

**Habitat, description
and distribution
of invasive alien plants**

Abelmoschus moschatus Medik.

Native : Southeast Asia

- Family** : Malvaceae
Synonyms : *Abelmoschus betulifolia* Wall.
Hibiscus abelmoschus L.
Common names : Musk-mallow, musk okra,
tropical jewel hibiscus

Abelmoschus moschatus is cultivated throughout Asia for its beautiful flowers and high medicinal value. It has become invasive in certain countries in the Asia-Pacific region interfering with the growth of native plants. Propagation of the plant is through seeds, tubers and stem cuttings.

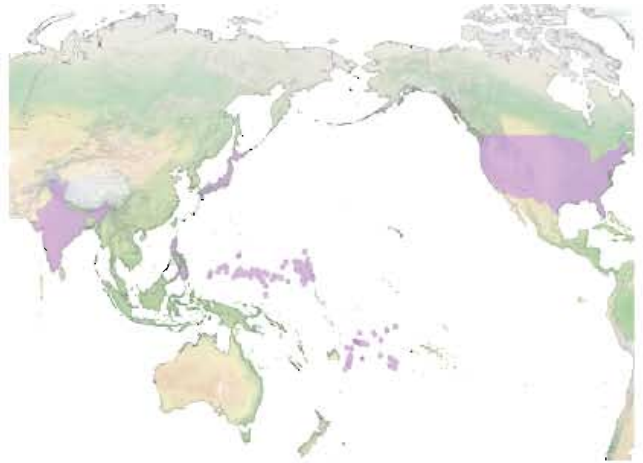
Description : Annual or biennial subshrubs, to 2 m tall, plants uniformly yellow hispid or setose. Stipules filiform, 0.7 - 0.8 cm. Leaves simple, palmately lobed, 6 - 15 cm across, variable in form, lobes lanceolate to triangular; lamina on distal part of stem narrower, both surfaces sparsely hirsute, base cordate, margin irregularly serrate; petiole 7-15 cm, sometimes densely pubescent along adaxial groove. Flowers solitary, axillary, yellow or water melon pink; pedicel 2-3 cm, hirsute, epicalyx lobes 6-10, linear to narrowly oblong, 8-13 × 1.5-2 mm, incurved, appressed to capsule. Fruit a capsule, oblong, 5 - 6 cm, apex acute, uniformly yellow hirsute. Seeds black-brown, reniform, concentrically ribbed, glandular-reticulate, with a musk odour.

Habitat : *A. moschatus* is common in agricultural areas, natural and planted forests, open and disturbed areas, roadsides, urban areas and wetlands. In the tropics, it grows up to an altitude of 1 650 metres above sea level. It is frost-sensitive and cannot withstand temperature above 45°C. The plant can thrive in fertile loamy and sandy loamy soil.

Threat and damage : *A. moschatus* threatens growth and survival of native flora and fauna. It also acts as a host for *Dysdercus cingulatus* Fabr., a pest of cotton.

Uses : The plant is usually used as an ornamental. Ambrette oil, extracted from the seeds, is used in the perfume industry and in aromatherapy. In India, the aromatic seeds are also used to treat various ailments such as stomatitis, urinary discharge, gonorrhoea and pruritus. Extracts of fruits and upper parts of the plant show insecticidal activity.

Management : No methods are currently known.



Distribution : American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Japan, Marshall Islands, New Caledonia, Niue, Northern Mariana Islands, Palau, Philippines, Samoa, Tonga, United States, Wallis and Futuna Islands.



Acacia farnesiana (L.) Willd.

Native : Tropical and subtropical America

Family : Fabaceae

Synonyms : *Acacia smallii* Isley
Mimosa farnesiana L.

Common names : Needle bush, sweet acacia

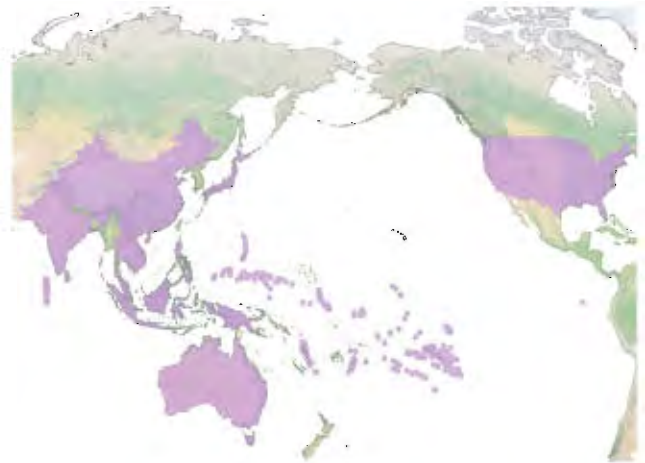
Acacia farnesiana has been introduced to several countries for its bark, gum, seed and wood. It is sometimes planted as an ornamental or to minimize soil erosion. The plant prefers dry habitats and can form thick impenetrable thickets. It has become invasive in most countries wherever introduced. Its life span is 10-50 years. The plant is a prolific seed producer and the seeds germinate when the soil is disturbed. Seeds are dispersed by ungulates.

Description : Shrubs or small trees, to 9 m tall, deciduous; branchlets slightly zigzag, marked with grey or pale brown dots, young parts glabrescent; spines stipular, in pairs, straight, 0.7 - 1.8 cm long. Leaves compound, rachis 1.2 - 5.5 cm long, pilose; petiole usually with a small gland about the middle, pinnae, 2 - 8 pairs, 1.2 - 2.5 cm long, leaflets 10 - 20 pairs, sessile, to 0.5 x 0.15 cm wide, linear, oblong, acute, base oblique, glabrous to sub-glabrous. Flowers orange in color, very fragrant, grouped in 50 or more globose heads, 1.5-2.0 cm in diameter, grouped by 2-3, or isolated on an 8-35 mm long slender, hairy-downy peduncle. Fruit a green pod, turning black or dark brown at maturity, thick, indehiscent, cylindrical, 4 - 8 cm long and 0.8 - 1.5 cm in diameter, each contains 12-14 seeds. Seeds transversally set in pods, ovoid, compressed.

Habitat : The plant can thrive in dry areas and on loamy or sandy soils up to an elevation of 2,000 metres. It can tolerate a wide variety of environmental conditions. It is fire-resistant but cannot tolerate frost.

Threat and damage : The plant can replace native vegetation by its fast growth and by forming dense thorny thickets.

Uses : The barks and pods are good sources of tannin and are used for dyeing leather. Fragrant essential oil from the flower is used in the perfume industry. Trees add nitrogen and organic material to the soil and are often used to reduce soil erosion. It is also used in folk medicine for styptic purposes or as an astringent.



Distribution : Australia, Bhutan, Cambodia, China, Cook Islands, Fiji, French Polynesia, Guam, India, Indonesia, Japan, Kiribati, Lao PDR, Malaysia, Maldives, Nauru, New Caledonia, Niue, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, Philippines, Solomon Islands, Sri Lanka, Thailand, United States, Vanuatu, Viet Nam.

Management : Grubbing controls spread of the species. The plant is susceptible to translocated herbicides like picloram, metasulfuron methyl, glyphosate and triclopyr and residual herbicides like tebuthiuron and hexazinon. Biological control is unknown.



Acacia mearnsii De Wild.

