets. The leaf tips are like teeth. **Flower** unisexual. **Fruits** appear like cones with persisted bracts. These are woody, 6 to 7 mm long and 2.5 to 3 mm wide; when ripe, the fruits release small winged seeds through the fruit cells.

4.0 Propagation : Seeds, cuttings or by air layering.

5.0 Ecology/ Geographic Distribution

Distributed throughout the Philippines along sandy seashores, extending inland in open sandy valleys along the streams. It is sometimes seen growing at altitudes as high as 800 m. It also occurs in the Indo-Pacific Region and is now pantropic in cultivation.

6.0 Chemical Constituents

- Plant contains kaempferol, quercetin, alicylic acids, amino acids, taraxarol, lupenone, lupeol, gallic acid, ß-sitosterol, catechin, and gallo-catechin. Phytochemical screening yielded alkaloids, flavonoids, triterpenoids, carbohydrates, tannins, phenols, gums, and mucilage.
- Bark yields 18% tannin namely catechin, ellagic acid, and gallic acid.
- Leaf and fruit yielded flavonoid and lupeol.
- Colouring matter is casuarin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antibacterial and antimicrobial:

- *C. equisetifolia* exhibited strong activity against *S. aureus, B. subtilis* and *S. sonnei*.
- Condensed tannin extracts showed potent antimicrobial effect on *Bacillus proteus, B. subtilis, K. pneumonia,* and *Aspergillus fumigatus.*

Hepatoprotective:

- *C. equisetifolia* showed dose-dependent protection against carbon tetrachloride induced hepatocellular injury in rats.

Antidiabetic/ Hypolipidemic:

- Ethanolic extract reduced blood sugar, significantly reduced total cholesterol, LDL, VLDL as well as improve HDL cholesterol.

Antioxidant / Anti-aggregating properties:

- Condensed tannins extracted from *C. equisetifolia* exhibited considerable DPPH radical scavenging activity and ferric reducing antioxidant power.
- Condensed tannin extracts showed moderate hemolytic action.

Antiasthmatic:

- Study of ethanol extract of bark showed significant dose-dependent antiasthmatic activity in various *in vitro* and *in vivo* animal models.

7.2 Uses in traditional medicine

- A decoction of the bark is an excellent astringent, emmenagogue (promotes menstruation) and ecbolic (alleviates menstruation pains) when taken in large doses. It is also helpful for hemoptysis (expectoration of blood from some part of the respiratory tract), as well as to arrest diarrhea and dysentery.
- A lotion of the bark is used for beriberi, the powder for pimples on the face while infusion used as a tonic.
- A decoction of the twigs is used as a lotion for swellings; an infusion of the branches is used as a diuretic.
- The leaves are used for colic (sudden recurrence of acute abdominal pain caused by spasm, obstruction, or twisting).

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Cinnamomum mercadoi Vidal
Lauraceae

1.0 Scientific Name : *Cinnamomum mercadoi* Vidal

2.0 Vernacular Names : Kalingag

3.0 Plant Description

A small to medium sized tree with relatively thick, aromatic bark. It reaches a diameter of 60 cm or more. **Bark** is gray, without fissures or cracks and covered irregularly with corky pustules, which give it a slightly rough appearance. **Leaves** are smooth, opposite, elliptical, 7 to 1 4 cm long and 3 to 6.5 wide; apex is acute, tip is rounded; texture is leathery; both faces are glabrous, the upper face is shiny while the lower has glaucous ochre bloom. **Fruit** smooth, ovoid, 12 mm long and 7 mm wide, shiny, steel blue, embedded at the base by the enlarged persistent calyx.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Kalingag is found only in the Philippines, from the Babuyan islands and northern Luzon to Mindanao, in forests at low and medium altitudes.

6.0 Chemical Constituents

Cinnamaldehyde is the essential oil that accounts for 65% to 80% of the herb. Essential oil derived from the bark consists almost entirely of safrol (in contrast to other *Cinnamomum* species which contain only small amount of safrol but large percentages of cinnamic aldehyde).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimicrobial:

- Phytochemical screening of crude methanol extract yielded saponins, condensed tannins, an unsaturated lactone ring and leucoanthocyanins.
- The crude extract showed antimicrobial activity with moderate activity against *S. aureus* and strong antifungal activity against *Microsporum canis*.

Diabetes:

- MHCP (methylhydroxy chalcone polymer), isolated from cinnamon. MHCP is a type of polyphenol or flavanoid, reported to increase cells' sensitivity to insulin *in vitro*.
- MHCP possesses antioxidant properties that can slow down various other complications in diabetes. MHCP is water soluble and is not found in the spice oils or oil extracts sold as food additives.
- A USDA research indicated that daily cinnamon supplements reduced blood sugars by 20–30%, reduced total cholesterol, LDL cholesterol and triglycerides from 13–30% in a study of 60 patients with type 2 diabetes, an effect comparable to that obtained from statin drugs.

Analgesic:

- *C. mercadoi* exhibited an analgesic activity that is comparable with aspirin. Hence verifying its folkloric use for headaches and rheumatism.
- Study also showed an analgesic activity comparable with aspirin. On acute oral toxicity testing, the mice sacrificed after 14 days had grossly normal findings.

7.2 Uses in traditional medicine

- The bark, masticated and taken internally, helps digestion. It is also used for flatulence (gas accumulation in the alimentary canal) and as an expectorant.
- The bark is also chewed for stomach trouble. It is used for tuberculosis and as a remedy for headaches and rheumatism.

8.0 Contraindications : Not available

9.0 Dosage:

- One heaping teaspoon of powdered bark to a cup of boiling water; or, 0.5 to 1 g of bark to 7 oz of boiling water fir 5-10 minutes, then steep.
- Tincture: Moisten 200 parts of cinnamon bark evenly with ethanol and percolate to produce 1,000 parts of tincture. Use 3-4 cc three times daily.
- Powdered bark: one heaping teaspoon to a cup of boiling water, 4 cups daily. For flatulence, stronger doses used, 2 tbsp for adults, 1 tsp for children.
- Suggested use: 1/4 teaspoon of cinnamon a day added to coffee, fruit juice or cereal. It may also delay the onset of type of diabetes.

10.0 Bibliography

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Cordia dichotoma G. Forst.
Boraginaceae

1.0 Scientific Name : *Cordia dichotoma* G. Forst.

2.0 Vernacular Names : Anonang

3.0 Plant Description

Smooth and deciduous, anonang grows 5 to10 m high. **Leaves** are alternate, ovate to oblong-ovate or elliptic-ovate with entire or somewhat undulate margins, pointed tip and somewhat rounded or heart-shaped base. **Flowers** are stalkless, white or yellowish-white and borne in lax inflorescences. **Fruit** (drupe) is yellowish-white or pinkish, ovoid with rather scenty pulp and a hard stone.

4.0 Propagation : Not available

5.0 Ecology/ Geographic Distribution

The species is found in secondary forests throughout the Philippines, in thickets at low and medium altitudes. It also occurs in India, southern China and Formosa, and throughout Peninsular Malaysia to tropical Australia and Polynesia.

6.0 Chemical Constituents

- Stearic, oleic and linoleic acids were identified as the major constituents.
- Flavonoids, kaempferol, quercetin and isorhamnetin, were isolated from the butanol fraction of the fruits.
- Rosamarinic acid was the major constituent of the leaves which may be responsible for the anti-inflammatory action of this plant. Arabinoglucan and the backbone of the polysaccharide to be composed of (1®6)-linked D-glucopyranosyl and (1®2)-linked L-arabinofuranosyl residues.

- The alcoholic extract of seeds contains D-glucose, D-xylose, D-ribose, L-rhamnose, D-glucuronic acid, D-arabinose, lactose, and L-fructose as the sugars and glycine, leucine, glutamic acid, cystine, alanine, threonine, aspartic acid, and proline as the free amino acids.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antiulcer activity:

- Flavonoids isolated from the plant exhibited significant anti-ulcer and cytoprotective effects against gastric ulcer in rats.

Hepatoprotective:

- Methanolic extract exhibited hepatoprotective action in male Wistar rats with carbon tetrachloride induced liver damage.

Wound healing:

- Ethanol fruit extracts showed significant wound healing activity on three different models, viz. excision, incision and dead space wound models on on either sex of albino Wistar rats.

Anti-inflammatory:

- Seeds extract yielded alkaloids, glycosides, saponins, tannins and carbohydrates. The ethanol extract and aqueous fraction possess acute anti-inflammatory activity.

Antioxidant:

- Methanolic extract of seeds and leaves showed positive antioxidant activity in a concentration dependent manner. The activity was more pronounced in leaves as compared to seeds.

Antioxidant in cerebral reperfusion injury:

- Study investigated the effect of *C. dichotoma* on acute cerebral reperfusion in rats. Pretreatment with methanol, chloroform, and aqueous extracts decreased MDA level, increased SOD, catalase, and glutathione levels, with a decrease in BBB penetration and infarct volume. Hence suggesting its potential to reduce neuronal damage in stroke patients.

Antioxidant for ulcerative colitis benefits

- Results showed animals treated with the methanol extract fraction recorded lower pathological scores and good healing on ulcerative colitis. The phenolic rich fraction showed antioxidant potential in the DPPH, ABTS, and FRAP assays.

Corrosion inhibitor:

- The alcoholic extracts is a better corrosion inhibitor (for mild steel) than toxic chemicals.

Anthelmintic:

- Ethanolic and aqueous extracts showed concentration dependent paralysis and death of *Eudrilus euginieae* earth worms, with the aqueous extract showing more significant activity.

Antidepressant:

- Ethanolic and aqueous extracts of leaves exhibited antidepressant activity in behavioral animal models.

Anti-implantation:

- A methanolic extract of *C. dichotoma* showed significant antiimplantation activity.

Antimicrobial:

- Bark extracts exhibited pronounced antibacterial and antifungal activities.

Degenerative disorders:

- An etiologic factor in several degenerative disorders is free radical induced stress, which affect immunomodulatory response and recruit inflammatory cells.
- In an *in vitro* model viz DPPD and hydrogen peroxide assays, a methanolic extract of seeds and leaves demonstrated positive antioxidant activity in a concentration-dependent manner, an activity more pronounced in the leaves.

Reversible contraceptive potential:

- Study evaluated the ethno-contraceptive use of *C. dichotoma* leaves (LCD) in post-coital albino rats. (2-hydroxypropyl)-β-cyclodextrin (BCD) was used as bioavailability enhancer to form LCD-BCD complex.
- Leaves extract showed 100% anti-implantation activity. LCD-BCD complex exhibited 100% pregnancy interception and showed strong estrogenic potential with a luteal phase defect.
- Histological and biochemical estimations showed reversible contraceptive potential after withdrawal.

7.2 Uses in traditional medicine

- The bark, moistened, is applied externally on boils and tumors to hasten ripening. It is used for headaches and stomachaches.
- A decoction of the bark is used as an antidyspeptic, a febrifuge. It is also given for dysentery and fever.
- In powder form, the bark is used as a cure for ulcers in the mouth. The bark, in infusion, is used as a gargle.
- The juice obtained from the bark, if administered in coconut milk, relieves severe colicky pains.
- The fresh fruit is used as laxative and pectoral. It is also used for gonorrhea.
- The dried fruit is used as an expectorant.
- The kernels, powdered and mixed with oil, are a good remedy for ringworm.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Ehretia mycrophylla Lam.
Boraginaceae


1.0 Scientific name : *Ehretia mycrophylla* Lam.

2.0 Vernacular names : Wild tea, forest tea (English), tsaang gubat, kalimomog, taglikot (Tagalog), alibungog (Visayas region), putputai (Bicol region), maragued, kalabong (Ilocos region) and talibunag (Igorot).

3.0 Plant Description

The plant grows from 4–10 meters in height. The inflorescences and leaves when young are somewhat hairy beneath, becoming smooth or nearly so when old. **Leaves** are oblong-ovate, elliptic-ovate, or ovate, 8–18 cm long, and entire, with pointed tip and usually rounded base. **Inflorescences** terminal and axillary, and 5–10 cm long, with few to many flowers. The flowers are white, 5 parted and about 8mm long. **Fruit** is ovoid, somewhat fleshy and about 5 mm long.

4.0 Propagation : Seeds or basal cuttings.

5.0 Ecology/ Geographic Distribution

It is found only in the Philippines, in thickets and secondary forests at low altitudes from northern Luzon to Mindanao.

6.0 Chemical Constituents

Phytochemical screening yielded alkaloids, flavonoids, glycosides, tannins, terpenoids, and saponins. Major constituents of leaves yielded an intractable mixture of triterpenes, namely a-amyrin, b-amyrin, and baurenol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Tsaang Gubat is one of the 10 herbs that is endorsed by the Philippine Department of Health (DOH) as an antispasmodic for abdominal (stomach) pains. It is registered as a herbal medicine at the Philippine Bureau of Food & Drug (BFAD). It is now available commercially in capsules, tablets and tea bags.

7.2 Uses in traditional medicine

- The leaves are used as a disinfectant wash during child birth.
- Also used to treat dysentery, gastroenteritis, intestinal motility, diarrhea or loose bowel movement (LBM) and stomach pains.
- Mouth gargle and body cleanser/wash.

8.0 Contraindication :

- May affect those suffering from peptic ulcer and pregnant mothers.
- May be harmful to those having liver or stomach disorders.
- Otherwise no known toxicity reported following their use in recommended doses.

9.0 Dosage

- For diarrhea, boil chopped leaves into 2 glasses of water for 15 minutes. Divide decoction into 4 parts. Drink 1 part every 3 hours.
- For stomach ache, boil chopped leaves in 1 glass of water for 15 minutes. Cool and strain.
- Indian traditional documentation recorded the use of 2–3 standard sized leaves of *C. dichotoma* fried with rice and taken for 2–3 days for contraceptive applications.

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Ficus nota (Blanco) Merr.
Moraceae

1.0 Scientific name : *Ficus nota* (Blanco) Merr.

2.0 Vernacular names : Tibig

3.0 Plant Description

An erect, spreading, dioecious tree, 8 m high. The branchlets are hairy. **Leaves** are oblong to elliptic or obovate, 15-35 cm long and 8-12 cm wide; beneath are soft, pubescent, the margins are irregular but distinctly toothed, the apex is abruptly acute and the base is auriculate. The midrib of the leaves is stout, with 7-9 pairs of ascending, curved nerves; the petiole is brown, tomentose, 3-5cm long. Tubercles are mostly cauline, occasionally from larger branches, clustered, rebranched, rigid, 20 cm long and bracteates. **Figs** are subglobose, 2-3.5 cm in diameter, glabrous, fleshy, pedunculate, green, becoming yellowish-white at the base; the umbilical scales are exerted; the peduncle is acute, 2 cm long and has three bracts.

4.0 Propagation : Figs

5.0 Ecology/ Geographic Distribution

The species is found in thickets and forests at low and medium altitudes. It occurs in Batan Island, Polilio, Mindoro, Palawan (Culion and Balabac), Panay, Samar and Leyte (Biliran). It also occurs in North Borneo.

6.0 Chemical Constituents

Dichlormethane extract of unripe fruits yielded 4-(2-hydroxyethyl)- 2 methoxyphenol (1), a mixture of meso-2,3-butanediol (2a), (2R,3R)-2,3-butanediol (2b) and (2S,3S)-2,3- butanediol (2c) and Î²-sitosterol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- The water extracted from the standing tree is drunk thrice a day for fever.
- The extracted water can also be applied to relieve muscle pain.

8.0 Contraindication : Not available

9.0 Dosage : Not available

10.0 Bibliography

- De Guzman, ET. et al. 1981. *Guide to Philippine Flora and Fauna*. Vol. I. Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Ficus septica Burm. *F.* var. *septica*
Moraceae

1.0 Scientific Name : *Ficus septica* Burm. F. var. *septica*

2.0 Vernacular Names : Hauili

3.0 Plant Description

This is an erect, small tree, 3-8 m high, smooth, with the young shoot more or less hairy. **Leaves** are smooth and shiny, oblong-ovate to elliptic-ovate, 10 to 20 cm long, with the tip tapering to a rather sharp point and the base pointed. The receptacles are axillary, solitary, depressed globose or turbinate, obscurely ridged or angled, 1.5 to cm in diameter and shortly peduncled.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

An endemic species commonly found throughout the Philippines. It also occurs in thickets at low and medium altitudes.

6.0 Chemical Constituents

The root bark contain isoflavones (ficusin A and ficusin B), two indolizidine alkaloids (ficuseptine and antofine).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available

7.2 Uses in traditional medicine

- A decoction of the roots helps the body disposes of excess water through urination. The roots are used as a poultice for boils.
- The fresh leaves are used as a sudorific (induces sweating) and headaches. The leaves, applied externally, are said to be antirheumatic.
- The latex is used to cure certain varieties of herpes.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Instia bijuga (Colebr.) O. Kuntze
Fabaceae


1.0 Scientific Name : *Instia bijuga* (Colebr.) O. Kuntze

2.0 Vernacular Names : Ipil

3.0 Plant Description

A tree reaching a height of 20 to 45 m and a diameter of 150 to 180 cm. **Bark** is 5 to 8 mm thick, gray with an orange tinge. The inner bark is light brown and mottled with brown specks. **Leaves** are alternate and simply compound with usually two pairs of leaflets, 8 to 12 cm long and 5 to 8.5 cm wide. **Flower** white and reddish, fragrant, and borne in panicles, 6 to 10 cm long. The pods, 10 to 25 cm long and 4 to 6.5 cm wide, and contain 3 to 6 orbicular seeds.

4.0 Propagation : Seeds.

5.0 Ecology/ Geographic Distribution

Usually found along seashores, and in some localities, in inland forests, from the Babuyan islands and northern Luzon to Mindanao and Palawan. It also occurs in Madagascar, across Peninsular Malaysia to the Caroline and Fiji islands.

6.0 Chemical Constituents

- Bark yields tannin. Wood yields a khaki-colored dye.
- Leaves yielded anthrones, flavonoids, glycosidic flavonoids, phenolic compounds, steroids, tannins, triterpenes, anthraquinones and coumarins.
- The root bark contain isoflavones (ficusin A and ficusin B), two indolizidine alkaloids (ficuseptine and antofine).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anti-inflammatory:

- Study examined the molecular mechanisms for the anti-inflammatory activity of phenanthroindolizidine alkaloids isolated from the leaves. Study suggests that it exerts its anti-inflammatory effects by inhibiting expression of the proinflammatory factors and related signaling pathways.

Antimicrobial / Antifungal / Antiprotozoal:

- Ethanol extracts inhibited *S. aureus, E. coli* and *C. albicans.* It showed antiprotozoal activity against *T vaginalis* and *Entamoeba histolytica*. Phytochemical screening yielded alkaloids, quarternary base, tannins, 2-deoxysugars and benzopyrone nucleus.
- Methanolic extract displayed intense antimicrobial and antifungal activities. Study isolated two indolizidine alkaloids: a novel ficuseptine and antofine.

Immunomodulatory / Anticancer:

- Previous study has shown anticancer effects singly or in combination with doxorubicin on T47D breast cancer lines. Study in thirty male Sprague Dawley rats showed HIF (hexane insoluble fraction) of leaves has a potential as protective agent combined with doxorubicin.

Apoptosis / Chemopreventive

- Leaves' ethanolic extract showed potential as chemopreventive agent with its activity on inducing apoptosis in liver cancer with p53-independent pathway.

7.2 Uses in traditional medicine

- A decoction of the bark, which contains tannin, is used to stop diarrhea.
- The fruit, when eaten, is laxative.
- A decoction of the roots helps the body disposes of excess water through urination.
- The roots are used as a poultice for boils.
- The fresh leaves are used as a sudorific (induces sweating) and for headaches. The leaves, applied externally, are said to be antirheumatic.
- The latex is used to cure certain varieties of herpes.

8.0 Contraindication : Not available

9.0 Dosage : For ulcer, 5 leaves washed and finely ground, plus salt to taste, then used as a compress on the boil (1–2 times daily).

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Lagerstroemia speciosa (L.) Pers.
Lythraceae

1.0 Scientific Name : *Lagerstroemia speciosa* (L.) Pers.

2.0 Vernacular Names : Banaba

3.0 Plant Description

A deciduous tree, 5 to 20 m high, with a diameter of 40 cm. **Bark** is smooth, gray to cream-colored and peels off in irregular flakes. **Leaves** are smooth, oblong-ovate to elliptic-ovate and 12 to 25 cm long. The flowers with six-petals, purplish lilac or mauve pink, rarely pink, 5 to 7.5 across and borne in large, terminal panicles up to 40 cm in length. **Fruits** are large capsule, obovoid or ellipsoid and 2 to 3.5 cm long. **Seed** pale brown with a wing 12 to 18 mm long.

4.0 Propagation : Seeds or by branch cuttings.

5.0 Ecology/ Geographic Distribution

Banaba abounds throughout the country, in the Batan Islands, from northern Luzon to Palawan, in Mindanao and the Sulu Archipelago, and in most or all islands and provinces. Commonly found in secondary forests at low and medium altitudes. The species is also reported to occur in India, southern China and southward through Peninsular Malaysia to tropical Australia.

6.0 Chemical Constituents

Corosolic acid, lagerstroemin, gallotannins, penta-O-galloyl-glucopyranose. corosolic acid, triterpenoid glycoside, tripertene, xanthine, alkaloids, tannins, flavonoids, triterpenoids, sterol and saponins.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anti-diabetic activity:

- Studies have identified several compounds (corosolic acid, lagerstroemin and gallotannins) as responsible for its anti-diabetic activity, where penta-O-galloyl-glucopyranose or PG was identified as the most potent, with a higher glucose transport stimulatory activity than lagerstroemin.
- Inhibition of TNF-induced activation: Diabetes leads to cardiomyocyte hypertrophy in association with up regulation of vasoactive factors and activation of nuclear factor (NF)-kappa B and protein-1. Findings indicated that ellagitannins from *L. speciosa* inhibit DNA-binding of NF-kappa B hence possible inhibition of diabetes-induced cardiomyocyte hypertrophy.
- Corosolic acid, a triterpenoid glycoside believed to facilitate glucose-transport into cells thus useful for diabetic condition. Further study also showed a significant reduction of blood glucose levels with the soft gel formulation showing better bioavailability than a dry-powder formulation.

Weight loss:

- It is becoming a common ingredient in weight-loss supplements/ products as a metabolic enhancer.

Hypertension:

- It is also being studied for its use in the treatment of blood pressure, renal and immune system benefits.

Anti-adipogenic activity:

- In addition to stimulating glucose uptake in fat cells, it also has anti-adipogenic properties. Study yielded seven ellagitannins, including lagerstroemin from the leaves of *L speciosa* exhibited strong activities in both stimulating insulin-like glucose uptake and inhibiting adipocyte differentiation.
- Ellagic acid derivatives also showed inhibitory effect on glucose transport.

Hypoglycemic activity:

- Irradiated leaf extract mixed with insulin was found to have a higher hypoglycemic activity compared with mixtures of nBLE and insulin. Results may suggest the potential of reducing the cost of insulin management by lessening the dependence on recombinant insulin.

Hyperuricemia activity:

- Xanthine oxidase is a key enzyme involved with hyperuricemia, catalyzing the oxidation of hypoxanthine to xanthine to uric acid. Due

to the presence of xanthine oxidase inhibitors, the study supports the dietary use of the aqueous extracts from banaba leaves for the prevention and treatment of hyperuricemia.

Anti-inflammatory / free radical scavenging:

- Study showed antioxidant and anti-inflammatory activities from the ethyl acetate and ethanol extracts of *L. speciosa*. A hydroalcoholic extract of leaves demonstrated antioxidant activity in the nitric oxide model.

Hepatoprotective activity:

- *L. speciosa* pers roots showed hepatoprotective activity protecting hepatocytes from CCl4-induced liver damages due to antioxidant effect on hepatocytes.
- Pharmacognostic Evaluation of Leaves: Study provided important information for the correct identification and herbal standardization of the leaves.

Antimicrobial activity/ Quorum sensing modulation:

- Study showed a fruit extract caused down regulation of the quorum sensing related genes and respective signaling molecules, without affecting *P. aeruginosa* growth. Results suggest a possible role for quorum sensing mechanisms and the potential source of QS-based antibacterial drugs.

Anti-obesity activity:

- A review of natural products with anti-obesity activity included *L. speciosa* (1) a crude aqueous extract promoting lipid metabolism; a 3% decrease in body weight, through PPARs (peroxisome-proliferator activated receptor) agonistic activity (2) Ellagitannins via inhibition of GPDH activity by 20%.

7.2 Uses in traditional medicine

- A decoction of the bark is used as stimulant and a febrifuge (a remedy for fever) and for abdominal pains. An infusion of the bark is taken to stop diarrhea. The bark, leaves and flowers are used as purgative.
- A decoction of the old leaves and ripe/dried fruit, taken like tea, reduces blood sugar. A decoction of the leaves is used as a deobstruent (clears obstructions of the natural ducts of the body) and a diurectic.
- A decoction of the roots is used against small ulcers of the mouth.

8.0 Contraindications:

- Due to lack of pharmacological and toxicity data, avoid the use of banaba during pregnancy and lactation.
- Due to the glucose-lowering actions of the plant, caution is warranted with use of other diabetic medications, as the effects could be additive.

- Banaba may cause blood glucose to be excessively lowered when combined with drugs that can cause hypoglycemia, such as sulfonylureas (glyburide or glipizide), or with complementary and alternative medicines (CAM) that have hypoglycemic activity (Gymnemasylvestre, American ginseng, and the like).
- Individual with known allergy or hypersensitivity to banaba, its constituents, or any members of the Lythraceae family should avoid.
- Banaba may cause low blood pressure. Caution is advised in patients taking drugs, herbs, or supplements that lower blood pressure.

9.0 Dosage : Not available

- In a small, randomized clinical trial involving type 2 diabetic patients, researchers found that dosages of 32 and 48 mg of a banaba extract standardized to 1% corosolic acid (glucosol preparation) administered for 2 weeks significantly reduced blood glucose levels.
- For diabetes, 32 and 48 milligrams of banaba leaf extract, standardized to 1% corosolic acid (Glucosol™) has been taken by mouth daily for two weeks.

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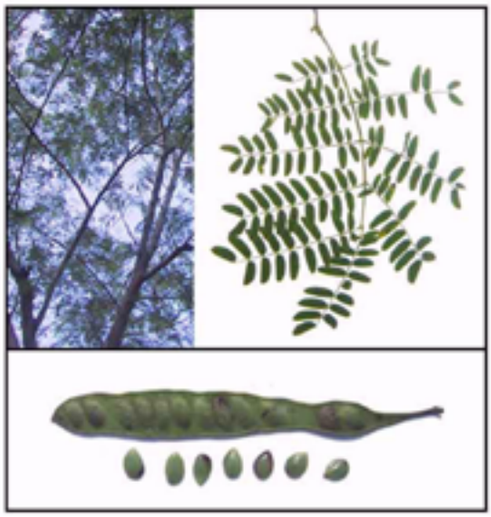
Leucaena leucocephala (Lam.) de Wit.
Fabaceae



1.0 Scientific Name : *Leucaena leucocephala* (Lam.) de Wit.

2.0 Vernacular Names : Ipil-ipil

3.0 Plant Description

A small tree. **Leaves** are compound, 15 to 25 cm long, with hairy rachises. There are 10 to 18 pairs of small leaflets along each primary branch of the main axis. **Flower** numerous, small and white, are in globular clusters (head). The pod, 12 to 18 cm long and 1.4 to 2 cm wide, is thin, flat, strap-shaped and contains 15 to 25 elliptic, shiny brown seeds. When mature, the pod splits open and releases the seeds.

4.0 Propagation : Seeds or stump planting.

5.0 Ecology/ Geographic Distribution

Grown abundantly throughout the Philippines, in settled areas at low and medium altitudes. It was introduced from tropical America and is presently distributed in all tropical regions of the world.

6.0 Chemical Constituents

- Seed contains the toxic amino acid mimosine. Raw seeds yield fat, 8.68%; crude fiber, 22.59%; nitrogen-free material other than fiber, 9.78%; nitrogen, 6.42%; sucrose; water, 14.8%; ash, 4.2%.
- Compound ficapreol-11 (polyprenol), squalene and lupeol were isolated for the first time from the species, plus 9 other known compounds.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anti-cancer /antiproliferative:

- Polysaccharides extracts from the seeds, sulfated to a sulfated glycosylated form possessed significant anti-proliferative activity against different cell lines. It induced HepG2 cell death by necrosis, but not apoptosis. Study concludes the chemical modification of leucaena gum induced its cancer chemopreventive and anti-proliferative activities.

Central nervous system depressant:

- Chloroform soluble and ethyl acetate soluble alkaloidal extracts from the seeds showed central nervous system depressant activity evidenced by a decrease in respiratory rate and depth and a decrease in motor activity.

Disintegrant action:

- Seed gum was evaluated for disintegrant action in lactose-based tablets containing ibuprofen, a relatively insoluble drug. Study showed the seed gum swells rapidly when brought in contact with water, generating enough pressure to cause disintegration action.

Anthelmintic effect:

- Seed extracts is the most active fraction to contain polar polyphenols, providing scientific justification for the use of the aqueous extract in traditional practice and application in anthelmintic therapy in veterinary practice.

