

# *Hedychium gardnerianum* Sheppard ex Ker Gawl.

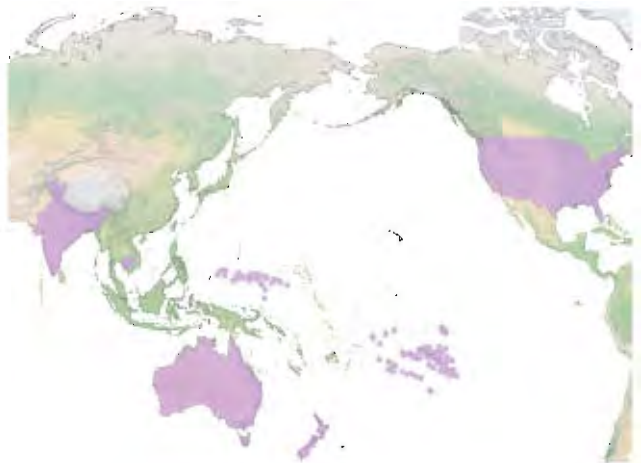
Native : Eastern Himalayas including  
Nepal and Northeast India

Family : Zingiberaceae

Synonyms : *Gamochilus speciosus* T. Lestib.  
*Hedychium pallidum* Regel

Common names : Kahila garland-lily, kahili ginger

*Hedychium gardnerianum* is a perennial ornamental herb that grows in wet climates from sea level to 1700 m. A native of the Eastern Himalayas, the plant is ranked among the top 100 of the world's worst invaders in the Global Invasive Species Database. The plant can displace native plants, form vast dense colonies and choke understorey vegetation. It has been introduced around the world mainly through horticultural trade. The fragrant rhizomes are the primary source of spread of *Hedychium*. The fleshy red seeds are spread by birds and also through garden waste. The plant also exhibits clonal reproduction, with the small root fragments having the potential to resprout.



**Distribution** : Australia, Bangladesh, Bhutan, Cambodia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, India, Nepal, New Caledonia, New Zealand, United States.

**Description** : Perennial rhizomatous herbs, 1.5 - 2 m tall; rhizomes branching, to 3.5 cm in diameter. Leaves ovate-elliptic, glabrous or sparsely pubescent along the midrib on the lower surface, apex shortly acuminate; 20 - 45 x 10 - 15 cm, petiole 1-2 cm long, ligules membranous, 1.5-3 cm long, entire or very shallowly two-lobed, glabrate; sheath glabrous or glabrate. Inflorescence yellowish, terminal, erect, cylindrical, 16-30 cm long, primary bracts widely spaced, ovate-elliptic, spreading or obliquely ascending, enfolding the cincinni, much shorter than the floral tube, 3 - 5 cm long, glabrous. Rachis glabrous, exposed, cincinnus two-flowered, greenish-yellow, linear, 3.5 - 5 cm long. Fruit a thin walled capsule, 1.5 cm long, with three compartments. Seeds bright scarlet, ca. 4 mm long; aril bright red, fleshy.



**Habitat** : The plant prefers open areas with warm moist climate but can also grow in full shade beneath a forest canopy. It is common in agricultural areas, coastlands, natural forests, planted forests, open ranges and grasslands, riparian zones, ruderal and disturbed areas, scrub- and shrublands, urban areas and wetlands.

**Threat and damage** : It may form dense growth in native forests, smother seedlings, displace them and prevent regeneration. This results in alteration of



forest habitats and ecosystems and degradation of native forest communities. The plant may also block stream edges, altering water flow. Aircraft-based analysis has shown that the plant reduces the amount of nitrogen in the metrosideros forest canopy in Hawaii, a finding later corroborated by ground-based sampling. Such alteration in natural ecosystem processes could alter the type of fauna in those habitats. The plant is poisonous to grazing animals.

**Uses :** Widely cultivated as an ornamental.

**Management :** Manual removal of the weed is an option for controlling local infestations. Small seedlings can be hand-pulled. Metasulfuron-methyl and glyphosate are effective in controlling *Hedychium* populations. *Ralstonia solanacearum* (Smith) Yabuuchi *et al.*, a host specific bacterium, which causes wilt has been identified as a potential biological control agent against the plant.





# *Hiptage benghalensis* (L.) Kurz

Native : South and Southeast Asia

**Family** : Malpigiaceae

**Synonyms** : *Banisteria benghalensis* L.  
*B. tetraptera* Sonnerat

**Common names** : Hiptage

The genus name *Hiptage* is derived from the Greek 'hiptamai' (to fly) and refers to the plant's unique three-winged fruit. The plant is invasive in Australian rain forests and in dry lowland forests in Mauritius and Réunion, where it forms dense thickets preventing growth of native vegetation. The Global Invasive Species Database ranks this species in the top 100 of the world's worst invaders. The seeds are dispersed by wind and propagation is mainly by seeds and cuttings.

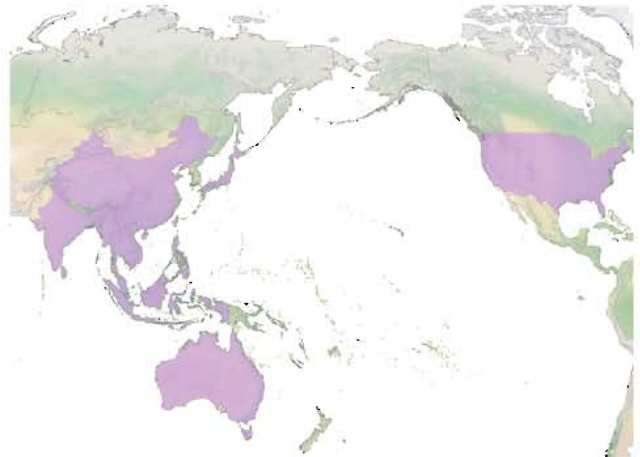
**Description** : Woody climbers, young shoots sparsely pubescent, often with minute medifixed hairs. Leaves simple, opposite, elliptic, 9-19 x 4-9 cm, acute or acuminate, pale and sparsely pubescent beneath, shiny above; petiole to 1 cm long. Raceme axillary and terminal, to 20 cm, erect, softly tomentose. Flowers creamy-white, fragrant, the posterior one being the largest and with a yellow centre, with appressed pubescent hairs to the outside, glabrous to sparsely pubescent within. Fruit a samara with three spreading, papery wings. Seeds globose to sub-globose, 9-10 mm long.

**Habitat** : The habitat of *Hiptage* is very variable but it is common in natural forests. The plant prefers climates ranging from warm temperate to tropical.

**Threat and damage** : *Hiptage* is invasive in many countries especially the United States (Florida and Hawaii) and Australia. It has been recorded as a pest in tropical Australian rain forests. On Réunion Island and Mauritius, it climbs over and smothers native vegetation.

**Uses** : Widely cultivated as an ornamental for its attractive and fragrant flowers. It can be trimmed to form a small tree or shrub or can be trained as a vine. The plant is also medicinal. The leaves and bark are hot, acrid, bitter, insecticidal and useful in treatment of biliousness, coughs, burning sensations, thirst, inflammation, skin diseases and leprosy.

**Management** : Very low volume basal bark applications of triclopyr are effective. Also, cutting



**Distribution** : Australia, Bangladesh, Cambodia, China, India, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand, United States, Viet Nam.

branches where *Hiptage* touches the ground and painting the stumps with triclopyr is useful in managing the population. Mechanical and biological control are unknown.



# *Hypericum perforatum* L.

Native : Europe, Northwest Africa, West, North and South Asia

- Family** : Clusiaceae  
**Synonyms** : *Hypericum marylandicum* Biroli ex Colla  
*H. vulgare* Bubani  
**Common names** : Goatweed, klamath weed,  
St. John's wort

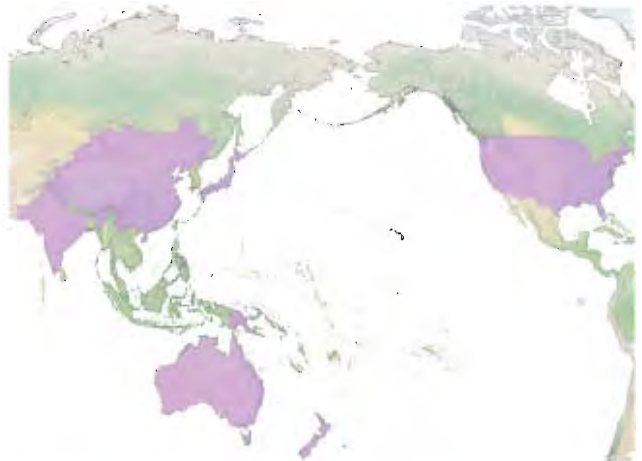
*Hypericum perforatum* can grow in a wide range of habitats and environments and has the ability to store reserves in its root crown which helps survival during harsh weather. The plant has an underground rhizomatous stem and deep taproot with many lateral roots. It has two distinct growth phases, a fall/winter prostrate or basal growth, and spring/summer erect woody stem growth. The plant spreads by runners and through seeds.