Native : South and East Australia

Family : Fabaceae

Synonyms : *Acacia decurrens* var. *mollis* Lindl.
Racosperma mearnsii (De Wild.) Pedley

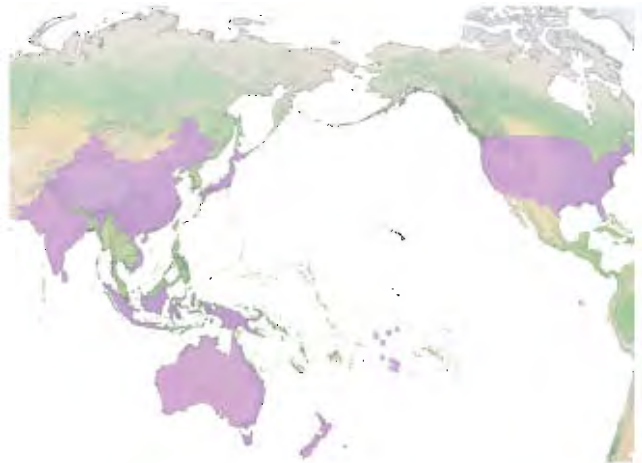
Common names : Black wattle, tan wattle

Acacia mearnsii is a fast growing nitrogen-fixing tree of the highland tropics widely used for various purposes including soil erosion control and soil improvement. The species has been introduced to 25 countries in tropical and subtropical regions worldwide. Multipurpose use and the ability to grow in a broad spectrum of soils and sites may have prompted such wide introduction. Black wattle is in the top 100 of the world's worst invaders. It is reported to displace native species and affect biodiversity in introduced regions.

Description : Small trees, to 20 m tall, branchlets angular, greyish white tomentose. Leaves compound, pinnae 30 - 60 pairs, 0.5 - 5.5 cm, glands at rachis of pinna insertion and elsewhere. Leaflets, 10 - 68 pairs, dense, linear; young leaves golden tomentose. Flowers in globose heads, yellowish or white, 6 - 7 mm in diameter, arranged in axillary racemes or terminal panicles; peduncles 7-1 mm; rachis yellow, densely tomentose. Fruit black, oblong, flat, slightly constricted between seeds, pubescent. Seeds 1-14, longitudinal in the pod, bean like, elliptical, flattened, blackish, 4 mm long, caruncle conspicuous.

Habitat : The tree grows in disturbed, mesic habitats in a wide range of climates including warm temperate dry climates and moist tropical climates. Black wattle is an aggressive colonizer due to its hardy nature and high competitive ability.

Threat and damage : The invasiveness of the tree is partly due to its ability to produce many long-lived seeds (viable up to 50 years) that are distributed by birds, cattle and wild animals, especially rodents. The seeds are triggered to germinate *en masse* by wildfire. Black wattle competes and replaces indigenous vegetation including grass communities and reduces the carrying capacity of the land. It also increases rainfall interception and transpiration causing a decrease in stream flow. Commercial plantations and invasive stands of black wattle in South Africa resulted in loss of diversity, increased soil erosion and destabilization of riverbanks and reduced surface



Distribution : Australia, China, Cook Islands, India, Indonesia, Japan, New Zealand, Pakistan, Papua New Guinea, Sri Lanka, United States, Viet Nam.

stream flow. In India, the species has virtually taken over the shola forests (southern montane wet temperate forests) and grasslands in the southwest region significantly reducing the diversity of indigenous flora.



Uses : Tannin extracted from the tree is used for making soft leather and other products like adhesives and resins. The wood is a good building material and the wood chips are used for making paper. It is also a good source of charcoal.

Management : Seedlings can be pulled out by hand but care must be taken to remove roots as the plant can re-sprout from roots. Treatment of the saplings with herbicides such as triclopyr, glyphosate, dicamba and picloram at the cut surface is effective. In large trees, herbicides may have to be applied through drilled holes. Basal bark and stump bark treatments with

herbicides are also effective. The introduction of a seed-eating weevil, *Melanterius maculatus* Lea, which caused reduction in seed numbers has been effective in controlling the spread of the tree in South Africa. A Cecidomyiid gall midge, *Dasineura* sp., has also been identified as a promising biocontrol agent as it forms flower galls and prevents fruit production without affecting vegetative growth. In an innovative initiative, the South African wattle industry is supporting a breeding programme to produce sterile black wattle trees (triploid trees) through genetic manipulation using gamma rays.



Acacia melanoxylon R.Br.

Native : Australia

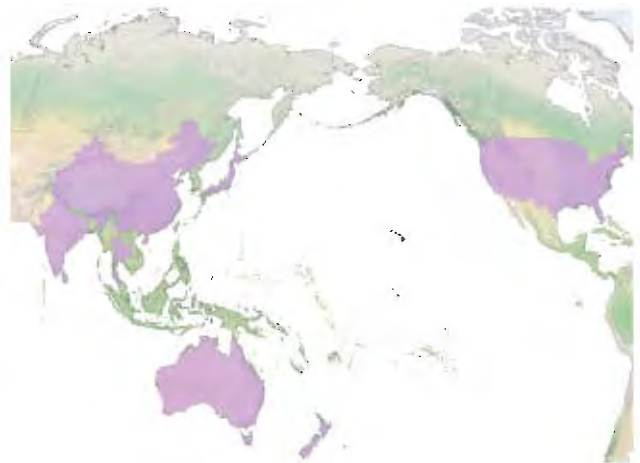
- Family** : Fabaceae
Synonyms : *Acacia arcuata* Spreng.
A. melanoxylon var. *arcuata* (Spreng.) Ser.
Common names : Australian blackwood, blackwood, blackwood acacia

Acacia melanoxylon is a rapidly growing nitrogen-fixing tree that can grow in a wide range of soils and climatic conditions. The seed has high longevity and germinability and the plant can regenerate from stem and root suckers. The species was introduced to many countries for forestry purposes, but turned out to be invasive in the long term. It is listed as a noxious weed in South Africa, where it invades and displaces natural vegetation. Control of its invasion in forest plantations and farmlands involves huge investment. The tree can survive for more than 200 years. Profuse vegetative growth can occur from cut and damaged plants and the tree can reproduce prolifically after wildfire. It produces many seeds but they remain dormant until a disturbance occurs. The seed has large red funicles that are attractive to birds.

Description : Small to medium trees, to 30 m tall, bark greyish - black, deeply fissured and scaly. Phyllode oblanceolate to lanceolate, 6-10 x 1.8-2.0 cm, one edge straight, the other curved, 3-6 parallel nerves, gland 4 mm in diameter at base. Inflorescence with 3-5 relatively large globular heads on short axillary racemes, 2.5-5 cm long, each head with 30-50 flowers, whitish to very pale yellow. Fruit a legume, flat, thin, 6-10 x 0.4-0.6 cm, mid-brown when ripe, either irregularly twisted or openly coiled. Seeds black, oval, flat, 6-10, longitudinally in the pod, funicle pink or red, half-encircling the seed in a double fold on each side, aril small.

Habitat : Grows in agricultural areas, coastal land, disturbed areas, natural forests, planted forests and in *Melaleuca* swamps. The tree occurs mainly in cool and warm humid climatic zones. It can tolerate drought, poor drainage, salty soils and cold winds. In its native Australia, it grows at an elevation of up to 2,700 metres. Best growth of the tree is observed in cooler, moist and slightly acidic fertile sites.

Threat and damage : *A. melanoxylon* replaces native vegetation, alters nutrient cycling, uses higher



Distribution : Australia, Bhutan, China, India, Japan, New Caledonia, New Zealand, Sri Lanka, Thailand, United States.

amounts of water than native species and cuts off light to the other plants. Windfalls obstruct water flow along invaded streams and rivers. It is reported to cause allergic contact dermatitis and bronchial asthma in wood workers.