Hypoglycemic:

- Study in streptozotocin-induced diabetic rats showed the seed extract acts as a hypoglycemic agent by selective regeneration of beta-cells of STZ-damaged pancreas while also protecting the beta-cells from the necrotic effect of STZ.

Seed polysaccharide / Drug delivery:

- Seed polysaccharide can be used for controlled release of both water-soluble and water-insoluble types of drugs. The extent of release can be varied by controlling degree of cross-linking.

Antidiabetic:

- Active fractions from seeds showed antidiabetic activities, on alloxan-induced diabetic rats with bioactive compounds indicating glycoside compounds with galactose monosaccharide clusters and other saccharides.

Antimicrobial:

- Seed oil extract showed concentration-dependent activity against both Gram-positive and Gram-negative bacteria. The lotion formulation had good pharmaceutical properties.

Seed composition and activities:

- Study on two varieties of *L. leucocephala* whole seeds and seed fraction revealed that the seed kernel portion is primarily the potential source of protein.
- Seeds exhibited urease activity, amylase activity, saponins, and hemagglutinins; while trypsin inhibitors, amylase inhibitors, and cyanogenetic glycosides were absent.

Antioxidant / cytotoxicity:

- A 20% aqueous methanol dried leaf extract was evaluated for antioxidant and cytotoxic activity. Fractionation isolated epicatechin-3-O-gallate (1) along with two quercetin glycosides: quercetin – 3 -O-arabinofuranoside (2) and quercetin-3-O-rhamnoside (3) together with apigenin (4).
- On DPPH assay, the isolated compounds showed strong antioxidant activity. Compound 1 showed slight toxicity against Vero cells.

Bark gum potential:

- The bark gum showed a swelling ability that may provide potential for its use as a disintegrant in tablet formulation, as a hydro gel in modified release dosage forms, and because of its rheological flow properties, as a suspending and emulsifying agent.

Nematicidal:

- The leaf and root extracts of *L. leucocephala* and *G. sepium* could be useful in root knot nematode management in vegetable beds.

Phenolic content / Free radical scavenging:

- Various extracts from (leaf, stem, and seed) were assessed for total phenolic content and antioxidant activities.
- The aqueous extract of seed showed the highest total phenolic content. All different parts can act as radical scavenger, the highest scavenging effect was found in the aqueous extract of seed.

Biofuel potential / Corrosion inhibitor:

- Seed oil is used as biofuel inn diesel engines. Kernel contains 15-20% fatty acid. Oil extracted from the kernel is used as biofuel, and can directly blend with fossil fuel at maximum of 20%.
- Fatty acid has potential for inhibiting bio-corrosion of mild steel and copper alloys.

Inhibition of hair growth:

- The inhibition of hair growth with *L. glauca* seeds and leaves is attributed to the amino acid "leucaenol" or leuca-inine.
- The ingestion of isolated leucaenine by rats and mice is said to have the same effect as whole seeds.
- Leucaenine seems to be a mitotic inhibitor, and may have damaging effects upon keratinization, while having no effects on melanogenesis.

7.2 Uses in traditional medicine

- The seeds have a beneficial effect in ascariasis.
- The roasted seeds are used as an emollient (softens or soothes the skin or mucous membrane).
- A decoction of the bark and roots is used as an emmenagogue (stimulates menstrual flow).

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Mentha cordifolia Opiz.
Lamiaceae

1.0 Scientific Name : *Mentha cordifolia* Opiz.

2.0 Vernacular Names : Peppermint (English), yerba buena (Tagalog), hilbas (Bisaya), albubuena (Pampanga), ablebana (Ifugao), mentha (Zamboanga), agra-vina (Pangasinan)

3.0 Plant Description

It is strongly aromatic, creeping herb growing up to 20 cm high. **Stem** is four-angled. **Leaves** are oblong-ovate, serrate, appear wrinkled with sparse hairs. It bears small whitish or purplish flowers. **Flowers** possess both male and female organs that allow it to be pollinated by bees and animals of the same nature.

4.0 Propagation : Terminal stem cuttings.

5.0 Ecology/ Geographic Distribution

The plant is widely cultivated in small scale throughout the country.

6.0 Chemical Constituents

The leaves contain 0.8 % volatile oil mainly, pulgernone, piperitone and limonene.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Yerba buena is one of the ten plants which have been identified, well studied and have passed safety and efficacy tests by the Department of Health as an analgesic to relieve body aches and pains. Dried yerba buena leaves have been manufactured into tablet form by the Department of Science and Technology through the Philippine Council for Health Research and Development.

7.2 Uses in traditional medicine

- Yerba buena was proven to be an effective pain killer (analgesic) specifically for toothache and stomach ache, gas pain or flatulence. A decoction of the leaves is used as expectorant, carminative, and externally as skin wash for itchiness and insect bites.

8.0 Contraindication

- Use cautiously in individuals taking iron, as spearmint may inhibit iron absorption.
- Use cautiously in individuals with gastrointestinal reflux disease as spearmint may increase the risk of heartburn and regurgitation, although no effect on lower esophageal sphincter function and acid reflux in healthy humans.
- Use cautiously in individuals taking CNS depressants, as spearmint may have sedative and antidepressant effects.
- Use cautiously in individuals trying to conceive, as spearmint tea may lower testosterone levels, cause damaging effects on testicular tissue, decrease sperm density, and significantly decrease follicle-stimulating hormone (FSH) and luteinizing hormone LH) levels. Use cautiously in individuals using hormonal agents.
- Spearmint may cause kidney damage. Use cautiously in individuals with kidney disorders or in those taking drugs that may damage the kidneys.
- Spearmint may increase the risk of kidney damage when taken with agents that are broken down by the kidneys.
- Spearmint may cause liver damage. Use cautiously in individuals with liver problems or in those who are using drugs that may damage the liver.
- Other reported adverse effects include chest pain and decreased libido.
- Avoid in individuals with known allergy/hypersensitivity to spearmint or other members of the Lamiaceae (Labiatae) family, such as basil, mint, rosemary, sage, savory, marjoram, oregano, thyme, lavender, and perilla.
- Spearmint may interfere with the way the body processes certain drugs that use the liver's "cytochrome P450" enzyme system.
- Spearmint may increase the amount of drowsiness caused by some drugs. Examples include benzodiazepines such as lorazepam (Ativan®) or diazepam (Valium®), barbiturates such as phenobarbital, narcotics such as codeine, some antidepressants, and alcohol. Caution is advised while driving or operating machinery.
- Spearmint may also interact with hormonal agents, antibiotics, antifungals, anti-inflammatory agents, cholesterol-lowering agents, anticancer agents, and radio protective drugs.

9.0 Dosage:

- Drink mint tea, prepared by adding one tablespoon of fresh mint leaves to hot water.
- Spearmint appears to be safe in healthy individuals when consumed in amounts normally found in food or beverages. Based on available research, it

appears that spearmint is well tolerated in recommended doses up to 500 mg daily or taken as a tea twice daily for 30 days. In rare cases, spearmint may cause an allergic response.

- To treat dandruff, it is suggested to mix a sprig of spearmint and rosemary in eight ounces of cider vinegar, let it sit for one week, and then apply to the scalp after shampooing.
- For excessive hair growth (hirsutism), spearmint tea has been taken twice daily for one month, with mixed results. Alternatively, 250 mL of spearmint tea has been taken twice daily for five days during the follicular phase of the menstrual cycle with beneficial effects.

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Momordica charantia L.
Cucurbitaceae

1.0 Scientific Name : *Momordica charantia* L.

2.0 Vernacular Names : Amargoso (Sp.), ampalaya (Tag.), ampalia (Tag.), apalaya (Tag.), apalia (Tag.), apaper (Ibn.), apapet (Itn.), margoso (Tag.), (Bis., Bon., If..), paria (Bik., Ilk., Sul.), pulia (Sub.), saligun (Sul.), balsam apple, balsam pear, African cucumber, tuberculated Momordica, bitter gourd (Eng.).

3.0 Plant Description

A climbing, nearly or quite smooth, annual vine. The simple tendrils are up to 20 centimeters long. **Leaves** are rounded, 2.5 to 10 cm in diameter, cut nearly to the base into five or seven, oblong-ovate, variously toothed and lobed, and heart-shaped at the base. **Flowers** are axillary, long-peduncled and yellow. The male flower is about 12 mm long, and is peduncled, with a rounded, green, about 1 cm long bract approximately at the middle. The female flower is similar to the male one, but long-peduncled. **Fruit** in cultivated forms, is oblong, cylindric, 15 to 25 cm in length, pointed at both ends, ribbed and wrinkled; while in wild forms it is ovoid, and 2 to 4 cm long. **Seeds** oblong, compressed, 10 to 13 mms long and corrugated on the margins.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Ampalaya is found throughout the Philippines. It is also thoroughly naturalized in thickets at low and medium altitudes. It is pantropic in distribution.

6.0 Chemical Constituents

- Fruits and leaves are excellent sources of iron, calcium, phosphorus, and Vitamin B.
- Bitter alkaloid and a glucoside are also reported present in the leaves.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- The Department of Health has endorsed ampalaya as an alternative medicine to help alleviate various ailments including diabetes, liver problems and even HIV.
- Ampalaya also helps treat skin diseases and cough, increasing the sterility of women, parasiticide, antipyretic and has purgative functions as well. (Note: In large dozes, pure ampalaya juice can be a purgative and abortifacient.)

7.2 Uses in traditional medicine

- Filipinos uses juice extracted from the green fruit for chronic colitis and bacillary dysentery. It probably acts as an astringent and as vulnerary when macerated in oil.
- The juice of the leaves is given for children's coughs. The sap of the leaves is used as a parasiticide.

8.0 Contraindications:

- Patients deficient in glucose-6-phosphate dehydrogenase should avoid consumption of bitter melon preparations due to the presence of vicine in the seeds.
- Few adverse reactions related to gastro intestinal (eg, abdominal pain, diarrhea) and headache have been reported in clinical trials.
- Bitter melon should be used with caution in patients with impaired hepatic function. Increases in liver enzymes have been observed experimentally, but without histological changes.
- Case reports exist of hypoglycemic coma in 2 children from intake of a tea made from the plant and atrial fibrillation due to intake of the crushed melon fruit.

9.0 Dosage:

- Bitter melon green fruit and young leaves are cooked, taken as food and are included in diet during treatment.
- Juice extract from bitter melon fruit or leaves are taken a spoonful for adults and teaspoonful for children. 3 times a day until symptoms improve.
- Decoction prepared by boiling 50 g of chopped fruits, seeds, leaves and/or roots of bitter melon to a liter of water, taken as bitter melon tea three times a day until symptoms improve.

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Peperomia pellucida (L.) HBK
Piperaceae

1.0 Scientific Name : *Peperomia pellucida* (L.) HBK

2.0 Vernacular Names : Ulasiman-bato, pansit-pansitan, sahica–puti (Tag.); ulasiman-ihals (C. Bis.); ulasiman-bato (Tag.)

3.0 Plant Description

This is a very succulent, erect, branched herb, growing from 5 to 40 cm in height. **Stem** round and often 5 mm thick. **Leaves** are ovate, 1 to 3 cm long, with pointed or blunt tip and heart-shaped based, pale-green pellucid, and shining. The spikes are green, erect, very slender and 1 to 6 cm long. **Fruit** is somewhat spherical, less than 1 mm thick and brownish.

4.0 Propagation : Seeds and rhizomes.

5.0 Ecology/ Geographic Distribution

Ulasiman-bato is pantropic species of American origin and is found commonly in damp places in the country.

6.0 Chemical Constituents

- Carbohydrates, alkaloids, tannins, flavonoids, steroids, triterpenoids in stems methanol extract.
- 5 bioactive compounds: 2 secolignans, 2 tetrahydrofuran lignans, and a highly methoxylated dihydronaphthalenone.
- Proximate analysis of leaves yielded a high ash content and a higher crude fiber as well as carbohydrate content. It is also high in sodium but low manganese, iron, zinc and copper content.
- Phytochemical screening of unspecified plant part yielded alkaloids, cardenolides, saponins and tannins.

- An ether soluble fraction of the whole plant yielded 4,7-dimethoxy-5-(2-propenyl)-1, 3-benzodioxole or apiol, in a liquid state, 2,4,5,-trimethoxy styrene, mp 138°, and three phytosterols, campesterol, stigmasterol and β-sitosterol.
- Main components of the essential oil are dillapiole (39.7%) and trans-caryophyllene (10.7%).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Ulasiman-bato is one of the ten plants which have been identified, well studied and have passed safety and efficacy tests by the Department of Health in lowering uric acid that causes rheumatism and gout.

Analgesic / Anti-inflammatory action:

- Aerial parts of peperomia extract exhibited anti-inflammatory and analgesic activities in mice. The anti-inflammatory activity was attributed to interference with prostaglandin synthesis.
- In another study done on rabbits, pansit-pansitan extract exhibited an anti-pyretic activity which indicates that it is comparable to standard aspirin.

Anti-cancer activity:

- A study isolated 5 new compounds, including 2 secolignans, 2 tetrahydrofuran lignans, and a highly methoxylated dihydronaphthalenone with known peperomins A, B, C and E.
- Compound 1 and peperomin E inhibited 3 cancer cell lines.

Antioxidant activity:

- *P. pellucida* extract, has a strong scavenging activity against free radicals suggesting its potential as a good natural anti-oxidant.

Anti-bacterial activity:

- A compound called patuloside A, a xanthone glycoside from *P. pellucida* have broad spectrum antibacterial activity.

Anti-arthritic activity:

- Extracts combined with ibuprofen treatment has significantly improved the symptoms associated with arthritis. Particularly that of knee joint rheumatism.

Uric acid reduction in blood:

- Rats subjected to pansit-pansitan extract showed a 44% reduction of uric acid level in blood while those that are given allopurinol drug have shown 66% reduction in uric acid level. Thus suggesting pansit-pansitan may contain compounds that maybe used as alternative to allopurinol to control uric acid levels in the blood.

Depressant activity:

- Peperomia leaf extract showed dose-dependent depressant effects probably due to psychoactive substances that are CNS depressant.

Mineral composition / Nutritional attributes:

- The proximate and mineral composition and nutritional attributes indicated that it is rich in crude protein, carbohydrate, and total ash contents.
- The ash content suggests a high-value for potassium, calcium, and iron as main elements.
- Results suggest *P. pellucida* can serve as a good source of protein, energy, and micronutrients.

Hypotensive effect / Cytochrome P450 effect:

- *P. pellucida* is use as an antihypertensive remedy. Results showed a dose-dependent hypotensive, bradycardic, and vasorelaxant effects probably mediated through nitric oxide-dependent mechanisms.
- An aqueous extract showed poor in vitro inhibition on CYP3A4 enzyme making it unlikely to cause clinically significant pharmacokinetic drug interactions via the enzyme inhibition.

7.2 Uses in traditional medicine

- Filipinos uses the whole plant as a warm poultice for abscesses and boils.
- Plant decoction is also good for gout.

8.0 Contraindications : Not available

9.0 Dosage:

- The whole plant can be harvested fresh, eaten raw as in salad ingredient or cooked with other vegetables and meat.
- Juice can be prepared by mixing stems and leaves with boiled water or formed into poultice to be applied topically over skin wounds and inflammation.
- Taken as a salad, pansit-pansitan helps relive rheumatic pains and gout. An infusion or decoction (boil 1 cup of leaves/stem in 2 cups of water) can also be prepared and taken orally in the morning an evening (a cup each time).
- For the herbal treatment of skin disorders like abscesses, pimples and boils, pound the leaves and/or the stalks and make a poultice (boil in water for a minute or two then pounded) then applied directly to the afflicted area.
- Likewise a decoction can be used as a rinse to treat skin disorders.
- For headaches, heat a couple of leaves in hot water, bruise the surface and apply on the forehead.
- The decoction of leaves and stalks is also good for abdominal pains and kidney problems.
- For arthritis, leaves and stems of the fresh plant may be eaten as salad. Or, as an infusion, put a 20-cm plant in 2 glasses of boiling water; and 1/2 cup of this infusion is taken in the morning and evening.

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Pongamia pinnata (L.) Merr.
Fabaceae

1.0 Scientific Name : *Pongamia pinnata* (L.) Merr.

2.0 Vernacular Names : Bani

3.0 Plant Description

Tree reaching a 6-25 m height and a diameter of 45 cm. **Bark** is dull gray or pinkish-brownish, smooth but shallowly fissured. The inner bark has a strong smell of crushed bean-pod. **Leaves** are alternate, pinnately compound, 20 to 25 cm long with 5 to 7 leaflets which are smooth, ovate, 6 to 15 cm long; the terminal one is larger than the other and pointed at the tip, usually rounded at the base. **Flowers** are numerous, purplish-pink or nearly white and borne on axillary, hairy racemes, 15 to 20 cm long. The pod is woody, smooth, oblong, 5 to 8 cm thick, shortly beaked at the apex, and containing one seed which is 3.5 to 5 cm long.

4.0 Propagation : Seeds, cuttings and spreads from root suckers.

5.0 Ecology/ Geographic Distribution

The species is commonly found throughout the Philippines. It occurs along seashores. In some localities like Laguna, it extends inland near the borders of the lakes. Bani is also widely grown in Southeast Asian countries.

6.0 Chemical Constituents

- Contains alkaloids demethoxy-kanugin, gamatay, glabrin, glabrosaponin, kaempferol, kanjone, kanugin, karangin, neoglabrin, pinnatin, pongamol, pongapin, quercitin, saponin, β-sitosterol and tannin.
- Seeds yield a thick, reddish brown oil known as pongam oil (also called

pangamol or hongay oil) employed medicinally and as an illuminant and in the manufacture of soaps and candles. Seeds yielded six compounds (two sterols, three sterol derivatives and one disaccharide) together with eight fatty acids (three saturated and five unsaturated). Metabolite yield consisted of ß-sitosteryl acetate and galactoside, stigma sterol, its galactoside, and sucrose. Of the fatty acids, oleic acid occurred in highest amount (44.24%), followed by stearic (29.64%) and palmitic (18.58%) acids.

- The bark contains a bitter alkaloid. Fatty acids in the oil include myristic, palmitic, stearic, arachidic, lignoceric, dihydroxystearic, linolenic, linolic, and oleic acids. A watery extract yields mucilage, which is gelatinized by ferric chloride. Study of a 50% ethanol syrup of stem bark yielded seven flavonoids, pongaflavone, karanjin, pongapin, pongachromene, 3,7-Dimethoxy-3', 4'-methylenedioxyflavone, millettocalyxin C, 3,3',4', 7-tetramethoxyflavone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anti-plasmodial activity:

- *P. pinnata* shows anti-plasmodial activity against *Plasmodium falciparum*.

Anti-Inflammatory activity:

- Anti-inflammatory activity against different phases (acute, sub acute and chronic) of inflammation was reported by the 70% ethanolic leaf extract. Anti-pyretic action was also significantly observed by the same extraction against Brewer's yeast-induced pyrexia.

Anti-diarrhoeal activity:

- The crude leaf extract of *P. pinnata* effect on production and action of enterotoxins. It reduce the production of cholera toxin and bacterial invasion to epithelial cells suggesting selective anti-diarrhoeal action with efficacy against cholera.

Anti-ulcer activity:

- The methanolic extract of *P. pinnata* roots showed significant protection against aspirin and has a tendency to decrease acetic acid-induced ulcer after 10-days treatment.
- Having augmentation of mucosal defensive factors like - mucin secretion, life span of mucosal cells, mucosal cell glycoprotein's, cell proliferation and prevention of lipid per oxidation, the extract also shows ulcers protective effect.

Anti-hyperglycaemic and Anti-lipidperoxidative activity:

- The oral administration of ethanolic extract of *P. pinnata* flower shows significant anti-hyperglycaemic and anti-lipidperoxidative effect beside enhancing the antioxidant defense system in alloxan-induced diabetic rats. Hence suggesting that the extract could be used as a better and safe alternative antihyperglycaemic drug for diabetic patients.

Antibacterial:

- Pongam oil has shown wide spectrum inhibitory effects against *Bacillus anthracis, B. mycoides, B. pulilus, Escherichia coli. Pseudomonas mangiferae, Salmonella typhi, Staphylococcus aureus and albus, Xanthomas campestris.*

Antioxidant / hypoglycemic:

- Ethanolic extracts and fractions of *P. pinnata* were tested for antioxidant activity. Total phenolic content was determined as gallic acid equivalents and total flavonoids as quercetin equivalents. Extracts exhibited significant antioxidant activity.

Anticonvulsant:

- Ethanolic extract showed significant anticonvulsant activity by lowering the duration of extension phase. The effect is attributed to flavonoids.

Anti-lice:

- The petroleum ether extract possess excellent anti-lice activity hence potential in using *P pinnata* leaves against *P humanus capitis* exhibiting resistance to synthetic anti-lice agents.

CD4-The 2 cytokine stimulation:

- Immune cells produce cytokines in response to various stimuli. *P. pinnata* simulates abundant IL-10 production, suggesting it to be a strong inducer of Th-2 cytokines with a potential to treat Th-1 cytokine mediated pathology.

Analgesic:

- Ethanolic extract showed significant dose-dependent *in vivo* analgesic activity (using Eddy's Hot plate method) in mice. Phytochemical screening yielded carbohydrates, amino acids, fixed oils, phytosterols, glycosides, flavonoids, tannins and phenolic compounds, which may be partly responsible for the anti-pyretic and analgesic activity.

Hepatoprotective / IR induced hepatic reperfusion injury:

- Possible protective effect of *P. pinn*ata hydroalcoholic leaf extract on hepatic ischemia/reperfusion (I/R) injury. The leaf extract at a dose of 400 mg/k/day reduced I/R induced organ injury through its ability to balance the oxidant / antioxidant state.

Neurodegenerative diseases

- Dichloride methane extract of dry stem yielded a new chlorinated flavonoid together with 29 known compounds.
- Pongaglabol methyl ether (20), lonchocarpin (24) and glabrachromene II (25) were selected as potential therapeutic agents for neurodegenerative diseases due to their significant anti-neuroinflammatory activities.

7.2 Uses in traditional medicine

- The flowers can be used to treat diabetes.

- Juice of the roots with coconut milk and lime water is used as a remedy for gonorrhea.
- The young shoots are used to treat rheumatism. A decoction of the leaves is applied as a bath or fomentation on the rheumatic joints. It is also given to children with coughs.
- Pounded seeds, roots, bark are used for hemorrhoid. The oil has antiseptic and stimulant healing properties for skin diseases, scabies, sores and herpes.

8.0 Contraindications : Patient loses weight during treatment with its parts or products and excessive use may develop high blood pressure.

9.0 Dosage : Not available.

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***Psidium guajava* L.**
Myrtaceae

1.0 Scientific Name : *Psidium guajava* L.

2.0 Vernacular Names : Guava (English); Bayabas, guayabas, tayabas, kalimbahin (Tagalog); bayabas, guyabas (Iloko, Bisaya, Ibanag); bayabas (Igorot); biabas (Sulu); gaiyabat, gaiyabit (Ifugao); geyabas (Bontok).

3.0 Plant Description

A small tree which grows well in various soil types. The plant may reaches a height of 8 m. The young branches are 4-angled. **Leaves** are opposite, oblong to elliptic and the base usually rounded. The peduncles are 1-3 flowered. **Flowers** are white, 3 – 3.5 cm across, solitary or 2–3 together. The fruit is rounded, ovoid or obovoid, 4–9 cm long and green but yellowish when ripe and contains seeds embedded in aromatic, pink and edible pulp.

4.0 Propagation : Seeds and vegetative parts using budding, grafting or marcotting. Successful attempt to use root cuttings.

5.0 Ecology/ Geographic Distribution

The plant is found throughout the Philippines in thickets and secondary forests at low altitudes up to 1,500 m above sea level.

6.0 Chemical Constituents

- The leaves contain fixed oil (6%), and volatile oil (0.365%). The essential oil contains eugenol, mallic acid, and tannin (8-15%).
- The fruit contains "glykosen" (4.14-4.3%), saccharose (1.62-3.4%), protein (0.3%). The ash yield 75% of $CaCO_3$.
- The bark contains 12-30% of tannin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Guava is one of the ten plants that is endorsed by the Philippine Department of Health (DOH) as an antiseptic to disinfect wounds. Also, it can be used as a mouth wash to treat tooth decay and gum infection.

7.2 Uses in traditional medicine

- Roots, barks and leaves decoction recommended for chronic diarrhea, astringent, vulnerary, mouthwash for swollen gums, febrifuge and anti spasmodic.
- Leaves crushed or chewed for toothache.
- Pounded leaves for rheumatism.
- Flower decoction effective for blood circulation.
- Leaves decoction is used for feminine and uterine wash.
- Fresh leaves are used to facilitate the healing of wounds and cuts.

8.0 Contraindications : Constipation was reported by a small percentage of patients in study.

9.0 Dosage:

- For diarrhea, eight hourly doses of guava extract standardized to 1 mg of quercetin per 500 mg capsule for 3 days.
- For dysmenorrheal, daily guava leaf extract standardized to 6 mg flavonoid content/day.
- Hyperlipidemia and hypertension, 0.4 to 1 kg/day of guava fruit added to the diet for 4 to 12 weeks.
- Guava is commercially available in capsules, liquids, powders, and tablets.
- Eight hourly doses of guava extract standardized to 1 mg of quercetin per 500 mg capsule for 3 days was used in 1 clinical trial; 10 mL of *P. guajava* tincture in water taken every 8 hours has also been used.

10.0 Bibliography

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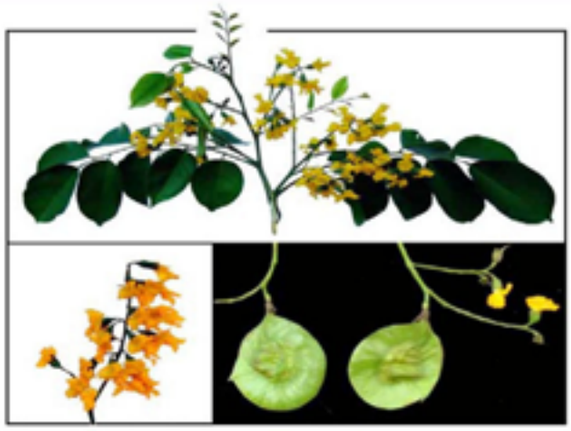
Pterocarpus indicus Willd. forma *indicus*
Fabaceae



1.0 Scientific Name : *Pterocarpus indicus* Willd. forma *indicus*

2.0 Vernacular Names : Narra

3.0 Plant Description

Large tree grows to a height of 25 m or more. **Leaves** are compound and 15 – 30 cm long with 7 – 11 leaflets, ovate to oblong-ovate, 5–10 cm long. **Flowers** are numerous, yellow, fragrant and about 1.5 cm long on branched, axillary panicles. **Fruit** is flat, dry, very shortly beaked, containing 1–5 seeds.

4.0 Propagation : Seeds, stump planting and tissue culture.

5.0 Ecology/ Geographic Distribution

Widely distributed and found in the primary and secondary forests at low and medium altitudes throughout the country. It also occurs in Southeast Asia,

Peninsular Thailand, Cambodia, islands of Pacific, Ryukyu and Caroline, Bismarck Archipelago, New Hebrides and Solomon islands.

6.0 Chemical Constituents

- Contains kinotannic acid, pterocarpin and pterostilben homopterocarpin, prunetin (prunusetin), formonoetin, isoliquiritigenin, p-hydroxyhydratopic acid, perofuran, pterocarpol, and b-eudesmol.
- Wood yields red coloring constituents: narrin, santalin and angolensin. Narrin is a dark red amorphous powder which yields phloroglucinol and resorcinol on fusion with alkali.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Immune enhancing / Anti-asthma:

- The root, bark and wood is a component in a pharmaceutical formulation touted to be immune enhancing and purported use for the prevention and treatment of asthma.

Antiplasmin constituent/ Anti-cancer:

- A polyphenolic substance with antiplasmin activity was isolated from the bark of *P indicus*. It exhibited carcinostatic effect on ascitic mice with Erlich carcinoma.

Antifungal:

- Methanolic extract of amboyna wood yielded B-eudesmol, a sesquiterpene alcohol with dose-dependent antifungal activity against *P pulmonarius*.

Anticancer:

- Leaves significantly inhibited Ehrlich ascites carcinoma's growth in mice.

Antimicrobial:

- Study yielded a mixture of loliolide and paniculatadiol from the ethyl acetate leaf extract.
- Air-dried flowers yield lupeol and phytol esters showing moderate activity against *Candida albicans* and low activity against *P. aeruginosa, E coli,* and *Aspergillus niger*.

Antiulcer:

- Leaf decoction and sulcralfate exhibited gastroprotective effects in indomethacin-induced gastric ulcers male albino rats.

Antibacterial:

- Leaves, root, and stem barks extracts exhibited a wide spectrum of antibacterial activity with the butanol and methanol fractions exhibiting pronounce inhibitory activity.

7.2 Uses in traditional medicine

- The wood has a diuretic, antidysenteric, antithermic and antimalarial properties; also used for intermittent fever. A decoction of the bark is used for diarrhea.
- A decoction of the resin (gum) is used for diarrhea and dysentery.
- The young leaves are applied on ripening boils, skin ulcers and prickly heat.
- An infusion of the leaves relieves stomach trouble, sprue (a tropical disease affecting mouth, throat and digestion), palpitation of the heart, rheumatism and abnormal mucous discharge from the vagina.
- A light infusion of the leaves controls fever; also used as lotion, disinfectant and insecticide.
- The root extract is applied on syphilitic sores.
- The fruit kernel is given as emetic.