**Description** : Perennial subshrubs, stem sometimes rooting at the base, two-lined, smooth, with ascending branches, 30-70 cm tall. Leaves simple, opposite, sessile or subsessile, 0.5 - 3.5 x 0.2 - 1.4 cm, narrowly ovate to elliptic-oblong or linear or sometimes oblanceolate, apex obtuse or mucronate to rounded, base cuneate to rounded, entire with intramarginal and often a few laminar black glands. Inflorescence a many-flowered, subcorymbose or broadly pyramidal cyme with ultimately monochasial branches. Flowers 1.5-2.5 cm in diameter, yellow, with marginal black dots and sometimes laminar black lines. Fruit a capsule, reddish-brown, 5-9 mm long, ovoid to pyramidal, each valve with dorsal vittae and lateral vesicles, splits open when mature. Seeds 1.0 - 1.2 mm, shortly apiculate, testa reticulate-pitted.

**Habitat** : The plant can grow on various types of soils, from dry, rocky to deep fertile soil but cannot grow in densely-shaded areas. As a weed, it is commonly found in agricultural areas, natural forests, planted forests and urban areas in upland temperate regions.

**Threat and damage** : Displaces and inhibits the settlement and establishment of native flora. The plant contains two toxic compounds, hypericin and hypericum red, which cause photosensitization in grazing livestock.

**Uses** : Used in treatment for anxiety and depression, sleep disorders, bacterial and viral infections, skin wounds, cancer and inflammatory arthritis. In gardens, it is used as an ornamental and a perennial border plant.



**Distribution** : Australia, China, India, Japan, Mongolia, New Zealand, Pakistan, Papua New Guinea, United States.

**Management** : Hand-pulling or digging-out provides temporary control. Glyphosate and picloram are effective in controlling propagation. Biological control is unknown.





# *Impatiens glandulifera* Royle

Native : Bhutan, Northeast India, Nepal, Northwest Pakistan

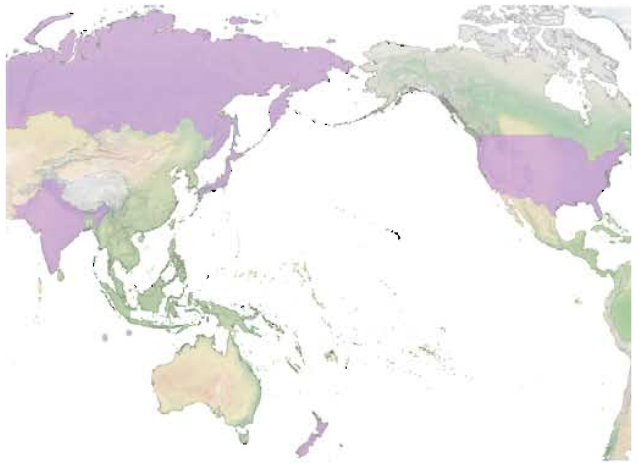
- Family** : Balsaminaceae  
**Synonyms** : *Balsamina glandulifera* (Royle) Ser.  
*B. macrochila* (Lindl.) Ser.  
**Common names** : Himalayan balsam, Indian balsam, ornamental jewelweed

*Impatiens glandulifera*, introduced as an ornamental plant in several countries, turned invasive due to its inherent features such as aggressive seed dispersal and high nectar production, which attracts pollinators. Eradication of the plant is difficult once established. The shape of the flower resembles an English police man's hat.

**Description** : Robust succulent herbs, annual, glabrous, to 2.5 m tall. Leaves simple, opposite-verticillate, 6 - 15 x 1.8 - 6.5 cm, elliptic-ovate, serrate, base glandular stipitate; petiole 30-35 mm long. Inflorescence axillary racemes with 5 - 12 deep to pale purplish, rarely white flowers, 2.5-4 cm long, zygomorphic, with a sepal sac of 1.2 - 2 mm, abruptly contracted to a spur of 2 - 8 mm length. Fruit a capsule, broadly clavate, 1.4 - 2 cm long, nodding. Seeds black, subglobose, 3 mm long, rugose.

**Habitat** : Common in agricultural areas, natural forests, riparian zones and wetlands at elevations between 1,800 - 3,200 metres. It tolerates a wide range of soil textures and structures, a pH range of 4.5 to 7.7 and relatively low sunlight.

**Threat and damage** : *I. glandulifera* is a fast-growing invasive plant that competes with native species and negatively affects wildlife habitats. Its hardiness, high reproductive rate, rapid growth, early germination and propensity to establish thick, dense stands all make *I. glandulifera* a successful competitor. The plant can alter water flow and promote erosion in watercourses.



**Distribution** : Christmas Island, Coco (Keeling) Islands, India, Japan, Nepal, New Zealand, Pakistan, Russian Federation, United States.

**Uses** : A popular ornamental; an edible oil is obtained from the seed.

**Management** : The plant can easily be removed by hand-pulling, grazing or cutting. The removal has to be continued until no more growth occurs for at least two to three years. Spraying the leaves with glyphosate is also effective but its use near waterbodies is not advisable. Biological control is unknown.



## *Imperata cylindrica* (L.) P. Beauv.

Native : Pantropical

**Family** : Poaceae

**Synonyms** : *Imperata angolensis* Fritsch  
*I. arundinacea* Cirillo

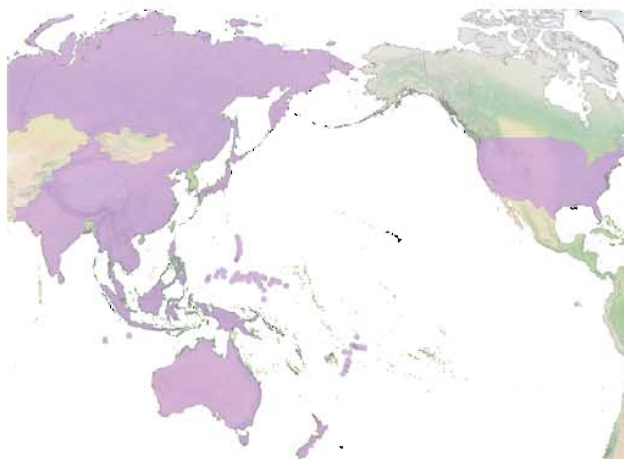
**Common names** : Alang-alang, blady grass, cogon grass, japgrass, satintail

*Imperata cylindrica* is one of the most noxious colonizers of degraded humid tropical forests. It also invades abandoned shifting cultivation areas. It is reported as a pest in 35 crops in 73 countries. The Global Invasive Species Database has ranked *Imperata* among the top 100 of the world's worst invaders. The species is extremely polymorphic, but it could easily be recognized by the dense, narrowly cylindrical, silky white inflorescence. Each plant produces as many as 3, 000 seeds which are highly germinable.