Uses : Used as an ornamental. The timber of the tree is extensively used for making cabinets and for other purposes such as panelling, inlays, boat building and making stringed instruments. Although most timber on the market is harvested from natural stands in Tasmania, the species is now grown as a plantation species in Southern Australia. It has good pulpwood potential and is especially good for making fine paper.

Management : The tree is difficult to control because of its fast growth and vigorous regrowth from root suckers and regeneration from seed. Mechanical control of the species involves pulling or digging out small seedlings along with the root system before flowering and fruiting. Biocontrol is being attempted in South Africa using *Melanterius acacia* Lea, a seed-feeding weevil.



Adenanthera pavonina L.

Native : Southeast China and India

Family : Fabaceae

Synonyms : *Adenanthera gersenii* Scheff.
A. polita Miq.

Common names : Coral bean tree, false wiliwili,
red bead tree, red sandalwood tree

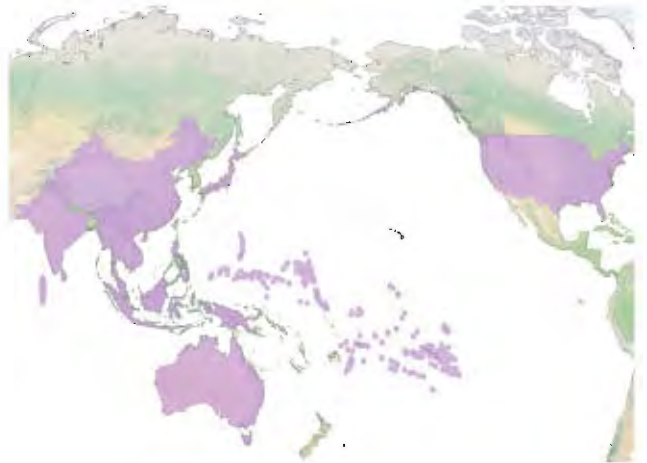
Adenanthera pavonina, a nitrogen-fixing tree, has long been considered an important tree in Southeast Asia and the Pacific islands. It is cultivated in home gardens and planted in forest clearings and village common lands as an ornamental tree and is now naturalized in many countries.

Description : Trees, to 15 m tall, deciduous, bark pale pinkish-grey. Leaves compound, bipinnate, to 24 cm long, rachis 10 - 40 cm long; petiole approximately 5-10 cm long, pinnae opposite, 2-6 pairs, 7-12 cm long; leaflets 7 - 15 pairs, sessile, alternate, obovate, 1.5 - 4.0 x 0.5 - 2.5 cm, margins slightly curved backwards, base unequal. Inflorescence of axillary and terminal raceme, flower pedicellate, pedicel 3.5 - 4 cm long. Flowers pale yellow, fragrant. Fruit a pod, 15 - 22 x 2 cm with slight constrictions between seeds, dark brown, turns black upon ripening, leathery, curve and twist upon dehiscence. Seeds 8 - 12, hard coated, 7.5 - 9 mm in diameter, lens shaped, vivid scarlet, adhere to pod.

Habitat : Common throughout the lowland tropics in coastland, natural forests and ruderal/disturbed lands up to 400 metres above sea level. Optimal plant growth occurs in areas with precipitation ranging from 3,000 to 5,000 mm. The tree prefers neutral to slightly acidic soils but will grow on a variety of soils in moist and seasonally moist tropical climates.

Threat and damage : The species invades intact, undisturbed hardwood forests as well as disturbed sites and can quickly establish large colonies. It is susceptible to breakage in high winds, with most damage occurring in the crown. However, rapid resprouting and growth can occur.

Uses : Cultivated as an ornamental. Also used for food, medicine, fodder, furniture, ornaments and fuelwood. A red dye from the wood is used by certain people to mark religious symbols on their foreheads. The young leaves can be cooked and eaten. Mature leaves are mulched to fertilize crops. The raw seeds are toxic and may cause intoxication. Cooked seed is



Distribution : American Samoa, Australia, Brunei, Cambodia, China, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Indonesia, Japan, Kiribati, Lao PDR, Malaysia, Maldives, Marshall Islands, Myanmar, Nauru, New Caledonia, Niue, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, United States, Viet Nam, Wallis and Futuna Islands.



rich in oil and proteins and easily digested by both humans and livestock. It was used in ancient India for weighing gold. The ground seeds can produce oil, which can be used as an industrial lubricant.

Management : Hand-pulling or digging out seedlings and saplings. Stem injection with glyphosate or basal bark treatment with triclopyr gives good control. Biological control is unknown.



Ageratina adenophora (Spreng.) R.M. King & H. Rob.

Native : Mexico

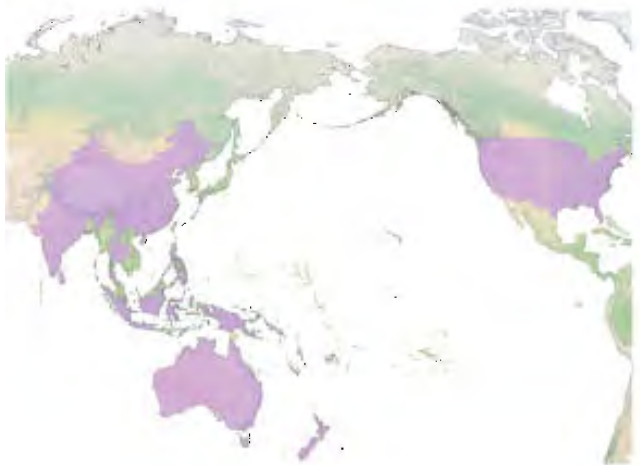
- Family** : Asteraceae
Synonyms : *Eupatorium adenophora* Spreng.
Common names : Cat weed, crofton weed,
hemp agrimony

Ageratina adenophora is a troublesome weed in Australia and many countries have listed it under the noxious weed category. Seeds are a contaminant in many traded products. The enormous number of seeds produced and rampant vegetative growth defeat all control measures. The allelochemicals released by the plant affect native biodiversity. A mature plant produces around 100,000 seeds per year. The plant reproduces vegetatively from short, pale-yellow rootstocks. The seeds are dispersed through wind and machinery movement.

Description : Perennial herbs, 1 - 3 m tall, stem often purple, terete, erect, glandular puberulent. Leaves simple, opposite, ovate - deltoid, 7 - 10 x 4 - 7 cm, apex acuminate, base obtuse to very broadly cuneate or truncate, three-nerved, sparsely pilose on both surfaces, margins crenate, median ones larger, upper leaves gradually smaller towards inflorescence; petiole 4 - 5 cm long. Inflorescence of loose compound corymbs, heads 6.5 mm in diameter, peduncle 8 - 14 mm long, densely pubescent, involucre cylindric, 3 - 4 mm long, florets 70-80, white; receptacle glabrous, areolate. Fruit an achene, reddish-brown or blackish-brown, 1.5 mm long, five-angular, glabrous, pappus of 8 - 10 bristles, 3.5 mm long.

Habitat : *A. adenophora* is a weed found in high altitude areas along roadsides, abandoned areas and forest margins. The plant can grow on any type of soil and can tolerate some salinity and infertility.

Threat and damage : *A. adenophora* reduces crop yield and hampers movement of livestock and machinery. It is a noxious and poisonous weed and farmers are often forced to abandon their landholdings due to its invasion. The plant is unpalatable to livestock and



Distribution : Australia, Bhutan, China, Fiji, India, Indonesia, Nepal, New Zealand, Papua New Guinea, Philippines, Sri Lanka, Thailand, United States.

feeding leads to mortality. It displaces the native flora by competition and by forming monospecific stands.