8.0 Contraindications : Pregnant woman are not advised to since it has abortifacient properties as evidence by its use it the South Pacific Islands for treatment of amenorrhoeia.

9.0 Dosage:

- For kidney stones, drink 100 ml once a day until its removal via urine.
- 6 g of cat whiskers leaves brewed with 100 ml boiling water for normal consumption.

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Quisqualis indica L.
Combretacea


1.0 Scientific Name : *Quisqualis indica* L.

2.0 Vernacular Names : Niyog-niyogan

3.0 Plant Description

A large, climbing, woody shrub, reaching a length of from 2 to 8 m. The younger parts have a rusty appearance on account of brown hairs. **Leaves** are oblong to elliptic, 7 to 15 cm long, with pointed tip and rounded base. **Flowers** are fragrant, show, first white then red, reddish-purple, or orange, exhibiting all these different stages on one and same flower stalk. **Fruit** is narrowly ellipsoid and 2.5 to 3 cm long, with 5, sharp longitudinal angle or wings. **Seed** pentagonal and black.

4.0 Propagation : Stem cuttings.

5.0 Ecology/ Geographic Distribution

It is indigenous in the Philippines and can be found throughout the country in thickets and secondary forests.

6.0 Chemical Constituents

The active anthelmintic principle in the plant has been identified as an amino acid. A Vietnamese study found the seeds to contain 10% tannin and 22% fixed oil. Local studies also reported the presence of oil which is a purgative. A gum extracted from the seeds gave reactions suggestive of alkaloids."

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Clinical trials have been conducted and indicated good results in the use of the seeds which is comparable with commercial piperazine preparations.

Antioxidant:

- Flower extract yielded high polyphenol contents and showed strong antioxidant activity.

Anti-acetylcholinesterase inhibitor:

- The flower methanolic extract exhibited dose-dependent acetylcholinesterase activity inhibition.

Larvicidal activity / Aedes aegypti mosquito:

- Larvicidal activity against the IV instar larvae of *Aedes aegypti.*

Antipyretic:

- The leaves methanolic extract showed significant dose-dependent antipyretic activity in brewer yeast-induced pyrexia model in rat.
- Floral volatiles and leaves alcoholic extract showed remarkable antipyretic effects.

Anti-inflammatory:

- Oral administration of the hydroalcoholic extract showed significant dose dependant anti-inflammatory activity in acetic acid-induced vascular permeability and cotton-pellet granuloma Wistar rats model (comparable to Diclofenac).
- The anti-inflammatory activity was attributed to bradykinin and prostaglandin synthesis inhibition property of the polyphenols.
- Floral volatiles and leaves alcoholic extract showed remarkable anti-inflammatory activity.
- Methanolic extract of leaves showed significant anti-inflammatory in rodents.

Immunomodulatory:

- Significant immunomodulatory activity of hydroalcoholic extract of flowers in a cyclophosphamide-induced myelo suppression Wistar rats model.

Anticonvulsant / Antihyperglycemic:

- Floral volatiles and leaves alcoholic extract showed remarkable anticonvulsant effects.
- The isolated mucilage exhibited significant anti-hyperglycemic effect.

Intestinal ascariasis:

- 85% complete cure was seen with *Q. indica* for the treatment of intestinal ascariasis with 10% side effects.
- There was 15% decrease in ova count. A second dose resulted in compete eradication.

Anti-diarrheal:

- The petroleum ether extracts of leaves showed significant dose dependent anti-diarrheal effects in all treated groups using loperamide (p.o) and atropine sulfate (i.p) as comparison.

Analgesic:

- Methanolic extract of leaves showed significant peripheral analgesic activities in rodents.
- Floral volatiles and leaves alcoholic extract showed remarkable analgesic activities.

Hypolipidemic effect:

- The methanolic extracts of aerial parts and flowers showed significant concentration- and dose-dependent reduction of harmful lipid layer in blood serum of passive-smoking-induced-hyperlipidemia-rats.
- There was reduction of LDL, VLDL, cholesterol, and triglycerides with elevation of HDL.

Antimicrobial effect:

- Methanol extract of dry flowers exhibited antimicrobial property.
- Floral volatiles and leaves alcoholic extract showed pronounced effects against most of the tested microorganisms.

Antimutagenic:

- *Q. indica*, reduced the mutagenicity potential of mitomycin C, dimethylenitrosamine and tetracycline and exhibited antimutagenic effects.

Antioxidants activity:

- The methanolic plant extract showed 95% antioxidant activity due to the redox properties, by scavenging free radicals such as peroxide, hydroperoxide or lipid peroxyl and thus inhibit the oxidative mechanisms that lead to degenerative diseases.
- Chloroform soluble fraction of the methanolic extract (stem bark) possesses significant antioxidant potentials.

Anti-staphylococcal activity:

- The extract of stem bark macerated with methanol followed by sequential solvent-solvent partitioning with n-hexane carbon-tetrachloride and chloroform act as an antibiotic against staphylococcal infection.
- The effectiveness of the respective antibiotics is expressed as "therapeutic index" according to the formula TI = LD_{50} /MIC which calculates the toxicity of antibiotics towards microorganisms *in vitro* (MIC = Minimal Inhibitory Concentration in ppm) and the toxicity towards animals *in vivo* (LD_{50} = a dose causing death of 50% of test animals in mg/kg/body weight).

Anticancer:

- Contains 3 ingredients with powerful anti-tumor activity that suppress the growth of a specific tumor cell line.
- Cell line used is particularly resistant to many commonly used cytotoxins due to overproduction of a transport protein in the cell wall.
- In contrast, a whole range of standard anti-cancer drugs fail to be effective against this cell.

7.2 Uses in traditional medicine

- The fruit is used as a vermifuge.
- The plant is also used as a cough cure.
- The leaves are used and applied to the forehead to relieve headache.

8.0 Contraindications :

- When excessive dose is given, the person will suffer from hiccough.
- Adverse side effects are hiccups, diarrhea, abdominal pain and distention triggered by either eating the fresh nuts or eating the nuts in consecutive days.

9.0 Dosage :

- The seeds can be taken as an anthelmintic, eaten raw two hours before the patient's last meal of the day.
- Adults may take 10 seeds while children 4 to 7 years of age may eat up to four seeds only. Children from ages 8 to 9 may take six seeds and seven seeds may be eaten by children 10 to 12 years old.

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- www.stuartxchange.com/Niyog.html October 5,2015

Samanea saman (Jacq.) Merr.
Fabaceae

1.0 Scientific Name : *Samanea saman* (Jacq.) Merr.

2.0 Vernacular Names : Rain tree

3.0 Plant Description

It is a hardy large spreading tree that reaches a height of 20 m or more and a diameter at breast height of more than 100 cm. **Bark** is dark brown with ridges. **Leaves** are evenly bipinnate with 8–12 pinnate. **Flowers** are small with extended stamens crowded together in a cluster (head) which appears like a small powder puff. **Seed** pods are straight, nearly black and somewhat fleshy, 15–20 cm long, turgid with pulpy mesocarp.

4.0 Propagation : Seeds.

5.0 Ecology/ Geographic Distribution

Widely grown in the Philippines. It is an introduced species from Central America. The species grows in West Indies, tropical America and Mexico.

6.0 Chemical Constituents

- Alkaloids are said to be abundant in the bark, stems, leaves, and seeds.
- Saponin-like alkaloid pithecolobin has been isolated from the bark and the seed.
- Leaves and stems have saponin and tannin; gum from the trunk.
- Pods are rich in starch and sugar, with a fair proportion of albuminoid substances. Bark has no tannin. Trunk yields an inferior gum.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimicrobial activity:

- **Plant**: Aqueous extract inhibited *Escherichia coli*, *Staphylococcus aureus* and *Candida albicans* while methanol extract showed inhibitory activity against *B. subtilis* and *S. aureus*.
- **Leaves**: Methanol extract showed a significant antibacterial activity to *Xanthomonas pathovars,* human pathogenic bacteria and *Trichophyton longifusus* a dermatophyte. Hexane extract inhibited *Fusarium solani*, Both hexane and methanol extracts had moderate bacterial activity against *P. aeruginosa*.
- 80% methanolic extract yielded two known macrocyclic spermine alkaloids, pithecolobines 1 and 2. The isolated compounds, especially pithecolobine 2, might a potential plant-based formulation for management of microbes in sick enclosed buildings.
- **Bark:** Carbon tetrachloride fraction showed antimicrobial activity. The crude extracts and alkaloid-rich fraction exhibited complete inhibition against *S. aureus*.
- **Pods:** Contain reddish brown condensed tannins (catechol type) composed of cyanidin, catechin, epicachin, anthocyanin monoglycones, delphinidine and malidin. Tannins in the ethyl acetate fraction showed the highest antimicrobial activity, including against *C. albicans*.
- A bioactive compound, pithecolobine isolated from the fraction of ethyl acetate:methanol (80:20) showed remarkable antimycobacterial activity.

Antioxidant:

- Several extracts showed the highest antioxidant potential in both DPPH and reducing power assay.
- The methanolic extract exhibited a radical scavenging activity with values higher than ascorbic acid.
- Bark chloroform and hexane soluble fractions showed good antioxidant activity.
- Leaves contains polyphenols (flavonoids and tannins) with concentration dependent hepatoprotective, nephroprotective and gastroprotective effects.

Anti-diabetic:

- Methanolic leaf extract exhibited potential anti-diabetic activity via *in vitro* α-amylase inhibition and *in vivo* epinephrine induced diabetic rats. Results showed significant reduction of blood sugar levels with significant inhibition of α-amylase.

Antiemetic:

- A methanolic extract of leaves showed 76.41% inhibition of emesis measured as reduction in number of retches in chicks. Chlorpromazine decreased the retches by 33.97%.

Analgesic:

- Methanol extract of leaves showed significant analgesic effect (using tail immersion test) with pethidine (standard drug) as comparison.

Anthelmintic activity:

- Alcohol and aqueous extracts of the bark showed anthelmintic activity *against Pheretima posthuma (*the same concentration as albendazole).

Anti-ulcer:

- Bark extract showed significant dose-dependent antiulcer activity in albino rats (comparable to standard drugs).

Larvicidal:

- Stem bark exhibited high toxicity to the fourth instar larvae of *Aedes aegypti* in preliminary screening.

Cytotoxicity:

- Hexane and methanol extracts of leaves indicated cytotoxicity in brine shrimp lethality assay.

Insecticidal activity:

- The hexane extract recorded insecticidal activity (50% mortality) against *Rhyzopeertha dominica* and *Tribolium granarium*.

Boiler feed:

- Leaves and pods can be tapped as sources of feeds for ruminants during drought periods when feeds are scarce.
- Pod is a good source of protein and energy containing circa 13.75% protein, 89.25 to 1.175% dry matter, 2.98 to 1.63 ether extract, 2.19 to 14.54% crude fiber, 0.23 to 3.27% ash and 6.44 to 55.67% nitrogen extract.

7.2 Uses in traditional medicine

- A decoction of the inner barks and fresh leaves is used as remedy for diarrhea.
- Roots are prescribed for cold, fever, influenza, and snakebite. Roots are also used to counteract the effects of croton oil and other poisonous drugs.

8.0 Contraindications : Not available.

9.0 Dosage : Not available.

10.0 Bibliography

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Shorea contorta Vidal
Dipterocarpaceae

1.0 Scientific Name : *Shorea contorta* Vidal

2.0 Vernacular Names : White Lauan

3.0 Plant Description

A large tree, 50 m in height and 182 cm in diameter. The crown is flat, irregular and open. **Leaves** are simple, alternate, ovate, acuminate at the apex, rounded at the base and smooth. The secondary nerves are pairs of six, prominent and further apart. The leaf blade is 10-14.5 cm long. **Inflorescences** paniculate, 2.2 cm long if terminal, 14 cm long if auxiliary, singly or doubly branched; the branchlet is 4 cm long. **Flowers** are 7 mm long and 4 mm wide, ovoid, lanceolate; the sepals are ovate, obtuse, the outer three somewhat larger; the petals are broadly oblong, elliptic, acute; the stamens are 15, sub equal; the anther cells are linear and as long as the stout appendages; the style is columnar, about thrice the length of the ovary. **Fruit** (nut) is enclosed by two long wings (up to 13 cm), one medium sized wing (8 cm) and two small wings (about 4 cm). **Seeds** are elongated, 3–4 cm long. The wings at the base are contorted around the nut.

4.0 Propagation : Seeds.

5.0 Ecology/ Geographic Distribution

S. contorta is endemic throughout the Philippines. Associated with apitong and other lauan species, it is widely distributed in most provinces and islands, from Babuyan to Mindanao. The species is available in large quantities in all lumbering regions of the country.

6.0 Chemical Constituents

- Starch.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Not available.

7.2 Uses in traditional medicine

- A decoction of the bark is used for cough.
- A decoction of the bark and leaves are used as antipyretic, tonic and astringent.
- A decoction of the wood inhibits tumor.

8.0 Contraindications : Not available.

9.0 Dosage : Not available.

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
- De Padua LS., Lugod GC. & Pancho JV. 1977. *Handbook on Philippine Medicinal Plants. Vol 1.* College of Sciences and Humanities, UPLB, College, Laguna.
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- Quisumbing E. 1978. *Medicinal Plants of the Philippines.* Katha Publishing Company, Inc., Quezon City, Philippines.

Spathodea campanulata Beauv.
Bignoniaceae

1.0 Scientific Name : *Spathodea campanulata* Beauv.

2.0 Vernacular Names : African Tulip

3.0 Plant Description

A medium-sized evergreen tree reaching a height of 20 m. **Leaves** are pinnate, 20–25 cm long and divided into 5-8 pairs of leaflets. **Flowers** are orange-red, large, about 10 cm long and 5 cm wide and borne in terminals. **Inflorescences** (racemes) are erect with a peculiar smell. **Fruit** is boat shaped, 12–33 cm long, flat and thick. It splits lengthwise and releases numerous flat seeds. **Seed** is about 2.5 cm wide with a broad, silvery-white transparent wing.

4.0 Propagation : Seed, stem and root cuttings.

5.0 Ecology/ Geographic Distribution

The species can be found in different parts of the country and is widely distributed in Luzon. It thrives within elevations up to 1,500 m. It is indigenous to tropical Africa and is now pantropic in cultivation.

6.0 Chemical Constituents

Phytochemical studies yield alkaloids, tannin, saponin, steroids, terpenoids, flavonoids. **Flower**: Butane, 1, 1-diethoxy-3-methyl- (35.11%) and n-hexadecanoic acid (30.22%) were the major constituents of the ethanolic extract. **Stem-bark**: Spathodic acid, steroids, saponins, ursolic acid, tomentosolic acid and pectic substances.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimicrobial:

- The petroleum leaf extracts showed good inhibitory activity against *Klebsiella pneumonia* compared with standard antibiotic streptomycin.
- The ethanol extract of leaf and flower showed dose-dependent inhibitory activity against *Escherichia coli, Klebsiella pneumonia, Proteus vulgaris, Pseudomonas sps, Salmonella typhimurium, Bacillus subtilis, Staphylococcus aureus* and *Vibrio cholera*. The activity is attributed to flavonoids and tannins with ethanol flower extract showing more potency than the leaf extract.
- The methanol extract of sun-dried bark showed the best antibacterial activity against *B. subtilis, E. coli, P. aeruginosa* and *S. aureus.*
- Antibacterial activity of methanolic and aqueous extracts against bovine mastitis pathogens were also recorded.
- The antifungal activity of the bark methanol extract was reduced upon storage while the antibacterial activity was unaffected.
- The roots yielded an iridoid glycoside (ajugol) and two phenolic derivatives. The phenolic derivatives inhibited *C. herbarum.*

Hypoglycemic:

- Decoction of stem bark showed a hypoglycemic effect in streptozocin-induced diabetic rats and decreased blood glucose in GTT testing. However, there was no effect noted on insulin levels.

Anti-malarial:

- Alcoholic extract of leaves showed antiplasmodial activity, more effective in early infection than established one. Results provide scientific basis for use of the aqueous decoction of leaves for treatment of malaria.

Wound healing:

- A cream formulation containing methanol extract of stem bark fascilitated excision wound healing in Sprague Dawley rats.
- An ointment from the methanolic extract of barks showed a healing activity on burn wounds and provides rational basis for its traditional use in promoting wound healing.

Analgesic / anti-inflammatory:

- The leaf extracts showed both analgesic and anti-inflammatory properties and presents a potential use for alleviating painful inflammatory conditions.

Sunscreen / UV protection:

- The flowers extract has potential to absorb UV radiation, hence a prophylactic utility in sunscreen formulations.
- Evaluation on gel formulations of *Hibiscus rosa-sinenesis, R. damascena,* and *Spathodea campanulata* exhibited sunscreen activity attributed to the free radical scavenging properties of polyphenols.

Anticonvulsant:

- The ethanol leaf extract yielded a glycoside: urs-12-en-27, 30 di-oic acid 3-0--L- rhamnopyranosyl (12) -L- arabinopyranoside. The compound exhibited significant abolition of seizures induced by PTZ and maximal electro shock seizures.

Acute and sub-chronic toxicity studies:

- Results obtained in hematological, biochemical, hepato-renal parameters, antioxidant activities and histological findings suggests non-toxicity of the ethanol extracts of leaf in Swiss albino mice.

Antioxidant:

- Prevention of *T-Booh and H2O2-induced DNA damage:* The antioxidants present in the ethanol extract of leaves and flowers effectively prevented DNA damage induced by t-butyl hydroperoxide and hydrogen peroxide.
- Nephroprotective: Pretreatment with an ethanolic extract of bark may be helpful in preventing damage induced by gentamicin in rat kidneys.
- Nephroprotective: The 70% ethanolic extract of bark in rats showed pretreatment benefits in preventing kidney damage induced by paracetamol nephrotoxicity.

Larvicidal and pupicidal activities against Aedes aegypti:

- An aqueous leaf extract exhibited potent larvicidal, pupicidal property along with morphogenetic effects against dengue vector *Aedes aegypti.*
- Results showed an alternative environmental friendly insecticidal formulation for an effective vector control strategy.

7.2 Uses in traditional medicine

- A decoction of the bark is used for constipation, gastrointestinal troubles and dysentery.
- A decoction of bark and leaves is used as lotion.
- Dried bark and pulverized or fresh inner bark are used as dressing for ulcers (superficial inflammation or sore of the skin or mucous membrane, discharging pus) and other skin diseases.
- Bruised leaves and flowers are applied on wounds.
- An infusion of the leaves is used for urethral inflammation.

8.0 Contraindications : Not available.

9.0 Dosage : Not available.

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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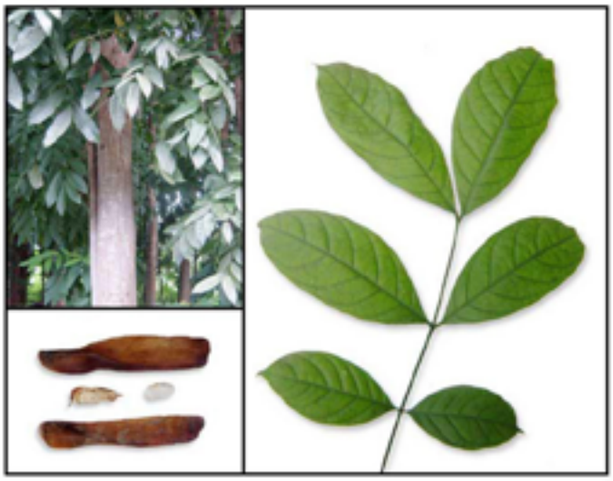
Swietenia macrophylla King
Meliaceae



1.0 Scientific Name : *Swietenia macrophylla* King

2.0 Vernacular Names : Mahogany

3.0 Plant Description

A more or less deciduous, erect tree growing up to 10 m or more in height, with a heavy, dark-green, dense crown. It sheds its leaves during summer. **Trunk** is more or less buttressed. **Bark** is dark gray and ridged. **Leaves** are alternate, smooth (with the upper portion shiny, brownish, or purplish), compound and about 15 cm long, comprising 3–6 pairs of leaflets. **Flowers** are greenish-yellow, about 8 mm wide, and borne in axillary panicles shorter than the foliage. **Fruits** are large, cylindrical, barrel-shaped, woody, grayish-brown and rough, 2–6 cm long with a 1–2 cm diameter. The body of the fruit splits into five thick outer valves and five thinner, inside valves. The outer valves fall off when ripe and expose the closely packed seeds attached by the tips of their wings. **Seeds** are brownish, 5–7 cm long with a broad, thin wing and a rather corky, thickened part containing embryo.

4.0 Propagation : Seeds, or by stump planting.

5.0 Ecology/ Geographic Distribution

Indigenous to Peru and Brazil in South America, it was introduced in the Philippines in 1914. It is now growing in Mt. Makiling, Los Baños, Laguna and in the provinces of Benguet, Ilocos, Isabela, Abra, Samar, Marinduque and Zamboanga.

6.0 Chemical Constituents

- The bark contains tannin; leaves contain seven phragmalin limonoids.
- Two new tetranortriterpenoids, mahonin and secomahoganin were isolated from the cotyledons.
- Study yields 6-Desoxyswietenine, a tetranortriterpenoid from mahogani.
- The acidic polysaccharide isolated from the gum exudate yielded residues of D-galactose, L-arabinose, L-rhamnose and D-galacturonic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antibacterial activity:

- The chloroform extracts of leaf and bark showed inhibitory activity at the conc of 500 µg/disc against most of the test bacteria.
- Swietenolide (1) and 2-hydroxy-3-otigloylswietenolide (2) isolated from the methanolic extract of the seed were active against 8 multiple-drug-resistant bacterial strains (clinical isolates) as observed through disc diffusion. Compound 2 was more potent.
- The methanolic extract of the seed also inhibited *Candida albicans, Staphylococcus aureus, Pseudomonas aeruginosa, Streptococcus faecalis and Proteus mirabillase* recording MIC and MBC values ranging from 25 mg/ml to 50 mg/ml.
- Chloroform extract of seed inhibited *Bacillus magaterium, Salmonella paratyphi* and *Shigella dysenteriae*. Highest activity was recorded 16 mm/ dics against *S. paratyphi.*
- Bark ethyl extract shows good activity against all test bacteria

Antifungal activity:

- Limonoids namely 6-acetylswietenine and 6-acetyl- 3-tigloylswietenolide exhibited antifungal activity against the groundnut rust *Puccinia arachidis.* Both effectively reduced the number of rust pustules on detached groundnut leaves.

Anti- HIV activity:

- Methanolic extract of bark containing chlorogenic acid, metylesters, catechin, gallocatechin showed significant HIV-1 protease inhibition action. The samples also suppressed the formation of syncytia in co-cultures of MOLT-4 and MOLT-4/HIV-1 cells.

Anti-inflamatory, analgesic and antipyretic activity:

- Methanolic extract of seed showed anti- inflammatory, analgesic, and antipyretic activities.
- The anti-inflamatory activity was evaluated using acute, sub-chronic, and chronic models of inflammation in rodents while analgesic activity was evaluated using Writhing, Tail clip method, Tail- flick method and antipyretic activity was evaluated using using Brewer's yeast-induced pyrexia.

- The extract produces anti-inflammatory activity through dual inhibition of the cyclooxygenase and lipo-oxygenase pathways of arachidonic acid metabolism.
- The extract enhanced peritoneal cell exudates along with macrophage significantly. The triterpenoids present in *S. mahogany* may be responsible for these activities.

Antioxidant activity:

- Methanolic extract of the seed contain phenol and flavonoid with potent antioxidant activity against free radical scavenging activity (DPPH), xanthine oxidase inhibition (XOI), hydrogen peroxide scavenging activity (HPSA) and ferric-reducing antioxidant power (FRAP) assays.

Cytotoxic activity:

- Crude ethanolic extracts of seed, bark, leaf and their various fractions exhibited significant cytotoxic effect as observed through brine shrimp lethality bioassay.

Antiulcer activity:

- Seed extract contains high amount of long chain unsaturated fatty acid with anti-ulcer properties associated with the inhibition of gastric bacterial metabolism.

Hypoglycemic activity:

- *S. mahogany* exhibited moderate effects on decreasing the blood glucose levels of the diabetic mice, thus a potential agent for diabetic therapy.

Platelet aggregation inhibitors activity:

- The ether extract from the seeds inhibited platelet activating factor (PAF)-induced platelet aggregation.
- Systematic separation of the extract afforded twenty eight tetranortriterpenoids related to swietenine and swietenolide *exhibiting* a strong inhibition against PAF-induced aggregation *in vitro* and *in vivo* assays.

7.2 Uses in traditional medicine

- Leaves have been used for diarrhea, febrifuge, colds and catarrh.
- Bark decoction may serve as an antipyretic (reduces fever), astringent for wound, tonic to increase body tone and febrifuge, which could be associated with its use as an antimalarial drug.
- The seed have been used for leishmaniasis, abortion medicine, cancer, amoebiasis, coughs, chest pains, intestinal parasitism, hypertension, diabetes and malaria as a folk medicine in Indonesia.

8.0 Contraindications : • Overdose may cause blood pressure level drops dramatically which lead to dizziness, faint, mild diarrhea or imbalance of acid-base in body of some individuals.

- Pregnant and lactating (breast feeding) women are not advisable to take the seed.

9.0 Dosage:

- Seeds: 2 – 5 seeds depending on size. Drink plenty of water prior and after consumption. One small to medium size seed for each morning, afternoon (optional) and evening for general health.
- Chronic illness: 2 medium size seed to be consumed every morning, afternoon and evening.
- Capsule: 3–4 capsule per day.
- Tea: Brew 4 cups of water with 16 grams of mahogany seeds, drink 2 glasses a day for lowering blood pressure.

10.0 Bibliography

- Bhurat MR. 2011. *Swietenia mahagoni* Linn: A phytopharmacological review. *Asian Journal of Pharmaceutical Research. Vol.1(1):1-4* www.ajprjournal.com
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Tectona grandis (L.) f.
Lamiaceae

1.0 Scientific Name : *Tectona grandis* (L.) f.

2.0 Vernacular Names : Teak

3.0 Plant Description

An erect, large, deciduous tree growing up to at least 20 m high. The branches are four-angled. **Leaves** are large, elliptic or obovate, pointed on both ends, usually wedge-shaped at the base and entire at the margins. The upper surface is rough but without hairs, whereas the lower is densely covered with grey or yellowish hairs. **Flowers** are numerous, short-stalked and arranged in large terminal, much-branched panicles 30–80 cm long. **Fruits** are somewhat rounded, about 1.3 cm in diameter and four-lobed. The soft pericarp is densely clothed with felted, stellate hairs.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

The species is grown in various parts of the Philippines, especially in the Sulu Archipelago and in some parts of Mindanao.

6.0 Chemical Constituents

Heartwood contains a resin, tectoquinone. Exhibits cracks and cavities lined with white crystalline deposit consisting of hydrocalcic orthophosphate with 11.4% ammonio-magnesium phosphate. Contains a higher percentage of carbon and hydrogen, and together with its calcium, phosphate and silica content, may account for the hardness of the wood. Leaves contain 6% tannin, dry weight.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antifungal:

- The antifungal activity may be attributed to deoxylapachol and tectoquinine compounds that triggers fungal wall stress.

Antibacterial:

- Synergistic antibacterial activity of tetracycline and the methanol extract of *T. grandis.*
- Crude extracts from leaf, bark and wood showed good activity against *S. aureus* and *K. pneumonia*.
- 2 anthraquinones from the chloroform extracts of leaves inhibited *S. aureus* and *K. pneumoniae*.
- Juglone or 5-hydroxy-1,4-naphthalenedione compound isolated from methanol extracts of teak bark inhibited *Listeria monocytogenes* and MRSA (methicillin resistant *Staphylococcal aureus*).

Cytotoxicity:

- Crude extracts from leaf, bark and wood showed high toxicity against HEK293 and CEF cells.
- Two anthraquinones from leaves showed cytotoxicity against chick embryo fibroblast, HEK292, HCT119 and L929 cells.

Anti-diabetes / decrease insulin resistance:

- *T. grandis* significantly reduced plasma glucose and serum triglyceride levels as well as promoted glucose uptake in skeletal muscle.
- Results suggest type 2 diabetes mellitus benefits from its ability to decrease insulin resistance.

Anti-Inflammatory / analgesic:

- The methanolic extract of the frontal leaves showed dose-dependent analgesic activity and significant anti-inflammatory activity using carrageenan-induced paw edema test.

Anti-tussive:

- The aqueous and methanol extracts showed dose-dependent anti-tussive effect.

Antipyretic:

- The methanolic extract of root showed significant reduction of body temperature in Wistar albino rats with yeast-induced pyrexia using paracetamol as comparison.

Antidiabetic / nephroprotective:

- A study of an ethanolic extract of bark in alloxan induced diabetes and associated renal complication showed (1) reduction in proteinuria and

albuminuria (2) improvement in serum total protein and albumin level, (3) prevention of rise in serum creatinine levels and (4) histopathological absence of renal sclerotic lesions in the treatment group.
- Results indicate *T. grandis* attenuates the progression of renal damage in alloxan-induced diabetic rats.