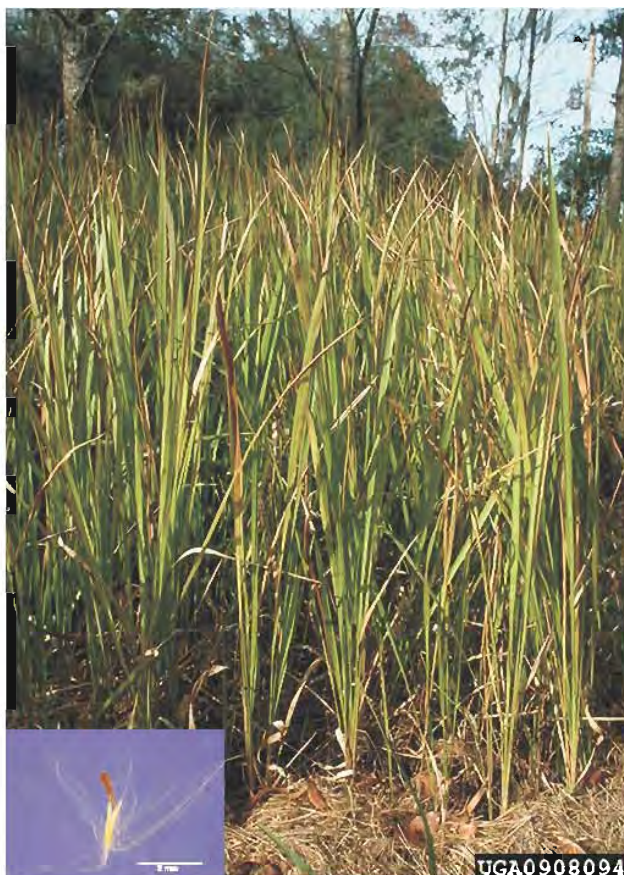
**Description** : Perennial grass, culms 20-150 cm high, tufted, nodes bearded. Leaves 15-70 x 0.8-2 cm, lanceolate, narrowed towards the base, glabrous, sheath rounded, glabrous; ligule membranous. Panicle to 30 x 1.5 cm, cylindrical; rachis glabrous, spikelets ca. 4 x 1 mm, similar, lanceolate, pedicelled, callus with long hairs, glumes equal, ca. 3 x 1 mm, lanceolate, with long silky white hairs on the dorsal surface; lower floret empty, upper bisexual; first lemma ca. 2 x 1 mm, oblong, hyaline, epaleate, second lemma ca. 1.5 x 1 mm, hyaline, 3 - lobed, paleate. Caryopsis 1-1.3 mm long.

**Habitat** : A common weed in hot climatic conditions in several countries of Africa south of the Sahara and in South and Southeast Asia. It invades a wide variety of natural habitats such as desert dunes, wetlands, savannahs and forests, where it outcompetes native plants. *Imperata* habitat also includes dry sand dunes of shores and deserts as well as swamps and river margins. It grows on grasslands and areas cultivated with annual and plantation crops, retarding their growth. The plant quickly enters and colonizes abandoned farmlands, railway lines, roadsides, highway embankments and deforested and reforested lands. It can withstand long dry spells on light soils and will tolerate waterlogging on heavy soils. *Imperata* quickly establishes on medium to good soils but is less frequently a pest on poor soils.

**Threat and damage** : It is a noxious weed because of



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wide distribution, high competitive ability and adaptation to a wide range of climatic conditions and soils. The plant is resistant to many control methods including burning. Dry and vast *Imperata* wastelands are highly prone to frequent and intense fires, which destroy native vegetation and hamper the succession of native plants by killing shoots. Following fires, *Imperata* regenerates very rapidly from the underground rhizomes and may dominate on sites previously disturbed by slash-and-burn agriculture.

**Uses :** Used in folk remedies for cancer, colds, diarrhoea, gonorrhoea, myalgia, night sweats, piles, rheumatism and tumours. Stands of this species are sometimes burned or cut so that the tender new growth can be used for short-term supplemental or emergency pasture, but it generally produces poor quality forage and animals avoid chewing the sharp-

edged mature leaves. It is often planted for soil stabilization, paper-making, weaving into mats and bags and for roofing.

**Management :** Hand-pulling is an option but is extremely labour-intensive. Burning has also been used successfully in controlling the grass. As with mowing, burning stimulates the growth and spread of *Imperata*, making follow-up control a necessity. A 2 percent solution of glyphosate is recommended in areas that will be immediately revegetated. In areas where immediate revegetation is not planned and non-target plant damage is not a concern, application of imazapyr has been recommended. The gall midge *Orseolia javanica* Kieffer & Leeuwen – Reijnvaan and the pathogen *Colletotrichum caudatum* (Sacc.) Peck are considered as potential candidates for use in classical biological control.





## *Lantana camara* L.

Native : Cental and South America

**Family** : Verbenaceae

**Synonyms** : *Lantana aculeata* L., *L. antillana* Raf.

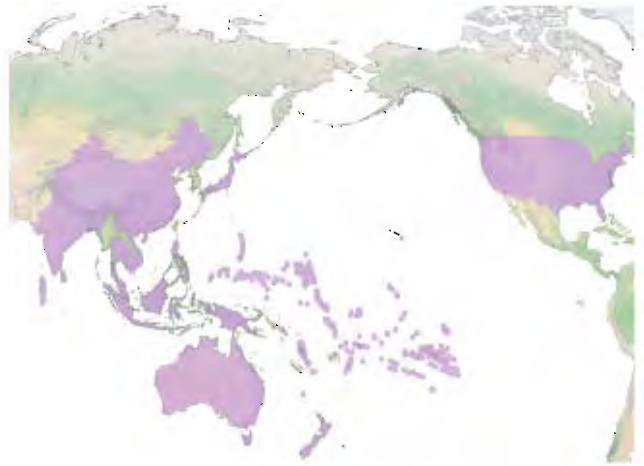
**Common names** : Lantana, sleeper weed, Spanish flag

*Lantana camara* is ranked among the top 100 of the world's worst invaders in the Global Invasive Species Database. It has approximately 650 varieties in over 60 countries including island groups. The plant has established and expanded its territory in many parts of the world often as a result of clearing of forests for timber or agriculture. Its allelopathic properties lead to reduced vigour of native plant species growing in the vicinity and decrease productivity in all invaded ecosystems. Mature plants produce up to 12, 000 seeds annually. Seed germination occurs when sufficient moisture is present; germination is reduced by low light conditions. The root system is very strong with a main taproot and a mat of many shallow side roots.

**Description** : Low erect or subscandent shrubs, armed with stout recurved prickles, up to 4 m in height. Stem square in cross section, hairy when young, cylindrical, up to 15 cm thick. Leaves simple, opposite, lamina ovate to oblong, 2-10 x 2-6 cm, bright green, papery, wrinkled, very rough, with short stiff hairs, emits a pungent odour when crushed, base rounded to subcordate, margin crenate, lateral veins of 5 pairs, prominent; petiole 1-2 cm, pubescent. Flower heads with 20 - 40 flowers, each up to 2.5 cm across. Flower colour varies from white, cream or yellow to orange pink, purple and red. Fruit a drupe, greenish blue-black, globose, ca. 4 mm in diameter, shining, one seeded.

**Habitat**: The wide geographic distribution of lantana, its luxuriant growth in diverse habitats and on different soil types in a reflection of its broad ecological tolerance. Lantana generally grows best in open areas such as wastelands, rain forest borders, roadsides, beach fronts and forests recovering from fire or logging.

**Threat and damage** : Lantana is a major invader in natural forests and agricultural systems around the globe. It can grow in clumps and dense thickets preventing regeneration and disrupting succession of native species in natural forests. As the density of lantana in a forest increases, species richness



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decreases. Forest fires can stimulate growth of lantana. The plant is poisonous to cattle, buffalo, sheep and goats. Bushes of the plant provide shelter to several insects of health concern such as malarial mosquitoes and tsetse flies.

**Uses :** Lantana is a favoured ornamental world wide. It is also used as fuel wood, hedge and mulch. The stems and branches are used for making furniture in some countries. Its leaf extract has antimicrobial, insecticidal and nematicidal properties. The use of lantana extract as a biocide has been suggested.

**Management :** Mechanical clearing and hand-pulling

are suitable for small areas and fire can be used over large areas. Glyphosate is most effective as an overall foliar spray. Metsulfuron may be effective if application is timed before annual droughts. Triclopyr ester applied on the basal bark is effective. Fungal pathogens like *Prosopidium tuberculatum* (Speg.) Arthur, *Puccinia lantanae* (Farlow) Lindquist and *Ceratobasidium lantanae-camarae* H.C. Evans, R.W. Barreto & C.A. Ellison have been identified as potential biocontrol agents. Though several insects feeding on lantana in its native range have been introduced as bio-control agents from time to time success in controlling the weed has been limited.