Uses : An oil from the plant has antifungal and insecticidal qualities and it also used for the production of xylitol. Tribal communities use the plant as a smoking torch for honey harvesting.

Management : Slashing followed by ploughing and then sowing desirable pasture species is effective. Applications of glyphosate, dicamba + picloram + triclopyr at the time of active growth are also useful. Attempts at biocontrol have been unsuccessful.



Ageratum conyzoides L.

Native : Central and South America and the West Indies

- Family** : Asteraceae
- Synonyms** : *Ageratum ciliare* Lour., *A. conyzoides* L.
A. obtusifolium Lam.
- Common names** : Ageratum, billy goat-weed, blue top, goatweed, mother brinkly

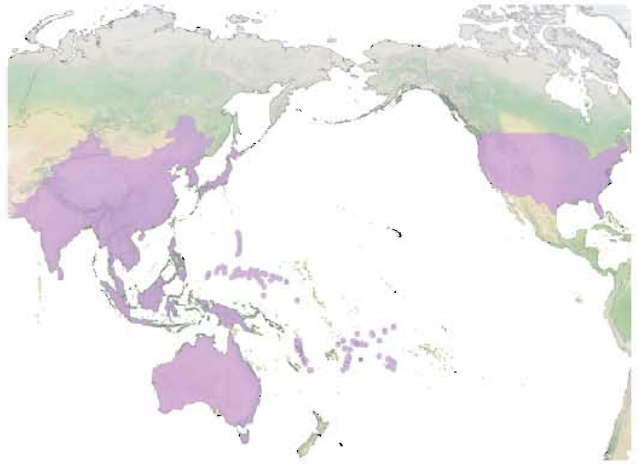
Ageratum conyzoides is a rampant weed that is widely distributed in the tropics and subtropics. It can significantly reduce total biomass, change community structure and reduce diversity of native plant species. A plant may produce about 40, 000 seeds and in some areas 50 percent of the seeds will germinate shortly after shedding. Seeds are positively photoblastic and viability is often lost within 12 months. They are dispersed by wind and water.

Description : Annual erect subshrubs, 0.5 - 1 m tall, stem sparsely to densely villous. Leaves simple, blades ovate to elliptic-oblong, 2 - 8 × 1 - 5 cm, margins toothed, abaxial faces sparsely pilose and gland-dotted; peduncles minutely puberulent and sparsely to densely pilose, eglandular. Flowers usually blue to lavender, sometimes with a white head. Fruit is an achene, sparsely strigoso-hispidulous, pappi usually with scales, 0.5-3 mm, sometimes with tapering setae.

Habitat : The weed exhibits high morphological variation and easily adapts to different ecological conditions. It grows in a variety of soil types such as sandy, loamy and clayey, and tolerates a range of pH levels. However, it thrives best in rich and moist mineral soils. *Ageratum* normally occurs as a weed in frequently disturbed areas such as vegetable gardens, agricultural areas, pastures (especially when overgrazed), plantations and orchards and along roadsides. The plant is shade-tolerant but dry and less fertile conditions do not suit its growth.

Threat and damage : *Ageratum* is a weed in crop fields and hosts many diseases such as tomato leaf curl. It is allelopathic and can displace native vegetation such as grasses and medicinal herbs and create homogenous monospecific stands. The weed is allergic to humans and is a health hazard. It is also a threat to forest communities and the dynamics of natural ecosystem processes.

Uses : *Ageratum* contains many bioactive compounds



Distribution : American Samoa, 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, Maldives, Marshall Islands, Myanmar, Nauru, Nepal, New Caledonia, Niue, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, United States, Vanuatu, Viet Nam, Wallis and Futuna Islands.



including flavonoids, alkaloids, coumarins, essential oils, chromenes, benzofurans, terpenoids and tannins. It is widely used as medicine for pneumonia, diarrhoea, rheumatism, the common cold, ulcers and bleeding. The plant has also good insecticidal, nematocidal and bactericidal properties.

Management : Mulching, hand-weeding and chipping are successfully practiced. A variety of chemicals have been used to control *ageratum*, including diuron, atrazine, acifluorfen, ametryne, bromacil, 2,4-D, glyphosate, fluroxypyr, diquat and paraquat. Biological control is unknown.



Ageratum houstonianum Mill.

Native : Mexico, Central America and the West Indies

- Family** : Asteraceae
Synonyms : *Ageratum mexicanum* Sims
A. wendlandii Baillly
Common names : Ageratum, blue billy goat-weed, flossflower, Mexican ageratum

Ageratum houstonianum is a noxious weed in many countries and a threat to native biodiversity. The plant is also toxic to animals and humans. It is commonly grown as an ornamental plant.

Description : Annual erect herbs, 0.5 - 1 m tall, branches purple-red, green or straw-coloured, white tomentose or thinly lanate. Leaves simple, opposite, broadly ovate or triangular-ovate, 2 - 6 x 1.5 - 3.5 cm, upper and axillary leaves smaller, tri-veined or inconspicuously 5 nerved, both surfaces sparsely or densely white pubescent, base cordate or truncate, margin crenate-serrate, apex acute; petiole 0.7 - 3 cm, petiole of upper leaves and axillary branches usually spreading, white, long tomentose. Inflorescence of corymbose, 2 - 4 cm in diameter, pale lavender to blue, purplish; peduncle densely pubescent or powdery pubescent, capitula 5 - many; involucre campanulate, 6-7 mm in diameter, phyllaries 2 or 3 seriate, narrowly lanceolate, 4 - 5 mm, abaxially glandular pubescent. Fruit an achene, black, five-angled, 1.5 - 1.7 mm, pappus of five short free scales, scales oblong-lanceolate, 2-3 mm, apex aristate-acuminate, sometimes truncate, 0.1 - 1.5 mm.

Habitat: The plant can tolerate disturbed habitats and is commonly seen near roadsides, riversides, upland slopes and in open areas, gardens, forest fringes, wastelands and pastures. It is distributed at elevations of 40 - 1, 300 metres above sea level.

Threat and damage : The plant threatens flora and fauna of invaded ecosystems. It is considered as a widespread environmental weed out of its natural area. The plant contains an alkaloid, pyrrolizidine, which causes liver lesions and tumor if ingested by grazing animals.

Uses : Crushing or drying the plants or flowers in an oil or alcohol base work as a mosquito repellent. In Cameroon, an essential oil from the flowers is used against ticks that transmit diseases in humans.

Management : Hand-pulling, cutting down and



Distribution : Australia, Fiji, French Polynesia, India, Japan, New Caledonia, New Zealand, Papua New Guinea.

covering with a thick layer of mulch are not very effective. However, application of glyphosate is effective in bringing down the population. Biological control is unknown.



Alliaria petiolata (M. Bieb.) Cavara & Grande

Native : Northwest Africa, West and Central Asia

- Family** : Brassicaceae
- Synonyms** : *Alliaria alliacea* (Salisb.) Britten & Rendle
A. fuchsii Rupr., *A. alliaria* Scop.
- Common names** : Garlic mustard plant, garlic root, garlic wort, hedge garlic

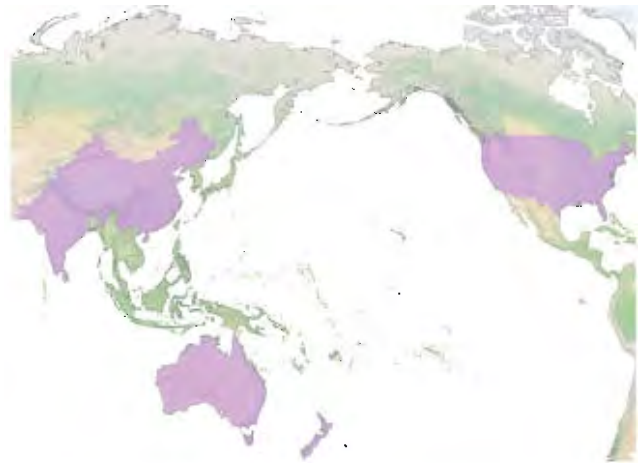
Alliaria petiolata, an invasive herb, can outcompete native herbaceous vegetation and cause serious impact to the invaded ecosystems. The plant acts as a population sink for certain butterflies. It is self- as well as insect-pollinated. The seed is dispersed through humans, animals and water.