Glucose lowering effect:
- Methanol extract of flowers in type 2 diabetic rats showed a reduction of blood glucose lowering effect. The activity was attributed to polyphenolic active constituents via an insulin sensitizing action, α-amylase and α-glucosidase inhibitory actions.
- Ethanol extract of the bark showed marked antihyperglycemic activity, which may be due to flavonoids and quinones.

Hypoglycemic:
- Study of a methanolic extract of roots in alloxan-induced diabetic albino rats showed significant hypoglycemic activity. The antihyperglycemic effect may be due to reported constituents, viz., lapachol, a naphthoquinone, lapachonone, deoxylapachl, and tectoquinone.

Antioxidant:
- Ethanol extract of bark showed potent *in vitro* antioxidant potential which may be due to the flavonoids and quinones.
- Ethyl acetate extract showed maximum activity against DPPH and ABTS.
- *T. grandis* significantly increased the levels of antioxidant enzymes i.e GSH, SOD and catalase.

Diuretic:
- The aqueous extract of leaves showed acute diuretic activity, with dose-dependent increase in urine volume and urine electrolyte excretion.

Tocolytic effect:
- The stem extract was evaluated for its effect on the contractions of the uterine strips isolated from non-pregnant female Wistar rats injected with estradiol benzoate, with contractions induced with oxytocin.
- The results showed that the stem extract possess the same tocolytic effect as the standard drugs: Magnesium sulfate, nifedipine, and isoxsuprine.

7.2 Uses in traditional medicine

- A decoction of the fresh and dried leaves is used for menstrual disorders, hemorrhages, hemotypsis as well as gargle for sore throat.
- A plaster of the powdered wood is used for bilious headaches and for dispersion of inflammatory swellings; can be taken internally for dyspepsia and vermifuge.
- The powdered wood with water is applied as paste on swelled eyelids and acute dermatitis.
- The flowers and seeds are diuretic.

- The oil from nuts is used to promote hair growth and soothes skin itches.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Terminalia catappa L.
Combretaceae

1.0 Scientific Name : *Terminalia catappa* L.

2.0 Vernacular Names : Talisai

3.0 Plant Description

A large deciduous tree, sometimes reaching a height of 25 m. The branches are horizontally whorled. **Leaves** are shiny, obovate, 10-25 cm long, tapering below to a narrow-heart-shaped base. The leafstalks are short and stout. **Flowers** are white, small and borne on spikes on the axils of the leaves. **Fruits** are smooth, compressed, ellipsoid, 3-6 cm long and prominently two ridged down the sides. The pericarp is fibrous and fleshy but the endocarp is hard.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

The species is found throughout the Philippines along seashores and often planted inland as a shade tree and commonly used in landscaping parks and gardens.

6.0 Chemical Constituents

Seed contains 51.2 percent fixed oil, Catappa oil, with 54% olein, pamitin, and 46 % stearin. **Bark** contains tannin. Phytochemical analysis yielded saponin, saponin glycosides, steroid, cardiac glycoside, tannins, volatile oils, phenols and balsam (gum). Physiochemical analysis of sun dried mesocarp of **fruits** revealed about 12.65% ash, 84.93% carbohydrate, 0.37% oil, 316 mg/g glucose, 0.1% protein, 1.30 mg/g tannin, 1.95% moisture, with 3434.5 kcal/kg calorific value. **Seeds** yield 4.13% moisture, 23.78% crude protein, 4.27% ash, 4.94% crude fiber, 51.80% fat, 16.02%

carbohydrate and 548.78 Kcal calorific value. Classified in the oleic-linoleic acid group, oil contains high levels of unsaturated fatty acids, especially oleic (up to 31.48%) and linoleic (up to 28.93%).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anti-Inflammatory:

- Topical application of ethanol and chloroform extracts of leaves in induced acute and chronic ear edema in mice showed reduced inflammation.
- Study of ethanolic extract of leaves yielded triterpenic acids responsible for the antiinflammatory activity.

Antimicrobial:

- The methanolic extracts of leaves showed inhibitory activity on *B. subtilis* and *S. aureus*.
- Study evaluated methanol, ethanol, and aqueous extracts of leaves and bark for antibacterial activity against clinical (sensitive and MDR) and ATCC strains of *E. coli, K. pneumonia* and MRSA. Bark extracts showed better activity compared to the leaves extracts, and the methanolic extract the most active of all the extracts.
- Tannin, from water extract of leaves inhibited bacteria isolated from aquatic animals indicated its potential use for ornamental fish culture.

Antifungal:

- Study evaluated ethanol and methanol leaf extracts of *T. catappa* and *T. arjuna* for *in vitro* antifungal activity against *A. niger, A. alternata, C. lunata* and *T. tonsurans*.
- Both showed antifungal activities, with *T. arjuna* showing better efficacy. Methanol extract showed best activity with *Curvularia lunata*.

Antimetastatic:

- The extract of TC leaves exerted an inhibitory effect on invasion and motility of highly metastatic lung carcinoma cells. It suggests TCE could be a potential antimetastatic agent.

Antinociceptive:

- The leaf extract is useful as an analgesic, supporting it folkloric use in Sri Lanka.

Antidiabetic:

- The leaf extracts exhibited significant blood glucose lowering in alloxan-induced hyperglycemic rats.
- The petroleum ether, methanol and aqueous extracts of *T. catappa* produced significant antidiabetic activity at dose levels 1/5 of their lethal doses.

Aphrodisiac:

- *T. catappa* seeds showing aphrodisiac activities in male rats.

Antinociceptive:

- The aqueous extract of leaves showed analgesic activity which may be mediated through both central and peripheral mechanisms.

Antitumor:

- Study evaluated the effect of a methanolic extract of leaves against Ehrlich ascitic lymphoma (ELA) in Swiss albino mice.
- Results showed significant antitumor activity, with the extract reversing the altered levels of hematological parameters and liver enzymes.

Antioxidant / hepatoprotective:

- Squalene from the leaf extract exhibited potent antioxidative and scavenging activities.
- Leaf extracts and corilagin (an isolated compound with antioxidant activity), provide hepatoprotection in experimentally induced liver injury through suppression of oxidative stress and apoptosis.
- Chloroform extract of leaves yielded ursolic acid and asiatic acid, which dose-dependently inhibited Ca2++-induced mitochondrial swelling, carbon tetrachloride-induced acute liver damage and D-galactosamine induced injury. The hepatoprotective activity was attributed to protection of the liver mitochondria and scavenging action of free radicals.

Organoprotective:

- Damage to pancreas in alloxan-treated diabetic control and regeneration of ß-cells by glibenclamide was observed. A comparable regeneration was noted with aqueous and cold extracts of *T. catappa*.
- Histological studies of the pancreas earlier necrosed by alloxan showed regeneration by methanolic and aqueous extracts.

Anthelmintic:

- Leaves inhibited motility and survivability of larvae of *T. colubriforis, C curticei* and *H. contortus*.

Erythropoiesis enhancement:

- The methanolic extract of *T. catappa* exhibited erythropoietic potential in adult Balb C mice by inducing production of hemoglobin higher than untreated control.

Antiparasitic:

- *T. catappa* eradicate Trichodina, fish ectoparasites, at 800 ppm hence potential alternative to chemicals and antibiotics in the aquaculture industry.

Toxicological study:

- Study evaluated three different doses of *T. catappa* crude aqueous leaf extract in two stages of toxicity.
- Results showed no toxicological effects on Sprague-Dawley white rats in a 14-day experimental period.

Nutritional properties of seed and oil:

- Seeds were found to be a good source of minerals. Oil contains high levels of unsaturated fatty acids, especially oleic and linoleic acids. Dominant saturated acids were palmitic and stearic acids.
- Oil extracts exhibited good physiochemical properties and a potential usefulness as edible oils and industrial applications.

Oil / biodiesel potential:

- Study of *castanhola* in Brazil showed the oil obtained from the fruit kernels to yield around 49% (%mass). The fatty acid composition was similar to other conventional oils.
- Study of physiochemical properties of the TC biodiesel showed to be in acceptable range for use as in diesel engines.

7.2 Uses in traditional medicine

- The red leaves are used to expel worms. The leaves, macerated in palm oil, are applied as a remedy for tonsillitis.
- The leaves, applied on the head and sides, are refreshing and sudorific (induces sweating).
- The sap of young leaves, mixed and cooked with the oil of the kernel, is used against leprosy. Juice from young leaves, is used in the preparation of an ointment for scabies, leprosy and other skin diseases. It is also taken internally for headache and colic.
- The bark is an astringent and used against gastric fevers and bilious diarrhea. A decoction of the bark is used for dysentery, gonorrhea and leucorrhea.
- A decoction of the fruit is purgative.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Vitex parviflora Juss.
Lamiaceae

1.0 Scientific Name : *Vitex parviflora* Juss.

2.0 Vernacular Names : Molave

3.0 Plant Description

A medium to a large-sized tree reaching a height of 25-30 m and a diameter of 100 – 150 cm. In exceptional cases, it reaches a height of 35 m or more and a diameter of 200 cm. **Leaves** are typically opposite or whorled and deciduous. It partially or entirely sheds its leaves during the later part of the dry season. **Fruits** are either dry, separating at maturity into 2–4 nutlets, or a drupe containing the nutlets. The average number of seeds per fruit ranges from one to three.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

The species is distributed throughout the Philippines. It is commonly found in the secondary and open primary forests at low altitudes. It also occurs in Timor, Java, Celebes and Amboina.

6.0 Chemical Constituents

- A new phenylpropanoid-substituted catechin, namely, swietemacrophyllanin [(2R*,3S*,7"R*)-catechin-8,7"-7,2"-epoxy-(methyl4",5"- dihydroxy phenyl propanoate)] was isolated from the bark together with two known compounds, catechin and epicatechin.
- The 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity of the isolated compounds indicated that all of the three compounds have

strong activity compared with trolox as a reference. Swietemacrophyllanin had the strongest activity with a 50% inhibitory concentration (IC_{50}) value of 56 $\mu g\ mL^{-1}$.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antioxidant:

- Ethyl acetate extracts of leaves yielded a new tetrahydrofuranoid lignan, altissinone and a new acylated flavone C-glucoside, 6 new iridoid glucosides together with 2 known iridoids, agnuside and negundoside
- The ethyl acetate extractive of the leaves showed potent antioxidant activity as observed through free radical scavenging, DPPH radical scavenging and rat paw edema model.
- The flavonoids and triterpene acids showed moderate antioxidant and 5-lipooxygenase inhibitory activities.

Antibacterial:

- Leaf extract showed moderate activity against both Gram-negative and Gram-positive bacteria.

Wound healing:

- Ethanol leaf extracts of *V. trifolia* and *V. latissima* showed significant wound healing potency.

Anti-Inflammatory:

- Significant acute and sub-acute anti-inflammatory activity of aqueous and alcoholic extracts of *V. altissima* leaf on male albino rats.

Antimutagenic:

- Ethyl acetate extract of leaves indicated the presence of phytol 1a, with lupeol 1b and ß-amyrin 1c as impurities, and sitosterol and stigmasterol.
- Micronucleus tests indicated reductions in the number of micronucleated polychromatic erythrocytes induced by mitomycin C, indicating antimutagen activity.

Antiulcer:

- Plant extract exhibited anti-ulcer activities in albino mice with ethanol-induced ulcer.

Antispasmodic:

- The crude bark extract exhibited potential as alternative remedy for diarrhea in albino mice.

7.2 Uses in traditional medicine

- An infusion or a decoction of the wood is an antidote to poisoning.

- A decoction of the bark is used for diarrhea.
- The wood and the bark are used to cure wounds and poisonous bites.

8.0 Contraindications : Not available.

9.0 Dosage : Not available.

10.0 Bibliography

- De Guzman ET. et al. 1981. *Guide to Philippine Flora and Fauna. Vol. I.* Natural Resources Management Center. Ministry of Natural Resources. Quezon City.
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Thailand

Aloe vera (Linn.) Burm. f.
Liliaceae

1.0 Scientific Name : *Aloe vera* (Linn.) Burm. f.

2.0 Vernacular Names : Waan faimai, haang takhe (Thailand), aloe, aloe vera, burn plant, barbados (English)

3.0 Plant Description

A short-stemmed succulent herb. Succulent **leaves** are crowded on the top of their stems, spreading, grayish green, glaucous, spotted when young, 20 to 50 cm long, 3 to 5 cm wide at the base, tapering gradually to the point tip, 1 to 2.5 cm thicked, having edges spiny and bitter latex inside. **Flower** borne on the upper part of a slender stalk, 50 to 100 cm high. The yellow perianth is divided into 6-lobes, about 2.5 cm long, with scattered small bracts. Each flower has 6 protruding stamens and 3-celled ovary with long style. Forms of the species vary in sizes of leaves and colors of flowers.

4.0 Propagation : Detaching the suckers, cuttings and separate shoots.

5.0 Ecology/ Geographic Distribution

Tropical area of Thailand.

6.0 Chemical Constituents

- Stem contains anthracene (3, 4-benzopyrene and pyrene).
- The leaves contains alkaloids, aloctin A, aloctin B, aloe-emodin, aloe-emodin glycoside, aloe-emodin monoglucoside, aloenin B, aloesol, aloesone, aloetic acid, aloin, aloinoside A, aloinoside B, aloinsides, amino acids, 2-amino-2-deoxyglucose, amylase, anthranol, anthranol glucoside, anthraquinones,

arabinan, arginine, ascorbic acid, barbaloin, bradykininase, calcium malate, campesterol, carboxylic acids, casanthranol 1 and 2, catalase, cellulase, cholesterol, chrysophanic acid, citric acid, 10-(1-deoxyglucosyl)aloe-emodin anthrone, 1,8-dihydroxyanthracene, 1,8-dihydroxyanthraquinones, fructose, D-galactan, D-glucitol, D-glucomannan, glucomannan, glucosamine, D-glucose, hecogenin, hexuronic acid, histidine, homonatoin, hydrolyzable sugars, imidazole derivatives, inorganic elements, isobarboloin, isocitric acid, isoemodin, isoleucine, leucine, lupeol, malic acid, D-mannose, 2-methyl-2-phytyl-6-chromanol, 8-methyltocol, minerals, monosaccharides, oxidase, pectic acid, pectin, pentasaccharides, phenylalanine, polyphenols, polysaccharides, proteinase, m-protocatechuic aldehyde, pteroylglutamic acid, quinones, reducing sugars, resin, sapogenin glucosides, saponins, β-sitosterol, sucrose, tartaric acid, uronic acid, valine.

- The flowers and fruits contain ascorbic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antidiabetic activity:

- The dried sap lowers the blood glucose in non-insulin-dependent diabetic patients and alloxan induced diabetic in Swiss albino mice.
- Aloes taken half a teaspoonful daily for 4-14 weeks, lower the fasting serum glucose level from a mean of 273 +/- 25 (SE) to 151 +/- 23 mg/dl ($p < 0.05$) with no change in body weight.
- In normal mice, both glibenclamide (10 mg/kg twice daily) and aloes (500 mg/kg twice daily) induced hypoglycaemia after 5 days, 71 +/- 6.2 and 91 +/- 7.6 mg/dl, respectively, versus 130 +/- 7 mg/dl in control animals (p less than 0.01); only glibenclamide was effective after 3 days. In the diabetic mice, fasting plasma glucose was significantly reduced by glibenclamide and aloes after 3 days. Thereafter only aloes was effective and by day 7 the plasma glucose was 394 +/- 22.0 versus 646 +/- 35.9 mg/dl, in the controls and 726 +/- 30.9 mg/dl in the glibenclamide treated group ($p < 0.01$).

Wound healing activity:

- The discovery of the therapeutic value of aloe for treating burns led to attempts to use it for wounds and abrasions. *A. vera* fresh leaves in petrolatum (50%) when applied over the wounds made by sterile sand paper on the tips of the finger, showed better healing rate than control. Stimulation of healing of *A. vera* ointment has been demonstrated on mouse skin. The application of aloe gel on chronic leg ulcers showed complete healing of ulcers of 15 year duration. Similar results have been reported by Thai doctors. Pharmaceutical preparations of aloe as a wound healing drug have been patented. Patents have been extended to the treatment of fish with extract of *A. vera*. When added to water in aquaria, healing of injured tissue of fish is promoted. Fractions of aloe extract markedly promoted attachment and growth of human normal cells and enhanced healing of wounded cell monolayers in vitro. It has also been reported that aloe yellow sap reduces skin cell growth while aloe gel promotes cellular growth.

- The healing effect of *A. vera* led to studies on its effect on gastric ulcers. *A. vera* gel showed prophylactic and curative effects on rat gastric ulcers. It was confirmed later that aloe gel, 2 ml twice daily, exhibited prophylactic effects against aspirin-induced ulcers (100 mg/kg) in rats. However, Palmer reported negative effects. These negative findings may have resulted from the deterioration of active principle during processing.
- Freeze-dried aloe gel exhibits a protective effect when administered (5 mg/100 g) to rats with cortisol. The data showed that aloe gel increased mucin production in the upper region of the stomach. Compared with cimetidine, aloe gel exhibits better healing effects on gastric ulcers. Attempts to clarify the mechanism of action of aloe gel have been carried out by various scientists. Aloenin and magnesium lactate found in aloe leaves were identified as active agents for inhibiting gastric juice secretion of rats. Increase of gastric juice production of esophagotonized dogs with artificial gastric fistula has been observed when aloe extract was administered, 15 ml daily for 20 days.
- The main active principles for antigastric ulcers were later identified as aloctin A and aloctin B, aloctin A inhibited gastric juice, acid and pepsin secretion when given intravenously to rats. The healing properties may be due to enhancement of DNA synthesis by aloe glycoproteins.

7.2 Uses in traditional medicine

- Roots parts can be used to treatment gonorrhea, leukorrhea and cervicitis.
- The leaves are used for griping, asthma, gastrointestinal ulcers, otalgia, flatulence, treatment of thermal burns, chronic wounds from radiation, abrasions, apthous ulcers, abscesses and felon , contusions, herpes simplex, gonorrhea, constipation, hemorrhoids, poisons of scorpion and centipede stings, headaches; as an antiinflammatory, laxative, cholagogue, taeniafuge, antipyretic, diuretic, ecchymosis of the conjunctiva, mucolytic, and hair tonic.

8.0 Contraindications

- Inhalation of powdered stem can cause nose cancer.
- Pregnant women, breastfeeding mothers and patient suffering from abdominal pain, fatigue or kidney's inflammation should not consumed the latex.
- Not to be use by children under 2 years old, unless recommended by a physician. Oral intake of the gel/mucus may cause skin rashes in certain individuals.

9.0 Dosage : Not available

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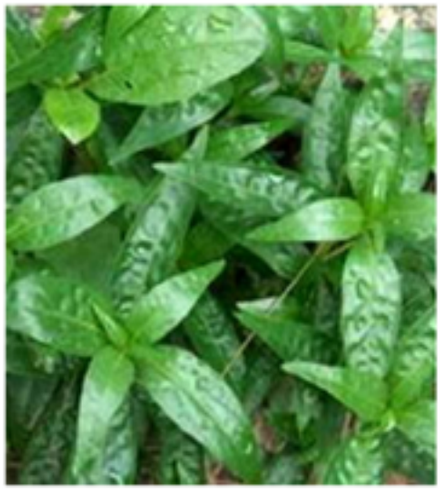
Andrographis paniculata (Burm.f.) Wall. ex Nees
Acanthaceae



1.0 Scientific Name : *Andrographis paniculata* (Burm.f.) Wall. ex Nees

2.0 Vernacular Names : Fa thalaai joan (Thailand) and creat (Eng.)

3.0 Plant Description

The plants are annual herbs about 30 to 100 cm high, having stem erect, 4-angled, much branches. **Leaves** are simple, opposite, sessile or short-petioled, elliptic or lanceolate, 2.5 to 8 cm long, 1 to 3 cm wide and glabrous on both surfaces. **Flowers** are in racemes, 2.5 to 10 cm long, consisting of flowers distant; frequently 1-sided; bract small, linear; pedicel 0 to 6 mm; calyx 1, green, about 3 mm long, connate at the base, divided into 5 linear segments, hairy; corolla white, tubular, divided into 2 lips, upper lip 3-lobed, rose-purple spotted, hairy; lower lip small, 2-lobed; stamens 2, filaments hairy, upwards, anther dark-purple; ovary 1, style slender, tip minutely bifid. **Fruit** is a linear-oblong capsule about 1.5 cm long, 3 to 5 mm wide, loculicidal, nearly glabrous. Each capsule contains 6 to 12 seeds which are subquadrate, bony, yellow or deep brown, slightly translucent.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

A. paniculata distributed in evergreen, pine, and deciduous forest and along road sides and some are cultivated as a medicinal plant in many parts of Asia including Indo-China, China, Thailand, Peninsular Malaysia, Indonesia, the Philippines and Australia. It is now widely naturalized in most of these regions. It has also been introduced, possibly for its ornamental value, in the West Indies and Central

America.

6.0 Chemical Constituents

- The root contains andrographin, andrographolide, apigenin-4,7-di-O-methyl ether,5-hydroxy-2,3,7,8-tetramethoxyflavone,(dl)-5-hydroxy-7,8 dimethoxy-flavanone, 5-hydroxy-7,8-dimethoxy mono-O-methylwightin, panicolin, β-sitosterol. The stem contains andrographiside, andrographolide, andrographoside, deoxyandrographiside, 14-deoxyandrographiside, 14-deoxyandrographolide, 14-deoxy-11, 12 didehydro-andrographolide, 3, 4-dideoxyandrographolide, neoandrographolide.
- The leaves contain andrographolide, caffeic acid, chlorogenic acid, dehydroandrographolide, deoxyandrographolide, deoxyandrographolide-19-β-D-glucopyranoside, 14-deoxy-11, 12-didehydroandrographolide, 3,5-dicaffeoyl-d-quinic acid, neoandrographolide, ninandrographolide, paniculide A-C. The whole plant contains andrographolide, 2-cis-6-trans farnesol, 14-deoxyandrographolide, 14-deoxy-11-oxyandrographolide, 11, 12-didehydro-14-deoxyandrographolide, neoandrographolide, 2-trans-6-trans-farnesol.
- The plant is also known to contain α-bisabolene, 14-deoxyandrographiside, deoxy-11-dehydrographolide, kalmegin, farnesol, 2,5-dihydroxy-7,8-dimethoxyflavone, diterpenoids, 5-hydroxy-2,7,8-trimethoxyflavone, 5-hydroxy-7,8-dimethoxyflavone, lactones, neoandrographolide, paniculide, paniculide A, paniculide B, paniculide C, trans, trans-farnesol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Hypoglycemic and antihyperglycemic activities:

- Oral and subcutaneous administration of a hot water extract of leaves and stems had no hypoglycemic effect in male rats and no antihyperglycemic effect in alloxan induced diabetic rats.
- Andrographolide given subcutaneously or orally, did not change the blood sugar level normal or diabetic rats.
- Oral administration of a water extract from leaves of 20 ml/kg produced no hypoglycemic activity in male rats and no antihyperglycemic activity in alloxan-induced diabetic rats.

Antibacterial activity:

- The water extract of dried roots inhibited *Staphylococcus aureus, a* 50% methanol extract of whole plant inhibited *Proteus vulgaris* while an ethanol extract was effective against β-streptococus group A (gr A).
- The leaves and stem powder was more effective in reducing *Shigella* populations but was less effective for cholera compared to tetracycline.
- Oral administration of stem and leaf powder at a dose of 1 g every 12 hours for 2 days was more effective than giving a dose of 500 mg every 6 hours for 2 days.

- Using the agar plate technique, a 95% ethanol extract from leaves showed antibacterial activity against *S. aureus* while the hot water extract showed no effect. However, both extracts were active against *E. coli*.
- Using the disc diffusion method, the extract and crude lactones were active against *E. coli*, *B. subtilis*, *M. luteus*, *S. aureus* and β-streptococus gr A. Dehydroandrographolide at a concentration of 750 µg/disc was active against *M. luteus* while andrographolide and neoanhydrographolide at equal concentration had no antibacterial activity against the test organisms.
- The antibacterial activity against oral bacteria (*Streptococcus mutans* KPSK2, GS-5 and *Bacteroides gingivalis*) was studied using 4 consecutive extraction fraction (hexane, methylene chloride, ethanol and water) using the agar diffusion method. The hexane and methylene chloride fractions exhibited inhibitory activity against KPSK2 (at concentrations of 85 and 25 mg/ml, respectively) and GS-5 (at concentrations of 42.5 and 3.125 mg/ml, respectively). The ethanol fraction showed inhibitory activity against all tested bacteria at concentration of 27.5 mg/ml for KPSK2 and GS-5 and 55 mg/ml for *B. gingivalis*. There was no inhibitory activity for all tested bacteria by the water fraction.
- The 70 and 85% ethanol extracts (10 mg/ml) inhibited streptococcus gr A, *S. aureus*, some strains of streptococcus group C and group G except group B. An 85% ethanol extract (20 mg/ml) showed antibacterial activity against *Shigella dysenteriae*, *S. aureus*, *Vibrio cholerae* 01, *E.coli* and *Salmonella typhi*. A 70% ethanol extract at the same concentration had antibacterial activity against *V. cholerae* 01 and *S. aureus*. Both extracts (25 mg/ml) showed antibacterial activity against all test organisms.

Antifertility activity:

- The dried root produced an antifertility effect in male and female mice at a dose of 0.75% of diet.
- The stems at a dose of 0.75% of the diet or 40.0 mg, showed antifertility in both male and female mice.
- The leaves extract showed no antifertility effect in male and female mice receiving the plant at a dose of 0.75% of the diet.

Hypotensive activity:

- The i.v. of a 95% ethanol extract of whole plant caused a 50 mm Hg drop in blood pressure of dogs. The effect was potentiated by physostigmine and blocked by atropine. Mepyramine and propanalol had no effect on the action of the extract.
- The water extract (0.21 g/kg, i.v.), 50% ethanol extract (0.14 g/kg, i.p.) and 85% ethanol extract (0.15 g/kg, i.p.) had no effect on blood pressure in dogs. However, a water extract (0.63 g/kg, i.v.) reduced blood pressure in normotensive dogs.
- Leaves ether extract had hypotensive activity in normal rats when given *i.v.*

Cardiac depressant activity:

- A 95% ethanol extract of whole plant at a dose of 40.0 mg/animal depressed cardiac activity which was blocked by atropine in the frog perfused heart.

- A water extract (0.21 g/ kg, i.v.) 50% ethanol (0.14 g/kg, i.p.) and 85% ethanol extract (0.15 g/kg, i.p.) had no effect on heart rate in dogs. A water extract (0.63 g/kg, i.v.) depressed heart rate.

Anti-inflammatory activity:

- Oral administration of a 85% ethanol extract of whole plant at a dose of 2 g/kg decreased carrageenin-induced pedal edema in rats, while water extract (0.5 to 2.5 g/kg) and 50% ethanol (0.125 to 2 g/kg) extract had no effect.
- Intraperitoneal injection of a water extract (0.5 to 2.5 g/kg), 50% ethanol extract (0.06 to 0.25 g/kg) and 85% ethanol extract (1 to 2 g/kg) reduced inflammation in rats.
- An alcohol extract and its fractions, chloroform and water fraction from aerial part exhibited an acute anti-inflammatory effect against carrageenin-induced pedal edema in rats. This effect was dose-dependent. A dose of 500 mg/kg of plant had similar anti-inflammatory effects against carrageenin-induced pedal oedema as 5 mg/kg of prednisolone or indomethacin or 10 mg/kg of ibuprofen.

Antitumor activity:

- A methanol-water (1:1) extract of whole plant had equivocal antitumor activity against sarcoma (Yoshida sac) in rats receiving the extract at a dose of 1.0 g/kg, i.p.
- *A. paniculata* was reported to show antitumor activity (KB cell culture screening method).

Smooth muscle stimulation:

- A 90% ethanol extract of whole plant (2.0 mg/ml) stimulated the guinea pig ileum which was blocked with atropine and potentiated by physostigmine, but was not blocked by antihistamine.

Antivenom activity:

- The intraperitoneal injection of a 95% ethanol extract of whole plant (50.0 mg/animal) in mice was active in prevention of the toxic effect when challenge with cobra venom 30 minutes after plant extracts administration.

Nicotinic activity:

- A 95% ethanol extract of whole plant (2.0 mg/ml) showed no nicotinic agonist and no antagonist activities on the rectus abdominis muscle of frogs.

Antipyretic activity:

- Oral administration of an 85% ethanol extract of whole plant reduced the temperature in hyperthemic rabbits previously induced by subcutaneous injection of typhoid vaccine.

Choleretic activity:

- A water extract given orally at a dose of 3.75 ml/kg increased biliary flow and liver weight in male rats.

Analgesic activity:

- A water extract at a dose up to 1,200 mg/kg and the ethanol extract at a dose of 600 mg/kg giving intraperitoneally had no pain relieving effect in mice, using the hot plate method.