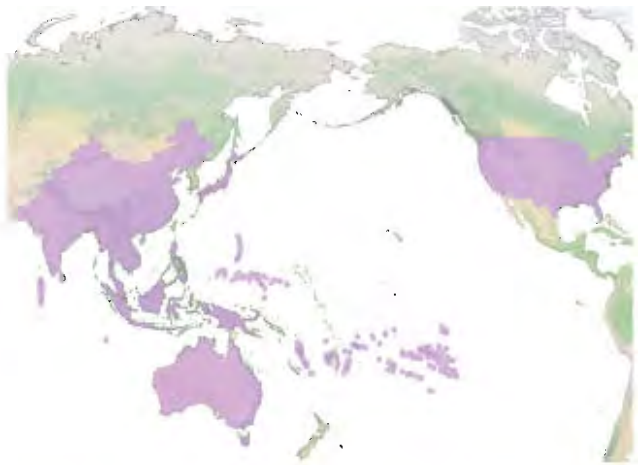
## *Leucaena leucocephala* (Lam.) de Wit

Native : Mexico and Central America

- Family** : Fabaceae  
**Synonyms** : *Acacia frondosa* Willd.  
*A. leucocephala* Lam.  
**Common names** : Wild tamarind, jumbie bean,  
lead tree, leucaena

*Leucaena leucocephala* is a nitrogen-fixing tree species widely promoted for tropical forage production and reforestation. However, it spreads and colonizes naturally and is widely considered as an invasive tree. The genus *Leucaena* is distinguished from other mimosoid legumes by its hairy anthers. *L. leucocephala* is distinguished from other species of *Leucaena* by its intermediate leaflets and large pods in clusters of 5 to 20 per flower head. In the past, *Leucaena* was known as a 'miracle' tree because of its worldwide success as a long-lived and highly nutritious forage tree and its use as fuelwood, charcoal, pulpwood and as a soil improver. This thornless tree can form dense monospecific thickets and is difficult to eradicate once established. The Global Invasive Species Database ranks this species among the top 100 of the world's worst invaders.

**Description** : Small trees, to 20 m tall, bark greyish-brown, slightly fissured, young shoot covered by tomentum. Leaves bipinnate, stipulate, stipule setaceous; rachis 7 - 15 cm long, pubescent, ending in a soft bristle, common rachis 15 - 20 cm long, pinnae 4 - 9 pairs, 5 - 10 cm long, hairy, ending in a bristle; leaflets 10 - 17 pairs, sessile, 1 - 1.3 x 0.2 - 0.4 cm, linear, oblong, acute, glabrous or subglabrous, base oblique. Flowers in globose white heads, often in pairs, peduncle 2.5 - 3.8 cm long, head 1.5 - 2.2 cm in diameter. Fruit a pod, straight, flat, 12.5 - 20 x 1.5 - 2.0 cm, minutely pilose, acute at apex, stipe 1 - 2.5 cm long. Seeds 15 - 25, 5.6 x 4.5 mm, oval, glaucous, dark brown, with a prominent U-shaped mark on either side.



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**Habitat :** It occupies agricultural areas, disturbed or degraded areas and open coastal and riverine habitats. It favours less acidic soils, sub-humid and humid climates and does not tolerate water logged soils or extended periods of flooding.

**Threat and damage :** *Leucaena* can form dense thickets excluding all plants and can spread rampantly through adjacent areas if not controlled. Such thickets can render extensive areas unsuitable and inaccessible. It can replace native forest land and is a threat to endemic species in some areas.

**Uses :** Pods, seeds and leaf tips are used as food, although mimosine toxicity is a problem. It is one of the best and most palatable fodder trees of the tropics. The leaf quality compares favourably with alfalfa or lucerne in feed value except for its higher tannin content and mimosine toxicity to non-ruminants. The tree makes excellent charcoal and it is also used as a

shade over coffee and cocoa.

**Management :** Removal by cutting is not suitable because vigorous resprouting will follow. Treating cut stumps with diesel or other chemicals may provide some control. It is sensitive to foliar-applied triclopyr. Soil-applied tebuthiuron, cut-surface application of picloram and basal bark and stump bark application of triclopyr ester are all effective. A bruchid beetle seed predator, *Acanthoscelides macrophthalmus* Schaeffer, has been deliberately introduced and released in South Africa as a biocontrol agent and the same insect has been accidentally introduced to Australia. The accidental spread of the psyllid insect defoliator *Heteropsylla cubana* Crawford in Asia in the mid-1980s caused cyclical defoliation, but did not kill trees and the psyllid appears to have been brought under control by a number of generalist local psyllid predators and parasites.





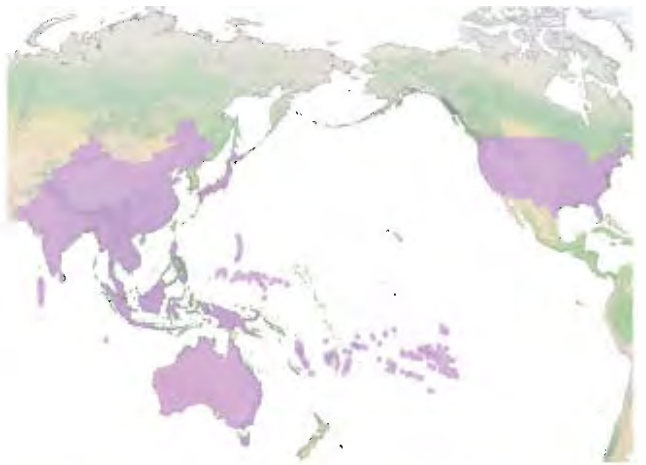
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# *Ligustrum lucidum* W.T. Aiton

Native : East Asia

**Family** : Oleaceae

**Synonyms** : *Esquirolia sinensis* H. Lev.  
*Ligustrum esquirolii* H. Lév.

**Common names** : Broadleaf privet, glossy privet,  
large leaf privet, ligustrum privet

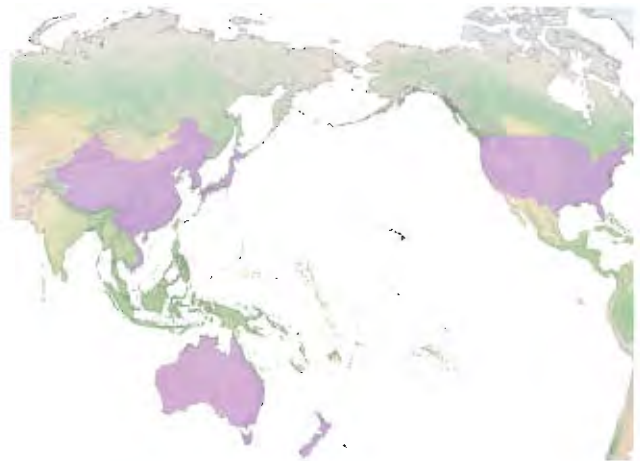
*Ligustrum lucidum* is a fast-growing species grown as a hedge or ornamental plant in different parts of the world. It is densely branched and can form thickets, destroying native animal habitats and wildlife corridors. Fruit-eating birds disperse the seeds and aid in spread of the plant.

**Description** : Large shrubs or small trees, branchlets terete with conspicuous white lenticels. Leaves simple, opposite, lamina ovate to broadly elliptic or elliptic to lanceolate, 6 - 17 × 3 - 8 cm, base rounded or sometimes attenuate, apex acute to acuminate or sometimes obtuse; 4 - 11 primary veins on each side of midrib, slightly raised or obscure; petiole 1-3 cm. Inflorescence paniculate, terminal, 8 - 20 × 8 - 25 cm, rachis angular in fruit. Flowers, 4-5 mm across, cream-coloured, scented, sessile or subsessile. Fruit a berry-like drupe, deep blue black, purplish-black on ripening, reniform, 7 - 10 × 4 - 6 mm. Seeds 1 - 3, kidney shaped with ribbed surface.

**Habitat** : Grows in agricultural areas, natural forests open woodlands, roadsides, waterways and disturbed areas; it prefers full sun to partial shade and is moderately drought-tolerant. The plant can thrive in any type of soil as long as it is not constantly wet.

**Threat and damage** : *Ligustrum* can invade closed forests wherever gaps occur. Once established, it forms dense understorey thickets which shade out and displace native vegetation. It germinates in the shade and seedlings rapidly grow into shrubs by utilizing canopy gaps. Damaged plants resprout from the root crown. The shoots contain a glycoside which is probably toxic.

**Uses** : Extracts from *Ligustrum* fruits stimulate the immune system, reduce inflammation and may have beneficial effects on the liver and anti-tumor activity. A commercial insect wax is produced on the branches as a result of eggs being laid by insects. The fruit is antibacterial, antiseptic, antitumour, cardiotoxic and diuretic.



**Distribution** : Australia, China, Democratic People's Republic of Korea, Japan, New Zealand, Republic of Korea, United States, Viet Nam.

**Management** : Small plants can be hand-pulled but older trees need to be dug out. Herbicides such as 2,4,5-T ester, glyphosate, triclopyr, dicamba and metasulfuron-methyl are effective in controlling the weed. Biological control is unknown.