Description : Biennial erect herbs, to 1 m tall, stem simple or branched distally, glabrous or pilose basally. Basal leaves of petiole 3 - 16 cm, blade reniform or cordate, surfaces glabrous or pilose, cauline leaves of petiole shorter than basal, blade ovate, cordate or deltate, base cordate or truncate, apex acute, margins acutely to obtusely toothed. Flowers white, in terminal racemes or short axillary racemes, petals four, 4 - 8 x 2 - 3 mm. Fruits divaricate, ascending, subtorulose, quadrangular or subterete. Pods, 4 - 5.5 cm long. Seeds many, dark brown or black, ca. 3 x 1 mm, narrowly oblong, 10 - 20 seeds in each fruit.

Habitat : The plant prefers shade but it can grow in unshaded areas as well. It grows well in moist, nutrient-rich, sandy and loamy soil. It is commonly found in natural and planted forests, riparian zones and urban areas.

Threat and damage : *Alliaria* can accumulate a soil seed bank and populations of the plant establish rapidly after disturbance. It can invade and dominate the understorey of natural forests posing a threat to native flora and fauna. The plant is also known to interfere with the oviposition of certain butterflies. Once established, *Alliaria* competes successfully with native flora for light, moisture, nutrients and space.

Uses : The garlic-smelling young leaves are used as a flavouring agent while cooking. The leaves and stems are anti-asthmatic, antiscorbutic, antiseptic, deobstruent, diaphoretic, vermifuge and vulnerary. The leaves are taken internally to promote sweating and to treat bronchitis, asthma and eczema. The roots are chopped up into small pieces and heated in oil to make an ointment to rub on the chest to relieve bronchitis.



Distribution : Australia, China, India, Nepal, New Zealand, Pakistan, Sri Lanka, United States.

Management : Cutting the plants at the ground level is recommended. Application of glyphosate to dormant rosettes in late autumn or early spring is effective. Biological control is unknown.



Ambrosia artemisiifolia L.

Native : North America

Family : Asteraceae

Synonyms : *Ambrosia glandulosa* Scheele
A. monophylla (Walter) Rydb.

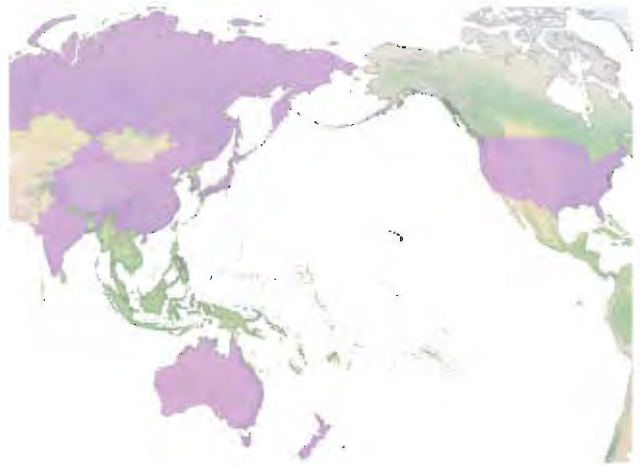
Common names : Annual ragweed, bastard wormwood,
blackweed, carrot-weed

Ambrosia artemisiifolia establishes easily in human-impacted and disturbed areas in high abundance. Although not a competitively aggressive species, it has become an invasive species in Europe, parts of Asia and Australia, interfering with the growth of cultivated crops. The main impact of *Ambrosia* is the copious amount of pollen produced from male flowers to which people are allergic. Fruits are dispersed by birds, melting snow, waterways and strong winds. One plant may produce up to 100,000 seeds which are viable for five to 14 years. Seeds are dispersed through exchanges of contaminated seedlots, forage and fodder. Germination occurs in the spring with only a portion of the seed bank germinating.

Description : Annual erect herbs, 1 - 2 m tall. Leaves opposite and alternate, blade deltate to lanceolate or elliptic, 1 or 2 pinnately-lobed, bases cuneate, ultimate margins entire or toothed, abaxial faces sparsely pilosulous to strigillose, adaxial faces strigillose, both gland-dotted. Flowers monoecious, male flowers green, small, 4 - 5 mm, with bractless flowers arranged in a terminal spike, often drooping, female flowers in the axils of the upper leaves, sessile, inconspicuous, in either small clusters or singly. Fruit, a woody achene resembling a crown, 3 - 4 x 1 - 2 mm, with 4-7 spine-like projections.

Habitat : Commonly found in ruderal or waste sites associated with frequent and extensive disturbance regimes resulting from human activities. The plant grows well on roadsides, along railway lines, gravel pits, construction sites, agricultural fields, waterways, urban areas and private gardens. It is a pioneer species that establishes after disturbance in early successional plant communities. *Ambrosia* prefers warm areas with nutrient-rich and slightly acidic soils.

Threat and damage : *Ambrosia* pollen is a seasonal aeroallergen in late summer to early autumn costing millions of dollars annually in health care costs and lost labour hours. In Europe and North America,



Distribution : Australia, China, India, Japan, New Zealand, Republic of Korea, Russian Federation, United States.

approximately 10-15 percent of the population is sensitive to the pollen that causes rhinitis,



oculorhinitis, asthma and dermatitis. The plant is a weed pest in agricultural crops like sunflower, sugar beet, maize and other cereal crops. It also displaces native vegetation in its introduced ranges especially after disturbance such as overgrazing, which put competitive pressures on the native flora. The plant competes strongly with crop plants for water and nutrients and can seriously reduce yields of cereals and other field crops. Its presence greatly reduces the fodder quality of meadows and taints dairy products if cattle feed on it.

Uses : An essential oil obtained from the tree has antibacterial and antifungal properties. Fruits are a food source for the bobwhite quail.

Management : Mowing, hand-pulling, tilling and burning are all physical options that can be employed to reduce the population. Among herbicides, dicamba and clopyralid and some triazines are effective. *Zygogramma suturalis* F., a chrysomelid beetle, has been released in the Russian Federation, China and Croatia as a biocontrol agent, but was only successful when *Ambrosia* populations were abundant and dense. A noctuid moth, *Tarachidia candefacta* Hübner and a stem-galling tortricid moth, *Epiblema strenuana* Walker, have both been released as biocontrol agents in the Russian Federation and China. Of these, *E. strenuana* has shown host-specificity to *Ambrosia* and experiences less predation compared to *Z. suturalis*.



Annona glabra L.