Antigastric ulcer activity:

- The powdered leaves at doses of 150, 300 and 450 mg/kg, given orally to rats 30 min prior to the induction of gastric lesions by using stress gave percent inhibition of lesions of 16.15, 31.62 and 39.62 respectively.
- The powdered leaves at the doses of 75 and 150 mg/kg orally given 2 times per day for 2 days to rats prior to the induction of gastric lesions induced by 100 mg/kg of aspirin had percent inhibition of lesions of 25.21 and 31.62 respectively.
- Rats with acetic acid-induced gastric lesions receiving 75 and 150 mg/kg orally of powdered leaves 2 times per day for 2 days. At day 2 after induction, they showed a percent curation of 25.21 and 31.62 repectively, which was lower than the effect of 120 mg/kg cimetidine given 2 times per day (37.01%).

Effect on intestinal smooth muscle:

- Andrographolide, isolated from leaves, at the concentrations of 10^{-5}-10^{-4}m markedly reduced the spontaneous contraction of isolated rabbit jejunums and depressed response of isolated guinea pig ileums to acetylcholine, histamine, barium chloride and calcium chloride in both potassium-depolarizing and electrical coaxial stimulation.

Sleeping time:

- Intraperitoneal administration of either water, 50% ethanol or 85% ethanol extract of whole plant at a dose of 10 g/kg calculated as powdered drug potentiated hexobarbital sleeping time. A water extract (3.75 ml/kg) produced a decrease in barbiturate sleeping time in mice.

Toxicity assessment:

- A methanol-water (1:1) extract of whole plant had a LD_{50} of more than 1.0 g/kg giving intrapertoneally to male mice.

Acute:

- The extract (20 g of leaves in 600 ml water, autoclaved and filtered) had no general toxic effect when given subcutaneously to rabbits at a dose of 10.0 ml/kg. Oral administration of leaf powder (2 g/kg) suspension, alcohol extract (2.4 g/kg) suspension and andrographolide (3 g/kg) suspension, showed no acute toxic effect in both male and female mice.

- A 50% alcoholic extract at 15 g/kg produced no toxic effect in mice. The LD_{50}, oral and subcutaneous administration of the extract, were higher than 15 g/kg and for intraperitoneal administration was 14.98 g/kg.

Subchronic

- Oral administration of powdered leaves suspension at dose of 200 and 400 mg/kg on alternate days for 4 weeks in mice showed no differences from controls. There were no effects on growth rate, major visceral organs, fertility, or teratogenicity.
- Oral administration of the leaf powder at doses of 50, 100 and 150 mg/kg on alternate days for 14 weeks in rats showed no general toxic effects. The rats receiving 150 mg/kg had a slightly slower growth rates.
- The toxic effect of the plant powder was evaluated for 6 months in rats receiving 0.12, 1.2 and 2.4 g/kg/day which was equivalent 1, 10 and 20 times the human therapeutic dose (6 g/day/50 kg). There were no abnormalities shown in growth rate, food consumption, clinical signs, hematological, serum biochemical values or histopathological changes.
- In conclusion, the pharmacological data support the claimed efficacy of *A. paniculata* as antidiarrhoeal but fail to show antibacterial activity against bacteria causing sore throat. Hence the relieving of sore throat effect may be due to the antiinflammatory activity.

7.2 Uses in traditional medicine

- *A. paniculata* has been used in Ayurvedic medicine to mitigate liver discomfort and to stop dysentery.
- Externally the plant is used to treat skin diseases, heal boils, insect bites, counteract snake-poison, and to relieve swollen parts. It has been use for all kinds of allergies.
- The plant is also remedy for infectious diseases that lead to stomachache, diarrhea, dysentery and bloody flux, anti-inflammatory, good for diabetes, reduces blood pressure.
- Even though it tastes bitter, many people drink it as a tonic, for treating tonsillitis, sore throat, fevers and flu and chest pains. When boiled with *Orthosiphon stamineus* the resulting decoction is believed to be effective in treating diabetes.
- The leaves have been used to improve health; treatment of abscesses, herpes zoster, and herpes simplex; as an antipyretic, antidysentery, antidiarrhoeal and antiinflammatory.
- Leaves or roots decoctions are used against stomach-ache, dysentery, typhus, cholera, influenza and bronchitis, as a vermifuge, and is considered a diuretic.
- The decoction or infusion of the leaves is useful for sluggish liver; dyspepsia; griping, irregular bowels; loss of appetite, flatulence and diarrhea (for children); also in convalescence after fever and general debility.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Amomum xanthioides Wall.
Zingiberaceae

1.0 Scientific Name : *Amomum xanthioides* Wall.

2.0 Vernacular Names : Bastard siamese cardamom, tavoy cardamom, wild siamese cardamom, false siamese cardamom and malabar cardamom

3.0 Plant Description

A perennial herb having underground stem; pseudostem 1 to 2 m high. **Leaves** are lanceolate or oblong, glabrous, consisting of base cuneate; margin entire; apex acuminate or caudate; blade 30 to 50 cm long 2 to 7 cm wide, firm, bright green; sheated petiole. **Flowers** emerge from rhizome in spikes, 2.5 to 5 cm long, consisting of few flowers with short-peduncles; pedicel about 10 cm long; outer bracts 1.2 to 2 cm, oblong, acute, glabrous, bifid longer than the corolla-segments; corolla tube cylindrical, under 2.5 cm; segment 3, oblong, 1 to 1.3 cm, pink; lip spoon-shaped with an orbicular blade, 1.2 to 2 cm broad, narrow suddenly to a broad claw; stamens shots; filament curve, anther-crest auricle on each side, ovary 3- celled, with many ovules; styles filiform; stigma small, subglobose. Capsule is rigid, oblong- trigonous, pale brown, under 2.5 cm long.

4.0 Propagation : Rhizomes

5.0 Ecology/ Geographic Distribution :

In any region of Thailand. The plants bloom from May to June.

6.0 Chemical Constituents

- The fruit contains amomumoside, bornanol glucosides, borneol acetate,

camphor, essential oil, linalool, ethyl (p-methoxy-trans-cinnamate), nerolidol.
- The seed contains borneol, bornylacetate, camphor, geraniol, geranyl acetate, palmitic acid, vanillic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antitumor activity:
- Methanol extract of dried fruits (administered intraperitoneally) inhibited Leuk- SN 36 tumor cells in female mice at 0.1 and 0.03 g/kg.

Hypotensive activity:
- 50% ethanol extract of dried fruits (administered intraperitoneally) to dogs, produce a hypotensive effect.

Histamine-like action:
- A 50% ethanol extract of dried fruits at a concentration of 0.01 g/ml increased guinea pig ileum contractions (similar to histamine effect).

Toxicity assessment:
- An alcohol extract of fruits did not show any toxic effects in mice when orally administered at 32 g/kg or subcutanously administered (1g/kg). The LD_{50} of this extract in mice (s. c.) was reported as 34.3 g/kg.

Carminative effect:
- Volatile oils in Bastard cardamom seeds produced carminative effect.

Cytotoxic activity:
- By the cylinder plate method, acetone and ether extracts of Bastard cardamom seeds had no cytotoxic activity against ascites carcinoma at concentrations of 5.0%. The methanol extract exhibited equivocal cytotoxic activity at the same concentration.

Effect on liver function:
- When an extract consisting of *Machilus sp.*, *Alisma sp.*, seeds of *Amomum xanthioides*, *Bulboschdenus maritimus*, *Artemisia iwayomosis*, *Atractylodes japonica*, *Crataegus cuneata*, *Hordeum valgare*, *Cirtus sinensis*. *Polyporus umbellatus*, *Agastache rugosa*, *Raphanus sativus*, *Poncirus trifoliatus*, *Curcuma zedoaria*, *Citrus aurantium*, *Saussurea lappa*, *Glycyrrhiza glabra* and *Zingiber officinale*, was orally administered to rabbits at a dose of 500 mg/ kg, it exhibited antihypercholesterolemia and antihepatotoxic activities and inhibited the activity of glutamateoxylate- transaminase and glutamate-pyruvate- transaminase.

7.2 Uses in traditional medicine

- The rhizomes are used for bronchitasis cough, bronchial asthma and blurred conciousness.
- The stem is used to alleviate nausea and vomiting.
- The leaves are used for urinary disorders as carminative.
- Flowers are for pruritic rash.
- The fruits are used for thirst, relieving gaseous tension in the gastrointestinal tract, leukorrhea, bronchial asthma, cough, nausea and vomiting, hemorrhoids, illness due to abnormality of *Pitta origin*; fever; fever due to abnormality of combination of three of any origins (*Semha*, *Pitta*, *Wata*, *Kamdao*, *Lohita*), illness due to *Semha* origin, abdominal discomfort.
- The seeds are used for nausea and vomiting (as a carminative) and lactagogue.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Annona squamosa L.
Annonaceae

1.0 Scientific Name : *Annona squamosa* L.

2.0 Vernacular Names : Noi naa, mak khiap, laa nang, manonae, manae, ma-o-chaa dan na-kloh-sae

3.0 Plant Description

A small size, deciduous tree, up to 8 m tall, is having small branches, twigs grayish-brown and fairly smooth. **Leaves** are simple, alternate, elliptic, 7 to 15 cm long, 2.5 to 6.5 cm wide, thin. Main veins are visible, having 6 to 12 pairs. Leaf-stalks are short, about 1 to 1.2 cm long. **Flowers** are solitary, droop from stalks about 2.5 cm long, from the leaf-axils or the woody twigs. Each flower consists of 3 short sepals, 3 thick fleshy petals which are narrow and pale green, inside with a deep brownish-red marking at the base numerous stamens, many pistils and 1 ovule. **Fruits** are more or less round in shape, about 7 to 10 cm in diameter and covered with round knobs, easily separable as they are only lightly fused together. A white, custard-like, sweet, granular pulp surrounds the small, black glossy seeds. **Seeds** are numerous.

4.0 Propagation : Seeds.

5.0 Ecology/ Geographic Distribution

North eastern and central parts of Thailand.

6.0 Chemical Constituents

- Whole plant consist of (-)-kaur-16-en-19-oic acid.
- The leaves contains anonaine, 4-(2-nitro-ethyl)-1-((6-O-β-D-xylopyranosyl-β-D-glucopyranosyl)-oxy) benzene, alcohols, benzyltetrahydro-isoquinoline, borneol, camphene, camphor, car-3-ene, carvone, eugenol, β-caryophyllene, essential oil, farnesol, geraniol, 16-hentriacontanone, hexacontanol, higenamine, hyperoside, isocorydine, limonene, linalool, linalool acetate, menthone, methyl-anthranilate, methylsalicylate, methylheptenone, *p*-(hydroxybenzyl)-6,7-(2-hydroxy,4-hydro) isoquinoline, n-octacosanol, α-pinene, β-pinene, rutin, stigmasterol, β-sitosterol, γ-terpinene, thymol and n-triacontanol.
- The fruits contains amino butyric acid, arginine, borneol acetate, citrulline, ethylene, glucose, limonene, ornithine, α-pinene, β-pinene, trans-ocimene and vitamin C.
- The seeds consist of acetylcholine, alkaloids, annonacins, annonastatin, annonin I(squamocin), annonin VI, anonaine, carbohydrate, cerotic acid, enzyme, fat and fatty acid, fixed oil , glycosides, linoleic acid, neoannonin, oleic acid, palmitic acid, proteins, resins, β-sitosterol, stearic acid and steroids.
- The stem contains 4-(2-nitro-ethyl)-1-((6-O-β-D-xylopyranosyl-β-D-glucopyranosyl)-oxy) benzene, higenamine and isocorydine. The stem bark contain anonaine, (-)-borneol, (-)-camphor, corydine,(+)-glaucine, isocorydine and β-sitosterol.
- The bark contain bullatacin, bullatacinone, and kaurenoic acid, phenolic and non-phenolic alkaloid, β-sitosterol, squamone and volatile oil.
- The roots contains 17-acetoxy-kauran-19-al, anonaine, (-) borneol, (-) camphor, β-caryophyllene, corydine, (+) glaucine, 17-hydroxy-kauran-19-al, isocorydine, kauren-19-al, kauren-19-ol, kauren-19-ol acetate and β-sitosterol.
- Part used not specified: essential oil, palmitic acid, linoleic acid, oleic acid, linolenic acid, stearic acid, procyanidin, squamocin and lignoceric acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Efficacy on wound healing in streptozotocin-induced diabetic rats:

- The efficacy of ethanolic extract of *A. squamosa* leaves on wound repair in streptozotocin-nicotinamide-induced diabetic rats was examined. Open excision wounds were made on the back of rats. The drug at a dosage of 100 mg/kg body wt was reconstituted in 200 µl of phosphate buffered saline and applied topically once daily for the treated wounds. The control wounds were left untreated.
- Wound tissues formed on days 4, 8, 12 and 16 (post-wound) were used to estimate DNA, total protein, total collagen, hexosamine and uronic acid.

- Levels of lipid peroxides were also evaluated along with tensile strength and period of epithelialisation.

- *A. squamosa* increased cellular proliferation and collagen synthesis at the wound site as evidenced by increase in DNA, protein and total collagen. The treated wounds were observed to heal much faster as proved by enhanced rates of epithelialisation and wound contraction, which was also confirmed by histopathological examinations.
- Beneficial effects of the topical application of *A. squamosa* to accelerate normal and diabetic wound healing.

Anti-tumor activity:

- Two major annonaceous acetogenins: 12, 15-cis-squamostatin-A and bullatacin were identified and quantified by HPLC.
- The seed extract showed significant anti-tumor activity against four human tumor cell lines, especially for MCF-7 (IC_{50} 0.25µg/ml) and Hep G2 (IC_{50} 0.36 µg/ml) cells in vitro.
- The extract inhibited the growth of H(22) tumor cells in mice with a maximum inhibitory rate of 69.55% by oral administration.

7.3 Uses in traditional medicine

- The leaves are used in the treatment of ringworm *Taenia versicolor* and skin diseases, anthelmintic, pediculicide, scabicide and antiinflammatory.
- The fruits are useful in the treatment of neck abscesses, ring-worm *Taenia versicolor*, herpes virus, ear abscesses; antisnake venom and anthelmintic.
- The seeds as a pediculicide and antiedema.
- The stem bark are used for wounds and periodontitis, also as an antisnake venom and antidiarrhoeal and astringent.
- The roots has been used as a laxative, emetic and antisnake venom and for detoxication.

8.0 Contraindications

- Toxic substance in leaves, seeds and immature fruits (used as pesticides and to kill lice).
- The root may cause severe diarrhea and destroy cardiovascular system if consumed.
- Seeds should not be eaten as it may trigger abortion and affect the cornea leading to blindness.

9.0 Dosage : Not available

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Barleria lupulina Lindl.
Acanthaceae

1.0 Scientific Name : *Barleria lupulina* Lindl.

2.0 Vernacular Names : Salet phanghon

3.0 Plant Description

The plant is a much branched shrub 1 to 2 m high. **Leaves** are simple, opposite, having a short red petiole and a pair of long spines in the axial; blade narrowly lance shape 6 to 16 cm long, 1.2 to 2 cm wide; surfaces dark green wish a red midrib above, paler beneath, glabrous or nearly so. **Inflorescences** are terminal, about 8 cm long, consisting of broad-oval, convex, imbricate bracts, tip of bracts red-purple; calyx 4, arrange in 2 pairs, the outer pair larger than the inner one; corolla segments 5, the upper 4 segments nearly equal and larger than the lower one; stamens 4 inserted at the base of the corolla-tube, 2 anterior ones fertile, 2 posterior ones very much smaller; ovary egg-shape, about 4 mm long, 2-celled, style about 3 cm long. **Fruit** is a compressed ovate-oblong capsule, having one seed in each cell.

4.0 Propagation : Stem cuttings

5.0 Ecology/ Geographic Distribution

The plant requires moist soil and commonly grown in garden for ornamental or medicinal purposes.

6.0 Chemical Constituents

- Aerial parts consist of acetyl barlerin, barlerin, shanzhiside methyl ester.
- The leaves contain 6-0-acetyl shanzhiside methyl ester, acetylbarlerin, barlerin, betaine, betaine hydrochloride, shanzhiside methyl ester and four iridoids (shanzhisde methyl ester, barlerin, 6-0-acetylshanzhiside methyl

ester and acetylbarlerin).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antiinflammatory effect:

- Carrageenan-induced rat pedal edema and acetic acid-induced writhing mice assays: All four iridoids showed activity on both test models. In the acetic acid-induced writhing model, 6-0-actylshanzhiside possessed the strongest inhibitory activity.The antiinflammatory activity supports its use for insect bite.

Antidiabetic activity:

- The methanol extract of aerial parts shows a pronounced blood-glucose-lowering potential in streptozotocin hyperglycemic rats. Hence provide pharmacological support to folklore claims for diabetes remedy.

7.2 Uses in traditional medicine

- The leaves are used for insect poisoning, urticaria skin rash, abscesses, erysipelas, herpes zoster herpes simplex, smallpox toothache, insect bite, haemorrhoids and burns; as diabetes remedy, analgesic and anti-inflammatory (fresh leaves are bruised, the squeezed juice is applied over the inflamed area).
- The roots are used in the treatment of jaundice, abdominal pain, food allergy, insect poisoning, toothache and antidote for snake venom.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Carthamus tinctorius L.
Compositae

1.0 Scientific Name : *Carthamus tinctorius* L.

2.0 Vernacular Names : Dok kham, khamfoi, kham, kham yong (Thailand).

3.0 Plant Description

An annual, much-branched, glabrous, spiny herb, 0.4 to 1.3 m. tall. Branches are stiff, cylindrical and whitish in colour. **Leaves** are simple, spirally arranged, without petiole; oblong, ovatelanceolate or elliptic in outline; dark green, glossy, about 3 to 15 cm. long, 1 to 5 cm. wide, having spines along the margin and at the tip. **Flowers** are solitary, terminal, 2.5 to 4 cm. in diameter with spreading outer leafy spiny bracts and inner triangular bracts, spinetipped, forming conical involucres, with small opening at the tip. There are about 30 to 90 florets. Florets are all tubular, hermaphrodite, usually orange-yellow in colour; consisting of corolla tube about 4 cm long with 5 pointed segments, expanded above tube; the staminal tube exserted, bright yellow, with 5 united anthers with introse dehiscence; the style pushes up through the staminal tube, after which 2-lipped stigmas open. **Fruit** is white or pale grey shining, 4-angled, achene, about 8 mm. long, without pappus.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Evergreen forest of northern Thailand

6.0 Chemical Constituents

- Whole plant consist of carthamin, trideca-1-cis-3-trans-11-triene-5,7,9-triyne
- The stems contain dehydrosafynol, 1-pentadecene and safynol.
- The leaves contain luteolin-7-O-D-glucoside, 1-pentadecene.
- The flowers contain arabinose, arachidic acid, calcium oxalate,*β*-carotene,

isocarthamidin, carthamin, carthamin glucoside, neo-carthamin, carthamone, kaempferol-3-rhamnoglucoside,lauric acid, linoleic acid, linoleic acid, lysine, mannose, myristic acid, myrisyoleic acid, nonacosane, oil, oleic acid, palmitic acid, palmitoleic acid, phytol, pigments, safflomin A, safflor yellow A, safflor yellow B, safrole yellow.

- The seeds contain acacetin, arctigenin, arginine, carmin, *β*-carotene, histidine, 2-hydroxyarctiin, isoleucine, leucine, linoleic acid, linolenic acid, lipase, lipids, lysine, maltose, oleic acid, tocopherol,α-tocopherol, γ-tocopherol, tracheloside, tryptophan, tyrosine, uronic acid glycosides, valine, vitamin E. Seed oil also have amino acids, α-amyrin, *β*-amyrin, anhydrouronic acid, arachidic acid linoleic acid, linolenic acid, lipase, 24-methylenecholesterol, palmitoleic acid, pentosan, phenolic acids, phosphatides, protein, *β*- sitosterol, squalene, stanol, stearic acid, sterols stigmasterol and tocopherols.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Hypercholesterolemic activity:

- Safflower oil, fed at levels yielding 300 mg and 600 mg of linoleic per day to rats prevented hypercholesterolemic response for 22 and 40 days respectively. The monounsaturated acid raised serum cholesterol levels while both saturated and polyunsaturated fatty acids reduced these levels. The saturated acids were about 1/4 as active as the polyunsaturated acids.
- The oil had strong antihypercholesterolemic activity in both sexes and was not associated with its essential fatty acid content. In nine out of ten aged mentally-ill patients, decreases in serum cholesterol levels were produced by daily dose of safflower oil emulsion containing pyridoxine, mixed tocopherols propyl gallate, citric acid and sodium benzoate. On the other hand, safflower oil emulsion as a supplement to the diet had no demonstrable depressant effect on the serum cholesterol levels of 24 young males.
- A formula, containing oxidation products-free safflower oil, for the treatment of atherosclerosis was patented. Juvenile diabetic patients, given safflower oil for 12 weeks, showed a statistically significant decrease in levels of cholesterol and other blood lipids. Safflower oil ingestion increased the high-density lipoproteins of human serum and plasma cholesteryl linoleate. Normal males showed a greater increase of plasma triglycerides than normal females.
- Safflower oil increased platelet linoleic acid content, decreased platelet aggregation and serum cholesterol. Apolipoprotein A-I and A-II levels in HDL was increased, whereas apolipoprotein B in LDL was decreased. Normal subjects demonstrated significant reduction in total cholesterol, low density lipoprotein cholesterol and total apolipoprotein B levels upon consumption of safflower oil-enriched diet.

7.2 Uses in traditional medicine

- Flowers has been used for treatment of biliary diseases, skin diseases, as a blood purifier, alterative, emmenagogue, hypochloresteremic, blood tonic, cardiotonic, relieve poor lymph, power the heart, power nerve, chelation menstruation, decrease cholesterol and prevent lipid clogging blood vessels.
- The seeds are used for treatment of skin diseases, swelling, paralysis; as an expectorant emmenagogue, phlegm, menstrual disorder and to relieve uterus pain.

8.0 Contraindications

- Not to be use by pregnant woman and patient using blood anticoagulation drug.

9.0 Dosage : Not available

10.0 Bibliography

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Citrus aurantifolia (Christm. & Panz.) Swing.
Rutaceae

1.0 Scientific Name : *Citrus aurantifolia* (Christm. & Panz.) Swing.

2.0 Vernacular Names : Manao, kroi-cha-maa, ma-nao-le, pa-nong, somma naao and maak-faa.

3.0 Plant Description

A shrub, 0.5 to 3.5 m high and thorny. **Leaves** are compound with one leaflet, which is ovate or elliptic 1.5 to 5.5 cm wide, having emarginate apex, rounded base, leathery texture, containing oil gland all over; petiole has narrow winged near the leaf-base. **Flowers** are white; fragrant; and composed of cup-shaped, 4 to 5 lobed, pubescent sepals, 4 ovate or oblong petals, 18 to 25 stamens, filaments in bundle, oblong anther and globose ovary seated on disk shape receptacle. The ovary has many locules and oil glands. **Fruits** are globose, somewhat with a notch at the apex; the skin is thin, pale green when young and yellow upon mature. Each fruit has few to many seeds.

4.0 Propagation : Seeds, cutting or grafting.

5.0 Ecology/ Geographic Distribution

Tropical area of Thailand

6.0 Chemical Constituents

- Leaves contains alcohols, aldehydes, carotene, chlorophyll A, chlorophyll B, 1,4-cineole, citral, citronellal, citropten, dipentene, essential oil, geranyl

acetate, isoisopulegol, isopulegol, limonene, d-limonene, linalool, lutein, luteolin, methylheptenone, myrcene, neoxanthin, neral, neryl acetate, ocimene, quercetin, scyllitol, terpenoids, violaxanthin.

- Fruits consist of l-alanine, γ-amino butyric acid, l-arginine, asparagine, 1-aspartic acid, ascorbic acid, camphene, carbohydrates, carotene, α-citral, β-citral, citronellal, citronellol, citropten, p-cymene, 1,2-dibromoethane, essential oil, farnesol, flavonoids, l-glutamic acid, 1-glutamine, histidine, d-limonene, linalool, linalyl acetate, linoleic acid series A and B, n-methylanthranillic acid, myrcene, myristic acid, nerol, nitrogenous compounds, ocimene, oleic acid, linolenic acid, palmitic acid, palmitoleic acid, pectin, β-phellandrene, α-pinene, β-pinene:, polyphenol, 1-proline, proteins, quinic acid, riboflavin, sabinene, 1-serine, sesquiterpinoids, stearic acid, terpenoids, terpinene, terpineols, thiamine, vitamin A, vitamin C.
- Fruit peel consist of carbohydrates, α-cellulose, cutin, hemicellulose, lignin, wax. Essential oil contains p-dimethyl- α-styrene, α-terpinene,γ-terpinene, terpinolene. Fruit juice also contain hesperidin, naringin, narirutin, neohesperidin and vitamin C.
- Not specified part used: camphene:, carotene, 1,4-cineole, 1,8-cineole, p-cymene, D-glucose, p-α-dimethyl-α-styrene, essential oil, D-fructose, latex, D-limonene, maltose, D-mannose, niacin, raffinose, D-rhamnose, riboflavin, serine, sesquiterpenoids, terpenoids, γ-terpinene, α-terpineol, terpinolene, thiamine, threonine, tryptophan, tyrosine, vitamin C, D-xylose.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Effects on serum cholesterol levels:

- 30 Wistar rats were divided into 5 groups: control, sham, 3 experimental groups. Sham and experimental groups received cholesterol for 4 weeks in two simultaneous ways: mixed with their daily pellet (2 g cholesterol dissolved in 6 ml oleic acid /100 g pellet) and a separate diet of twice weekly (o.4 g dissolved in 12 ml Oleic acid) drip-fed. The control group received cholesterol –free diet and was forced-fed with normal saline.
- After 4 weeks of cholesterol treatment, cholesterol was withdrawn from the diets. The experiment groups started to be force-fed with the *C. aurantifolia* family peel essential oils for 6 weeks, once daily dissolved in distill water, 25 µl /kg, 50 µl /kg and 100 µl /kg respectively. The sham group received normal saline once daily with the same method of experimental groups while the control group did not receive any treatment. After the 70th day, the food was withheld for 12 h and the rats underwent general anesthesia by having them breathe evaporated diethyl ether in a closed chamber for 1 to 3 minutes and blood sample was collected from the inferior vena cava with a 5 ml syringe carrying a 24 F needle
- Comparing the sham and the control groups, serum level of cholesterol (Chol) triglyceride (TG), and low density lipoprotein (LDL), were markedly higher in sham group ($p < 0.05$), but the lower level of HDL in the sham group was not statistically significant. Cholesterol and LDL levels were significantly lower in

all experimental groups in comparison with the sham group. Triglyceride levels in all experimental groups were lower than that in the sham group; however, this difference was statistically significant only two experimental groups (50, 100 µl /kg) ($p<0.01$). Although the HDL levels were higher in all experimental groups both versus the shams and the controls, the result Krushal-Wallis test of heterogenity in all 5 groups opposed this inference ($p = 0.110$)

Effect on tumor cell lines:

- The in vitro effects of concentrated lime juice (CLJ) extract on the spontaneous proliferation of a human breast carcinoma cell line (MDA-MB-453) and a human lymphoblastoid B cell line (RPMI-8866) were investigated.
- CLJ extract was prepared by freeze-drying fresh fruit juice and dialyzing the concentrated extract against phosphate buffered saline in order to deplete low molecular weight micronutrients such as flavonoids as well as adjusting the pH of the extract to the physiological range. The effects of different concentrations of the CLJ extract on the spontaneous proliferative responses of the cell lines were determined by 3H-thymidine incorporation after 24 hrs of incubation.
- CLJ extract had no significant effect on MDA-MB-453 cell line, however, using the concentrations of 125, 250, and 500 µg/ml of CLJ extract a significant inhibition of the spontaneous proliferation of RPMI-8866 cell line was detected ($P < 0.05$). Due to the protein nature of the biologically active macromolecules of the CLJ extract, it is reasonable to assume that the protein components of the CLJ extract may have anti-proliferative effects on tumor cell lines.

7.2 Uses in traditional medicine

- Leaves have been used for hepatomegaly due to injuries or chronic diseases and improve menstrual cycle.
- Flowers are used for treatment of flatulence, stomach pain, nausea, vomiting and cough; as an expectorant.
- Fruits for treatment of flatulence, stomach pain, vitamin A deficiency, ulcers, cough and insect bites. Juice also improve the menstrual cycle, masking of alcoholic smell, relieving thirst, treatment for membranous stomatitis and infectious diseases in early childhood (under 5 year old), scurvy, ingrown nail, traumatic congestion and haematoma, cough, urticaria, hemorrhoids, fungal diseases of feet, acne and freckles; as skin tonic, blood tonic voice tonic, emmenagogue, carminative, tonic, anthelmintic, elimination of black marks on the legs due to chronic ulcers.
- Seeds for treatment of chronic gastro-intestinal ailments for children between the ages of 5 and 13 (characterized by marked malnutrition, usually associated with intestinal parasitism, respiratory distress and internal abscesses); antipyretic and expectorant.
- Roots to treat exanthematous fever, recurrent fever and abscesses.

8.0 Contraindications

- Concentrated fruit juice with direct exposure to the sun should not be applied onto skin with direct exposure to the sun.
- Excessive consumption may trigger diarrhea.