## *Ligustrum robustum* (Roxb.) Blume

Native : South and Southeast Asia and China

**Family** : Oleaceae

**Synonyms** : *Ligustrum ceylanicum* Decne.  
*L. neilgherrense* Decne.  
*Phyllyrea robusta* Roxb.

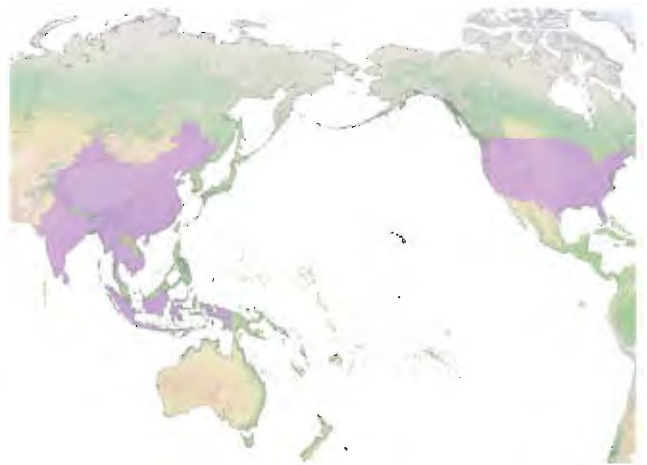
**Common names** : Ceylon privet, Sri Lankan privet,  
tree privet

*Ligustrum robustum* is a highly invasive plant that disrupts primary forest regeneration and threatens native floral diversity. The high fruit production by the plant in invaded regions has been cited as one of the reasons for its high invasiveness. The Global Invasive Species Database ranks this species among the top 100 of the world's worst invaders. The tree can regenerate easily from root and stump remains. It behaves like a hemisciaphilous species which establishes in shady sites but requires light to mature.

**Description** : Shrubs or small trees, to 5 m tall, stem arched. Leaves simple, opposite, 3-9 x 1.5-2.5 cm, shortly petiolate, often glandular beneath, margin entire. Inflorescence terminal, thyrsoid or paniculiform, bracteate, ovate to lanceolate, to 8 cm in length. Flowers white, small, subsessile or short-pedicellate. Fruit a fleshy berry or drupaceous. Seeds usually solitary, sometimes 2-4. Fruits are ingested by birds and propagated in their droppings, dispersing the seeds over long distances.

**Habitat** : The species is common in wet and intermediate low montane regions in India and in the submontane forests in Sri Lanka, at altitudes from 725 to 1,650 metres. It also grows along roadsides, in agricultural areas, natural forests, planted forests, riparian zones, ruderal/disturbed land, scrub-/shrublands and urban areas.

**Threat and damage** : The dense foliage of the tree reduces light availability to the forest floor preventing regeneration of light-demanding understorey species. Heavy infestation by the weed alters the structure and composition of forests by affecting nutrient cycling and water availability. It can displace native species and affect successional patterns by competing with them for nutrients and water. The rapid growth rate, ability to tolerate high shade conditions, high seedling recruitment and dependence on birds to distribute seeds make this



**Distribution** : Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Sri Lanka, Thailand, United States, Viet Nam.





species a formidable invader. The leaves and fruits are reported to be allelopathic.

**Uses :** Grown as an ornamental hedge plant and for fuel wood and soil erosion control. The wood of the tree is used for making tool handles.

**Management :** Small plants may be hand-pulled; older individuals need to be dug out. Seedlings are best pulled after rain when the soil is loose. The entire root must be removed because broken fragments may

resprout. Application of glyphosate or triclopyr plus a non-ionic surfactant on the leaves is reported to be effective. Metsulfuron is also effective when sprayed on wet foliage. The cut-stump method can be used to treat individual bushes in environmentally-sensitive areas. Réunion Island identified several species including a moth viz., *Epiplema albida* Hampson, and a *Hyphasia* species which feed on *Ligustrum*, as potential biocontrol agents. The potential of *E. albida* as a biocontrol agent is being considered for testing.





## *Ligustrum sinense* Lour.

Native : China, Lao PDR, Viet Nam

**Family** : Oleaceae

**Synonyms** : *Ligustrum calleryanum* Decne.  
*L. walkeri* Decne.

**Common names** : Chinese ligustrum, Chinese privet,  
common Chinese privet, hedge privet

*Ligustrum sinense* is a small deciduous tree with small flowers that have an unpleasant smell. The tree can displace shrubs of alluvial forests and remain persistent in these areas. The fruits are consumed by wildlife, which often excrete the seeds at distant locations where they may germinate and become established.

**Description** : Shrubs or small trees, deciduous, branchlets terete, villous, pubescent, pilose, puberulent to glabrescent, up to 5 m in height. Leaves simple, opposite, 2-7 x 1-3 cm, ovate, densely villous to sparsely pubescent or glabrous, papery to subcoriaceous, leathery, base cuneate to subrounded, apex acute/acuminate; petiole 2-8 mm. Inflorescence terminal or axillary panicle, 4-11 x 3-8 cm. Flowers white, basally-fused petals with exerted stamens. Fruit a berry, blue-black, globular or ovoid, 5-8 mm in diameter. Seeds 3-4 mm long.

**Habitat** : Occurs commonly in open disturbed areas, low wet places, along roadsides and in natural forests and coastlands. It is also found in alluvial forest remnants, wastelands and shrublands.

**Threat and damage** : The trees can form dense thickets, outcompete native vegetation and alter the composition and structure of natural communities. The leaves and fruit are poisonous to livestock and humans.

**Uses** : Commonly used as an ornamental plant and for hedges; the fruits are used in brewing. An oil extracted from the seeds is used for soap-making. The bark, seed and leaves are medicinally useful.

**Management** : Hand-pulling of seedlings and digging out older individuals will help to control the spread of the tree. Foliar treatment with glyphosate is known to be useful. Biological control is unknown.



**Distribution** : American Samoa, Australia, China, Fiji, Guam, Hong Kong S.A.R., Lao PDR, New Caledonia, New Zealand, Norfolk Island, Samoa, Singapore, Tonga, United States, Viet Nam.



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## *Lonicera japonica* Thunb.

Native : East China, Korea and Japan

- Family** : Caprifoliaceae  
**Synonyms** : *Caprifolium hallianum* Hort.  
*C. japonicum* (Thunb.) Dum. Cours.  
**Common names** : Chinese honeysuckle,  
Hall's honeysuckle,  
Japanese honeysuckle

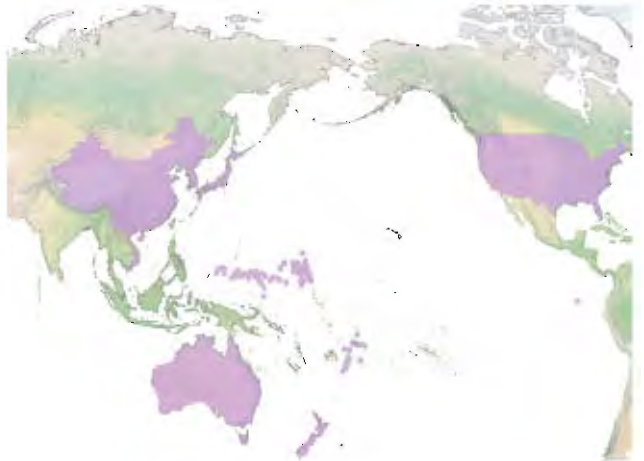
*Lonicera japonica* is a semi-deciduous shrub that can smother and kill other plants through competition for nutrients and light. The plant can bloom throughout the growing season and spread via aboveground runners that root at the nodes. Seeds are dispersed by birds.

**Description** : Woody climbers, branches hollow, young parts with yellow-brown stiff hairs, interspersed with long glandular hairs. Leaves simple, opposite, blade ovate or oblong to lanceolate, 3 - 8 x 1.5 - 4 cm, abaxially sparsely to densely hairy, adaxially hairy along veins, base rounded to subcordate, apex acute to acuminate, margin ciliate, occasionally sinuate; petiole 0.3-0.8 cm. Flowers white or creamy-yellow, fragrant, paired, axillary towards apex of branchlets; peduncle 0.5-4 cm, shorter toward apex of branchlets; bracts leaf-like, ovate to elliptic, 10 - 30 mm. Fruit a berry, black when mature, glossy, globose, 6 - 7 mm in diameter. Seeds brown, ovoid or ellipsoid, ca. 3 mm, shallowly pitted.