Native : Tropical America and West Africa

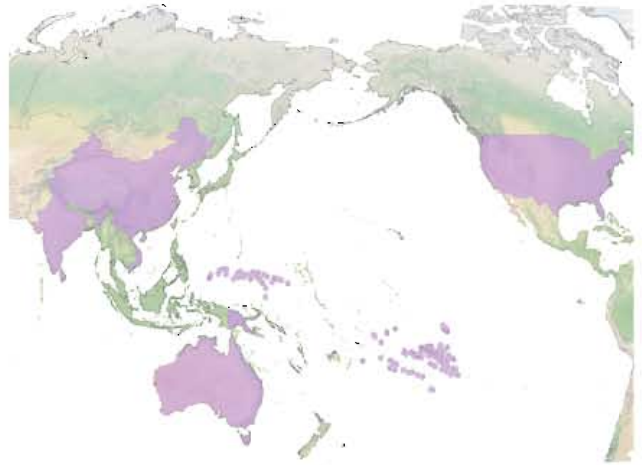
- Family** : Annonaceae
Synonyms : *Annona australis* A. St.-Hil.
A. chrysocarpa Lepr. ex Guill. & Perr.
Common names : Alligator apple, cherimoyer,
pond apple, swamp apple

Annona glabra is a highly invasive woody weed that threatens wetlands and riparian ecosystems of the moist tropics in particular. It can establish as a dense understorey that suppresses other plant growth leading to monocultures. The plant can tolerate heavy flooding and spend weeks at a time with its roots under water. It is very useful as a rootstock for other *Annona* species.

Description : Small trees, 10 - 12 m tall, branches horizontal. Leaves simple, blade ovate to elliptic, 5-15 × 6 cm, base broadly cuneate to rounded, apex acute to shortly acuminate, glabrous. Flowers axillary, solitary, thick and fleshy, peduncle stout, linear, club-shaped, to 2 cm, becoming enlarged; outer petals cream-white, ovate-cordate, adaxially concave, inner petals cream-white, inside base deep purple, oblong-ovate, base cupped, incurved-cuneate, 2 × 3 cm of outer petal corrugate. Fruit an aggregate of the berry, ovoid, round at apex, 7 - 8 cm in diameter, yellow to orange, smooth, pulp yellow. Seeds many, 12 - 15 × 8 - 10 mm, elliptic, black.

Habitat : *A. glabra* can behave as a freshwater or brackish water mangrove as it can survive root immersion at high tide and prolonged freshwater flooding. Seedlings require ample soil moisture and sunlight to survive. Such conditions can be expected only on riverbanks and in naturally open wetlands or disturbed wetlands and rain forests. It grows in swamps, tolerates salt water and cannot grow in dry soil. The hard seeds can remain viable for considerable periods in either fresh, brackish or sea water.

Threat and damage : The tree forms dense monotypic stands displacing native vegetation. Its tolerance of immersion in salt and freshwater enables the tree to invade melaleuca wetlands, where it forms a dense understorey preventing young melaleucas from developing. It grows in estuaries choking mangrove swamps, where the seedlings carpet the banks and prevent other species from germinating or thriving.



Distribution : Australia, China, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, India, New Caledonia, Niue, Palau, Papua New Guinea, Solomon Islands, Sri Lanka, United States, Viet Nam, Wallis and Futuna Islands.



Uses : Fruits are edible and can be made into jam, jellies and wine. The flesh of the fruit is sweetly scented but since it is strongly narcotic it is not very popular. The plant is a deterrent to the Giant African snail, *Achatina fulica* Bowdich and is usually used in nursery beds to prevent infestation.

Management : Trees and seeds are readily destroyed

by fire and regular burning in areas that are tolerant to this practice is a successful management tool. Hand-pulling has been successful in ditches and drains. Cutting large trees and treating the stump with any of the common herbicides is effective. Stem injection with herbicides is recommended for aquatic areas. Biological control is unknown.



Anredera cordifolia (Ten.) Steenis

Native : South America

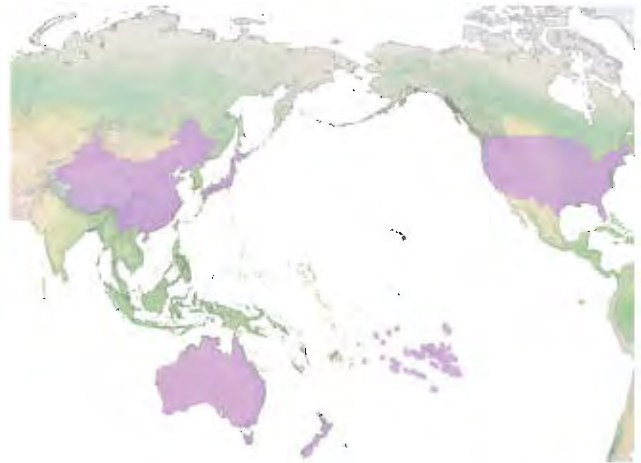
- Family** : Basellaceae
Synonyms : *Boussingaultia cordata* Spreng.
B. cordifolia Ten.
Common names : Bridal wreath, madeira vine,
mignonette vine

Anredera cordifolia is a succulent climbing vine. The combination of fleshy leaves and thick aerial tubers makes it very heavy. It smothers trees and other vegetation and can easily break branches and bring down entire trees. The weed is notoriously difficult to control. Wart-like tubers are produced on aerial stems and are key to identifying the plant. It spreads through tubers, which detach very easily.

Description : Climbers, stems often producing single or clustered axillary tubers. Leaves simple, petiole 6-12 mm, lamina ovate to orbicular, 2-10 × 1-7 cm, base of larger leaf blades proximal to inflorescences, cordate, base of small distal leaf blades tapering, apex obtuse to acute. Inflorescences racemes or in branched panicles of racemes, 10-35 cm long, fragrant; single bract subtending, pedicel triangular-lanceolate, 1-2 × 0.3-0.4 mm, paired bracts subtending, each flower persistent, triangular to obtuse, 0.6-1 × 0.5-0.6 mm, basally connate into cup. Flowers bisexual, usually functionally staminate, sepals basally adnate to petals, cream-white, ovate to elliptic, 1.2-2.3 × 1.1-2 mm, apex obtuse, petals basally connate, cream-white, ovate to elliptic, 2.1-3 × 1.4-2 mm, apex obtuse, spreading at anthesis. Utricles rarely producing viable seeds.

Habitat : In Australia, *A. cordifolia* invades riparian vegetation, edges of rain forests, tall open forests and damp sclerophyll forests. In New Zealand, it has become naturalized in wastelands, especially scrub-covered areas such as coastal gullies. The smothering habit of the weed makes it a nuisance especially for tropical Pacific Islands to the north where it commonly occurs in natural forests, planted forests and riparian zones. The plant prefers sandy, loamy and clayey well-drained soils. It can grow well in open and semi-shaded conditions.

Threat and damage : The plant proliferates readily from small vegetative parts and as a result is very hard to control. The aggressive vining nature of the plant helps it to smother desirable species. The growth rate



Distribution : Australia, China, Cook Islands, Fiji, French Polynesia, Japan, New Caledonia, New Zealand, Niue, United States.



of the stem in warm and moist regions can exceed 1-6 metres per week in a growing season. Its sheer weight results in the breaking of branches of host trees, thereby reducing them to poles, and potentially causing collapse of the rain forest canopy. *Anredera* is not only a highly destructive species but also the most difficult to eradicate because it produces plenty of terrestrial, small to large aerial tubers (to 25 cm in diameter) on the stems, which grow into new plants.

Uses : It can be trained to twine up trellises, fences or rock walls for decoration or for screening. The raw root is crisp and pleasant when first put in the mouth, but soon degenerates into a mucilaginous mass. When well-baked, the root loses this quality and is quite pleasant to eat. The plant has anti-inflammatory, anti-ulcer and liver-protective effects. The flowers

have a mignonette scent. Tubers are a source of food in South America.