9.0 Dosage : Not available

10.0 Bibliography

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Clinacanthus nutans (Burm.f.) Lindau
Acanthceae



1.0 Scientific Name : *Clinacanthus nutans* (Burm.f.) Lindau

2.0 Vernacular Names : Phayaa yo, phak man kai, phak lin khiat (Chiang Mai), phayaa plong thong, phayaa plong kham (Lampang), pho-so-chaang (Karen-Mae Hong Sorn)

3.0 Plant Description

A shrub 1-3 m high with pubescent branches. **Leaves** are simple, opposite, narrowly elliptic oblong or lanceolate, 2.5 to 13 cm long, 0.5 to 1.5 cm wide. The leaves have apex acute or acuminate; margin exsculptate-dentate or subentire; base cuneate, obtuse, rounded or truncate often oblique; pubescence on the nerves; petiole 3 to 15 mm long. **Flowers** are in dense cymes at the top of the branches and their branchlets; cymes 5-flowered, often terminating drooping horizontal branches but themselves erect, subsecund, combined into a large lax, leafy panicle. Each flower has calyx densely patently glandular-pubescent, about 1 cm long; corolla glandular-pubescent, about 3.5 cm. Dull red with green base; lower lip (turnedupwards) with yellow streaks, apically sordidly yellow or greenish yellow; stamens 2, inserted in the throat, more or less appressed against the upperlip. Ovary is compressed, 2-celled, 2

ovules in each cell; having style filiform, shortly bidentate. Capsule is oblong, basally contracted into a short, solid stalk, 4-seeded.

4.0 Propagation : Propagated by cuttings.

5.0 Ecology/ Geographic Distribution

They are cultivated and found in deciduous forests.

6.0 Chemical Constituents

Roots contain betulin, lupeol, β-sitosterol, stigmasterol and leaves contain lupeol, β-sitosterol and stigmasterol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Activity against snake venom:

- A water extract of leaves reduced mortality rate in snake-venom treated mice from 100 % to 63±3.34 % while a 95 % alcohol extract (2.0 g/kg) was ineffective when injected intravenously, intraperitoneally or given orally.
- On the other hand, a water extract was ineffective in counteracting snake venom when tested on rat phrenic-nerve diaphram preparations.

Antiinflammatory activity:

- Leaf (especially butanol extract), reduced inflammation induced by carrageenin injection in rats. One of the active ingredients was identified as a flavonoid compound and reported to be instable.
- A clinical trial on the use of an alcohol extract of leaves conducted at Prachinburi, Thailand exhibited effectiveness against aphthous ulcers and herpes simplex. The extract accelerated wound healing and reduce the inflammation.
- Although *C.nutans* was effective in reducing the inflammation from insect bites, studies on the active ingredients are incomplete. Due to insufficient data, it should not be used for treatment against snake venom as yet.

7.2 Uses in traditional medicine

- Leaves as antipyretic and anti-inflammatory.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Coccinia grandis (L.) Voigt
Cucurbitaceae

1.0 Scientific Name : *Coccinia grandis* (L.) Voigt

2.0 Vernacular Names : Ivy gourd, scarlet-fruited gourd and tamlueng

3.0 Plant Description

Woody climbing perennial herb. **Leaves** simple, alternate, ovate with deeply cordate base, 3 to 5 angular to deeply 5-partite, 5 to 8 cm wide and long; tendrils simple. **Flowers** solitary or fascicled, axillary, dioecious, white, campanulate. **Fruit** is 7 to 8 cm long, and become a scarlet red when ripe. Root and stem are succulent, probably enabling the plants to survive prolonged periods of dry weather.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

The fruit is common in Indian cuisine. Natives of Thailand, Indonesia, and other Southeast Asian countries also consume the fruit and leaves. Cultivation of ivy gourd in home gardens has been encouraged in Thailand.

6.0 Chemical Constituents

- The fruits contain β -amyrin and its acetate lupeol and cucurbitacin B.
- Aerial parts contain heptacosane, cephalandrol, tritriacontane, β–sitosterol, alkaloids cephalandrines A and B.
- Ivy gourd is rich in beta-carotene. It is also known to contain pectin, cytosine 5-methyl, daucosterol, lup-20(29)-en-28-oic acid, 3-O-β-[α-L-arabinnopyranosyl-β-D-glucopyranosyl]-β-hydroxy, β-sitosterrol and taraxerone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Hypoglycaemic effect:

- The juice, decoction of leaves, stem and fruit in 20 ml/kg showed significant hypoglycaemic response in fasting rabbits. The fruits were found to be most potent. The water-soluble alkaloid obtained from alcoholic extract of the root exhibited antidiabetic activity on alloxan diabetic rats.
- A quarternary base from the whole plant extract exhibited short-lasting hypoglycaemia in guinea-pigs and showed definite activity on glucose tolerance test in guinea-pigs, and moderate hypoglycaemic activity in alloxanised rats.
- The alcohol extract of whole plant and leaf exhibited significant hypoglycaemic effect on somatotropin and corticotrophin-induced and streptozotocin-treated hypoglycaemic rats.

7.2 Uses in traditional medicine

- The leaves are antipyretic; Ground fresh leaves has been used to relieve itching and inflammation from poisonous plants.
- The root-external also use as antipyretic and inflammatory.
- The fruit is known to be antidiabetic. Alcohol extract of creeping stem, water extract of unripe fruit and powder of dried leaf can decrease blood sugar level in animals. In India, it is often recommended to diabetics due to its low glycemic index and its possible ability to help regulate blood glucose.
- In Unani medicine, the juice of this plant is given in polyuria; root bark as a purgative; flowers in bilious affections, liver and skin diseases; fruits as blood-purifier, astringent, for direct action on kidneys and urinary disorders.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Combretum quadrangulare Kurz.
Combretaceae



1.0 Scientific Name : *Combretum quadrangulare* Kurz.

2.0 Vernacular Names : Sakae, kae (Northeastern), khon khae, chong khae (Phrae), sang-kae (Khmer-Prachin Buri), phaeng (Northern).

3.0 Plant Description

A small tree, 5-10 m tall; having stem covered with small scales branches 4-angled. **Leaves** are simple, opposite, oblanceolate, 6 to 15 cm long, 3 to 6 cm wide, consisting of tip obtuse or retuse; margin entire; base attenuate. **Flowers** are white, in terminal or auxiliary spikes, 4 to 5 cm long; consisting of calyxtube cap-shaped, 1 mm long, 4-angled; petals 4,oblanceolate, 1 to 2 mm long, glabrous, tip rounded or retuse; stamens 8, about 3 mm long; pistil 3 to 4 mm long. **Fruits** are about 2 cm in diameter, 4-winged.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Lowland forests.

6.0 Chemical Constituents

- Roots contain combretol, daucosterol, 3,6-diketo-olean-12-en-28-oic acid, olean-12-en-28-oic acid, 3β,6β,18β-trihydroxy-urs-12-en-30-oic acid.
- Seeds contain combretol, daucosterol, 3,6-diketo-olean-12-en-28-oic acid, olean-12-en-28-oic acid, β-sitosterol, 3,6,18-trihydroxy-urs-12-en-30-oic acid.
- Not specified part used: myricetin-3,4,5,3,7-pentamethyl ether.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Anthelmintic activity:

- The ethereal and 95% alcohol extracts of dried roots were as active as the seed extract for anthelmintic activity.
- Ground ripe seeds after single oral administration to buffalo calves, decreased the number of *Neoascaris vituiorum* eggs in feces to zero within 1-3 weeks.
- In a clinical trial for treatment of positive children with threadworm eggs, 2 single doses of 1.5 and 3 g of seeds prepared by frying with eggs and crude pills given to the tested groups. It was found out that the seeds were ineffective for the treatment of threadworm infection in the pre and primary school children. Moreover, it was also reported that children given 3 g of the seeds had side-effects as vomiting, nausea and dizziness within 24 hours after digestion. More side-effects were found in children who had the seeds fried with eggs.

Antibacterial activity:

- The 95% alcoholic extract of dried roots showed *in vitro* antibacterial activity.
- Extract of seed showed antibacterial activity against *Staphylococcus aureus* ATCC 25923, *Bacillus subtilis* ATCC 6633, *Salmonella typhosa* Bangkok, *Escherichia coli* ATCC 25922 and *Pseudomonas aeruginosa* ATCC 1004.

Piscicidal activity:

- The water extract of leaves produced moderate activity against Tilapia (*Oreochromis niloticus* Linn.)

Toxicity assessment:

- Ripe seeds of C.*quadrangulare* produced no acute toxicity to albino rats and mice when administered orally at a single dose of 0.582 and 1.985g/kg respectively. The LD_{50} of a 80% methanol extract, given orally to male mice, female mice, male rats and female rats, were reported to be 3.95, 3.9, 4.4 and 3.5 g/kg respectively. In a sub-chronic toxicity test, female rats, given 1 g/kg/day extracts for 4 weeks, had significantly less weight gain without any changes in SGOT, SGAT, alkaline phosphatase, BUN and in serum albumin levels comparing to the controls.
- Since clinical trial showed negative result in treating thread worm infested children with seeds at the doses of 1.5 and 3 g, and at the high dose side

effects were observed *C.quadrangulare* is not recommended for primary health care unless more data to support the claimed efficacy are available.

7.2 Uses in traditional medicine

- Roots are traditionally been used for treatment of abscesses, gonorrhea, as alterative and anthelmintic.
- Whole plant for stomachache, treatment of roundworm infestation, chronic gastrointestinal ailments of children between the ages of 5 and 13 characterized by marked malnutrition, usually associated with intestinal parasitism, and abscesses in children 5 years and older.
- Sapwood used for treatment of threadworm.
- Leaves for treatment of wounds; as antipyretic and antidysentery.
- Seeds for treatment of roundworm infestation, chronic gastrointestinal ailments of children between the ages of 5 and 13 characterized by marked malnutrition, usually associated with intestinal parasitism.
- Not specified part used: antidiabetic.

t.0 Contraindications : Not available

9.0 Dosage : Not available

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Cymbopogon citratus (DC.) Stapf.
Gramineae

1.0 Scientific Name : *Cymbopogon citratus* (DC.) Stapf.

2.0 Vernacular Names : Lemongrass, lapine, takhrai, khaa-hom (Shan-Mae Hong Son), khrai (Peninsular), cha khrai (Northern), soet-kroei, loekroei (Khmer-Surin), ho-wo ta-po (Karen-Mae Hong Son), hua-sing-khai (Khmer-Prachin-buri).

3.0 Plant Description

A perennial aromatic herb with tufted culms, erect, up to 1 m high, terete and hard. It is scarcely flowered. **Leaves** are aromatic when crushed due to essential oils; consisting of terete and glabrous leaf sheaths; linear blade, narrow base, acute apex, up to 100 cm long and 2 cm wide; chartaceous ligule, about 2 mm long, truncate, minutely ciliate. **Inflorescence** is a large false panicle; racemes paired, subtended by spathes. Spikelets are paired; consisting of the upper pedicellate; the flower sessile, about 4 mm long, lanceolate. Lower glume is subcoriaceous, lanceolate, as long as the spikelet, acute, having margins inrolled, 2- keeled, hispid along keels, 5-veined; upper glume is lanceolate, chartaceous. About 4 mm long. 1-keeled, having margin inrolled and fimbriate, inconspicuously 3-veined; lower lemma is membranous. Lanceolate, margins broadly inrolled and fimbrate, cuspidate, 1-veined; upper lemma is lanceolate, having membranous, about 3 mm long; having margins fimbrate, 1-veined, aristate.

4.0 Propagation : Root cuttings.

5.0 Ecology/ Geographic Distribution

Lemongrass requires a warm climate with plenty of sunshine and sufficient but not excessive rainfall. Sandy loams are best suited to the crop.

6.0 Chemical Constituents

- Leaves contain 1, 4- cineole, citral, citral A, citral B, d-citronellic acid, cymbopogone, cymbopol, cymbopogonol, *p*-cymeme, dipentene, essential oil, eugenol, furfural, geraniol, linalool, luteolin, L-menthol, methylheptenol, methylheptenone, myrcene, nerol, ocimene, iso-orientin, phenolic substances, α-pinene, β-terpinene, waxes.
- Not specified part used: amino acids, benzyl alcohol, borneol, β-(+)-cadinene, camphor, d-camphor, car-3-ene, cellulose, cineole, citral, α-citral, citronellal, citronellol, essential oil, nerol, fenchone, geranial, geraniol, gerianol, hexacosyl alcohol, humulene, (+)-limonene, linalool, neral, menthol, menthone, d-menthone, methylheptenol, mehtylheptenone, myrcene, nerolidol, ocimene, α-oxobisabolene, phenylethyl alcohol, α-pinene, β-sitosterol, terpineol, terpinolene, triacontyl alcohol.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antifungal activity:

- The essential oil of lemon grass showed antifungal activity against several plant pathogenic fungi on agar plates. The comparative fungi toxicity of lemon grass oil and citral against *Aspergillus niger* and *Rhizopus stolonifer* was assayed by the shake culture technique. At equal concentrations, lemon grass oil, the principal constituent of which is citral, was less active than citral alone. However, the constituents of lemon grass oil other than citral were also active, though the combined activity of the extract was less than that of citral.

Antibacterial activity:

- The essential oil and some constituents (citral, citronellal and geraniol) showed bactericidal activity. The essential oil was also vibriocidal *in vitro* but ineffective against cholera in rabbit.
- The α-citral (geranial) and β- citral (neral) components individually showed antibacterial action against Gram-negative and Gram-positive organisms, while myrcene did not show observable antibacterial activity. However, myrcene provided enhanced activity when mixed with either of the other 2 components. Lemon grass oil was found to elicit morphological changes like filamentation, inhibition of septum formation, spheroplast formation, and production of blisters, bulges or mesosomes, and lysis, and development of abnormally shaped cells in two strains of *Escherichia coil* K 12. Moreover, the lemon grass oil inhibited the incorporation of diamimopimelic acid into the cell wall murein of starin W7 in a dose-dependent way. The results suggest that the activity of lemon grass oil involves the penicillin-binding protein

PBP2 and PBP3. The oil, at lower concentrations, caused membrane damage in the cells which was indicated by leakage of essential intracellular materials, while at higher concentration, other effects, such as cytoplasmic coagulation, were also manifested.

- Dimethyl sulfoxide (DMSO) caused some enhancement of the effect of lemon grass oil on *Bacillus subtilis*, but with *E. coil* this effect was only observed after the minimal inhibitory concentration of the oil was attained.

Animal repellent activity:

- When polyolefin-paper packaging laminates were treated with a lemon grass oil emulsion and used for packaging food, it showed dog and cat-repelling properties. This action was observed even after 7 days.

Toxicity assessment:

- The LD_{50} and tolerated dose (TD) of lemon grass oil following oral administration to rats produced and LD_{50}/TD ratio of 6.9.

Decrease body temperature:

- Oral doses of lemon grass tea up to 40 times larger than the corresponding dosage taken by humans and 200 mg/ kg of citral, were unable to decrease body temperature of normal rats and/ or hyperthermic rats previously induced with pyrogen. However, both exhibited hypothermic activity when administered by the intraperitoneal route.

Effect on gastrointestinal movement:

- Oral administration of lemon grass tea 20-100 times larger than the corresponding dosage taken by humans and 200 mg/ kg of citral, did not change the intestinal transit time of a charcoal meal in mice, nor did it after the defecation scores of rats in an open-field arena. But when given by intraperitoneal route both extract and citral exhibited activity.

Effect on central nervous system:

- Oral doses of lemon grass tea 200 times larger than the corresponding dosage taken by humans and 200 mg/ kg of citral, did not show depressant, hypnotic, neuroleptic, anticonvulsantor anxiolytic effects in rats and mice. Only in a few instances did intraperitoneal doses produce any effects. Similarly, lemon grass tea had no hypnotic effect (ie. sleep induction, sleep quality, dream recall and reawakening) or anxiolytic properties in humans.

Hypotensive and antihypertensive activities:

- A decoction of leaves (10% dried weight) at dose of 1, 2 and 3 ml/ kg showed dose-related hypotensive activity in rats when given intravenously. A decoction of dried and fresh leaves caused a dose-dependent reduction of arterial blood pressure in both normal and deoxycorticosterone acetate (DOCA)–salt hypertension rats given by intravenous injection at a dose of 13.3- 90.0 mg/ kg. But oral and intraperitoneal administration at the dose of 18 times used by intravenous injection failed to show this effect. The reduction of blood pressure followed two phases. The first phase was

immediate and of short duration; while the second was slow and long duration. Chronic daily intake of the decoction for 7 to 8 weeks failed to prevent the development of hypertensive as well as reduction of blood pressure at the hypertensive stage in DOCA/salt rats.

Diuretic activity:

- A decoction of leave (10% and 20% dried weight) given orally at a dose of 25 ml/ kg had a weak diuretic effect in rats.

Antiinflammatory activity:

- A decoction of leave (20% dried weight) given orally at a dose of 3 ml/ kg showed some weak antiinflammatory activity in carrageenin induced pedal edema in rats.

Toxicity assessment:

- Lemon grass tea given daily in a single oral dose to healthy volunteers for 2 weeks at dose of 2 time higher than the corresponding human dosage produced no changes in serum glucose, urea, creatinine, cholesterol, triglycerides, lipids, total bilirubin, indirect bilirubin, GOT,GPT, alkaline phosphatase, total protein, albumin, LDH and CPK. Urine analysis (proteins, glucose, ketone, bilirubins, occult blood and urobilinogen) as well as EEG and EKG showed no abnormalities. There were slight elevations of direct bilirubin and of amylase in some volunteers but without any clinical manifestations.
- Lemon grass tea administered orally to adult rats for 2 months, at a dose up to 20 times higher than the estimated corresponding human dose, did not induce any effect which could be taken as evidence of toxicity. An absence of effect was also noted in male and female rats and in their offspring when the tea was administered prior to mating or during pregnancy.
- The pharmacological data supports the claimed efficacy as carminative therefore it is recommended to be used in primary health care.

7.2 Uses in traditional medicine

- Rhizomes: treatment of disorders of urination, taeniaversicolor, strangury; as an appetite stimulant and antiflatulant.
- Stems: for uterine stimulation during labor, hair treatment; as a carminative, appetite stimulant, and diuretic.
- Whole plant: treatment of haematuria, stomachache cholera; as a diuretic, antiasthma, and rubefacient.
- Leaves: as an antihypertensive.
- Not specified part used: treatment of abnormal urination, sore throat, dysuria with urinary stones or discharge; as a diuretic, antidiarrhea, antiinflammatory, appetite stimulant, carminative, digestive, rubefacient, antispasmodic, and antiemetic.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Gymnema inodorum (Lour) Dence.
Asclepiadaceae

1.0 Scientific Name : *Gymnema inodorum* (Lour) Dence.

2.0 Vernacular Names : Chiang daa vegetable, jinda vegetable, seng vegetable, moun kai von vegetable, hon kai vegetable, e-houn vegetable

3.0 Plant Description

A climbing vine with a diameter of 0.5 to 5 cm. depending on the age. Aerial parts contain white latex. **Leaves** simple, dark green, arrange in opposite pairs, sphere and slender sharp pointed and of leaves, 9 to 11 cm. wide, 14.5 to 18.5 cm long, smooth hairless shin, smooth edge and slightly wavy leaves. Front, dark green leaves than behind. Stalk 3 to 6 cm long. **Flowers** are in clusters, yellowish orange color, five adjacent petals with a protruding tube (corona) at the centre. **Fruits**, spear shape, a lot of seeds inside fruit. **Seeds.** Flat.

4.0 Propagation : Cuttings and seed.

5.0 Ecology/ Geographic Distribution

Found in the forest of northern Thailand; Chiang Mai, Mae Hong Son, Lampang, Lamphoon.

6.0 Chemical Constituents

The leaves contain GIA-1, GIA-2, GIA-3, GIA-7, that derivative of (3β, 4β, 16β)-16, 23, 28-trihydroxyolean- 12-en-3yl-β-D-glucopyranosiduroic acid, gymnemic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

- Dry powder and leaf extracts normalize the blood glucose level and insulin level as well as increased the number of beta cells within 20 to 60 days.
- Three compounds (Gia-2, Gia-5, and Gia-7), derivatives of extracts from the leaves could decrease blood glucose at 15 and 30 min in rats; 30% and 32 % decrease (Gia-2), 21 % and 35 % decrease (Gia-5) and 19 % and 16 % decrease (Gia-7) respectively.
- Leaves extract could decrease blood glucose, free radical and increase insulin, glutathione, Vitamin C and Vitamin E in blood rats.
- Fresh juice from the soft leaves could scavenge hydrogen peroxide generated free radicals hence prevent DNA damage in TK6 cells (white blood cells in human).

7.2 Uses in traditional medicine

- The leaves has been used to relieve fever, cold, constipation, antidiabetes (via glucose absorption inhibition) rejuvenate, gout, obesity and vomit.

8.0 Contraindications

Should not be used by patient suffering from gastritis.

9.0 Dosage : Not available

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Momordica cochinchinensis (Lour.) Spreng.
Cucurbitaceae

1.0 Scientific Name : *Momordica cochinchinensis* (Lour.) Spreng.

2.0 Vernacular Names : Fak khao (Thailand), giant spine gourd (English), nanban kikaraswri (Japanese)

3.0 Plant Description

Dioecious, woody climber, often climbing high on the trees, stem robust, angular. Root tuberous. Tendrils unbranched. **Leaves** simple, palmately lobed; petiole 5 to 10 cm long, with 2-5 glands near the middle; blade suborbicular in outline, c.15 cm in diameter, deeply 3 to 5 lobed, margin entire or subdentate, base cordate with few glands, petiold 5-30 cm long. **Flower** solitaey in leaf axil, 7 to 10 cm diameter, yellow with dark throat inside. Male inflorescence long pedunculate, up to 30 cm long, is bearing an apical, suborbicular, sessile bract, 3-4 by 4-5 cm, pedicel up to 10 mm long. **Fruit** 10 to 20 by 6 to10 cm, yellow, turning red at maturity, densely covered with small, rigid spines. **Seeds** brown, compressed 5 mm thick.

4.0 Propagation : Seeds or stem cutting.

5.0 Ecology/ Geographic Distribution

Common climber over big tree in the forest margin or abandoned area. It is occasionally grown in home orchard or backyard garden.

6.0 Chemical Constituents

- The fruit flesh (yellow) and seed membrane (red) extract contain ß-carotene, lycopene, saponified sample ß-carotene, zeaxanthin, ß-cryptoxanthin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antioxidative activity:

- The antioxidative activity has been investigated using the primary rat hepatocyte system. Tert-Butyl hydroperoxide (t-BHP) was used to induce cell damage. Increased in the glutathione-S-transferase and superoxide dismutase activities were observed.
- The proteins isolated from *M. charatia* and *M. cochinchinensis* exhibited several interesting pharmacological properties, e.g. anti-cancer, anti-viral and insulin-like activities.
- For acute toxicity assay, mice were subcutaneously injected with the proteins from the 0-9% precipitated fraction.
- The numbers of mortalities were determined as the median lethal dose (LD_{50}) by Weils moving average method. The LD_{50} of the Fak-khao proteins tested in female and male mice was 70.71 and 93.31 mg/kg, respectively.
- Both plants contain basic glycoproteins with pI>8 and molecular weight of approximately 30 kDa. The crude proteins, 0-30 and 30-60% salt precipitated proteins, from individual plants were tested for their antimicrobial, antimalaria and nuclease activities as well as mosquito larvicidal effect.
- The LC_{99} of the Fak-khao protein on *Aedes aegypti* was 0.8-1.2mg/ml, while the Fak-khao protein (5.5-5.9 mg/ml) displayed approximately 15% inhibitory effect. Nuclease activity of the protein was shown to be present only at high concentration 0.5 mg protein: 0.5 mg DNA.

7.2 Uses in traditional medicine

- In Vietnam, the seed membranes are said to aid the relief of dry eyes, as well as to promote healthy vision. Similarly, in traditional Chinese medicine the seeds of gac, known in Mandarin Chinese as mubiezi, are employed for a variety of internal and external purposes.
- Chemical analysis indicated presence of important phytonutrients in high concentrations such as beta-carotene (Vitamin A). Research also confirmed that the beta-carotene in the fruit is highly bioavailble.
- In a double-blind study with 185 children, some were given a dish containing 3.5 mg beta-carotene from spiny bitter gourd, while others were given an identical-looking dish containing 5 mg beta-carotene powder.
- After 30 days, the former group eating natural beta-carotene had significantly greater plasma (blood) levels of beta-carotene than the latter with synthetic beta-carotene.
- It also contains high level of vitamin E. The fatty acids in the aril are important for the absorption of fat-soluble nutrients, including carotenoids, in a diet typically low in fat.
- Due to its high content of beta-carotene and lycopene, gac is often sold as a food supplement in soft capsules.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Ocimum basilicum L. var. *citratum*
Labiatae



1.0 Scientific Name : *Ocimum basilicum* L. var. *citratum*

2.0 Vernacular Names : Hairy basil, mang lak, komko khaao (Northern).

3.0 Plant Description

An erect herb, 30 to 50 cm high, many branches; consisting of stem and branches striate, more or less pubescent, with strong odor. **Leaves** are simple, opposite, 2.5 to 5 by 1 to 2.5 cm; having blade lanceolate to eliptic; apex and base acute; margin entire or narrowly ovate tooth; both surfaces glabrous and glandular dotted; petiole slender, 1 to 2.5 cm long. **Inflorescences** are in terminal raceme-like, simple or branched, 7 to 15 cm long; consisting of bract 2-3(-5) mm long, tip acute, hairy; pedicels very short or sessile; flowers white or purple; calyx campanulate, 2–2.5 mm long (to 4-4.5 mm in fruit), 2-lipped, upper lip large with decurrent margin, the lower with 4 narrow pointed teeth, hairy inside, outside scattered with white hair; corolla campanulate, 2–2.5 mm long (to 4–4.5 mm in fruit), 2-lipped, the upper truncate, subequally 4 lobed, the lower entire; stamens 4, in 2 pairs, exserted; style 2 lobes. **Fruit** is composed of 4 dry 1-seeded nutlets. Nutlet is ellipsoid, 1.2 mm long, black, dotted.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

The plants are distributed in open waste places and are widely spread in tropical Africa and India, Ceylon to South China and Malaysia. It is also commonly planted in native gardens.

6.0 Chemical Constituents

- Leaves contain borneol, camphene, (+)-camphor, caryophyllene, 1,8-cineole, p-cymene, eugenol, β-elemene, essential oil, humulene, isoborneol, limonene, linalool, methyl chavicol, nevadensin, myrcene, myrtenol, oct-1-en-3-ol, oleanolic acid, α-phellandrene, β-phellandrene, salvigenin, α-pinene, β-pinene, sabinene, cis-sabinene hydrate, trans-sabinene hydrate, α-selinene, β-selinene, terpine-4-ol, γ-terpinene, terpinolene, ursolic acid.
- Flowers contain nevadensin, oleanolic acid, salvigenin, ursolic acid.
- Seeds contain D-arabinose, L-arabinose, camphene, camphor, D-galactose, D-galacturonic acid, D-glucose, D-mannose, D-mannuronic acid, mucilages, myrcene, oil, pentosans, polysaccharides, D-xylose, L-rhamnose.
- Essential oils contain borneol, bornerol acetate, α-cadinene, β-cadinene, β-cadinol, camphene, chavicol methyl ether, camphor, caryophyllane oxide, β-caryophyllane, 1,8-cineole, cinnamic acid methyl ester, p-cymene, β-elemene, linalool, elemol, estragole, eugenol, eugenol methyl ether, geraniol, geraniol acetate, limonene, linalool acetate, methyl ether chavicol, α-pinene, myrcene, ocimene, tricyclene.
- Not specified part used: camphor, cinnamyl alcohol, α-citral, essential oil, linalool, methyl cinnamate, methylheptenone, ocimin, L-proline, L-threonine, thymol, undecan-2-one (enodyl), luparone, methyl-nonyl-ketone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Mollusicidal activity:

- Methanol extract of dried leaves (100.0 ppm.) kills 40 % *Bulinus globosus.*

Plant growth inhibitory activity:

- A water extract of *O. basilicum* var. *citratum* leaves at various concentrations inhibited tuber sprouting and shoot length of *Cyperus rotundus* but no effect against wheat (*Triticum aestivum*), *Vigna mungo* or rice (*Oryza sativa*).

Hypotensive effect:

- A water extract of the aerial parts showed hypotensive effect on dogs.

Laxative activity:

- The seeds have laxative activity because the outer seed coat can swell around 45 times without being digested (considered as a bulk laxative). The dried mucilage power from the seeds has been made into pharmaceutical

products in various dosage forms (powder, capsule, and tablet). The granules have been satisfactorily coated with 1 % hydroxy propyl methyl cellulose.

- Pradab, et al reported a clinical trial on the laxative activity of the seeds. Two teaspoonfuls of the seeds together with 240 ml or 1 glass of water, was as effective as two teaspoonfuls of psyllium.
- A clinical trial of the seeds as a bulk laxative in patients suffering from constipation taking ½, 1, 1 ½ teaspoonful in 250 ml water three times daily were 13.3 %, 31.6 %, 10.5 %. Those patients not taking any laxative recorded a constipation rate of 80.6 % ($p > 0.001$). Therefore, the seeds may be used as a bulk laxative in post-operative patients.