**Habitat** : *Lonicera* grows in riparian zones, disturbed sites, openings and along forest borders. It is shade and drought-resistant. It can be grown from sea level to 1,200 metres in altitude.

**Threat and damage** : The vine can spread rapidly and topple small trees and shrubs. It grows as a ground layer on the forest floor displacing native vegetation and quickly climbs into the forest canopy through tree gaps. It often forms a dense curtain of vines on forest borders.

**Uses** : Grown as an ornamental, as a ground cover and for erosion control. The vine provides a sweet fragrant screen for privacy or shade. The flowers attract humming birds and bees. *Lonicera* is a valuable medical herb in China, where it is used to treat chicken pox and to maintain human vascular homeostasis. Birds and cotton-tailed rabbits eat the seeds and leaves of *Lonicera*.



**Distribution** : American Samoa, Australia, Bhutan, China, Democratic People's Republic of Korea, Federated States of Micronesia, Fiji, French Polynesia, Hong Kong S.A.R., Japan, Marshall Islands, New Zealand, Niue, Republic of Korea, Samoa, Singapore, Solomon Islands, Tonga, United States, Viet Nam.

**Management** : Hand-pulling, cutting and mowing. Foliar spray of glyphosate is effective. Cutting and painting the cut ends with a liberal dose of triclopyr are also useful. Biological control is unknown.





## *Macfadyena unguis-cati* (L.) A.H. Gentry

Native : Central and South America

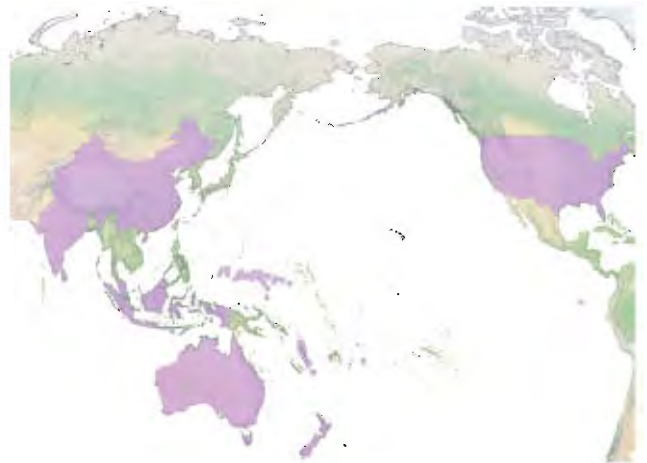
- Family** : Bignoniaceae  
**Synonyms** : *Bignonia unguis-cati* L.  
*Dolichandra unguis-cati* (L.) Lohmann  
**Common names** : Catclaw-trumpet, cat's claw climber,  
cat's-claw creeper, cat's-claw vine

*Macfadyena unguis-cati*, a woody climbing liana, is one of the most destructive weedy species to have invaded all continents except Antarctica. The plant invades all layers of forest ecosystems by spreading both vertically and horizontally. Once established, it is difficult to eradicate the plant due to its rapid growth, extensive root system and prolific seed production. The production of multiple individuals from a single seed indicates that the plant may be apomictic. The species can produce long primary roots that extend across the soil surface producing large tubers every 50 cm from which runners are produced. The claw-like tendrils make the plant very distinctive.

**Description** : Perennial woody climbers, often rooting at nodes, up to 30 m in height. Leaves opposite, compound, dark green to nearly black, dimorphic, juvenile plants with small leaflets, 1-2 x 0.4-0.8 cm, mature leaflets narrowly ovate to lanceolate, 5-16 x 1.2-6.9 cm, both surfaces sparsely lepidote; tendril deciduous, three-forked, 0.1 - 3.5 cm long, each fork bearing a small horny hook. Flowers showy, trumpet shaped, 7 x 10 cm across, solitary or in few-flowered clusters at leaf axils, petals joined into yellow floral tube with orange lines in the throat. Fruit a capsule, blackish, linear, flattened, tapering at both ends, 26-95 x 1-2 cm, inconspicuously lepidote. Seeds 1-1.8 x 4.2-5.8 cm, wings membranous, adpressed.

**Habitat** : *Macfadyena* is a weed of tropical, sub-tropical and warmer temperate regions. It is an aggressive invader in natural forests, open areas, planted forests, orchards, gardens and roadsides from sea level to over 600 metres. The plant can tolerate most soil types except salty and poorly-drained soils.

**Threat and damage** : The plant can form a thick carpet of leaves and stems on the forest floor, interrupting regeneration and germination of other species. It can also grow to the top of the forest canopy and spread across suffocating the host trees with its weight and shade. The plant can survive grazing, fire and frost.



**Distribution** : Australia, China, Federated States of Micronesia, India, Indonesia, Malaysia, Nepal, New Zealand, Niue, Singapore, Sri Lanka, United States, Vanuatu.

**Uses** : Used as an ornamental, particularly to screen fences or buildings.

**Management** : Digging out or hand-pulling are effective in controlling small infestations. Cutting and stump painting using undiluted glyphosate is an effective chemical control method. Regrowth from stumps can be controlled by spraying diluted glyphosate. The potential of the leaf-feeding beetle *Charidotis auroguttata* Boheman, the leaf-sucking tingid *Carvalhotingis visenda* Drake & Hambleton and the leaf-tying moth *Hypocosmia pyrochroma* Jones in controlling the population of the plant is not known.





## *Maesopsis eminii* Engl.

Native : West and Central Africa and parts of East Africa

**Family** : Rhamnaceae

**Synonyms** : *Karlea berchemioides* Pierre  
*Maesopsis berchemioides* (Pierre) A. Chev.

**Common names** : Musizi, umbrella tree

*Maesopsis eminii* is a fast-growing tree species introduced to many countries for its useful timber. It escaped from plantations and invaded evergreen forests with negative impacts on ecosystems. The tree can be easily identified by its leaves that have dentate margins bearing very visible glands on the dry leaves. The leaves are also characterized by the presence of domatia in the axils of secondary nerves on the dorsal surface. The tree is notable for its ability for self-pruning. Seeds ripen about two months after flowering. Hornbills, bats, rodents and monkeys are the dispersal agents of the seed. When the trees are old, they lose their shedding ability and produce a spreading and rounded crown.

**Description** : Trees, 15 - 25 (-45) m tall, bark pale brown, furrowed, blaze red, branchlets pubescent. Leaves opposite or subopposite, decussate, stipules subulate, cauducous, lamina 8.5-12 x 2.5-4 cm, ovate-lanceolate, oblong-ovate or lanceolate, base obliquely obtuse, apex acuminate, margin dentate, glabrous, chartaceous, 7-10 pairs of lateral nerves, parallel, slender, prominent, intercostae reticulate; petiole 1-2 cm long, slender, glabrous. Inflorescence of axillary cyme, many flowered, 1-5 cm long; peduncle 4-25 mm long. Flowers bisexual, pentamerous, yellowish green, pedicel 1-3 mm. Fruit a drupe, to 3 x 1.5 cm, oblong-obovoid, green to yellow when young and purple-black at maturity, muciculate; one seeded.

**Habitat** : The tree is common in moist forests especially forest edges. Its seedlings can survive under a dense canopy but need gaps to grow to the canopy. The tree is intolerant of frost and needs an annual temperature ranging from 20 to 23° C for effective growth. It grows well in areas with an annual rainfall of 800 to 3 100 mm and at altitudes from 500 to 1 500 meters above sea level. The tree prefers well drained but moist soils with medium fertility and a soil pH level of 4.5 to 7.5.

**Threat and damage** : *M. eminii* seedlings can outcompete native saplings and when it grows to the top canopy, it can spread out over nearby trees cutting



**Distribution** : Fiji, India, Indonesia, Malaysia, Philippines, Singapore.

sunlight available to them. The tree utilizes forest gaps and becomes dominant in logged and disturbed areas. It can affect the upper organic soil horizon by forming a dense superficial root mat, altering the pH, affecting soil fauna and increasing soil erosion. It is an aggressive colonizer of grasslands and disturbed areas within forests.





**Uses :** The wood is used for many purposes such as making poles, boxes, crates and plywood. The leaves are used as fodder. In Africa and India, it is used as a shade tree in coffee, cocoa and cardamom plantations. The seed contains an edible oil. The root is used to treat gonorrhoea.

**Management :** Removal of bark from the stumps will kill the tree and prevent coppicing. Cutting down trees before fruiting is another control method. Seedlings and saplings should be dug out and removed. Biological control is unknown.