Management : Physical control of *A. cordifolia* is not easy. Placing a plastic sheet below the plant before any manual control will help removal of all parts of the plant, especially aerial tubers. All parts of the vine must be removed, including underground tubers and vines to prevent resprouting. Spraying glyphosate or triclopyr on plants and tubers are reported as effective in controlling the plant. Scraping stems at staggered intervals and applying glyphosate is also an effective control method. Larger infestations can be controlled by cutting back top growth and spraying the remaining stems with metasulfuron methyl or picloram. An insect, *Plectonycha correntina* Lacordaire, is reported to be a promising biocontrol agent.



Antigonon leptopus Hook. & Arn.

Native : Mexico

- Family** : Polygonaceae
- Synonyms** : *Antigonon cordatum* M. Martens & Galeotti
A. platypus Hook. & Arn.
- Common names** : Chain-of-love, confederate vine,
coral vine, Mexican creeper

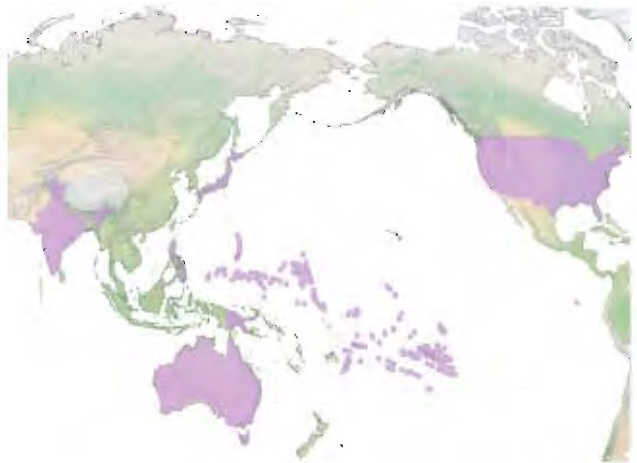
Antigonon leptopus is a smothering vine that invades disturbed areas and forest edges. It produces huge quantities of seeds, which are spread by water currents and animals that consume the fruits. The plant is invasive in several countries including India, the United States and some of the Pacific Islands. Vegetative reproduction is through root suckers, underground tubers and stem segments.

Description : Robust vine, perennial, spreading, stem angular. Leaves simple, 2.5 - 7.5 cm long, cordate - ovate, hastate - ovate or triangular, reticulately veined, acute to acuminate, lower ones much larger; petioles 0.6 - 1.5 cm long. Inflorescence paniculate, branches bearing flowers in clusters along the rachis, rachis tip tendrillate. Flowers bright pink or white, petals 4 - 10 x 2 - 6 mm. Fruit an achene, conical, sharply three-angled above, shining, 8-12 x 4-7 mm, much exceeded by the veiny, persistent, enlarged perianth.

Habitat : Grows well on dry to moist soil in lowland areas with limestone soils. It tolerates drought by defoliation and regrows strongly after rain. The vine is common on roadsides, particularly on banks and cutting-faces, rain forest margins, banks of water courses and coastal sand dunes.

Threat and damage : Invades disturbed areas and forest edges, outcompeting native vines and understory plants. Leaves dry out and drop during the dry season providing fuel for fires.

Uses : Ornamental. It is also used to cover fences or climb trellises with fresh green foliage and a splash of bright colour. The leaves are used in the Caribbean as poultices for boils and swellings. Tea from the leaves is used to treat hypertension, diabetes, flu and menstrual pains. The plant is preferred for urban planting because it tolerates air pollution, restricted space, inadequate sunshine and poor soil. This vigorous growing vine also does well in greenhouses where it adds an airy grace and periodic colour.



Distribution : American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, India, Japan, Kiribati, Maldives, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Tonga, United States.

Management : Cutting alone is ineffective. Underground tubers must be removed or plants will resprout. Application of Garlon 4 can kill the foliage but the plant will regrow after a short span of time. Biological control is unknown.



Ardisia crenata Sims

Native : Southeast Asia

Family : Myrsinaceae

Synonyms : *Ardisia crenulata* G. Lodd

Common names : Australian holly, Christmas berry, coral ardisia, coral berry tree

Ardisia crenata is an ornamental plant that has become highly invasive in mesic forests. The plant thrives well in productive, well-drained soils and the growth rate has been positively correlated with soil phosphorus levels. Eradication is effective before seed production. The fruits are mainly spread by birds. The plant is easily propagated by seeds or stem cuttings.

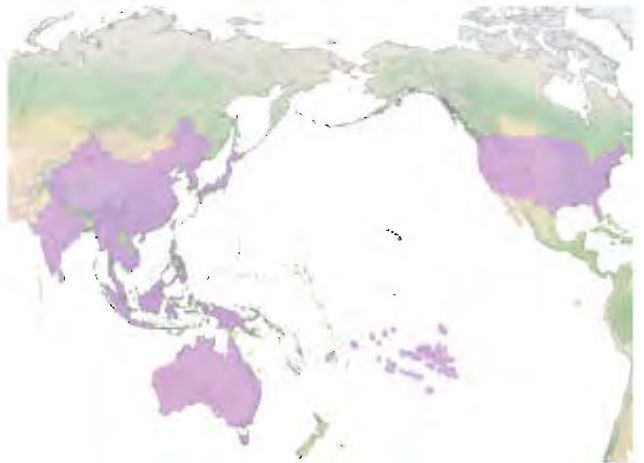
Description : Shrubs, to 1.5 m tall, branchlets minutely reddish, glandular, papillate, terete. Leaves simple, petiole narrowly marginate, blade elliptic, narrowly lanceolate or oblanceolate, 7 - 21 × 2 - 4 cm, subcoriaceous, prominently punctate, base cuneate, margin subrevolute, crenate, or undulate, with large vascularized marginal nodules, apex acute or acuminate. Inflorescences terminal, umbellate or cymose on specialized, 2 or 3 leaved lateral branches, 4-16 cm. Flowers membranous, white or rarely pinkish, 7-12 mm in diameter; pedice 17-12 mm long. Fruit a bright red, glabrous, one seeded drupe, up to 0.8 mm in diameter.

Habitat : Common in natural forests, planted forests and disturbed areas up to an elevation of 2, 400 metres. It prefers rich, well-drained moist soils for growth. Seeds can germinate in a range of soil pH from 4-10. It can resprout vigorously after cutting and fire.

Threat and damage : Invades the understorey of mesic forests and significantly reduces native species diversity. It can cut light to the understorey species and displace ground cover.

Uses : An ornamental that is cultivated in many countries. The root is anodyne, depurative and febrifuge. It is used to stimulate blood circulation.

Management : Hand-pulling of seedlings and saplings is effective. Spraying of glyphosate is effective on dense seedling populations. Larger trees are cut and the stumps are treated with herbicides. Basal bark application of triclopyr gives good results. Biological control is unknown.



Distribution : Australia, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Fiji, French Polynesia, India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, Philippines, Republic of Korea, Samoa, Sri Lanka, Thailand, United States, Viet Nam.



Ardisia elliptica Thunb.

Native : South and East Asia

Family : Myrsinaceae

Synonyms : *Ardisia humilis* Vahl., *A. kotoensis* Hayata
A. littoralis Andrews

Common names : Shoebuttan ardisia

Ardisia elliptica is a shade-tolerant shrub. Its fast growth and attractive fruits made it a popular ornamental plant in the past. The species escaped from private and public gardens to invade natural forests. Due to high reproductive output and shade-tolerance, carpets of seedlings are usually formed underneath adult plants. High seed viability and seed consumption by both avian and mammalian frugivores lead to rapid spread of the species across landscapes. *Ardisia* is included in the top 100 of the world's worst invaders in the Global Invasive Species Database. Large adults can produce up to 400 fruits. Seedlings and juveniles can survive under very shady conditions for many years.