Induction of glucose tolerance in diabetics:

- A study was carried out in 16 diabetic patients given 30 g of the seeds, divided into 3 doses after meals, for a period of one month. The results revealed consistently improved glucose tolerance. A lowering of the fasting blood glucose level up to the extent of 30 % was obvious and consistent.

Toxicity assessment:

- *Acute:* The seeds, orally administered at a dose of 0.25- 5 g/ kg in male and female rats, showed no toxic effect within 7 days of observation.
- *Subchronic:* The seeds, orally administered at a dose of 1 g/ kg continuously for 10 days, exhibited no effects in either rabbits, rats or cats.
- *Chronic*: The seeds were orally administered at doses of 0.25, 0.5, 1 and 2 g in each group of rats continuously for 12 weeks. No observable change in the histopathological characters of the livers, small and large intestines.

Antifungal activity:

- The essential oil moderately inhibited keratinophilic fungi, *Physalospora tucumanensis*, *Ceratocystic paradoxa*, *Sclerotium rolfsii*, *Curvularia lunata*, *Helminthosporium sacchari*, *Fusarium moniliforme* var. *subglutinans* and *Cephalosporium sacchari (*sugarcane fungi).

Antibacterial activity:

- Alcohol extract of hairy basil showed bactericidal effects to both Gram positive and Gram negative bacteria.
- Ether extract of steam-distillate of hairy basil inhibited, *in vitro*, growth of *Mycobacterium tuberculosis* at dilutions of 1: 50,000, 1: 12,500 and 1: 5,000.

7.2 Uses in traditional medicine

- Whole plant used to treat coughs, digestive diseases, toothache, indigestion, and chronic gastrointestinal ailments (children age 5 to 13, characterized by marked malnutrition, usually associated with intestinal parasitism); as a carminative, anti-flatulence, and diaphoretic.
- Leaves used for treatment of colds, bronchitic, skin diseases, chronic gastrointestinal ailments (children age 5 to 13, characterized by marked malnutrition, usually assocated with intestinal parasitism), vomiting and *Tinea capitis*; as a carminative and diaphoretic.

- Seeds used as a laxative, antiamoebic and diuretic.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Orthosiphon aritatus (Blume) Miq.
Labiatae

1.0 Scientific Name : *Orthosiphon aritatus* (Blume) Miq.

2.0 Vernacular Names : Yaa nuat maeo (Thailand), Java tea, cat's whiskers,

3.0 Plant Description

The plants are branched herbs, to 2 m high, usually branching at base, having stem 4-angled and covered with short hairs. **Leaves** are simple, opposite, consisting of blade ovate, rhombic or ovate-lanceolate, 1.5 to 10 by 1 to 5 cm; apex acuminate: base cuneate; margin coarely serrate; minutely hairy on the nerves or glabrous; abundantly minutely gland-botted; petiole up to 3 cm long. **Flowers** are arranged in whorl, distantly along an elongate rechis, terminal, 7 to 30 cm long, white purple; consisting of pedicel 1–6 mm long, hairy; calyx campanulate 2.5 to 4.5 mm long (to 10 mm in fruit), curved, with longitudinal veins, 2-lipped, the upper lip broad, the lower 4-teethed; corolla much longer than calyx, about 3 cm long, the tube slender, 1 to 1.8 cm long, straight, 2-lipped, upper lip shallowly 4-lobed, recurved, the lower straight, concave; stamens 4, in 2 pairs, filament glabrous, filifrom, very long, anthers 2-celled; the tip of the style club-shaped. **Fruit** contains 4 dry 1-seeded nutlets. Nutlet is obovate, rather flattened and rugose.

4.0 Propagation : Seeds or stem cuttings

5.0 Ecology/ Geographic Distribution

They are distributed throughout Southeast Asia to tropical Australia and easily grown in the moist and sheltered area.

6.0 Chemical Constituents

The dried leaves and shoots contain up to 12 % of minerals. The potassium content is high at about 600 to 700 mg per 100 g of fresh leaves. It has about 0.2 % of lipophilic flavones that include sinensetin, flavonol glycosides, caffeic acid derivatives (mainly rosmarinic acid and 2,3-dicaffeoyltartaric acid), inositol, phytosterols (β-sitosterol), hederagenin, ursolic acid, glycolic acid, saponins, and up to 0.7 % essential oil. The plant is also known to contain methylripariochromene A.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antifungal activity:

- The 95 % alcohol extract from leaves exhibited antifungal activity against *Neurospora crassa* at a concentration of 50 % while water and acetone extracts had no activity.

Toxicity assessment:

- The LD_{50} of a hot water extract of the dried leaves and stems after single dosing was > 5 g/kg in both rats and mice.
- There was no change in weight, blood chemistry (SGOT, SGPT, BUN) or in histopathology of major internal organs i.e. kidney, liver, heart, lung and spleen amongst female and male rats receiving daily dose at 0.5, 1 and 2 g/kg for 30 days.

Urinary-stones removal:

- Water extract of 4 g dried aerial part in 750 ml boiling water as drinking water daily for 1 to 6 months to 23 urinary-stone patients.
- The stones, 0.5 cm-sized, were removed in 40 % of the patients. 20 % of the patients experienced no pain after the treatment. Even though clinical data supports the folkloric use as diuretic further studies are needed to find the active principles and mechanism of action.

7.2 Uses in traditional medicine

- The root has been used as a diuretic.
- Leaves decoction exhibited diuretic properties and used in the treatment of kidney diseases, dysuria with urinary stones or discharges, back and joint pains, kidney swelling, antihypertensive and antidiabetic.
- The whole plant is used in the treatment of kidney diseases, any disorders which cause cachexia and wasting diseases, dysuria with urinary stones or discharges; as a diuretic. The plant is used to stop mild spasms, regulation of bile, lower blood pressure stimulates urine production, treat gout, diabetes and rheumatism; eliminate stones in the bladder and kidney as well as treatment for cystitis and urethritis.
- In Malaysia, the whole plant is boiled in water and drunk to eliminate stones in the bladder and kidney.
- In Indonesia, it is used with a mixture of other herbs to treat jaundice,

diabetes, gout, rheumatism and arteriosclerosis.

- In Europe, an infusion of the dried leaves is taken as a diuretic and to treat bacterial infections and inflammations of urinary tract.
- It also relieves spasms of the smooth muscle in the walls of the internal organs, making it valuable for gallbladder problems.
- Researchers have found it to be mildly antiseptic as well.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Pluchea indica (L.) Less.
Compositae


1.0 Scientific Name : *Pluchea indica* (L.) Less.

2.0 Vernacular Names : Khlu

3.0 Plant Description

A shrub, 0.5–2 m high, much-branched, glabrous. **Leaves** are sessile, alternate; obavate; 2.5–9 by 1–5.5 cm; consisting of apex acute or optuse; base cuneate; maegin acutely dentate; membranous. **Flowers** are small, violet, arranged in heads in terminal or axillary dense corymbs, having peduncle 5–6 mm long, pedicels sessile; involucres campanulate, bracts about 1 mm long, 5–6 seriate, outer broadly ovate, the inner lanceolate; rays flower pistillate, corolla about 5 mm long, shortly 3–4 toothed; disc flower bisexual, corolla-tube 4–6 mm long, 5–6 toothed, anthers shortly sagittate at base, style shortly bifid at tip. **Seeds** are minute cylindrical achenes, about 1 mm long, 10-ribbed; having pappus white, 4 mm spreading.

4.0 Propagation : Stem cuttings or seeds.

5.0 Ecology/ Geographic Distribution

They are widespread from India to southern China, through Indo-China, Thailand, Malaysia, Indonesia and the Philippines, to Australia (including Christmas Island) and the Pacific Islands (including Hawaii) and thrive in moist lowland, along swamps, sea-shore and back-mangrove. They are commonly grown as medicinal plant.

6.0 Chemical Constituents

The chemical constituents extracted are benzyl glucoside, citrucin C, 3-(2'-3'-diacetoxy-2'-methly-butyryl)-cuauhtemone, hedyotisol A and B, hex-3-cis-enyl glucoside, linaloyl apiosyl glucoside, linaloyl glucoside, 9-hydroxylinaloyl glucoside, 4-

allyl-2-6-dimethoxyphenol glucoside, phenyl-ethyl-glucoside, pinoresinal monoglucoside, plucheol A and B; plucheoside A-C, plucheoside D-1, plucheoside D-2, plucheoside D-3, plucheoside E, pterocarptriol, salicylic acid methyl ester glucoside, stigmasterol glucoside, syringaresinol monoglucoside.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Diuretic activity:

- A 10% infusion of aerial parts, intravenously injected into rats, produced dose related diuretic activity. Insufficient levels of potassium were found in the extract to account for the diuretic effect.
- Experiments using a 5% infusion, performed on normal human subjects recorded higher activity as compared to 50 mg of hydrochlorothiazide.

Toxicity assessment:

- The LD_{50} value of an infusion of aerial parts, administered orally to rats, was higher than 5 g/kg. No pathological changes were observed even after administration of a very high dose.
- When an ethanol water (1:1) extract of aerial parts was administered intraperitoneally to mice, the LD_{50} was reported to be 750 mg/kg.

Antiinflammatory activity:

- A methanol fraction from root extract possessed significantly anti-inflammatory and antiarthritic activity.

7.2 Uses in traditional medicine

- The whole plant is diuretic, antidiabetic, used in treatment of dysuria with urinary stones or discharges and urinary disorders.
- The root is used for longevity and treatment for any disorders causing cachexia or wasting diseases and dysuria with urinary stoned or discharges. In Indonesia, the roots, mixed with other ingredient, are applied as a poultice for rheumatic pains. Externally it is used to relieve skin diseases.
- The leaves is used for longevity, haemorrhoids, and any disorders causing cachexia or wasting diseases. In Malaysia, Indo-China and India a decoction of the leaves, or the crushed fresh leaves or roots of *P. indica* are used especially as a febrifuge and diaphoretic.
- In Indonesia and Malaysia, the leaves are also used as a stomachic, a galactagogue, and cough medicine. The juice from fresh leaves is used in treatment of hemorrhoids while the crushed leaves, mixed with the juice of other plants, is a remedy for dysentery.
- The flower is used in treatment of dysuria with urinary stones or discharge.
- The seeds are used to treat nasal polyp and haemorrhoids.
- The bark is also used for longevity, treatment of nasal polyps, haemorrhoids, any disorders causing cachexia or wasting diseases.
- The stem is used as diuretic and used in the treatment of urinary disorders,

haemorrhoids, nasal polyposis.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Quisqualis indica L.
Combretaceae

1.0 Scientific Name : *Quisqualis indica* L.

2.0 Vernacular Names : Rangoon creeper, lep mue naang, tha mang, cha mang, macheemang (Northern), thai-mong (Karen-Mae Hong Son), a-do-ning (Malay-Yala).

3.0 Plant Description

Climbing shrubs which grow into a large woody vine. Young parts are covered with soft brown hairs. **Leaves** are opposite or nearly so; oblong or elliptic in shape; 7 to 15 by 3 to 6 cm; tapering to a blunt or notched apex; slightly cordate at the base; having thin and soft hairs, densely on the under surface; the lower part of the petiole persistent and becoming hard and thorn-like. **Flowers** are fragrant, in terminal drooping short clusters, each flower has a narrow green calyx tube dividing at the top into 5 triangular teeths, petals white changing to red. **Fruit** is dry, narrowly ellipsoid, 3 to 4 cm long, 5-angled.

4.0 Propagation : Seeds, cuttings or division of the roots.

5.0 Ecology/ Geographic Distribution

They are commonly found in deciduous forests at an altitude up to 800 m and flower all year round. It is grown ornamentally in all tropical and subtropical countries.

6.0 Chemical Constituents

- Whole plant: quisqualic acid.
- Leaves: rutin.
- Flowers: cyanidin monoglycoside, pelargonidin-3-glucoside, rutin.

- Seeds: D-mannitol, quisqualic acid.
- Fruits: alanine, asparagine, aspartic acid, glutamic acid, glycine, histidine, leucine, lysine, proline, quisqualine acid, serine, threonine, valine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antibacterial activity:

- Water extract of the leaves was evaluated for antibacterial activity against respiratory infecting bacteria, i.e. β-streptococcus group A, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Klebsiella pneumoniae*. It was active only against the β-streptococcus group A.
- Hot water extracts of the fruits showed no in vitro antibacterial activity against *S. aureus, Escherichia coli, Salmonella typhosa Bangkok* or *P. aeruginosa* ATCC 0045.

Mutagenic activity:

- Histidine removed methanol and hot water extracts of fruits had no mutagenic effect on *S. typhimurium* strains TA 98 and TA 100 at a concentration of 50.0 mg/ disc.

Anthelmintic activity:

- Neither the seeds (raw or baked) nor a gum, isolated from seeds, has anthelmintic activity against ascariasis. However, in China the seeds are substitute for santonin in an ancient Chinese anthelmintic drug called "Shih-Chiin-Tzu". Oil from the seeds also has purgative properties.
- Quisqualic acid possessed marked anthelmintic activity against *Ascaris suum* at 1/500 w/v, *in vitro*.

Neurological effects:

- Quisqualic acid has been extensively studied on its neurological effects and an *in vivo* tests were carried out by direct injection of quisqualic acid into the animal neuronal area.
- The excitatory effect was reported on cultured neurons, insects (*Tenebrio moliter*), snails (*Achatina fulica*), crayfish (*Cambarus clarkii*), carp fish (*Cyprinus carpio*), hermit crabs (*Eupagurus bernhardus*), chick, mice and rats.

Toxicity assessments:

- Injection of quisqualic acid into the limbic lobe in rats and cats brains resulted in various types of limbic seizures. This convulsant effect could be blocked by pentobarbital diphenyl hydantoin when given i.p. to rats at a higher dose than usual therapeutic levels.
- Quisqualic acid produced necrosis to rat glioma cells, *in vitro*. The compound, injected directly in to the striatum of 7-day-old rats, produced neuronal necrosis and reduced the size of the striatum and hippocampus on the injection site.
- Quisqualic acid, found in the seeds, is effective against *Ascaris suum*.

7.2 Uses in traditional medicine

- Whole plant: treatment of chronic gastrointestinal ailments amongst children (between the ages of 5 and 13) characterized by marked malnutrition, usually associated with intestinal parasitism; as an anthelmintic.
- Roots are used for round worm infestation, foaming stools; as an anthelmintic.
- Leaves for treatment of abscesses and an antiinflammatory.
- Seeds as an anthelmintic and fruits as a treatment of hiccough, roundworm infestation, foaming stools in children.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Sapindus rarak DC.
Sapindaceae


1.0 Scientific Name : *Sapindus rarak* DC.

2.0 Vernacular Names : Soap nut tree, pra kham di khwai

3.0 Plant Description

It is a medium sized tree, 5 to 10 m high, having the top broad and densely foliaged; bark grayish-brown, smooth or fissured. **Leaves** are compound, odd-pinnate, spirally arranged; leaflets are oblong-lanceolate or subfalcate, 6 to 10 by 2 to 3 cm, having base acute and unequal, acuminate at apex; margin entire; glabrous when adult. **Flowers** are small, white or pale yellow, in terminal panicles, widely branched, consisting of short yellowish hair; sex separate; sepals 4 or 5, petals 5, both with densely appressed-pubescent on the outside; stamens 8, filaments long-hairy; ovary 3-loculed with ovule in each locule. **Fruit** is mostly globose, 2 cm in diameter, wrinkled, brown, with round black seed.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

They are scattered along mixed deciduous forest and dry evergreen forest, at the altitudes 100 to 1, 300 m. They flower and fruit from March to June.

6.0 Chemical Constituents

The fruits contain hederagenin and saponin.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Piscicidal activity:

- A water extract of fruits was toxic on Tilapia (*Oreochromis niloticus* Linn.). The maximum concentration for 0 % mortality was reported to be 10 ppm. While the minimum concentration for 100 % mortality was 100 ppm.

Hemolytic activity:

- An ethanol-water (1:1) extract of fruits possessed a hemolytic index of 3,000.

Toxicity assessment:

- LD_{50} of a 50 % ethanol extract in mice was 10 g/ kg (p.o.) and 2 g/kg (s. c.).

7.2 Uses in traditional medicine

- Leaves: treatment of abnormal urine and infectious diseases.
- Flowers: treatment of pruritic rash.
- Fruits: Use as substitute for soap, to alleviate toxic symptoms; treatment of bronchial asthma, infectious diseases, skin diseases, chronic gastrointestinal ailments of children between the ages of 5 and 13 characterized by marked malnutrition, usually associated with intestinal parasitism and exanthematous fever; as an antipyretic.
- Seeds: treatment of skin diseases.
- Stem: treatment of nausea and vomiting caused by wind element
- Bark: treatment of any disorders causing cachexia or wasting diseases, for symptoms after febrile attacks.
- Roots: treatment of bronchitis and asthma.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Solanum trilobatum L.
Solanaceae

1.0 Scientific Name : *Solanum trilobatum* L.

2.0 Vernacular Names : Maewaeng krue, khwaeng khia (Tak)

3.0 Plant Description

It is straggling shrub, having numerous short stout and recurved prickles on stem and branches nearly glabrous. **Leaves** are simple, alternate or subopposite, thin and glabrous in texture, light green, having blade broadly ovate, apex and base obtuse, margin irregularly lobed. **Flower** is violet, clustered, 2 to 8 flowers, 3 cm in diameter when anthesis; consisting of pedicel axillary, pedencle short, cxalyx 5 – lobes acute, nearly glabrous, rarely prickly, hardly enlarged in fruit, corolla – tube very short, 5 – lobes, wheel-shaped, pubescent outside; stamens 5 in the corolla – throat, filaments short, anthers oblong, narrowed upwards, joinded in a cone, protruding, opening at the apex, ovary 2 – locule, style columnar, stigma small. **Fruit** is a globose, glabrous and edible berry, 1 cm in diameter, much exceeding the calyx – lobes, red when ripe, containing numerous seeds inside.

4.0 Propagation : Seed

5.0 Ecology/ Geographic Distribution

Commonly found at an open grassland and require full sun. Wide distribution in India, Ceylon, Burma and Malay Peninsula.

6.0 Chemical Constituents

The leaves contain tomatid – 5- en – 3- ß – ol. Fruits (alkaloids, glycosides).

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Hypoglycemic activity:

- Either water or alcohol extract of dried fruits at a single dose of 5 and 10 g/kg once a day for 3 days, and 10 g/kg once a day for 7 days exhibited low hypoglycemic activity for a short duration after oral administration to rabbits.
- A water extract reduces rabbit blood sugar levels at the end of 2 hour following oral administration. And ethanol extract reduced rat blood sugar level at the end of 2, 3 hours after oral administration.
- A glycoside fraction of fruits reduced blood sugar levels (1 ml of a 5 % glycosides, s.c. or 10 ml of 10 % glycosides, p.o.) in rabbits.

7.2 Uses in traditional medicine

- Roots for asthma, tuberculosis, treatment of bleeding via the anus and urethra, cough, fever due to an abnormality of a combination of the following origins.
- The stem is used in treatment of tympanites, cough and viscous saliva; as expectorant, detoxicant and diuretic.
- The leaves is known to be treatment of viscous.
- The fruits is antidiabetic, biliary tonic and blood tonic.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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Thunbergia laurifolia Lindl.
Acanthaceae


1.0 Scientific Name : *Thunbergia laurifolia* Lindl.

2.0 Vernacular Names : Rang chute

3.0 Plant Description

A lilac-colored flowering vine that climbs over trellises and up into treetops. **Leaves** are opposite, heart-shaped with serrated leaf margin and taper to a pointed tip. **Flowers** are not scented and borne on pendulous inflorescences. The hermaphrodite flower is trumpet-shaped with a short broad tube, white outside and yellowish inside. The corolla is pale blue in color with 5 to 7 petals, one larger than the others. The plant flowers almost continuously throughout the year with flowers opening early in the morning and aborting in the evening of the same day.

4.0 Propagation : Seeds and stem cuttings or shoots from the tuberous roots.

5.0 Ecology/ Geographic Distribution

Native to Guangdong China, Taiwan, Indo-China, India and Malaysia but cultivated elsewhere in the tropics.

6.0 Chemical Constituents

The aerial parts of contains two iridoid glucosides, 8-epi-grandiforic and 3'-O- β-glucopyranosyl-stibericoside and seven known glucoside compounds. The plant contains flavonoids such as apigenin, casmosiin and chorogenic acid.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Cholinergic effects:

- The water extract has been demonstrated to reduce cholinergic effects and decrease mortality in rats treated with folidol, an organophosphate insecticide.
- Tea from the leaves has also been shown to effectively reduce insecticide residue levels in the blood circulation of agriculturists.

Hepatoprotective activity:

- The aqueous extract of the leaves possess hepatoprotective activity against ethanol-induced liver injury both *in vitro* and *in vivo* hence potential to be used as an herbal detoxifying agent subject to a more comprehensive toxicological data.
- A 28-day repeated dose toxicity study of aqueous extract at an oral dose of 500 mg/kg did not cause any major histological changes to the organs; though it may affect some hematological values and kidney weights.
- The 15-day-treatment of *T. laurifolia* extract decreased levels of blood glucose in diabetic rats.
- Juice from crushed leaves are taken for menorrhagia, placed into the ear for deafness, and applied for poulticing cuts and boils. Microwave-dried leaves displayed stronger antioxidant properties (AOP) than fresh leaves.
- Besides antioxidant, it has antibacterial, antifungal, anti-inflammatory and antidote for poison.

7.2 Uses in traditional medicine

- Widely used in Thailand, Malaysia and India traditional medicine.
- The leaf sap is used for menorrhagia, ear infections and deafness, and the poulticed leaves to soothe cuts and boils.
- Leaves are also used as an antipyretic agent and antidote for scorpion venom and dried leaves as herbal tea to treat drug and alcohol abuse.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Tiliacora triandra (Colebr.) Diels
Menispermaceae


1.0 Scientific Name : *Tiliacora triandra* (Colebr.) Diels

2.0 Vernacular Names : Yaa naang, bai yanang or bai ya nang, thao wan khieo

3.0 Plant Description

A climber with large tuber underground, striate stem, more of less hairy. **Leaves** are simple, spirally arranged; lanceolate- ovate, 5 to 12 by 2 to 4 cm; consisting of apex acuminate; base rounded or subcordate, with 3 or 5 sub-basal nerves, the nerves tending to join together near the margins. **Flowers** are small, combined to peduncled axillary raceme, unisexual; consisting of male flowers yellow, sepals 6, inner broadly elliptic; petals 3 or 6, emarginate; stamens 3, clavate; female flower sepals and petals as in male, pistils about 8, borne on short stripe. **Fruit** is globose drupe, 7 mm in diameter, orange red when mature.

4.0 Propagation : Seeds

5.0 Ecology/ Geographic Distribution

Found in open places and secondary forests. The plants are usually burned in the dry season and the shoots arise form the underground tuber in the rainy season.

6.0 Chemical Constituents

- Roots contain alkaloids, alkaloid G, alkaloid H, aporphine, isoquinolines, lactone, nortiliacorinine A, tannin, tiliacorine, tiliacorinine, tiliacorinine-2´-N-oxide.

- Aerial part contain magnoflorine, norisoyanangine, nortiliacorine A, noryanangine, protoquercitol, tiliacorinin-2′-N-oxide, (1S,1R)-tiliageine, tilitriandrene.
- Not specified part used: nortiliacorinine A, tiliacorine, tiliacorinine, tiliacorinine 2-N-oxide, tiliandrine.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antimalarial activity:

- A methanol extract of roots inhibited multidrug- resistant *Plasmodium falciparum*, *in vitro*. The water-insoluble alkaloid fraction, consisting of alkaloid G, nortilicorinine A, tiliacorine, alkaloid H and tiliacorinine were found to have inhibitory activity but the water-soluble alkaloid fraction showed no activity.
- Five alkaloids isolated from the roots including alkaloid G, nor-tiliacorinine A, tiliacorine, alkaloid H and tiliacorinine, with LD_{50} values against *P. falciparum* at 344, 558, 675, 916 and 3533 ng/ ml respectively.

Toxicity assessment:

- Oral administration of root powder (2.5 g/kg) to mice exhibited 80% mortality in contrast to another study, no toxic effect when administered to mice at a dose of 10 g/kg.

Antipyretic activity:

- Gastric intubation of a 50% ethanol extract of dried leaves to yeast-induced pyrexia rabbits, recorded negative antipyretic activity.

Antispasmodic activity:

- A 50% alcohol extract possessed an antispasmodic activity on isolated guinea pig ileums due to an antihistaminic effect.

Hypotensive effect:

- Administraiton of a 50% alcohol extract, intravenously to dogs, recorded no hypotensive effect. Tiliacorinine (dihydrochloride), reduced the blood pressure of normal and hypertensive rats. The present data is not adequate to complement this plant in primary health care.

7.2 Uses in traditional medicine

- Roots: for relieving of drunkenness and detoxication; as an antipyretic and laxative.
- Whole plant: treatment of recurrent fever.
- Leaves: as a detoxicant.
- Not specified part used: for relieving fever and drunkenness; as a detoxicant.

8.0 Contraindications : Not available

9.0 Dosage : Not available

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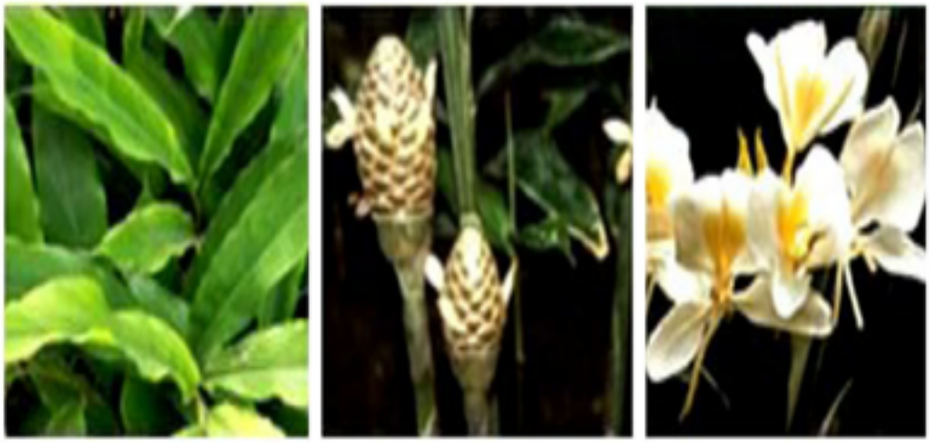
Zingiber officinale Roscoe
Zingiberaceae



1.0 Scientific Name : *Zingiber officinale* Roscoe

2.0 Vernacular Names : Ginger, khing, khingklaeng, khingdaeng (Chanthaburi), khingphueak (Chiangmai), sa-e (Karen-Mae Hong Son).

3.0 Plant Description

It is a low herb; having horizontal, white or pale yellow, fleshy and aromatic rhizome; and stem leafy. **Leaves** are lanceoate, 12 to 20 by 1.5 to 2 cm; tapering gradually to the apex; narrowing to base and clasping the stem by their long sheaths. **Inflorescences** are borne separately on a bladeless leaf-sheath; consisting of flowers zygomorphic, with bracts and bracteoles subtending the flowers, bracts closely appressed against each other; calyx shortly 3 lobed; corolla tubular, divided into 3 subequal lobes; fertile stamen one only; very rarely flowers. **Fruit** is a dehiscent capsule.

4.0 Propagation : Propagated by division of the rhizomes.

5.0 Ecology/ Geographic Distribution

The plants require a rather hot and moist climate, a rich, well-drained, humus or loamy soil. They are commonly cultivated throughout the tropics.

6.0 Chemical Constituents

- Rhizomes contains amino acid, amylases,anethole, anisaldehyde, arabinose, asparagines, ß-bisabolene,borneol, d-cadinene, caffeic acid, calcium, camphene, carbohydrate, 1,8-cineole, citral, citronellal, citronellol, p-coumaricacid, α-cubebene, ar-curcumene, digalactosyl, diglyceride, dipentene, enzymes, essential oil, farnesol, fat and fatty acids, fenchone, fructose, geranial, geraniol, germanium, gingediacetates, gingediols, gingerols, 10-gingerol, 6-gingerol, 8-gingerol, D-6-gigerol, S-(+)-gingerol, glucose, guaiene, n-hexadecanoicacid, iron, inorganicelements, D-limonene, linalool, lysophosphatidylcholine, L-menthol, D-menthol, methylgingediol, methylgingediacetate, myrtenal, nerol, niacin, trans-ß-ocimene, n-octadec-9,12,15-trienoic acid, n-octadec-9c, 12c-dienoic acid, n-octadec-9-enoic acid, n-octadecanoic acid oil, palmitic acid, oleoresin, paradol, peroxidase, phosphorus, phosphatidylcholine, phosphatidylinositol, α-pinene, L-pipecolic acid, proteins, riboflavin, sabinene, cis-sesquisabinene hydrate, sesquithujene, shogaol, (6)-shogaol, (10)-shogaol, starch, tannin, terpinen-4-ol, α-terpineol, thujyl alcohol, α-terpinyl acetate, thiamine, zerumbone, zingerone, α-zingiberene, zingiberenol.
- Entire plant and the leaves contain S-(+)-6-gingerol and shikimic acid respectively.
- Essential oil contain bisabolene, ß-bisabolene, borneol, borneol acetate, camthene, car-3-ene, caryophyllene, cineole, 1,8-cineole, citral, citronellal, citronellol, α-copaene, (+)-α-curcumene, ar-curcumene, dihydrogingerol, elemol, ß-eudesmol, farnesene, α- farnesene, ß-farnesene, geranial, geraniol, geraniol acetate, gingerol, 6-gingerol, hexahydrocurcumin, limonene, linalool, methanoazulene derivatives, methyl gingerol, nerol, nerolidol, n-nonanone, phellandrene, ß-phellandrene, α-pinene, ß-pinene, ß-sesquiphellandrene, cis-ß-sesquiphellandrene, shogaol, α-terpinene, terpineol, trans-ß- sesquiphellandrene, 2-undecanone, n- undecanone, zingerberone, zingerone, zingiberene, zinbgiberol.
- Not specified part used :acetic acid, amylase, bisbolene, α-citral, citric acid, essential oil, furanogermenone, gingerol, 6-gingero, l,8-gingerol, 10-gingerol, oxalic acid, hexahydrocurcumin, 2-hydroxypropionic acid, 1-(-)-malic acid, oleoresin, d-ß-phellandrene, polysaccharides, pyroglutamci acid, 6-chogaol, succinic acid, zingiberene.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Antihypercholesterol activity:

- Intragastric administration of ginger oleoresin to cholesterol-fed rats, significantly lowered serum and hepatic cholesterol and significantly increased fecal cholesterol excretion from the control value. The mechanism by which ginger oleoresin restrained elevation in serum and hepatic cholesterol levels in hypercholesterolemia was probably the impairment in cholesterol absorption.