# *Melaleuca quinquenervia* (Cav.) S.T. Blake

Native : Australia, New Guinea and New Caledonia

**Family** : Myrtaceae

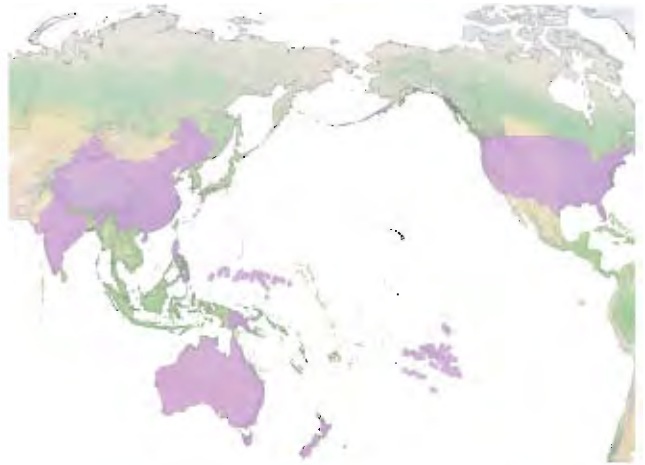
**Synonyms** : *Melaleuca leucadendra* var. *angustifolia* L. f.  
*M. leucadendra* var. *coriacea* (Poir.) Cheel

**Common names** : Cajeput, paper bark tree, punk tree

*Melaleuca quinquenervia* has been widely introduced as an ornamental throughout the tropics from its native home in Eastern Australia and nearby islands. The specific name originates from the Latin words 'quinque' and 'nervis' meaning 'five-nerved', and refers to the common number of longitudinal veins in the leaves. The leaves have a resinous odour and taste when crushed. The bark is whitish or pale brown, spongy, peeling and in many layers. It is widely planted and naturalized in tropical regions, especially in dry tropical lowlands in India, the Philippines and the West Indies. In many areas it has become an undesirable plant. Large numbers of seeds are stored in the fruits and are released when fire or other disturbance occurs. Seeds are dispersed by wind and water and seedlings may grow into almost impenetrable monocultures. The Global Invasive Species Database ranks this species among the top 100 of the world's worst invaders.

**Description** : Trees, to 25 m tall, stem moderately straight to crooked, narrow, bark thick, pale-coloured, made up of many papery layers. Leaves simple, alternate, elliptic to lanceolate-elliptic, 5-9 x 0.8-1.5 cm, bright green, camphor-scented, apex acute. Inflorescence a terminal spike. Flowers white, sessile, 3-4 mm long. Fruit a capsule, woody, short cylindrical, grey-brown, 3-4 x 4-5 mm, hard, persistent, 200 - 350 seeded. Seeds minute.

**Habitat** : : In Australia and Papua New Guinea, this tree is generally confined to the lowlands below 100 metres, but in New Caledonia it forms extensive stands in the uplands up to an altitude of 900-1, 000 metres. The best-developed stands occur as open forest and woodland on favourable sites, but elsewhere they are reduced to low woodland or tall shrubland. In Australia, it grows along stream fringes of tidal estuaries and frequently forms pure stands in freshwater swamps. It often grows close to the beach and will tolerate wind-blown salt, prolonged flooding and a fluctuating water table. In waterlogged and flooded areas, the tree forms adventitious aerial roots.



**Distribution** : Australia, China, Federated States of Micronesia, Fiji, French Polynesia, India, New Caledonia, New Zealand, Palau, Papua New Guinea, Philippines, Singapore, United States.

The tree seeds profusely and can become a weed, especially where periodic fires provide a suitable seed bed. It is highly fire-tolerant during all but the early seedling stages. It also tolerates a dry season of up to seven months a year. Severe frosts will defoliate and kill the branches, but the tree generally recovers by epicormic sprouting.



**Threat and damage :** The tree is an aggressive invader that spreads rapidly forming impenetrable thickets. In a single year, one paper bark tree can produce a dense island hammock of nearly 180 metres in diameter. It grows very fast and produces dense stands that completely shade out all other vegetation and provide little food for wildlife.

**Uses :** Often planted as an ornamental for their peculiar bark and showy flowers. The tree is a good source of nectar and pollen for bees, helped by its extended flowering period. It exudes resin as it burns and as such the wood is excellent fuel and makes good-quality charcoal. The wood has been widely used as a source of pulp. However, because the wood contains silica, it rapidly blunts saws and planes. Essential oils are extracted from leaves and twigs and are used in local medicines. As an exotic, the tree is relatively free of pests and diseases in areas where it

has been introduced and is suitable for beach planting and erosion control on degraded sites.

**Management :** Small seedlings can be hand-pulled. Herbicides like hexazinone and tebuthiuron are most effective in controlling *Melaleuca*. Current chemical control recommendations for *Melaleuca* include low-volume applications of glyphosate for control of saplings, and aerial or individual stem (girdle) applications of imazapyr alone, or in combination with glyphosate for mature trees. Two biocontrol agents, the Australian *Melaleuca* snout weevil (*Oxyops vitiosa* Pascoe) and the Australian melaleuca psyllid (*Boreioglycaspis melaleucae* Moore), have been approved by the United States Department of Agriculture for use against *Melaleuca* and have been released in the field in the United States. Research is being conducted on other potential biocontrol agents, including leaf, stem tip and flower bud feeders.





## *Melia azedarach* L.

Native : Southeast Asia and Northeast Australia

**Family** : Meliaceae

**Synonyms** : *Azedara speciosa* Raf.  
*Azedarach commelinii* Medik.

**Common names** : Bead tree, Chinaberry, Indian lilac, margosa tree, Persian lilac

*Melia azedarach* is a fast-growing tree species commonly planted as an avenue or shade tree. The leaves have an unpleasant odour when crushed. Traditionally, it is planted in courtyards where it is thought to bring good luck.

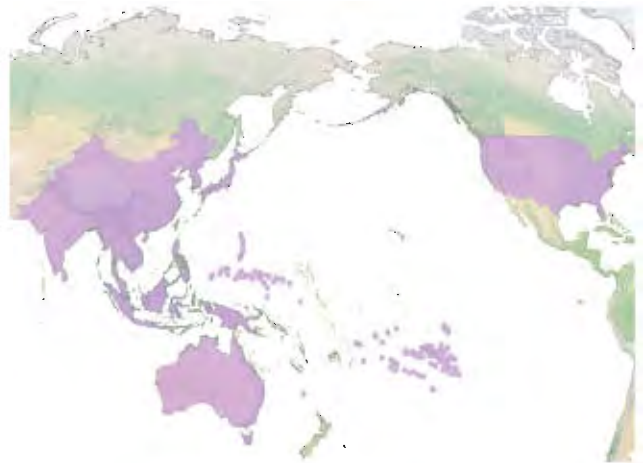
**Description** : Small trees, deciduous, bark brownish-grey, longitudinally exfoliating, branches spreading. Leaves odd-pinnate, pinnae 2 or 3, 20 - 40 cm, leaflets opposite, lamina ovate, elliptic or lanceolate, 3 - 7 × 2 - 3 cm, terminal one usually slightly larger, both surfaces with stellate trichomes when young. Inflorescence thyrses, glabrous or covered with short lepidote pubescence. Flowers pink to lilac, fragrant, male and female flowers separate. Fruit a drupe, globose to ellipsoid, 10-30 × 8-15 mm; endocarp ligneous. Seed single, ellipsoid, 6-7 mm long, enclosed in a thick, hard and bony endocarp.

**Habitat** : Grows in natural forests, riparian zones, disturbed lands and wetlands up to an altitude of 1, 800 metres. The plant is highly adaptable and tolerates a wide range of climatic and soil conditions.

**Threat and damage** : The tree is an aggressive invader in lowland to highland rain forests. It builds up dense stands that outcompete other plants, thus disrupting regeneration. The tree flowers throughout the year and produces many seeds that are dispersed by birds. It begins to flower even at the seedling stage.

**Uses** : Leaves are used as fodder and are highly nutritious. The wood is used to make agricultural implements, furniture and tool handles. The shiny seeds are used as beads and for rosaries. Extracts from the bark and fruits have pharmacological properties and are used to kill parasitic roundworms. The extract of leaves and seed is insecticidal.

**Management** : Seedlings can be hand-pulled. Grazing by cattle is effective in controlling spread. Triclopyr is useful in controlling the growth of seedlings. Biological control is unknown.