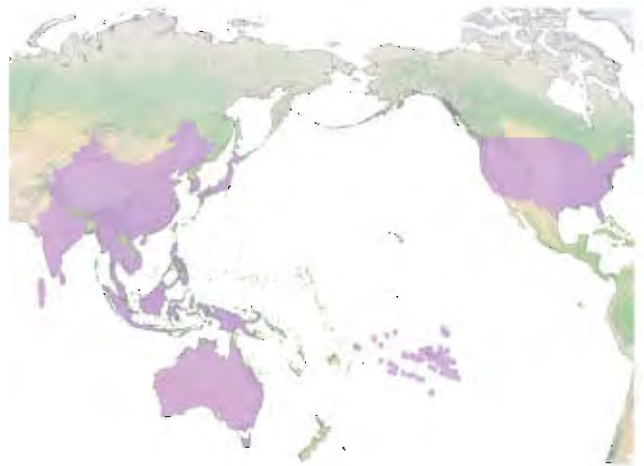
Description : Shrubs, to 6 m tall, branchlets angular, glabrous, conspicuously black punctate-lineate, longitudinally ridged. Leaves simple, petiole 5 - 10 mm, blade oblanceolate or obovate, 6 - 12 × 3 - 5 cm, subleathery, dull and densely punctate abaxially, especially along the margin; base cuneate, margin revolute, entire, apex obtuse or acute. Inflorescence axillary or subterminal on basally thickened lateral branches, subumbellate or umbellate. Flowers leathery, pink or white, 6 - 8 mm; pedicel 10 - 20 mm, densely white verruculose, punctate. Fruit a drupe, subglobose, red or purplish-black, ca. 8 mm in diameter, minutely punctate, fleshy, one seeded. Seeds spherical, about 5 mm in diameter.

Habitat : Usually found in wet forests and open areas. In Hawaii, the tree is naturalized in disturbed *hala* forest, mesic forest and lower portions of rain forests. In Australia, it is cultivated in gardens and has naturalized in the last five to ten years. Also, isolated specimens of the species exist in riparian vegetation within areas of dry rain forest associated with the monsoon belt of Northern Australia.

Threat and damage : The weed readily forms dense monotypic stands that exclude native species.

Uses : Ornamental.

Management : Hand-pulling of seedlings is effective.



Distribution : Australia, Cambodia, China, Cook Islands, French Polynesia, India, Indonesia, Japan, Malaysia, Maldives, Myanmar, Papua New Guinea, Philippines, Republic of Korea, Samoa, Sri Lanka, Thailand, United States, Viet Nam.

Basal application of a triclopyr mixed with oil diluents is necessary to control old growth. Tebuthiuron and glyphosate are also effective in controlling spread. Biological control is unknown.



Argemone mexicana L.

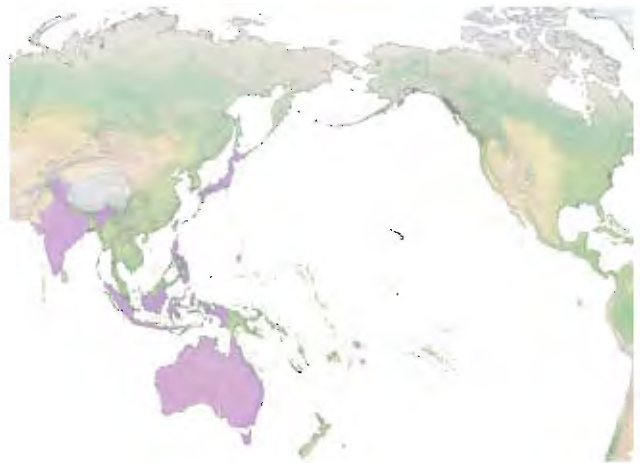
Native : Mexico and the West Indies

- Family** : Papaveraceae
Synonyms : *Argemone mucronata* Dum. Cours. ex Steud.
A. spinosa Gaterau
Common names : Bermuda thistle, Mexican poppy,
Mexican thistle, prickly poppy

Argemone mexicana is a major weed that poses a serious threat to agricultural and vegetable crops in the tropics and temperate regions. As a result of its infestation, several instances of seed and oil poisoning and death have been reported from India, Fiji, South Africa and other countries. Its prickliness is a nuisance to subsistence farmers. *A. mexicana* forma *leiocarpa* is a variety found in West Africa which has few or no prickles on the stem, leaves and capsules. In Southern India, the plant flowers and produces fruits throughout the year. The dispersal of seeds occurs through surface water, mud adhering to farm machinery and through humans and livestock. Each plant produces 60 - 90 capsules and 300 - 400 seeds are found in a single capsule.

Description : Annual herbs or subshrubs, stem branched, with sparse explanate fulvous spines. Leaves simple, alternate, pinnately-lobed, basal leaves dense, glaucous with blue-green markings on veins, paler abaxially, broadly oblanceolate or obovate to elliptic, 5 - 25 x 2.5 - 8 cm, glabrous, sparsely with sharp spines on veins, base cuneate, margin pinnatifid, apex acute; lobes with undulate teeth, apically spiny, cauline leaves alternate, similar to basal leaves, upper leaves smaller and sessile, often subamplexicaul; petiole 5 - 10 mm. Flowers solitary, sometimes in a few flowered cyme, yellow or orange, 1.7 - 3 cm, subsessile. Fruit a capsule, oblong to broadly elliptic, 2.5 - 5 x 1.5 - 3 cm, sparsely fulvous and spiny, 4 - 6 valved, apically dehiscent. Seeds numerous, spherical, 1.5 - 2 mm in diameter, netted, brownish-black.

Habitat : *A. mexicana* can adapt to a wide range of habitats and soil types. It is common in agricultural areas, wastelands, pastures, gardens, along roadsides, on stony edges, vacant land and near forests. In Tanzania, the plant occurs from sea level to 2,900 metres elevation. It grows well in nitrogen-deficient sites. It cannot survive in the shade but can tolerate drought.



Distribution : Australia, Fiji, Guam, India, Indonesia, Japan, New Caledonia, Niue, Philippines, Samoa.



Threat and damage : *A. mexicana* is a principal weed of many agricultural crops in Australia and India. The plant produces allelochemicals that affect the growth of vegetables. Grazing animals can be poisoned through hay or chaff. In poultry, ingestion of seeds affects egg production and often leads to death. The adulteration of edible oil with Mexican poppy plant oil has resulted in epidemic dropsy in humans. The plant is also considered as an allergen. Because of the similarity between seeds of the plant and seeds of *Brassica nigra* (mustard), the former is widely used for adulteration purposes. As a result, several instances of seed and oil poisoning and death have been reported. The plant contains several alkaloids, including berberine and protopine in the herb, and sanguinarine and dihydrosanguinarine in the seed oil, which display significant cytotoxic and

antimicrobial properties.

Uses : The plant is used to expel torn placenta and help cleanse the body after parturition. Dried and powdered plants are recommended as green manure. The seed oil is used as an illuminant, lubricant, in soap making and for protection from termites. The narcotic effects of the herb and its juice and flowers are well known. In Mali, *Argemone* is used to treat malaria.

Management : Mechanical methods to control the plant include pulling, hoeing and cutting the flowering stalks while in early bloom. Cultivation of the ground destroys the weed if continued for a sufficient time to stir all dormant seeds into growth. Chemicals like glyphosate, triasulfuron and 2,4-D amine are used to control Mexican poppy. Biological control is unknown.