- Ginger intake for 24 days decreased both serum and hepatic cholesterol levels in hypercholesterolemic rats. Ginger showed no significant effect on serum cholesterol when tested at 2–4 hours after ingestion. This finding indicated that ginger is definitely antihypercholesterolemic but needs to be taken daily for several days to obtain significant result.
- Panchcole extract, a combination of *Piper longum* roots and seeds, *P. officinarum* seeds, *Plumbago zeylanica* barks and *Z.officinale* rhizomes, was a potent inhibitor of HMG-Co Areductase, reducing serum LDL cholesterol by 88.9% and serum triglyceride by 73.6% in rabbits. Dietary feeding of Panchcole reduced both cholesterol and phospholipid as well as the cholesterol/phospholipid ratio significantly. Panchcole extract feeding brought about a definite regession of atheroma and hindered placque formation in the ascending and thoracic aorta.

Narcotic antagonist activity:

- A preparation of ginger, in tablet form, given to patients as an oral treatment for narcotic addiction. Ginger exhibited narcotic antagonist activity.

Anticonvulsant activity:

- A hot water extract of ginger rhizomes at a concentration of 0.15% exhibited anticonvulsant activity on metrazol-induced bursting of snail neurons.

Analgesic and antipyretic activities:

- A 50 % methanol extract of ginger, subcutaneously administered (dose of 10.0 g/kg (dry weight of plant)) exhibited analgesic activity in acetic acid-induced writhing mice method but negative via hot plate method.
- The IV administration of the pungent constituents of ginger, (6)-gingerol and (6)-shogaol at doses of 1.75–3.5 mg/kg and oral administration of these agents at 70-140 mg/kg produced antipyretic and analgesic activity.

Barbiturate potentiation:

- A 50 % methanol extract of ginger potentiated the effect of barbiturate in mice (subcutaneously administered at a dose of 10.0 g/kg (dry weight of plant)), but at 3.0 g/kg it gave a negative result.
- A hot water extract of ginger neither potentiated the action of barbiturate nor exhibited hypothermic activity in male mice when administered at a dose of 4.0 g/kg by gastric intubation. A hot water extract of the mixture of *Pinellia ternate* (tubers) 6.0 g, *Magnolia obovata* (bark) 3.0 g, Perllafrutescens (aerial parts) 2.0 g, *Zingiber officinale* (rhizomes) 1.0 g, and *Poriacocos* (fruits) 5.0 g potentiated the action of barbiturate in male mice when administered at a dose of 2.0 g/kg by gastric intubation. Hot water extract did not have hypothermic activity in male rats when administered at 4.0 g/kg by gastric intubation.
- A 75% methanol extract neither potentiated the action of barbiturate nor decreased barbiturate sleeping time in male mice when intraperitoneally administered at a dose of 500 g/kg.
- The IV administration of the pungent constituents of ginger, 6-gingerol and 6-shogaol, at doses of 1.75–3.5 mg/kg and oral administration of these agents

at 70-140 mg/kg, produced a prolonged hexobarbital-induced sleeping time. In the cortical EEG, The low-amplitude fastwave pattern was observed for 5 min after IV administration of (6)-shogaol, and then changed to the drowsy pattern, which was restored after 60 min.

Antibacterial activity:

- The extract of ginger did not inhibit *Staphylococcus aureus, Escherichia coli, Bacillus subtilis* and *Pseudomonas aeruginosa.*
- An alcohol extract of ginger showed significant activity against *E. coli, Proteus vulgaris, Salmonella typhimurium, S. aureus* and *Streptococcus viridians.*
- Extracts of ginger significantly inhibited gr A hemolytic streptococci, *S. aureus* and *Streptococcus faecalis* with the effects being more pronounced against the first 2 organisms. The inhibition was dose-dependent in all organisms.
- Ginger and ginger roots inhibited *Micrococcus luteus* but the activity was lost within 20 minutes at 100° C.
- An ethanol extract of rhizomes was reported to be active against *S. aureus, ß*-streptococcus gr.A and *P. aeruginosa* but not effective against *Klebsiella pneumonia.*

Spontaneous activity reduction:

- A 50 % methanol extract of ginger did not reduce spontaneous activity in mice when subcutaneously administered at a dose of 10.0 g/kg (dry weight).
- A hot water extract (4.0 g/kg by gastric intubation) was inactive in male rats. But a hot water extract of a mixture of *Pinella ternate* (tubers) 6.0 g, *Magnolia obovata*(bark) 3.0 g, *Perilla frutescens* (aerial parts) 2.0 g, *Zingiber officinale* (rhizomes) 1.0 g and *Poriacocos* (fruits) 5.0 g, reduced spontaneous activity in male rats when administered at 4.0 g/kg gastric intubation.
- The intravenous administration of the pungent constituents of ginger, (6)-gingerol and (6)-shogaol, at doses of 1.75-3.5 mg/kg and oral administration of these agents at doses of 70-140 mg/kg, inhibited spontaneous motor activity.

Cytotoxic activity:

- The cytotoxic activity of various ginger extracts was tested on Ehrlich-Ascites carcinoma cells. At a concentration of 5.0 %, a water extract was inactive, methanol extract exhibited weak activity, acetone and ether extracts were equivocal.
- Zerumbone, isolated from roots of ginger, at 10.0 γ/ml 100 % inhibited the growth of mouse L/210 leukemic cells.

Mutagenic activity:

- A hot water extract of ginger caused mutation in B291 I cells and *Salmonella typhimurium* strain TA 100 (12.5 mg dry weight of plant/disc), but it did not have mutagenic activity on *Salmonella typhimurium* strain TA98 (50 mg dry weight of plant/disc).
- An alcohol extract of ginger was mutagenic toward streptomycin-dependent *Salmonella typhimurium* strains 510 and 4. The mutagenic activity of ethanol extract of ginger decreased considerably when irradiated with short-wave UV

light (3.94 J/m/sec for 12 hours).

- Ginger extract, gingerol and shogaol were mutagenic on metabolic activation in strains TA 100 and TA 1535 but not in strain TA 98 while zingerone was non-mutagenic in all strains. When mutagenicity of gingerol and shogaol was tested in the presence of different concentrations of zingerone, it was observed that zingerone suppressed mutagenic activity of both compounds in a dose-dependent manner.

Local anesthetic activity:

- The local anesthetic activity of hot water extract on the sciatic nerve of frogs was demonstrated at a concentration of 1.0 **%.**

Vertigo-reducing effect:

- The powdered ginger roots reduced vertigo better than placebo but had no action upon the duration or the maximum slow phase velocity of nystagmus in healthy volunteers.

Effect on thiamine synthesis:

- Ginger fed rats showed an increase in the intestinal synthesis of thiamine.

Anthelmintic activity:

- Orally administered hot water extract of a mixture of *Zingiber officinale* (rhizomes), *Rehmannia glutinosa* (roots), *Dioscorea batatas* (tubers), *Dolichos lablab* (seeds), *Glycyrrhiza uralensis* (roots), *Evodia rutaecarpa* (fruits), *Atractylodes macrocephala* (rhizomes) and *Panax ginseng* (roots) exhibited anti-schistosomal activity in humans.

Molluscicidal activity:

- A methanol extract of ginger exhibited weak molluscicidal activity against *Bulinus globosus* at a concentration of 100 ppm.

Effect on gastrointestinal tract:

- A 50 % methanol extract of ginger, injected into dorsal lymph sac of copper sulfate-induced emesis frogs at a dose of 10 g/kg (dry weight of plant), showed antiemetic activity.
- Dried rhizomes of ginger were tested for antivertigo effect in 36 human subjects (18 male and 18 female) by oral administration at a dose of 940 g/person. Ginger was superior to dimenhydrinate in preventing the gastrointestinal symptoms of motion sickness.
- A 50 % methanol extract of ginger subcutaneously administered to mice at a dose of 10.0 g (dry weight of plant)/kg decreased gastric secretion. It did not show antiulcer activity and stimulate the gastric motility when it was given by gastric intubation.

- Oral administration of acetone extract of ginger at 1000 mg/kg and zingiberene (the main terpenoid from acetone extract) 100 mg/kg significantly inhibited HCL-ethanol induced gastric lesions in rats by 97.5 and 53.6 % respectively.

- 6-gingerol (pungent principle) at 100 mg/kg significantly inhibited gastric lesions by 54.5 %. Oral administration of furanogermenone at 100 mg/kg prevented stress-induced gastric ulcer in mice.
- An intravenous administration at a dose of 3.5 mg/kg of (6)-shogaol resulted in intensive inhibition of the traverse of a charcoal meal through the intestine in contrast with the equal dose of (6)-gingerol. However, (6)-shogaol facilitated such an intestinal function after oral administration at a dose of 35 mg/kg. Both (6)-shogaol and (6)-gingerol suppressed gastric contraction in situ and (6)-shogaol was more active than (6)-gingerol. An acetone extract of ginger (75 mg/kg), (6)-shogaol (2.5 mg/kg), or (6)-,(8)-,or(10)-gingerol (5 mg/kg) enhanced the transport of a charcoal meal in mice. The effect of these substances were similar to or slightly weaker than those of metoclopramide and domperidone.
- A hot water extract of ginger did not show any proteolytic activity at a concentration of 1.0 mg/ml, and ginger powder inhibited α-amylase activity.
- Ginger increased bioavailability of certain drugs either by promoting rapid absorption from the gastrointestinal tract, or by protecting the drug from being metabolized/oxidized in its first passage through the liver after being absorbed, or by a combination of these two mechanisms.

Prevention of caries and tooth diseases:

- A paste formulated with ginger powder, magnesium silicate, rock salt, borax, catechu, black pepper, alum, sweet almond seeds and shells, pyrethrum, mastic, tobacco, water and glycerol, applied twice daily to a 10-year-old patient suffering from spongy gums, discolored teeth, crystal deposits and bacterial infection, showed improvement of the gums and teeth within 1 month after treatment, and during intermittent examinations for 12 years the patient maintained excellent teeth with no cavities.

Antinematocidal activity:

- Ginger extract showed strong nematocidal activity by killing *Meloidogyne incognita* and other species of soil nematodes within 40 minutes duration.

Effect on larynx:

- A hot water extract of ginger did not inhibit laryngeal reflex in cat when intravenously administered at a dose of 400.0 mg/kg, but the mixture of *Pinella ternate* (tuber), *Magnolia obovato* (bark), *Perill afrutescens*(aerial parts), *Zingiber officinale* (rhizomes) and *Porta cocos* (fruits) was active.

Effect on cardiovascular system:

- A 50 % methanol extract of ginger, subcutaneously administered to mice at a dose of 10.0 g/kg, did not decrease capillary permeability, in an acetic acid induced capillary leakage.
- 50 % methanol extracts exhibited hypotensive activity in rats (intravenously administered) at doses of 0.25 g and 0.5 g (dry weight of plant) /kg but did not exhibit diuretic activity when administered at 10.0 g (dry weight of plant) /kg. Thus the hypotensive activity of ginger was not the result of diuretic activity.

- The methanol extract increased the force of contraction of guinea pig atrium at a concentration of 0.1 mg/ml. Intraventricular injection of (6)-shogaol (0.1–0.5 µg) in rats caused a pressor-response in a dose dependent manner. The pressor-responsed induced by intravenous injection of 0.5 mg/kg shogaol was markedly reduced by a spinal destruction to the sacral cord level. In rats whose the spinal cord was destroyed to the thoracic cord level,(6)-shogaol induced pressor response was reduced by 10 mg/kg IV injection of hexamethonium and phentolamine. When the spinal cord was destroyed to the sacral cord level, the pressor response was not affected by these blockades. The intravenous injection of 0.5 mg/kg, (6)-shogaol caused a tri-phasic pressor response which was comprised of a rapid fall accompanied with bradycardia and apnea followed by a rise and a delayed fall. The rapid fall disappeared with atropine and vagotomy. The marked rise was not affected by α-adrenoreceptor blockades, Ca - antagonists, and ganglion blockade, but was inhibited by a combination of α-adrenoreceptor blockade and Ca- antagonists.
- At lower doses, both (6)-shogaol and (6)-gingerol produced depressor response and at higher doses produced 3-phase pattern responses. (6)-shogaol caused two prossor responses on the perfusion pressure in the hindquarters of rats. The first pressor response was reduced by hexamethoniumor spinal destruction to the spinal cord level and partly reduced by phentolamine. The second pressor response, which occurred when the systemic blood pressure regained its original pressure, was not affected by hexamethonium, phentolamine or spinal destruction. The peripheral pressor response of (6)-shogaol in the hindquarters of rats was not affected by α-adrenoreceptor blockades and Ca-antagonists. This effect was markedly potentiated during the perfusion of norepinephrine (5 µg/ml), but this potentiation was prevented by pretreatment with reserpine (5 mg/kg, i.p.). Moreover, repeated injection of (6)-shogaol did not exhibit a pressor response in artery and vein of the tail or artery of the femur. (6)-shogaol at a dose of 3.6 µM showed positive inotropic and chronotropic and chronotropic actions on isolated rat atria. This effect disappeared by repeated injections or pretreatment of 100 mg/kg by subcutaneous injection of (6)-shogaol.

Hair stimulant effect:

- The juice from ginger rhizomes, externally applied on mice at a dose of 0.1 ml/animal, did not exhibit hair stimulant effect.

Cholagogue activity:

- The dietary feeding of ginger or the ingestion of acetone extract of ginger increased bile secretion. The excess bile salt excretion was mainly due to the increased production of taurodeoxycholic acid and taurocholic acid. Further analysis of the extract indicated that (6)-gingerol and (10) - gingerol were mainly responsible for the cholagogue affect.

Respiratory system:

- (6)-Shogaol (100 µM) induced contractile response on isolated guinea-pig trachea.

Anti-inflammatory activity:

- (6)-Shogaol inhibited carrageenin-induced hind pedal edema in rats via the inhibition of cyclo-oxygenase activity.

Anti-platelet activity:

- Three fractions namely the n-hexane, chloroform and ethyl acetate fractionated from the aqueous ginger extract, reduced platelet thromboxane formation from exogenous araohidonate and also inhibited platelet aggreration induced by arachidonate, epinephrine, ADP and collagen.
- An aqueous extract also reduced the formation of thromboxane B_2 without affecting the platelet phospholipase activity. At a higher dose, lipoxygenase products were also reduced. Ginger was found to act as a potent inhibitor of thromboxane synthetase, raising levels of prostacyclin, without a concomitant rise in PGE_2 or $PGF_{2\alpha}$.
- (6)-Shogaol, the pungent component of ginger, inhibited arachidonic acid-induced platelet aggregration in rabbits. (6)-Shogaol also prevented prostaglandin I_2 release from rat aorta and inhibited cyclo-oxygenase activity of rabbit platelets and microsomal fractions of rat aorta in a concentration-dependent manner. (6)- Shogaol exhibited an inhibitory action on 5-lipoxygenase activity.
- The consumption of ginger affected the platelet thromboxane production in humans. The levels of thromboxane in serum obtained after blood clotting were 782 and 498 pmol/ml in humans before and after consumption 5 g ginger daily for 7 days, respectively.

Uterine contraction:

- A traditional emmenagogue formulae consisting of *Alpinia galangal, Z. officinalis, Z. cassumnar, Citrus hystrix* and *Piper longum* showed no effect on rat uterine contractions but could potentiate the action of either oxytocin or simulated electrolyte solution.
- It also reduced the effect of methyl ergonovine upon the uterine contraction but had no effect on uterine contraction induced by acetylcholine. It was suggested that the emmenagogue formulae had no effect on *ß*-adrenergic receptor of rat uterus.

Antiserotoninergic activity:

- An acetone extract of ginger rhizomes possessed an antiserotoninergic affect on the contractile response of isolated guinea pig lieums. Further fractionation by column chromatography active components responsible for antiserotoninergic action.

Migraine:

- Consumption of powdered or fresh ginger exert abortive and prophylactic

effects in migraine headache. Due to its nontoxicity it is also safe to be use in childhood and juvenile migraine headache.

Antitussive effect:

- (6)-Shogaol showed an intense antitussive effect as compared to dihydrocodeine phosphate.

Piscicidal activity:

- A water extract of rhizomes was piscicidal against Tilapia (*Oreochromis niloticus* Linn.), the maximum concentration for 0% mortatity was 10,000 ppm.

Insecticidal activity:

- Water, alcohol, acetone and hexane extracts of fresh rhizomes possessed moderately-low to very-low insecticidal activity against the oriental fruit flies while the water-distillate of fresh rhizome skin was highly effective.

7.2 Uses in traditional medicine

- Roots are used for longevity, sweet voice and enhancing appetite.
- Treatment by `water' as skin tonic, carminative, antipyretic, anthelmintic, antidysenteric, antidiarrheal, digestive stimulant, diuretic, antimalarial and antihypertensive arising from abnormality of `fire' element causing abdominal discomfort and scybalous constipation, dyspepsia caused by wind flatulence and chronic illnesses.
- Chronic illnesses may lead to death, insomnia, yellowish stools, eye diseases, dysuria with urinary stones or discharge, abdominal discomfort, abnormal sputum, abnormality of four elements, cough, mucopurulent discharge of nasal cavity, apthous ulcers, constipation, nausea and vomiting, contusion, hemorrhoids, fever due to abnormality of combination of three of the following origins (*Semha, Pitta, Wata, Kamdao, Lohita*), chronic gastrointestinal ailment of the children between the ages of 5 and 13 (characterized by marked malnutrition, usually associated with intestinal parasitism), bodily discomfort and baldness due to abscesses;
- The stems are used in the treatment of abdominal discomfort, stomach discomfort, dysuria with urinary stones or discharge, mucitis, eye diseases, indigestion caused by wind element and vomiting; as a carminative, element tonic, digestive stimulant, anthelmintic, antidysenteric and antidiarrheal.
- Leaves are used for treatment of high body temperature, dysuria with or without urinary stones or discharge, mucitis and eye diseases; as a carminative, digestive stimulant, element tonic and anthelmintic.
- Flowers are used for treatment of blepharitis, mucitis, dysuria and dysuria with urinary stones or discharge; as skin tonic, anthelmintic, digestive stimulant, element tonic and antidysentery
- The fruit is used as an antipyretic.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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Zingiber zerumbet (Linn.) Smith
Zingiberaceae



1.0 Scientific Name : *Zingiber zerumbet* (Linn.) Smith

2.0 Vernacular Names : Kathue (Central), kathuepaa, kawaen, kaaen, haeodam (Northern), plepho (Karen-MaeHong Son), hieokhaa (Shan-Mae Hong Son), hieodaen, mae hong Son).

3.0 Plant Description

The plant is a perennial herb having creeping horizontal rhizome, which is white or pale yellow inside, and leafy stem to 2 m tall. **Leaves** are simple; oblong-lanceolate, 10 to 20 by 2 to 4 cm; thin; entire; consisting of apex acuminate, base gradually narrowed towards the leaf sheath; a few scattered hairs. **Inflorescence** is borne separately from the leaves, spike is oblong, 20 to 30 cm long, flowers are white or pale yellow, each subtended by a reddish green, curved bract; consisting of calyx shortly 3-toothed, herbaceous; corolla-tube as long as the bracts 3-lobed, lip (anterior staminode) 3-lobed, midlobe nearly round, about 2 cm in diameter, emarginated, lateral lobes smaller, ovate, free almost to the base; fertile stamens 1, as long as the lip, anthers 2-celled, connective tissue prolonged in to a crest, shorter than the anther. **Fruit** is subglobose, up to 1.5 cm in diameter.

4.0 Propagation : Propagation by rhizomes.

5.0 Ecology/ Geographic Distribution

The plants are commonly found in tuft along evergreen forest at 100-1,000 m above sea level. They require shade and well-drained soil.

6.0 Chemical Constituents

- Rhizomes contain afzelin, campheme, caryophyllene, ß-caryophyllene, caryophyllene epoxide, caryophyllene oxide, 1,8-cineole, p-cymene, 3,4-O-diacetyl afzelin,di-p-coumaroyl methane, diferuloylmethane, essential oil, feruloyl-p-coumaroyl methane, humulene, α-humulene, humulene diepoxide, humulene epoxide, humulenol, (+)-humulenol II, humulene epoxide I, humulene epoxide II, α-pinene, sabinene, zerumbone and zerumbone epoxide.
- Essential oil contains zeruymbone and zerumbonepoxide.
- Not specified part used: eremophilone, essential oil, humulene epoxide I, humulene epoxide II, sesquiterpeneoids and zerumbone.

7.0 Reports on Medicinal Usage

7.1 Uses supported by experimental clinical data

Cytotoxic activity:

- An ether extract was cytotoxic against hepatoma HTC, *in vitro.*

Carminative effect:

- The effect may be due to the presence of essential oil.

Anthelmintic activity:

- Earthworms applied with 95 % ethanol extract of *Z. zerumbet* became paralysed within 18 hours and dead 24 hours post application.

Antihistaminic activity:

- Ethanol-water (1:1) extract at various concentrations showed no effect on guinea pig ileums *in vitro*.

Antimalarial activity:

- A clinical trial on the antimalarial activity of an aqueous alcohol extract of rhizomes was carried out and it was reported that 50 % of the patients infected with *Plasmodium falciparum* but none of those infected with *P. vivax,* were cured.

Chronotropic effect:

- Chronotropic effect upon alcohol-water (1:1) extract administration, intravenously to dogs at various doses. The extract neither act as smooth muscle stimulant nor antispasmodic activities.

Antibacterial activity:

- A hot water extract (0.5 ml/disc) showed no effect against *Bacillus subtilis* strains H-17 (rec+) and M-45 (rec-) but exhibited antibacterial activity against both bacteria when water extract prepared without heat was used.
- An ethanol extract of rhizomes showed no activity against *Staphylococcus aureus, Streptococcus faecalis, Escherichia coli, Shigella flexneri, Salmonella*

typhosa, Vibrio cholerae, V. parahaemolyticus and *Aeromonas hydrophila.*

Mutagenic activity:

- Both hot water and cold water extracts of *Z. zerumbet rhizomes* at a concentration of 0.5 ml/disc or various concentrations showed no effect on *B. subtillis* strains H-17 (rec+) and M-45 (rec-).

Piscicidal activity:

- A water extract of rhizomes exhibited piscicidal effect against `tilapia' (*Oreochromis niloticus*), the maximum concentration for 0 % mortality was reported to be 1,000 ppm while the minimum concentration for 100 % mortality was 10,000 ppm.

Smooth-muscle relaxation activity:

- It was reported that *Z. zerumbet* (Linn.) possessed relaxation activity on spasmogen induced guinea pig ileums.

Toxicity assessment:

- An alcohol extract (10 g/kg) administered to mice by gastric intubation or sub cutaneously, showed no toxic effect.

7.2 Uses in traditional medicine

- Roots: treatment of sprain and body discomfort; as an antipyretic.
- Rhizomes: to improve bowel movement, digestive secretagogue, enhancing appetite and promote health; treatment of griping, tenesmus, stomachache, abdominal distention, abdominal discomfort, mucous bloodystool and abscesses; as a lactagogue, antidysenteric, antiflatulence, carminative and diuretic.
- Stem: for enhancing appetite and as an antipyretic
- Leaves: for accelerating lochial discharge, treatment of hematuria.
- Flowers: treatment of chronic pyrexia, cachexia, chronic ailments and disorders of wind elements, as an element tonic.
- Part used not specified: for correcting bowel movement; treatment of stomach discomfort and griping; as an element tonic, antidysenteric.

8.0 Contraindications : Not available

9.0 Dosage : Not available

10.0 Bibliography

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List of Contributors
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LIST OF CONTRIBUTORS

BRUNEI DARUSSALAM

1. **Mr. Muhd. Safwan bin Abdullah Bibi**
Forestry Department
Ministry of Industry & Primary Resources
Jalan Menteri Besar, Berakas BB3910
Bandar Seri Begawan, Brunei Darussalam
Tel: 673-2381678 Fax: 673-2381012
e-mail: forestrybrunei@hotmail.com

2. **Mr. Mulyadi Hj. Mohd. Ali**
Agriculture Department
Ministry of Industry & Primary Resources
Jalan Menteri Besar, Berakas BB3910
Bandar Seri Begawan, Brunei Darussalam
Tel: 673-2663346 Fax: 673-2661354
e-mail: mulyadi_ali@agriculture.gov.bn

CAMBODIA

3. **Mr. Hung Suntra**
Forest and Wildlife Research Institute
Ministry of Agriculture, Forestry & Fisheries
#40 Preah Norodom Boulevard
Phnom Penh, Cambodia.
Tel: 855-23-219282, 855-12-802699
Fax: 855-23-214282
e-mail: hsuntra@yahoo.com

4. **Mr. Chan Sophal**
Department of Forestry and Wildlife
Forest and Wildlife Research Institute
Forest Administration
#40 Preah Norodom Boulevard
Phnom Penh, Cambodia.
Tel / Fax : 855-23-213612
e-mail: ffpri_fwri@online.com.kh

INDONESIA

5. **Dr. Yetti Rusli**
Ministry of Forestry
Jakarta, Indonesia.
Tel: 62-21-5730205, 62-21-5730222;
Fax: 62-21-5700226
e-mail: yettir@dephut.cbn.net.id

6. **Dr. Nurliani Bermawie**
Head of Medicinal Plants Programme
Indonesian Medicinal and Aromatic
Crops Research Institute (IMACRI)
Ministry of Agriculture
Jl. Tentara Pelajar No.3, Bogor
Indonesia
Tel: 62-251-321879, 62-251-342891
Fax: 62-251-327010
e-mail: nurlianib@yahoo.com

LAO PDR

7. **Prof. Dr. Bounhong Southavong**
Traditional Medicine Research Centre
Ministry of Health
Ban Phon Papao Tha
Sisattanak District
Vientianne, Lao PDR
Tel: 856-21-315693 Fax: 856-21-312354
e-mail: laotmrc@laotel.com;
bsouthavong@hotmail.com

8. **Assoc. Prof. Dr. Kongmany Sydara**
Traditional Medicine Research Centre
Ministry of Health
Ban Phon Papao Tha
Sisattanak District
Vientianne, Lao PDR
Tel: 856-21-315693 Fax: 856-21-315693
e-mail: ksydara@gmail.com

MALAYSIA

9. **Dr. Ling Sui Kiong**
Natural Products Division,
Forest Research Institute Malaysia (FRIM),
Kepong 52109, Selangor, Malaysia
Tel: 603-62797356 Fax: 603-62729805
e-mail: lingsk@frim.gov.my

10. **Dr. Rasadah Mat Ali**
Natural Products Division,
Forest Research Institute Malaysia (FRIM),
Kepong 52109, Selangor Malaysia
Tel: 603-62797330 Fax: 603-62729805
e-mail: rasadah@frim.gov.my

11. **Ms. Ummu Hani Badron**
Natural Products Division
Forest Research Institute Malaysia (FRIM),
Kepong 52109, Selangor
Malaysia
Tel: 603-62797602 Fax: 603-62729805
e-mail: ummu@frim.gov.my

MYANMAR

12. **Mr. Myo Myat**
Director,
Planning & Statistic Department
Ministry of Forestry,
Yankin P.O. Yangon, Myanmar
Tel: 95-67-405012 Fax: 95-62-405378
trincertcom@mptmail.net.mm

PHILIPPINES

13. **Dr. Antonio M. Dano**
Ecosystems Research and Development Bureau,
Department of Environmental and Natural Resources (DENR)
College, Laguna, Philippines
e-mail: tonydano705@gmail.com

THAILAND

14. **Ms. Tasanee Pattanaseree**
Forest Products Development Division,
Forestry Research & Development Bureau,
Royal Forest Department.
61. Phaholyothin Road, Chatuchak.
Bangkok, 10900, Thailand.
Tel : +66-2561-4293 ext. 5861, 5476
e-mail: tasaneepat@hotmail.com

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