**Distribution** : Australia, Bangladesh, Bhutan, Brunei, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Federated States of Micronesia, Fiji, French Polynesia, Guam, Hong Kong S.A.R., India, Indonesia, Japan, Kiribati, Lao PDR, Malaysia, Myanmar, Nauru, Nepal, New Caledonia, Niue, Norfolk Island, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Solomon Islands, Sri Lanka, Thailand, Tonga, United States, Viet Nam.



## *Merremia peltata* (L.) Merr.

Native : Africa, Asia and the Pacific islands

**Family** : Convolvulaceae

**Synonyms** : *Convolvulus bufalinus* Lour.  
*C. crispatus* Wall., *C. peltatus* L.  
*Ipomoea peltata* L.

**Common names** : Merremia

*Merremia peltata* is used as a ground cover in some countries but it has turned invasive affecting natural forests and disturbed/degraded areas. The low seed viability of the plant is compensated by efficient vegetative propagation from nodes. It is used as an erosion control agent and helps to protect nutrient loss when land is disturbed.

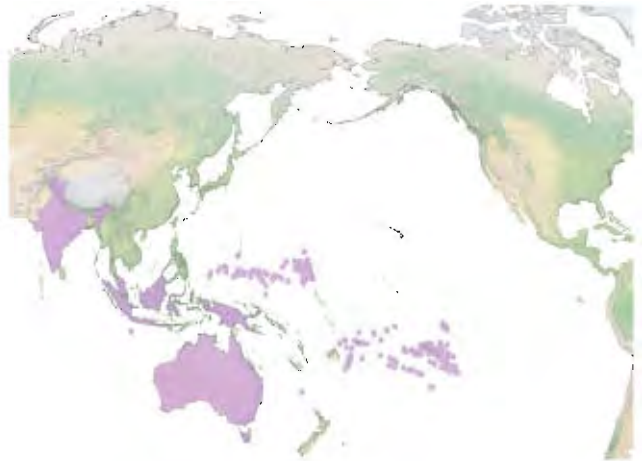
**Description** : Gregarious vines, root tuberous; stem smooth, twiny at the tips. Leaves simple, alternate, 7.5-25 x 7-20 cm, broadly cordate to orbicular, peltately attached, base obtuse, apex acuminate, strongly nerved with purple veins beneath, leaf margins waxy; petiole 3-24 cm long. Twigs and leaves produce a milky or pale yellow exudate. Flowers in cymose clusters, axillary, white or yellow, funnel-shaped, 5-6 cm in diameter; peduncle 15-30 cm long. Fruit a capsule, about 15 mm long, 4 seeded. Seeds dull brown, densely long-pilose, 8-10 x 4 mm.

**Habitat** : Grows well in forests and thickets, agricultural areas, planted forests, riparian zones and urban areas. In Samoa, *Merremia* is reported up to an elevation of 300 metres affecting lowland ecosystems.

**Threat and damage** : *Merremia peltata* threatens native biodiversity and helps invasion of other invasive species like *Mikania micrantha*. The plant can crawl up and smother forest trees and other vegetation and also form dense ground cover.

**Uses** : A decoction of the leaves is used against boils, infections, appendicitis and cysts. Tea made by crushing leaves gives relief to headache and ear pain and roots are used to cure muscular rigidity. The leaves contain an alkaloid, namely convolvamine, which has antimicrobial properties.

**Management** : Grazing by cattle is an effective control method. Application of herbicides like 2,4-D, dicamba, triclopyr, picloram and glyphosate are also useful. Mycoherbicide developed from host-specific strains of *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk. is used worldwide to control the plant.



**Distribution** : American Samoa, Australia, Christmas Island, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Indonesia, Malaysia, Marshall Islands, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Wallis and Futuna Islands.





## *Miconia calvescens* DC.

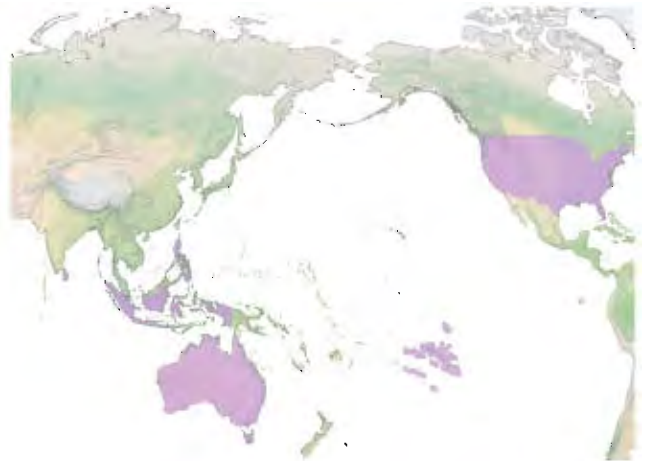
Native : Central and South America

- Family** : Melastomataceae  
**Synonyms** : *Melastoma mandioccana* Raddi  
*Miconia magnifica* Triana  
**Common names** : Bush currant, Miconia, purple plague, velvet tree

The huge red and purple leaves make *Miconia* a highly desirable species for gardeners. Perhaps the most characteristic feature of the leaves is the three prominent longitudinal veins. In many of the introduced areas, *Miconia* has become a dominant canopy tree over large areas shading out the entire understorey. The tree is still valuable as an ornamental in many parts of the tropics although its invasive nature is now well known. The Global Invasive Species Database ranks this species among the top 100 of the world's worst invaders. Young stems and leaves of the tree are covered with velvet hairs. The seeds are photosensitive and can remain viable in the soil for more than five years. Seeds are dispersed by wind, water and fruit-eating birds and small mammals. The longevity of the soil seed bank is about six to eight years. However, most of the seeds germinate within 15 to 20 days.

**Description** : Shrubs or small trees, to 15 m tall, young parts deciduously stellate-puberulous; branchlets quadrisulcate, terete with age. Leaves simple, opposite, oblong-elliptic, apex shortly blunt-acuminate, base obtuse to rounded, 3-nerved, membranaceous, obscurely undulate-serrulate, 17 - 30 x 7 - 15 cm, venules laxly reticulate beneath, green above and bright purple below; prominent petioles 3 - 6 cm long. Inflorescence of panicle 20-30 cm long, multiflorous (with 1 000 - 3 000 short-lived flowers), with paired primary branches. Flowers white or pinkish, bracteoles 2-3 mm long and caducous, oblong, hypanthium 2-2.7 mm long. Fruit a berry, up to 1 cm across, bluish-black or dark purple when ripe, sweet, attractive, 140-230 seeded. Seeds 0.5 mm across. A mature tree can produce up to five million seeds.

**Habitat** : *Miconia* is common in pastures, forest borders, riverbanks, trail sides, roadsides, disturbed areas, coastlands, riparian zones, scrub-/shrublands, urban areas, wetlands and planted and natural forests. The plant is shade-tolerant, but it regenerates freely and grows more rapidly in forest gaps and open



**Distribution** : Australia, French Polynesia, Indonesia, New Caledonia, Philippines, Singapore, Sri Lanka, United States.

areas. The distribution of *Miconia* suggests wide climatic adaptation with a preference for tropical climates with distinct seasonality. The tree normally grows up to 1 800 metres above sea level and where annual rainfall is more than 2 000 mm.





**Threat and damage :** *Miconia* forms dense monospecific stands shading out native vegetation with its large leaves suppressing the growth and regeneration of native species in the understory. It also affects wildlife populations. The shallow and tentacular root system of the tree exacerbates soil erosion and landslides. *Miconia* is considered as the most invasive and damaging alien plant species to threaten rain forests in the Pacific islands.

**Uses :** Preferred as an ornamental for its attractive leaves and flowers.

**Management :** Good sanitation is essential to control the spread of *Miconia*. To prevent human dispersal of seeds, people working in infested areas should

change their clothes and shoes before leaving the area. Thorough washing of agricultural tools, machinery and other potential dispersing agents at the site also helps to prevent spread of seeds. Mechanical control is through hand-picking of seedlings and juvenile plants. Application of triclopyr plus 2,4-D at the cut surfaces of trees will prevent regrowth. The Chinese rose beetle (*Adoretus sinicus* Burmeister) causes up to 50 percent defoliation but does not cause tree mortality. The high level of host specificity of the leaf-defoliating sawfly (*Atomacera petroa* Smith) makes it a good biocontrol agent for *Miconia*. A fruit-feeding gall wasp (*Allorhogas* sp.) and a fruit-feeding beetle (*Apion* sp.) were evaluated for host specificity in Brazil.

